

MARINE RESOURCES SURVEY - New South Wales State Fisheries

Funds were granted to equip the Fisheries Research Vessel "Kapala" with high opening and bobbin equipped hard ground trawls for the trawl fish section of the marine resource survey currently being undertaken by New South Wales State Fisheries.

During 1977/78 the trawls were used extensively on the north coast of New South Wales. Whilst the investigations have added significantly to the existing knowledge of bottom topography, no new resources were located. It would now appear certain that trawl fish do not comprise a major resource and will not provide the basis of a major industry in northern New South Wales.

Unfortunately much of the sea bottom off the north coast which is suitable for trawling appears to support heavy concentrations of stalked invertebrates but virtually no fish or prawns. Most of the remaining bottom is rocky or contains scattered foulds which make it unsuitable for trawling even with the specialised gear used.

Details of this survey were published in Kapala Cruise Reports No.47-54 inclusive. Since no worthwhile additional resources were located the programme was terminated in December 1978 and the equipment used in that programme was redeployed in the winter deepwater trawl fish survey, which commenced in April 1979, with a series of gear trials and underwater observations. The purpose of this programme is to obtain preliminary estimates of stock sizes of gemfish and blue grenadier. Simultaneously data on other species caught incidentally will also be collated for stock estimation. This programme was developed from the previous survey of deepwater trawl stocks (1976-1977) for which an estimate was obtained of about 40,000 tonnes indicated stock of all species. However, the data were not extensive enough to provide good estimates on the principal target species of gemfish and blue grenadier.

Following the trials referred to above the gear was deployed in a sampling programme that extended from eastern Bass Strait to Port Stephens off the central New South Wales coast. The nets have proved particularly effective as sampling gear and excellent data have been obtained.

Details of the work carried out in more southern waters are contained in Kapala Cruise Reports Nos. 56 -59 and subsequent reports currently in press.

Project Supervisor: Dr. D.D. Francois, Director, N.S.W. State Fisheries.

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The Committee expressed strong disapproval concerning submission of a one page report covering three years work; it was considered inadequate for publication and did not contain sufficient information.

The report has been expanded and a copy is attached.

It will be noted in the revised report that the trawls were required to allow effective continuation of the trawl fish survey of the New South Wales coastal shelf and slope, the objectives of which were to chart the trawl grounds in these zones and determine the nature and magnitude of the fish resources on these grounds. Funds to the extent of \$8,000 were approved by the Committee.

The trawl assessment programme is divisible into two main segments, firstly, conduct of a survey of grounds and stocks on the northern New South Wales continental shelf and slope and, secondly, continuation of the assessment of fish stocks on the deepwater grounds from Newcastle to eastern Bass Strait. In addition, underwater observations were made on the trawl gear in Jervis Bay.

Details of the north coast survey were published in "Kapala" Cruise Reports No's. 47-54. Information on the central and south coast surveys have been presented in "Kapala" Cruise Reports No's. 57 and 58 and gear trials in Report 56. Copies are enclosed. Summaries of "Kapala" Cruise Reports have been published progressively in "Australian Fisheries". In addition, as indicated in the revised report, pertinent information on the surveys was presented in the 1977 Trawl and Danish Seine Seminar, the proceedings of which were subsequently published. Relevant information was also included in the paper by N. Crozier and K. Graham, "Development of New South Wales Offshore Fish Resources" presented at the Australian National Fishing Industry Committee Seminar held in Adelaide in August, 1978. Copies of these documents are also enclosed.

Although it is agreed that the report provided did not conform to FIRC requirements, the fact that the "Committee expressed strong disapproval concerning submission of a one page report covering three years work" is not considered reasonable when the true circumstances are taken into account. The nets provided, at a relatively low cost, only comprise a small part of the range of nets and other sampling gear used by "Kapala" and an insignificant portion of the capital expended by N.S.W. State Fisheries on equipment and operating costs. Once appropriate sampling procedures are established, they are not normally an issue so far as surveys and brood stock assessments are concerned and thus provision of a full account of the survey work, as implied by the Committee, would not seem relevant.

