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Results from the 1995 Inshore Sentinel Survey for Cod in NAFO Subdivision 3Ps

by

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Research documents are produced in the official language in which they are provided to the secretariat.

¹La présente série documente les bases scientifiques des évaluations des ressources halieutiques sur la côte atlantique du Canada. Elle traite des problèmes courants selon les échéanciers dictés. Les documents qu'elle contient ne doivent pas être considérés comme des énoncés définitifs sur les sujets traités, mais plutôt comme des rapports d'étape sur les études en cours.

Les Documents de recherche sont publiés dans la langue officielle utilisée dans le manuscrit envoyé au secrétariat.

ABSTRACT

An inshore survey for cod (*Gadus Morhua*) was conducted in NAFO Subdivision 3Ps over 35 weeks in 1995. Inshore fishers employed gill nets, long lines (trawls), and cod traps to catch fish according to a predetermined sampling strategy. Catches for gill nets and long lines were considered good to excellent relative to the last years of the commercial fishery. Cod traps were used outside of the traditional timing of a trap fishery and consequently, catches were considered by fishery to be low. Fishers indicated that traps may be more appropriately used to capture fish for tagging experiments.

RÉSUMÉ

Un relevé côtier de la morue (*Gadus morhua*) d'une durée de 35 semaines a été mené en 1995 dans la sous-division 3Ps de l'OPANO. Les pêcheurs ont utilisé des filets maillants, des palangres (chaluts) et des trappes à morue pour capturer le poisson d'après une stratégie d'échantillonnage fixée à l'avance. Les pêcheurs ont considéré les prises au filet maillant et à la palangre comme bonnes à excellentes par rapport aux dernières années de la pêche commerciale. Comme la trappe à morue n'a pas été utilisée pendant la saison régulière de pêche à la trappe, ils ont considéré les prises ainsi réalisées comme faibles et ont indiqué qu'il serait peut-être plus utile d'utiliser la trappe pour capturer de la morue à des fins d'étiquetage.

Introduction

Canadian research vessel (RV) surveys for cod have historically sampled in waters beyond the 100 m contour in the inshore areas. While capable of surveying in shallow water, rough bottom and inshore fishing gear conflicts prevent the RV from coming inshore.

Inshore fishers perceived that results of the RV surveys did always reflect what they were observing in the inshore fishery with respect to catches and catch rates. Under the Northern Cod Science Program (NCSP), a specific initiative was established in 1990 to gather quantitative data from the inshore fishery to supplement stock assessment information and attempt to address the concerns of the inshore fish harvesters. The NCSP initiative intended to use fishers to collect quantitative data and provide a qualitative interpretation of the information based on their professional fishing experience. However, the 1993 moratorium on cod fishing in Subdivisions 3Ps effectively halted data collection from the inshore.

From 1992 to 1994, attempts were made to establish an inshore sampling program which would provide useful data for assessment purposes. A formal sampling program, known as Sentinel Survey projects, were announced by the Minister of Fisheries and Oceans in October 1994 and included all of Atlantic Canada. The survey in Newfoundland and Labrador is an extension of the original Northern Cod Science Project with modifications which allow for science activities achievable only under a fishing moratorium.

The Sentinel Survey has the following objectives:

1. To develop a reliable catch rate series for use in resource assessments.
2. To incorporate the knowledge of inshore fish harvesters in the process of resource assessment.
3. To describe the temporal-spatial distribution of cod in the inshore area over a number of years through, for example, the use of catch rate information, tagging studies, by-catch information and fish harvesters' observations.
4. To gather length frequencies, sex and maturity data and otoliths for use in resource assessment.
5. To establish a long-term physical oceanographic and environmental monitoring program of the inshore areas.
6. To provide a source of biological material for other researchers. For example, tissue for genetic, physiological and toxicological analyses, cod stomachs for food and feeding studies and by-catch information.

Participants

The primary collectors of data in the Sentinel Survey are inshore fish harvesters. The process of participant selection is as follows: Through consultation with fish harvesters and fisheries organizations, traditional inshore fishing grounds were identified and mapped. This resulted in the identification of fifteen areas in NAFO Subdivision 3Ps (Figure 1).

In the autumn of 1994, the communities within the boundaries of the identified coastal areas were advised via the media and word-of-mouth of sentinel information meetings. The objective of the meetings was to present both the scientific and administrative rationale and structure for the project. A representative from one or both of the project sponsoring organization and the Department of Fisheries and Oceans (DFO) Science Branch attended the meetings.

Fishers who met an eligibility criteria were invited to apply to participate in the survey. The criteria included five years as head of a fishing enterprise and a willingness to participate in a six week science training program.

Where more than one application was received from an area, the project sponsor conducted a draw or lottery to select the participant. While there was considerable interest in the project in most areas, there were many sites from which only one application was received and others where additional canvassing was required in order to enlist participants.

In order to minimize inter-annual enterprise effects on data collection, participants are expected to remain with the survey over a number of years. It is also expected that most of the sampling activities will continue once commercial fishing activities resume and the sentinel participants will form a core of index fish harvesters.

Training

In order to establish a standardized data collection routine, provide a rationale for the data collection methods and establish an initial and thorough point of contact, a science training program was developed jointly by DFO and the Marine Institute of Memorial University of Newfoundland in the eighteen months prior to the start of the Sentinel Survey.

Originally, one person from each Sentinel Survey crew was to participate in a six week training course prior to commencing survey activities. The training course provides an introduction to data collection, sampling methods and tools, use of computers and electronic oceanographic monitoring instruments. Participants also receive overviews of the ocean environment, resource management and presentation/communication skills.

Sampling

In 1995, sampling ran for a maximum of thirty-five weeks. The timing of sampling was determined after discussions with fish harvesters but was targeted for seasonally appropriate times based on historical fishing patterns.

Cod Traps

Three of the sites were designated for use with cod trap sites. The specific location of each trap site was chosen after consultation between DFO scientists, fish harvesters, the Fishermen, Food and Allied Workers Union (FFAW). Site selection was based on the need to survey throughout inshore areas and targeted historical fishing areas and historical gear use patterns.

Designated trap crews fished cod traps for a maximum period of five weeks and then switched to either baited trawl lines or gill nets for an additional period of ten weeks. Non-trap sites fished either baited hooks or gill nets for the full fifteen weeks.

Trap crews fished five days per week for five weeks. Fishing days in the week were selected at the discretion of the crew and depend primarily on weather conditions. All berths selected for traps were considered prime trap locations.

When a trap was hauled, the crew noted the soak time since the previous haul, estimated how much fish had been caught, removed a sample of approximately 100 fish for biological sampling and released the remaining catch. Meshed fish and dead or floating fish were retained and brought ashore. While it is acknowledged that Japanese style cod traps could have higher mortalities of fish than modified Newfoundland traps, fish harvesters were asked to release as much live fish as possible.

Gill Nets and Long Lines

Both gill net and trawl crews fished up to three days per week. Hook and line crews fished two tubs of baited line trawl. Each tub consisted of up to 500 hooks for a total of 1000 hooks per fishing day. Gill net crews fished 2-6 fifty fathom 140 mm monofilament gill nets. The nets were rigged 2-3 to a fleet but only two fleets were fished per fishing day. All fish caught in gill nets and on hooks were landed. If catches exceeded 500-700 kg per week, the numbers of nets in a fleet were cut back. However, some consideration was given to bottom topography and net performance when reducing the number of nets in a fleet.

Similarly, the number of hooks per tub were reduced if landings exceeded 500-750 kg per week. Other measures to reduce mortality were available if fish were particularly abundant in an area and catches appeared to be excessive even with the minimal amounts of gear possible.

Sampling Strategy

Prior to the start of sampling with gill nets and trawl lines, a fixed (control) location on the fishing grounds was established for each site for the duration of the project. The control site was a location that was chosen to reflect average fishing activity over a fishing season. It is expected that the same control site will be occupied over years. Since fishing grounds can change depending on season, there may be more than one control site per sentinel community.

Each fishing day, half of the gear was set at the control site. The other half of the gear (experimental) was set anywhere on the fishing grounds at the discretion of the crew. The location of each fishing set was plotted on a nautical chart. The time of the set and the soak time for the gear was recorded down to the quarter hour. If high catch rates were experienced at one experimental location on a particular day, set locations were moved for the following fishing day. Environmental observations were recorded and included wind direction and speed, percent cloud cover, tide conditions, presence of invertebrates (bait) and other fish species in the area, marine mammals, sea birds and any other variable which may have influenced fishing behaviour.

When the gear was retrieved, any catches from the control and experimental gear were kept separate and sampled on shore. All fish were counted, length measured, sexed, and examined for parasites. Observations were made on stomach contents and fullness. Otoliths were sampled based on length frequency requirements.

Every other week, a sample of up to 100 fish was frozen and transported to St. John's for weight analysis. All information was recorded on forms similar to those used by the Port Sampling Section and on the Research Vessels. Otoliths were stored in manila envelopes with relevant information recorded on the outside. Fin clips were stored on blotter paper in the envelopes.

Other biological samples were collected on an "as needed" basis. These included fin clips and/or blood samples, liver samples for toxicological studies, etc.

DFO Fisheries Evaluation Section and Commercial Sampling section staff provided field support through weekly visits to sites and regular phone contact. Project sponsors maintained regular contact with participants for administrative support and scientific liaison.

Public Consultations

In addition to the organizing meetings in the spring and summer of 1995, a series of twenty-five public meetings were conducted between January and April 1996 to present the 1995 results of the survey and solicit feedback on the information and ways of improving the survey.

RESULTS

Distribution of Fish

Participants throughout the survey identified fish in their respective areas before, during and after survey activities although there were differences observed in the abundance depending on location. All sites noted that fish were located in shallower water than expected. This observation generated considerable debate between scientists and participants and at public meetings conducted over the winter. There were no clear causative factors identified although there were a number of hypotheses generated. These included predator-prey interactions, changed behaviour as a result of relaxed fishing pressure and changed behaviour due to changes in stock structure to name a few. Most sites noted that the shallow water distribution of fish formed a coastal band but did not extend to any great distance from shore (a function of a few kilometres).

All areas throughout the survey area reported that fish were in good physical condition and had been feeding well.

