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A Description of the Cod Stock Structure in Placentia Bay, NAFO Subdivision 3Ps

by

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ABSTRACT

Fishermen in Subdivision 3Ps have stated that research surveys do not adequately reflect the status of the stock(s) which they fish, the timing and contribution of these fish to their fishery or the interactions of the stocks over the year. To address these concerns, semi-structured interviews of chairmen of Fishermen's Committees were conducted to gather fishermen's information on stock structure, temporal-spatial distribution of fish and biological parameters. Data suggests that there is a spawning aggregation of fish that overwinter in the northern end of Placentia Bay and that these fish contribute to a late autumn-winter fishery and an early spring fishery. The late spring and summer fisheries which develop at the southern end of the bay and move north appear to be supported by fish moving into the bay from offshore. The late spring and summer fishery on the southern Burnin Peninsula is supported by fish moving southeast from Fortune Bay.

RÉSUMÉ

Les pêcheurs de la subdivision 3Ps ont indiqué que les relevés de recherche ne reflètent pas correctement l'état des stocks qu'ils exploitent, l'apparition du poisson dans leur pêche et la contribution de ce poisson à cette dernière, ainsi que les interactions entre les stocks au fil des ans. Pour faire suite à leurs doléances, on a effectué des entrevues semi dirigées des présidents des comités de pêcheurs, afin de recueillir auprès de ces derniers des renseignements sur la structure des stocks, sur la distribution spatio-temporelle du poisson et sur divers paramètres biologiques. Selon les données obtenues, il apparaît qu'une concentration de frayeurs passe l'hiver dans le nord de la baie de Placentia et que ces poissons alimentent une pêche de fin d'automne et d'hiver ainsi qu'une pêche préprintannière. Quant à la pêche qui a lieu à la fin du printemps et en été dans le sud de la baie et qui se déplace ensuite vers le nord, elle semble alimentée par du poisson du large migrant vers l'intérieur de la baie. Enfin, la pêche pratiquée à la fin du printemps et en été au sud de la péninsule de Burin exploite du poisson qui émigre de la baie de Fortune en direction sud-est.

Introduction

Prior to and since the closure of the NAFO Subdivision 3Ps cod fishery in September 1993, fishers from Placentia Bay and along the south coast have been stating that fish abundance in their area is higher than it has been in years. Submissions and statements were made during FRCC meetings and representations have been made to the FFAW to suggest that at least for Placentia Bay, the fishery may be supported over the year from up to four separate cod stocks - 3Ps, 2J3KL (3L), 3NO and a local "bay stock". Fishers contend that DFO research vessel surveys do not adequately reflect the status of the stock(s) which they fish, the timing and contribution of these fish to their fishery or the interactions of the stocks over the year.

In order to expand the data available for review and assessment of the state of fish stocks, researchers from DFO and the Sociology Departments of Memorial University of Newfoundland and Carleton University undertook a semi-structured interviewing process of chairpersons of fishermen's committees along the south coast of Newfoundland (NAFO Subdivision 3Ps). The questionnaire aims to (i) gather data which will assist in identifying if there is more than one stock complex along the south coast, (ii) identify the temporal and spatial distribution of the stock(s), (iii) provide information on fish distribution for future biological studies (eg. tagging, sampling for genetic analysis, parasite studies, etc), and (iv) develop a network of inshore fisher contacts for future research.

The survey should be viewed as a pilot study attempting to capture some of the "traditional knowledge" which inshore fishermen use in order to prosecute the fishery. Traditional knowledge or traditional environmental knowledge (TEK) is generally defined as a body of knowledge built up by a group of people through generations of living in close contact with nature. It includes a system of classification, a set of empirical observations about the local environment, and a system of self-management that governs resource use (Johnson 1992). While the knowledge of fishers in the Newfoundland inshore fishery does not fall under the exact definition of TEK since self-management only applies to gear use in a few communities, we will be developing new methodologies for data collection which fit the Newfoundland experience and as well as drawing upon the existing methodologies of TEK data collection.

Information for the Placentia Bay portion of the survey is presented.

Materials and Methods

Participant Selection

The present or past chairpersons from thirteen communities from Placentia Bay were selected for interview. Names were obtained from a list published by the Fishermen, Food and Allied Workers (FFAW) union. Where recent elections were not reflected on the list, the most recent past chairperson was interviewed. Since chairpersons are elected to their positions, it is assumed that their observations would be representative of the fishers in the community. Throughout the interview, the interviewers would ask if the observations expressed by the respondents were

shared by the majority of the fishers in the community.

