AN ANALYSIS OF FISHING ACTIVITIES ON POSSIBLE PREDATORS OF THE CROWN OF THORNS STARFISH (*Acanthaster planci*) ON THE GREAT BARRIER REEF.

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ABSTRACT

This study investigated the available sources of reef fish catch data for the Great Barrier Reef, and sought to establish a database of such information. Commercial records, provided by the Queensland Fish Board, of estimated landings of 9 demersal reef fish species were analysed for the last 25 years, by region. Estimates of annual landings and changes in the relative composition of these species were examined. Other commercially important species were entered in the database, but not considered in the report. Available information on spearfishing and charterboats operations were also collated and catch per unit estimates were calculated.

It is impossible to evaluate any fishing effects based on the available data. All the results provided in this report were based on data which is both inconsistent and largely inaccurate. These problems make the results speculative, and as such they should be considered as indicating trends rather than absolute values.
A number of sources of information were identified in the course of this study, which may in the long term provide the necessary data on which to base such evaluations.

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ABBREVIATIONS USED IN TEXT

A.F.I.C AUSTRALIAN FISHING COUNCIL

A.F.S. AUSTRALIAN FISHERIES SERVICE.

COMMONWEALTH D.P.I. COMMONWEALTH DEPARTMENT OF PRIMARY INDUSTRIES (See also Q.D.P.I.)

C.P.U.E. CATCH PER UNIT EFFORT

C.S.I.R.O. COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION

F.I.R.T.A. FISHING INDUSTRY RESEARCH TRUST ACCOUNT.

GBR GREAT BARRIER REEF

G.B.R.M.P. GREAT BARRIER REEF MARINE PARK

G.B.R.M.P.A. GREAT BARRIER REEF MARINE PARK AUTHORITY

N.F.B. NORTHERN FISH BOARD

N.F.I.C. NATIONAL FISHING COUNCIL

Q.C.F.O. QUEENSLAND COMMERCIAL FISHERMEN'S ORGANISATION

Q.D.P.I. QUEENSLAND DEPARTMENT OF PRIMARY INDUSTRY

Q.F.B. QUEENSLAND FISH BOARD

Q.F.M.A. QUEENSLAND FISH MANAGEMENT AUTHORITY

PART 1: INTRODUCTION

CHAPTER 1: RATIONALE AND CONCEPTUAL FRAMEWORK

1.1 AIMS

This study seeks to fulfill two purposes.
(1). Specifically to compile the available catch records of possible predators of the crown of thorns starfish, *Acanthaster planci*.
(2). To establish a framework for a database of fisheries related information on the Great Barrier Reef. The rationale and conceptual framework needed to implement these two aims are outlined in the following sections.

1.2 RATIONALE

Over the last 25 years a number of hypotheses have been formulated to account for the occurrence of `outbreaks ' of large feeding aggregations of the coral feeding asteroid *Acanthaster planci*. This species causes extensive damage to coral reefs throughout most of the Indo-west Pacific (Endean & Stablum, 1973; Birkeland, 1982; Moran, 1986).

Of the several hypotheses that focus on man-induced causes of *A.planci*, the predator removal hypothesis first proposed by Endean (1969) has received the most attention in the scientific literature (Moran, 1986), and the media (Raymond, 1985). This hypothesis emphasizes that outbreaks are unique events which arise because man has removed the predators of the starfish. Initially the major predator controlling starfish numbers on the reef was thought to be the giant triton *Charonia tritonis* (Endean, 1969). In more recent years Endean (1977, 1982) has extended the hypothesis to include the effects of fish predators such as the groper *Pomicropslanceolatus*.This extended version of the hypothesis stressed that *Charonia tritonis* was a major predator of large juvenile and small adult starfish whereas *P. lanceolatus* preyed on juvenile *A.planci* (Moran 1986). Endean (1982) further claimed that the collection of triton shells and overfishing on some reefs may have been responsible for the more recent outbreaks on the Great Barrier Reef. The maori wrasse, *Cheilinus undulatus* has also been proposed as a potential predator of juvenile starfish (Endean, 1982).
A number of other species have been observed to feed on *A.planci* in the Red Sea (e.g *Balistoides viridescens, Pseudobalitstes flavimarginatus*, and *Arothron hispidus*), (Ormond &Campbell, 1974). These were not included in the hypothesis as it was doubted whether they were important predators on the Great Barrier Reef (Endean, 1982).

More recently, indirect evidence from a preliminary gut analysis study found fragments of *A.planci* in the guts of the commercially important spangled emperor, *Lethrinus nebulosus* (Birdsey, 1987).These fragments were estimated to be from an adult starfish with an estimated diameter of 400mm. However it is not clear whether the starfish was alive or dead when eaten. Indeed Glynn (1984) found that a variety of different animals including polychaetes, crustaceans, and fish fed on starfish which were either mutilated or dead. Alternatively, it could be evidence of sublethal mortality (Zann et al., in press), a result of the removal or mutilation of an arm. Regardless, *L.nebulosus* warrants further investigation as do a number of other commercially important sedentary reef species.

Based on the above rationale, this study was undertaken to examine catch rates of potential predators of echinoderms on reefs of the Great Barrier Reef. The available estimates of commercial catch records of species of commonly caught reef fish for the last 24 years were examined.Yearly and regional differences in official landings of both individual fish species and combined total reef fish estimates were examined. Available spearfishing and charter boat records were also compiled, and the catch rates examined both regionally and temporally. Recreational fishing is considered superficially in Chapter 10.

1.3 CRITERIA FOR DATABASE ESTABLISHMENT

1.3 (i) MANAGEMENT REQUIREMENTS

A comprehensive database is essential for successful fisheries management (Crutchfield, 1986). This should incorporate accurate and up to date records indicating catch by species, the areas caught and the port landed, as well as some measure of fishing effort. Records of licensed fishing vessels and their general fishing characteristics are also imperative.
Furthermore, management's ability to access the database will affect the quality and timeliness of research commissioned and the success of resultant policy (Beurteaux, 1987).

1.3 (ii) ESTABLISHING A DATABASE

In compiling a database that would be of use in management decisions in Queensland, one has first to identify the sources of information and secondly to assess their accuracy.
In the case of Queensland this is notoriously difficult and an understanding of the history of Queensland fisheries is therefore essential. This is outlined in section 2.4. The lack of comprehensive records from any one data source has resulted in the compilation of a number of information sources which differ widely in their accuracy and comprehensiveness and so, in turn, must be interpreted differently and with caution.

1.4 CONCEPTUAL AND DATABASE FRAMEWORK

1.4 (i) CONCEPTUAL FRAMEWORK

Due to the lack of any consistent and accurate catch records for Queenland reef fisheries, this study was originally envisaged as drawing on a number of sources of information, for collation into a cohesive database.
Two differing perspectives were envisaged to best evaluate the long term effects of fishing activities on potential predators of the starfish *A.planci*.

Firstly, a long term regional perpective provides the major focus on regional and temporal differences of Queensland fish production. It identifies annual trends in actual landings and changes in the relative composition of major reef fish species expressed as a percentage of the total landings for each port. This perspective is more fully outlined in the following section.

Secondly, a detailed biological perspective focuses on the relative abundance and size range of demersal reef fish species. A detailed study of two specific localities, Boult reef in the Capricorn-Bunker group and Cairns area reefs is made.

However, due to the unavailability of data at the completion of this study, the original conceptual framework had to be abandoned. As it stands the original framework is still sound. In the event of these other data sources becoming available it is recommended this framework be utilised. These projects, their estimated time of completion and relevance to management are detailed in Chapter 13.

1.4 (ii) A LONG TERM REGIONAL PERSPECTIVE

Catch records and production figures for the commercial fishery were used to assess the following:

(a) Queensland total reef fish production.

(b) The relative importance of individual species in Queensland.

(c) Regional contrasts of fisheries production, catch composition, fishing techniques, and industry differences.

Commercial annual production figures for individual species by landing region are taken from Queensland Fish Board (Q.F.B.) annual reports from 1957 to 1981. Lamentably no records were available after this date, though a number of sources were investigated (Q.F.M.A, and fish processors).

CHAPTER 2. AN OVERVIEW OF QUEENSLAND FISHERIES

2.1 INTRODUCTION

The commercial fishing industry in Queensland is one of the largest in Australia, second in value only to Western Australia.The proportion of fish caught by the amateur fishery in Austalia has not been determined, but in 1976-77 an estimated 27% of fresh and frozen fish was believed to have been caught by leisure fishermen. However, unofficial sources within the industry suggest the total value of production may be as much as 2-3 times the official figure. There are a large number of amateur fishermen who sell all, or at least part of their catch.This group could be described as professional amateurs and their activities can impinge heavily on operations of the commercial fishermen. It is estimated that greater than 50% of the total catch is traded on the black market.

The most important edible fish caught around Queensland are mullet (Mugildae), mackerel (Scombride), bream (Sparidae), whiting (Sillaginidae),and giant perch (barramundi). Reef fish species caught by line fishermen comprise about 15-20 % of the total estimated landings. Most commonly caught are coral trout (*Plectropomus* spp.), sweetlip (Haemulidae), emperor (Lethrinidae) and cod (Serranidae). Assorted mixed reef fillets form a substantial part of total landings of reef fish.

In general it appears that the traditional fisheries are nearly fully exploited. Seefried (1983) noted over the 5 year period 1976 to 1981, fin fish production in Queensland waters had remained reasonably static but in some cases had declined (emperor, snapper, threadfin salmon, whiting, and flathead).

Management policies are needed to overcome resource depletion, to conserve the income of commercial fishermen and to resolve conflicts between recreational and commercial fishing

2.2 METHODS OF REEF FISHING

Reef fish are taken by fishermen engaged in a number of fisheries (e.g. prawn and mackerel) and in most cases reef fish provide only a supplement to other fishing methods. Most vessels are capable of being used for reef fishing, and consequently the majority carrying line fishing licenses.

Optimum locations sought by commercial fishermen are areas adjacent to, but clear of submerged reef, bommies and reef outcrops, in depths of between 4 and 14 fathoms. The fish are taken by handlines which are rigged and baited according to the prevailing conditions and the individuals"

preferences. The quantity caught is largely determined by an individual fishermen's experience and skill, but is generally between 10-100 kg of marketable fish per day. The bulk of commercial reef catch is held on ice and unloaded as fresh fish or as fish fillets.

2.3 REGIONAL DIFFERENCES IN LINE FISHING OPERATIONS.

Reef fishing by handline is carried out along the entire east coast though few fishermen work north of Cape Flattery. Little data exists regarding the number of people in the industry. Williams (1980) found 156 professional fishermen were registered as primary reef fishermen in 1979 (or 5.9 % of total number of professional fishermen in Queensland) and 112 in 1980 (4.9 %). The majority of fishermen were found to work in one `fishing area' only, although 25% operated in two. Many were reported as considering reef fishing as a secondary or tertiary form of fishing. The percentage of part-time fishermen was estimated at 12 %.

2.4 HISTORY AND STRUCTURE OF FISH MARKETING IN QUEENSLAND.

This section provides a general outline of the background from which the Queensland fishing industry has developed over the last 30 years and gives an understanding of the problems associated with consistent data records.

2.4 (i). Queensland Fish Board.

Until 1982 marketing of fish was controlled by the Fish Supply Management Act (1972), which established the Queensland Fish Board (Q.F.B.) as the statutory marketing authority for the fishing industry. The Q.F.B. was responsible for the marketing of fish catches in certain sections of Queensland which had been declared fish supply districts. Previously, from 1966 to 1973 the North Queensland Fish Board had been responsible for the marketing of fish caught north of Rockhampton.

On 25th March 1982, the Queensland Fishing Industry Organisation and Marketing Bill was passed, mainly as a response to the poor financial situation of the Q.F.B., and the demands from the fishing industry to reorganise the marketing of fish. The Act included provision for the institution of a new authority termed the Queensland Fish Management Authority (Q.F.M.A.). The Act made the Q.F.M.A responsible for the coordination and control of marketing, production, licensing, product quality standards, and fish promotion (Queensland Statutes, 1982). It also made provision for the compilation of monthly returns from seafood wholesalers and processors in order to provide an accurate catch database.The Q.F.B.'s regulatory functions were ceded to the Q.F.M.A., however the board was retained to operate in the role of a trader on an equal

footing with the private industry. By giving fishermen the choice of selling their product through the Fish Board, or other licensed processors, it was hoped that black market sales would be reduced (Seefried, 1983).

Today the Q.F.M.A. is closely associated with the Queensland Department of Primary Industries (Q.D.P.I.) who appoints it's members in association with the Queensland Commercial Fishermens Organisation (Q.C.F.O.). The fishing Industry in Queensland may also lobby the State minister for Primary industry, who has the final say regarding state fisheries policy, through the National Fishing Industry Council (N.F.I.C.). The N.F.I.C. came into being during 1986 when fishermen expressed dissatisfaction with the former national body, the Australian Fishing Industry Council (A.F.I.C.), (Gray & Spencer, 1986).

2.4 (ii) Black Market.

In major ports such as Southport, Scarborough, Townsville, and Cairns it has been estimated that more than 50 % of the total catch, caught by profesional fishermen is traded on the black market. In addition, it is estimated that 75% of amateur fishermen sell part or all of their catch on the black market, or to private processors (Q.D.P.I., 1980). The Fish Supply Management Act (1972) required all fish and seafood caught within the fish supply district and destined for sale in Queensland to be delivered to the fish board. However, due to dissatisfaction with the Board's marketing performance, fishermen continued supplying the black market. The 1982 Queensland Fishing Industry Marketing and Organisation Act incorporated some of the recommendations of the committee so that fishermen have the choice of selling their product through the Q.F.B., fishermen's cooperatives or licensed private processors and wholesalers.

2.5 OTHER STUDIES

Williams (1979, 1980) undertook an analysis of commercial fishing operations in Queensland, examining the number of fishermen, areas fished, mobility, periods spent fishing, location of home port, and subsidiary fishing activities.

Reports describing the general nature of the commercial fisheries in the Capricornia section have been compiled in a joint effort by Q.D.P.I. and Q.C.F.O (1977) and by GBRMPA (1979). Fishing related activities in the Cairns Section are described in publications by Haysom and Mcpherson (1978), Q.D.P.I. (1980) and zoning recommendations by GBRMPA (1981). Information on the economic characteristics of the recreational and commercial fisheries in the Great Barrier Reef region are detailed in Hundloe et al, (1980); Hundloe, (1981); Hundloe et al (1981); Driml, (1980); Driml et al (1982); Bandaranaike, (1981); and Jensen, (1979). These studies provide regional and total estimates of capital and recurrent expenditure, incomes, values of catches, and consumption of seafood.

PART 2: METHODOLOGY

CHAPTER 3: METHODOLOGY FOR COMMERCIAL FISHERY ANALYSIS.

3.1 INTRODUCTION

The analysis and subsequent outcome of a study is affected by the quality and consistency of the available data sources. The objective of examining the commercial fishing industry on the Great Barrier reef was to investigate the composition and annual catch trends of potential predators of *A. planci*. A secondary objective was to establish a framework for the establishment of a fisheries database that would provide information on which to base management decisions. Intrinsic to both these objectives is the identification of all relevant available data sources. Accordingly, other data sources and future developments pertaining to commercial fishing are outlined in chapter 4.

3.2 SOURCES OF INFORMATION

Annual Queensland Fish Board records of landings by Port were the only data available for analysis. These records list the total quantities of fish and shellfish received at various Q.F.B. markets and depots throughout Queensland. Data were collated from 1957 to 1981 when the major responsibilities of the Queensland Fish Board became largely defunct. A number of these commercially important demersal reef species are examined in detail to provide estimates of the rate of exploitation of reef fish. The justification for species selection is outlined below.

3.3 JUSTIFICATION OF SPECIES SELECTION FOR ANALYSIS

Thirty two varieties of fish are recorded in the Q.F.B.records. Although species such as Mullet (Mullidae) and Whiting (Sillaginidae) form a major part of the total estimated Queensland fish production, they are disregarded from examination as they are coastal and estuarine in habit and are not commonly taken on line. Likewise, Mackerel which represent approximately 30 % of the total estimated landings is excluded on the basis that it is pelagic and piscivorous in nature. Other species such as snapper, *Chrysophrys auratus* have a southerly distibution and are rarely encountered on the GBR. Estimates of landings of these species by regional fish depot are available in the database for viewing.Table 3.1 lists the scientific names of those species included in the Q.F.B records and gives their known distribution and common habitat.

Regional estimates of landings and percentage composition of sweetlip, *Lethrinus chrysostomus*;

emperor, *Lethrinus nebulosus*; coral trout, *Plectropomus* sp.; morwong, *Plectorhynchus pictus*; nanygai, *Lutjanus malabaricus* were chosen to indicate the rate of exploitation of reef fish. Mixed reef fillets were also considered as they form a substantial part of reef fish landings. Apart from the spangled emperor *Lethrinus nebulosus*, which has been identified as a possible predator or at least an active opportunistic scavenger of the crown of thorns (Birdsey 1987, unpub GBRMPA), no other commercially fished species have been identified as likely predators. The justification for the inclusion of the other 4 species is as follows.

1. All are large resident demersal fish on coral reefs.
2. All are benthic omnivorous feeders.
3. All are commercially caught fish on coral reefs.

The biology and information available on each species is summarised below. The species code and common species names given are those provided by the Queensland Department of Primary industries publication "Recommended Marketing Names for Fish" (1985).

EMPEROR

Scientific Name: *Lethrinus nebulosus* **DPI CODE:** 4066

Other names: SPANGLED EMPEROR; YELLOW SWEETLIP

Biology

Reaching a length of up to 860mm it is common fish in offshore waters from Gladstone north. Although it is a good marketable species it does not find as ready sale as it should, principally because the percentage recovery of fillets is relatively low (Grant, 1982). Walker (1978) notes this species is a carnivorous bottom feeder, feeding mostly on crabs and sea urchins.

SWEETLIP

Scientific Name: *Lethrinus chrysostomus* **DPI CODE:** 4064

Other names: LIPPER; RED THROAT; TRICKY SNAPPER

Biology

The most common Emperor on the Great Barrier reef, it is taken by line fishing from Gladstone north. This fish may reach a length of 900mm and a weight of 9 kg. Walker (1978), examining the dietary habits of this species found it fed on 240 separate food items, the most important being crabs (34.7% diet composition), sea urchins (15.9%), bivalves (5.2%), gastropods (4.9%) and fish (3.1%).

NANYGAI

Scientific Name: *Lutjanus malabaricus* and *L.sebae* **DPI CODE:**4053

Other Names: SCARLET SEA PERCH; RED EMPEROR; RED JEW; RED SNAPPER

Biology

The similarity of *L.malabaricus* to the true red emperor *L.sebae* has resulted in both species being marketed under the same name. More common on the northerly reefs it forms mixed schools with the saddle tailed sea perch *Lutjanus sanguineus* Birdsey (1987) noted the importance of crab in this species diet (57%). Echinoids also formed a significant component of the diet but gastropods and bivalves seemed relatively unimportant.

CORAL TROUT

Scientific Name: *Plectropomus spp.* **DPI CODE:** 544

Biology

Plectropomus leopardus is the most commonly caught species of trout with *P.maculatus* more common in inshore areas. Growing to at least 480mm, coral trout is a commonly sought species owing to it's premium market price. In general fish caught are between 2 and 4 kg. Coral trout are carnivorous benthic and piscivorous feeders.

MORWONG

Scientific Name: *Plectorhynchus pictus* **DPI CODE:** 502

Other names: PAINTED SWEETLIP, MOTHER-IN-LAW, SLATE BREAM

Biology

Probably the commonest morwong, *P.pictus* is abundant on reefs and in estuaries along the entire Queensland coastline. However a number of more edible species are marketed under this name including *P.goldmanni*, *P.chaetodonoides* and *P.flavomaculatus*. All are carnivorous benthic feeders.

COD

Scientific Name: *Cephalopholis spp.*and *Epinephalus spp.*

Other Names: GREASY COD, GROPER, FLOWERY COD

Biology

Referring to a variety of serranid species, all of which are omnivorous benthic feeders. Species are found in all habitats along the entire Queensland coastline.

BREAM

Scientific Name: *Acanthopagrus australis* **DPI CODE:** 476

Other Names: SILVER BREAM, SEA BREAM

Biology

Found along the entire Queensland coast, though more common in southerly regions of the reef. Bream are carnivorous benthic feeders, predating on a wide variety of crustacea and small fish.

PARROT FISH

Scientific Name: *Bodianus perdito* and *Choerdon* sp.

Other Names: TUSK FISH, GOLD SPOT PIGFISH

Biology

Bodianus perdito is more common in southern Queensland waters, whilst *Choerdon* sp. are common along the entire GBR. All are omnivorous benthic feeders.

3.4 REGIONAL SECTIONS

Some 31 processing plants were under the control of the Q.F.B. Seventeen of these are within the bounds of the Great Barrier Reef Marine Park.
To best reflect any regional differences in species composition and catch rates, the G.B.R has been partitioned into four `Regional Fisheries Sections' (Table 3.1). These can be regarded as the primary catch area for fish processed at adjacent shore based processing plants within these Fisheries Sections. The broad spatial scale adopted is a result of the resolution of the available data. As no actual catch per unit area data was available, the best that can be inferred is that there was a greater likelihood of the fish being caught within the Fisheries Section adjacent to the port of landing, than in any other Section.

The Northern, Central, and Capricornia fisheries sections are based on the the GBMRPA zoning sections of the G.B.R. The Northern Fisheries Section incorporates both the GBRMPA Far Northern and the Cairns-Cormorant pass Sections. The Central and Capricornia Fisheries Section are identical to those GBRMPA zoning sections of the same name. The Southern Fisheries Section lies outside the bounds of the Great Barrier Reef, but the fish depots in this section process fish caught from the reef which is shipped down.

Fig. 3.1. Map of areas designated as fisheries sections.

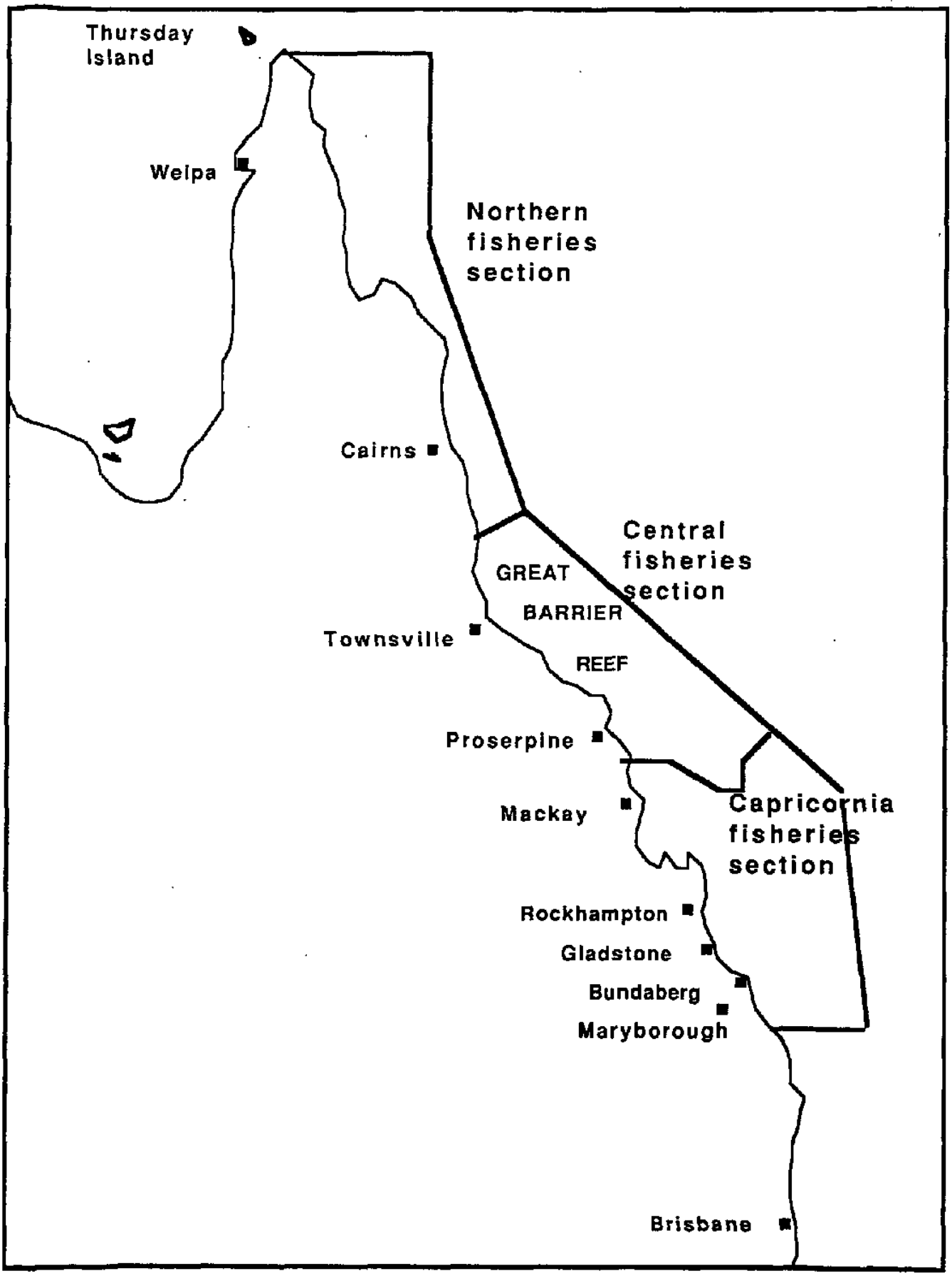


TABLE 3.1:SPECIES OF FINNED FISH RECIEVED BY THE QUEENSLAND FISH BOARD.

HABITATS	METHOD	DISTRIBUTION
C: Coastal	LF: Line fishing	A: All of Queensland
E: Estuarine	N: Netting	N: North of Bundaberg
R: Reef	SN:Set netting	S: South of Bundaberg
	T:Trawling	
	TN:Tunnel netting	

VARIETY	SCIENTIFIC NAME	DPI CODE	HABITAT	METHOD	DISTRIBUTION
Barramundi	*Lates calcarifer*	552	C/E	N	N
Bream	*Acanthropagrus australis*	476	C/E/R	TN	A
Bream(Black)	*Acanthropagrus berda*	477	C/E/R	TN	A
Cod	Various Serranid species		C/E/R	LF	A
Dart	*Trachinotus bailloni*		C/R	N	A
Emperor	*Lethrinus nebulosus*	4066	C/R	LF	N
Flathead	*Platycephalus* spp.	616	C/E	TN	A
Gar	*Hemiramphus* spp.	710	C/E/R	IN	A
John Dory	*Zeus faber*	750	T	S	S
Jew	*Argyrosomus hololepidotus*	510	C/E	LF	S
	Protonibea diacanthus	510	C/E	L/F	N
Kingfish	*Seriola lalandi*	421	C/R	TR	A
Mackerel	*Scomberomorous* spp.	330	C/R	TR	A
School Mackerel	*S.queenslandicus*	331	C/R	TR	A
Morwong	*Plectorhynchus* spp.	502	C/E/R	LF	A
Mullet	*Mugil cephalus*	321	C	N	S
Nanygai	*Lutjanus malabaricus*	4053	C/R	LF	N
	L.sebae		C/R	LF	N
Parrot	*Bodianus perdito*		C/R	LF	N
	Choerdon spp.		C/R	LF	N
Pike	*Sphyraena obtusata*	375	C/R	LF	S
Ray	various species		C/E/R	N/T	A
Salmon	*Arripis trutta*	490	C/E	SN/TR	A

VARIETY	SCIENTIFIC NAME	DPI CODE	HABITAT	METHOD	DISTRIBUTION
Sampson	*Seriola hippos*		C/R	TR	S
Shark	various species	660	C/R	LF	A
Snapper	*Argyrops spinifer*		C/R	LF	A
Snapper	*Chrysophrys auratus*	495	C/R	LF	A
Squire	*Chysophrys auratus*	495	C/R	LF	S
Sweetlip	*Lethrinus chrysostomus*	4064	C/R	LF	N
Tailor	*Pomatomus salatrix*	420	C/E	N	S
Trevalli	*Caranx sexfasciatus*	402	C/E/R	N	A
Coral trout	*Plectopomus* spp.	544	C/R	LF	N
Trumpeter	*Pomadasys* spp.	535	C/E	LF/N	A
Tuna	*Thunnus* spp.	352	C/R	LF	A
Whiting	*Silago* spp.	521	C/E	N	S
Yellowtail	*Trachyurus novozealandiae*	C/R	N	A	A
Mixed fish	Other fish				

TABLE 3.2. REGIONAL SECTIONS AND QUEENSLAND FISH BOARD DEPOTS

REGIONAL FISHERIES SECTION	FISH BOARD DEPOT
1. NORTHERN SECTION	
Cape York-Tully	Port Douglas
	Cairns
	Innisfail
2. CENTRAL SECTION	Ingham
Tully-Mackay	Paluma
	Townsville
	Ayr
	Homehill
	Bowen
	Proserpine
	Mackay
3. CAPRICORNIA SECTION	Yeppoon
Mackay-Maryborough	Rosslyn Bay
	Rockhampton
	Gladstone
	Bundaberg
	Pialba
	Maryborough
	Tin Can Bay
4. SOUTHERN SECTION	Brisbane
Maryborough-Brisbane	Cleveland
	DoboyCreek
	Mooloolaba
	Sandgate
	Scarborough
	Southport
	Tewantin
	Wynnum

3.5 DATA STORAGE

Data of all Q.F.B. records by species by port from 1974 till 1981 are compiled whilst prior to this only those species of relevance to this study are collated. This data along is stored at the GBRMPA on a UNIX based mainframe.

3.6 METHODS OF ANALYSIS

The Q.F.B. data has been analysed to examine both the spatial and temporal trends in annual production of the above species. The regional fisheries sections defined in 3.5 were used to best examine differences in combined annual landings, species composition, and processing plant differences. The results for each fisheries section are examined in chapters 5 to 7. Tables 5.1, 6.1, and 7.1 show the combined total landings of fish by region, whilst Tables 5.2, 6.2, and 7.2 list the total landings of individual species by region. Appendix A provides tables of regional annual landings of fish species, by processing plant.These figures are the combined total of fish fillet and whole fish production over a period of 24 years from 1957 until 1981, when the Q.F.B. became defunct. Figures had to be modified to convert fish fillets to whole fish, and to convert figures prior to 1974 from pounds to kilograms. No attempt was made at any catch per unit effort (CPUE) analysis due to a paucity of information regarding actual fishing effort concurrent with the Q.F.B landing data. In addition, other inconsistencies in the landing data make any detailed analysis impossible. These problems are outlined in section 3.7.

3.7 INTERPRETATION OF FISH BOARD DATA

Many inconsistencies in the Q.F.B. data had to be addressed in the development of a database suitable for analysis. These are outlined below as an aid to interpretation of the results and to forewarn the reader of the inaccuracies inherent in the data. The absolute figures given should not be taken on their face value but rather should be taken as an indication of long term trends in the dynamics of the fishing industry over the last 24 years. Estimates of the black market and other private processing plants need to be investigated (see Chapter 4).

1. From the financial year 1970 onwards, estimated landings of fish were separated into fillets of fish and finned fish. Previously only finned fish had been recorded. This was related to changes in policy and in technology both in the processing and the catching of fish. A conversion factor of two has been used to convert fish fillets to whole fish.

2. Q.F.B. records changed from pounds (lbs) to kilograms (kg) in 1974. A conversion factor of 2.2 was used to account for this.

3. In the financial years 1966 till 1973 the Northern Fish Board (N.F.B.) controlled markets north of Rockhampton. Landings were recorded separately for the two Fish Boards over these years. Any change in catch composition should be viewed in light of these changes in administration.

4. On 31st January 1973 the landing ports governed by the Northern Fish Board were ceded back under the aegis of the Queensland Fish Board. Consequently data provided by the Northern Fish Board in 1973 was for the 7 months ended 31st January 1973, whilst data from the Queensland Fish Board was recorded as the year ending 30th June 1973.

5. In 1976, the end of the financial year was changed from the 30th June back to the 30th April. Therefore data in 1976 from the fish Board is for the ten months ending 30th June 1976.

7. The Queensland Fish Board stoppped official recording of fish landings after 1981 once its powers were revoked under the Queensland Fishing Industry Organisation and Marketing Bill (1982). Consequently analysis occurs only up till 1981.

8. Landings of coral trout (*Plectropomus* spp.) were not recorded until after 1963. This should be considered when looking at the total landings of reef fish.

PART 3: RESULTS

CHAPTER 4: SOURCES OF INFORMATION

4.1 INTRODUCTION

A number of other sources of information and studies presently being undertaken have been identified in the course of this study. Initially it was envisaged that the two studies under the auspices of the Queensland National Parks and Wildlife Service (Q.N.P.W.S.) would provide the important short term perspective yielding information on catch rates and species composition at a reef level, which the Q.F.B. data were unable to do. However, this data was unavailable at the time of investigation.

4.2 IDENTIFICATION OF SOURCES OF INFORMATION AND STUDIES BEING UNDERTAKEN.

i. LOG BOOK RETURNS

On January 1st 1988, monthly catch return log books became compulsory for all trawlers and line fishermen. This is being instituted by the Queensland Fish Management Authority (Q.F.M.A.) for the Queensland Commercial Fishermens Organisation (Q.C.F.O.) with the cooperation of Q.D.P.I. The results of these logbook returns will be stored in an electronic database housed at the Q.F.M.A. in Brisbane. Sample log book returns are provided in Appendix D. This will be the most accurate and comprehensive database available for the Great Barrier Reef to date, having information on species catch rates, catch areas, landing ports, as well as catch per unit effort data.

ii. BOULT REEF INFORMATION

A study is currently being undertaken by QNPWS on the response rate of fish stocks at Boult Reef replenishment area to fishing carried out. The data collated includes catch rates and species composition through fish counts of demersal reef species. This study should provide accurate data on species composition at a reef level over time.

iii. CAIRNS SECTOR

Cairns Q.N.P.W.S. is also presently investigating fishing of previously zoned replenishment areas in the Cairns area. This study will provide information on catch rates and composition, similar to that of the Boult reef study.

iv. A SURVEY OF QUEENSLAND PROCESSORS AND WHOLESALERS.

This information is being collated as part of a study undertaken by the Institute of Applied Social Research for the Q.C.F.O. As part of the study, which is largely economic in nature, private processors and wholesalers were surveyed for the amount of fish that were processed on their premises. In addition, interview forms were sent to all Master fishermen asking information on catch areas, and tonnage of fish landed per annum.

CHAPTER 5. THE NORTHERN FISHERIES SECTION.

5.1 INTRODUCTION

The Northern Fisheries Section (N.F.S.) has 2 major processing plants at Cairns and Innisfail which process the majority of the fish landed from this region. A third processing plant at Port Douglas was put into operation in 1978. This Fisheries Section incorporates the Far Northern and the Cairns to Cormorant Pass Sections of the GBRMP (Fig. 3.1). It extends from Two mile opening in the north to the passage south of Beaver and Taylor reefs in the south. It covers an area of some 36,000 square kilometres with a total of 211 reefs of a variety of types (Hopley, 1982).

Williams (1982) recorded 6 primary reef fishermen and 8 mackerel fishermen as operating in this area in 1979. These fishermen were spread over a large geographic area with two fishermen in the following home ports respectively; Cairns, Port Douglas, Cooktown. It is believed that these operations would have largely non-overlapping territories. The combined total production of reef fish caught in the Northern fisheries section is shown in table 5.1 and figures 5.1 and 5.2, whilst table 5.2 provides a breakdown by species of fish landed for the Northern fishereies section. Appendix A1 provides the estimated weight of species processed by each regional fish depot.

5.2 ESTIMATED ANNUAL LANDINGS

Fig. 5.1 clearly demonstrates how the combined landings have varied over the 25 years examined with an eleven fold maximum range of landings between years.The reef fish species examined constitute 5 to 35 percent of the total finfish catch, though 10 to 15 percent was the most common. During the years 1969 to 1971 combined reef fish species accounted for over 20 percent of the total finfish catch. Estimated reef fish landings were also the highest recorded during this time.

5.3 SPECIES COMPOSITION

Coral trout (Figs. 5.3, 5.4) have been the most commonly landed reef fish in this region subsequent to 1963. The relative composition of coral trout expressed as a percentage of total estimated fish landings, has varied between 1 and 12 percent. Landings have fluctuated considerably, peaking in 1968 with 32 tonnes of fish processed and again in 1970 when 35 tonnes were landed. A minimum catch of 8 tonnes was recorded in 1973 but landings again increased over the next 5 years to a maximum of 31 tonnes of fish processed in 1978.

Landings of sweetlip (Fig. 5.4) declined substantially from a peak of 18 tonnes in 1958 to only 3 tonnes in 1963. Catches of sweetlip increased over the years 1966 through to 1968 when an estimated total of 16 tonnes of fish were landed. Apart from 1972, a sharp decline in landings of sweetlip was recorded over the 5 years to 1973 (3.4 tonnes). Landings increased steadily after this to an estimated catch of 13.5 tonnes in 1976. Landings for all years fell after 1977 to under 10 tonnes of sweetlip landed per annum.

The relative composition of emperor increased from under 1 percent, prior to 1967, to between 1 and 3 percent of the total estimated catch after this date (Fig. 5.6). Landings of Emperor (Fig. 5.5) remained under under 3.5 tonnes for the years 1957 through to 1966 but increased nearly 4-fold over the next two years to a peak of 11.5 tonnes in 1968. Landings fluctuated widely over the following years with the greatest estimated catch of emperor being landed in 1975 (13.4 tonnes). Landings dropped over the next 4 years until 1980 to a plateau of approximately 4.7 tonnes of processed fish, per year. Innisfail was the major port of landing for this species until 1978 after which time Cairns and Port Douglas became the major ports of landing.

Landings of morwong (Fig. 5.9) were minimal in this region, nearly all being under one tonne.

Nanygai commonly formed approximately 0.2 percent of the total estimated catch of fish in the Northern fisheries section. A catch of 1.7 tonnes of nanygai (fig. 5.11) was estimated as being landed for the Northern section in 1967, after a 5 year period of no official landings. After 1967 landings levelled out around 0.4 tonnes per year for the next 5 years. Landings rose steadily after this, the most dramatic rise being from 1.3 tonnes in 1977 to 3.7 tonnes in 1978.

Bream was estimated to account for under 1 percent of the total annual finfish catch in the Northern fisheries section. The exception is 1970 when bream constituted 2.35 percent of the total catch.

Cod formed under 2 percent of the total estimated finfish landings except in 1976 when 3.3% of the catch was cod (Fig. 5.14). Likewise the estimated landings in this year were considerably higher than other years. Parrot fish landings were minimal in the Northern fisheries section, accounting for under 0.1 percent of the total estimated finfish catch.