Catch Rate Information

While it has been possible to derive catch rate information for each of the sentinel sites on a fine temporal scale, the lack of a time series renders the data difficult to interpret with respect to the overall state of the cod stock. However, through the observations of the sentinel participants, it has been possible to put the information in some perspective relative to the last years of the commercial fishery. Participants throughout the survey area cautioned that the observed catch rates may be higher than those observed in a commercial fishery due to the competitive nature of the fishing gear on the grounds.

During the public meetings and throughout the Sentinel Survey with participants, the question of what constituted a "good catch" rate for gill nets and trawl was posed. A benchmark averaged over a season of 100 lbs or 45 kg for gill nets and 0.5 lb or 0.23 kg per baited hook was established. This translates into approximately 20 fish per gill net and 65 fish per tub of 500 baited hooks.

Gill Net Catch Rates

Fishers predicted that catch rates would be low during the winter months of the survey and this was observed. However, using the 20 fish/net benchmark, Placentia Bay experienced good to excellent catch rates during "traditional fishery times" (Figure 2-8).

Trawl Catch Rates

Trawl catches exceeded the benchmark 65 fish/500 hooks for a number of weeks during the late summer and autumn of 1995 (Figure 9-18).

Cod Trap Catches

Since the cod trap component of the survey was late in starting and missed much of the traditional timing of the fishery, it is difficult to derive much more than presence or absence of fish in the area for the 1995 survey. Fishers reported that all traps caught "trap size" or small fish. In addition, most agreed that the low numbers of traps should not be used to derive any indices of abundance due to the highly variable and patchy distribution of fish in and around trap berths. Consequently, many trap crews have advised that traps might be more appropriately used in applied activities like cod tagging.