Interview Format

A specified set of topics and questions were developed by researchers at DFO and Memorial University (Appendix A). However, the questions were not presented directly nor was the respondent asked to provide any written answers. Semi-structured interviews were conducted using the developed questions as a guide for the interviewers. This allowed respondents to return to previous questions during the discussion for clarification or modification as more detail was recalled. Charts published by the Canadian Hydrographic Service were used to allow fishers to demonstrate the temporal-spatial aspects on fish on their fishing grounds.

Scheduling of the meetings was arranged by telephone a few days in advance with interviews being conducted in the homes of the respondents. A brief introduction to the objectives of the study were described over the telephone but none of the specific questions were presented. Interviews ranged from a maximum of three hours to a minimum of one hour (one case).

In all but one case respondents appeared receptive, cooperative and became quite involved in the interview process (the St. Lawrence fisher we interviewed was very nervous and seemed somewhat withdrawn. It is felt that information collected from him is useful but more limited then most other interviews). No sense of antagonism or obvious signs of mistrust of the interview team were evident.

In general, we believe there is no reason to suspect the reliability of the material. This is supported by the interview process itself which involved periodic movement back to key aspects of the information. Fishers were consistent throughout in terms of the basic information recalled though the review process did lead to elaboration and clarification.

In seven cases on the Burin Peninsula: Lord's Cove, Lamaline, Fortune, Parker's Cove, St. Bernard's, Little Bay East, and Baine Harbour, technical problems led to a loss of the initial taped material. Written notes and map overlay data was still available and in all cases return visits were made and central aspects of the interview material were retaped. It is felt that some of the more nuanced points of the initial interviews were lost but no cental data. Moreover, the second interviews helped confirm the reliability of the information gathered and in some cases allowed gathering of further information as fishers had recalled more material.

This problem also suggests the usefulness of a follow-up strategy in future research of this type. It is clear that fishers have a lifetime of valuable experience to draw on but in most cases they, like anyone else, do not recall the fullness of that experience in one intense session. From the researchers' perspective, a follow-up is useful in that it allows the opportunity to wade through the data and identify new questions or clarifications.

All interviews were tape recorded with one interviewer leading the discussion and another writing notes. Further notes were prepared immediately after the interviews during review discussions between the interviewers. Tapes were transcribed several days or weeks after the

interviews. Review of notes and transcripts and listening to taped interviews allowed a reconstruction of annual events as they occur in the fishery in Placentia Bay.

Results

As anticipated, a large body of varied information was captured during the interviews. We will present information pertaining to the temporal-spatial distribution of fish over the year and characteristics of fish with which fishers use in identifying the stock from which they may have come.

A clear picture of fish movement and the development of annual events of the fishery was described during each interview. It is worth noting that in nearly all cases, fishers knew their observations/views were reflective of most if not all of the community. Virtually all the areas of questioning on fish movement and dispersion (with the exception of cod spawning) were subjects which fishers had ongoing conversations about within and among communities.

Many temporal events are unique to each community but when assembled for the entire bay describe a fall, winter and early spring fishery which catches fish apparently returning to or moving out from deep holes and channels at the north end of the bay. A summer fishery which relies on fish moving in to the bay from across the continental shelf is also described. Fishers were unable to identify the origin of the fish which migrate in to the bay for the summer fishery. Consequently, it is not possible to use fishers' knowledge from these interviews to determine how fish from 3Ps, 2J3KL or 3NO may contribute to the fishery.

Development of the Fall and Winter Fishery

The Placentia Bay fishery is nearly continuous throughout the year. There are periods of intense fishing activity interspersed by periods of no fish. The description presented here begins during a traditional lull in activity during the month of August.

Fishers throughout the bay described a lull in catches occurring during approximately the months of August and early September. The cause of the lull was explained as either fish being glutted on capelin and quiescent on the bottom and therefore unavailable to all gears, and/or having moved out of the bay following prey species.

In mid to late September, fish again became available to hook and line gear around Cape St. Mary's, on the southeastern side of the bay. The trawl fishery develops over a period of weeks along the eastern side of the bay and appears to fan out across the bay as it heads north. It is possible that the distribution of fish is fairly uniform across the bay but fishers could comment only on the development of the fishery on their grounds. Fishers suggest that these fish come from St. Mary's Bay around Cape St. Mary. It is also possible that they are returning from deeper water int he vicinity of St. Pierre Bank. Fishers attribute this knowledge to information provided by DFO from returned tags.

