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(Noumea, New Caledonia, 20 - 24 October 1975)

PURSE-SEINING AROUND NEW ZEALAND

by

D. Eggleston
Fisheries Research Division
P.O. Box 19062
Wellington, New Zealand

SUMMARY

Surface schooling fish are abundant around New Zealand but for historical and social reasons pelagic fishing has been slow to develop. Both experimental and small-scale commercial fishing for small fish such as pilchards and anchovy, medium size species such as mackerel and kahawai, and larger fish such as skipjack tuna, indicate that purse-seining would be a successful means of capturing each of these groups of fish. The principal restraint on development is marketing. Before fishery development begins careful evaluation should be given to fishing conditions, fish abundance and behaviour, and likely yields as well as processing and marketing.

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History of Fishing in New Zealand:

Fishing in New Zealand began with the Maori who mainly used set nets, trap nets, beach seines and trolling, among other methods. The European immigrants to New Zealand were largely from the United Kingdom and the fishermen among them, even until recently, have consisted largely of trawler men. There have been few immigrants from the Mediterranean or Asian countries with a tradition of fishing for pelagic species or of regarding pelagic species as of high edible quality. Thus, New Zealand fishermen have a traditional expertise in fishing methods such as lining, bottom set netting, trawling and Danish seining, but no experience in pelagic fishing. The local market is very small and has been easily supplied with large white meat bottom fish, and there has been no development of a local market for the richer, dark meat pelagic species nor for smaller, bonier, and less convenient species. Until recently this resulted in no pelagic fishing except in very limited areas, and little exploitation of pelagic species, except when caught incidentally during bottom fishing.

The Resource:

New Zealand has an abundance of surface schooling fish. This can be considered in three size categories:

1. Small: pilchard, anchovy, sprat, saury, etc.
2. Medium: kahawai, jack mackerel, trevally, Pacific mackerel, koheru, mullets, etc.
3. Large: skipjack, yellowfin, kingfish, barracouta, etc.

Fishery Development

1. Small species:

Presently the only pilchard fishing is for groper bait. This is carried out by the small Italian fishing community in Wellington, and by another group of fishermen of Italian origin in the Marlborough Sounds.

In the 1880's smoked "Pictou bloaters" were produced by four smoke houses and were sold on both local market and exported to Fiji.

From 1942 to 1950 there was a limited amount of pilchard purse-seining to supply a cannery in Picton. The pilchards were shipped to the New Zealand Army rather than sold on the local market.

Landings were initially good but fell off in later years. This decline in the fishery was due to several factors including marketing problems and falling catch rates. The reduction in catch rate was probably due to local overfishing and the vessel used was unable to fish farther afield. Probably the last straw was loss of the net in 1950.

In 1969 and 1970 the N.Z. Government's experimental and exploratory fishing vessel "W.J. Scott", fitted with a large pilchard purse-seine, fished in Tasman Bay and Cook Strait for pilchards. "W.J. Scott" is 29.5 m (96 feet) long and a combination stern trawler/purse-seiner. She used a net 450 m long by 36 m deep 13 mm mesh purse-seine. A dory was used in setting and a power block in hauling. The area is well-sheltered and generally when fishing, waves were less than three feet high. The dory used was unsuitable for work in rough seas. Sets were made on surface schools or on echo-sounder traces. The site of the school found on the echo-sounder was marked by dropping a float and then setting round the float. Catches were generally poor - how far this was due to the lack of skill of the skipper and crew cannot be assessed, but the skipper had no previous fishing experience. The small school size of 0.5 to 30 tonnes (mean about 5 tonnes) was unprofitable for a vessel of this size with six crew under the prevailing marketing conditions. A smaller shallower net, which in turn could be used with less crew would probably have made more money.

In 1972 a smaller vessel, "Rosalind" 16.0 m, with a 275 m net, 28 m deep, and also using a dory in setting and pulling the vessel out of the gear, fished in the Marlborough Sounds. Both day and night fishing were tried over two months. Setting and retrieving time was about 40-65 minutes. Catches per night varied from nothing to 3500 kg, with an average night's fishing of 70-150 kg pilchard live bait. This catch was low because of reduced fishing time, limited areas of operation and the need to construct live bait holding nets after successful sets.

Given an experienced crew with the optimum vessel and gear both day and night, pilchard purse-seining would be successful in the Tasman Bay/Marlborough Sounds, and possibly in other areas, and probably several sets of 3-5 tonnes could be made in a day's (or nights) fishing. The profitability of the venture would depend on catch rates, marketability and processing costs, seasonality, etc.

Anchovy form a variable part of the catch, generally up to 5-20 per cent of the landings in this area. Other fish which would also be caught as by-catch would include kahawai, mackerel and barracouta.

If not sold directly the fish can be used for pole and live bait tuna fishing: indeed in season this might be a more profitable outlet. Other areas where pilchard purse-seining may succeed would be the Bay of Plenty and Northland.

2. Medium size species:

This group includes kahawai, jack mackerel, trevally, koheru and Pacific mackerel. Purse-seining for these species was first tried in 1965 during a demonstration of fishing techniques by a team of Japanese fishing technologists. Kahawai and skipjack were the goal species, but, although fish were successfully surrounded, they were lost due to gear failure.