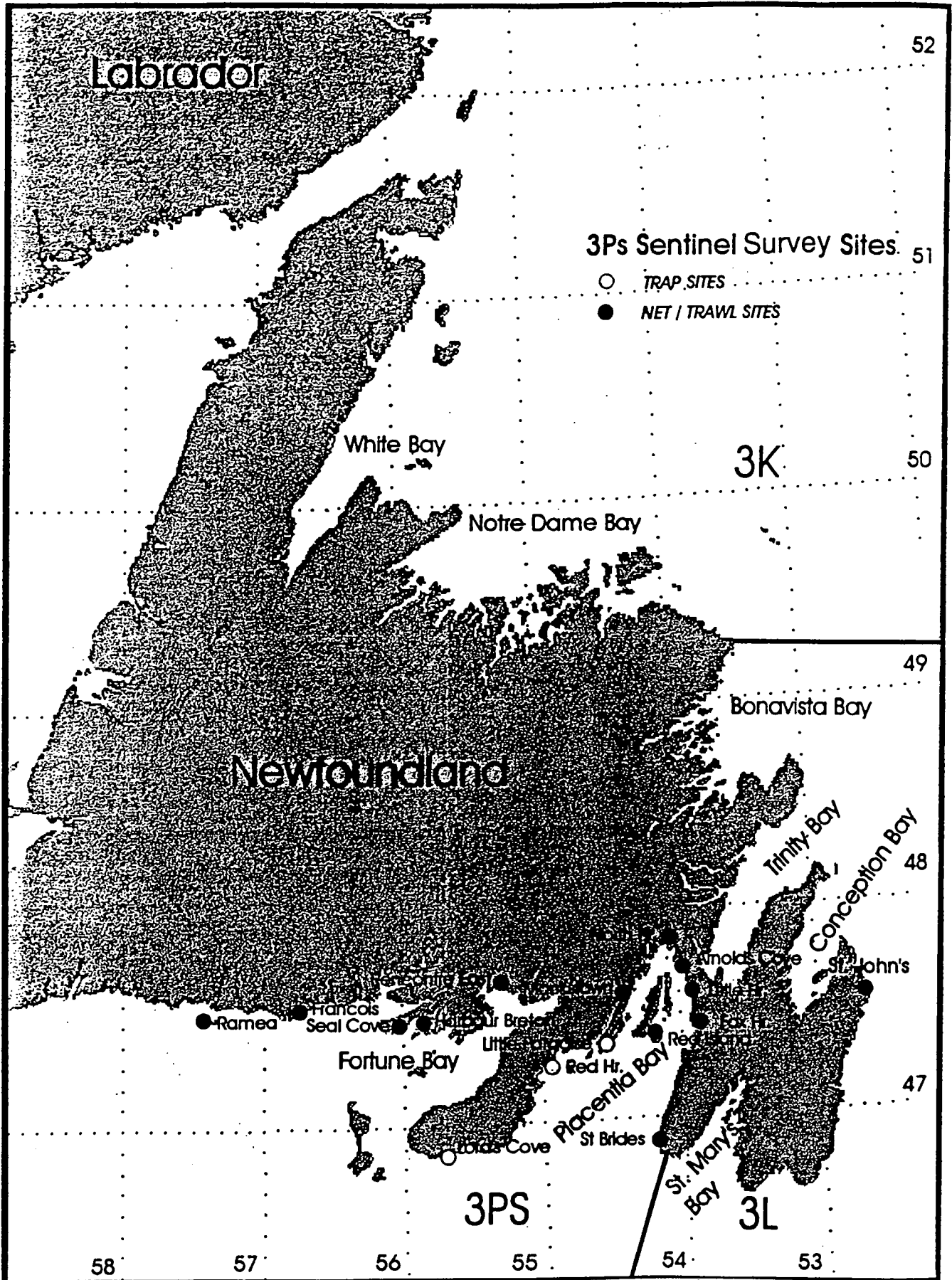


Figure 1. Sentinel Survey sites in NAFO Subdivision 3Ps

St. Brides

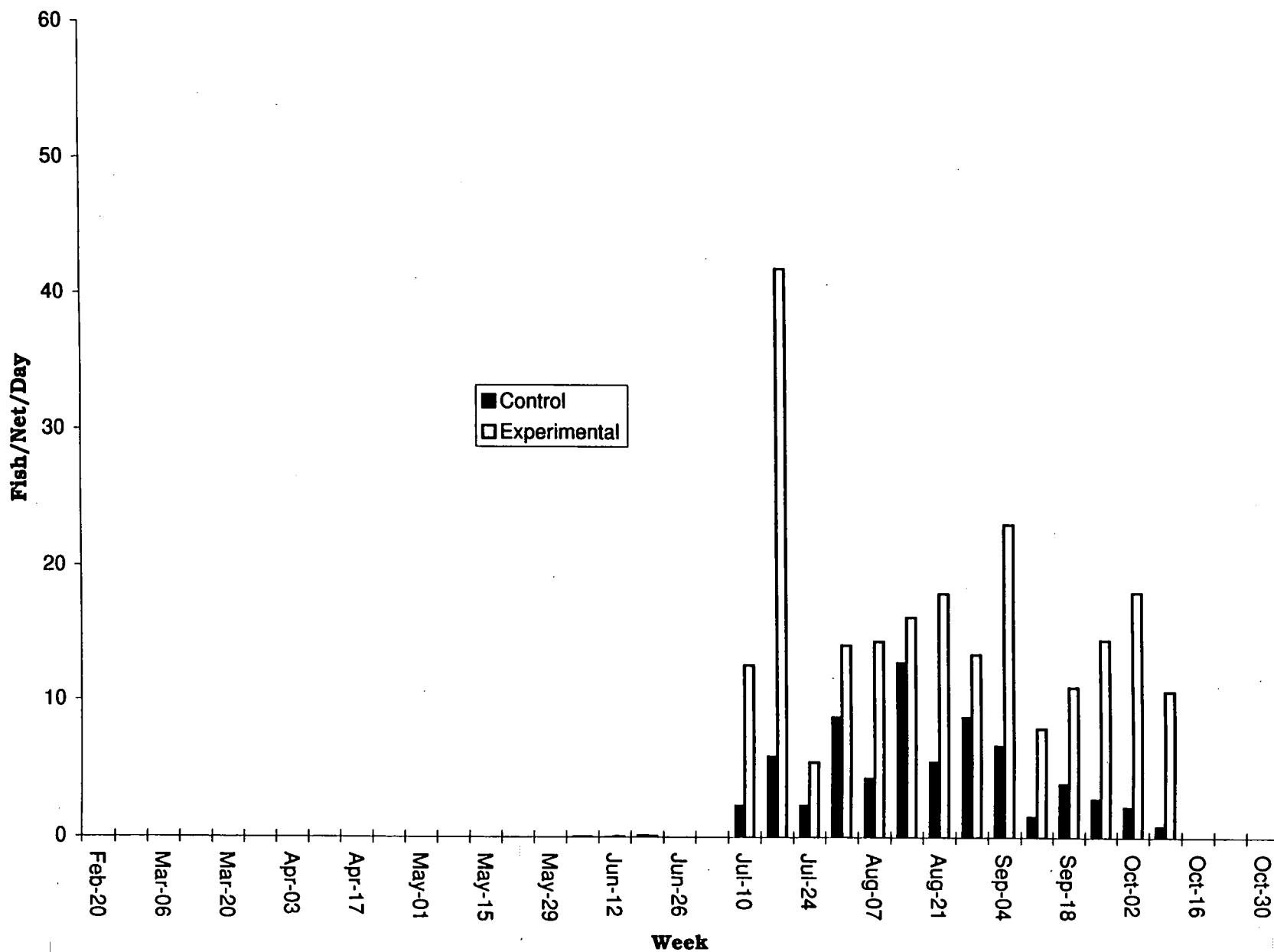


Figure 2. Gill net catch rate for St. Brides, Placentia Bay

Placentia CPUE GN

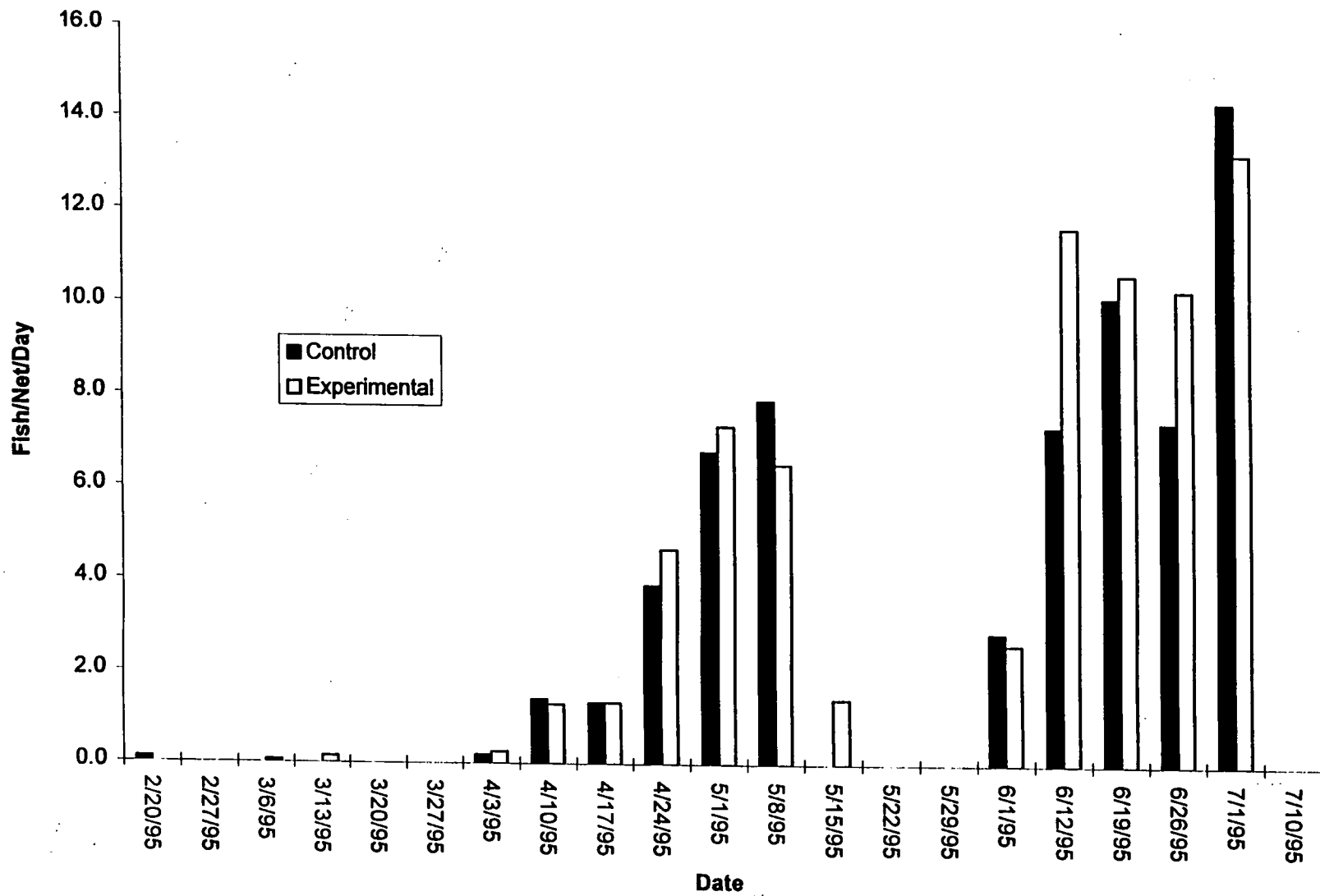


Figure 3. Gill net catch rate for Placentia, Placentia Bay