By late October and early November, fish are congregated in the north end of the bay and fishing operations cease south of approximately Red Island. Fishers along the eastern side of the bay indicate that lack of fish and poor weather for the cessation in fishing activity. Communities in the north end of the bay continue to fish until approximately mid-February when a combination of poor weather and declining catches halts operations. Both gill net and hook and line are used in the this fishery. Landings data for gill net and hook and line appear to support fishers observations of increased landings in the northern end of the bay over the past few years (Figures 1 and 2).

There is also an active winter fishery through the ice in Paradise Sound. Fishers report being able to drive their trucks on the ice out to the fishing grounds up until the time the Coast Guard ice breaker arrives in the early spring.

Development of the Spring Fishery

Fishers in communities at the north end of the bay set cod traps in late March and April to take advantage of fish starting to move from the deep holes and trenches. Both spawning and post spawning fish are observed at this time. Fishers reported that the spring fishery in this area has regularly taken hundreds of thousands of pounds of fish before May 15 each year. Fishers believe that these fish have overwintered in the deepest areas of the bay, spawned and start moving in the early spring in search of prey. They are reported to feed on herring and capelin. Fish disperse down the bay possibly reaching St. Brides in the south by early June. Fishers in this community are not as certain that they get fish coming from the northern end of the bay.

Fishers indicate that the spring dispersion is the result of cod following prey species south out of the bay. They also indicate that the first run of capelin (mid-June) appear to be moving out of the bay rather than in to the bay. Up to two weeks later, a second, larger capelin run occurs with fish coming in to the bay. Cod appear to move in around the same time.

Cod trap landings data for Placentia Bay reflect the early development of the trap fishery in the northern end of the bay (Figure 3). If fish were entering the bay in the late winter or early spring, more southerly locations would be expected to report the early landings. A similar pattern in the development of the trap fishery is observed in Trinity Bay where a bay stock is thought to exist (eg. Davis and Chen, unpublished data; Lilly, pers comm).

Development of the Summer Fishery

Depending on the location, fishers describe a drop in landings in late spring on the eastern side of Placentia Bay. They assume that the bay stock has dispersed and/or possibly moved out of the bay in search of prey. Following this lull in activity, there appears to be a large influx of fish reported entering the western side of the bay apparently following capelin. The fish appear to fan out across the mouth of the bay and move north. The fishery develops in a predictable manner on both sides of the bay and lasts into late July and sometimes early August.

Fishers switch from cod traps as the season progresses to gillnets and hook and line as fish from cod trap berths near shore to deeper water. Fishers report that there has never been a significant summer fishery in the most northerly section of the bay. Fishers in this area do not believe that fish which enter the bay in late may-early June ever reach their end of the bay in any great abundance. These fishers often move further south to continue fishing. Merasheen Island is the centre of considerable fishing activity during the summer months. Many families move to the island during the summer for fishing and have done so since the resettlement program in the 1960's.

There appear to be unique events occurring between Burin and the three surveyed communities of St. Lawrence, Lord's Cove and Lamaline on the southern tip of the Burin Peninsula. Fishers in Burin report a spring movement of fish down Placentia Bay on both eastern and western shores. They assume this is the spring movement of fish from the north end of the bay. This is followed by a summer movement of fish from around the bottom of the Burin Peninsula in an easterly direction into Placentia Bay. Burin is the most southerly community which reports any influence of a bay stock on their fishery.

In contrast the fishers in St. Lawrence, Lord's Cove and Lamaline do not report a spring fishery. They do however, prosecute a fishery in June and July and indicate that fish appear to be moving in an easterly direction from Fortune Bay in to Placentia Bay. Fishers reported finding hooks characteristic of the Harbour Breton winter fishery in the fish caught around the southern end of the Burin Peninsula. Fish tagged on the St. Pierre and Burgeo Bank are also caught in the southern Burin trap fishery. Fishers report that the condition of fish is poor ie. fish are thin and livers and gonads are small. Conversely, they also have a fall fishery where they report that fish are moving in a westerly direction. Fish condition has improved with larger livers and gonads appearing to mature relative to the spring.

Fishers correlate events in Fortune Bay with the success or failure of the fishery in their area. Fishers observe that a good winter fishery in the Harbour Breton area is correlated with a good summer fishery in their area. They also indicated that a good summer fishery in this area is usually followed by a good fall fishery.