The percentage of mixed reef fish was substantially higher in 1970 and 1971 forming over 10 percent of total estimated finfish landings. Estimated landings had increased 3 fold from previous years. In all other years mixed reef fish accounted for under 7 percent of the total catch.

FIG. 5.1: Combined reef fish. Estimated landings in the Northern Fisheries Section.

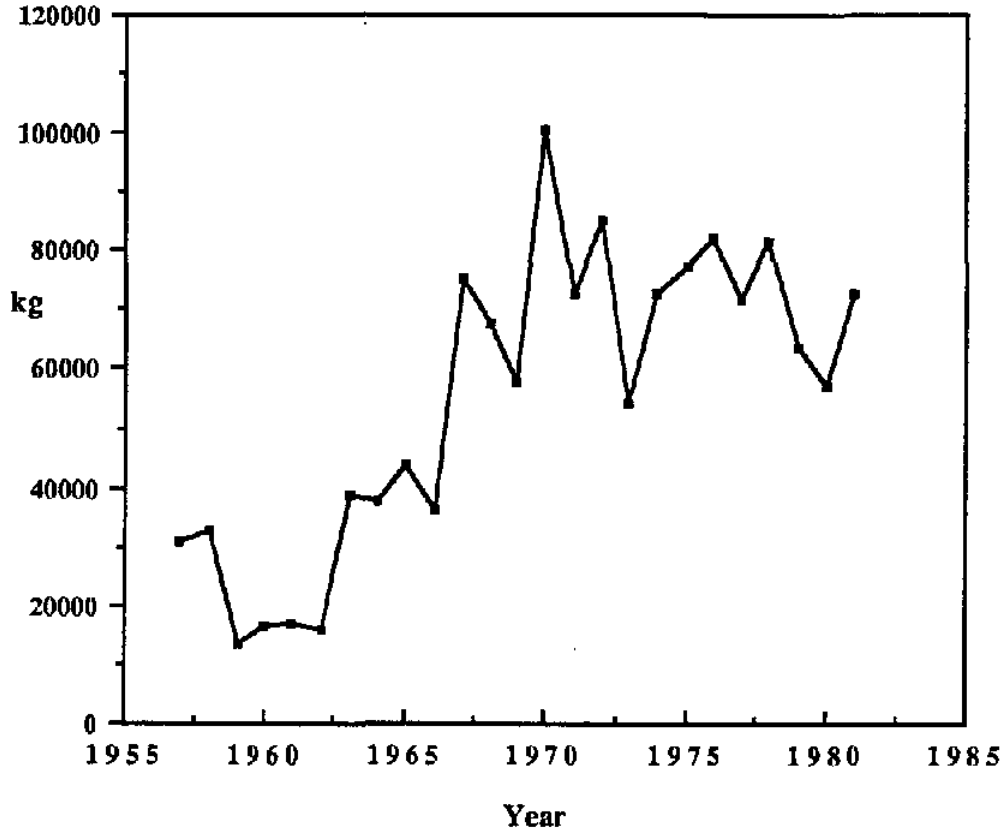


FIG. 5.2: Combined Reef Fish. Estimated percentage of of total catch in the Northern Fisheries Section

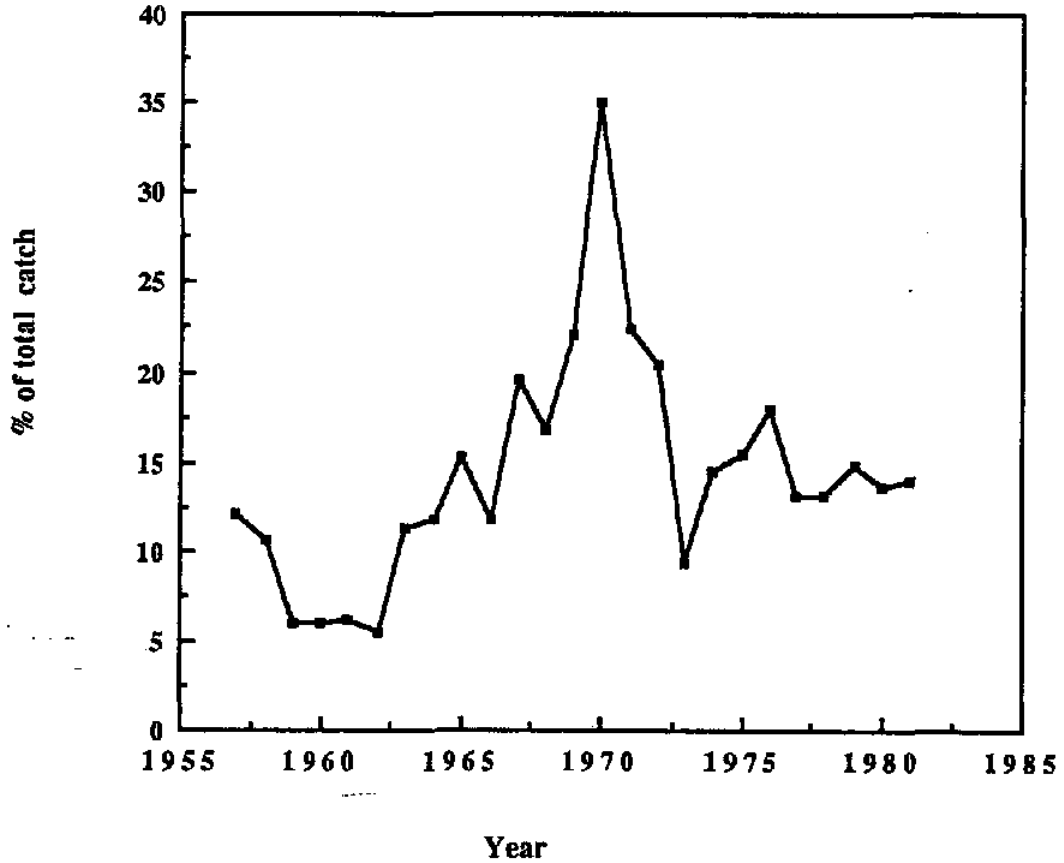


FIG. 5.3: Coral trout. Estimated landings in the Northern Fisheries Section.

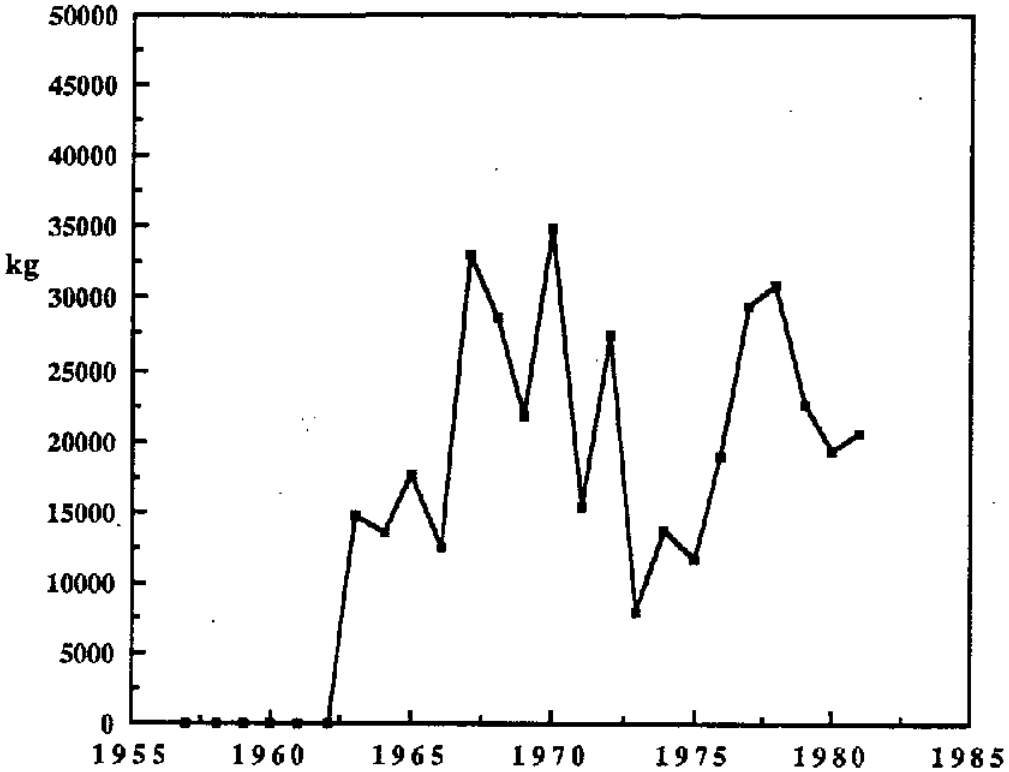


FIG. 5.4: Coral trout. Estimated percentage of total catch in the Northern Fisheries Section

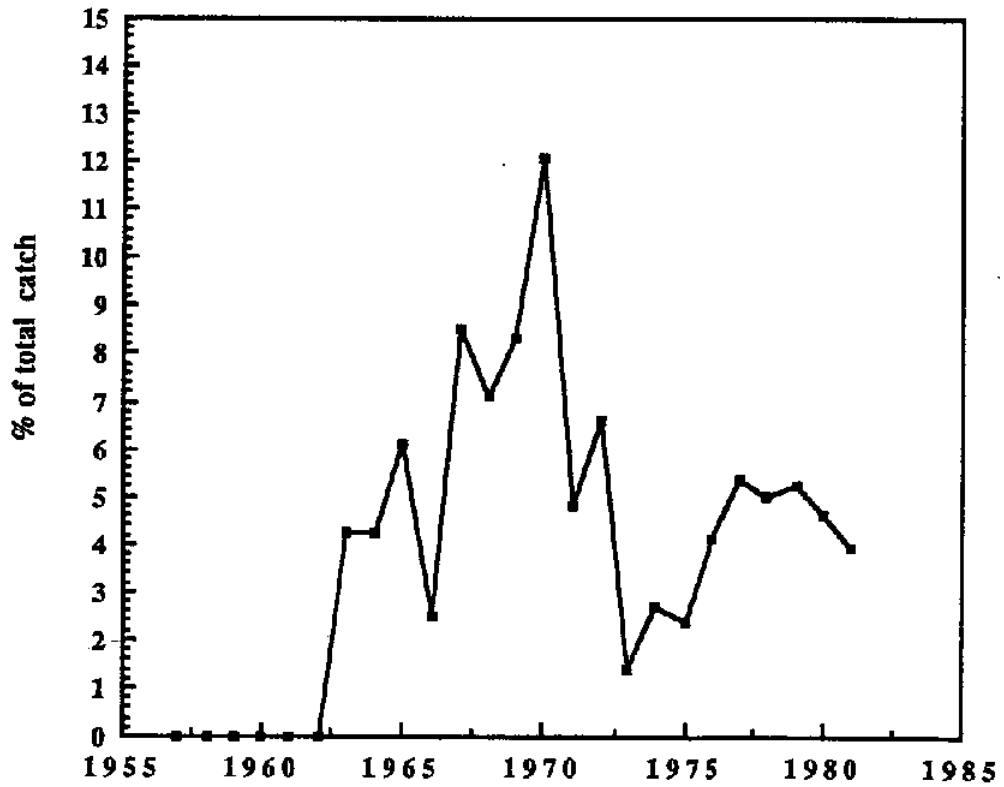


FIG. 5.5: Sweetlip. Estimated landings in the Northern Fisheries Section.

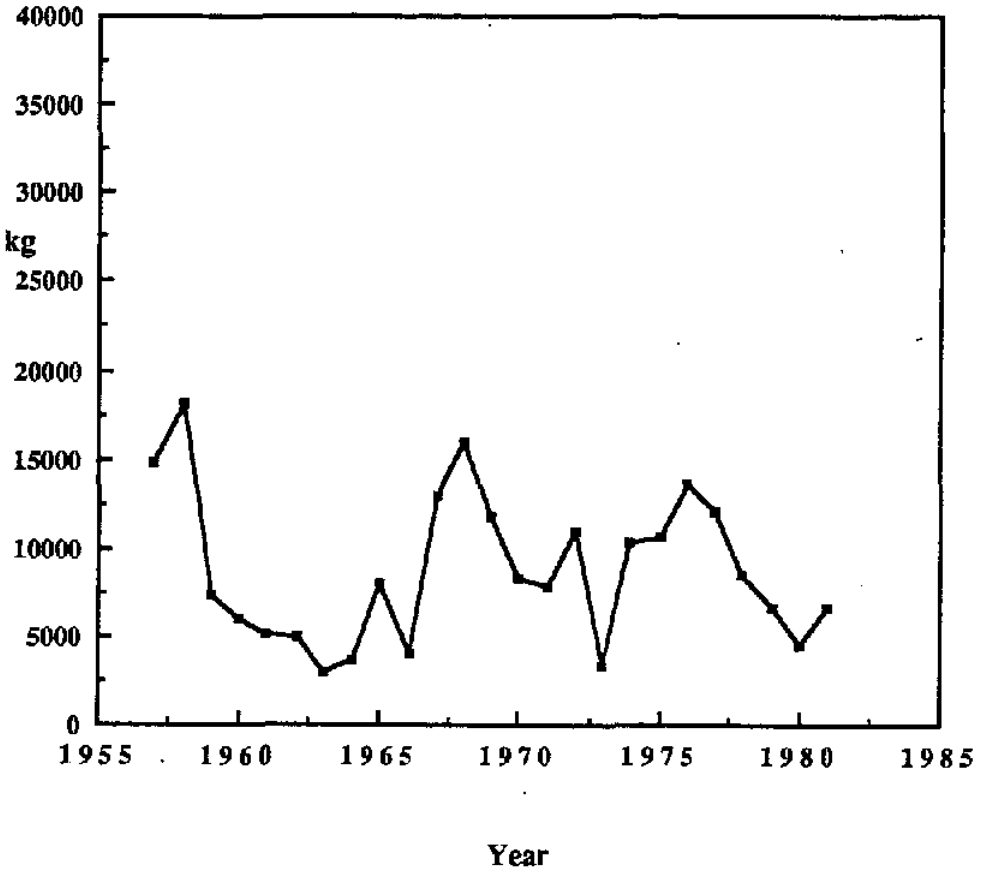


FIG. 5.6: Sweetlip. Estimated percentage of total catch in the Northern Fisheries Section

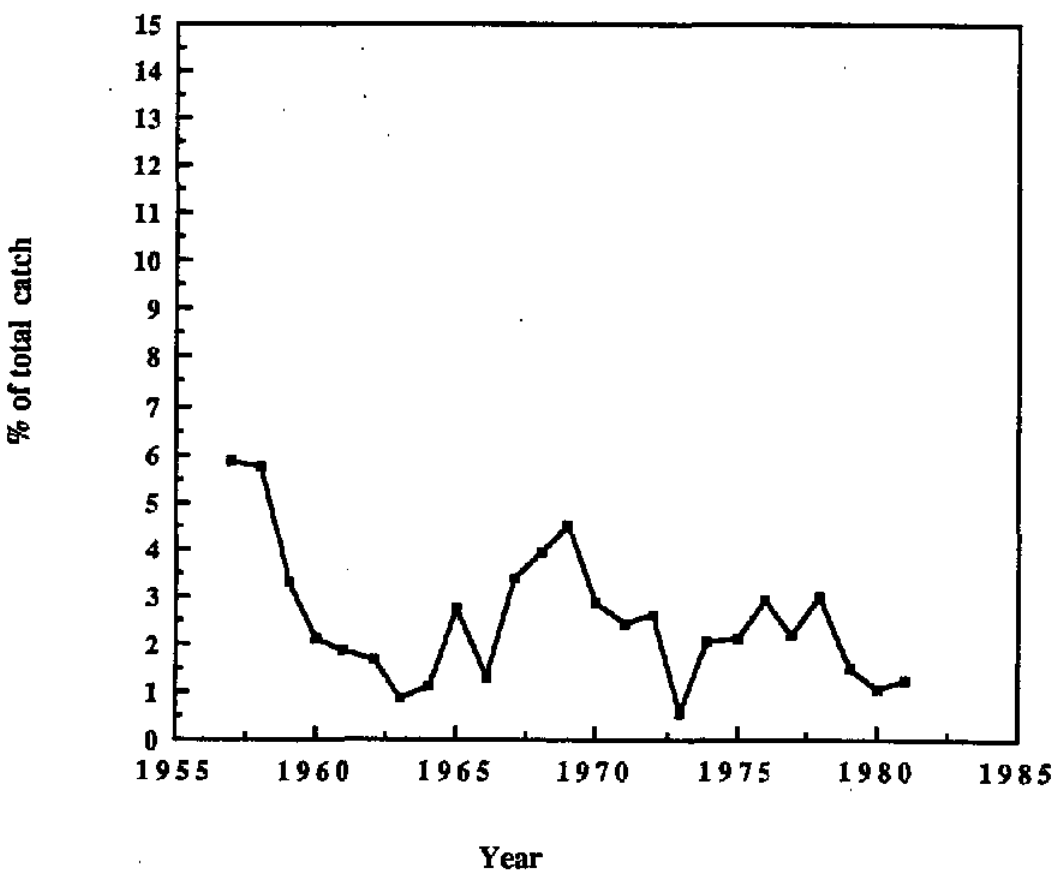


FIG. 5.7: Emperor. Estimated landings in the Northern Fisheries Section.

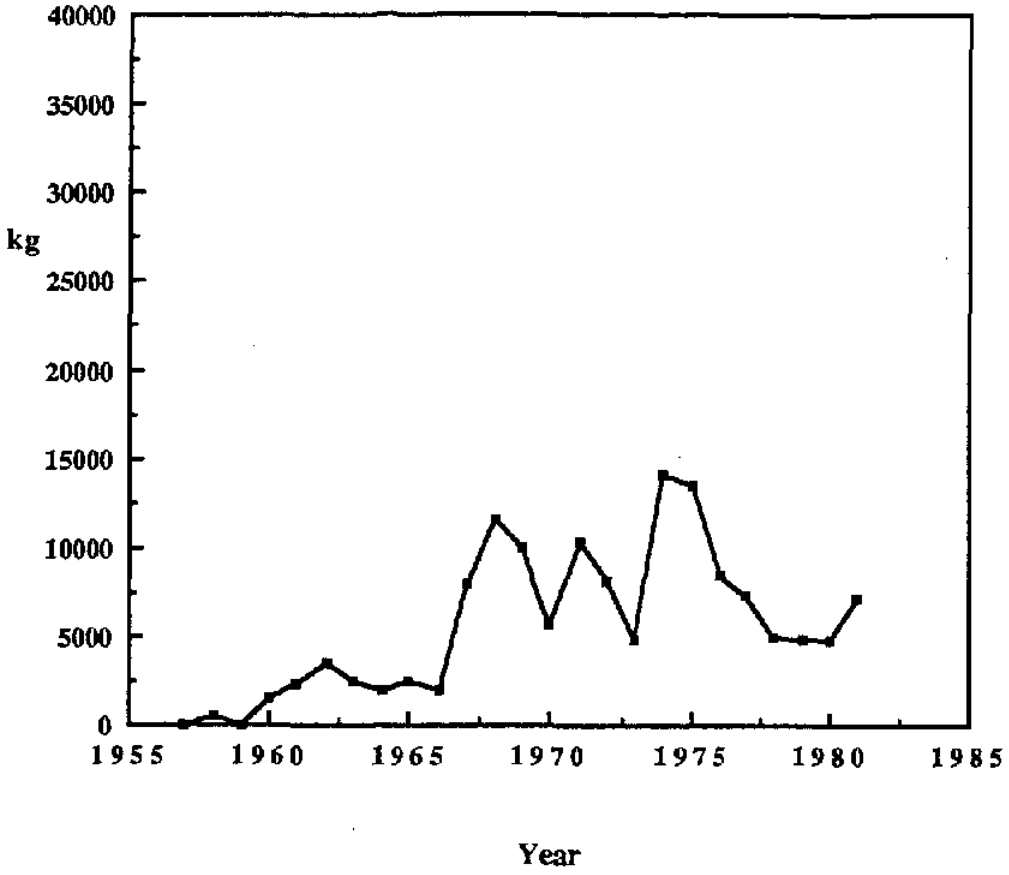


FIG. 5.8: Emperor. Estimated percentage of total catch in the Northern Fisheries Section

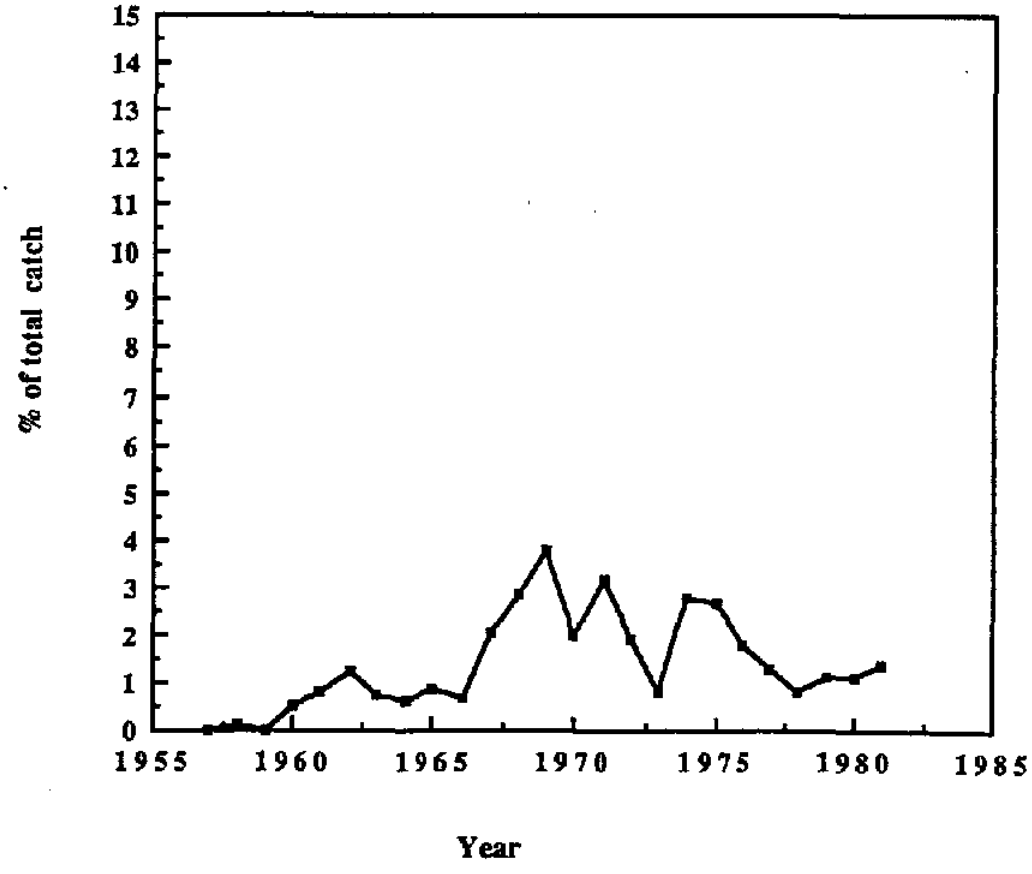


FIG. 5.9. Morwong Estimated landings in the Northern Fisheries Section.

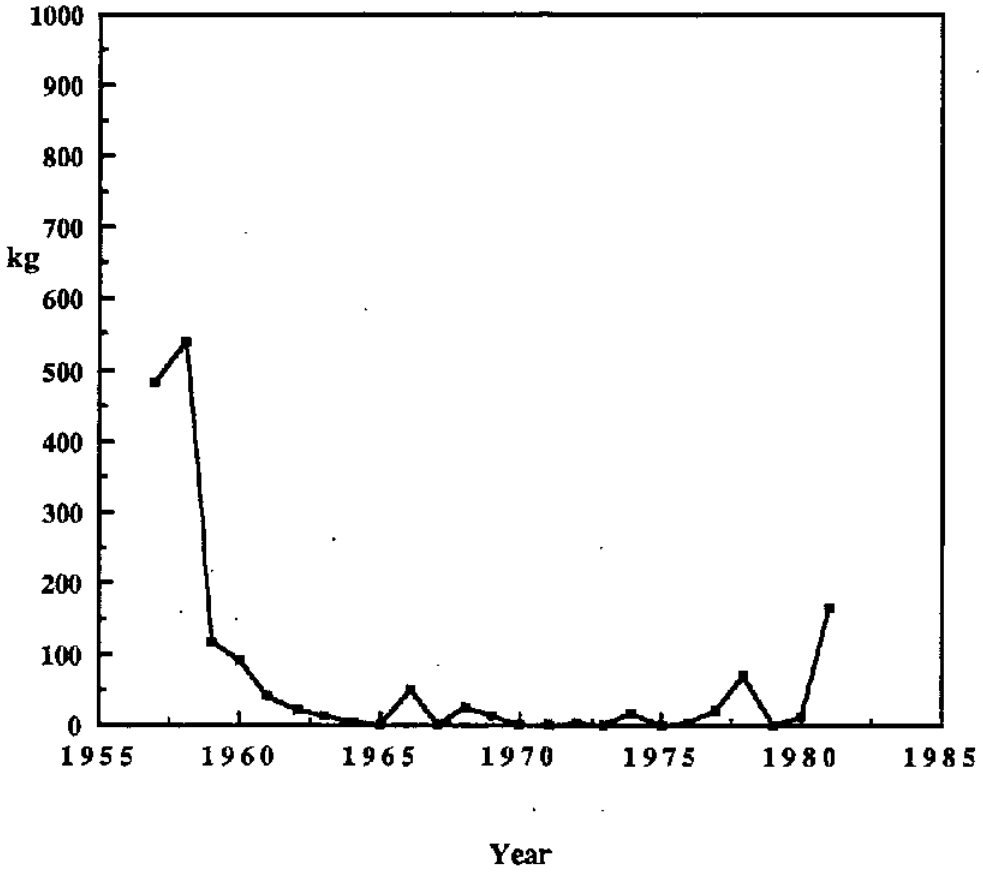


FIG. 5.10: Morwong. Estimated percentage of total catch in the Northern Fisheries Section

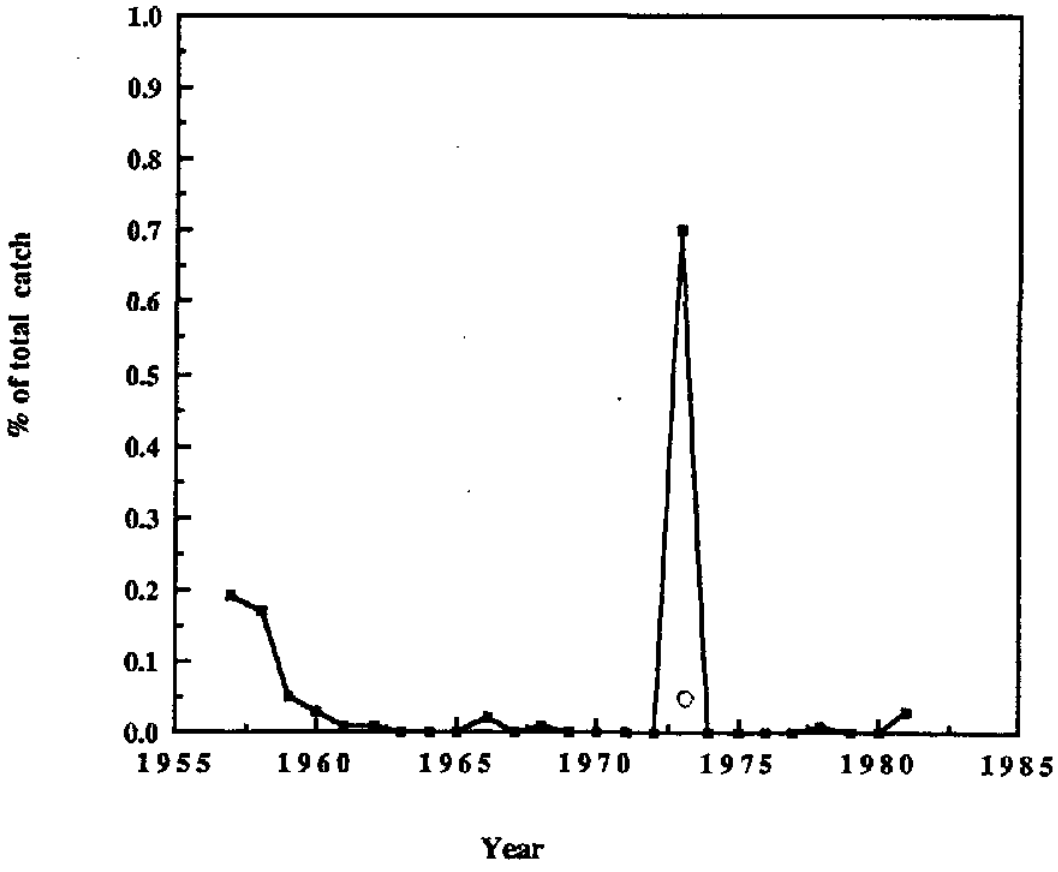


FIG. 5.11: Nanygai. Estimated landings in the Northern Fisheries Section.

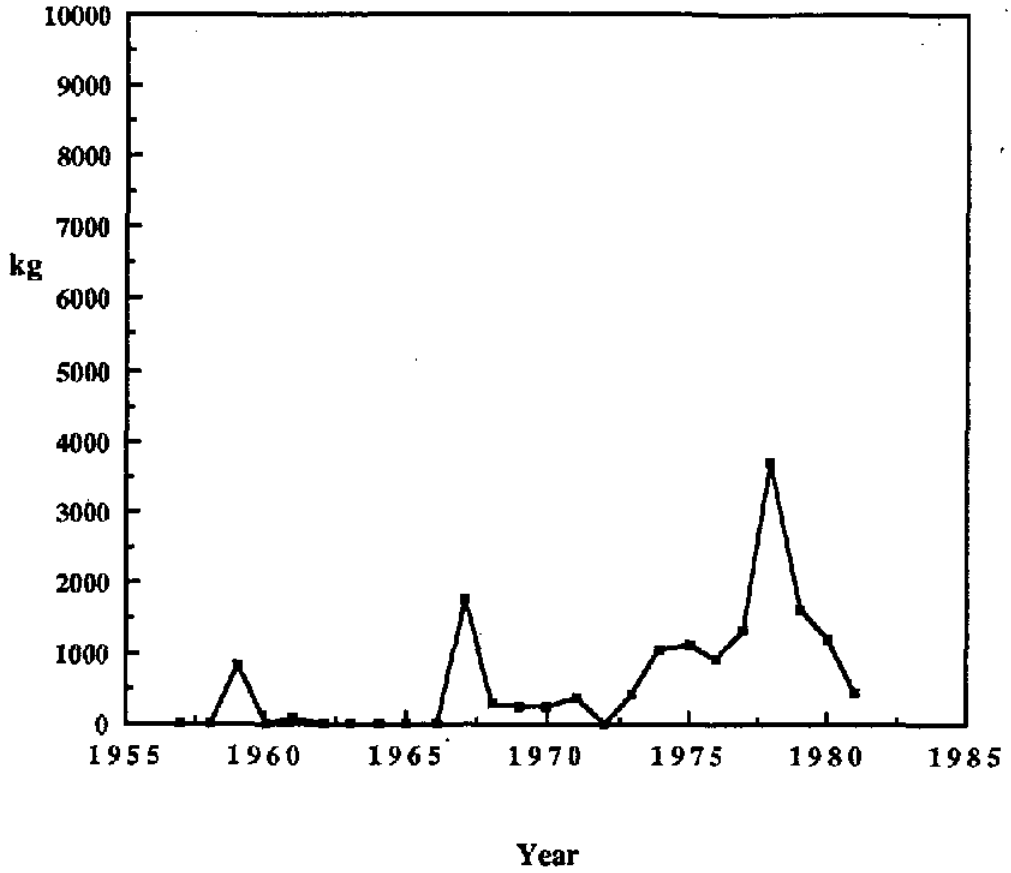


FIG. 5.12: Nanygai. Estimated percentage of of total catch in the Northern Fisheries Section

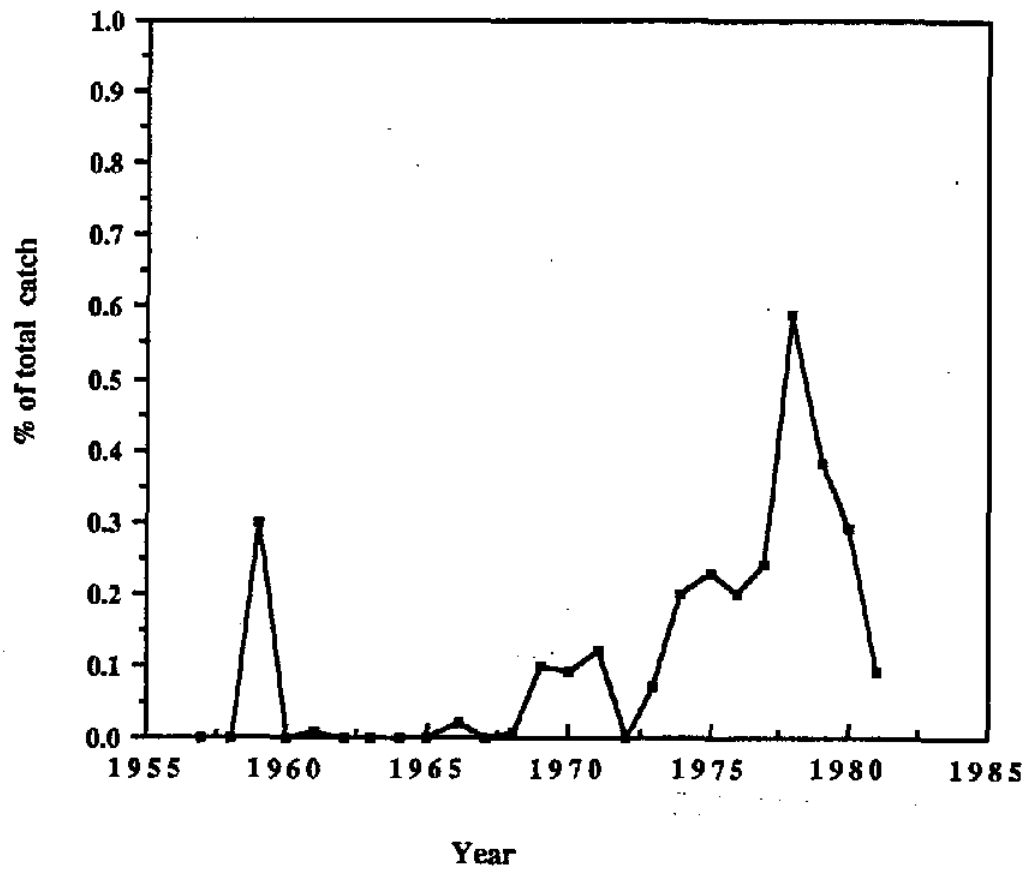


FIG. 513: Cod. Estimated landings in the Northern Fisheries Section.

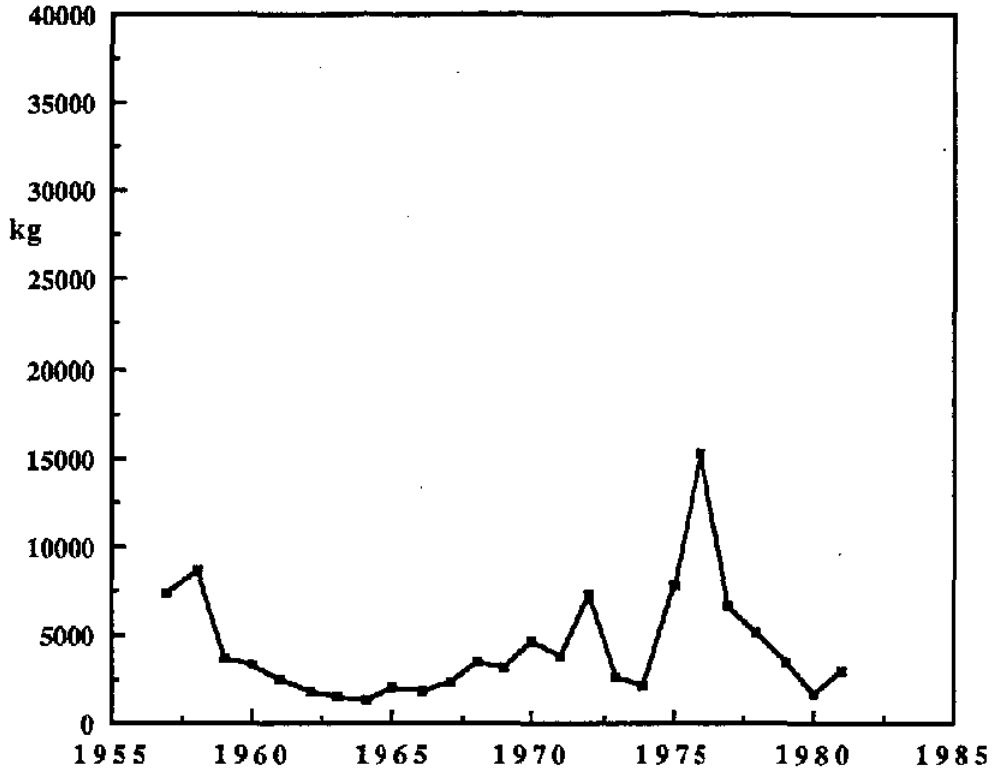


FIG. 5.14: Cod. Estimated percentage of total catch in the Northern Fisheries Section

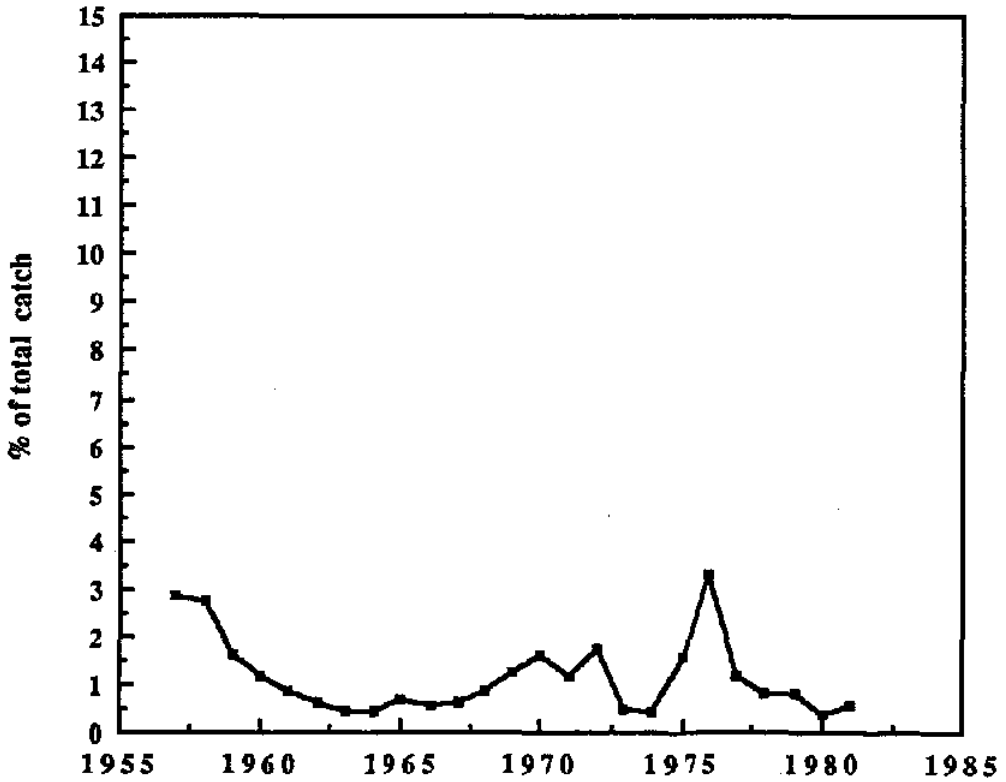


FIG. 5.15: Bream. Estimated landings in the Northern Fisheries Section.