Fox Harbour CPUE

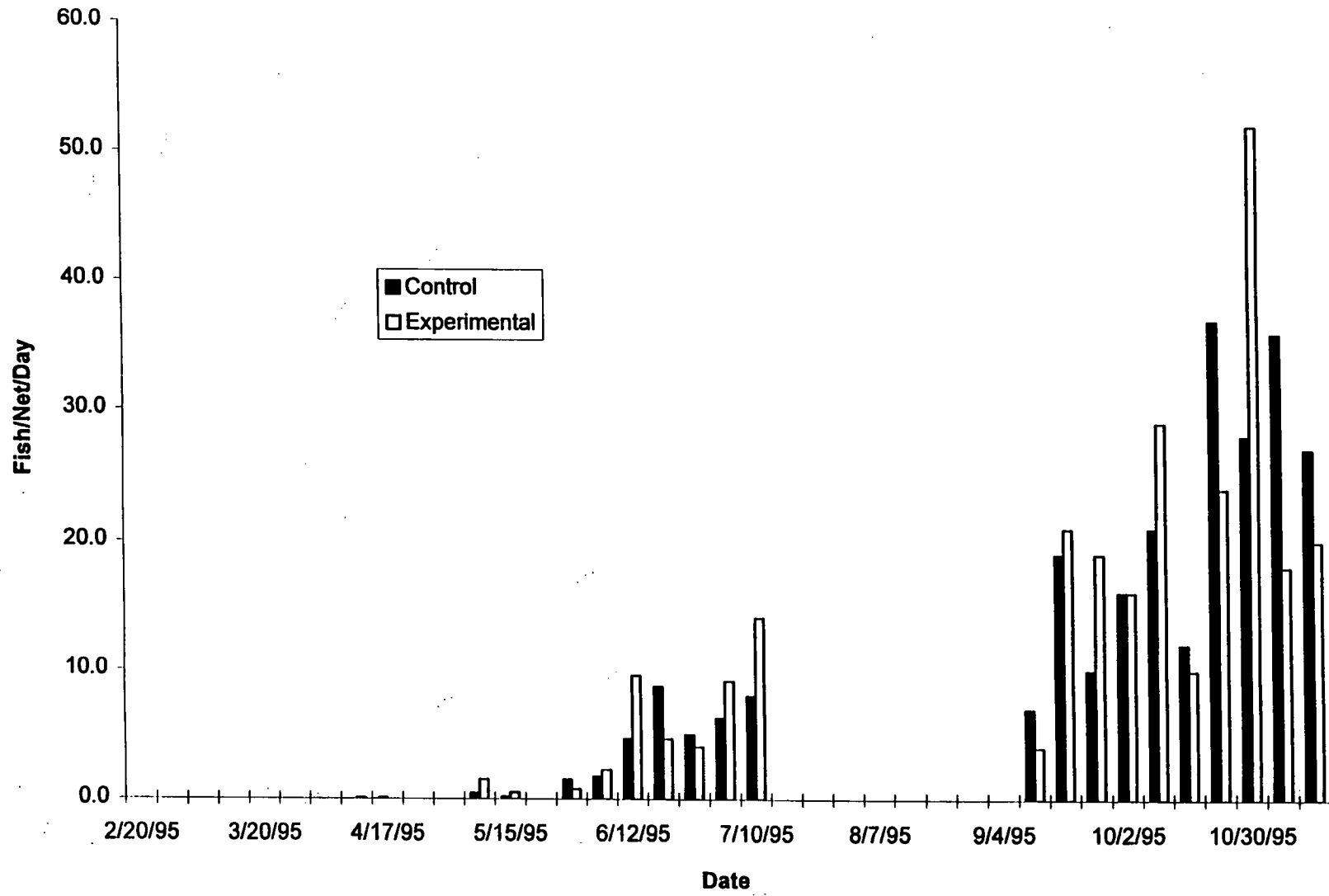


Figure 4. Gill net catch rate for Fox Harbour, Placentia Bay

Little Harbour CPUE

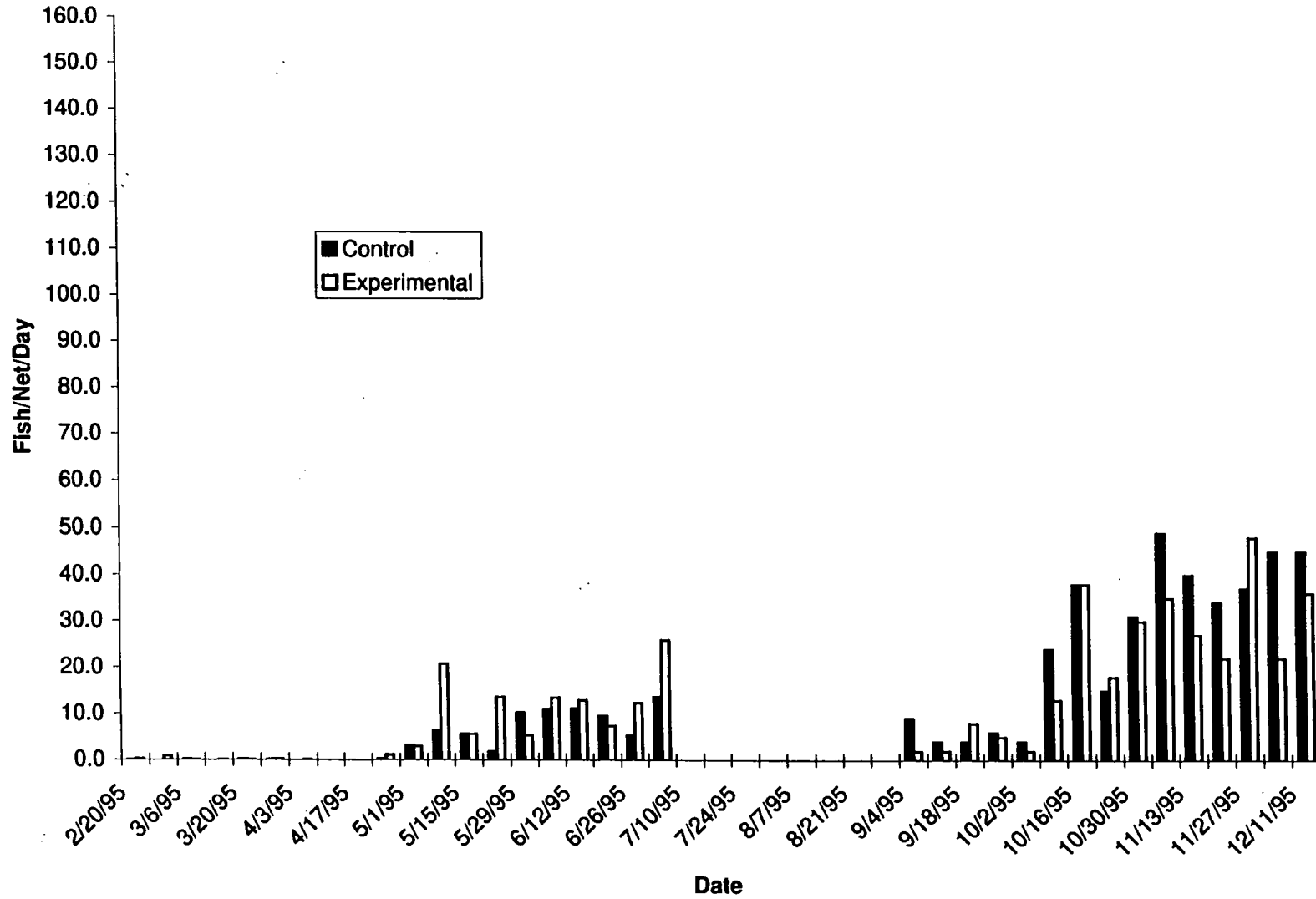


Figure 5. Gill net catch rate for Little Harbour East, Placentia Bay

North Harbour CPUE

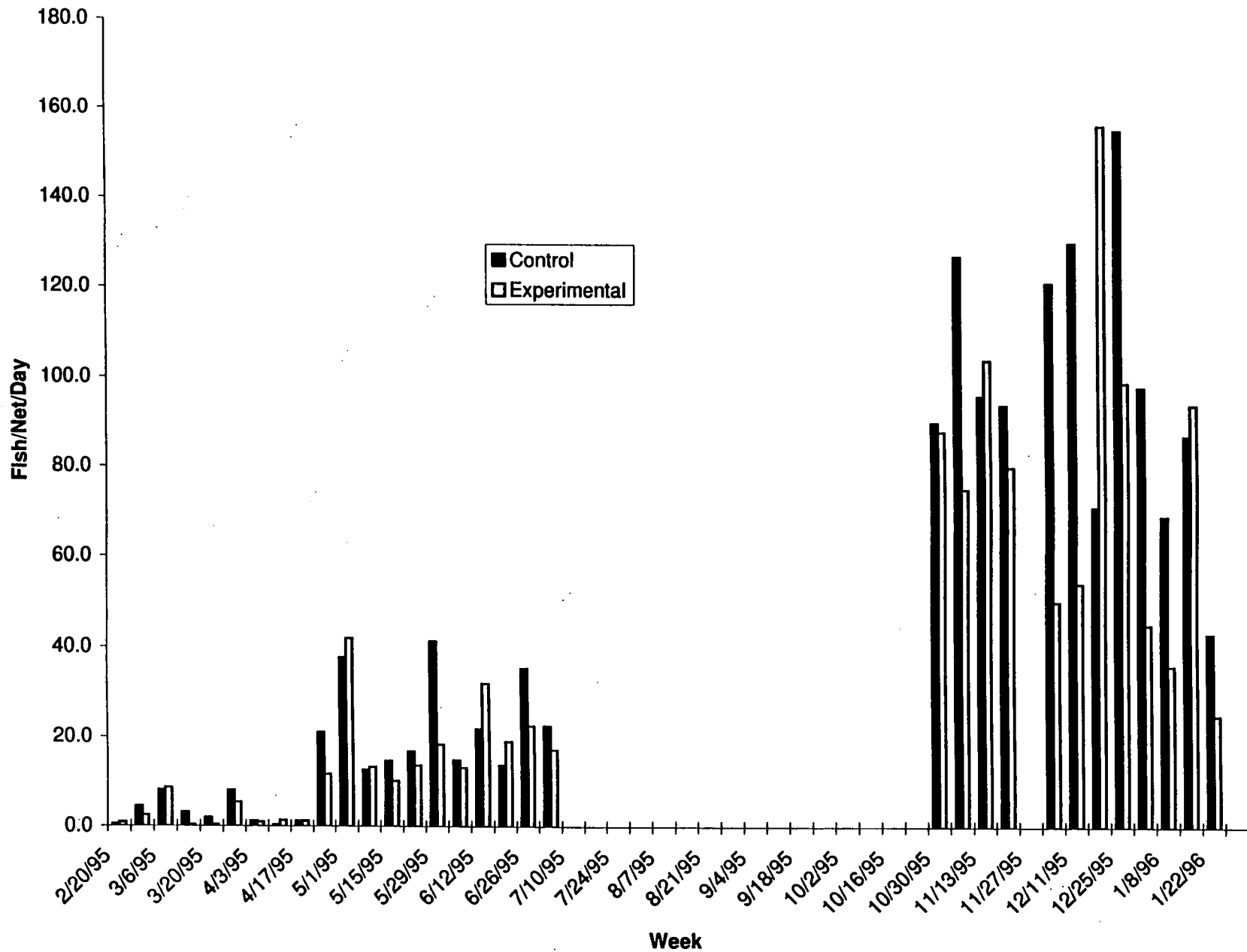