#### Fish Product Development

Action is being taken to provide the information requested by the Committee in relation to the above project. However, this is being hampered by the fact that the Senior Technical Officer resigned his position overnight and a subsequent check of Departmental records suggests that a number of files dealing with fish product development were retained by him.

Action is now in hand to obtain copies of the kiln design plans from the consultant draftsman and the missing files. With the Committee's concurrence I would prefer to provide the required information within a month in order that it can be of an acceptable standard.

Yours sincerely,

Donald D. Francois,  
Director of Fisheries.

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MARINE RESOURCE SURVEY, NEW SOUTH WALES STATE FISHERIES -  
REPORT TO THE FISHING INDUSTRY RESEARCH COMMITTEE

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INTRODUCTION

An application was made to the Fishing Industry Research Committee for provision of funds during the year 1976/77 to purchase high opening and bobbin equipped hard ground trawls for the Fisheries Research Vessel "Kapala".

The trawls were required to allow effective continuation of the trawl fish survey of the New South Wales coastal shelf and slope, the objectives of which were to chart the trawl grounds in these zones and determine the nature and magnitude of the fish resources on these grounds. Funds to the extent of \$8,000 were approved by the Committee.

The trawl assessment programme is divisible into two main segments, firstly, conduct of a survey of grounds and stocks on the northern New South Wales continental shelf and slope and, secondly, continuation of the assessment of fish stocks on the deepwater grounds from Newcastle to eastern Bass Strait. In addition, underwater observations were made on the trawl gear in Jervis Bay.

NORTH COAST SURVEY

During 1977/78 the trawls were used extensively on the north coast of New South Wales. On the continental slope previously charted deepwater trawling grounds between North Solitary Island and the Clarence River, and a northward extension of the Sydney-Newcastle ground to the east of Cape Hawke were confirmed. Almost all the ground between Cape Hawke and North Solitary Island, and north from the Clarence River to Danger Point was also confirmed to be untrawlable.

To the north of Danger Point (N.S.W.-Queensland border) some small areas of trawlable bottom were charted. Successful trawls were made in 125, 150, 175, 200, 225 and 300 fathoms.

On the continental shelf several areas of trawlable bottom have been found along the edge of the shelf from Smoky Cape to Danger Point with a large continuous ground in the 70-100 fathom depth range running from Ballina to north of Danger Point. Bottom which appears flat on the echosounders in the 50-70 fathom range between Sugarloaf Point and Smoky Cape was investigated with the 3-bridled trawl but many hook-ups occurred, and/or slabs of rock were picked up in the net. In the Sydney-Port Stephens region, "coral" bottom has been successfully trawled with the 3-bridled trawl.

With reference to fish catches on the slope, the main trawling grounds (Port Stephens-Cape Hawke and North Solitary Island-Clarence River) were sampled several times during the year over the depth range possible on each ground. Fish catches were consistently low during the autumn and spring, but during winter, significant catches of gemfish were taken on both grounds. Catches in excess of 500 boxes a trawl were reported from gemfish vessels which fish the Port Stephens area during the gemfish season.

Using a prawn trawl, catch rates up to 2.5 tonnes/hour of small industrial fish principally three-spined cardinal fish (Apogonops anomalus) were taken on the Clarence River ground during autumn. Schools of these fish were still evident on this ground during subsequent visits to the area, and may possibly provide the basis of a stock-food industry either as fish meal or fish silage.

Fish catches on the continental slope north of Danger Point were disappointingly small during each sampling period. The species composition of the catches was almost identical to catches taken in southern waters during earlier surveys.

On the continental shelf all fish trawls conducted north of Sugarloaf Point produced very small catches (less than 50 kg/hour). Catches with 3-bridled trawl on the coral areas adjacent to Port Stephens and east of Tuggerah Lakes were larger and comprised mainly valuable marketable fish, including jewfish, john dory, snapper and morwong.

Prawn trawls conducted near the edge of the continental shelf off North Solitary Island in October took large catches of 3 spined cardinal fish (0.5-0.75 tonnes/hour), similar to the catches on the continental slope in the same area.

Whilst the investigations have added significantly to the existing knowledge of bottom topography, no new resources were located. It would now appear certain that trawl fish do not comprise a major resource and will not provide the basis of a major industry in northern New South Wales.