The Parker's Cove-Baine Harbour area of Placentia bay appears to be an area of mixing of the bay stock and the offshore stock. Success of the fishery appears to depend to some degree on the ability of fishers to select which stock component is stronger in a particular year and adjust their fishing behaviour to exploit the dominant stock. This is in contrast to most other areas of the bay which appear to fish predominantly on either the bay stock or the offshore stock depending on the time of the year. For example, a community may have a spring fishery on the bay stock followed by a lull in activity, then an intensive fishery on offshore fish which are in the bay. This activity is followed by another lull and then a fall and winter fishery on the bay stock returning to the deep sections at the north end of the bay.

Landings

Winter

The winter fishery on the bay stock is prosecuted primarily with hook and line and gill nets depending on location. In general, fishers report that total landings are higher for the more northerly communities. This observation also is reflected in the landings data particularly for the past three years (Figures 1 and 2). This suggests that fish congregate in the northern parts of the bay and are available to gear for a longer period. Communities in the southerly to mid-section of the bay opportunistically catch fish as they move along the coast. Their fall/winter fishery finishes by mid-November.

For fishers driving out to the fishing grounds on the ice in Paradise Sound, fishing in 1993 yielded catches on the order of 1500 lbs per day per vehicle. Fishes reported that there has always been an active and successful ice fishery in this area. Fishers reported that spawning fish are regularly caught throughout the ice fishing period.

Spring

The early spring fishery on the bay stock is prosecuted primarily with cod traps at the north end of the bay. Fishers report that this is a successful fishery and it is not unusual for single crews to report landings of 600,000 to 1 million lbs prior to May 15 in any given year. Cod trap crews in more southerly locations report catches in mid to late May.

Summer

The summer fishery is prosecuted with cod traps, gill nets and hook and line, depending on location and time of the season. Fishers in Placentia Bay report that catches are variable but can reach 250,000 to 500,000 lbs. The timing and characteristics of changes in gear throughout the summer fishery is similar to the fisheries along the northeast coast of Newfoundland. Again depending on location, fishers suggested that their landings are comprised of a mix of bay stock and fish that have migrated in to the bay from offshore.

Characteristics of Fish

In comparison to fish caught in summer, winter or bay stock fish are reported to be larger and in better overall condition. Fishers report that for fish caught in the north end of the bay, gonads develop throughout the winter and fish which are in spawning condition (ripe and running) are regularly observed. Summer fish arriving from offshore were in a post reproductive state. Livers condition is described as "fat" or "thick" during the winter.

Fishers reported a difference in the coloration of the summer and winter fish. The winter fish have grey bellies and lighter backs compared to the white bellies and very black backs of the summer fish. Fishers suggest these differences may be due to winter fish feeding predominantly on krill and herring in the bay while summer fish are feeding on capelin. Fishers did however

report that there are capelin in the bay in deep water during the winter.

Parasites are found regularly in summer fish and are very rarely reported in winter fish.

Trends in the Fishery

Fishers report that in general, landings from the summer fishery have been falling in the past few years despite an increase in effort and efficiency of crews working in the bay. In contrast, these fishers report an increase in the landings for the winter and early spring fishery. Without assessing landings data, it is difficult to determine if the overall trend is accurate.

Fishers report that in certain parts of the bay, they can selectively set their gear on different grounds and fish summer or bay fish. They believe that the success of the gear depends on the abundance of fish from each stock contributing to the complex available for fishing. Fishers in these locations report that in the last three years, setting gear to fish the bay stock is more successful.

Discussion

The consistency of observations among fishers suggests a regular, repeating pattern for the development of the fishery in Placentia Bay. The presence of spawning fish in the deeper parts of the bay during the winter and early spring also suggests a resident stock of fish. This stock appears to be the primary contributor to the fishery of a number of communities at the northern end of the bay and a secondary contributor to the fishery in the middle and south end of the bay on both sides. It also appears that the influence of the resident Placentia bay stock is felt in the fishery only as far as the community of Burin on the western side of Placentia Bay and at least to St. Brides on the eastern side.

Studies using TEK acknowledge that resource users often do not know what happens to the resource once it leaves their hunting or fishing grounds (Johnson 1992). However, it has been noted that Newfoundland fishers have tremendous knowledge of their own particular fishing grounds and use this knowledge to guide their fishing practices (Davis 1992). For the contained area of Placentia Bay, fishers have demonstrated considerable knowledge of the resident stock which appears to overwinter in the bay. They are however, less knowledgable about the fish which constitute their summer fishery. There are suggestions that fish move into Placentia Bay from Fortune Bay and from the St. Pierre Bank. Information regarding the St. Pierre Bank contribution comes from tag information provided by DFO on tag returns. Similarly, fish tagged in St. Mary's Bay have been caught in Placentia bay during the fall fishery.