Figure 6. Gill net catch rate for North Harbour, Placentia Bay

Monkstown CPUE

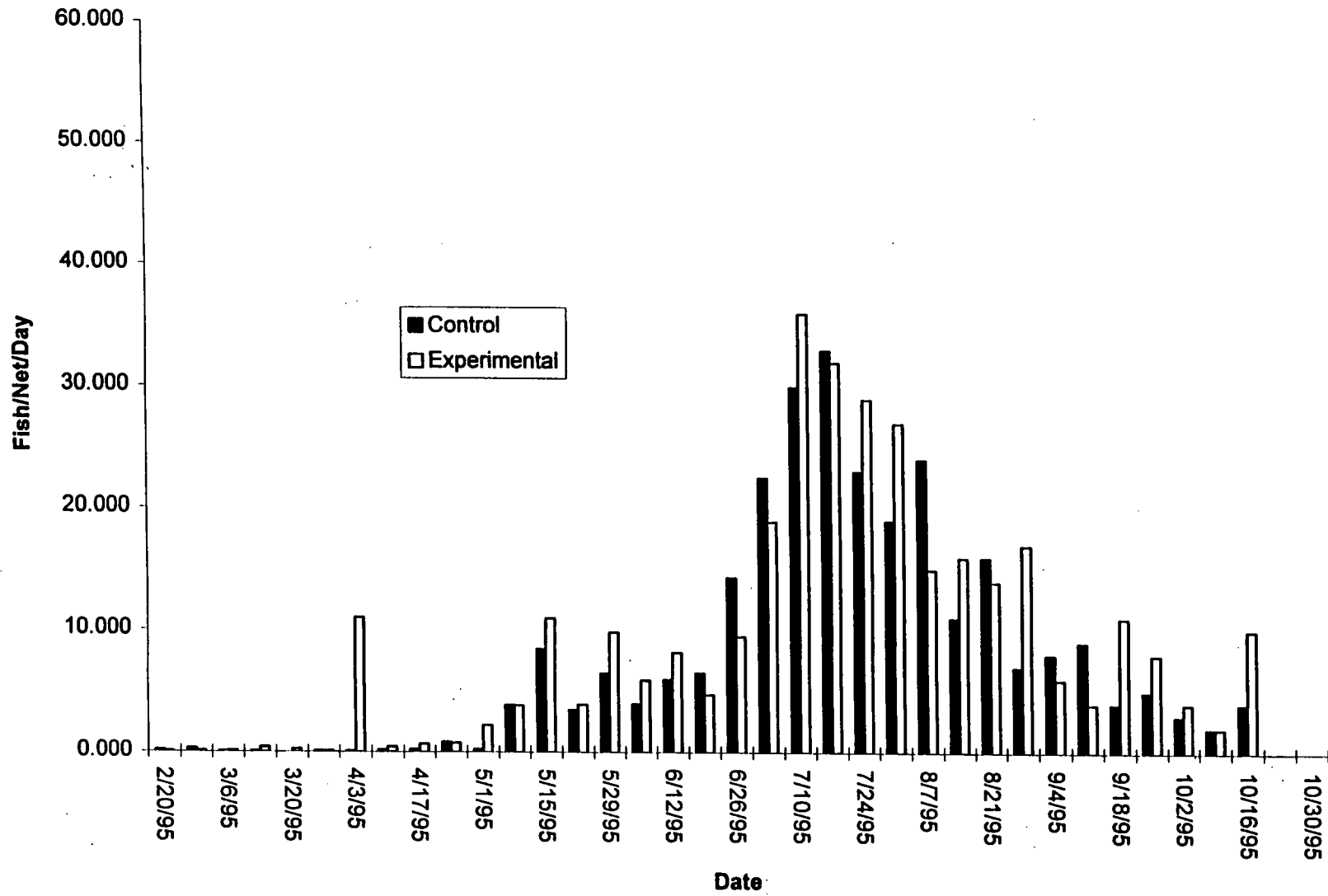


Figure 7. Gill net catch rate for Monkstown, Placentia Bay

Lord's Cove CPUE

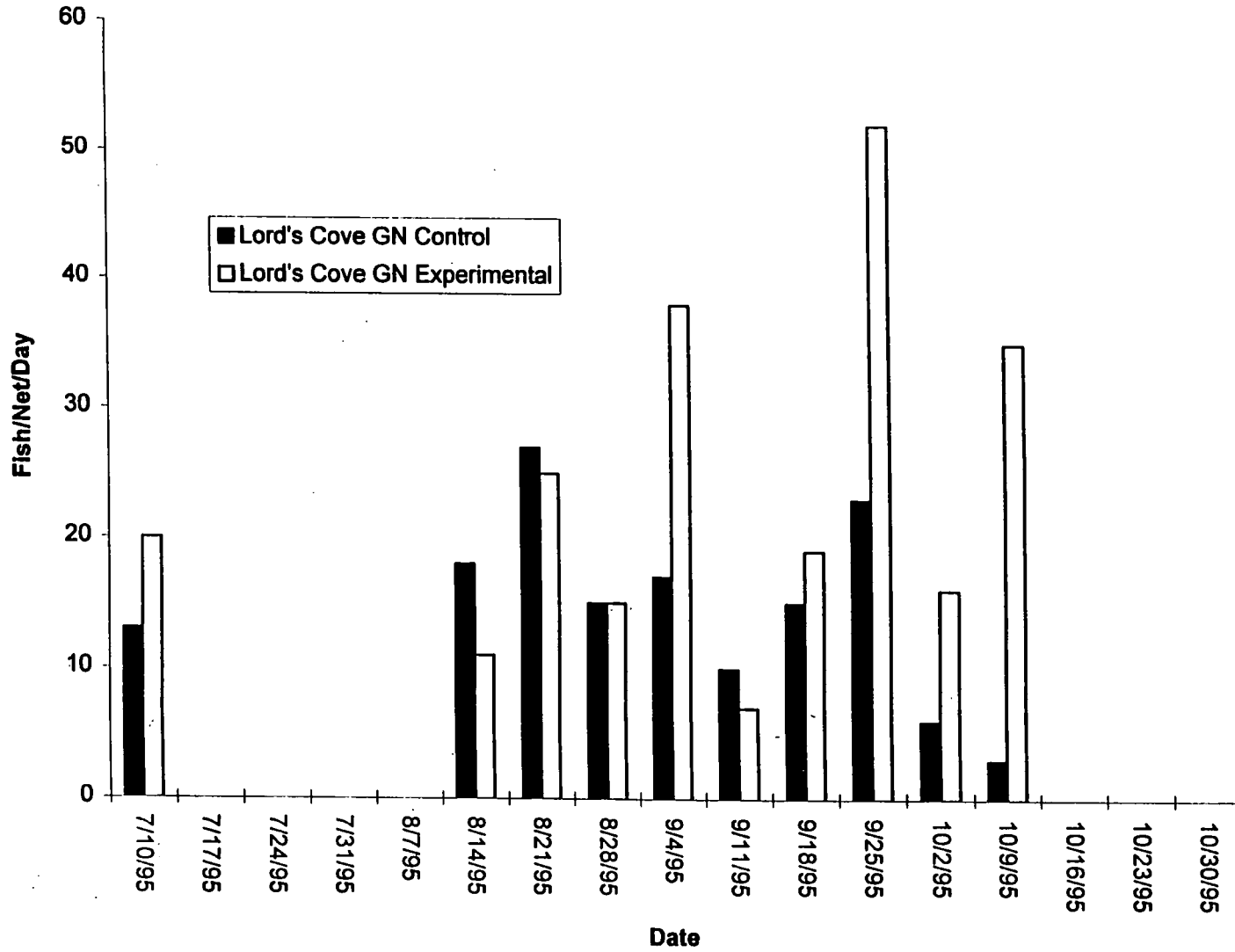


Figure 8. Gill net catch rate for Lord's Cove

Rencontre East CPUE

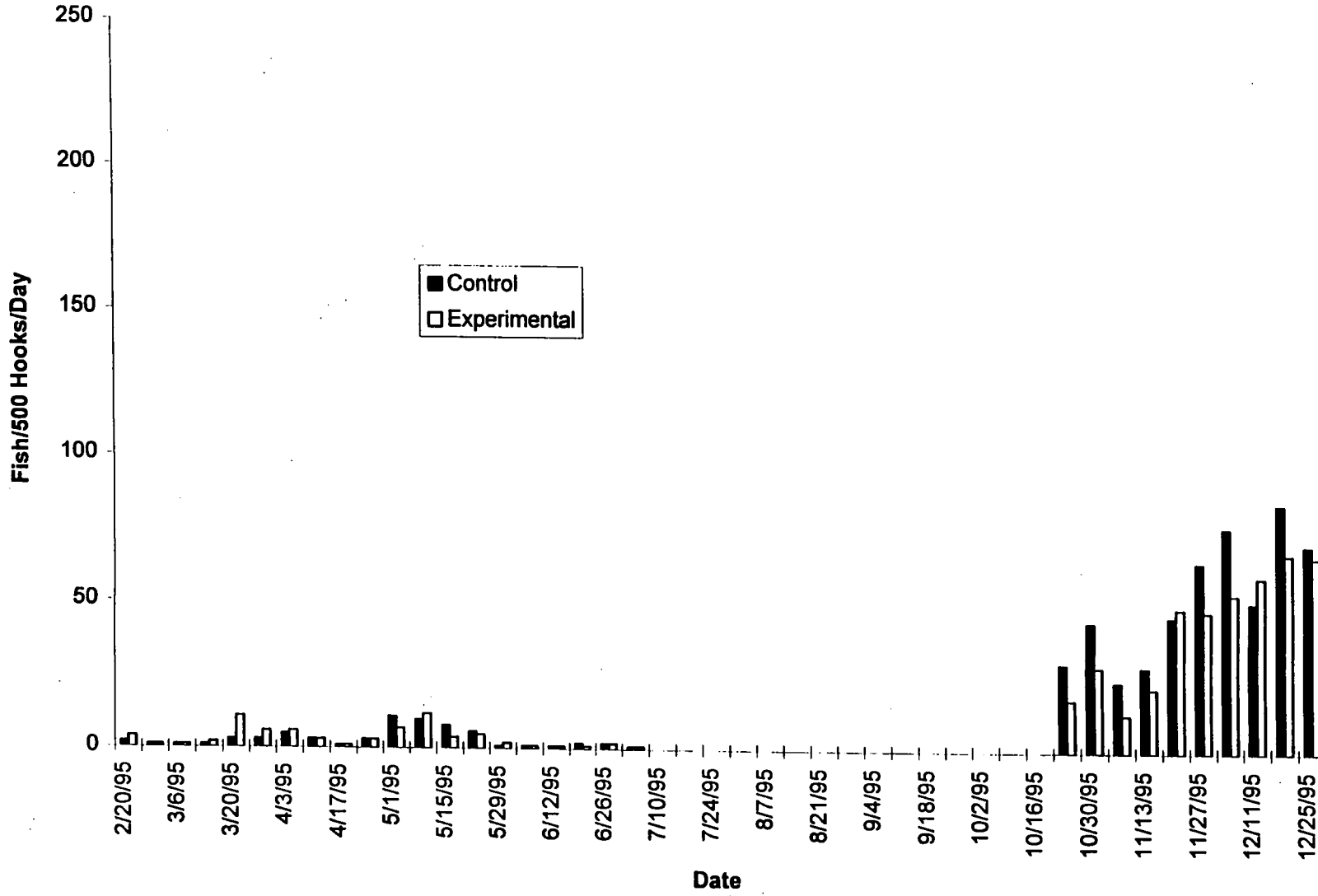