Unfortunately, much of the sea bottom off the north coast which is suitable for trawling appears to support heavy concentrations of stalked invertebrates but virtually no fish or prawns. Most of the remaining bottom is rocky or contains scattered fould which make it unsuitable for trawling even with the specialised gear used.

During 1978, moderate quantities of royal red prawns were caught on the newly charted grounds north of Danger Point. However, because of the small trawling area available and problems associated with strong currents and extreme radar conditions, commercial trawling for prawns in this area is unlikely.

Details of the north coast survey were published in "Kapala" Cruise Reports No's. 47-54, copies of which are enclosed.

#### CENTRAL AND SOUTH COAST ASSESSMENT PROGRAMME

Since no worthwhile additional resources were located in northern New South Wales, this segment of the programme was terminated in December, 1978, and the trawls redeployed in further surveys of the winter deepwater trawl fishery on the central and south coast of New South Wales.

The main purpose of this programme was to obtain preliminary estimates of stock sizes of gemfish and blue grenadier. Simultaneously data on other species caught incidentally will also be collated for stock estimation. This programme was developed from the previous survey of deepwater trawl stocks (1976/77) for which an estimate was obtained of about 40,000 tonnes indicated stock of all species.

A stratified sampling strategy, similar to that used in the initial stock assessment programme, was adopted. The depths to be sampled were selected to suit the known depth distribution of gemfish and blue grenadier, the target species. These depths were 150, 180, 190, 200, 210, 220, 250 and 280 fathoms.

Trawls are carried out in each depth on the grounds between Port Stephens and Montague Island and from Eden into eastern Bass Strait as far south as Flinders Island.

Gemfish and blue grenadier were sampled for length frequency and sexual condition, and the first five heads from each centimetre size class collected for ageing by otolith analysis. The data is being used to estimate mortality rates and recruitment. Girth and length data of gemfish were also collected as part of the codend escapement study.

Data on other species are mainly limited to catch weights but some length-frequency data are being collected as time permits. However, full details of size and sexual condition of squid, school sharks, and gummy sharks are being recorded.

The 68 foot headline Boris box trawls, used in the first stock assessment programme were used early in this second programme, but latterly were replaced with larger 56 metre headline Engel balloon trawls. Fishing trials with these nets were first carried out, and then underwater observations made in Jervis Bay to check on modifications to the rig, and measure headline height and wing and door spreads.

In gear trials with the Engel net using 8 foot Vee doors, the spread between the doors was 148 ft and between the wing-ends 78 ft; the headline opening was 18 ft. This compares with the Boris box wing spread of 47-48 ft and headline height of 7 ft.

Details of the observations on the Engel and other trawls used by "Kapala" and "Kamala" are summarised below.

56 m headline Engel balloon trawl:-

The footrope of this net was found to be running about one fathom off the bottom at the design speed of 3.0 knots. Satisfactory bottom contact was gained by removing 20 of the 54 floats. Headline height was about 3 fathoms and wing spread 78 ft. Since this modification, the net has fished successfully although the bulky footrope of 12 inch rubber discs does present some difficulties in shooting from the net-drum.

Three-bridle rigged 68 ft Boris box trawl:-

This rig was modified from the 1978 rig to alleviate the stress evident at the first seizing of the footrope to the fishing line in the bosom. Four additional toggles along the wing were seized to the fishing line and a much better configuration was observed. A 3 ft extension piece in the centre bridle was also removed and this also appeared to distribute the towing strain more evenly.

88 ft headline Kapala prawn trawl:-

This is a longer winged version of the "Kapala" 6 seam trawl. Observations showed that modified tapers in the upper and lower bosom relieved previously stressed areas. The rubber disc ground rope in the wings were seen to be riding clear of the bottom but short pieces of chain added to the wings overcame this.

75 ft Seibenhausen prawn trawl:-

In action mouth and wing shapes were good and the net was stretched very tightly between the doors. However, typical of this style of net, there was a very marked constriction between the upper and lower bellies and the codend, and a lot of fish were observed trapped against the netting in this area. Groundrope contact with the bottom was light with the chain just touching the tops of the sand ridges.