Regardless of the gaps which might be present in fishers' knowledge regarding offshore movements of fish and the role these fish play in the summer fishery, it is obvious that fishers knowledge of the bay stocks can complement the information DFO obtains through research vessel surveys. The coverage and timing of the RV surveys in Placentia Bay suggests that they might miss the areas of greatest concentration of overwintering fish. The 1994 survey extended coverage into the bay on the eastern side of Merasheen Island and occurred in early April.

Fishers contend that cod congregate in deep areas on the western side of Merasheen and would not have been available to survey trawl gear at the time of the survey.

Landings data for the winter and spring fisheries suggest that an increase in fish availability has occurred in the past few years. However, without directly assessing changes in effort, it is difficult to determine the strength of any changes in abundance. Cod trap trends over the past four years may be the most indicative of abundance trends since they are fixed, passive sampling gear. Fishers also contend that cod trap effort in the northern end of the bay has not undergone any large increase in the past four years.

The observations of fishers on the condition of fish and direction of movement is also suggestive. Spring fish are reported to be in poor condition moving south and possibly out of the bay whereas fall and winter fish are bigger, in better condition and moving into the bay. It is possible that the spring observations are made on post-spawning fish dispersing around and/or out of the bay while the fall observations are made on the same stock moving back to the spawning grounds after a season of feeding and growth.

Research Recommendations

Observations from fishers suggest that the regular research vessel groundfish survey does not temporally or spatially reach the locations where cod appear to overwinter in Placentia Bay. Some form of winter survey involving high resolution hydroacoustics might be considered to further describe the limits of the overwintering fish. Input from local fishers should be sought in the design of any survey.

Literature Cited

Davis, M.B. 1992. Description of the inshore fishery during 1991 for 2J3Kl cod as reported by inshore fisherpersons. CAFSAC Research Document 92/37.

Johnson, M. 1992. Lore: Capturing traditional environmental knowledge. IDRC, Ottawa, Ontario.

3PS inshore cod fishery interviews

This project is an effort to use fishermen's knowledge of codfish stocks in 3PS to refine assessments of the status of stocks in the area. The project is co-sponsored by Memorial University and DFO. We are interviewing chairs of fishermen's committees in a large selection of towns in 3PS. A summary of this interview will be mailed to you. If you wish we would be grateful for any comments, reflections or additions you would like to provide after considering the summary. Information which the fishermen provide will be compiled into a report, which, when completed, will be distributed to each fisherman that participated in the study.

1. Years of fishing experience

a. always from this community or where else and how long

b. if experience interrupted find out time frames

2. Age

3. Family fishing history:

a. How long has family been in fishery?

b. Always in this community/region?

c. Did you learn to fish from your father/family?

d. Any formal training received?

4. Last season fished?

In the following questions prompt respondent to go through last season fished in as much detail as can be recalled

5. When did you start fishing?

clarify: was this typical?...

6. What type of gear did you begin with?

clarify: was this typical?...

7. Going through the season in detail, explore each gear change:

When changed?

Why the change?

If hook and line then discuss bait in terms of availability/getting it vis landing levels and choice of gear change and bait fish re. cod movement patterns

Water conditions: temperature, slub and weather patterns

8. Going through the season in detail, explore location of fishing effort (use chart) and note any association with gear changes.

9. Going through the season in detail, explore relative percentage (or more specific) landings each week/month - "meaningful period" - and prompt for association with gear and location...

10. Going through the season in detail, explore changes in size of fish by month (or meaningful period).

11. Going through the season in detail explore changes in characteristics of fish by month (or meaningful period) and prompt for associations. Size, color, health,

NB: parasites (e.g. worms) and color

12. Going through the season in detail explore changes in stock of fish by month or meaningful period and prompt for associations.

13. What do you know about migration patterns of fish in the area? (with chart explore where fish comes from and go to for each type of fishery).
associations with weather,climate change, unusual yrs. etc.

14. Explore knowledge of fish reproduction and spawning in the area.
When?, Where?, Observations of spawning fish and water color.
caplin, herring and other stocks

In the following questions move to the 10 year period:

15. Has pattern of cod fishing changed in past 10 years (allow for as much detail as respondent can recall and prompt for reasons for changes).

a. Patterns within each season (by month/meaningful period) such as migration:

b. gear use/changes: Japanese traps, mesh sizes, etc.

c. location and location changes

d. time of fishing effort

16. Has effort changed in past 10 years (prompt for reasons) and relate to fish caught. Ask about:

    type of nets used
    net days
    trap days
    number of traps
    type of traps
    changes in mesh size
    new boats/motors
    sounders,
    other improvements made to effort

17. Get estimate of fishing costs per season over past ten years (specific as possible) and reason for changes in costs per season...