Figure 9. Trawl catch rate for Rencontre East

Harbour Breton CPUE

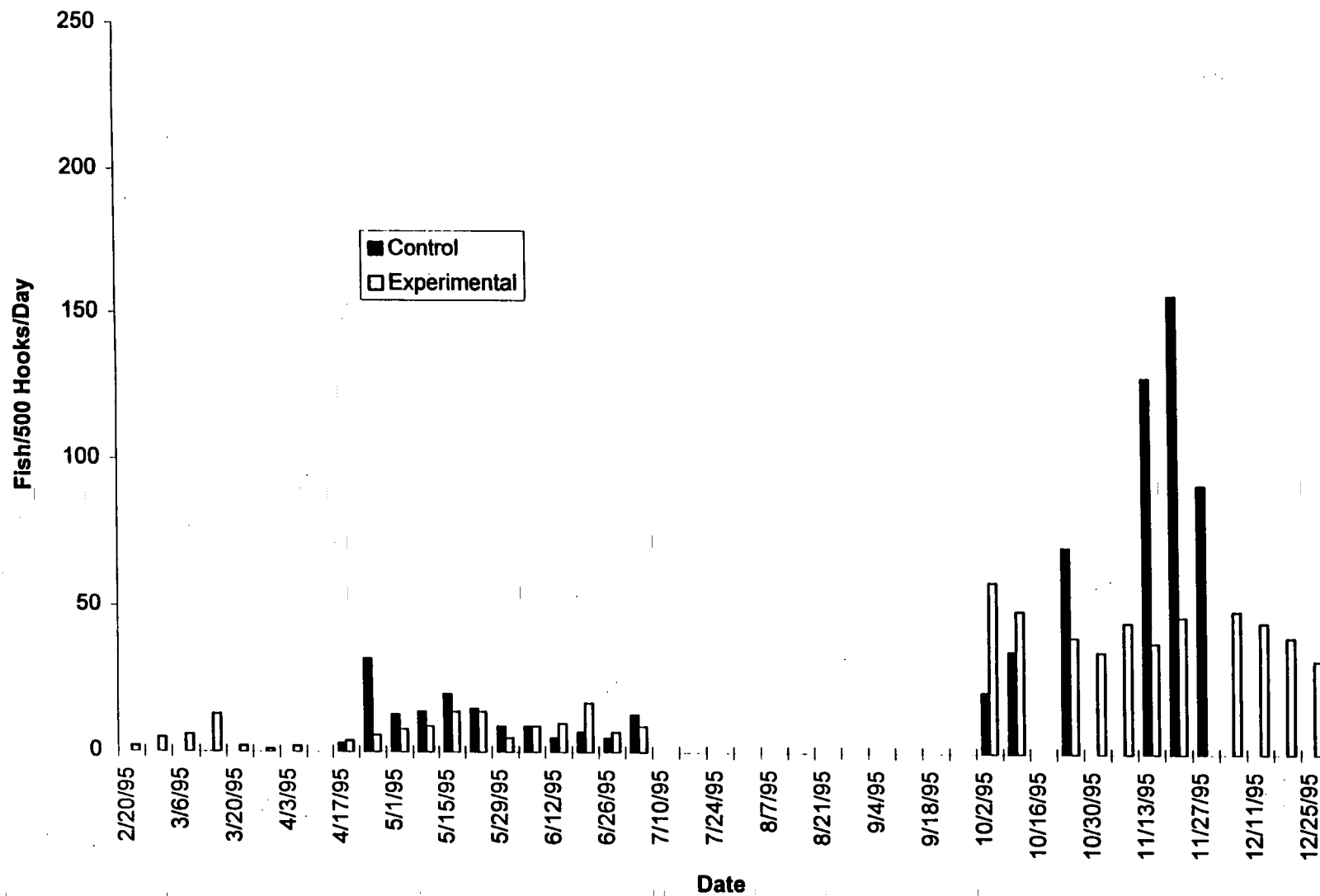


Figure 10. Trawl catch rate for Harbour Breton

Seal Cove CPUE

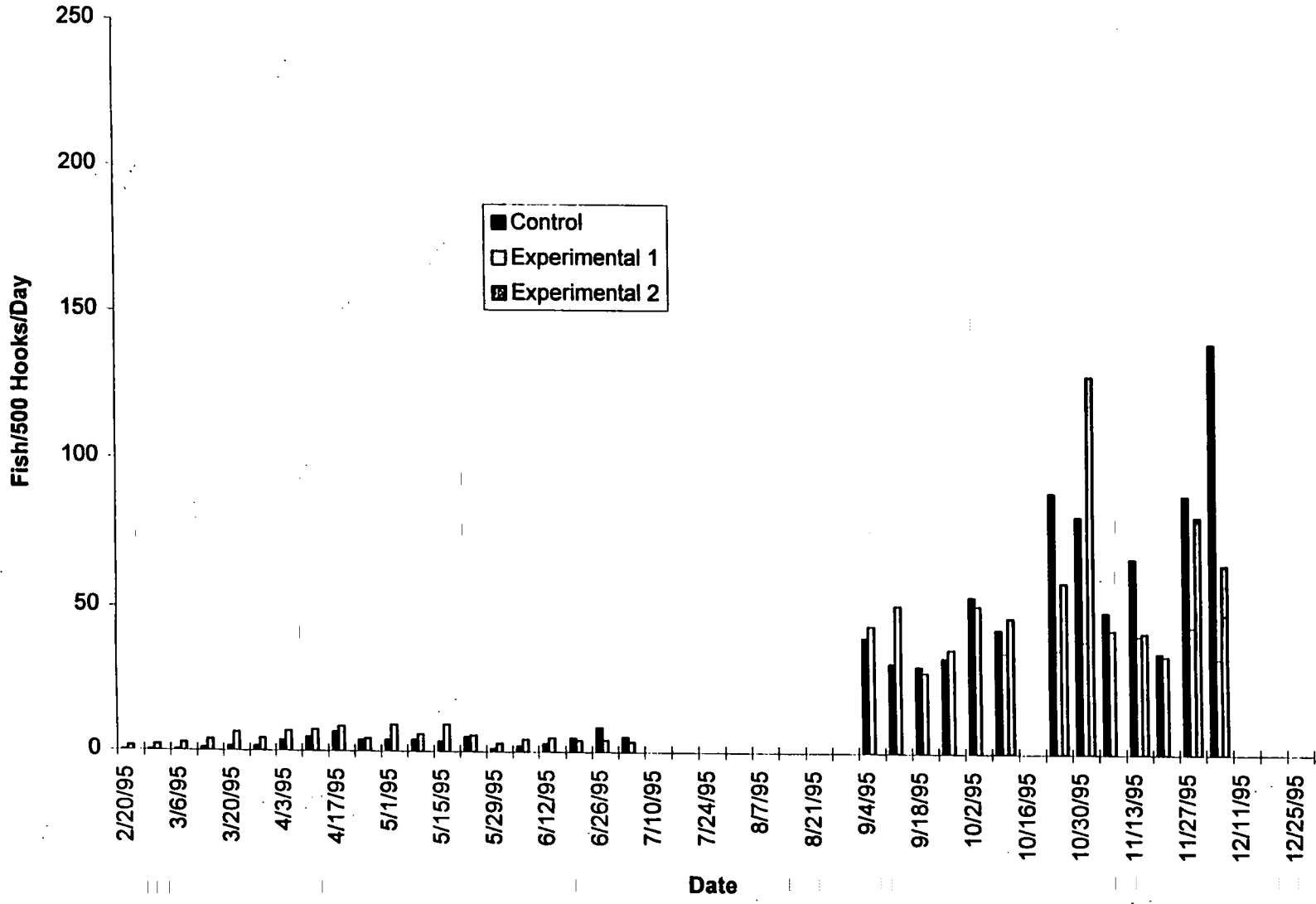


Figure 11. Trawl catch rate for Hermitage-Seal Cove

Francois CPUE

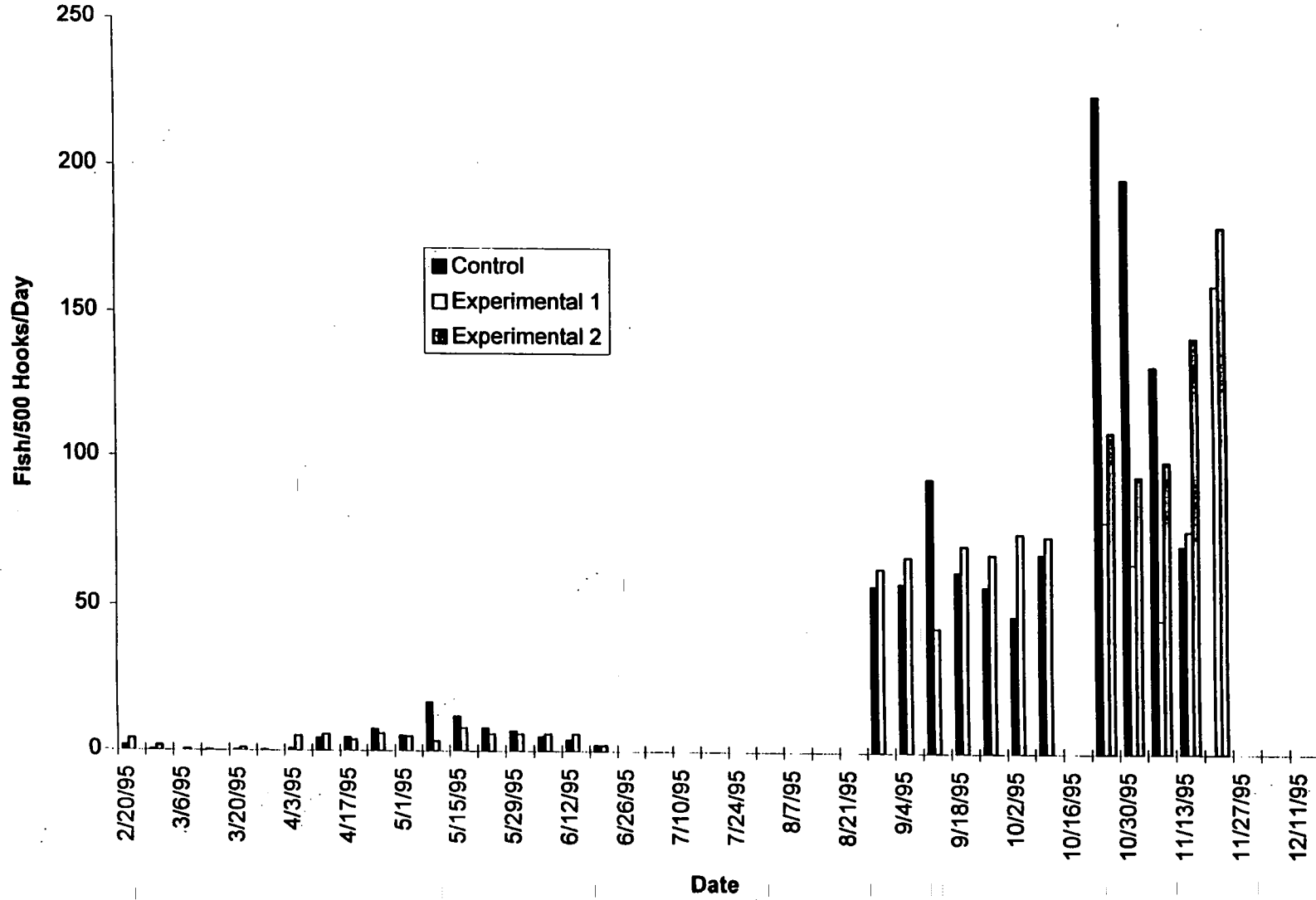