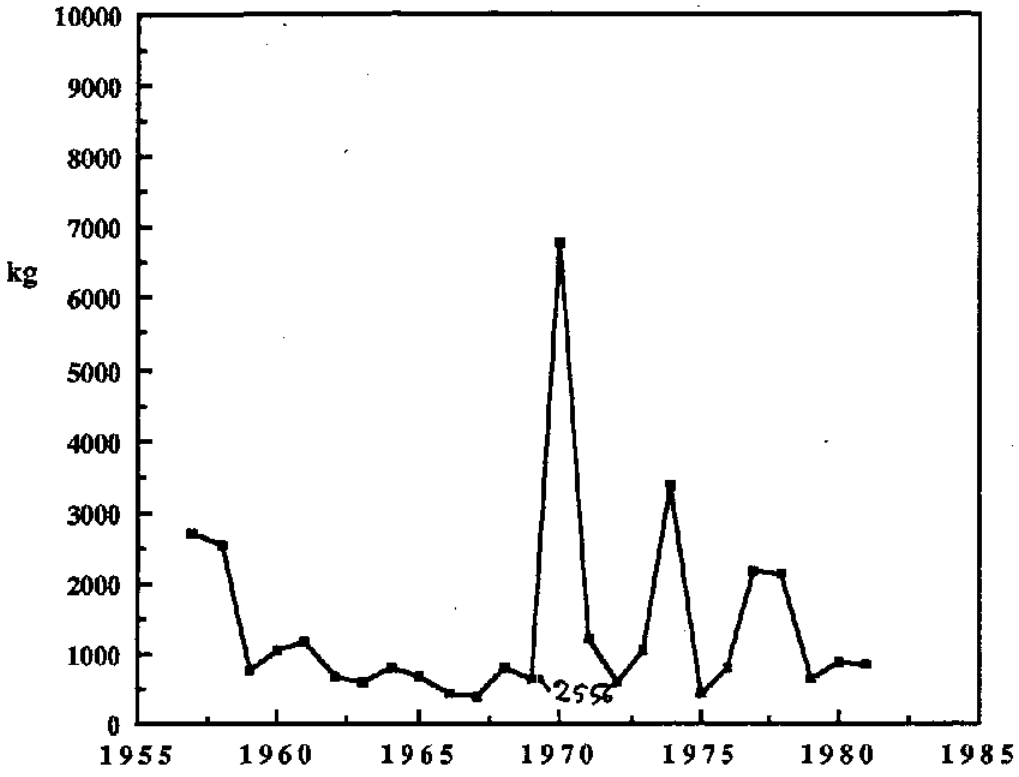


FIG. 5.16: Bream. Estimated percentage of total catch in the Northern Fisheries Section

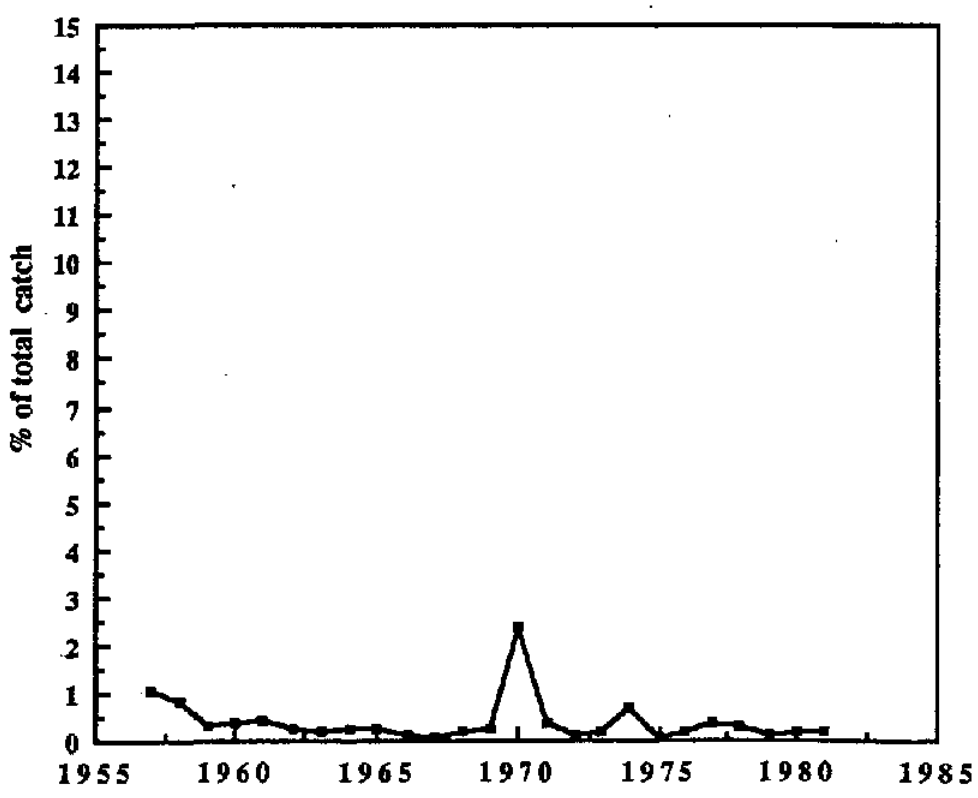


FIG. 5.17: Parrotfish. Estimated landings in the Northern Fisheries Section.

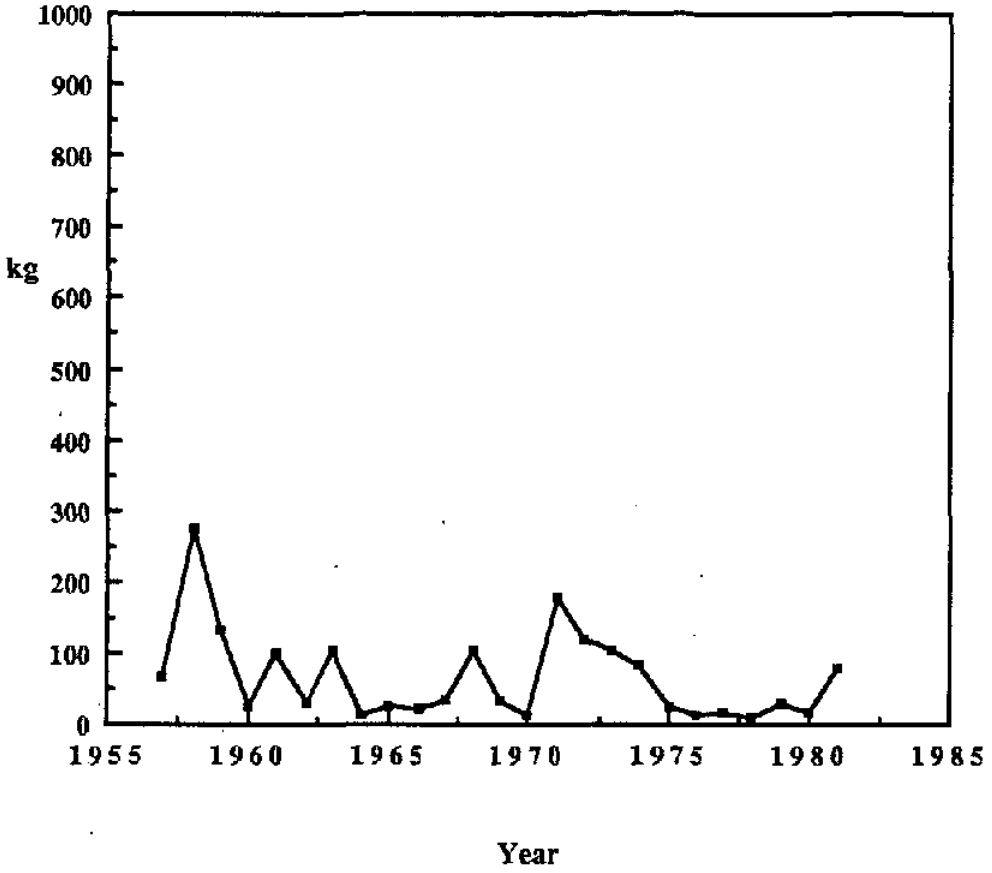


FIG. 5.18: Parrotfish. Estimated percentage of total catch in the Northern Fisheries Section

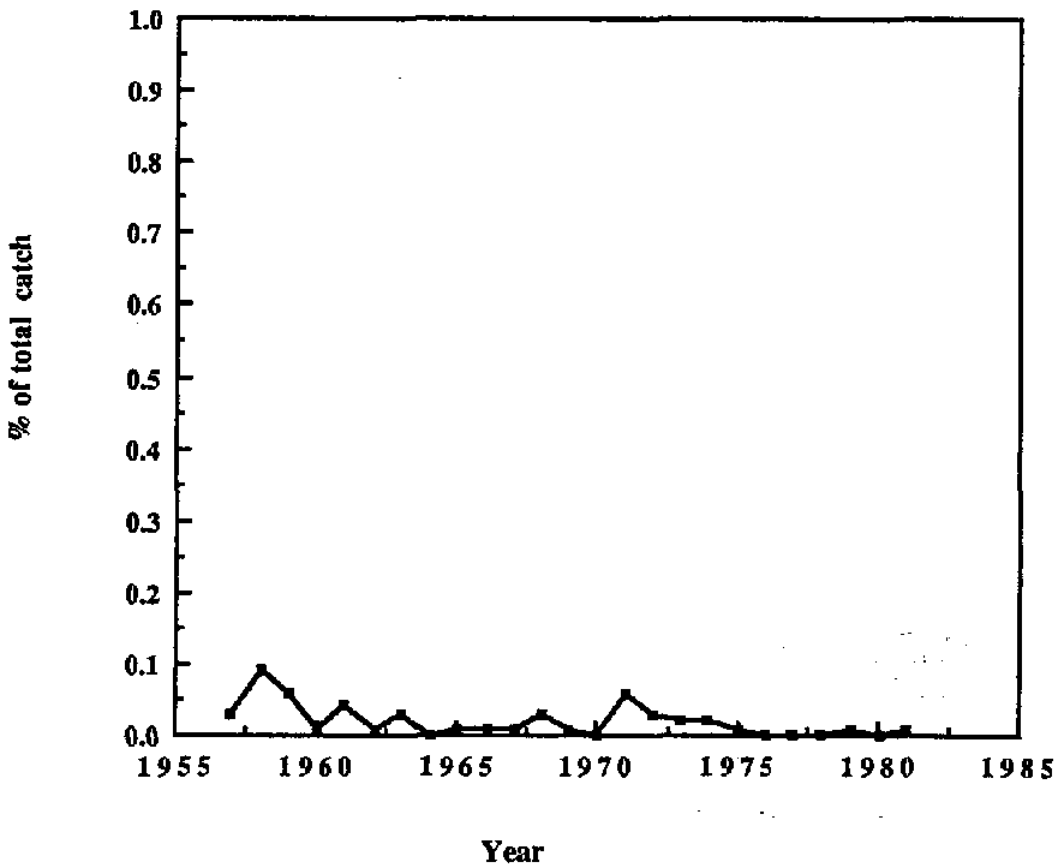


FIG. 5.19: Mixed reef fish. Estimated landings in the Northern Fisheries Section.

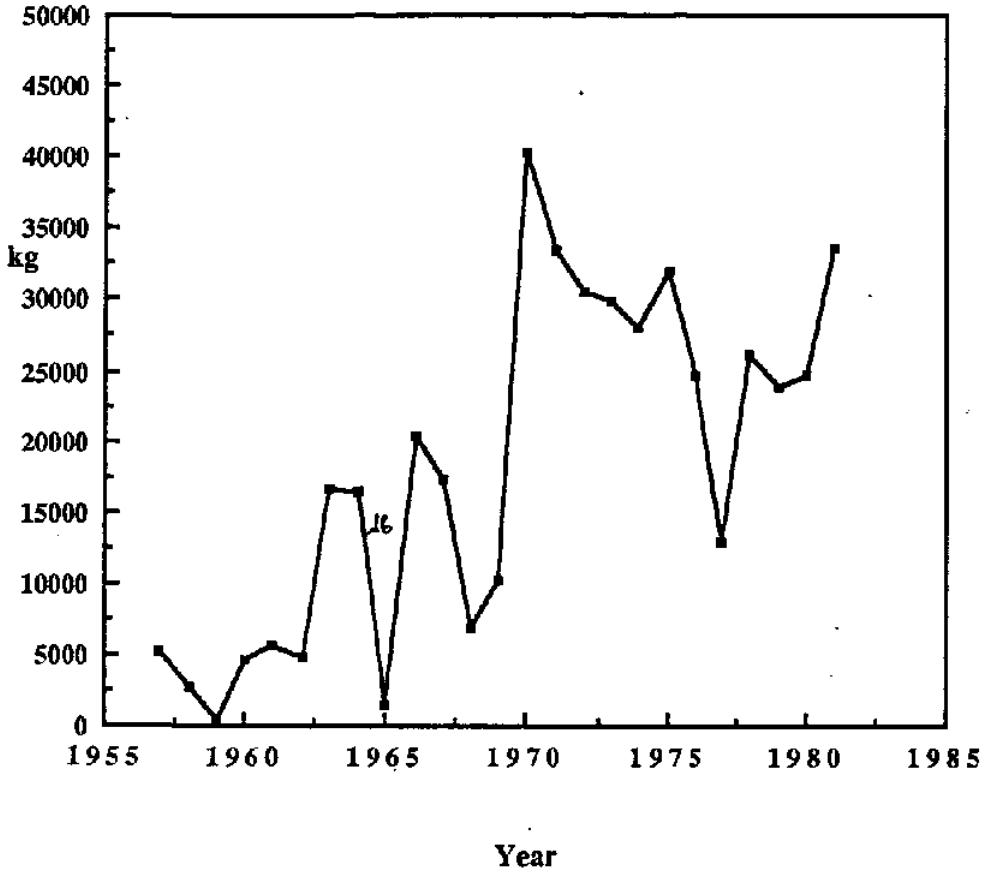


FIG. 5.20: Mixed Reef Fish. Estimated percentage of of total catch in the Northern Fisheries Section

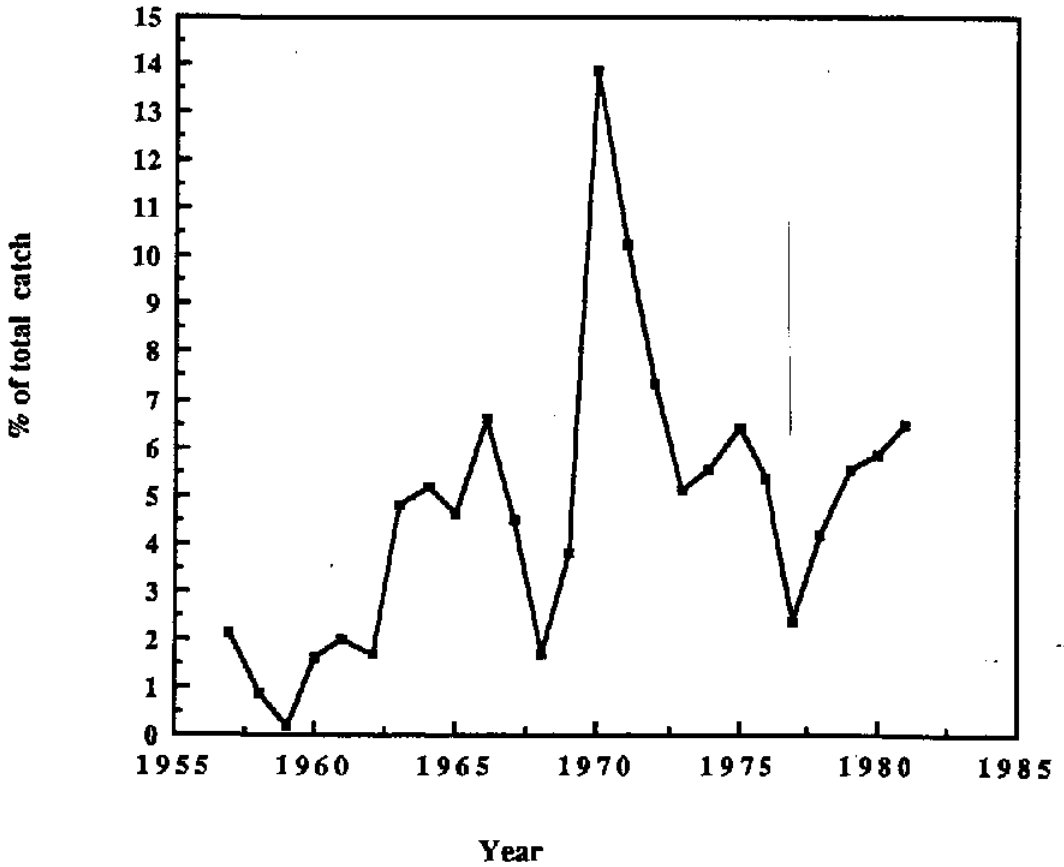


TABLE 5.1: ESTIMATED LANDINGS OF COMBINED REEF FISH AND TOTAL FINFISH LANDINGS IN THE NORTHERN FISHERIES SECTION.

YEAR	REEF FISH LANDINGS	TOTAL LANDINGS	PERCENTAGE OF REEF FISH
57	30653	253011	12.12
58	33097	313341	10.56
59	13380	224071	5.97
60	16372	277351	5.90
61	16938	278439	6.08
62	15832	291597	5.43
63	39028	347204	11.24
64	37705	318085	11.85
65	43966	288015	15.27
66	36339	308598	11.78
67	75402	384817	19.59
68	67733	404316	16.75
69	57633	260420	22.13
70	100619	287994	34.94
71	72466	323626	22.39
72	85012	415121	20.48
73	54215	584290	9.28
74	72763	505958	14.38
75	77033	500176	15.40
76	82378	459227	17.94
77	71809	550529	13.04
78	81582	620359	13.15
79	63647	432698	14.71
80	57105	421449	13.55
81	72457	518769	13.97

TABLE 5.2: ESTIMATED LANDINGS(Kg) OF REEF FISH SPECIES AND RELATIVE COMPOSITION OF TOTAL FINFISH LANDINGS OF THE NORTHERN FISHERIES SECTION.

YEAR	SPECIES	LANDINGS (Kg)	% OF TOTAL FINFISH LANDINGS
57	Bream	2711	1.07
57	Cod	7297	2.88
57	Emperor	0	0.00
57	Mixed	5278	2.09
57	Morwong	481	0.19
57	Nanygai	0	0.00
57	Parrot	65	0.03
57	Sweetlip	14821	5.86
58	Bream	2548	0.81
58	Cod	8618	2.75
58	Emperor	456	0.15
58	Mixed	2652	0.85
58	Morwong	538	0.17
58	Nanygai	0	0.00
58	Parrot	272	0.09
58	Sweetlip	18013	5.75
59	Bream	731	0.33
59	Cod	3668	1.64
59	Emperor	45	0.02
59	Mixed	486	0.18
59	Morwong	117	0.05
59	Nanygai	845	0.38
59	Parrot	134	0.06
59	Sweetlip	7355	3.28
60	Bream	1051	0.38
60	Cod	3281	1.18
60	Emperor	1450	0.52
60	Mixed	4531	1.63
60	Morwong	90	0.03
60	Nanygai	0	0.00
60	Parrot	24	0.01
60	Sweetlip	5945	2.14
61	Bream	1169	0.42
61	Cod	2444	0.88
61	Emperor	2289	0.82
61	Mixed	5595	2.01
61	Morwong	41	0.01
61	Nanygai	101	0.04
61	Parrot	100	0.04
61	Sweetlip	5200	1.87

YEAR	LANDINGS SPECIES	(Kg)	% OF TOTAL FINFISH LANDINGS
62	Bream	675	0.23
62	Cod	1809	0.62
62	Emperor	3550	1.22
62	Mixed	4833	1.66
62	Morwong	21	0.01
62	Nanygai	1	0.00
62	Parrot	30	0.01
62	Sweetlip	4913	1.68
63	Bream	565	0.16
63	Cod	1451	0.42
63	Coral trout	14735	4.24
63	Emperor	2490	0.72
63	Mixed	16626	4.79
63	Morwong	11	0.00
63	Nanygai	0	0.00
63	Parrot	104	0.03
63	Sweetlip	3046	0.88
64	Bream	805	0.25
64	Cod	1369	0.43
64	Coral trout	13555	4.26
64	Emperor	1954	0.61
64	Mixed	16356	5.14
64	Morwong	3	0.00
64	Nanygai	4	0.00
64	Parrot	13	0.00
64	Sweetlip	3647	1.15
65	Bream	681	0.24
65	Cod	1993	0.69
65	Coral trout	17555	6.09
65	Emperor	2517	0.87
65	Mixed	13265	4.61
65	Morwong	0	0.00
65	Nanygai	0	0.00
65	Parrot	23	0.01
65	Sweetlip	7932	2.75
66	Bream	397	0.13
66	Cod	1771	0.57
66	Coral trout	7715	2.50
66	Emperor	2060	0.67
66	Mixed	20284	6.57
66	Morwong	51	0.02
66	Nanygai	0	0.00
66	Parrot	19	0.01
66	Sweetlip	4042	1.31

YEAR	SPECIES	LANDINGS (Kg)	% OF TOTAL FINFISH LANDINGS
67	Bream	358	0.09
67	Cod	2300	0.60
67	Coral trout	32891	8.55
67	Emperor	7923	2.06
67	Mixed	17270	4.49
67	Morwong	2	0.00
67	Nanygai	1745	0.45
67	Parrot	33	0.01
67	Sweetlip	12880	3.35
68	Bream	786	0.19
68	Cod	3499	0.87
68	Coral trout	28652	7.09
68	Emperor	11545	2.86
68	Mixed	6884	1.70
68	Morwong	24	0.01
68	Nanygai	288	0.07
68	Parrot	104	0.03
68	Sweetlip	15951	3.95
69	Bream	606	0.23
69	Cod	3187	1.22
69	Coral trout	21793	8.37
69	Emperor	9910	3.81
69	Mixed	10114	3.88
69	Morwong	12	0.00
69	Nanygai	269	0.10
69	Parrot	32	0.01
69	Sweetlip	11711	4.50
70	Bream	6775	2.35
70	Cod	4612	1.60
70	Coral trout	34837	12.10
70	Emperor	5673	1.97
70	Mixed	40149	13.94
70	Morwong	0	0.00
70	Nanygai	261	0.09
70	Parrot	12	0.00
70	Sweetlip	8300	2.88
71	Bream	1216	0.38
71	Cod	3795	1.17
71	Coral trout	15430	4.77
71	Emperor	10288	3.18
71	Mixed	33348	10.30
71	Morwong	0	0.00
71	Nanygai	381	0.12
71	Parrot	179	0.06
71	Sweetlip	7828	2.42

YEAR	LANDINGS SPECIES	(Kg)	% OF TOTAL FINFISH LANDINGS
72	Bream	563	0.14
72	Cod	7356	1.77
72	Coral trout	27426	6.61
72	Emperor	8109	1.95
72	Mixed	30473	7.34
72	Morwong	5	0.00
72	Nanygai	0	0.00
72	Parrot	122	0.03
72	Sweetlip	10958	2.64
73	Bream	1055	0.18
73	Cod	2719	0.47
73	Coral trout	7812	1.34
73	Emperor	4789	0.82
73	Mixed	29871	5.11
73	Morwong	4086	0.70
73	Nanygai	400	0.07
73	Parrot	102	0.02
73	Sweetlip	3381	0.58
74	Bream	3361	0.66
74	Cod	2179	0.43
74	Coral trout	13643	2.70
74	Emperor	14088	2.78
74	Mixed	28066	5.55
74	Morwong	15	0.00
74	Nanygai	1018	0.20
74	Parrot	83	0.02
74	Sweetlip	10310	2.04
75	Bream	403	0.08
75	Cod	7781	1.56
75	Coral trout	11706	2.34
75	Emperor	13425	2.68
75	Mixed	31941	6.39
75	Morwong	0	0.00
75	Nanygai	1129	0.23
75	Parrot	25	0.01
75	Sweetlip	10623	2.12
76	Bream	768	0.17
76	Cod	15290	3.33
76	Coral trout	18816	4.10
76	Emperor	8399	1.83
76	Mixed	24651	5.37
76	Morwong	3	0.00
76	Nanygai	907	0.20
76	Parrot	12	0.00
76	Sweetlip	13532	2.95

YEAR	LANDINGS SPECIES	(Kg)	% OF TOTAL FINFISH LANDINGS
77	Bream	2149	0.39
77	Cod	6594	1.20
77	Coral trout	29467	5.35
77	Emperor	7267	1.32
77	Mixed	12910	2.35
77	Morwong	22	0.00
77	Nanygai	1321	0.24
77	Parrot	18	0.00
77	Sweetlip	12061	2.19
78	Bream	2121	0.34
78	Cod	5210	0.84
78	Coral trout	30937	4.99
78	Emperor	4967	0.80
78	Mixed	26060	4.20
78	Morwong	69	0.01
78	Nanygai	3681	0.59
78	Parrot	9	0.00
78	Sweetlip	18528	2.99
79	Bream	607	0.14
79	Cod	3555	0.82
79	Coral trout	22611	5.23
79	Emperor	4743	1.10
79	Mixed	23908	5.53
79	Morwong	0	0.00
79	Nanygai	1632	0.38
79	Parrot	27	0.01
79	Sweetlip	6564	1.52
80	Bream	867	0.21
80	Cod	1606	0.38
80	Coral trout	19337	4.59
80	Emperor	4782	1.13
80	Mixed	24765	5.88
80	Morwong	14	0.00
80	Nanygai	1213	0.29
80	Parrot	16	0.00
80	Sweetlip	4505	1.07
81	Bream	814	0.16
81	Cod	3069	0.59
81	Coral trout	20483	3.95
81	Emperor	7086	1.37
81	Mixed	33686	6.49
81	Morwong	166	0.03
81	Nanygai	470	0.09
81	Parrot	78	0.01
81	Sweetlip	6605	1.27

CHAPTER 6. THE CENTRAL FISHERIES SECTION.

6.1 INTRODUCTION

The Central fisheries section is the same as that designated as the Central Section in the G.B.R.M.P. (Fig. 3.1). It extends from Dunk Island in the north to Hydrographers Passage east of the Whitsundays in the south and contains some 220 reefs and a large number of high islands.

Major shore based Q.F.B. processing factories are present at Ingham, Townsville, Bowen, and Mackay, whilst other plants have operated at Paluma, Ayr, Homehill, and Proserpine at various times. The processing plant at Mackay processes the most fish of any factory on the G.B.R. The combined total production of reef fish caught in the Central fisheries section is shown in table 6.1 and figures 6.1, and 6.2. Table 5.2 and all subsequent figures provide a breakdown by species of fish landed for the Central fisheries section. Appendix A2 records the species landed by fish depot.

6.2 ESTIMATED ANNUAL LANDINGS

The Central Fisheries Section had the most variable combined annual reef fish landings in comparison to the other sections, fluctuating 40 fold between the maximum and minimum landings (Fig. 6.1). Reef fish species combined, formed an increasing percentage of the total estimated finfish catch, over time, ranging from 6 to 40 percent. Apart from a substantial decline in annual production of reef fish over the years 1976-78, landings in general increased. The most significant increase was a 2-fold jump in estimated landings of fish in 1970.

6.3 SPECIES COMPOSITION

The most noticeable feature about the Central fisheries section is that landings of all the species examined have increased significantly over the years examined. The majority of reef fish landings have been processed through the Mackay fish depot, with Townsville also handling significant quantities.

Coral trout is the most commonly commercially landed fish in the Central fisheries section (Table 6.2). Changes in the relative composition of coral trout, follow those patterns seen for the estimated annual landings. Subsequent to 1970, coral trout formed 10 to 16 percent of the total estimated catch. Landings increased nearly 4-fold from 1969 to 1970, jumping from 23.1 to 86.0 tonnes (Fig. 6.2). Annual landings of coral trout increased steadily over the following 4 years to

104 tonnes of fish caught in 1974. Annual production of coral trout declined by an order of magnitude during the next 4 years to a minimum of 10.3 tonnes of fish landed in 1978. Estimated landings increased over the next 3 years to a maximum annual production of 130 tonnes of fish landed in 1981.

The relative composition of sweetlip was between 2 and 7 percent until 1976, but formed 10 to 14 percent of the total fish catch subsequently (Fig. 6.5). Estimated annual landings of sweetlip (Fig. 6.4) apart from minor slumps in production increased culminating in a peak production figure of 96.3 tonnes in 1980. Annual production increased most substantially in 1973 with a 3-fold increase to an estimated catch of 59.2 tonnes.

The relative composition of emperor increased markedly after 1969, to form 4 to 15 percent of the total estimated catch. These trends are reflected in the annual estimated landing figures. Catches of emperor were minimal up to 1970 (under 3 tonnes) then increased 20-fold to 61.1 tonnes in 1972. After a marginal slump in 1973, landings of emperor jumped to a peak production figure of 116 tonnes in 1974. A similar production yield was sustained in the next year, but landings fell to a low of 18.9 tonnes in 1976. Production remained relatively constant in the subsequent years.

Landings of morwong were inconsequential in the Central fisheries section. Annual production of nanygai in this region was extremely low (under 50kg) until 1979 when landings rose to 0.8 tonnes. However production fell to previous figures over the next two years.

Cod comprised approximately 1 percent ot the total estimated finfish catch in the Central fisheries section.

Bream formed 0.5 to 3 percent of the total estimated finfish catch. However in 1969, Bream comprised 6.3 percent of the total catch.

Catches of parrot fish were inconsequential in the Central fisheries section, comprising under 0.7 percent of the total estimated catch.

Mixed reef fillets in the Central Fisheries Section formed 1 to 9 percent of total estimated finfish landings. Significant increases in the relative composition of mixed reef fish occur in 1961, 1969, and 1978.

FIG. 6.1: Combined reef fish. Estimated landings in the Central Fisheries Section.

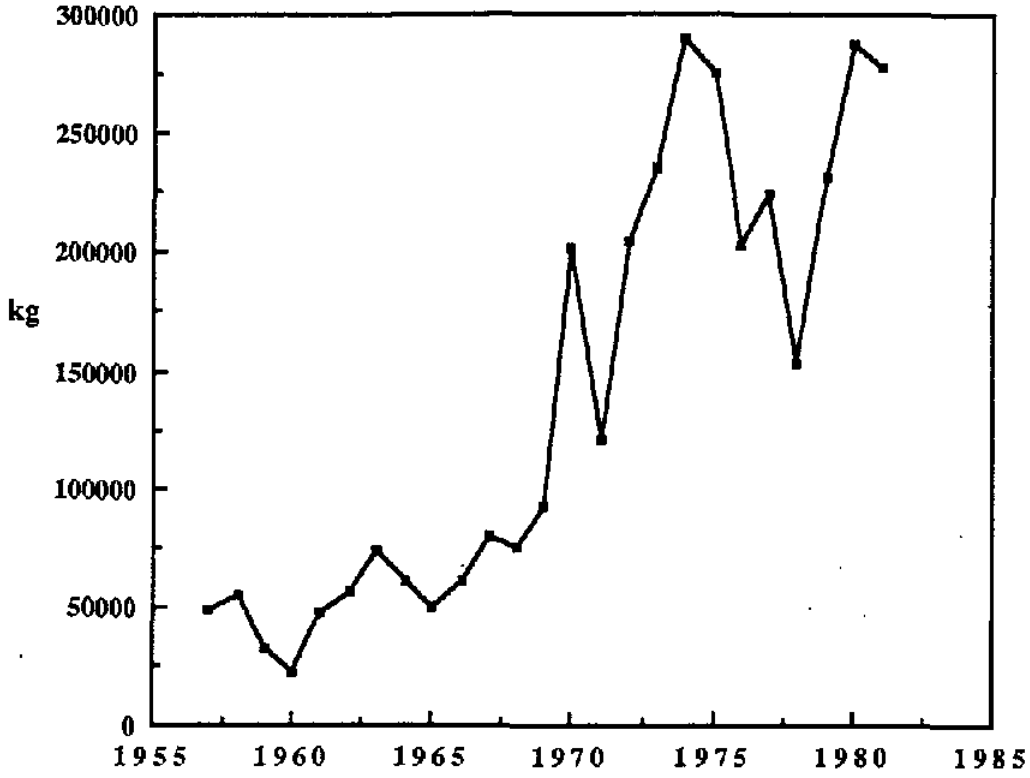


FIG. 6.2: Combined reef fish. Estimated percentage of the total catch in the Central Fisheries Section.

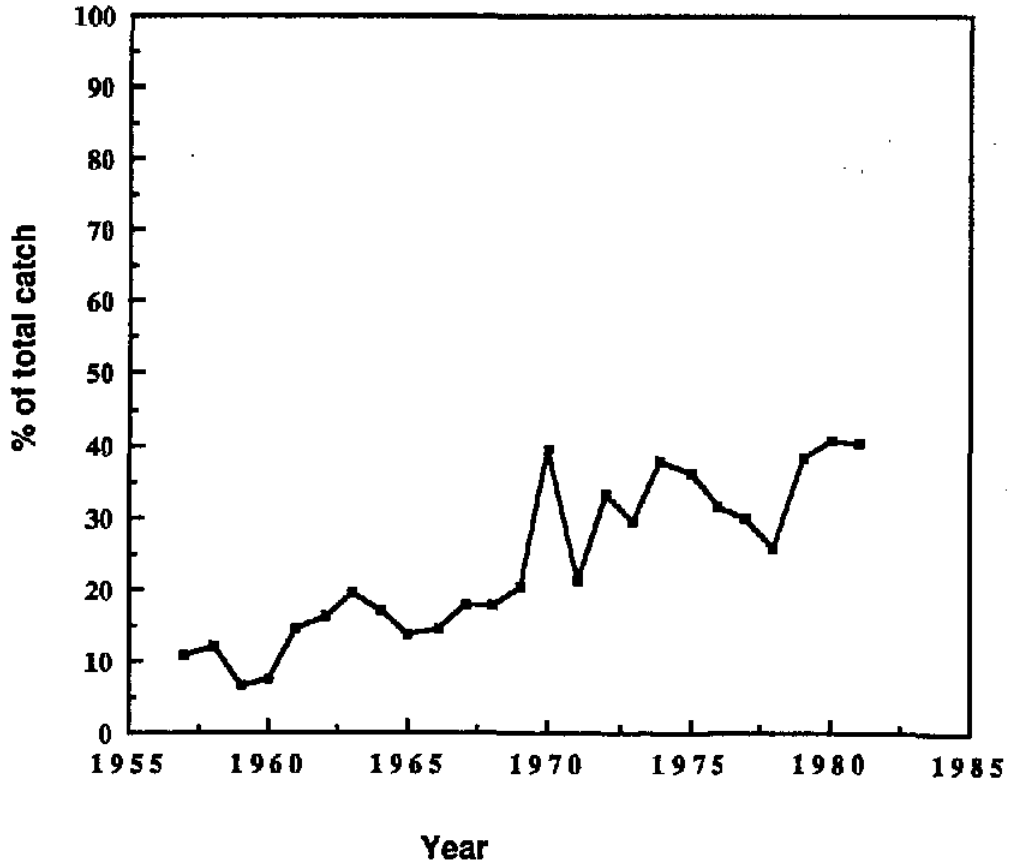


FIG 6.3: Coral trout. Estimated landings in the Central Fisheries Section.

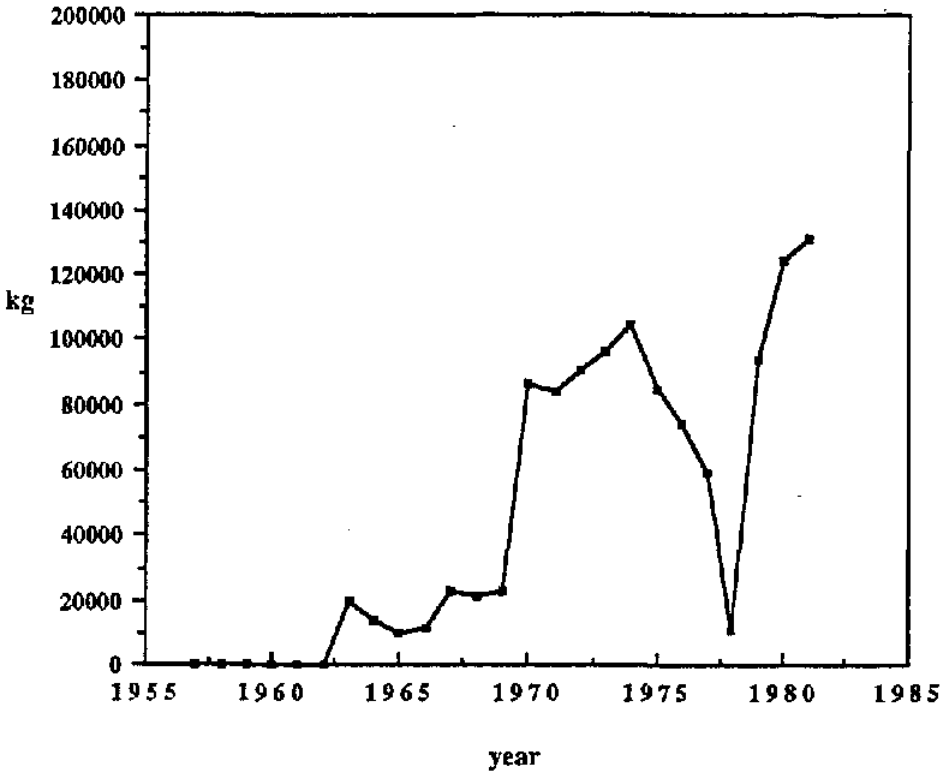


FIG. 6.4. Coral trout. Estimated percentage of in the Central Fisheries Section.