18. Have catches changed in past 10 years?

    specify amounts as closely as possible
    compare with last year fished and peak season (prompt to relate to costs re. cpue)
    pattern of catch within season

19. Have size of fish changed in past 10 years?

    pattern of fish size within season by month/meaningful period

20. Have characteristics of fish changed in past 10 years? pattern of characteristics within season by month.

21. Have "stock" patterns changed in past 10 years (prompt for stock identification)? (similar to or different from prior to intensive fishing?)

22. Has migration pattern changed in the past 10 years? (With chart explore where fish come from and go for each type of fishery.)
    explore how he knows where fish come from and go (similar to or different from prior to intensive fishing?)

23. With chart explore identification of different "stocks" and ask about
    health of different stocks
    changes in different stocks

24. Explore any changes in the pattern of fish spawning in the past 10 years

25. Explore representativeness of "the community" on respondents overall interview and particularly with regard to opinion on "stocks."

26. Explore fisher's opinion of what the most significant changes in the industry have been since he started fishing.

27. What fishery related groups/organizations have you or do you belong to? (union, committees, associations, etc.)

28. Allow opportunity for respondent to add his own additional thoughts, bring up points he thinks we should be addressing, etc.

Get mailing address and remind that interview summary and copy of the report will be sent when ready. Then we would like to call him and ask if we got it right.