In the trawling survey fifteen cruises were carried out to the end of October, 1977, between Port Stephens and eastern Bass Strait. Continual bad weather with S.W. winds of force 6-7 was experienced during southern cruises to Bass Strait and precluded working further south than the vicinity of Gabo Island.

During July the Eden-eastern Bass Strait area was surveyed using the standard foot Boris trawls. The overall catch rate of 240 kg/hour of all fish was low compared to previous surveys in 1977. Table 1 shows a summary of Eden area surveys.

TABLE 1: TOTAL FISH CATCH RATES FOR EDEN SURVEYS

Survey Period	Overall Catch Rate (kg/hour)	Catch rate (kg/hour)	
		120-210 fm	220-300 fm
March, 1977	720	250	1276
July, 1977	380	355	540
October, 1977	800	665	1100
July, 1979	240	265	220

Markedly reduced catches of morwong, ocean perch and dogfishes and increased catch rates for nannygai and ling were experienced. Table 2 summarises these results.

TABLE 2: CATCH RATES OF IMPORTANT SPECIES FOR EDEN SURVEYS

	Depth	CATCH RATE (KG/HOUR)					Dogfish
		Morwong	Nanngai	Ocean Perch	Ling	Blue Grenadier	
March, 1977	120-210 220-300	40	-	80	30	17	750
July, 1977	120-210 220-300	55	140	55	65	14	240
October, 1977	120-210 220-300	190	30 70	90	90	155	230
July, 1979	120-210	-	200	-	105	20	65

In July, 1979, catch rate was 35% lower than for the corresponding period in 1977. However, both the July surveys indicated a low level of stocks for that time of the year compared with other survey periods. It should also be noted that during May and June immediately prior to this survey, the area had been intensively fished by the Eden fleet resulting in heavy landings of gemfish and blue grenadier. This fishing activity may have produced some localised depletion in the area.

Further deepwater trawling was carried out using the Engel trawls during the remainder of July, August and September between Port Stephens and Bateman Bay. Although trawling was concentrated in the appropriate depths for gemfish only small quantities of this species were taken. Very large catches of ribbon fish were made, i.e. 7-10 tonnes per two hour tow, particularly north of Sydney. The fish were running ripe and they were concentrated densely enough to be detected by the echo sounders.

No spent gemfish were caught during July and early August and many females appeared in fact to be several weeks away from spawning.

Of particular interest was the capture of juvenile blue grenadier between Sydney and Port Stephens. Previously only an occasional adult had been caught this far north and juveniles had never been recorded by us north of Jervis Bay. The recently completed Eden Survey in October resulted in the capture of significant quantities of juvenile and adult blue grenadier.

Charts of the south coast trawl fish grounds surveyed by Kapala were published and distributed to trawl fishermen. These charts seem to have been well received and appear to be in every day use.

Details of the central and south coast surveys have been presented in "Kapala" Cruise Reports No's. 57 and 58 and the gear trials in Report 56. Copies are enclosed.

In addition, pertinent information on the surveys was presented in the 1977 Trawl and Danish Seine Seminar, the proceedings of which were subsequently published. Relevant information was also included in the paper by N. Crozier and K. Graham, "Development of New South Wales Offshore Fish Resources" presented at the Australian National Fishing Industry Committee Seminar held in Adelaide in August, 1978. Copies of these documents are also enclosed.

#### CONCLUSIONS

1. The high opening and bobbin equipped hard ground trawls, purchased with funds provided from the Fishing Industry Research Trust Account to supplement existing gear, proved highly effective for resource sampling.
2. Surveys of the shelf and slope zone in northern New South Wales indicated trawl fish do not comprise a large resource and will not provide the basis for a major industry in the area.
3. Stock surveys of the deepwater trawl fish resources on the central and southern coast of New South Wales were continued as part of an intensive and long term assessment programme. Reliable assessment data cannot be expected for some time.
4. Details of the surveys have been published in the "Kapala" Cruise Report series. These have been progressively summarised in "Australian Fisheries". Pertinent information has also been reported in other publications as indicated in the above report.