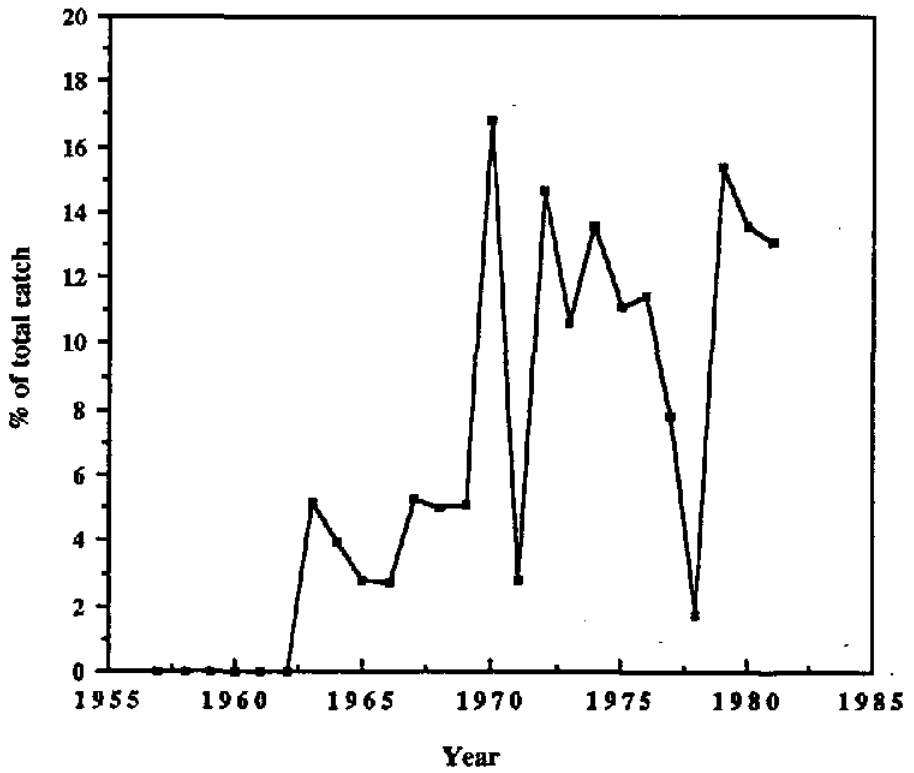


FIG. 6.5: Sweetlip. Estimated landings in the Central Fisheries Section.

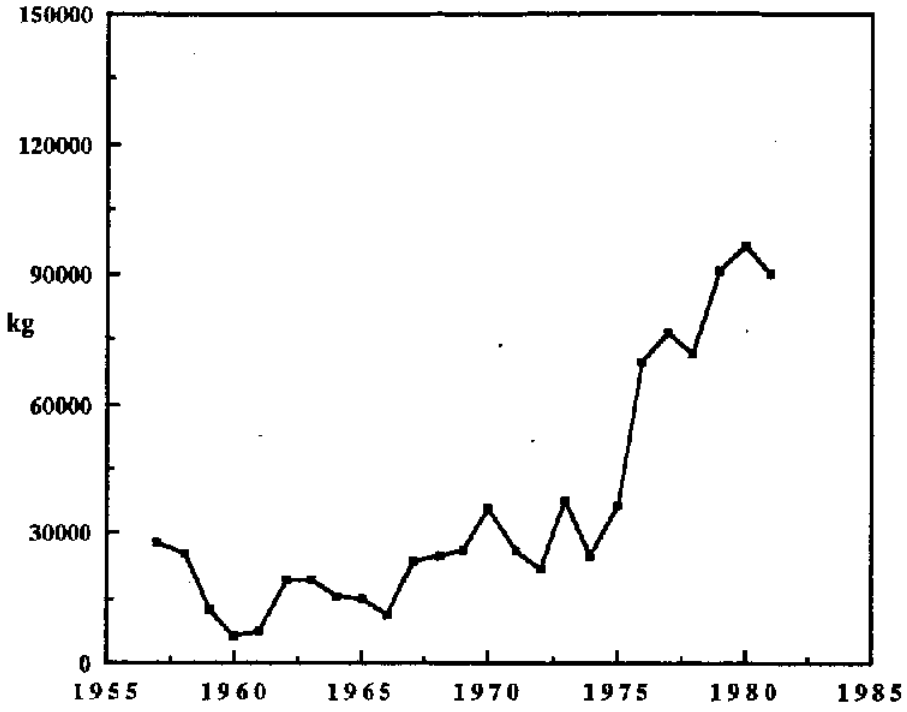


FIG. 6.6: Sweetlip. Estimated percentage of total catch in the Central Fisheries Section.

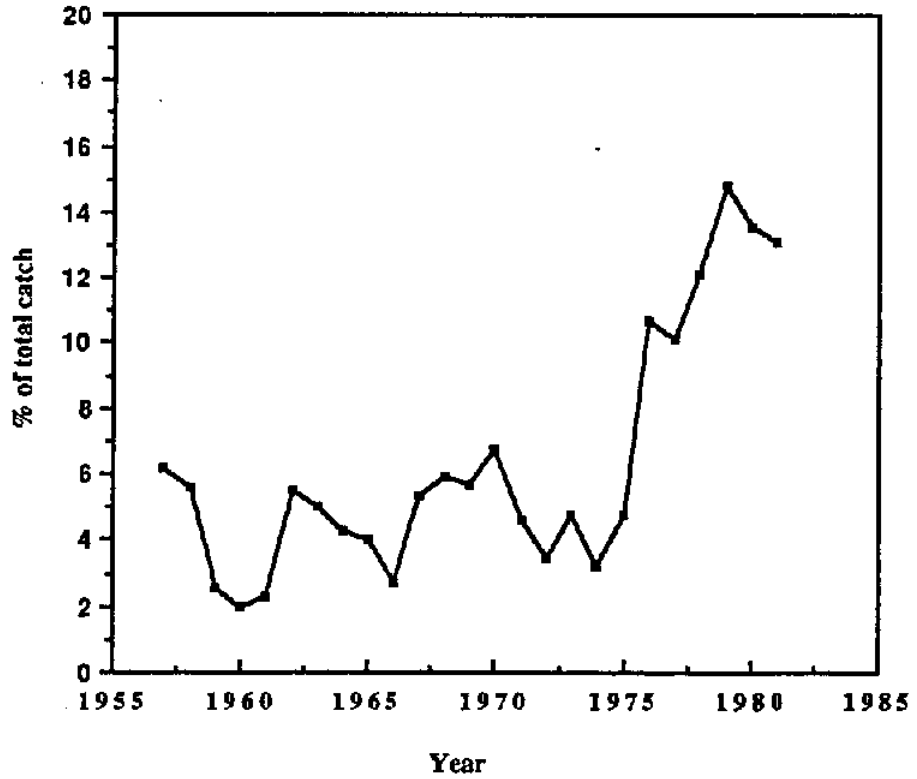


FIG. 6.7: Emperor. Estimated landings in the Central Fisheries Section.

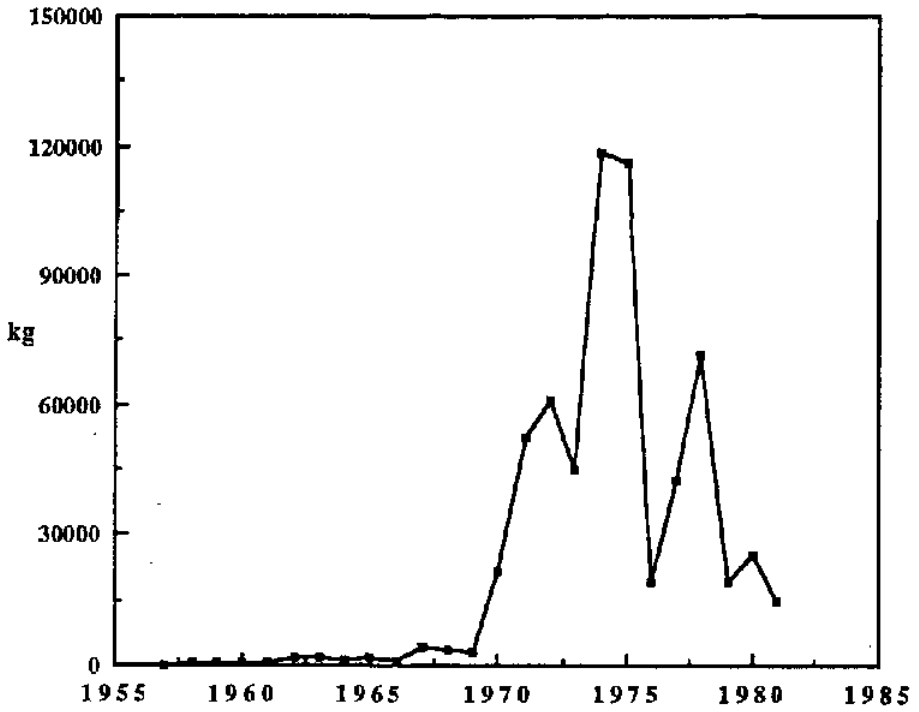


FIG. 6.8: Emperor. Estimated percentage of total catch in the Central Fisheries Section

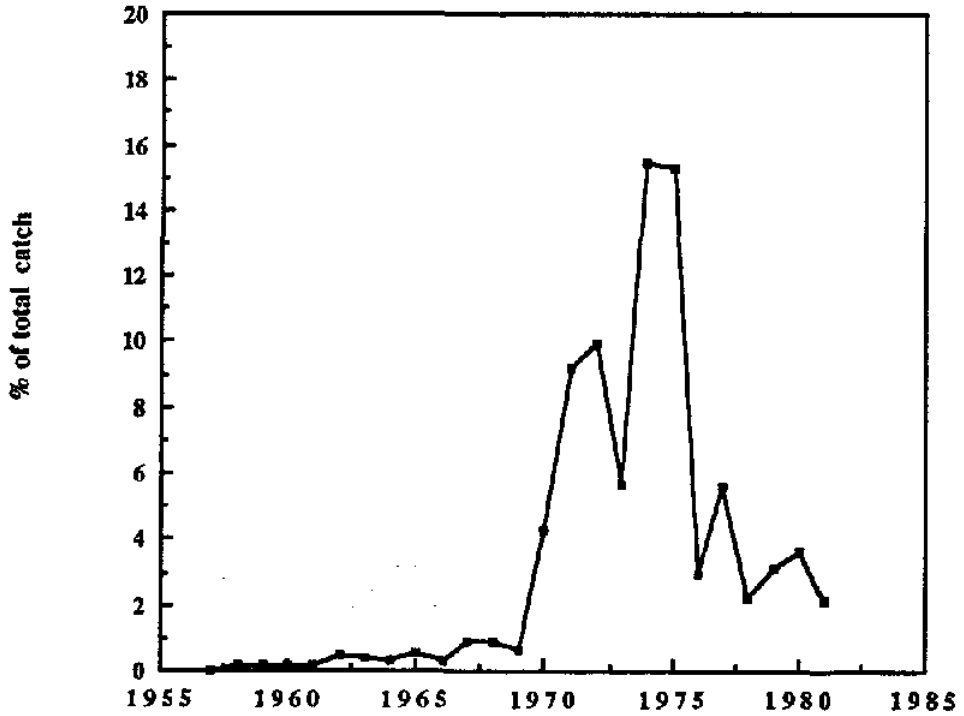


FIG. 6.9: Morwong. Estimated landings in the Central Fisheries Section.

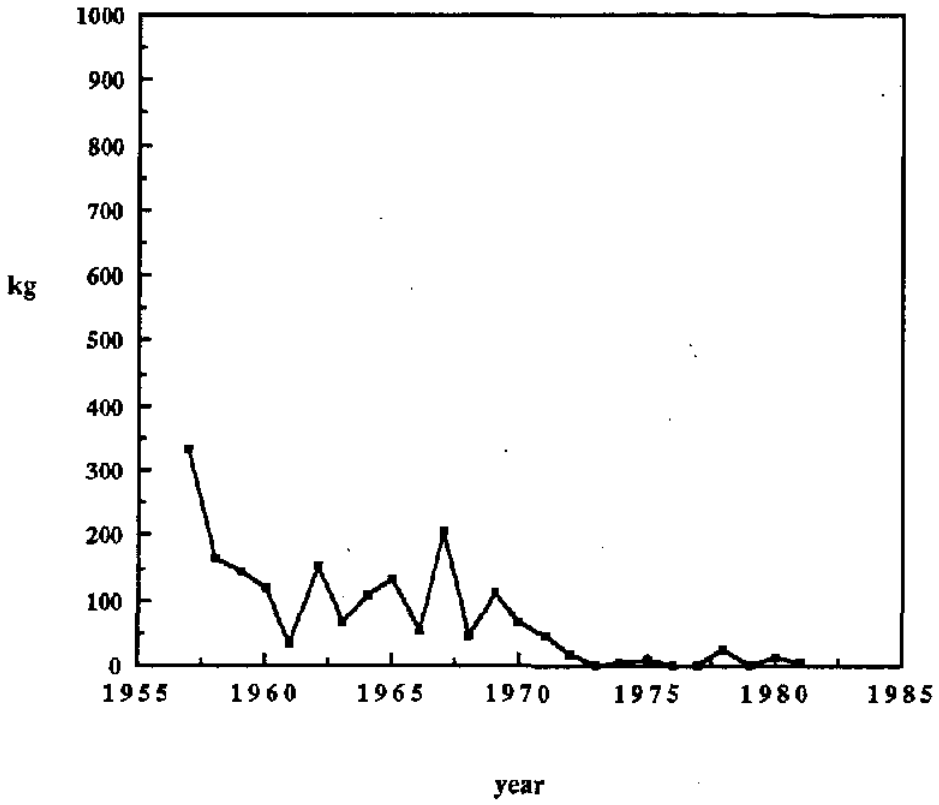


FIG. 6.10: Morwong. Estimated percentage of total catch in the Central Fisheries Section

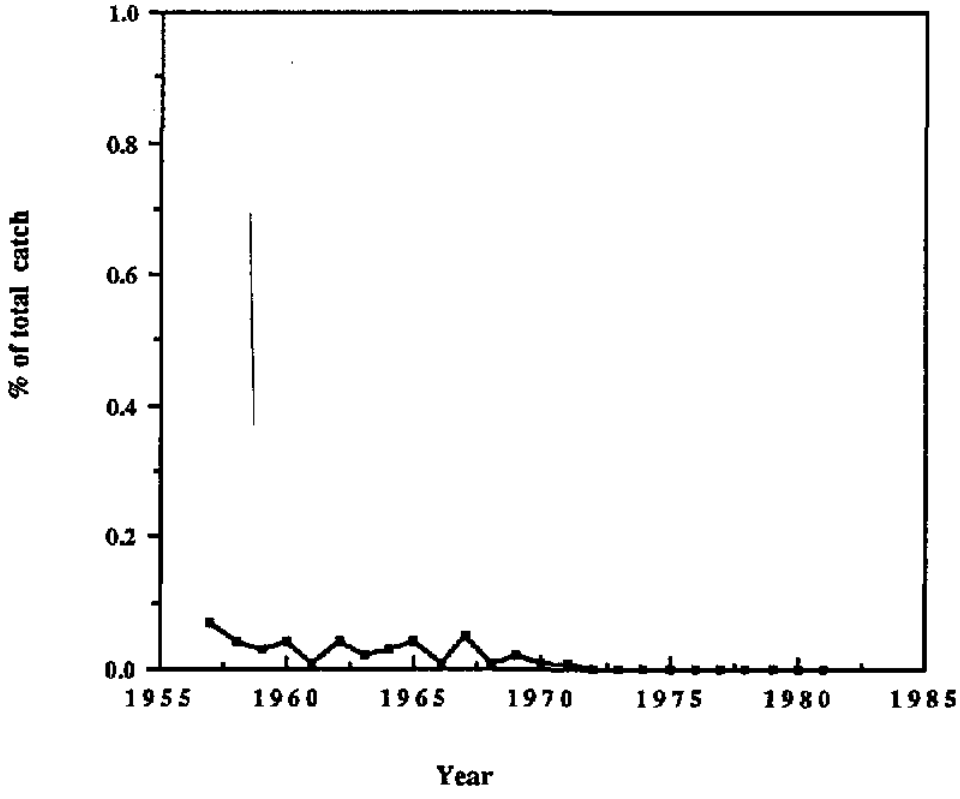


FIG. 6.11: Nanygai. Estimated landings in the Central Fisheries Section.

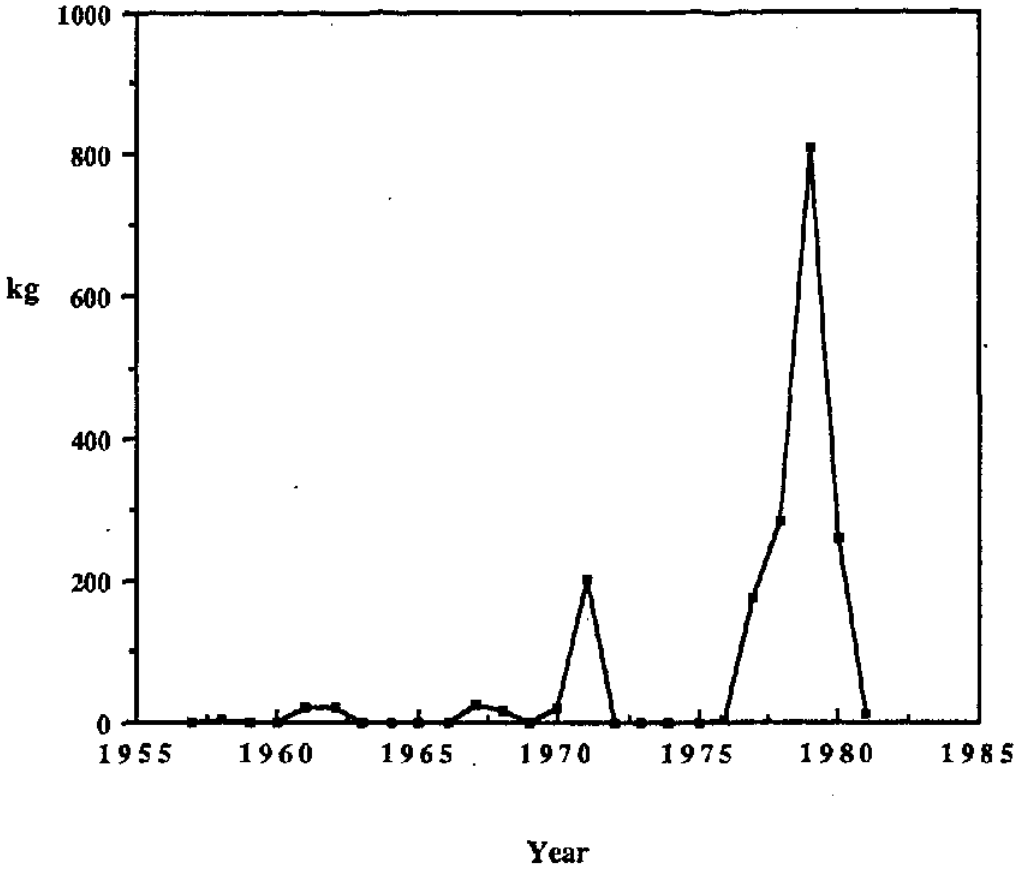


FIG. 6.12: Nanygai. Estimated percentage of total catch in the Central Fisheries Section

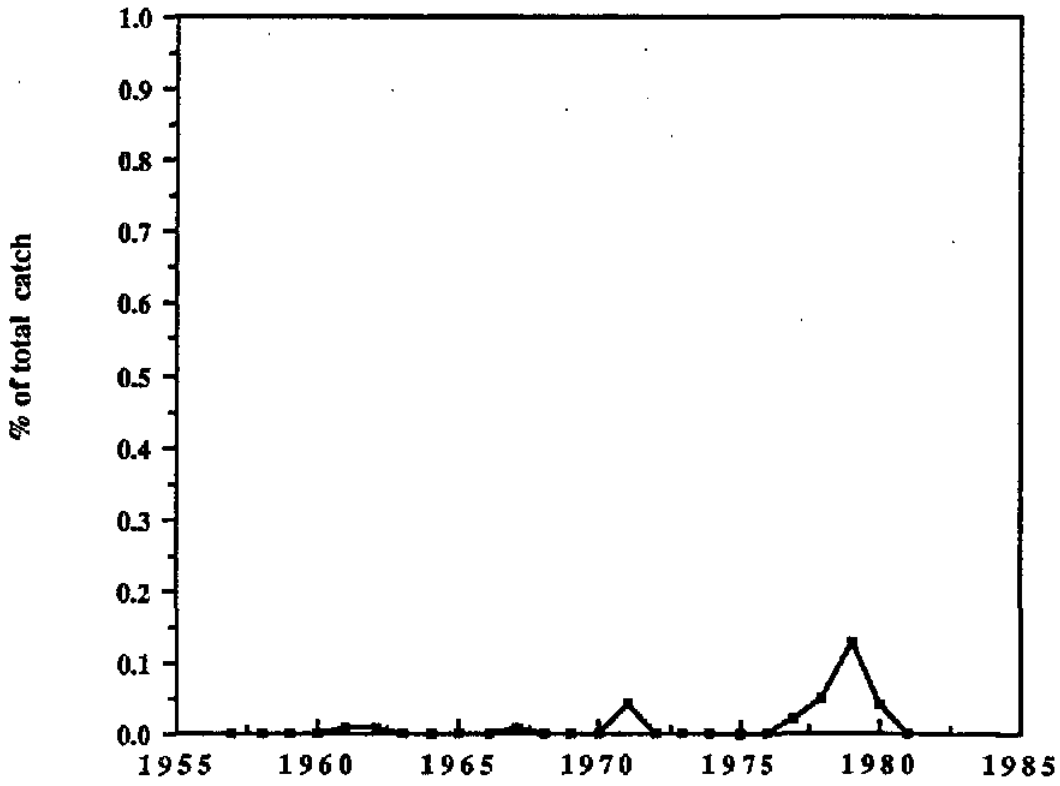


FIG. 6.13: Cod. Estimated landings in the Central Fisheries Section.

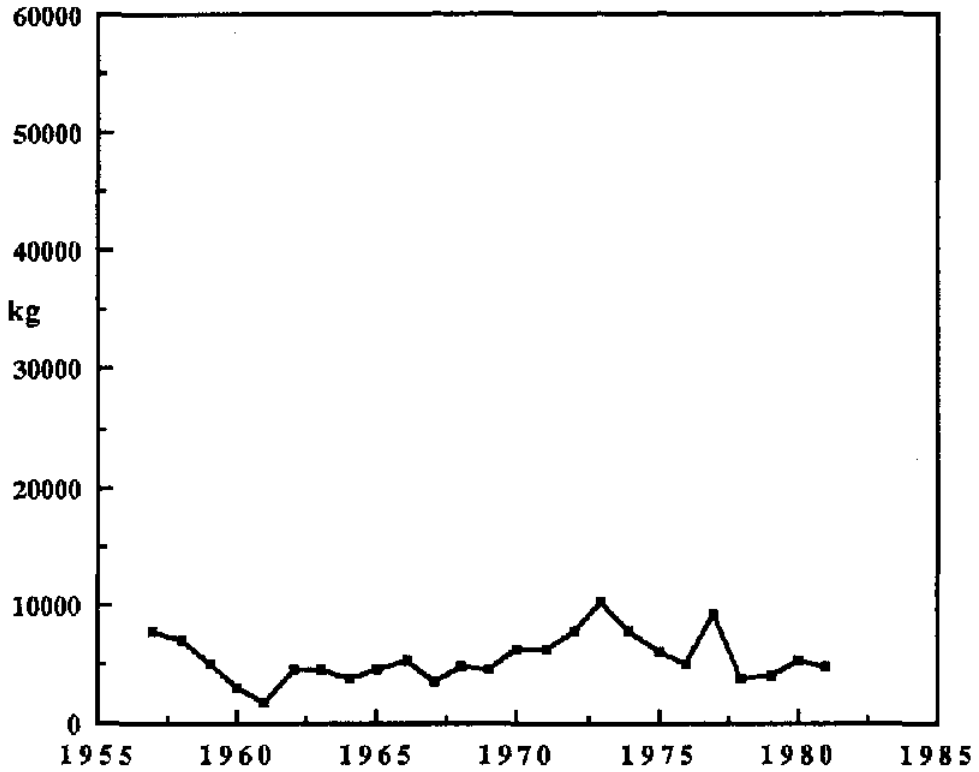


FIG. 6.14: Cod. Estimated percentage of total catch in the Central Fisheries Section

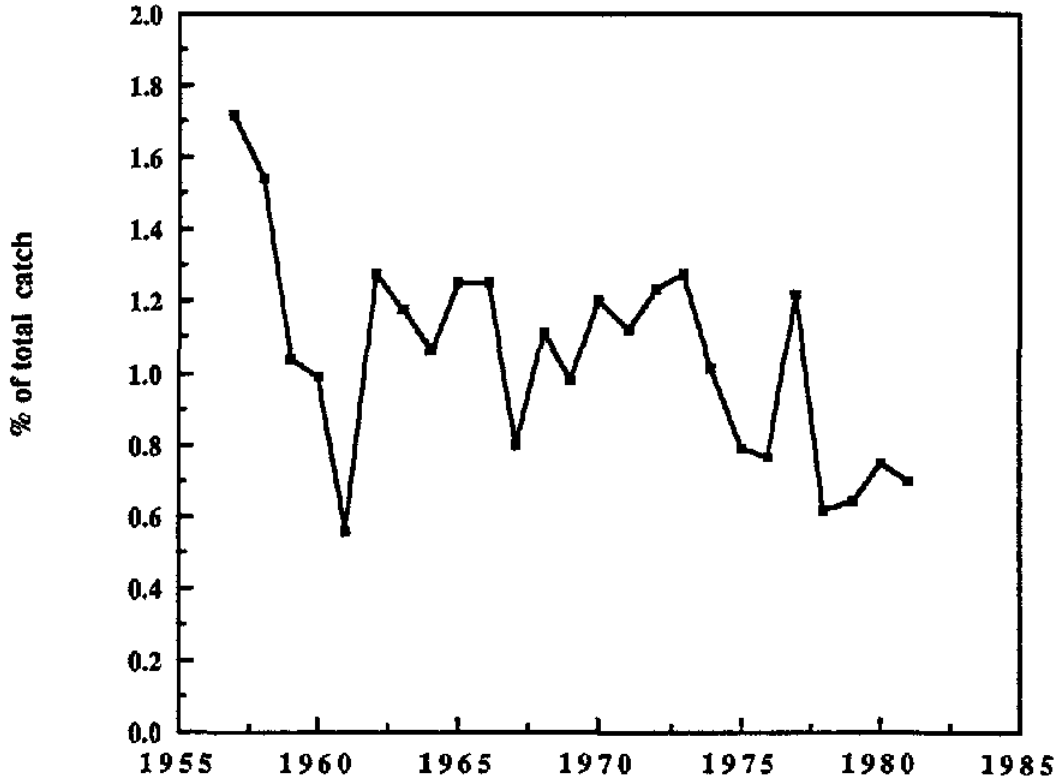


FIG. 6.15: Bream. Estimated landings in the Central Fisheries Section.

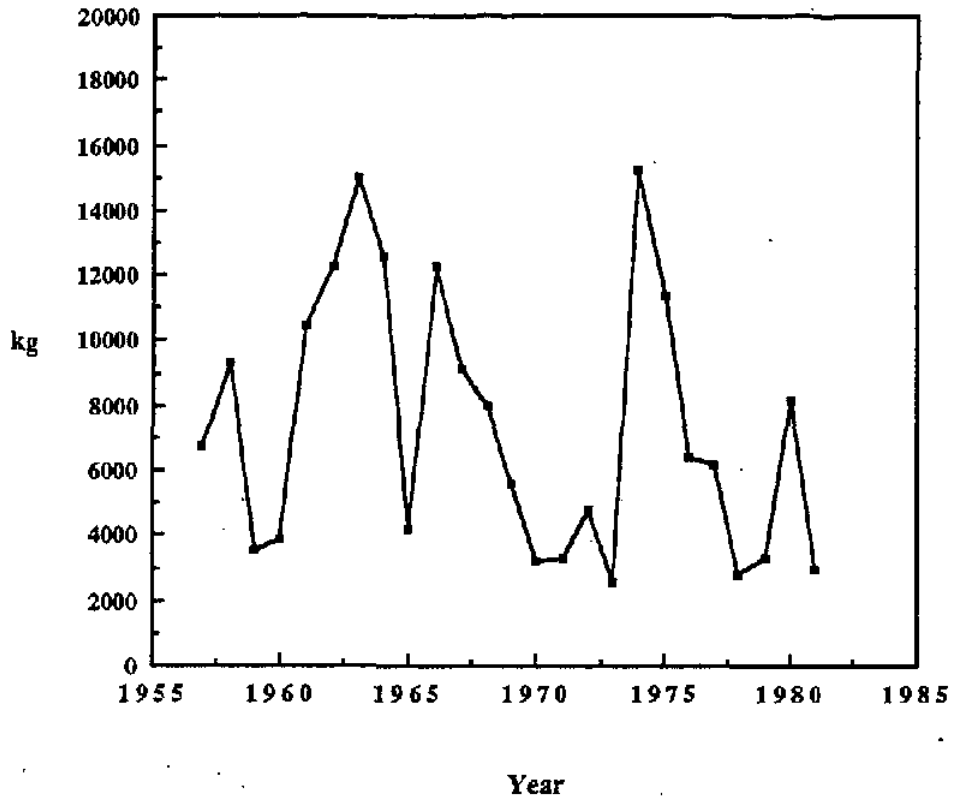


FIG. 6.16: Bream. Estimated percentage of the total catch in th Central Fisheries Section.

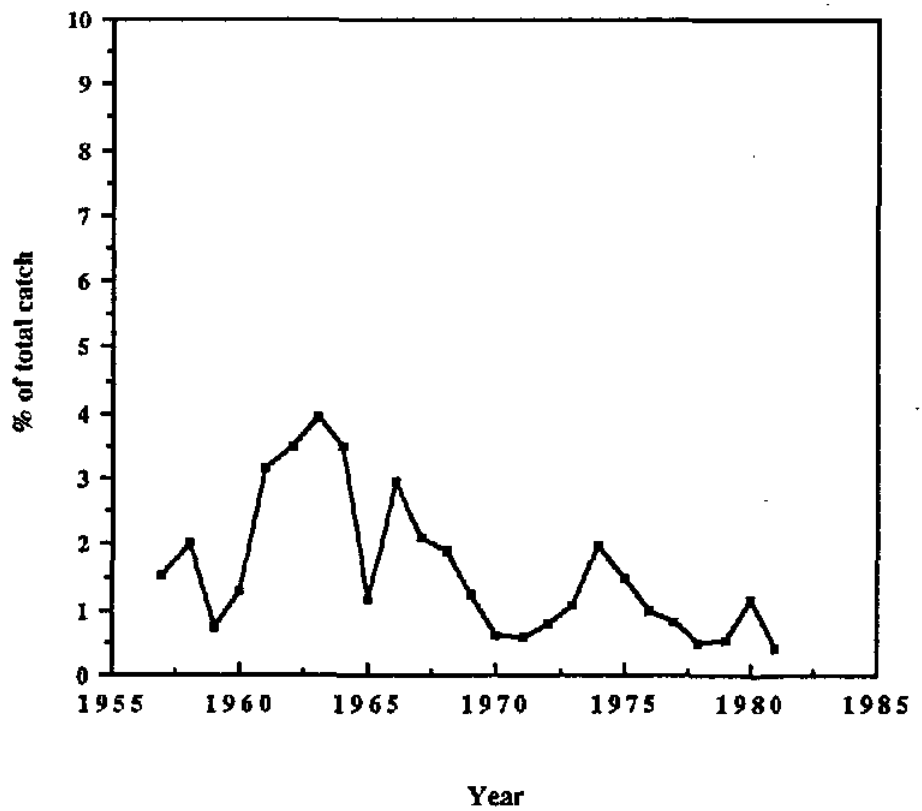


FIG. 6.17: Parrotfish. Estimated landings in the Central Fisheries Section.

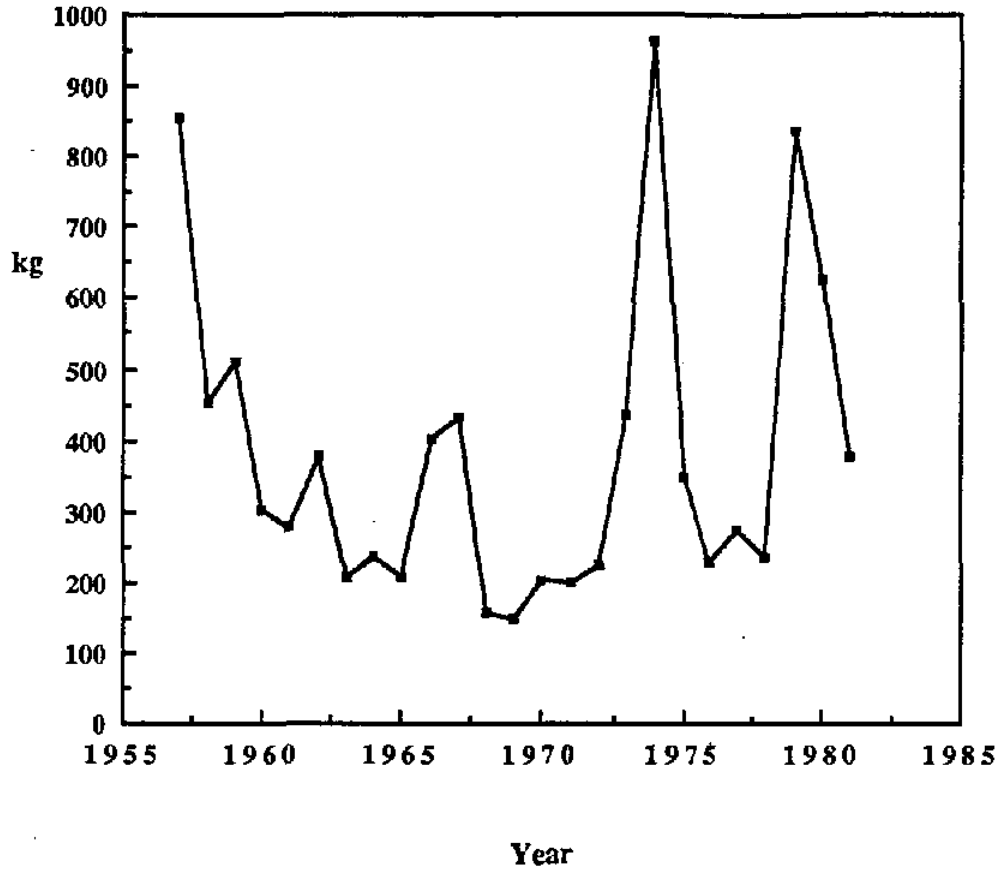


FIG. 6.18: Parrotfish. Estimated percentage of total catch in the Central Fisheries Section

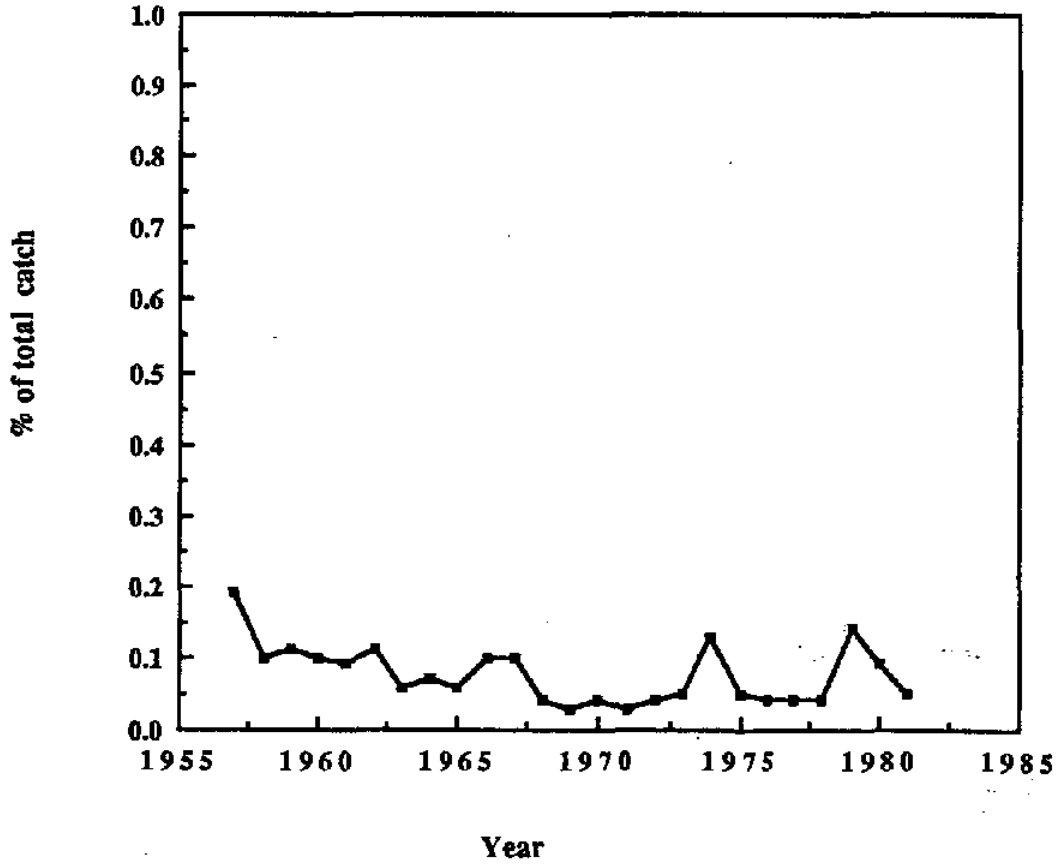


FIG. 6.19. Mixed reef fish. Estimated landings in the Central Fisheries Section.