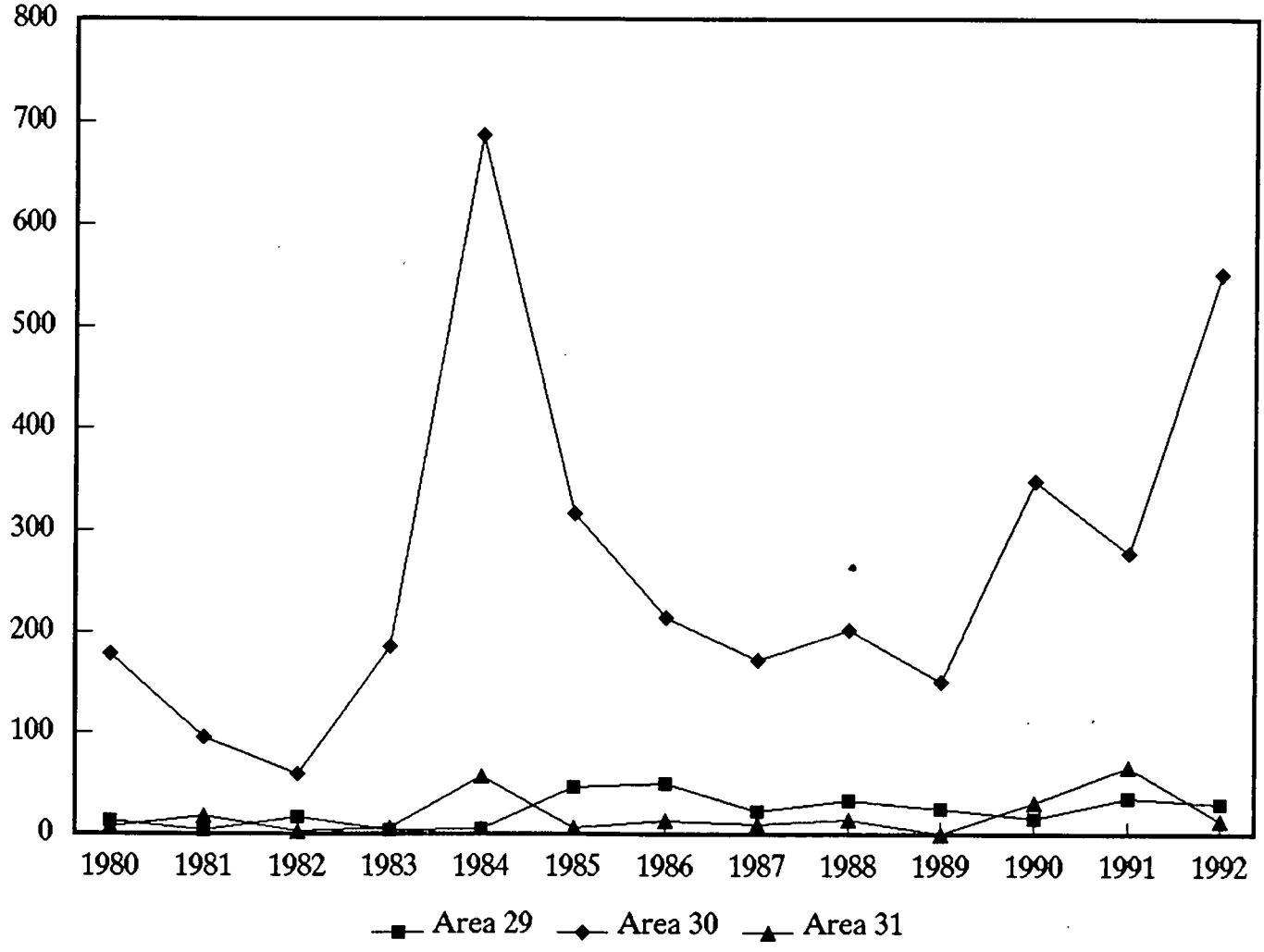

Figure 1. Gillnet landings 1980-93 Areas 29,30,31 for the Winter Fishery (Oct-Mar)

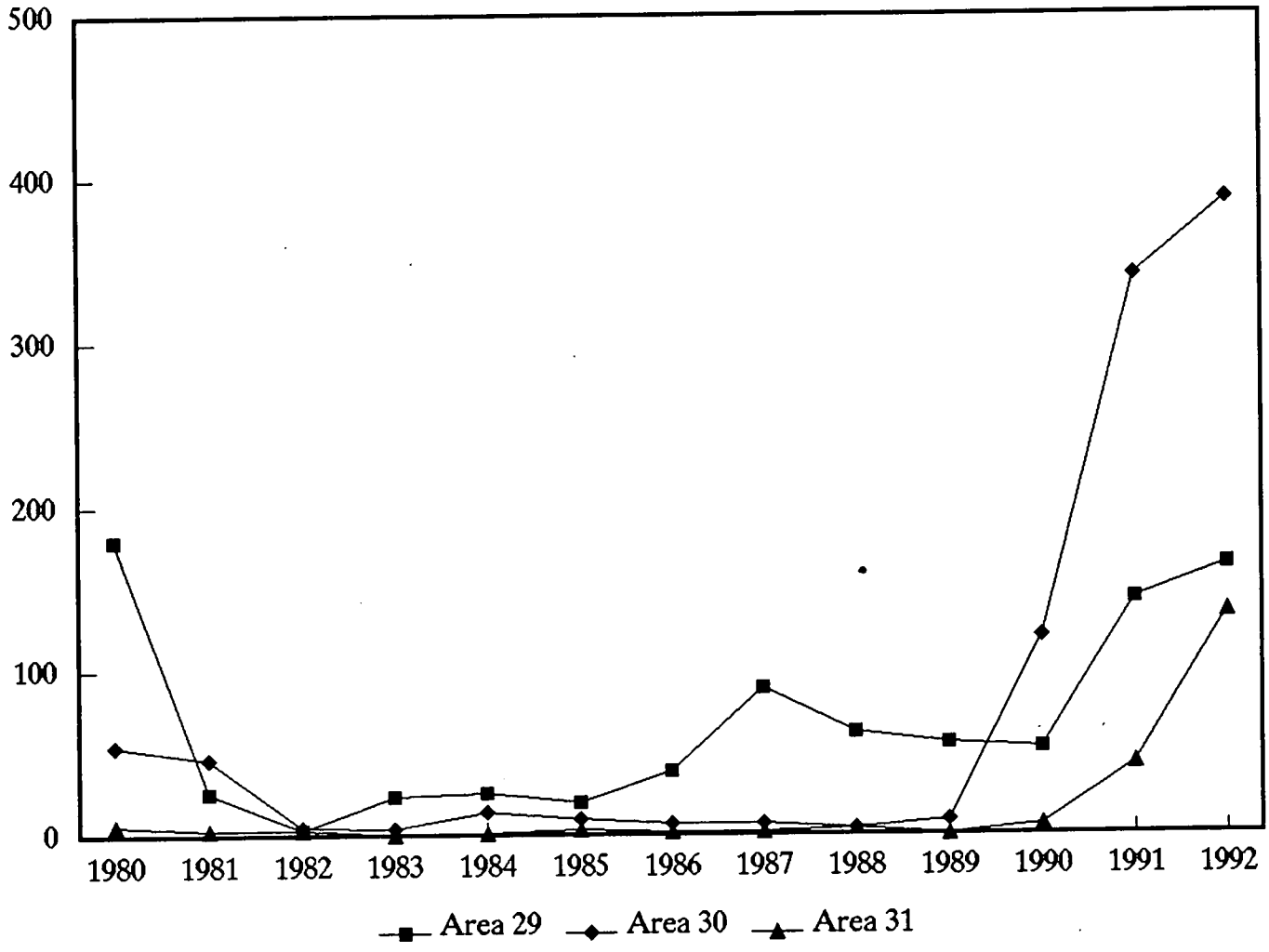

Figure 2. Longline landings 1980-93 Areas 29,30,31 for the Winter Fishery (Oct-Mar)