In 1966 the "W.J. Scott", a trawler/purse-seiner Norwegian vessel, was purchased by the New Zealand Government for experimental and exploratory fishing. She was fitted out for purse-seining with a power block on the stern, a frame and used a dory for setting. Despite the inexperience of her crew the "W.J. Scott" was soon successfully fishing in the Bay of Plenty and Gisborne areas, and made good landings of kahawai and jack mackerel with some trevally, using a net 400 m long by 36 m deep and 63 mm mesh. A large mesh (90 mm) net was also tried but very large quantities of jack mackerel were gilled. The "W.J. Scott's" success was followed by the local construction of the "Kaiti" (21m long) to fish by purse-seining. "Kaiti" hauled the net by power block hung from an aft A-frame and used a dory.

The use of a dory is restricted to good weather conditions and requires an extra crewman. In 1970 the "Kaiti" was replaced by the 23 m "Marine Countess" and returned to trawling. "Marine Countess" is still fishing and has used various nets mostly about 450 m by 55 m deep, and 63 mm mesh. The "Marine Countess" uses the Norwegian pattern of purse-seining which dispenses with the dory, and has regularly landed some 500 to 700 tonnes of kahawai and jack mackerel each year. Her effectiveness could be further increased by fitting of bow and stern thrusters to avoid fouling the net.

In 1974 a further purse-seiner was built by another company. The "F.V. Lindberg" is 23 m long and her net is 640 m by 64 m deep. As yet "Lindberg's" fishing activities have met with very limited success. She uses a dory in setting and hauling.

During 1974 and in early 1975 the United States 40 m long purse-seiner "Paramount" fished around New Zealand as part of a joint Star-Kist Tuna Company/New Zealand Government pelagic fish exploratory survey. "Paramount" met with various logistical and shore support problems, but proved a very effective fishing unit for jack mackerel and other species, catching over 600 tonnes in 16 days' fishing. It was estimated that freed from such shore problems "Paramount" could land 2500 tonnes of mackerel in the period August to December. The "Paramount" survey has now been completed.

There are plans to supplement the purse-seine fleet in the near future by the introduction of two Canadian style drum seiners. The performance of these vessels will be watched with interest as this method of fishing could be most suitable for New Zealand.

3. Large species:

The only successful tuna purse-seining has been by "Paramount" for skipjack. "Paramount" fished the usual United States west coast method with a dory and a 1450 m net. She successfully fished skipjack in January to March 1975, and in 35 fishing days caught 1100 tonnes. Catches could

have been much higher if time had not been lost to repairs and unloading problems. Catches were made mainly in the Bay of Plenty, although seinable skipjack do occur in other areas. The great majority of sets were made within the New Zealand 12-mile limit.

Since "Paramount" demonstrated that skipjack can be purse-seined in the New Zealand areas the local purse-seiners have modified their nets and hope to catch skipjack in the following season, either for canning locally or for export frozen.

Discussion:

Small and medium sized pelagic schooling fish are available in surface schools throughout the year, although they are less abundant and more difficult to catch in winter. Skipjack schools are abundant from November to April.

While there is a possibility of some purse-seine catches all year, for most profitable operation this method is probably best combined with other fishing, such as trawling, in winter. Although most New Zealand purse-seiners have used auxillary dories in setting and to prevent the vessel tangling in the net this limits their operation to very good weather. The "Marine Countess", which does not use a dory, has problems in fouling the net; this can be ameliorated by fitting bow and stern thrusts.

At present purse-seiners shoot only on surface schools: sonar would greatly increase the effectiveness of fishing and would probably also extend the season.

The small school size of pilchard and similar species means that vessels with storage for 5-20 tonnes would be of adequate size. For other species with schools ranging up to 100 tonnes larger vessels have advantages. Pilchard and small species generally occur in sheltered waters, therefore dories can be effectively used. Although calm weather prevails over much of the northern coasts of New Zealand in summer, fishing without a dory would have advantages, especially if fishing is to continue into winter. The Norwegian triple roller system of hauling and then stacking with other blocks aft would appear to be most suitable for New Zealand conditions. Refrigerated brine storage of fish also has advantages for rapid chilling and cool storage of large fish catches.

Conclusions:

Some of the more obvious lessons to be learnt from the New Zealand experience of purse-seining are:

- (a) The size, distribution and population structure of stocks of the goal species should be assessed before capital investment occurs so that information on the resource and its resilience is available to planners. Even general information is valuable. Such information can be obtained from aerial surveys of surface schools, fishermen interviews etc., as well as simple biological information on age, growth rates and population structure.
- (b) Studies on the size of school, seasonality of school sightings, seasonal variations in school behaviour, as well as school distribution in relation to bottom type, bottom depth and sea-state should be made before deciding on vessel size and type, method of setting and retrieving the net and catch, net design, dimensions, mesh size, etc.

- (c) Marketing and processing should be studied so that the appropriate storage method is used aboard the vessel.
- (d) When fishing begins either experienced crew should be used or steps taken to ensure good crew training.

Many of these studies can be made at least at a general and indicative level at very little expense before detailed planning and heavy capital investment begins.

The future of purse-seining around New Zealand depends wholly on the balance between catching and marketing costs in relation to the market value of the products. Substantial schools of pelagic fish, vulnerable to purse-seining and which could give yields of over 50,000 tonnes a year, occur around the coast. A body of data on the seasonality and catchability is gradually building up as well as a core of experienced fishermen. If economic conditions are favourable then purse-seining could be a highly productive fishing method in New Zealand.