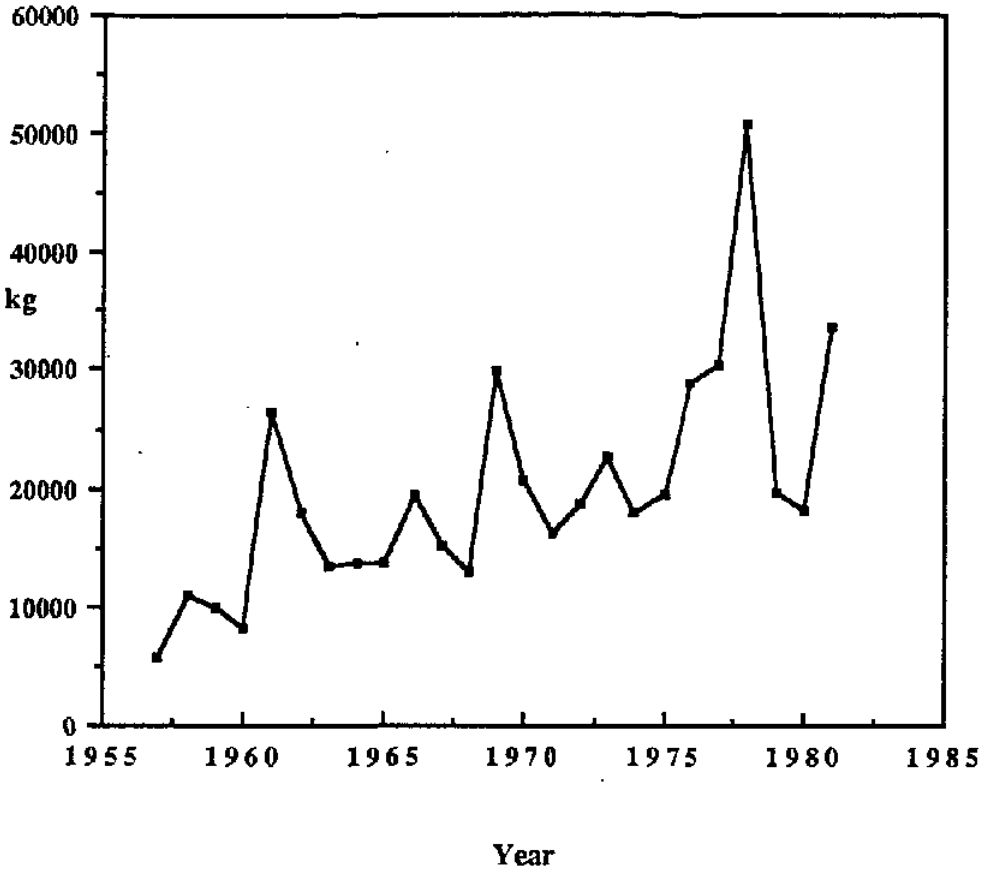


FIG. 6.20: Mixed Reef Fish. Estimated percentage of total catch in the Central Fisheries Section

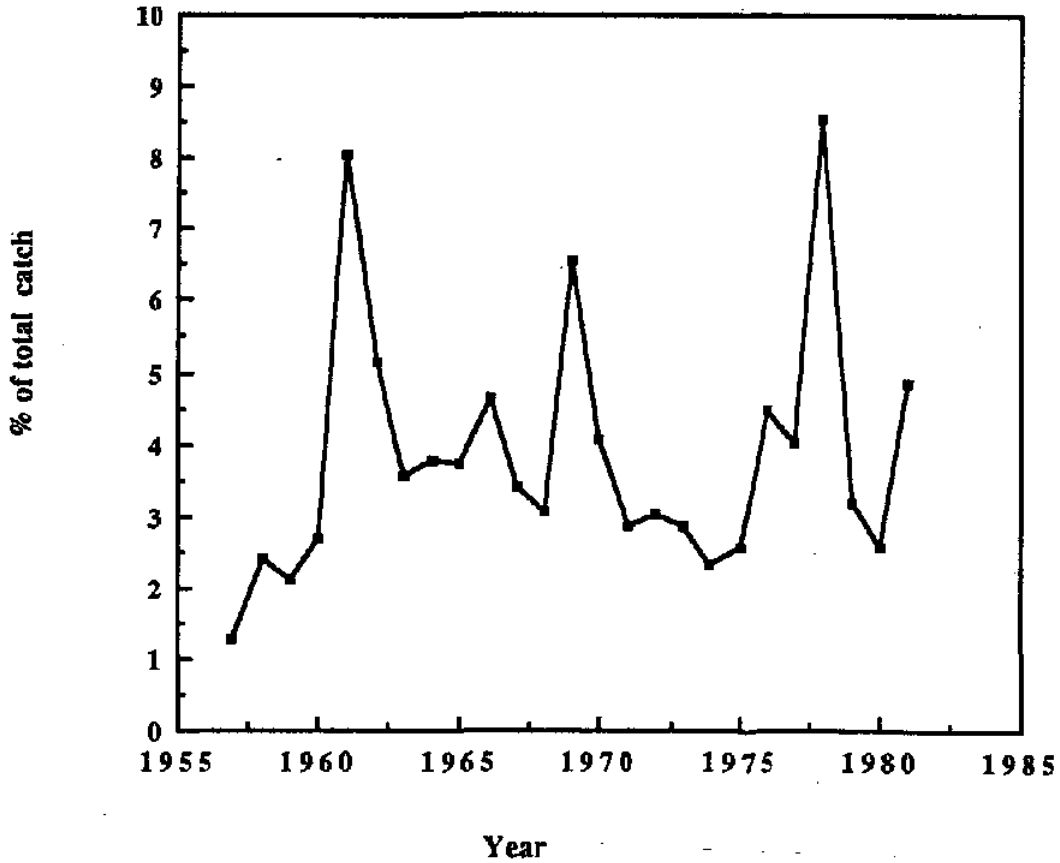


TABLE 6.1: ESTIMATED LANDINGS OF COMBINED REEF FISH AND TOTAL FINFISH LANDINGS FOR THE CENTRAL FISHERIES SECTION.

YEAR	REEF FISH LANDINGS	TOTAL LANDINGS	PERCENTAGE OF REEF FISH
57	48836	444716	10.98
58	54352	459374	11.83
59	32273	473746	6.81
60	21840	300008	7.28
61	46976	327449	14.35
62	56394	349438	16.14
63	73333	377820	19.41
64	60984	360051	16.94
65	49958	367166	13.61
66	61124	415425	14.71
67	79563	441881	18.01
68	75139	419308	17.92
69	92198	454769	20.27
70	201787	510060	39.56
71	121201	569003	21.30
72	204087	615640	33.15
73	235292	795327	29.58
74	289717	768174	37.72
75	274646	759877	36.14
76	202950	645435	31.44
77	223979	753075	29.74
78	153004	594612	25.73
79	232134	610132	38.05
80	287258	709852	40.47
81	277351	690642	40.16

TABLE 6.2: ESTIMATED LANDINGS(Kg) OF REEF FISH AND RELATIVE COMPOSITION OF TOTAL FINFISH LANDINGS IN THE CENTRAL FISHERIES SECTION.

YEAR	SPECIES	LANDINGS (Kg)	% OF TOTAL FINFISH LANDINGS
57	Bream	6714	1.51
57	Cod	7640	1.72
57	Emperor	189	0.04
57	Mixed	5632	1.27
57	Morwong	333	0.07
57	Nanygai	0	0.00
57	Parrot	854	0.19
57	Sweetlip	27475	6.18
58	Bream	9295	2.02
58	Cod	7063	1.54
58	Emperor	774	0.17
58	Mixed	11025	2.40
58	Morwong	163	0.04
58	Nanygai	3	0.00
58	Parrot	451	0.10
58	Sweetlip	25578	5.57
59	Bream	3558	0.75
59	Cod	4944	1.04
59	Emperor	851	0.18
59	Mixed	10011	2.11
59	Morwong	143	0.03
59	Nanygai	0	0.00
59	Parrot	509	0.11
59	Sweetlip	12257	2.59
60	Bream	3845	1.28
60	Cod	2974	0.99
60	Emperor	453	0.15
60	Mixed	8115	2.71
60	Morwong	119	0.04
60	Nanygai	0	0.00
60	Parrot	302	0.10
60	Sweetlip	6032	2.01
61	Bream	10428	3.18
61	Cod	1830	0.56
61	Emperor	485	0.15
61	Mixed	26413	8.07
61	Morwong	33	0.01
61	Nanygai	20	0.01
61	Parrot	280	0.09
61	Sweetlip	7487	2.29

YEAR	SPECIES	LANDINGS (Kg)	% OF TOTAL FINFISH LANDINGS
62	Bream	12246	3.50
62	Cod	4476	1.28
62	Emperor	1691	0.48
62	Mixed	18026	5.16
62	Morwong	151	0.04
62	Nanygai	20	0.01
62	Parrot	376	0.11
62	Sweetlip	19407	5.55
63	Bream	14958	3.96
63	Cod	4446	1.18
63	Coral trout	19570	5.18
63	Emperor	1625	0.43
63	Mixed	13396	3.55
63	Morwong	65	0.02
63	Nanygai	0	0.00
63	Parrot	209	0.06
63	Sweetlip	19062	5.05
64	Bream	12572	3.49
64	Cod	3828	1.06
64	Coral trout	14166	3.93
64	Emperor	1117	0.31
64	Mixed	13647	3.79
64	Morwong	108	0.03
64	Nanygai	0	0.00
64	Parrot	235	0.07
64	Sweetlip	15310	4.25
65	Bream	4198	1.14
65	Cod	4587	1.25
65	Coral trout	10153	2.77
65	Emperor	2006	0.55
65	Mixed	13785	3.75
65	Morwong	132	0.04
65	Nanygai	0	0.00
65	Parrot	207	0.06
65	Sweetlip	14890	4.06
66	Bream	12281	2.96
66	Cod	5199	1.25
66	Coral trout	11357	2.73
66	Emperor	1307	0.31
66	Mixed	19320	4.65
66	Morwong	53	0.01
66	Nanygai	0	0.00
66	Parrot	403	0.10
66	Sweetlip	11204	2.70

YEAR	SPECIES	LANDINGS (Kg)	% OF TOTAL FINFISH LANDINGS
67	Bream	9173	2.08
67	Cod	3525	0.80
67	Coral trout	23369	5.29
67	Emperor	4135	0.94
67	Mixed	15109	3.42
67	Morwong	205	0.05
67	Nanygai	26	0.01
67	Parrot	433	0.10
67	Sweetlip	23589	5.34
68	Bream	7983	1.90
68	Cod	4661	1.11
68	Coral trout	20989	5.01
68	Emperor	3651	0.87
68	Mixed	12898	3.08
68	Morwong	45	0.01
68	Nanygai	15	0.00
68	Parrot	158	0.04
68	Sweetlip	24739	5.90
69	Bream	5582	1.23
69	Cod	4466	0.98
69	Coral trout	23173	5.10
69	Emperor	3038	0.67
69	Mixed	29842	6.56
69	Morwong	113	0.02
69	Nanygai	0	0.00
69	Parrot	148	0.03
69	Sweetlip	25835	5.68
70	Bream	3212	0.6
70	Cod	6100	1.20
70	Coral trout	86086	16.88
70	Emperor	21911	4.30
70	Mixed	20780	4.07
70	Morwong	67	0.01
70	Nanygai	19	0.00
70	Parrot	203	0.04
70	Sweetlip	34499	6.76
71	Bream	3285	0.58
71	Cod	6394	1.12
71	Coral trout	16099	2.83
71	Emperor	52513	9.23
71	Mixed	16290	2.86
71	Morwong	46	0.01
71	Nanygai	199	0.04
71	Parrot	198	0.03
71	Sweetlip	26177	4.60

YEAR	SPECIES	LANDINGS (Kg)	% OF TOTAL FINFISH LANDINGS
72	Bream	4734	0.77
72	Cod	7628	1.24
72	Coral trout	90320	14.67
72	Emperor	61138	9.93
72	Mixed	18548	3.01
72	Morwong	16	0.00
72	Parrot	225	0.04
72	Sweetlip	21478	3.49
73	Bream	2536	1.07
73	Cod	10183	1.28
73	Coral trout	84234	10.59
73	Emperor	44926	5.65
73	Mixed	22693	2.85
73	Morwong	0	0
73	Nanygai	0	0.00
73	Parrot	435	0.05
73	Sweetlip	37677	4.74
74	Bream	15243	1.98
74	Cod	7790	1.01
74	Coral trout	104305	13.58
74	Emperor	118630	15.44
74	Mixed	17851	2.32
74	Morwong	6	0.00
74	Nanygai	0	0.00
74	Parrot	964	0.13
74	Sweetlip	24928	3.25
75	Bream	11390	1.50
75	Cod	6025	0.79
75	Coral trout	84699	11.15
75	Emperor	116196	15.29
75	Mixed	19500	2.57
75	Morwong	7	0.00
75	Nanygai	0	0.00
75	Parrot	349	0.05
75	Sweetlip	36480	4.80
76	Bream	6450	1.00
76	Cod	4927	0.76
76	Coral trout	74095	11.48
76	Emperor	18904	2.93
76	Mixed	28840	4.47
76	Morwong	0	0.00
76	Nanygai	6	0.00
76	Parrot	227	0.04
76	Sweetlip	69501	10.77

YEAR	SPECIES	LANDINGS (Kg)	% OF TOTAL FINFISH LANDINGS
77	Bream	6181	0.82
77	Cod	9195	1.22
77	Coral trout	59166	7.86
77	Emperor	42296	5.62
77	Mixed	30313	4.03
77	Morwong	0	0.00
77	Nanygai	174	0.02
77	Parrot	274	0.04
77	Sweetlip	76380	10.14
78	Bream	2830	0.48
78	Cod	3632	0.61
78	Coral trout	10388	1.75
78	Emperor	13172	2.22
78	Mixed	50702	8.53
78	Morwong	23	0.00
78	Nanygai	284	0.05
78	Parrot	238	0.04
78	Sweetlip	71735	12.06
79	Bream	3266	0.54
79	Cod	3899	0.64
79	Coral trout	93862	15.38
79	Emperor	19275	3.16
79	Mixed	19589	3.21
79	Morwong	0	0.00
79	Nanygai	808	0.13
79	Parrot	837	0.14
79	Sweetlip	90598	14.85
80	Bream	8145	1.15
80	Cod	5331	0.75
80	Coral trout	123917	17.46
80	Emperor	25475	3.59
80	Mixed	18216	2.57
80	Morwong	14	0.001
80	Nanygai	256	0.04
80	Parrot	628	0.09
80	Sweetlip	96312	13.57
81	Bream	2931	0.42
81	Cod	4818	0.70
81	Coral trout	130813	18.94
81	Emperor	14615	2.12
81	Mixed	33510	4.85
81	Morwong	4	0.00
81	Nanygai	13	0.00
81	Parrot	377	0.05
81	Sweetlip	90270	13.07

CHAPTER 7: CAPRICORNIA FISHERIES SECTION.

7.1 INTRODUCTION

The Capricornia fisheries section encompasses both the Capricornia and Capricorn-Bunker sections of the Great Barrier Reef Marine Park. It is an area of some 12,000 square kilometres, and includes the Pompey, Swain, and Capricorn-Bunker reef complexes. In terms of fishing it represents one of the most economically important areas on the Great Barrier Reef. Studies by the Institute of Applied Social Research (1981) as well as studies by D.P.I. in association with Q.C.F.O. (1979), have detailed the economic characteristics of the commercial fishing industry in this area.

Major shore based Q.F.B. processing factories are present at Rockhampton, Yeppoon, Gladstone, Bundaberg, whilst other minor depots have operated at Maryborough, Pialba, Rosslyn Bay and Tincan Bay at various times. The combined total production of reef fish caught in the Capricornia fisheries section is shown in table 7.1 and figures 7.1 and 7.2, whilst table 7.2 provides a breakdown by species of fish landed for the Capricornia fisheries section. Appendix A3 has a full listing of species landed by port.

7.2 ESTIMATED ANNUAL LANDINGS

The Capricornia fisheries section consistently had the greatest annual landings of reef fish for all sections, up until 1970 (Table 7.1). However, reef fish species accounted for approximately 14 percent of the total estimated finfish catch. This is due to the fact that a number of temperate species caught in this section are not caught further north (Table 3.1). Annual production dropped substantially in 1961 and again in 1968 and 1969 (Fig. 7.2). Combined landings of reef fish were greatest in 1980, accounting for 25 percent of the total estimated finfish catch.

7.3 SPECIES COMPOSITION

Bream, caught mostly in nets, is the most frequently caught commercial fish species in the Capricornia fisheries section (Fig. 7.15) The relative composition of this species was between 2 and 8 percent of the total estimated catch of all fish. Estimated landings increased most markedly in 1973 to 25 tonnes, from 3.2 the previous year. Landings declined subsequently (Fig. 7.14).

Sweetlip was the most commonly caught reef fish in this section (Table 7.2), comprising 2 to 6

percent of the total estimated catch. Notable is the threefold increase in landings from 22.5 tonnes in 1969 to 63.1 tonnes in 1971 (Fig. 7.4).

The relative composition of coral trout (Fig. 7.3) was 1 to 2 percent of the total catch, prior to 1970. Subsequently coral trout composed 2.5 to 4 percent of the total estimated catch. This is reflected in the estimated annual landings. Landings of coral trout increased markedly from 1969 when 9.8 tonnes were recorded as being landed until 1973 when 46.7 tonnes were caught. Landings of coral trout declined subsequently apart from increase in 1976 and again in 1980.

The relative composition of emperor increased from under 1 percent up until 1975, to 2 percent subsequently. The estimated landings of emperor (Fig. 7.5) show similar patterns of annual production found for coral trout. Notable is the 13.3 tonnes landed in 1962 from 5.1 tonnes landed the previous year. A decline in landings was evident over the next 6 years reaching a low of 4.7 tonnes of fish caught in 1968. Estimated landings overall increased in the subsequent years.

Morwong was more commonly caught in the Capricornia fisheries section, than in the other sections of the Marine Park. Even so, the percentage composition of morwong was under 0.3 percent and fell to under 0.05 percent after 1965 (Fig. 6.9). Landings have declined however from values of around the 2-3 tonne mark in the late fifties and early sixties to figures under one tonne subsequent to 1964 (Fig. 7.7).

Q.F.B. records of nanygai for the Capricornia fisheries section, show marginal landings, being less than one tonne until 1973 when 1.1 tonnes were landed (Fig. 6.7). No Landings of nanygai were recorded for 1974 and 1975. Landings increased steadily after this time,with an estimated 1.7 tonnes of nanygai being caught in 1981.

Cod constituted under 1.6 percent of the total estimated finfish production. Estimated annual landings of cod increased to a maximum of 11.3 tonnes of fish caught in 1975, but declined subsequently to approximately 4 tonnes per annum.

Parrot fish was more commonly caught in the Capricornia fisheries section, than the other sections, but estimated landings were still minimal, being under 1 tonne per annum.

The percentage of mixed reef fish varied from 0.5 to 2.5 percent of the total estimated finfish catch over the years up to 1975, and subsequently constituted 2 to 4 percent of total production. Estimated landings of mixed reef fish have generally increased, most significantly in the years 1961, 1969, and 1978.

FIG. 7.1: Combined reef fish. Estimated landings in the Capricornia Fisheries Section.

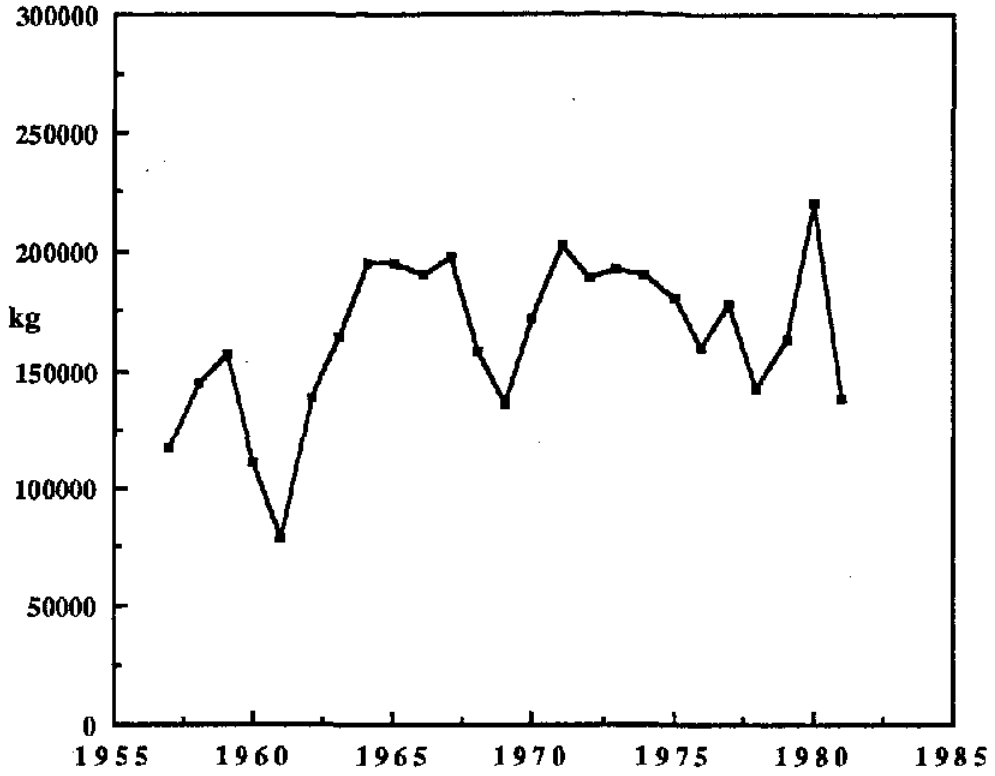


FIG. 7.2: Combined Reef Fish. Estimated percentage of total catch in the Capricornia Fisheries Section

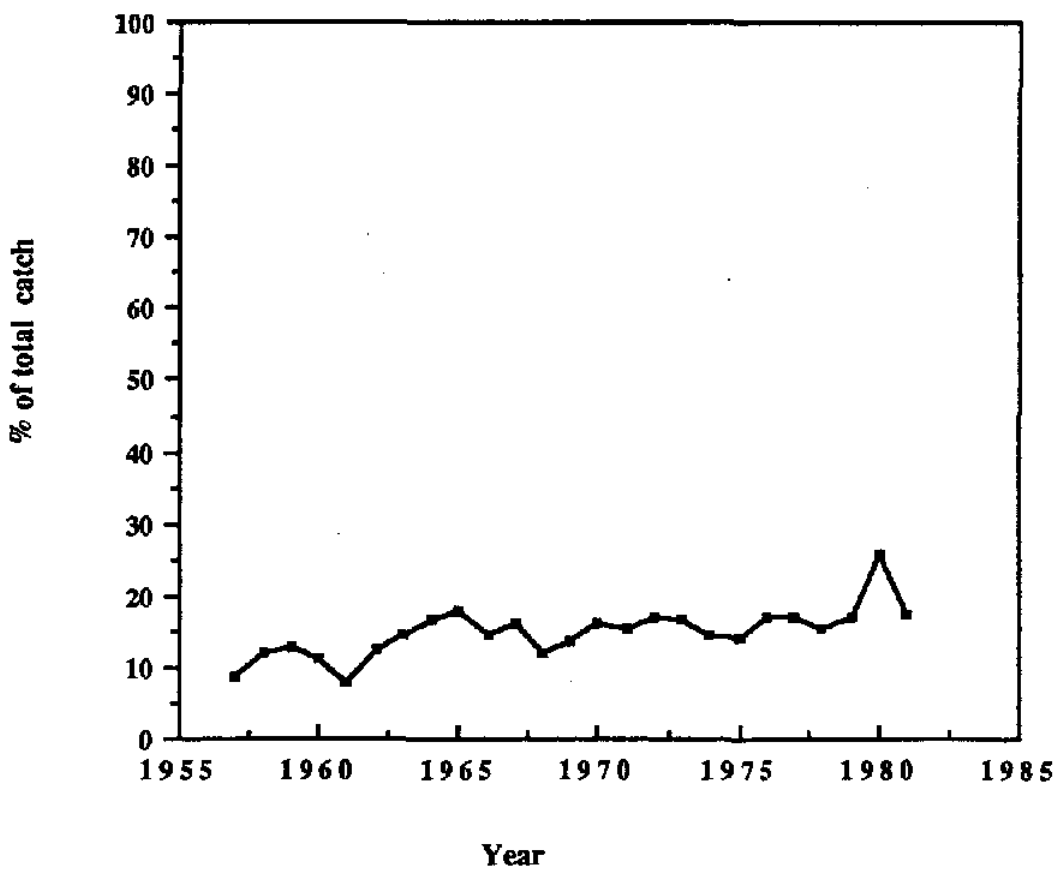


FIG. 7.3: Coral trout. Estimated landings in the CapricorniaFisheries Section.

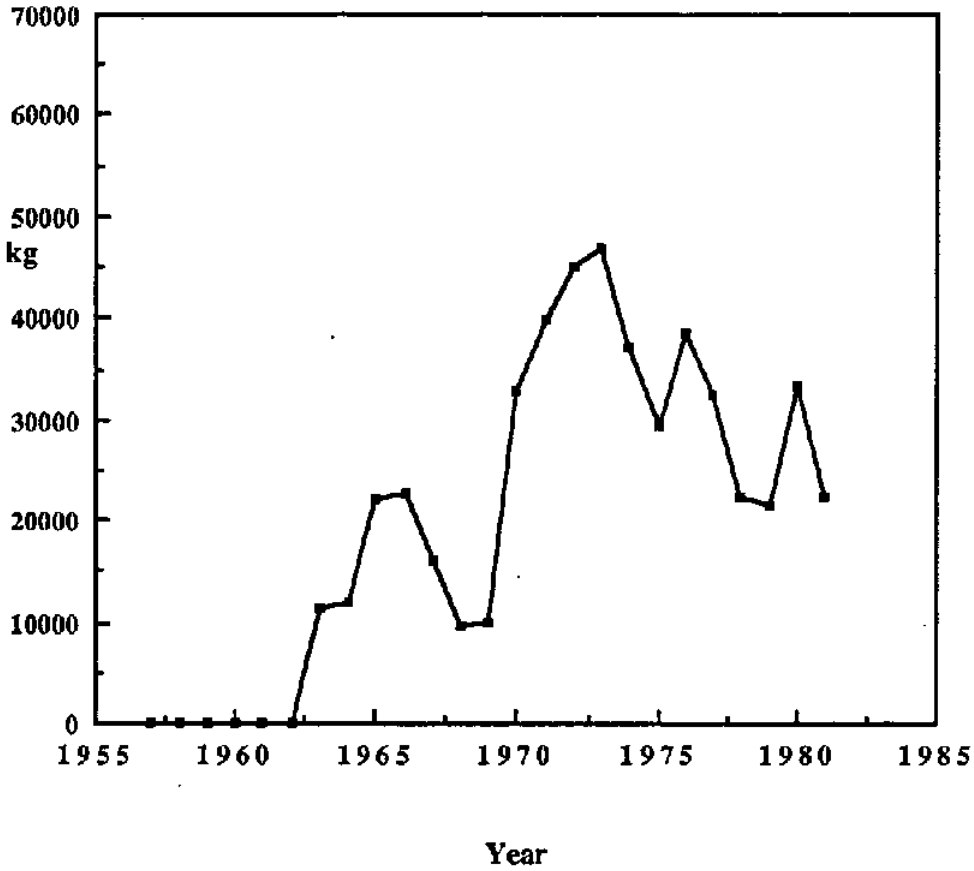


FIG. 7.4: Coral trout. Estimated percentage of total catch in the Capricornia Fisheries Section

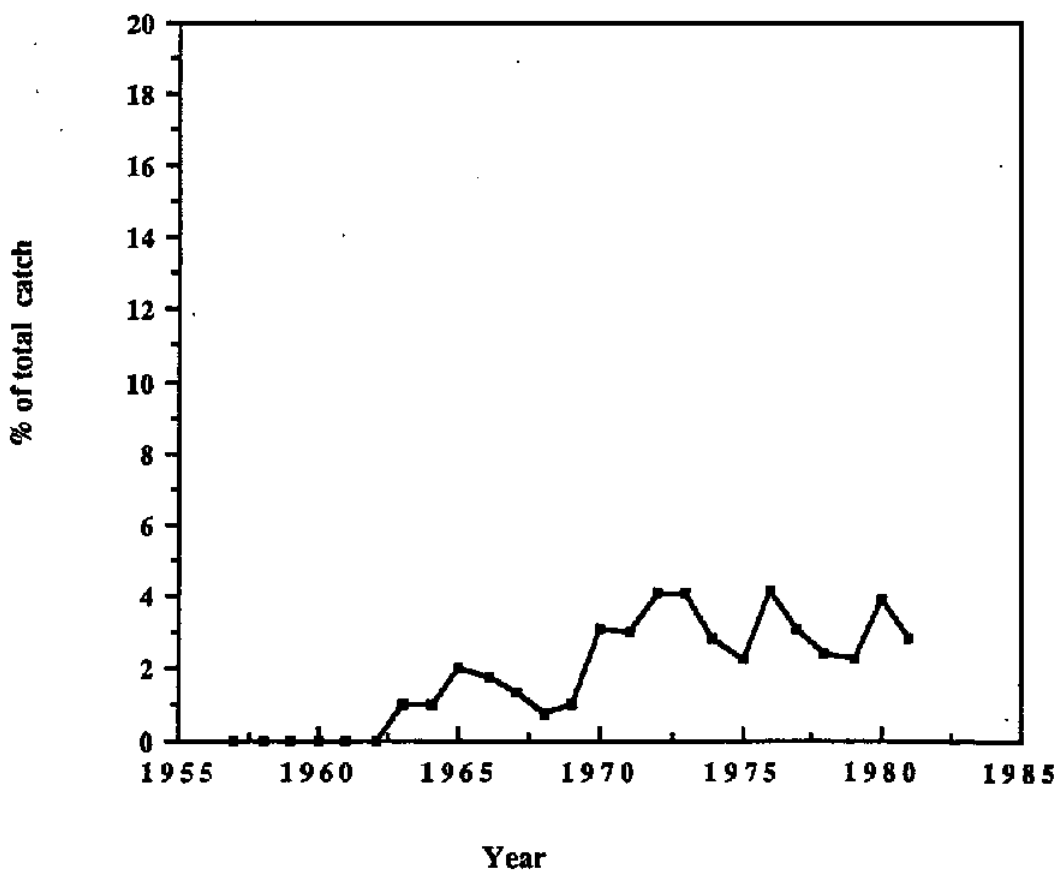


FIG. 7.5: Sweetlip. Estimated landings in the Capricornia Fisheries Section.

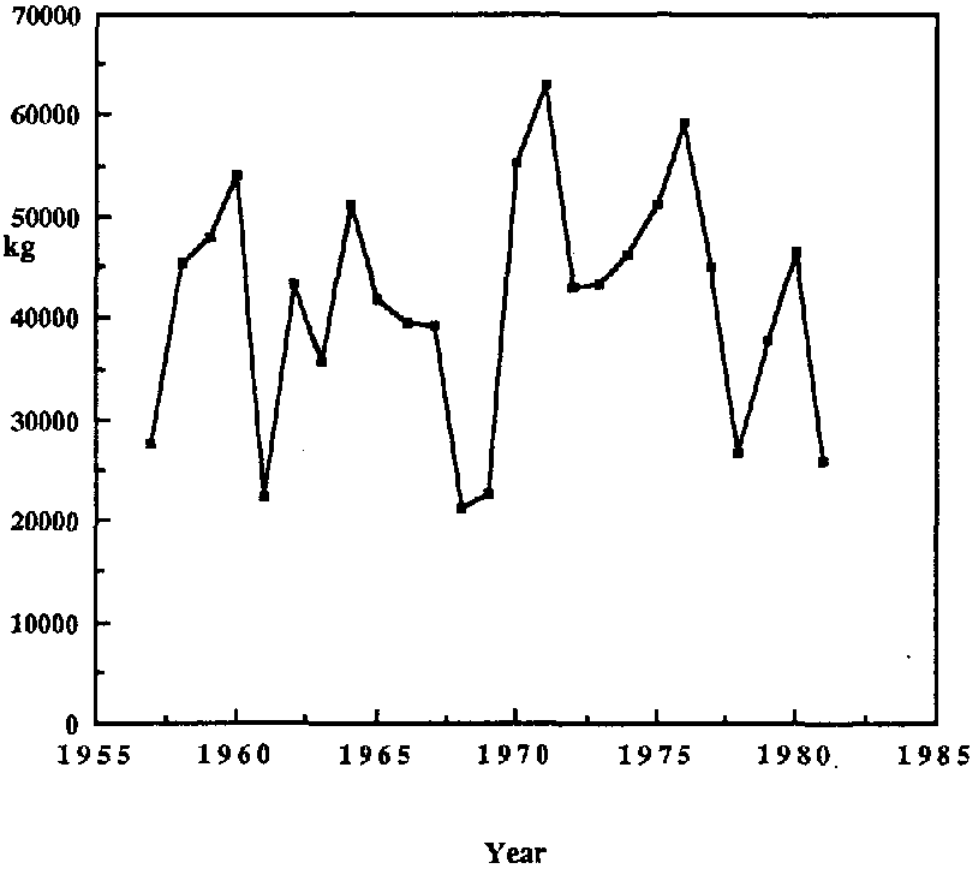


FIG. 7.6: Sweetlip. Estimated percentage of total catch in the Capricornia Fisheries Section

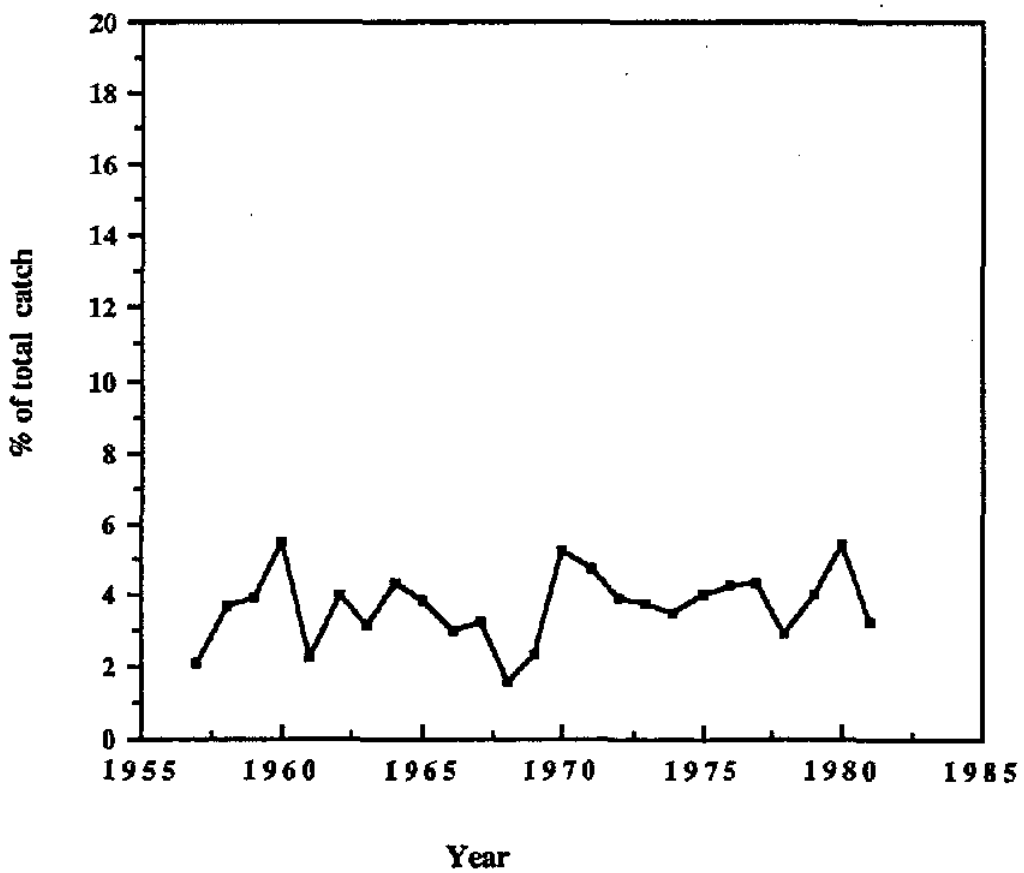


FIG. 7.7: Emperor. Estimated landings in the Capricornia Fisheries Section.

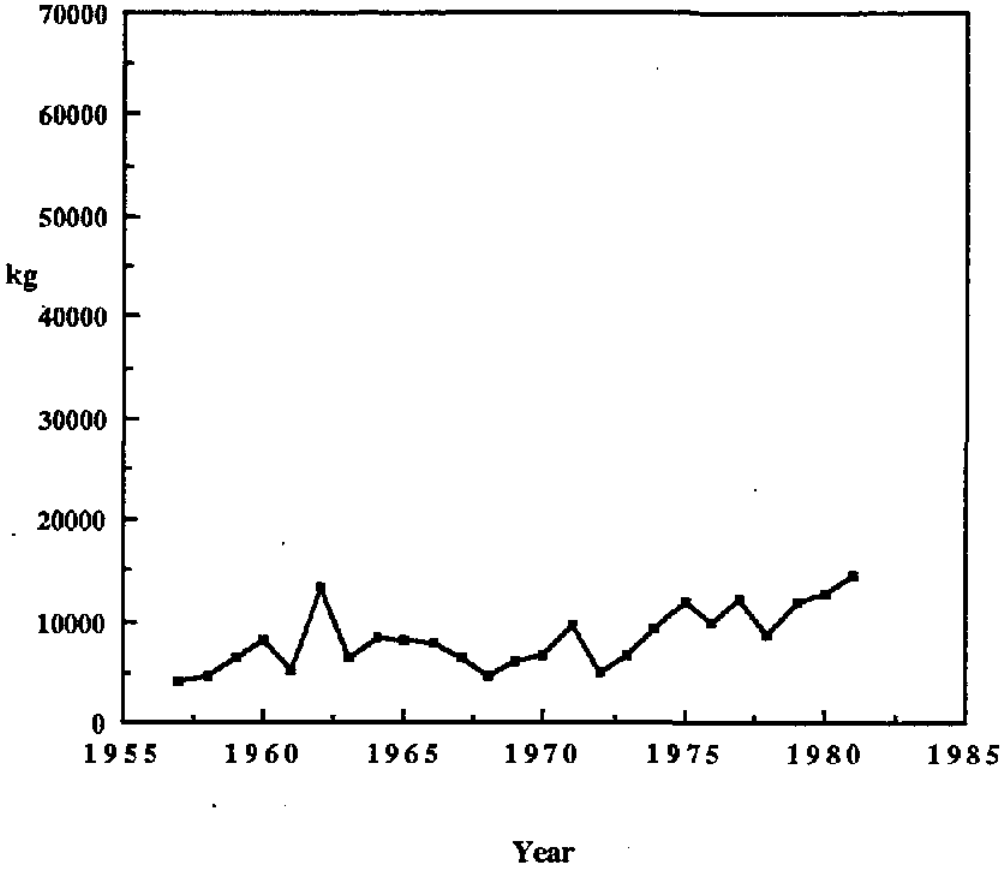


FIG. 7.8: Emperor. Estimated percentage of total catch in the Capricornia Fisheries Section

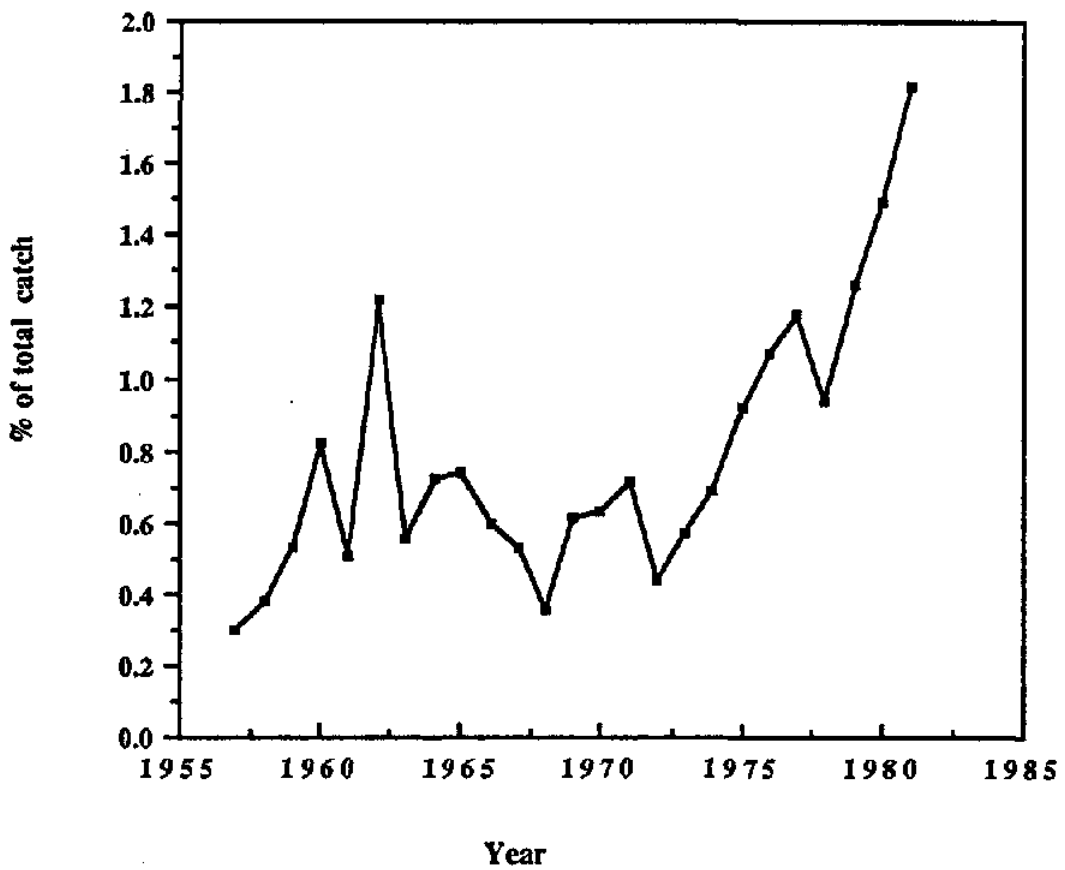


FIG. 7.9. Morwong. Estimated landings in the Capricornia Fisheries Section.