Figure 12. Trawl catch rate for Francois

Ramea CPUE

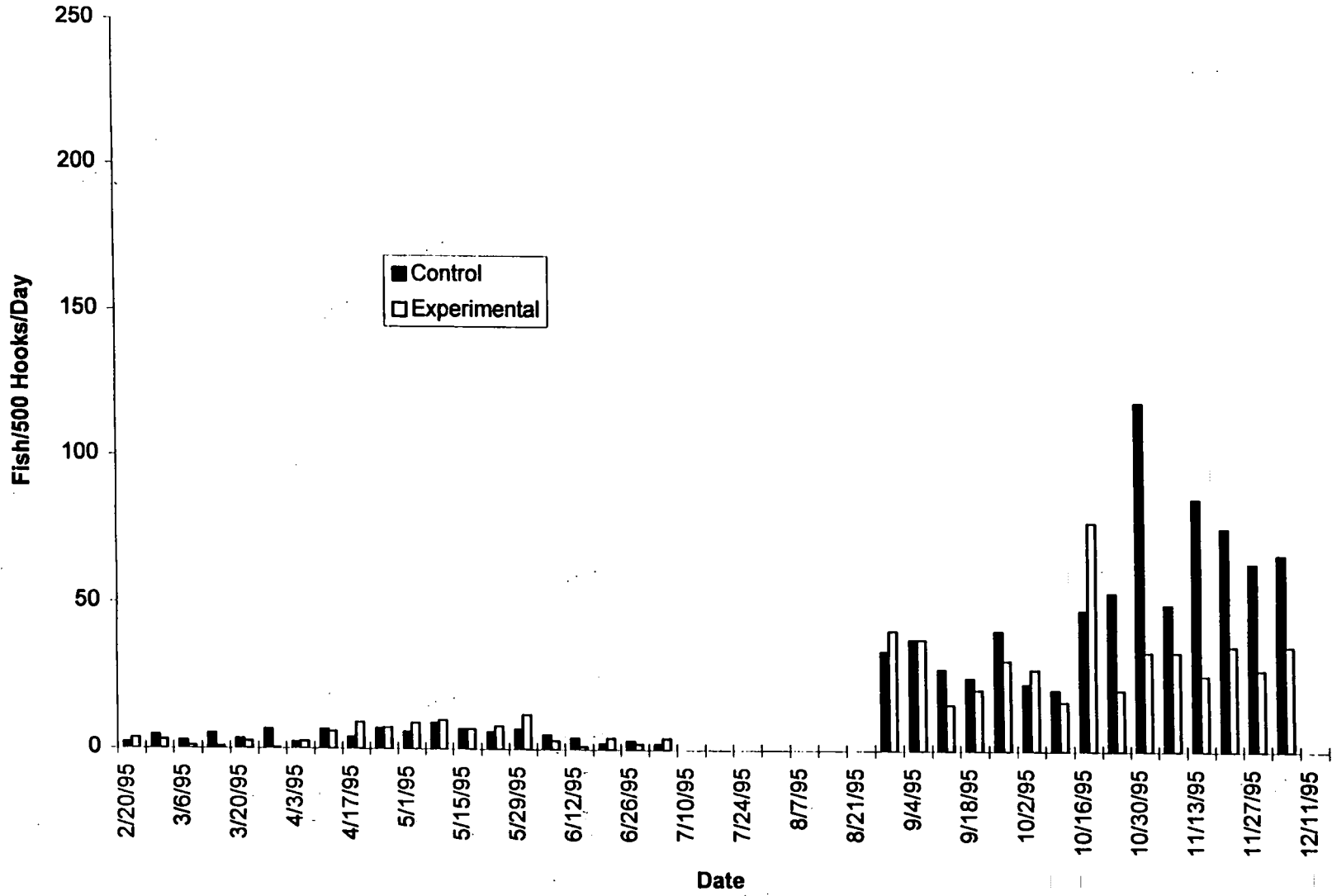


Figure 13. Trawl catch rate for Ramea

Placentia CPUE LT

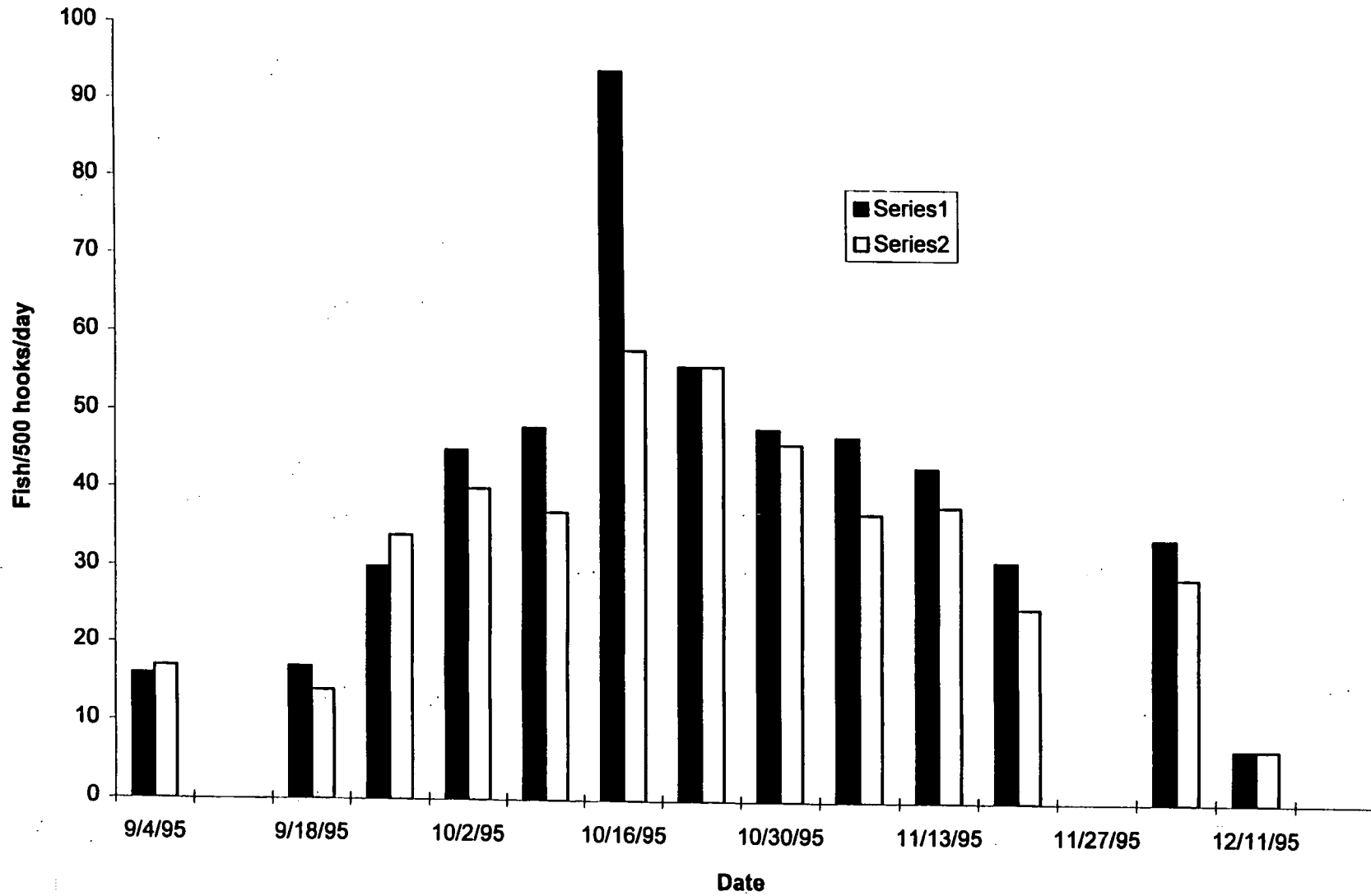


Figure 14. Trawl catch rate for Placentia, Placentia

Arnold's Cove CPUE

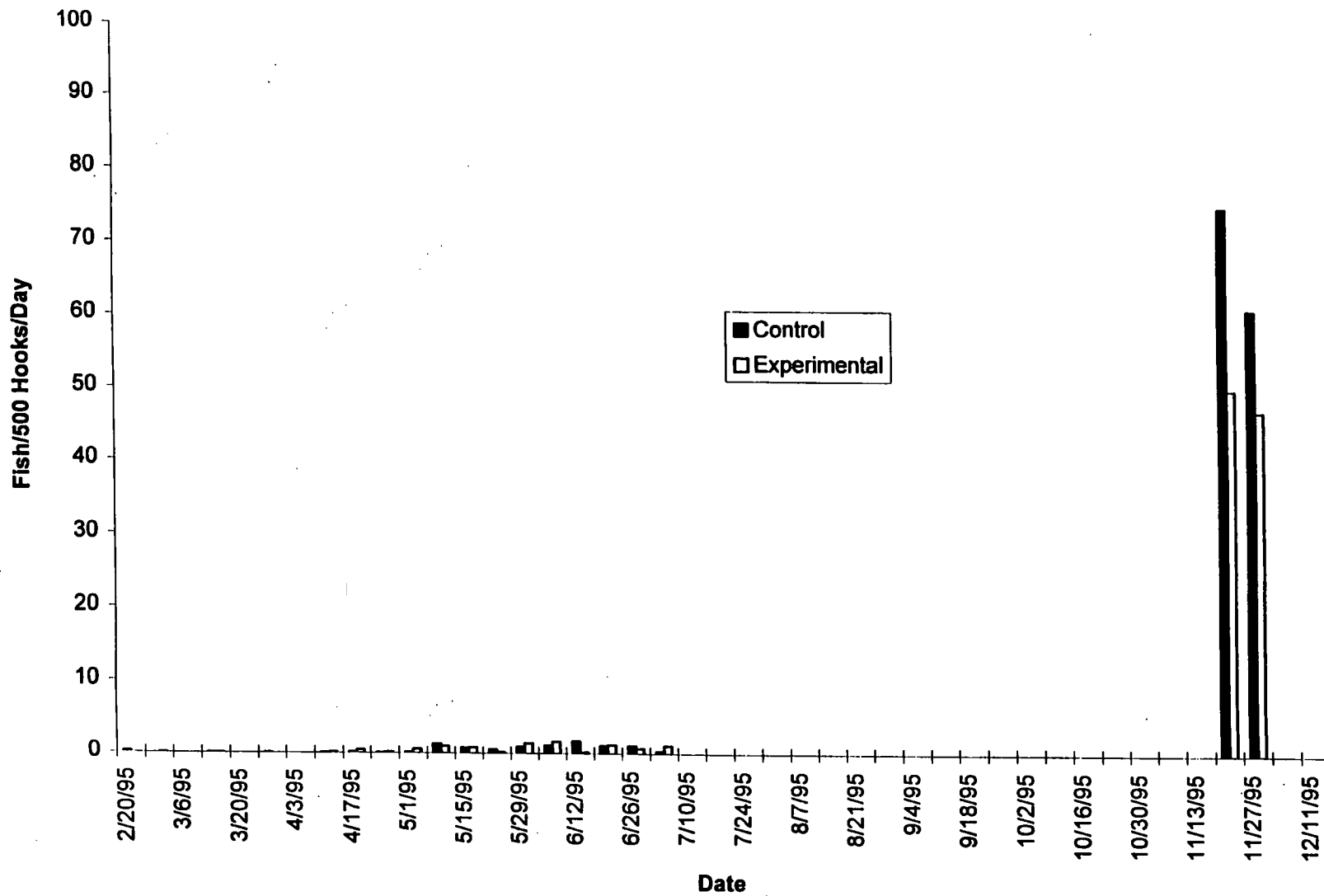