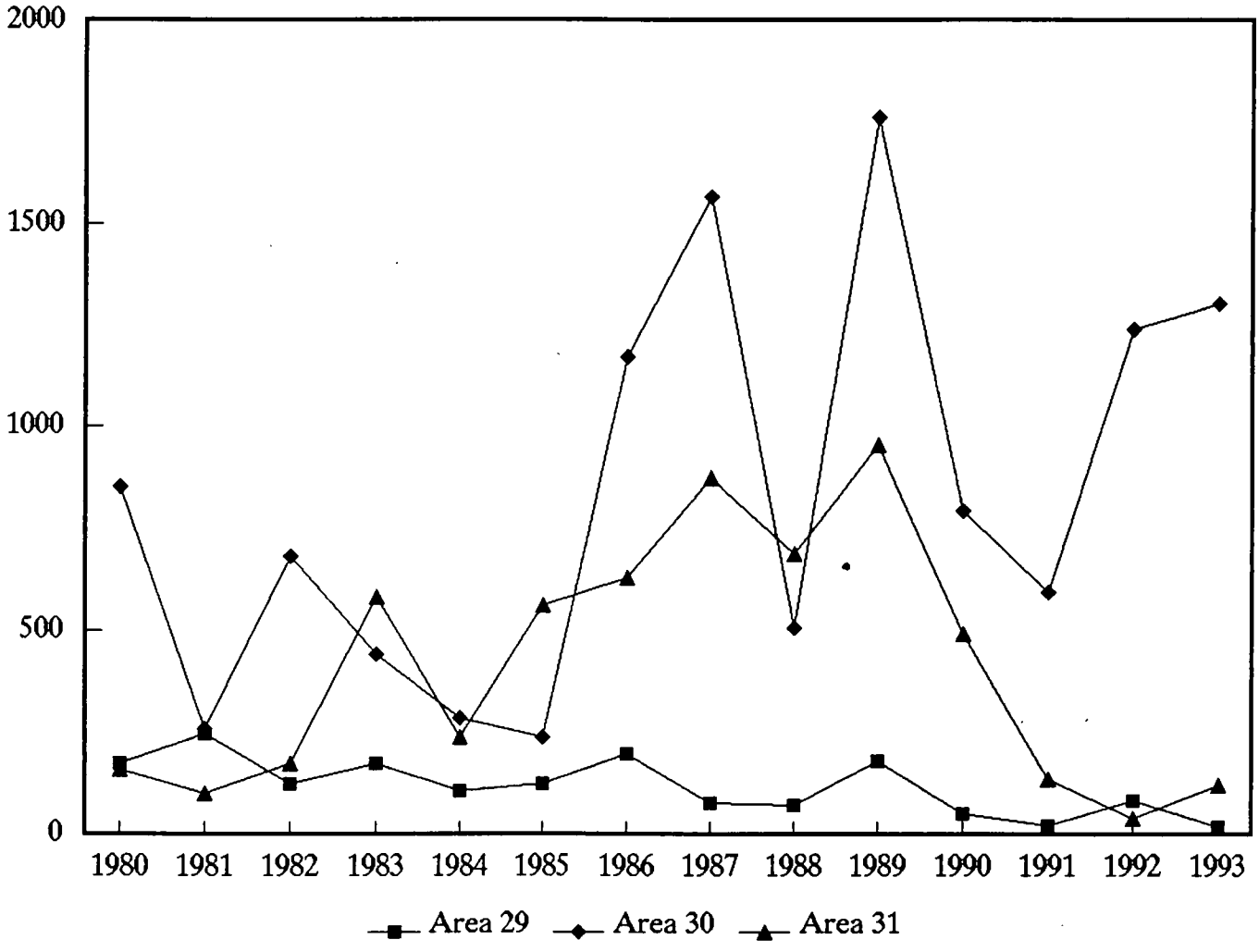

Figure 3. Cod trap landings 1980-93 Areas 29,30,31 for the Spring Fishery (Jan-Jun)