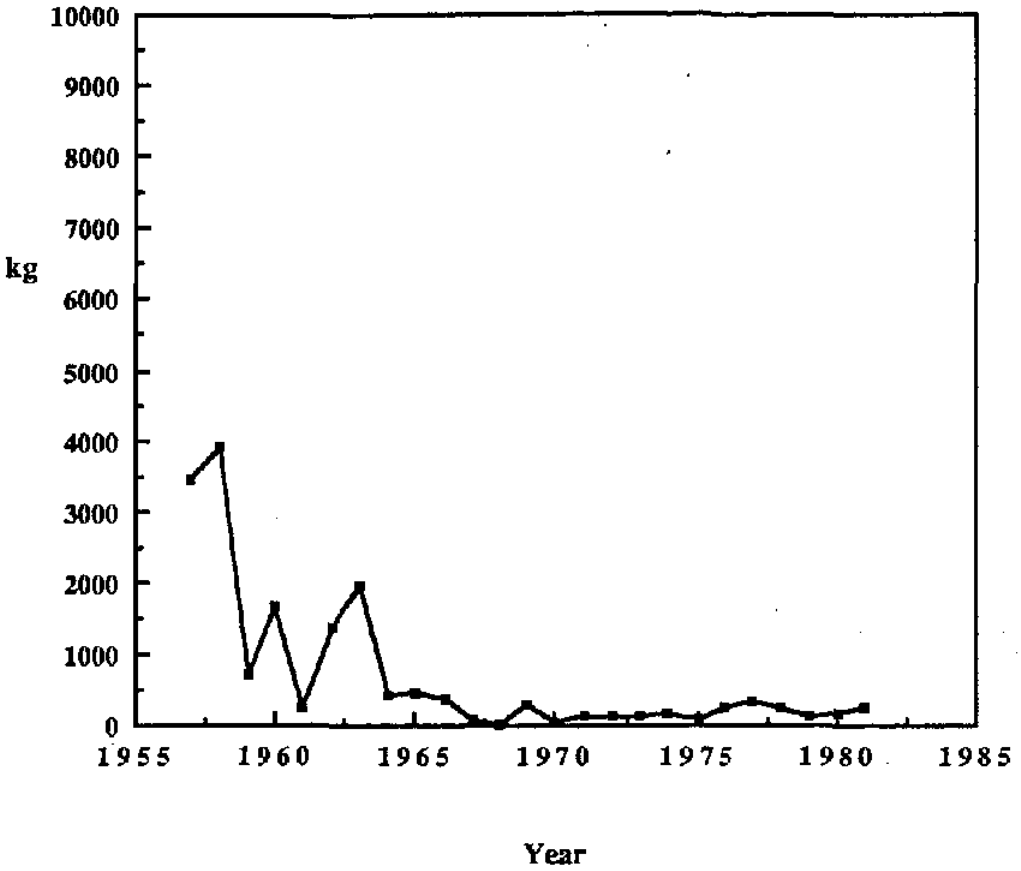


FIG. 7.10: Morwong. Estimated percentage of total catch in the Capricornia Fisheries Section

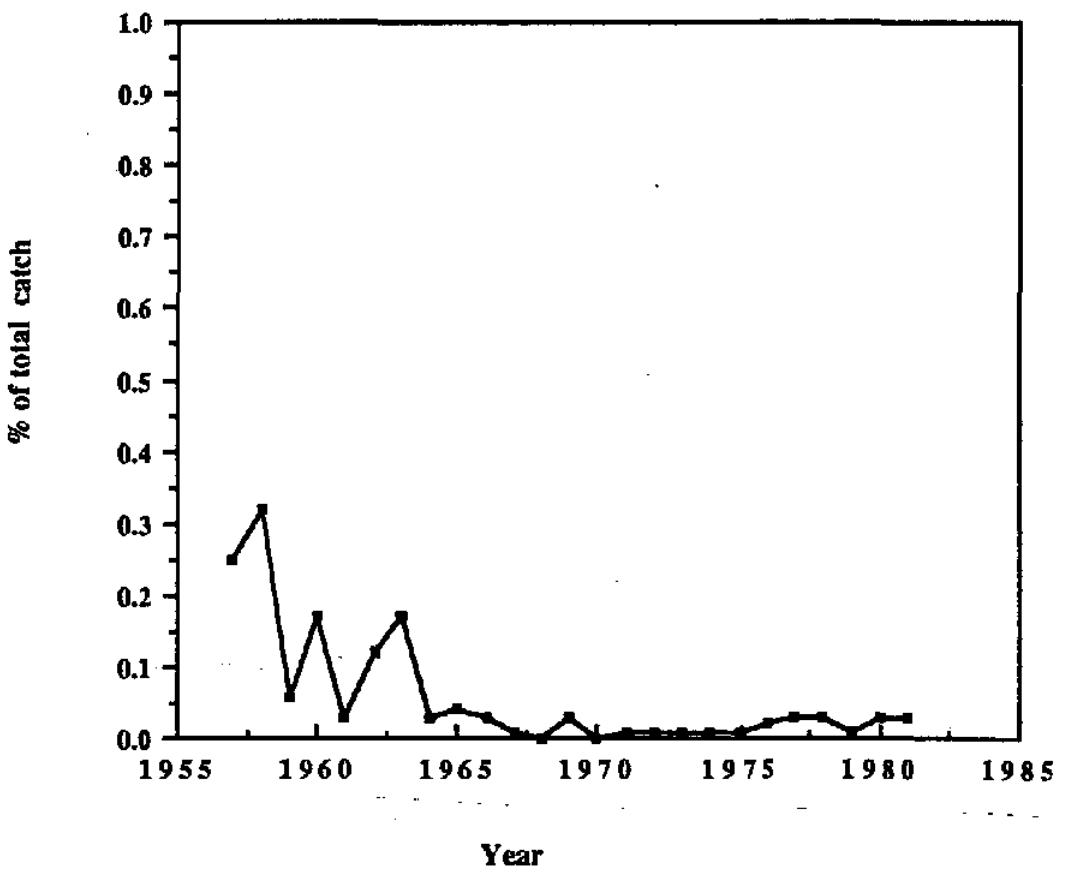


FIG. 7.11: Nanygai. Estimated landings in the Northern Fisheries Section.

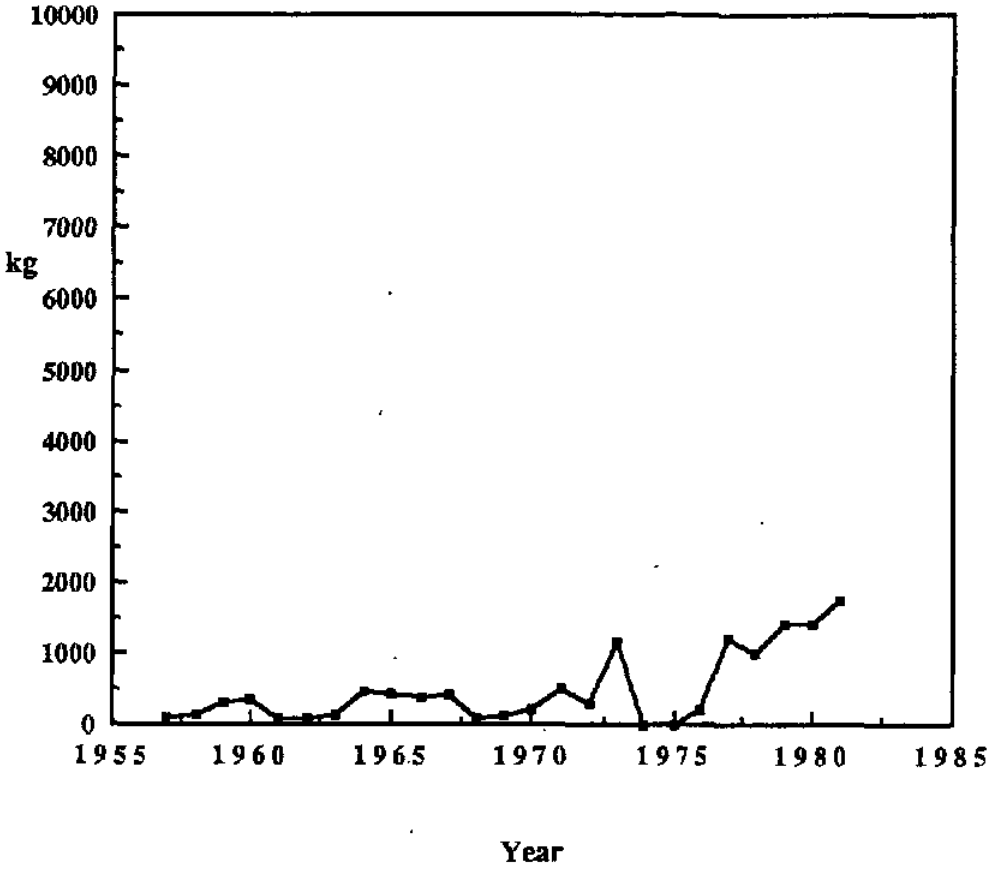


FIG. 7.12: Nanygai. Estimated percentage of total catch in the Central Fisheries Section

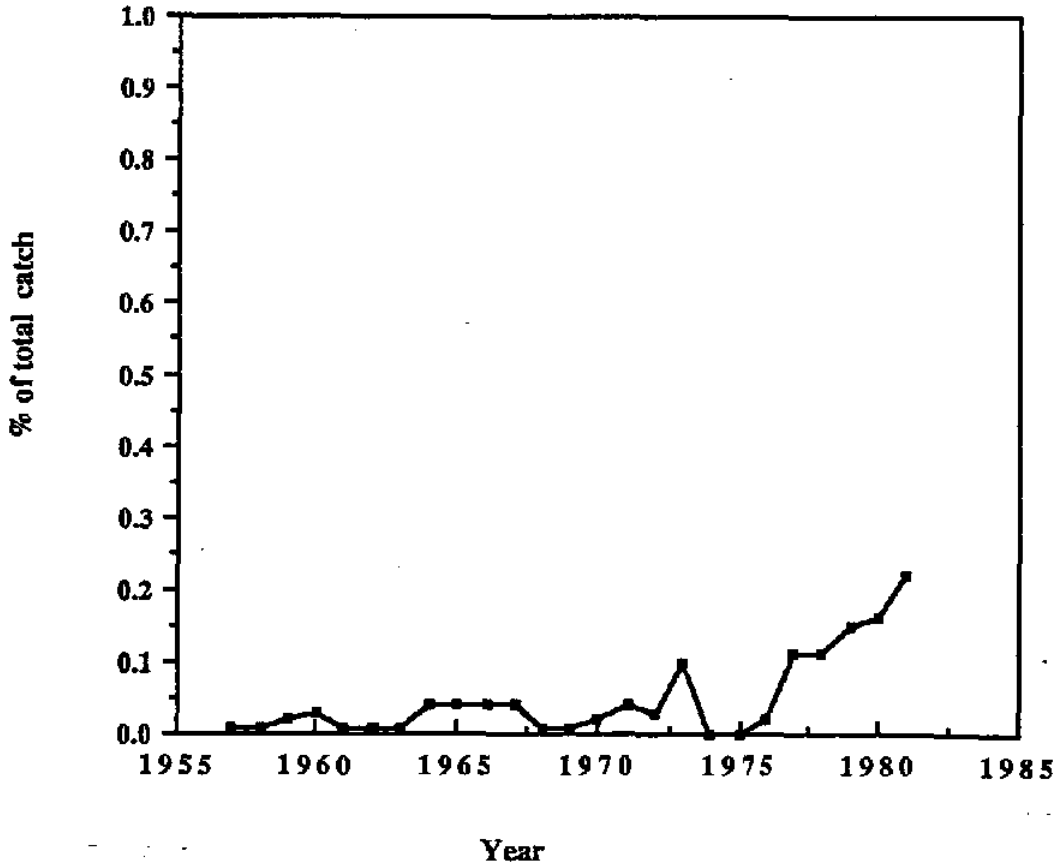


FIG. 7.11: Nanygai. Estimated landings in the Northern Fisheries Section.

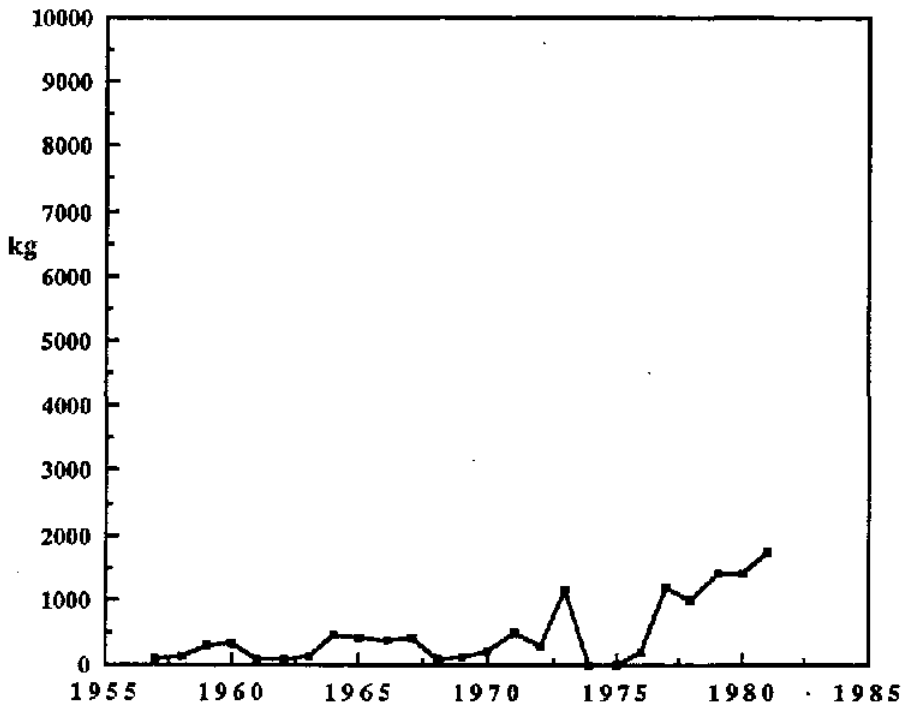


FIG. 7.12: Nanygai. Estimated percentage of total catch in the Central Fisheries Section

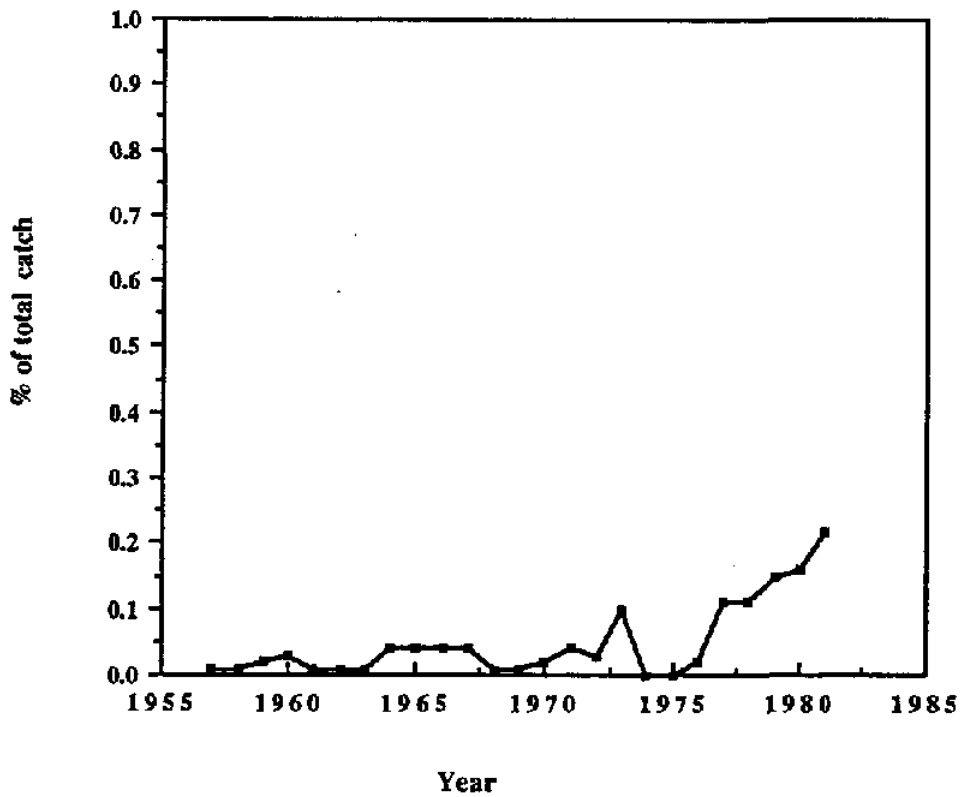


FIG. 7.13: Cod. Estimated landings in the Capricornia Fisheries Section.

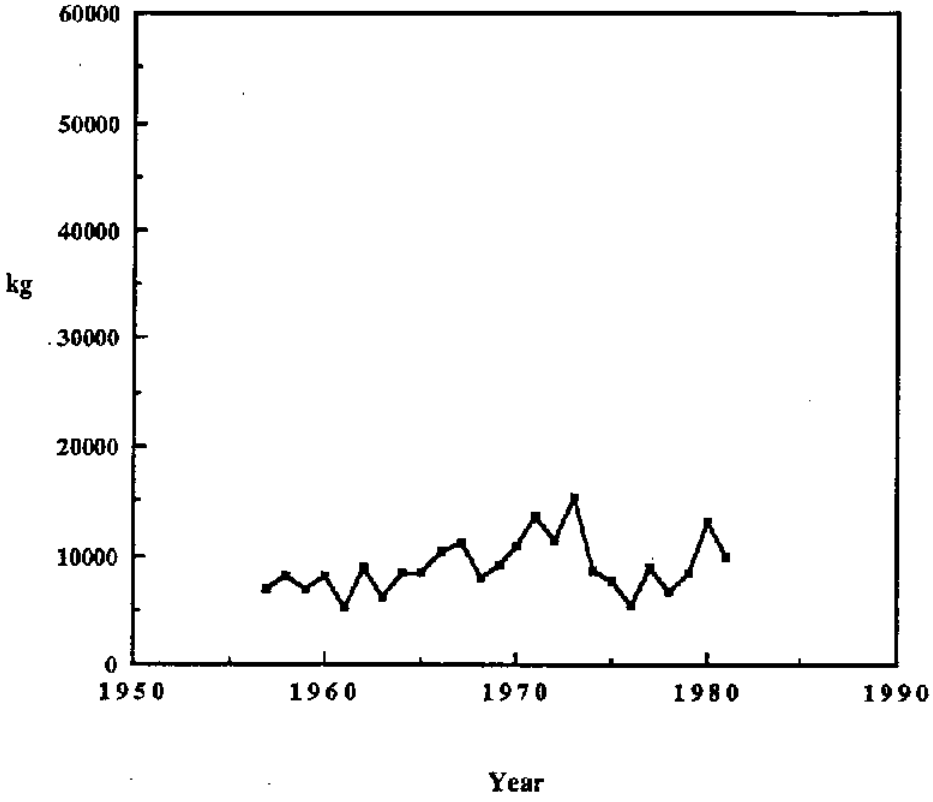


FIG. 7.14: Combined Reef Fish. Estimated percentage of total catch in the Capricornia Fisheries Section

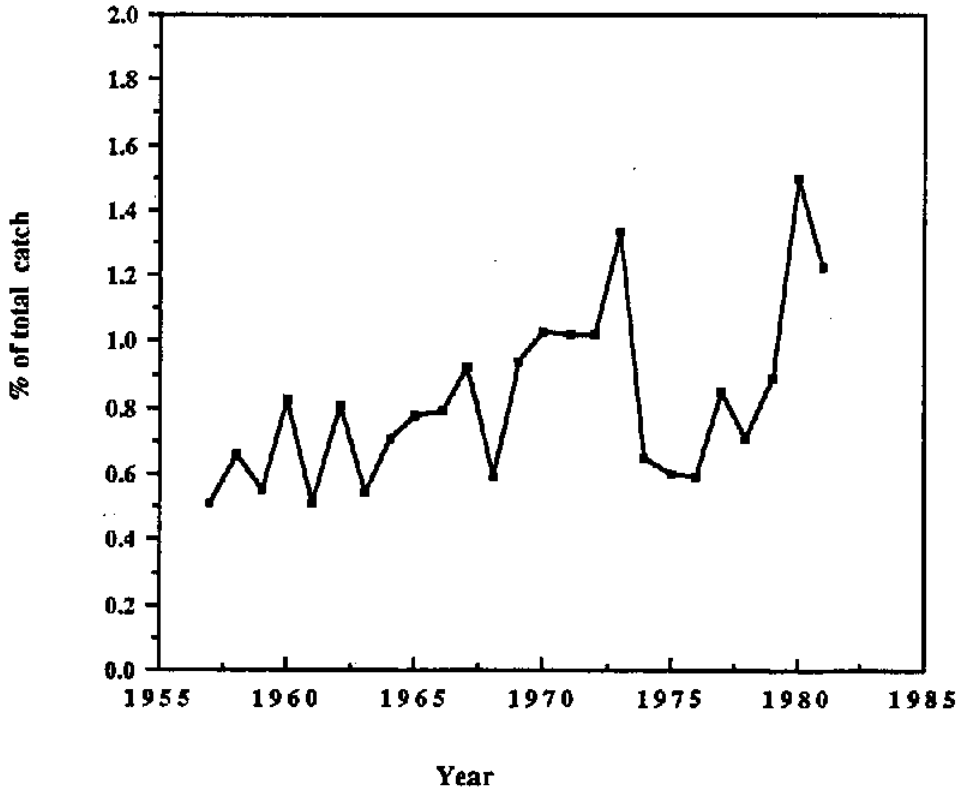


FIG. 7.15: Bream. Estimated landings in the Capricornia Fisheries Section.

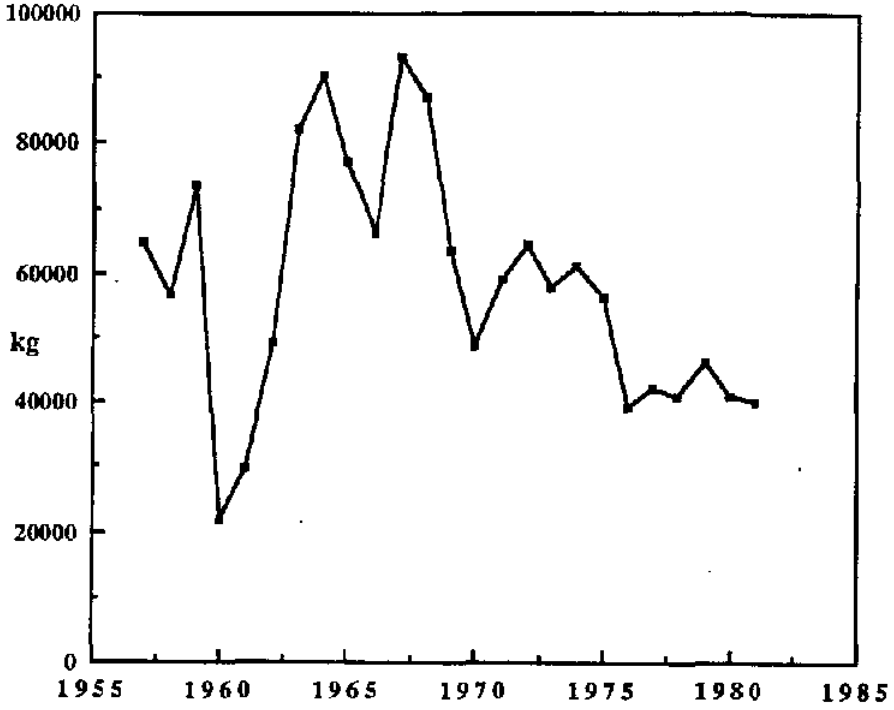


FIG. 7.16: Bream. Estimated percentage of total catch in the Capricornia Fisheries Section

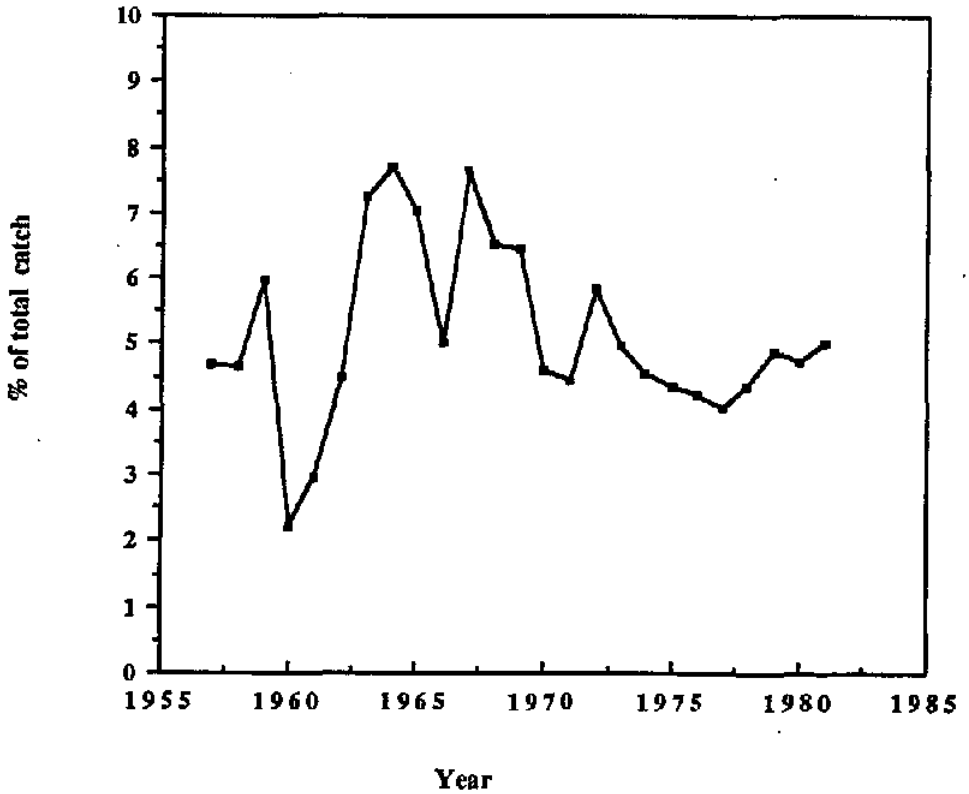


FIG. 7.17: Parrotfish. Estimated landings in the Capricornia Fisheries Section.

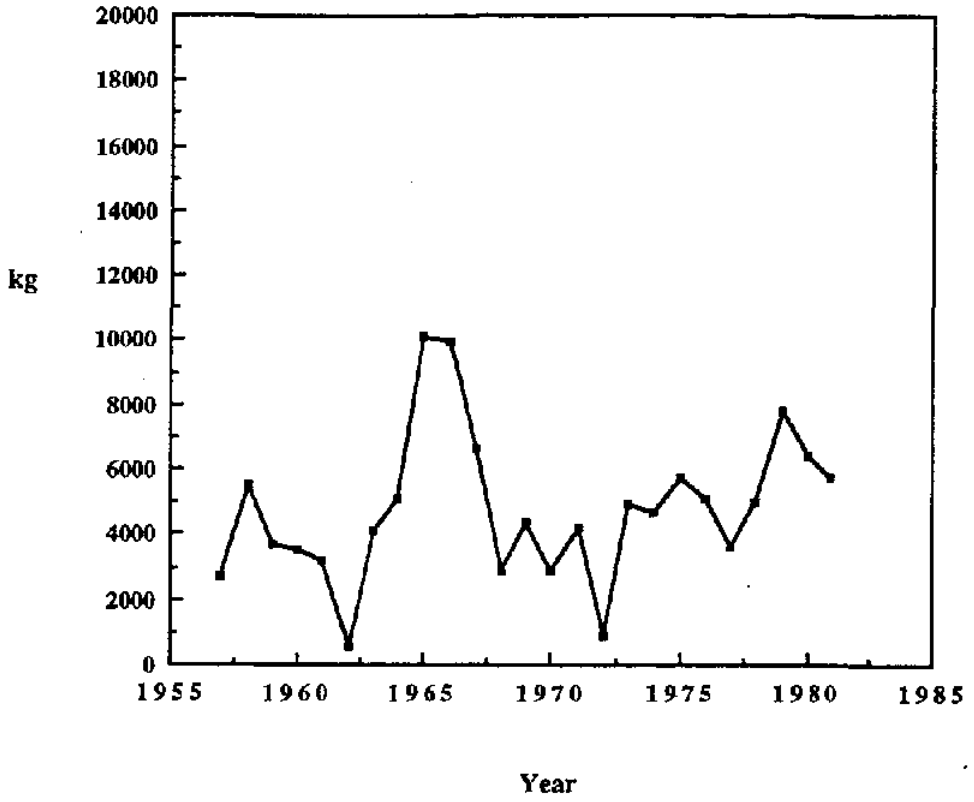


FIG. 7.18: Parrotfish. Estimated percentage of total catch in the Capricornia Fisheries Section

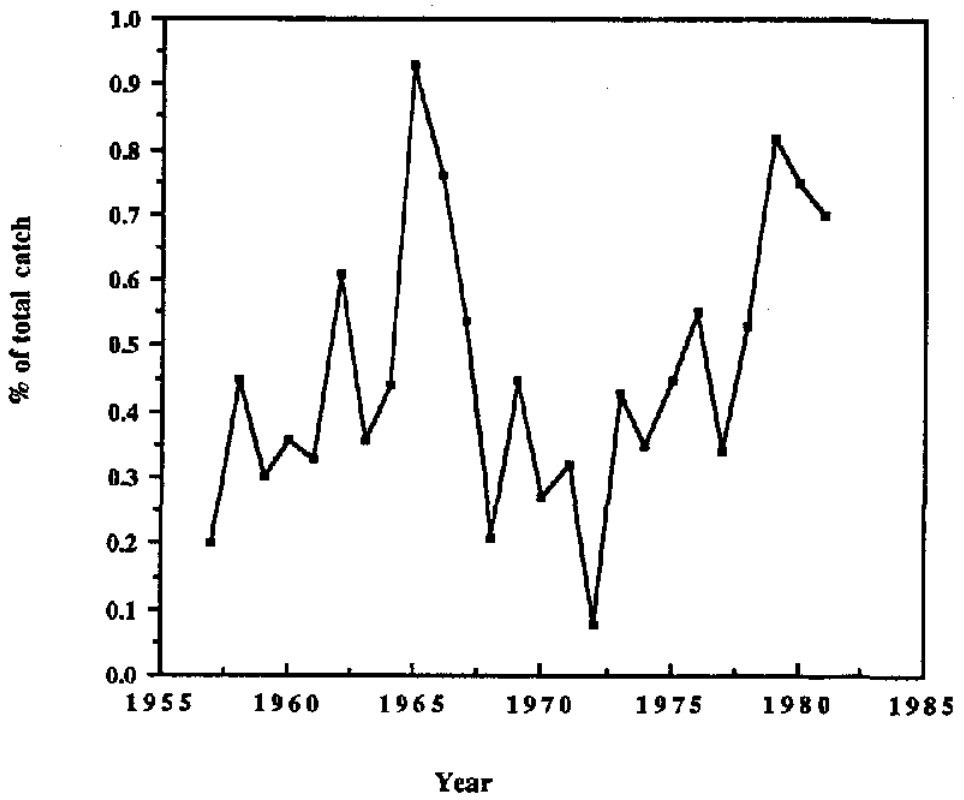


FIG. 7.19: Mixed reef fish. Estimated landings in the Capricornia Fisheries Section.

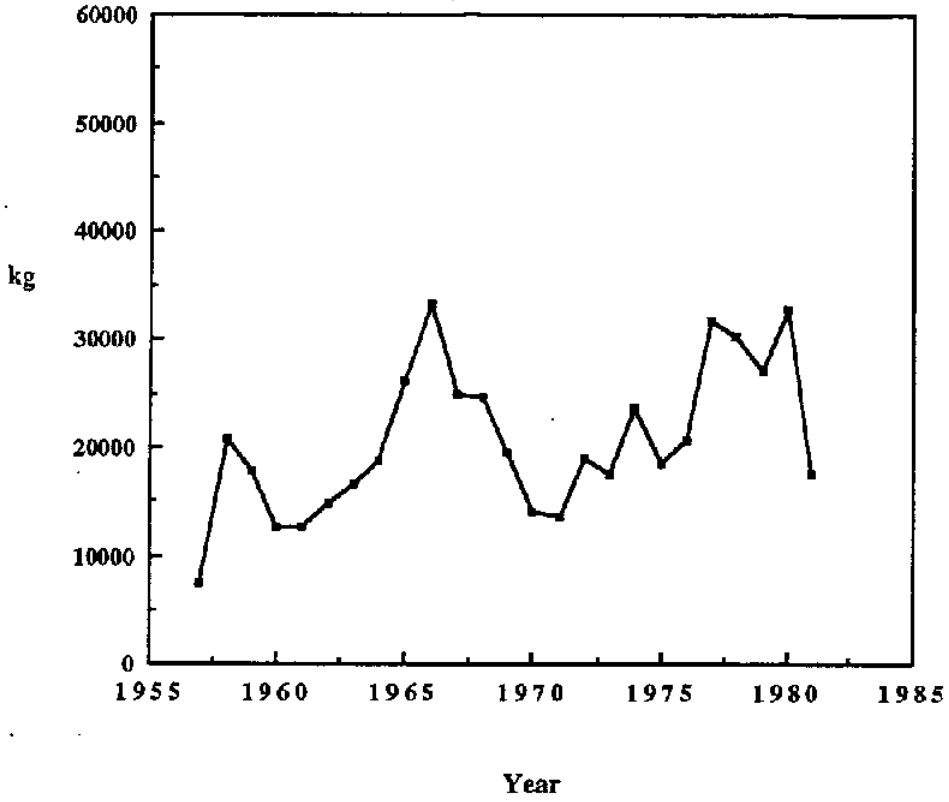


FIG. 7.20: Mixed Reef Fish. Estimated percentage of total catch in the Capricornia Fisheries Section

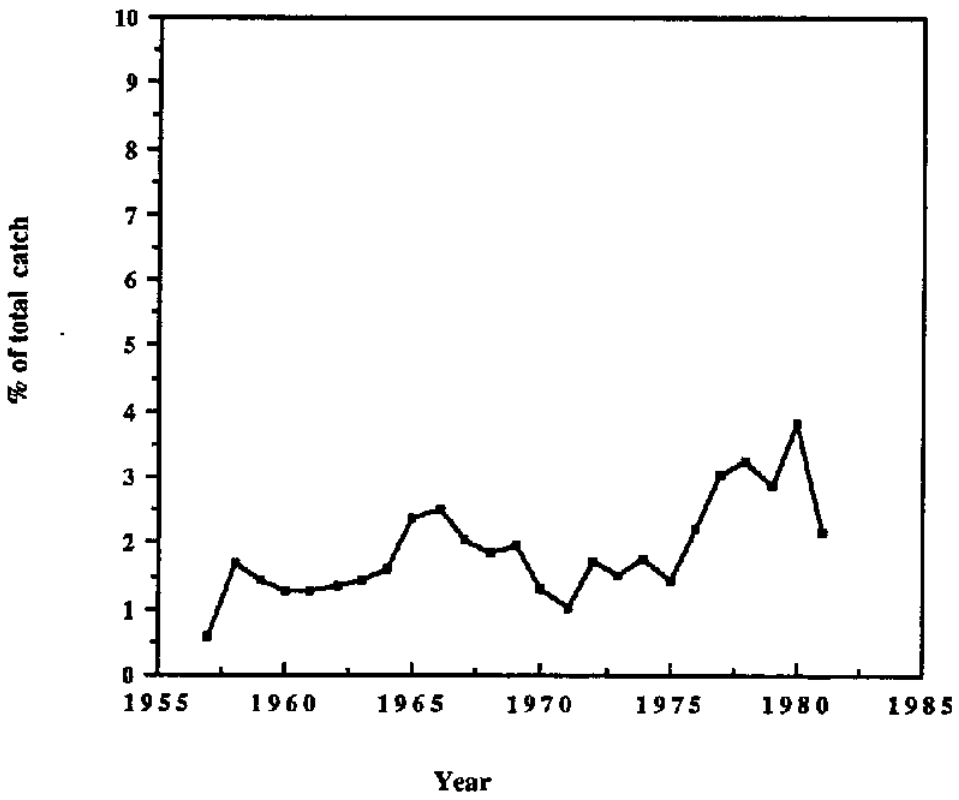


TABLE 7.1: ESTIMATED LANDINGS OF COMBINED REEF FISH AND TOTAL FINFISH LANDINGS FOR THE CENTRAL FISHERIES SECTION.