Figure 15. Trawl catch rate for Arnold's Cove

Little Paradise CPUE

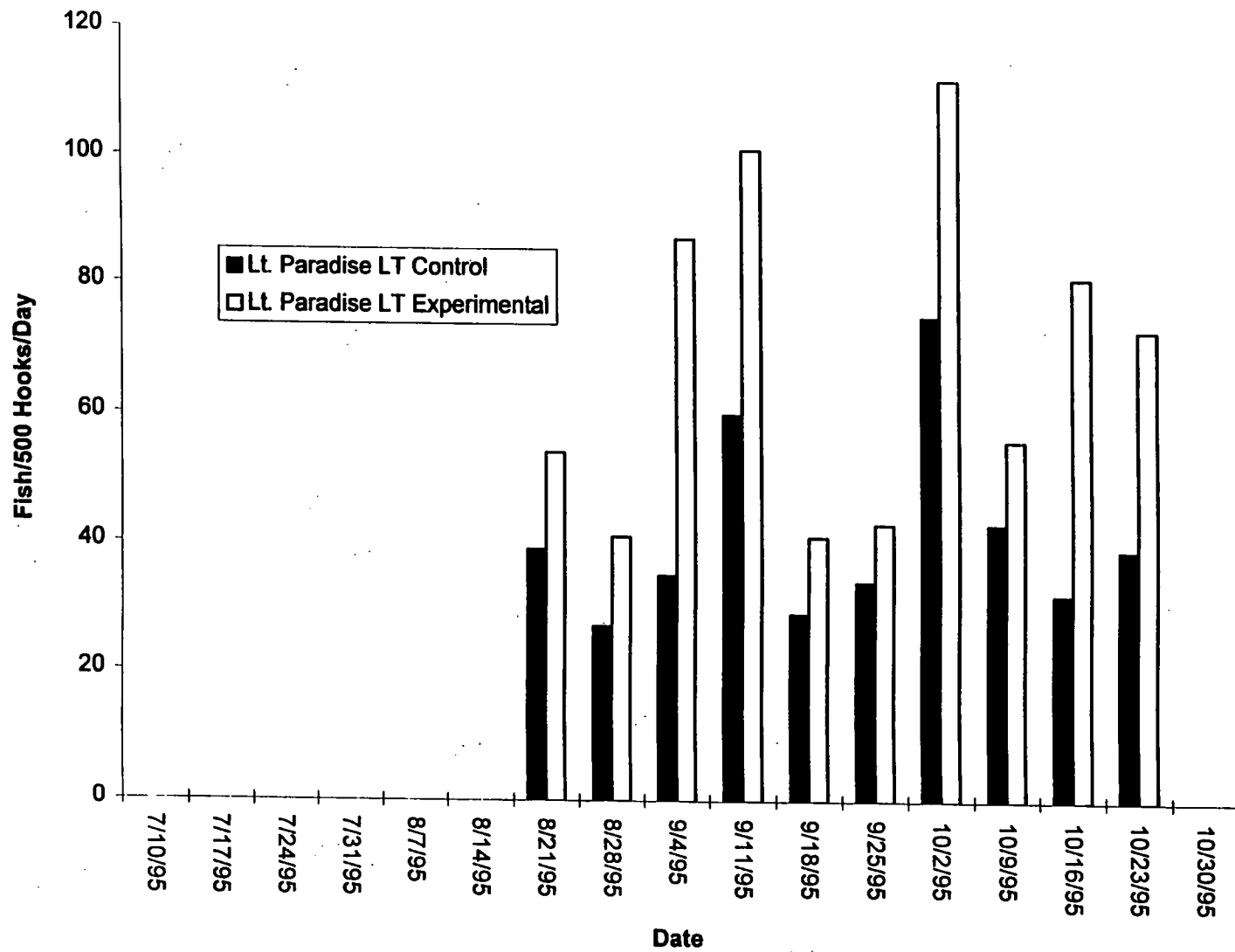


Figure 16. Trawl catch rate for Little Paradise

Lord's Cove CPUE LT

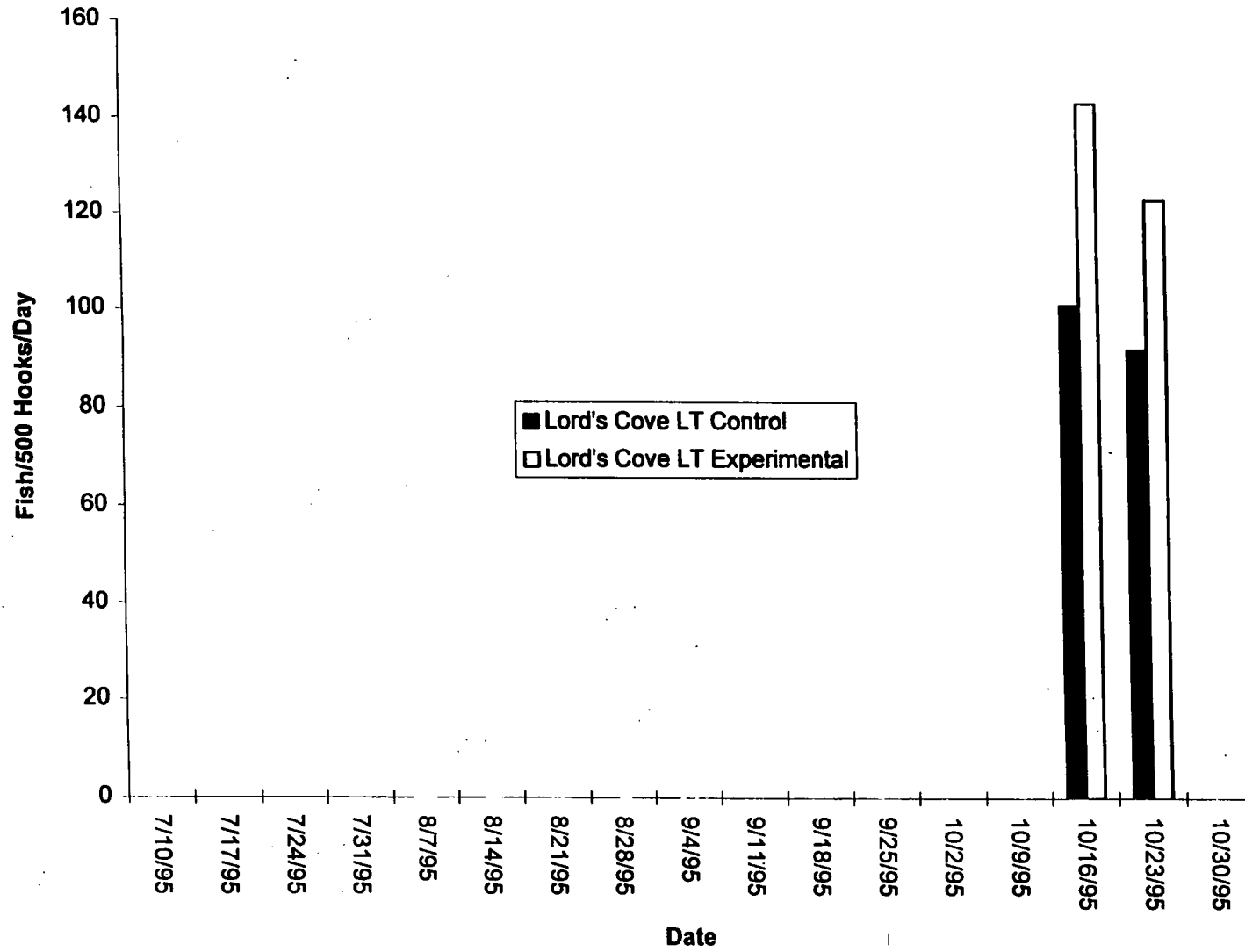


Figure 17. Trawl catch rate for Lord's Cove

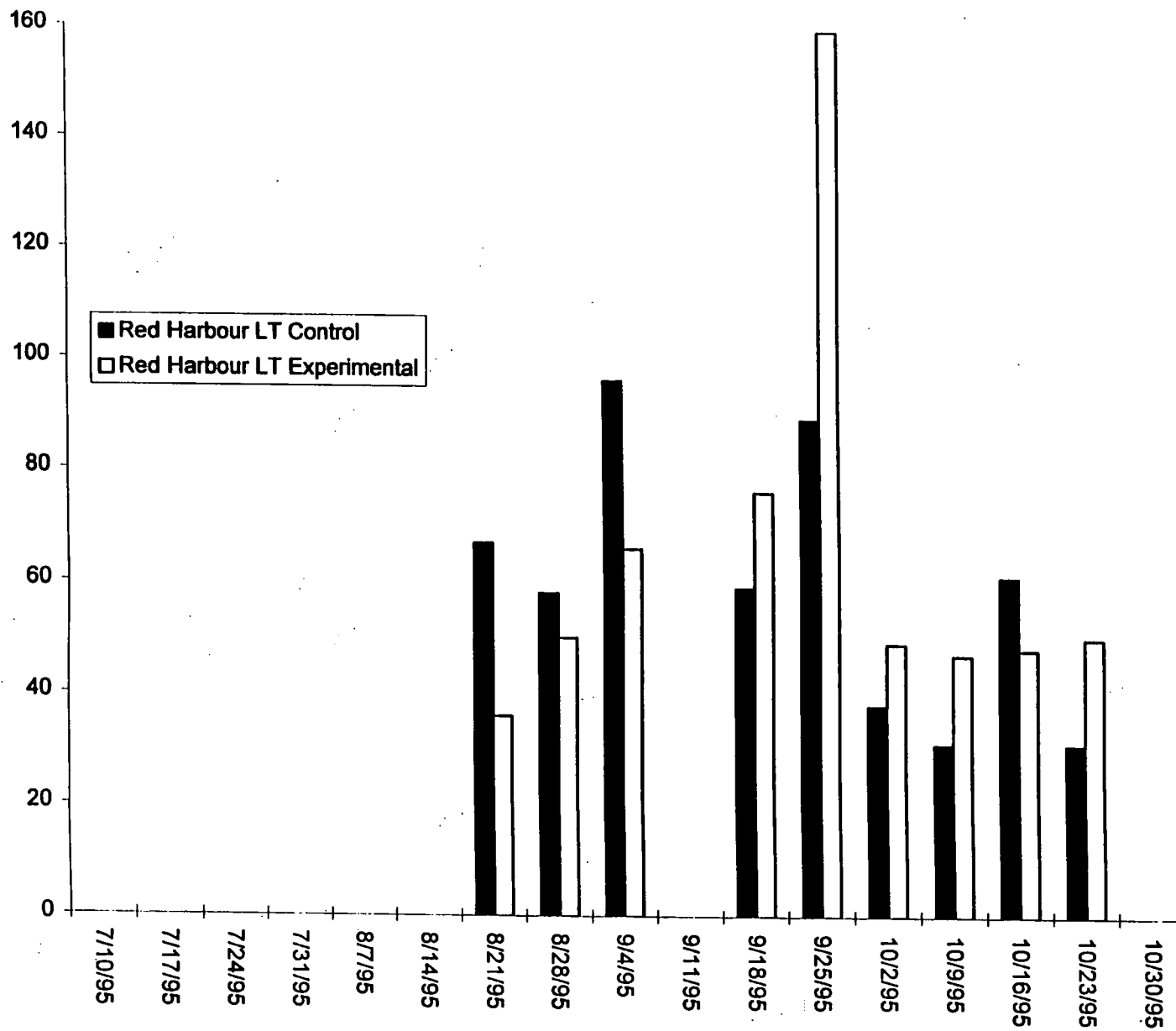


Figure 18. Trawl catch rate for Red Harbour