YEAR	REEF FISH LANDINGS	TOTAL LANDINGS	PERCENTAGE OF REEF FISH
57	117021	1352526	8.65
58	144825	1223476	11.84
59	157185	1230423	12.77
60	110419	984497	11.22
61	78538	994882	7.89
62	137913	1094359	12.6
63	164780	1134938	14.52
64	194913	1175248	16.58
65	195034	1097638	17.77
66	190822	1314920	14.51
67	198127	1217982	16.27
68	158218	1331196	11.89
69	135847	985283	13.79
70	171654	1058741	16.21
71	203493	1330800	15.29
72	188837	1103358	17.11
73	193526	1157008	16.73
74	190971	1334002	14.32
75	180318	1286084	14.02
76	158863	929200	17.10
77	177629	1044748	17.00
78	142097	935707	15.19
79	162604	928976	17.13
80	220352	863253	25.53
81	137906	797649	17.29

TABLE 7.2: ESTIMATED COMBINED LANDINGS(Kg) OF REEF FISH AND TOTAL FINFISH LANDINGS IN THE CAPRICORNIA FISHERIES SECTION.

YEAR	SPECIES	LANDINGS (Kg)	% OF TOTAL FINFISH LANDINGS
57	Bream	64582	4.77
57	Cod	6902	0.51
57	Emperor	4115	0.30
57	Mixed	7521	0.56
57	Morwong	3443	0.25
57	Nanygai	78	0.01
57	Parrot	2745	0.20
57	Sweetlip	27634	2.04
58	Bream	56748	4.64
58	Cod	8051	0.66
58	Emperor	4660	0.38
58	Mixed	20699	1.69
58	Morwong	3882	0.32
58	Nanygai	124	0.01
58	Parrot	5494	0.45
58	Sweetlip	45166	3.69
59	Bream	73397	5.97
59	Cod	6805	0.55
59	Emperor	6478	0.53
59	Mixed	17847	1.45
59	Morwong	714	0.06
59	Nanygai	286	0.02
59	Parrot	3710	0.30
59	Sweetlip	47948	3.90
60	Bream	22041	2.24
60	Cod	8120	0.82
60	Emperor	8103	0.82
60	Mixed	12625	1.28
60	Morwong	1678	0.17
60	Nanygai	336	0.03
60	Parrot	3522	0.36
60	Sweetlip	53994	5.48
61	Bream	29632	2.98
61	Cod	5103	0.51
61	Emperor	5101	0.51
61	Mixed	12663	1.27
61	Morwong	255	0.03
61	Nanygai	72	0.01
61	Parrot	3250	0.33
61	Sweetlip	22462	2.26

YEAR	SPECIES	LANDINGS (Kg)	% OF TOTAL FINFISH LANDINGS
62	Bream	49290	4.50
62	Cod	8908	0.81
62	Emperor	13394	1.22
62	Mixed	14881	1.36
62	Morwong	1363	0.12
62	Nanygai	77	0.01
62	Parrot	6709	0.61
62	Sweetlip	43290	3.96
63	Bream	82436	7.26
63	Cod	6084	0.54
63	Coral trout	11357	1.00
63	Emperor	6370	0.56
63	Mixed	16608	1.46
63	Morwong	1963	0.17
63	Nanygai	104	0.01
63	Parrot	4139	0.36
63	Sweetlip	35719	3.15
64	Bream	90570	7.71
64	Cod	8341	0.71
64	Coral trout	11820	1.01
64	Emperor	8517	0.72
64	Mixed	18653	1.59
64	Morwong	408	0.03
64	Nanygai	437	0.04
64	Parrot	5135	0.44
64	Sweetlip	51032	4.34
65	Bream	77235	7.04
65	Cod	8474	0.77
65	Coral trout	22150	2.02
65	Emperor	8175	0.74
65	Mixed	26134	2.38
65	Morwong	438	0.04
65	Nanygai	397	0.04
65	Parrot	10162	0.93
65	Sweetlip	41869	3.81
66	Bream	66270	5.04
66	Cod	10368	0.79
66	Coral trout	22601	1.72
66	Emperor	7876	0.60
66	Mixed	33267	2.53
66	Morwong	387	0.03
66	Nanygai	548	0.04
66	Parrot	9975	0.76
66	Sweetlip	39529	3.01

YEAR	SPECIES	LANDINGS (Kg)	% OF TOTAL FINFISH LANDINGS
67	Bream	93365	7.67
67	Cod	11152	0.92
67	Coral trout	15961	1.31
67	Emperor	6407	0.53
67	Mixed	24996	2.05
67	Morwong	70	0.01
67	Nanygai	429	0.04
67	Parrot	6634	0.54
67	Sweetlip	39112	3.21
68	Bream	87152	6.55
68	Cod	7901	0.59
68	Coral trout	9498	0.71
68	Emperor	4756	0.36
68	Mixed	24730	1.86
68	Morwong	18	0.00
68	Nanygai	90	0.01
68	Parrot	2841	0.21
68	Sweetlip	21232	1.59
69	Bream	63842	6.48
69	Cod	9227	0.94
69	Coral trout	9861	1.00
69	Emperor	6034	0.61
69	Mixed	19524	1.98
69	Morwong	280	0.03
69	Nanygai	115	0.01
69	Parrot	4390	0.45
69	Sweetlip	22573	2.29
70	Bream	48902	4.62
70	Cod	10907	1.03
70	Coral trout	32904	3.11
70	Emperor	6693	0.63
70	Mixed	13976	1.32
70	Morwong	48	0.00
70	Nanygai	203	0.02
70	Parrot	2869	0.27
70	Sweetlip	55150	5.21
71	Bream	59099	4.44
71	Cod	13566	1.02
71	Coral trout	39722	2.98
71	Emperor	9499	0.71
71	Mixed	13590	1.02
71	Morwong	124	0.01
71	Nanygai	506	0.04
71	Parrot	4220	0.32
71	Sweetlip	63166	4.75

YEAR	SPECIES	LANDINGS (Kg)	% OF TOTAL FINFISH LANDINGS
72	Bream	64443	5.84
72	Cod	11236	1.02
72	Coral trout	45145	4.09
72	Emperor	4833	0.44
72	Mixed	18913	1.71
72	Morwong	117	0.01
72	Nanygai	286	0.03
72	Parrot	917	0.08
72	Sweetlip	42946	3.89
73	Bream	57754	4.99
73	Cod	15348	1.33
73	Coral trout	46730	4.04
73	Emperor	6600	0.57
73	Mixed	17599	1.52
73	Morwong	107	0.01
73	Nanygai	1171	0.10
73	Parrot	4961	0.43
73	Sweetlip	43256	3.74
74	Bream	60957	4.57
74	Cod	8707	0.65
74	Coral trout	37163	2.79
74	Emperor	9263	0.69
74	Mixed	23753	1.78
74	Morwong	171	0.01
74	Nanygai	0	0.00
74	Parrot	4654	0.35
74	Sweetlip	46303	3.47
75	Bream	55999	4.35
75	Cod	7676	0.60
75	Coral trout	29303	2.28
75	Emperor	11845	0.92
75	Mixed	18518	1.44
75	Morwong	81	0.01
75	Nanygai	0	0.00
75	Parrot	5781	0.45
75	Sweetlip	51115	3.97
76	Bream	39240	4.22
76	Cod	5486	0.59
76	Coral trout	38526	4.15
76	Emperor	9962	1.07
76	Mixed	20815	2.24
76	Morwong	258	0.03
76	Nanygai	213	0.02
76	Parrot	5071	0.55
76	Sweetlip	39292	4.23

YEAR	SPECIES	LANDINGS (Kg)	% OF TOTAL FINFISH LANDINGS
77	Bream	42091	4.03
77	Cod	8862	0.85
77	Coral trout	32392	3.10
77	Emperor	12323	1.18
77	Mixed	31859	3.05
77	Morwong	332	0.03
77	Nanygai	1198	0.11
77	Parrot	3601	0.34
77	Sweetlip	44971	4.30
78	Bream	40830	4.36
78	Cod	6682	0.71
78	Coral trout	22338	2.39
78	Emperor	8791	0.94
78	Mixed	30411	3.25
78	Morwong	257	0.03
78	Nanygai	999	0.11
78	Parrot	4981	0.53
78	Sweetlip	26808	2.87
79	Bream	46320	4.88
79	Cod	8491	0.89
79	Coral trout	21462	2.26
79	Emperor	11936	1.26
79	Mixed	27212	2.87
79	Morwong	134	0.01
79	Nanygai	1405	0.15
79	Parrot	7812	0.82
79	Sweetlip	37832	3.99
80	Bream	40857	4.73
80	Cod	12989	1.50
80	Coral trout	33453	3.88
80	Emperor	12851	1.49
80	Mixed	32887	3.81
80	Morwong	33149	3.84
80	Nanygai	1397	0.16
80	Parrot	6437	0.75
80	Sweetlip	46332	5.37
81	Bream	40210	5.04
81	Cod	9846	1.23
81	Coral trout	22382	2.81
81	Emperor	14481	1.82
81	Mixed	17460	2.19
81	Morwong	249	0.03
81	Nanygai	1747	0.22
81	Parrot	5789	0.73
81	Sweetlip	25742	3.23

PART 4: OTHER FISHERIES

CHAPTER 8: SPEARFISHING

8.1 INTRODUCTION

Spearfishing is a controversial and emotive issue, particularly in the crown-of-thorns debate. Endean (1974) cited spearfishing as being the major cause of removal of large specialised predators such as the Queensland groper *Pomicrops lanceolatus*.

There are few published reports on the catches of recreational spearfishing or of competitions. Saenger (1976) analysed the available data for Queensland. It is this data, plus data provided by the Queensland Branch of the Australian Underwater Federation (A.U.F.Q.) that is used in this analysis.

Spearfishing clubs today are very conservation minded with competitions aimed at collecting a diversity of species and not necessarily the largest, taking the fishing pressure off the traditional `target' species. Clubs are scattered along the G.B.R., the Bundaberg club being particularly active. (See Appendix B4).

8.2 SOURCES OF INFORMATION

The sources of data used are;
(1) Competition results from the Bundaberg Skindivers Club spearfishing competitions, 1963-1974; Cairns clubs, Mackay clubs, 1961-75; Ayr clubs, 1968-72; Cairns clubs, 1969-1973
(2) Non -competitive spearfishing results from two trips by the Bundaberg Skindivers club to Lady Elliot Island, and Tryon Island in the Capricorn-Bunker group in 1974.
(3) The Queensland state titles, 1955-1975.
No records were available for recreational spearfishing outside the auspices of the A.U.F. The data is stored in adatabase, as detailed in section 3.4.

8.3 METHODS

Data were broken down according to the availability of data into the following four regions.

1. Cairns
2. Ayr
3. Mackay
4. Bundaberg

Catch per unit effort data were calculated using catch rates for both the number and of weight of fish, over the number of expended man-hours (Appendix B1). Fish and weight per man were also used, as hours expended were not always recorded. The average weight per fish of the most commonly occurring species for each year was calculated to examine whether there had been any decrease in the mean size over the years and also to illuminate any regional differences in the mean size.

The most commonly speared fish selected for analysis were;

1. Coral trout: *Plectropomus* sp.
2. Netted Sweetlip: *Plectorhynchus flavomaculatus*
3. Brown Sweetlip: *Plectorhynchus gibbosus*
4. Many lined Sweetlip: *Plectorhynchus chaetodontoides*
5. Painted Sweetlip: *Diagramma pictum*

8.4 RESULTS

i. Cairns

Competition spearfishing results in the Cairns area were available from 1969 to 1973. Both the mean numbers and mean weight of fish per man increased in 1970 and stayed at a similar level the following year. (Figures 8.1, 8.2, 8.4). However both fell in 1972, but this is more likely a result of inadequate sample size than any real pattern. A mean of 5.6 $\pm$ 1.6 fish per man and a mean weight per man of 9.3 $\pm$ 1.86 was calculated over this 5 year period. The mean weight per fish has remained relatively constant over this time (2.25 $\pm$ 0.5 kg).

ii . Ayr

Spearfishing results from 1969 to 1972 showed a slight but steady increase both in numbers of fish caught per man, and the mean weight per fish caught (Figures 8.5, 8.7, 8.8). The mean weight of fish per man increased 7 fold over the same period, most notably from 1970 to 1971. Coral trout and painted sweetlip were the most commonly speared species of fish off Ayr reefs. Coral trout had a mean weight per fish 3.4 $\pm$ 0.58 kg over the years 1968 to 1972 of and declined in mean weight per fish over that period (Fig. 8.9). The mean weight per fish of painted sweetlip increased over that time period.

iii. Mackay

Records from spearfishing competitions off Mackay were for the years 1961, 1968, and 1971 through to 1975. A mean of 4.1 $\pm$ 1.7 fish per man and a mean weight per man of 9.7 $\pm$ 4.8 was calculated over these years (Fig. 8.13). Both values were reasonably constant over the period 1971 to 1975. The mean weight per fish increased over this same period (2. 9 $\pm$ 1.2). Only sparse records of commonly caught fish were available for Mackay (Fig. 8.14). The mean weight per coral trout and painted sweetlip both dropped 2 fold in 1975.

iv. Bundaberg

Data from the Bundaberg spearfishing club is the most comprehensive dataset available with both competitive and non-competitive records. Estimates of weight and number of fish per man per hour were calculated as accurate lengths of time spent in the water were recorded (Figures 8.15 and 8.16). Both estimates fluctuated considerably over the years. The apparent increases in 1972 should be disregarded due to the inadequate sample size. A mean of 1.8 $\pm$ 1.1 fish per man per day and 3.7$\pm$ 2.9 kilograms per man per day were calculated over this period. A mean weight of 2.25 $\pm$ 0.53 kilograms per fish was estimated over this time, with notably heavier mean weights in 1971 and 1972 (Fig. 8.17). Coral trout, netted sweetlip and painted sweetlip were all commonly taken in competitions off Bundaberg. The mean weight of all these species remained relatively constant (Fig. 8.19).

8.5 DISCUSSION

i.. Regional Differences

Referral to Table 8.1 would suggest that although the mean weight per fish is similar for all areas, catch rates differ considerably. Catch rates for Bundaberg competitions were significantly lower than the other areas. However, due to the high error associated with these estimates, it is impossible to gauge whether fish are indeed scarcer on reefs off Bundaberg (i.e. the Capricorn-Bunker group). In addition, factors such as skill need to be considered. Comparison of the competitive and recreational results from Bundaberg show similar catch rates but a significantly lower weight per fish for recreational spearfishing. Spearfishermen with the motive of getting fish for eating may go for greater numbers than size. Comparison of the mean weight of coral trout and netted sweetlip showed no real differences for the two modes of spearfishing.

TABLE 8.1: SUMMARY OF ESTIMATED CATCH EFFORT STATISTICS BY AREA FOR SPEARFISHING COMPETITIONS.

AREA	F/M SE	KG/M SE	KG/ F SE	Tot Wt
Cairns	5.6 ± 1.6	8.9 ± 6.9	2.5 ± 0.5	353.4
Ayr	2.4 ± 0.7	7.8 ± 0. 9	2.9 ± 0.9	162.9
Mackay	4.2 ± 1.0	9.7 ± 4.8	2.7 ± 1.2	689.3
Bundaberg(comp)	1.8 ± 1.1	3.7 ± 2.9	2.3 ± 0.5	187.1
non-competitive	1.4 ± 0.3	2.7 ± 0.1	1.6 ± 0.1	

ii. General Discussion

The A.U.F.Q. have long worked to maintain spearfishing with conservation of fish stocks in mind. Spearing of the estuary cod *Epinephalus tauvina* and the Queensland groper *Pomicrops lanceolatus* was banned by the A.U.F. in 1967. The largest recorded specimen of the Queensland groper weighed 233.1 kg and was speared at Lady Elliot island in 1966. The scoring system used today has a minimum weight of 1 kg for all species and a point system which emphasizes a diversity of species rather than the heaviest catch. This design has the effect of spreading fishing pressure out over a number of species and taking the pressure off 'target species'. The actual total landings of fish per annum (Table 8.1) is insignificant in comparison to amateur line fishing and charter boat operations. Although there are persuasive arguments against spearfishing (removal of predators, changing behaviour patterns of fish) there is little hard evidence to substantiate these claims. Until such evidence can be produced, the relative effects of line fishing and spearfishing can not be distinquished.

FIG. 8.1: Combined catch effort data for Cairns spearfishing competitions.

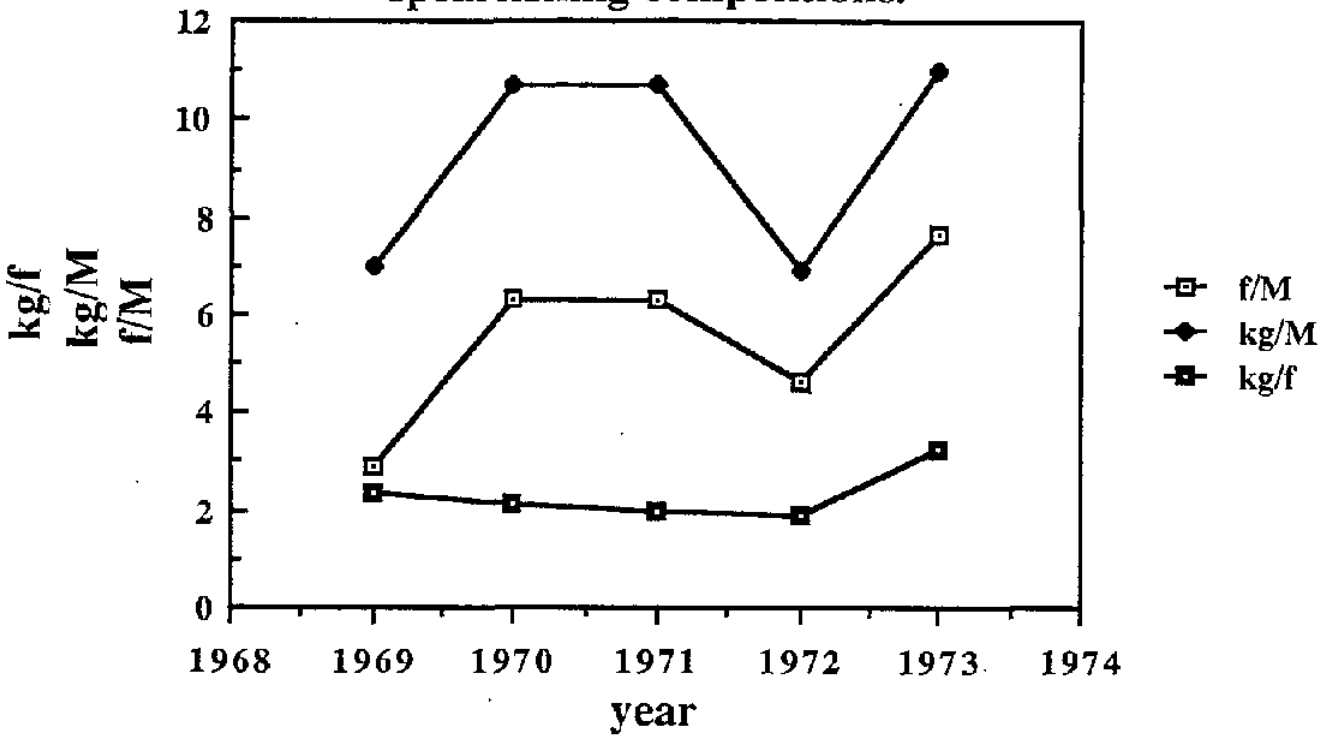


Fig. 8.2: Combined catch effort data for Ayr spearfishing competitions.

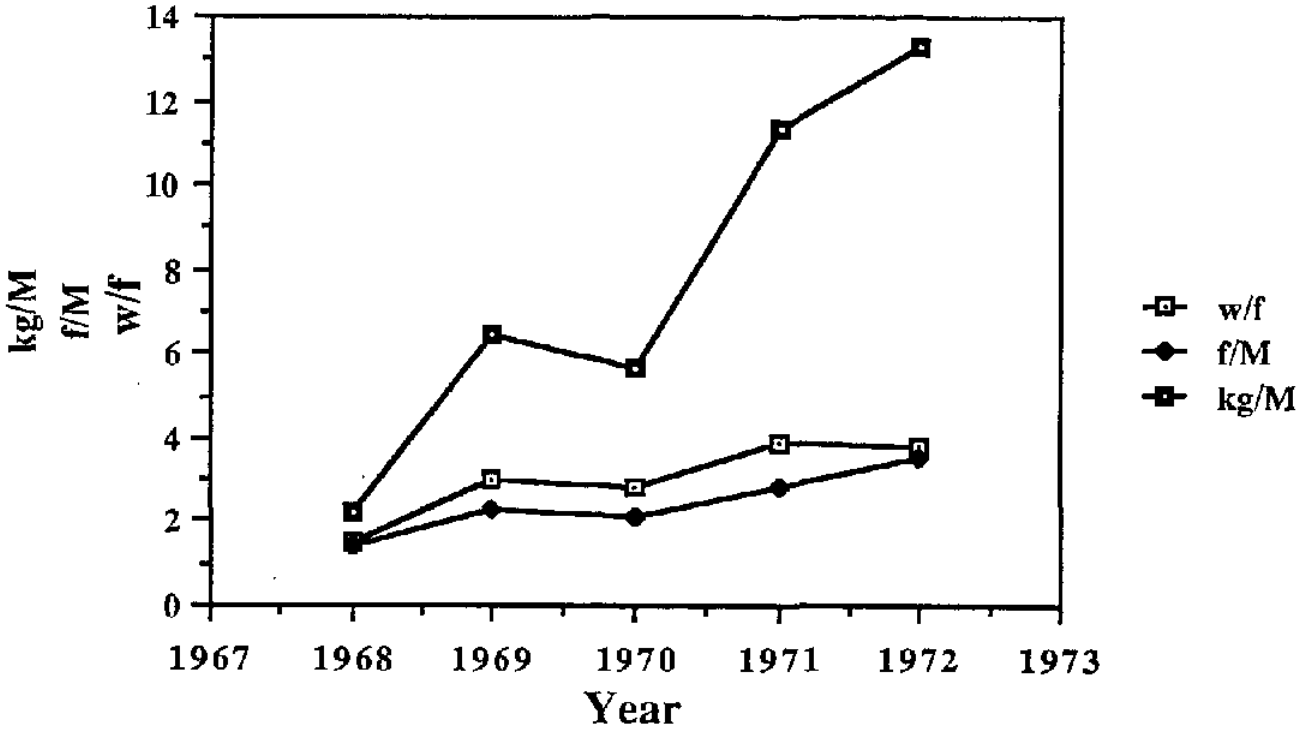


FIG. 8.3: Mean weight (kg) per fish for common species in Ayr competitions.

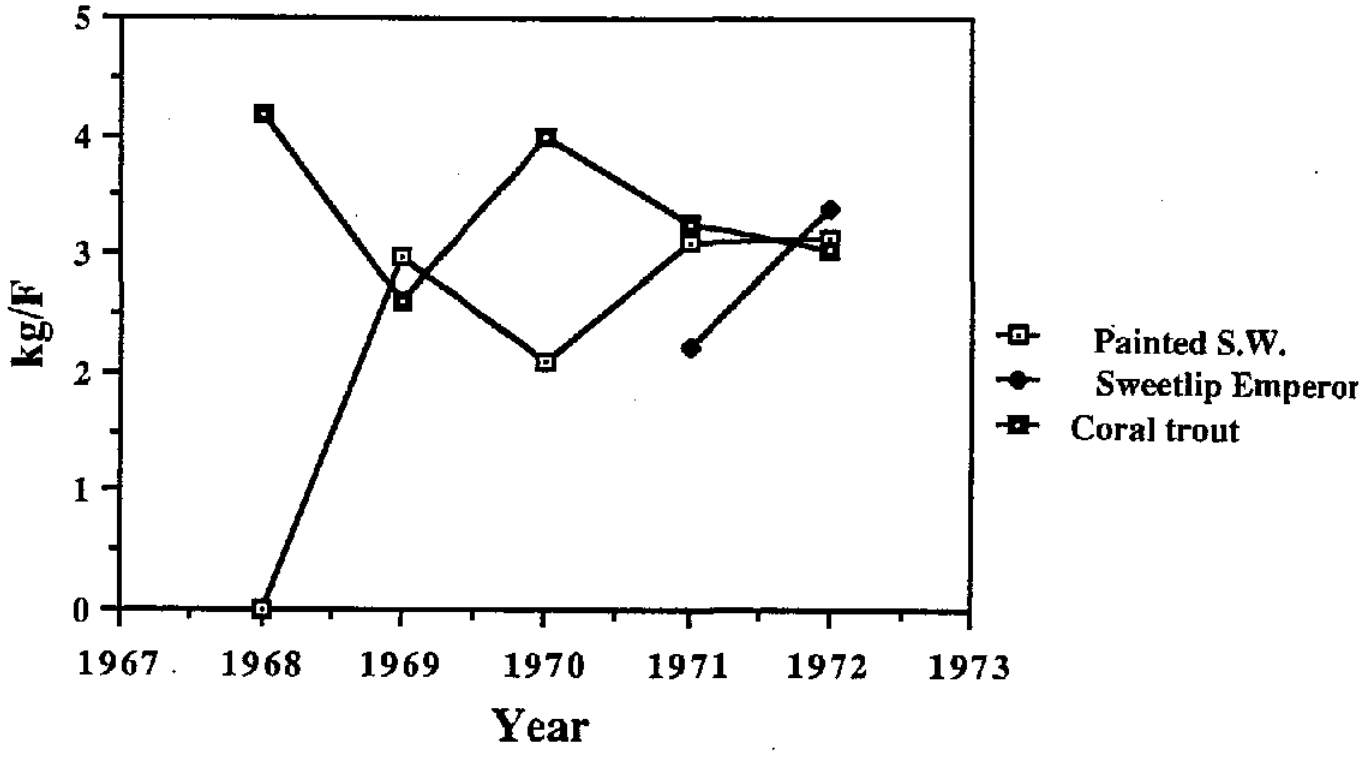


FIG. 8.4: Combined catch effort data for Mackay spearfishing competitions.

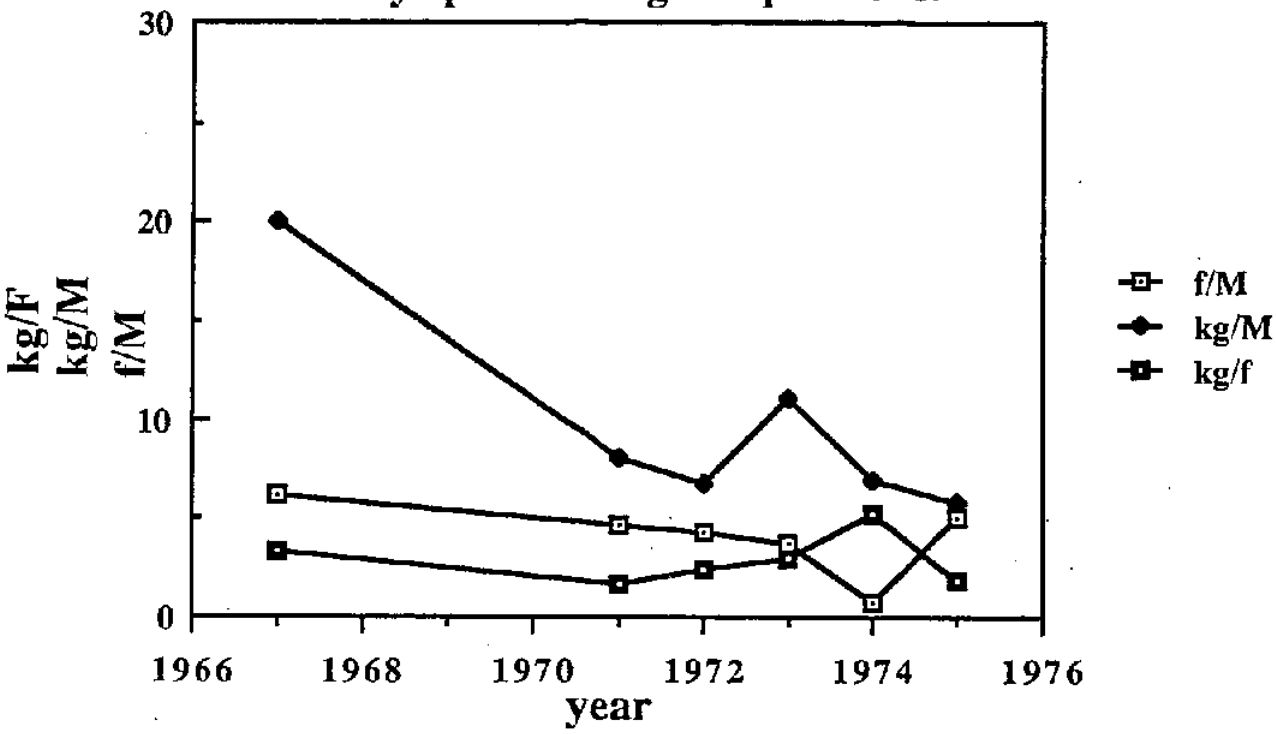


FIG. 8.5: Mean weight (kg) per fish of common species caught in Mackay competitions.

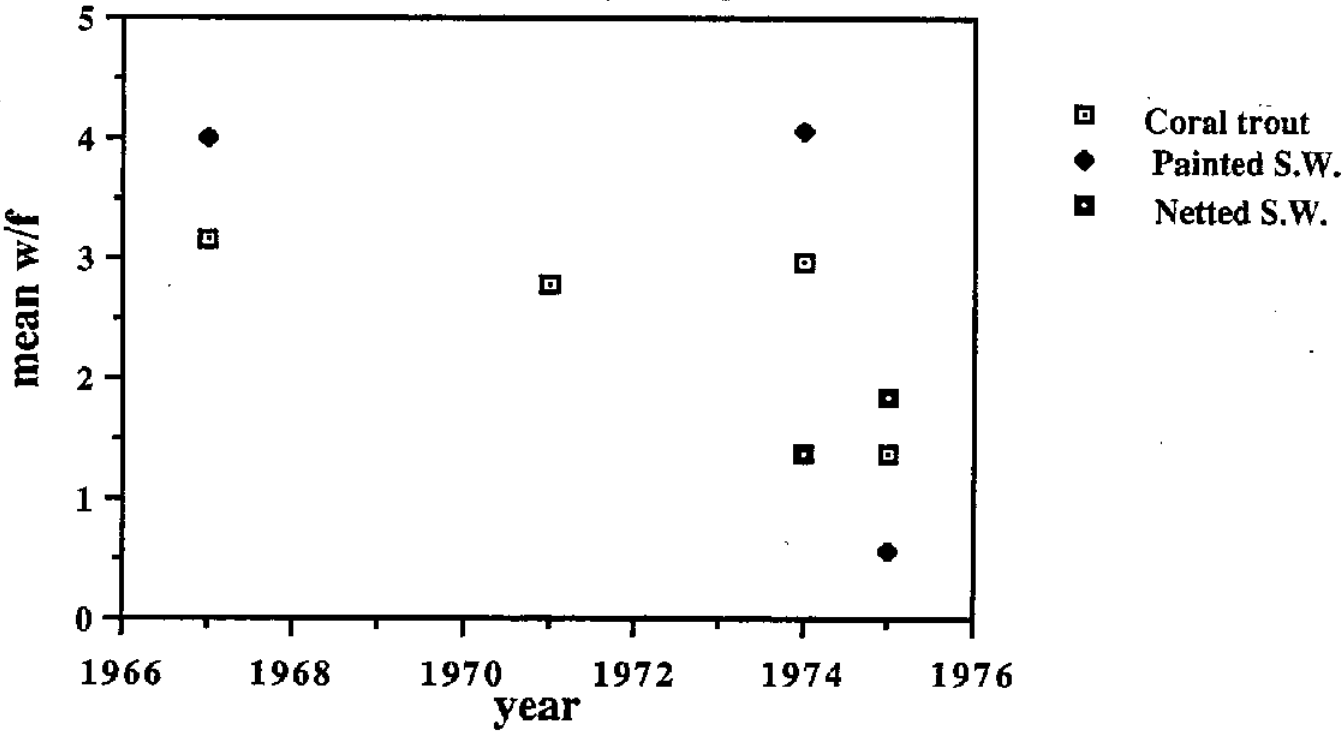


FIG. 8.6: Mean number of fish per man and per hour for Bundaberg spearfishing competitions.

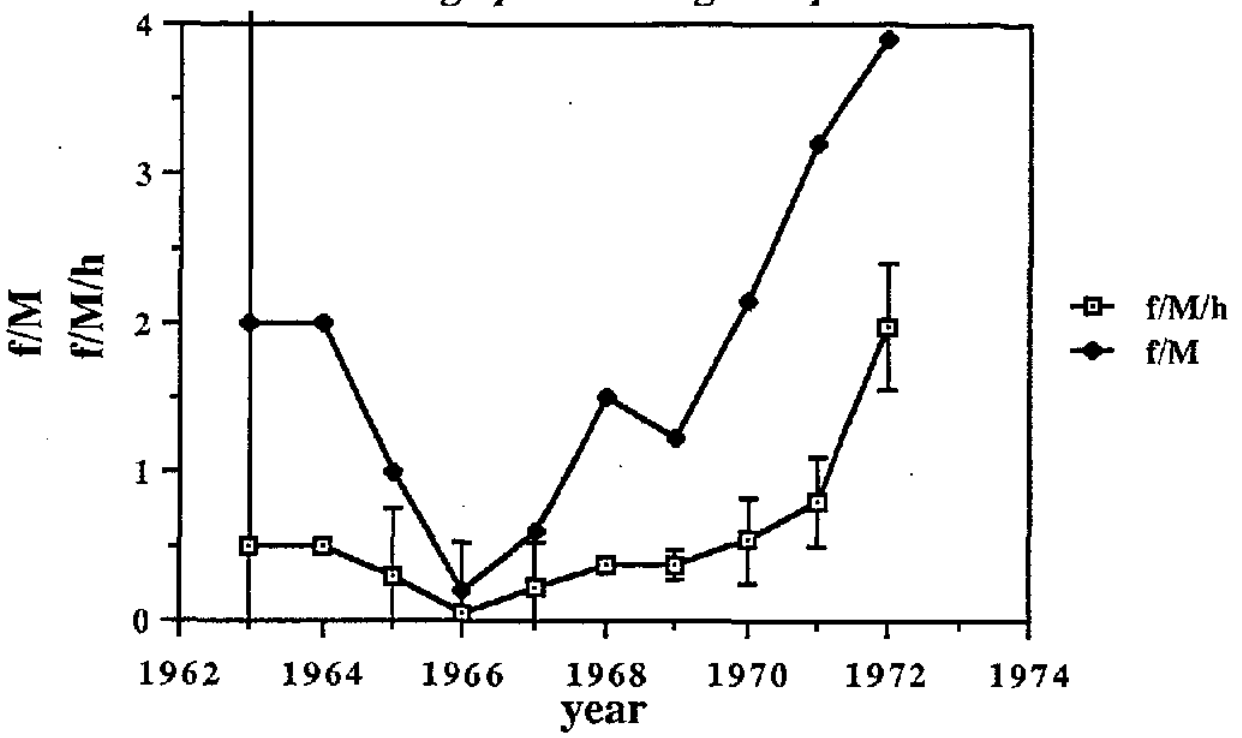


FIG. 8.7: Mean weight of fish per man per hour for Bundaberg spearfishing competitions.

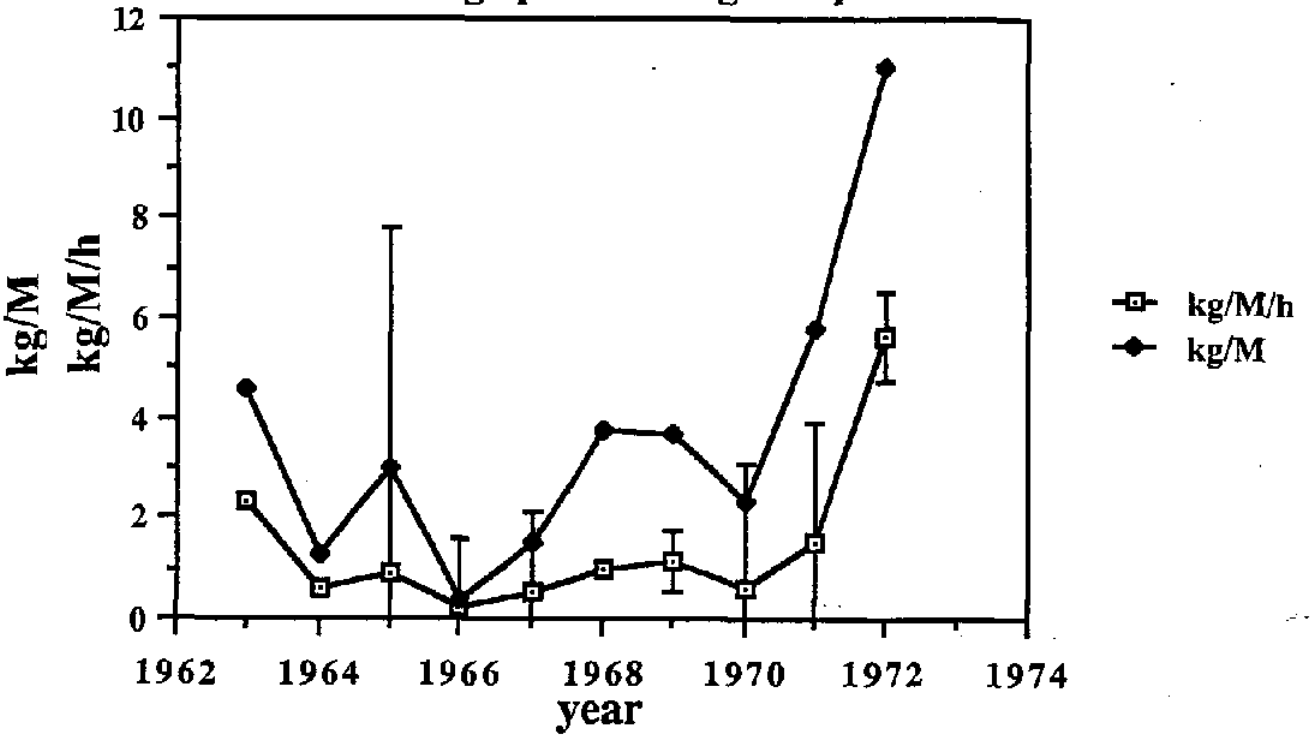


FIG.8.8: Mean weight (kg) per fish for Bundaberg spearfishing competitions

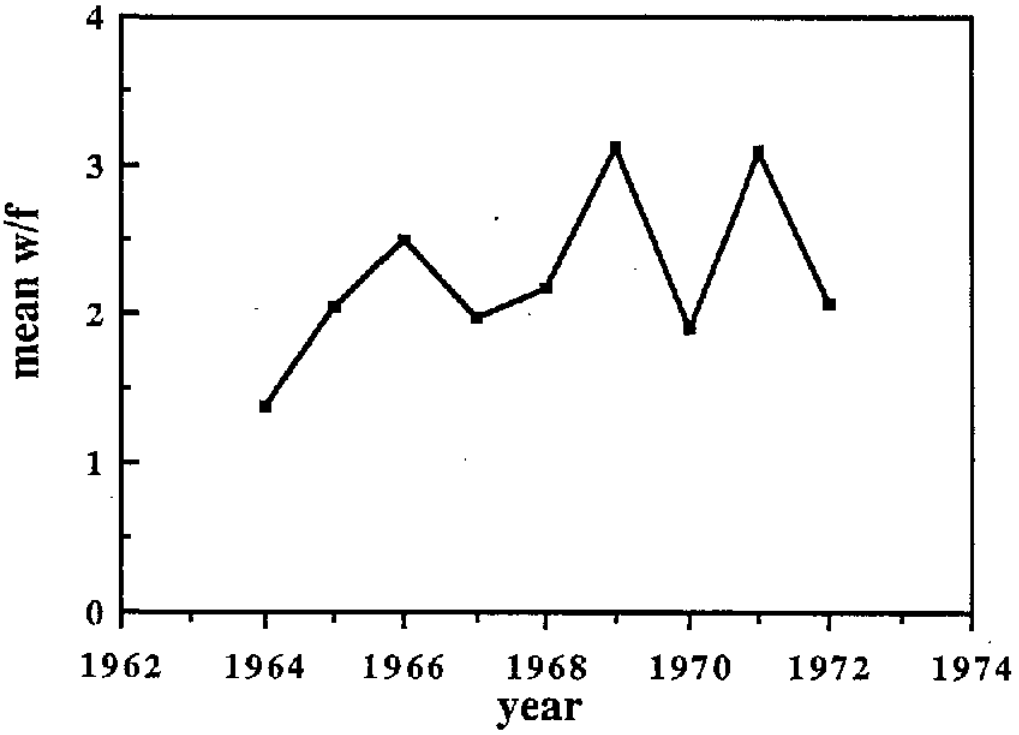


FIG. 8.9: Combined catch effort data for Bundaberg spearfishing competitions.

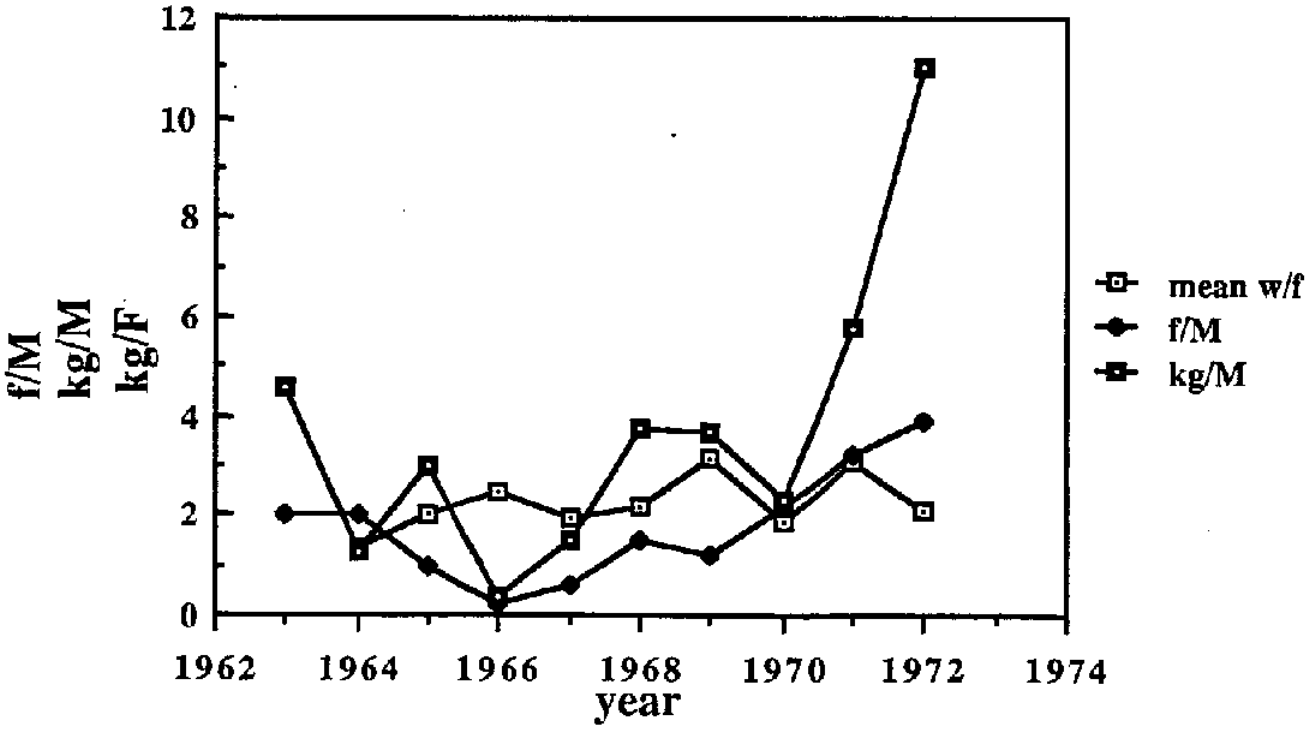
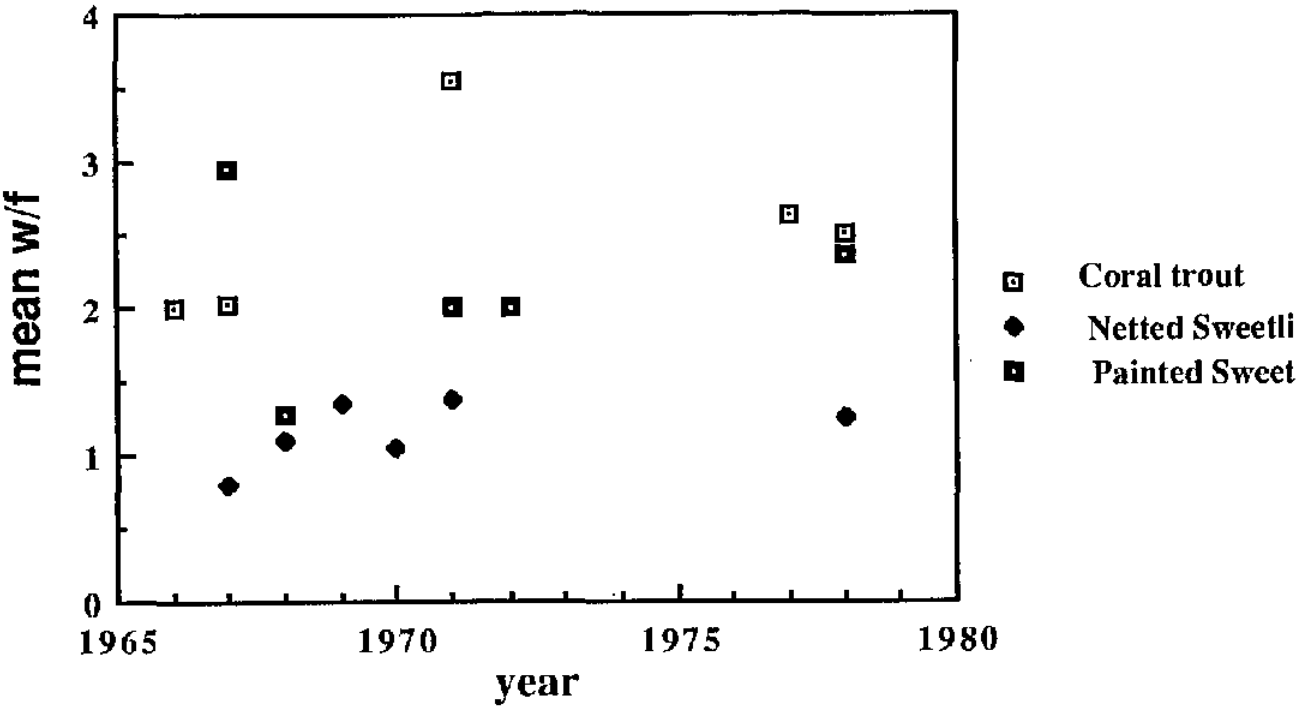


FIG. 8.10: Mean weight (kg) per fish for common species caught in Bundaberg competitions.



CHAPTER 9: CHARTER BOATS.

9.1 INTRODUCTION

Charter boats have become an increasingly economically important characteristic on the G.B.R. Most visitors to the G.B.R. 'experience the reef' via these boats. These charter boats cater for activities such as diving, reef walking, photography, cruising and resort access.. However, reef fishing is by far the principal activity and amounts to a considerable number of fish caught. Hundloe et. al. (1987), calculated from 48 charter boats surveyed, a total weight of 263,000 kg of reef fish caught for 1984. They extrapolated this value to include all 83 boats working on the G.B.R, to arrive at a value of 450,000 kg of whole fish.

9.2 SOURCES OF INFORMATION

Data were taken from a survey of charter boats from the Institute of Applied Research (Unpub report to GBRMPA) This report surveyed the number of Charter Boats in Queensland listed by the Queensland department of Harbours and Marine as of August 1984. A total of 435 vessels were listed, excluding bareboats. Of this number 243 boats were listed as being owned by individuals or firms with residential or business addresses on the mainland adjacent to the reef region. Estimates of the extent of fishing activity associated with each charter boat were gained in the survey, by asking for areas fished, annual amount of fish caught, most commonly caught species, and number of visitor days.

9.3 METHODS

The above data source was summarised to provide annual estimates of fishing activity for each home port region and the fisheries section in which they lie (Fig. 3.1). Only catches of demersal species were used. The most commonly caught species were coral trout, sweetlip, red emperor, spanged emperor. Pelagic fish such as mackerel and other game fish were not considered as the were not relevant to the aims of this study. The annual number of fish, weight of fish and the number of fishing days were compiled where available for each boat. These terms are defined below.

1. Number of fish: Number of fish caught per annum.
2. Weight of fish: Whole wet weight of fish caught per annum.
3. Fishing days: This is based on the the number of visiting days for each boat. **Visitor days** refers to the number of persons on board charter boats as paying customers regardless of the length of stay on board. For example a passenger undertaking a half-day trip would be considered

to generate one visitor day. If the vessel is primarily used for fishing then this can be regarded as being equivalent to fishings days. Otherwise the estimates of fishing days is based on the the number of charters which went out fishing.

Catch per unit effort (CPUE) data were calculated both as number and as weight per fishing day (i.e. per person per day). The average weight per fish was also calculated.

Unfortunately, not all information was available for every boat (i.e number and weight of fish, but not fishing days available). Consequently the mean of each of the above measures was calculated, based on the number of boats for which the data was available. Estimated figures were also calculated for the total number of charter boats per region to gain an idea of the total annual catch by charter boats in the area. In the accompanying figures (Figures 9.1- 9.4) the mean value is shown with the vertical bars representing the standard error associated with each estimate. This data represents the best estimate of annual production for each charter boat surveyed. It was not possible to survey all charter boats in the region so that total figures should be considered as underestimates. These results should however be interpreted as indicating relative regional differences in catch rather than absolute values. Many other factors need consideration such as actual hours spent fishing, area fished, knowledge of the skipper, skill of the passenger and differences in bait and gear.

9.4 RESULTS

Table 9.1 provides a breakdown of charter boats by home ports.

i. Northern fisheries section

A total of 8500 fish were recorded as being caught by 6 boats in the Northern fisheries section, and an estimated total weight of 2620 kg of fish from 8 boats. On the basis of the available number of fishing days, an estimated mean number of 7.12 fish and 3.96 kg of fish were caught per person, per boat, per day. There was little difference in these estimates for the individual ports of Cairns, Innisfail, and Port Douglas (Fig. 9.1). An estimated weight per fish of 1.82 $\pm$ 0.86 was calculated from the available data.

ii. Central fisheries section

The Central section had the greatest number of charter boats with 31 boats listed as being primarily involved in reef fishing. Thirteen boats worked out of Townsville and an equal number out of Shute Harbour and Airlie Beach. Mission Beach, Cardwell, and Lucinda each had one charter boat operating, and Bowen two.

A total weight of 131,490 kg of fish was caught by 20 boats and a total number of 68,210 fish

from 21 boats were caught in 1984. Catch rates of 6.76 ± 3.7 fish per day and 13.8 ± 10.4 kg of fish per day were estimated for this section. The number of fish caught per day was similar for all individual ports, but the weight of fish caught per day by Townsville boats was significantly higher (Fig. 9.3). Individual ports differed minimally from an estimated mean weight of 1.92± 0.8 kg per fish for the Central fisheries section (Fig. 9.3).

iii. Capricornia fisheries section

Twenty one charter boats operated in the Capricornia fisheries section in 1984, 13 of these from Gladstone, 4 out of Bundaberg, and 2 out of Rosslyn Bay. A total number of 14,900 fish from 2 boats and a total weight 54,870 kg were caught by 11 boats in 1984. Based on records from 9 boats a mean catch rate of 6.86 3.6 kg per fish per day was estimated. This value was significantly lower for boats operating out of Gladstone (Fig. 9.3). A mean weight of 1.35 ± 0.01 kg per fish was calculated for the Capricornia fisheries section, which was consistent for all ports.

9.4 DISCUSSION

i. Regional Differences

There was little difference in the mean weight per fish calculated for the Northern, Central, and Capricornia fisheries sections (Fig. 9.4). Likewise, the catch rates of number of fish caught per day for the Northern and Central fisheries sections showed minimal differences. Estimates of the weight of fish caught per day differed 3-fold (Fig. 3.4). However this estimate should be disregarded as the other two calculations of catch per unit effort were more consistent.

Most obvious were the regional differences in total numbers and weight of fish caught. From the available data a mean number of 1,416 fish and 2,620 kg of fish were caught in the Northern fisheries section in 1984. Based on these values, it could be expected that an estimated total of 28,320 fish and 5,812,00 kg of fish could potentially be caught by the 20 boats operating in the Northern fisheries section (Table 9.2).

Likewise, in the Central fisheries section, an estimated total of 2,114,510 fish and 4,076,190 kg of fish could be caught by the 31 boats operating. For the 21 boats in the Capricornia fisheries section an estimated 312,900 fish and 6,570,900 kg of fish could conceivably be caught. Clearly, the amount of fish taken by charter boats is substantial, most notably in the Central fisheries section.

Fig 9.1: Mean catch effort data for fish caught by charter boats in the Northern fisheries section.

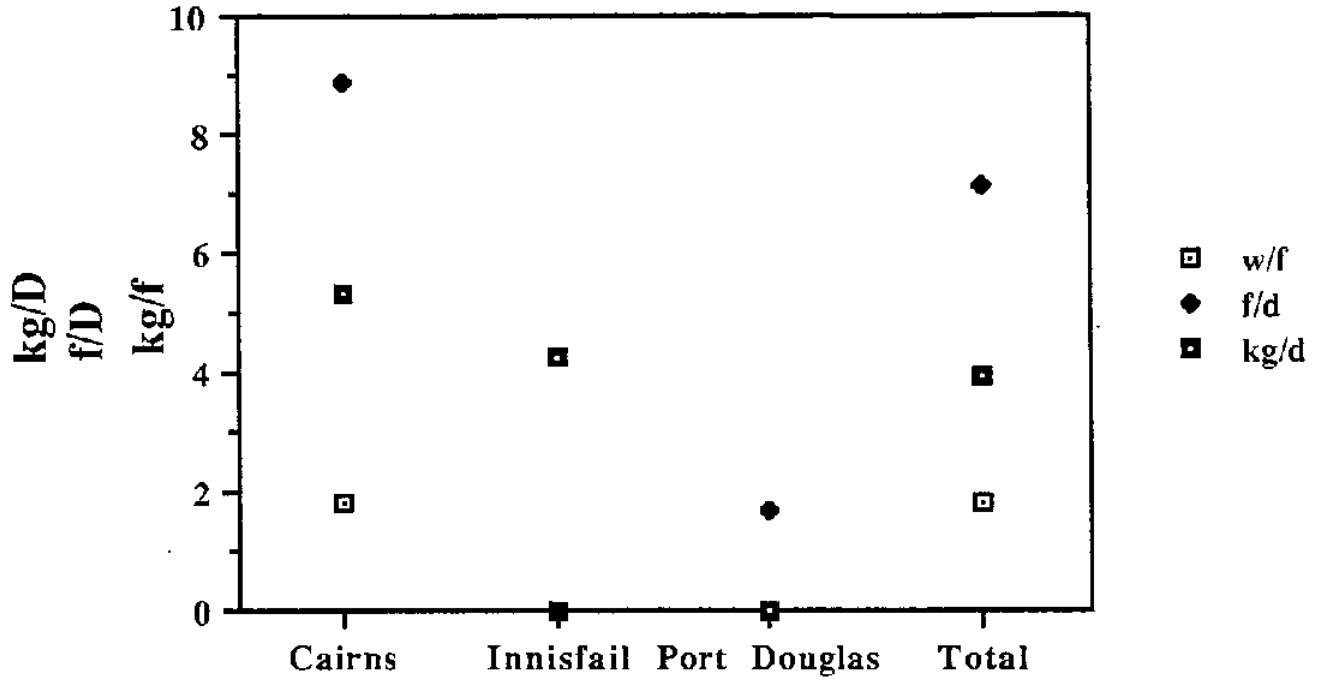


Fig 9.2: Mean Catch effort data for fish caught by charter boats in the Central fisheries section.

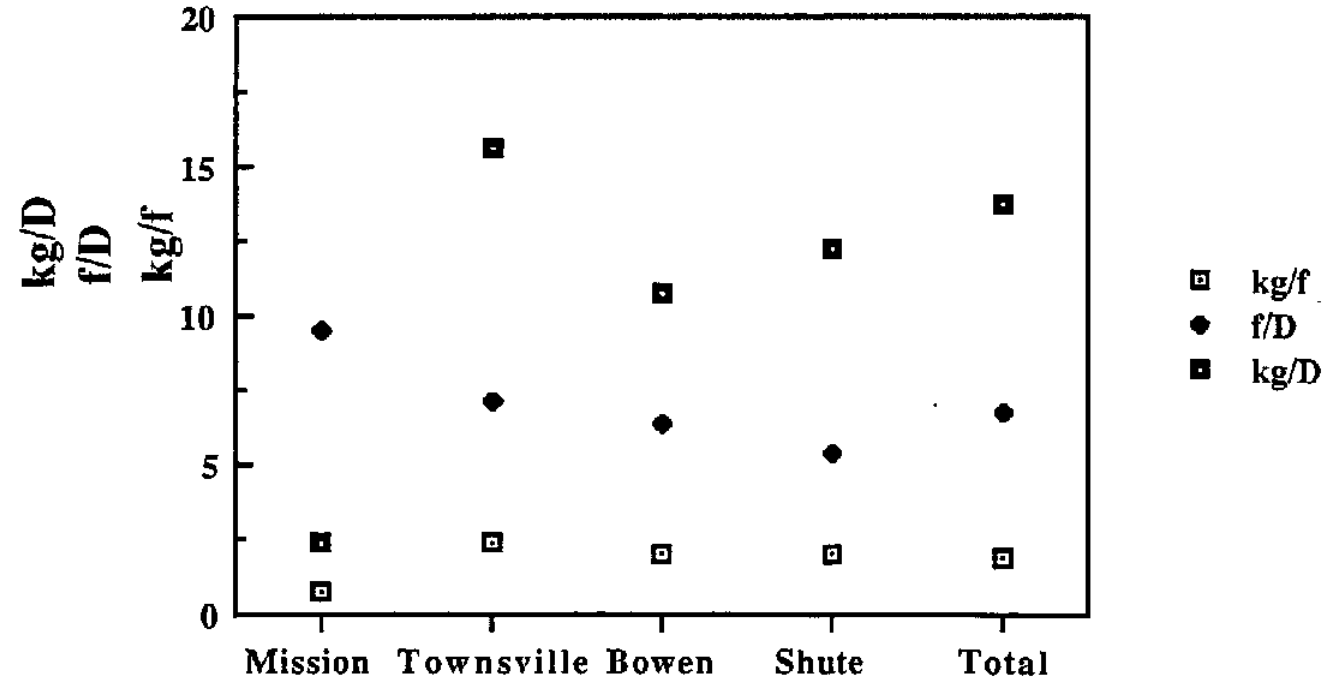


Fig 9.3: Mean catch effort data for fish caught by charter boats in the Capricornia fisheries section

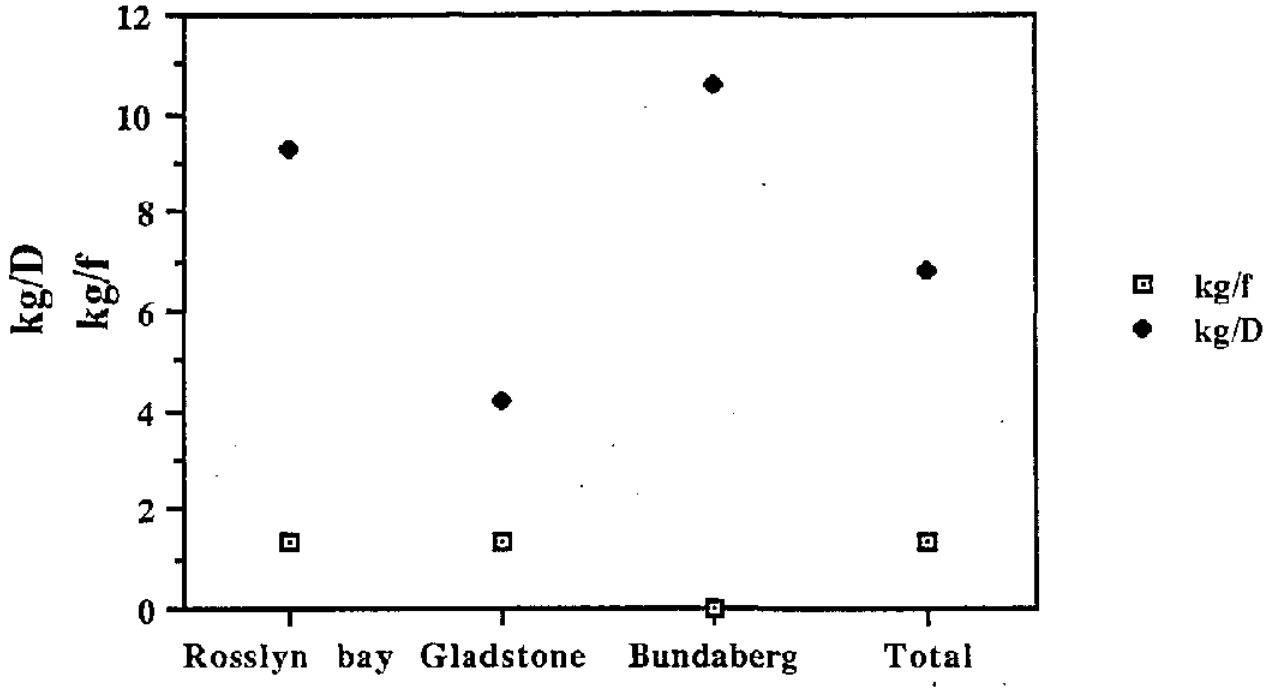


Fig 9.4: Regional comparison of catch effort for fish caught by Charter boats.

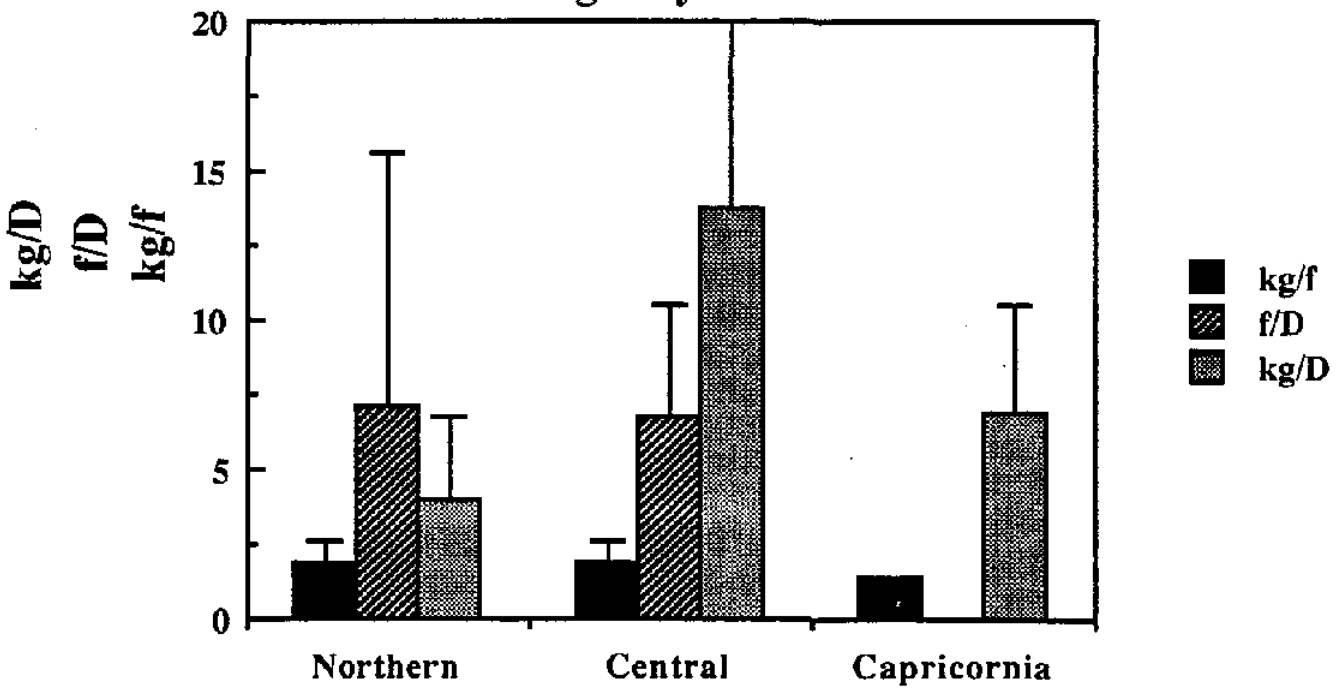


TABLE 9.1: ESTIMATED TOTAL ANNUAL CATCH AND CATCH RATES OF CHARTERBOATS BY HOMEPORT AND BY FISHERIES SECTION.

HOMEPORT	TOT No. BOATS	No. FISH	Wt Fish	No. DAYS	WEIGHT PER FISH	FISH PER DAY	WEIGHT PER DAY
NORTHERN FISHERIES SECTION							
PORT DOUGLAS							
Total	4	1600	1000	3820		1.7	0.4
Number boats		1	1	3	1		
Average		1600	1000	1273			
Std.Dev				782.5			
CAIRNS							
Total	13	6900	14320	1571	5.4	26.8	10.6
Number boats		5	5	4	3	3	2
Average		1380	3580	392.7	1.8	8.9	5.3
Std.Dev		953	2360	36.2	0.8	9.1	3.9
INNISFAIL							
Total	3	0	5640	1285	12.3		
Number boats		0	3	3	3		
Average		0	1880	428	4.3		
Std.Dev		967	190.8	0.6			
TOTAL							
Total	20	8500	20960	6291	5.5	28.5	23.8
Count		6	8	9	3	4	6
Average		1416	2620	699	1.8	7.1	3.9
Std.Dev		874.6	2032	703.6	0.8	8.5	2.8

HOMEPORT	TOT No. BOATS	No. FISH	Wt Fish	No. DAYS	WEIGHT PER FISH	FISH PER DAY	WEIGHT PER DAY
CENTRAL FISHERIES SECTION							
MISSION BEACH-LUCINDA							
Total	3	11500	9200	380	1.9	9.5	2.4
Number Boats		3	3	1	3		
Average		3833	3066	380	0.7	9.5	2.4
Std.Dev		1681	2786	0.4			
TOWNSVILLE							
Total	13	36510	101100	6570	13.9	63.9	155. 7
Number Boats		8	10	12	6	9	10
Average		4563.7	10110	547.5	2.3	7.1	15.6
Std.Dev		4366	10339	256.3	0.4	4.3	11.6
BOWEN							
Total	2	1860	3140	280	3.9	6.4	10.7
Number Boats		2	2	1	2	1	1
Average		930	1570	280	1.9	6.4	10.7
Std.Dev		870	1430	0.3			
SHUTE HARBOUR							
Total	13	16940	18050	2695	10.1	21.6	24.4
Number Boats		7	5	4	5	4	2
Average		2420	3610	741	2.0	5.4	12.2
Std.Dev		2575	4085	933	0.8	2.3	0.3
TOTAL							
Total	31	68210	131490	10695	32.7	101.5	193. 2
Number Boats		21	20	18	17	15	14
Average		3428	6574	566	1.9	6.7	13.8
Std.Dev		3400	8473	500	0.8	3.7	10.4

CAPRICORNIA FISHERIES SECTION

HOMEPORT	TOT No. BOATS	No. FISH	Wt Fish	No. DAYS	WEIGHT PER FISH	FISH PER DAY	WEIGHT PER DAY
ROSSLYN BAY							
Total	2	6700	23000	1500	1.3	9.3	
Number Boats		1	2	1	1	1	
Average		6700	11500	1500	1.3	9.3	
Std.Dev		2500					
GLADSTONE							
Total	13	8200	26350	4242	1.4	23.0	20.9
Number Boats	1	6	6	1	1	5	
Average	8200	3893	707	1.4	23.0	4.2	
Std.Dev	967	741	2.2				
BUNDABERG							
Total	4		5520	515	31.5		
Number Boats			3	3	3		
Average			1840	171	10.6		
Std.Dev			1177	89	2.2		
TOTAL							
Total	21	14900	54870	6257	2.7	61.8	
Number Boats		2	11	10	2	9	
Average		7450	4988	625	1.3	6.9	
Std.Dev		750	4550	688	0.01	3.60	
grand total	72						

TABLE 9.2: EXPECTED TOTAL NUMBER AND WEIGHT OF FISH BASED ON ALL BOATS IN EACH FISHERIES SECTION. VALUES ARE EXTRAPOLATED FROM ACTUAL MEAN VALUES.

CPUE	NORTHERN SECTION				CENTRAL SECTION				CAPRICORNIA SECTION			
	Total	Mean	S.D.	N	Total	Mean	S.D.	N	Total	Mean	S.D.	N
F/D												
OBSERVED	8500	1416	874	6	68210	3428	3400	21	14900	7450	750	2
EXPECTED	20BOATS				31BOATS				21BOATS			
TOTALS	28320				2114510				312900			
KG/F												
OBSERVED	29060	2620	2032	8	131490	6574	8473	20	54870	4988	4550	11
EXPECTED	20BOATS				31BOATS				21BOATS			
TOTALS	581200				4076190				6570900			

PART 4: DISCUSSION

CHAPTER 10: REGIONAL FISHERIES DISCUSSION.

10.1 INTRODUCTION

Owing to inconsistencies in the data, outlined in Chapter 3, the results of this study must be viewed as being indicative of trends only. In no manner should they be taken as representing absolute values. With the above caveat in mind, this chapter examines regional patterns of commercial, and recreational fishing. Secondly, differences in estimated catch rates, by fishing method are discussed, using the available data. Lastly estimated catches of all methods of fishing are considered, to gain an idea of the potential total fishing pressure per region.

10.2 REGIONAL PATTERNS OF COMMERCIAL REEF FISH PRODUCTION

The following points can be made about the regional differences in commercial reef fish production over the last 25 years.

1. The Capricornia fisheries section had the greatest overall estimated total annual finfish production, followed by the Central Section.

2. Prior to 1970, estimated reef fish landings were greatest in the Capricornia fisheries section. Subsequently the Central Section had a greater annual production.

3. Estimates of combined reef fish landings constitute the greatest percentage of total finfish production in the Central fisheries section followed by the Northern fisheries section.

4. Estimated combined reef fish landings of reef fish in the Northern fisheries section was greatest in 1970 (100.6 tonnes) and accounted for 35 percent of the total estimated finfish catch. Estimated annual landings of coral trout and mixed reef fish were also the greatest in this year.

5. Apart from 1971 and 1978, combined reef fish landings in the Central fisheries section have been greater than 200 tonnes per annum. Estimated reef fish landings were greatest in 1974 and 1980, and were due largely to increased catches of coral trout and emperor.

6. Estimated, combined reef fish landings in the Capricornia fisheries section were greatest in 1971 and again in 1980.

7. In the Northern fisheries section, coral trout were the most commonly caught reef species. Sweetlip and coral trout were the most commonly caught species in the Central fisheries section, whilst in the Capricornia fisheries section, sweetlip, bream, and coral trout were all commonly caught.

10.3 REGIONAL COMPARISON OF RECREATIONAL FISHING METHODS

The following tentative conclusions can be drawn about regional differences in catch rate estimates of recreational fishing methods.

i Spearfishing

1. The average weight per fish, for spearfishing was greatest in the Central fisheries section, followed by the the Northern, and Capricornia fisheries sections.

2. Estimates of the number of fish caught per man, per day, in the the Northern fisheries section was 3 times greater than in the Capricornia fisheries section.

3. The estimated mean weight of fish caught per man, per day was greatest in the Central fisheries section reflecting the greater mean weight per fish, calculated for this section.

ii. Charterboat operations

1. The average weight per fish was greatest in the Central section, followed closely by the Northern fisheries section. The estimated average weight per fish in the Capricornia fisheries section was substantially lower.

2. The number of fish caught per man, per day was greatest in the Northern fisheries section, followed by the Central section. An estimate for the Capricornia section was not available.

3. The average weight of fish caught per man, per day was greatest in the Central fisheries section, followed by the Capricornia section.

4. Estimates of both the total number of fish, and total weight of fish caught were greatest for the Central section followed by the Capricornia fisheries section. Some 68,000 fish were caught in the Central section, 14,000 in the Capricornia section, and only 8,500 in the Northern section. An estimated 131 tonnes of reef fish were caught in the Central section, 54.8 tonnes in the Capricornia section, and 20 tonnes in the Northern section. These estimates reflect the distribution

of charter boat operations, the majority being located at Townsville and Shute Harbour.

iii. Discussion

The Catch per effort estimates and the regional trends identified are similar to findings of other workers (Craik, 1981; Driml et. al., 1982). Craik (1981) compared the catches from charter boats, and noted that the number, and weight of fish, caught per angler day, increased from north to south. In areas adjacent to Cairns and Innisfail, where reefs were close to shore, catches were found to increase with increasing distance from shore. She also noted catches by angler boats generally appeared to equal or exceed those from charter boats in the same area, but the mean weight per fish within an area was identical for both speedboat anglers and charter boat anglers. Angler boats in Capricornia were noted as catching more fish than boats in Cairns. This study also identified similar catch rate estimates for both areas. However, Craik noted that the total number of fish caught in the Cairns area by speed boats, was comparable to that in the Capricornia fisheries section, in terms of fish per unit area. Due to the greater mean weight per fish, in the Cairns area, Craik estimated that 49 kg of fish, per square kilometre, were removed in the Cairns area, compared to 25 kg, per fish in the Capricornia fisheries section.

Off Townsville, Craik found the estimated mean catch of fish, per man, per day, by amateur anglers had remained stable since 1961, but the mean weight per fish had declined about 1kg in that period.

10.4 COMPARISON OF CATCH RATES BY METHOD.

Table 10.1 provides a comparison of estimated catch rates and total production, broken down by region, for various methods of fishing. The amateur results were taken from a survey of recreational boat users in 1980 by Driml et. al. (1982 Unpub report to GBRMPA). Spearfishing results are the mean values over the years for which data were available (Chapter 8). Charter boat figures are those figures used in Chapter 9 for 1984. It is apparent that the estimates of weight per fish are all very similar. Likewise, the number of fish caught per day by charter boats and amateur fishermen. The marginally higher values for charter boats could be due to the fact that a greater length of time is spent fishing and also the greater experience of operators compared to the average recreational fisherman in selecting a `good' fishing spot. The lower estimates of spearfishing catch rates could be a result of greater selectivity and of lesser amount of time spent `fishing'. Most spearfishing competitions last 4 hours whereas, the mean length of time spent by recreational fishermen is around 12 hours. The consistently higher mean weight per fish for spearfishing in all 3 fisheries sections of the GBR, is most probably due to selectivity on the part of the spearfisherman, whereas line fishing is a largely unselective fishing method.

TABLE 10.1: COMPARATIVE ESTIMATES OF CATCH RATES BY FISHING METHOD. S.F: Spearfishing **C.B:** Charter Boat Fishing **A.F** Amateur Fishing

CPUE	NORTHERN SECTION			CENTRAL SECTION			CAPRICORNIA SECTION		
	S.F	C.B	A.F	S.F.	C.B.	A.F.	S.F.	C.B.	A.F.
No.FISH									
Total	846	8500	1032442	2224	68210	2028312	1029	14900	176156
N	5	6		11	21		10	2	
Mean	169	1416		202	3428		102.9	7450	
Wt.FISH (tonnes)									
Total	1.7	20.9	2328.1	5.6	131.4	4014.6	1.7	54.8	2429.6
N	5	8		11	20		9	11	
Mean	0.3			0.5	2.1		0.2	4.9	
KG/F									
	2.4	1.8	2.4	2.6	1.9	2.1	2.2	1.4	1.4
F/D	5.6	7.1	6.3	4.7	6.7	6.1	1.7		6.3
KG/D	9.3	3.9	16.0	10.0	13.8	13.1	3.7	6.8	7.9

10.5 REGIONAL ESTIMATES OF TOTAL REEF FISH PRODUCTION

From the previous discussion, it is apparent that the recreational fisheries form a substantial part of total reef fish production. In addition, the magnitude of fish handled by the black market and private processors remains poorly documented. Interviews have shown that 75 percent of amateur fishermen sell part, or all of their catch (D.P.I., 1979). Amateur fishermen and clubs commonly sell a large part of their catch to friends, restaurants, and hotels. Estimates made by Fish Board personnel, suggest that the amount of reef fish sold privately at least equalled the amount of fish processed by the Q.F.B. Clearly these factors, and those detailed in Chapter 3, make the following discussion largely speculative.

i. NORTHERN FISHERIES SECTION

Spearfishing has been disregarded from the analysis as the mean annual average of 169kg of fish landed is insubstantial. Driml et al. (1982) estimated a total weight of fish caught by amateur fishermen to be in the order of 232.8 tonnes. An estimated 3530 private boats in the Cairns region, fished on the GBR in 1980. A survey by D.P.I., (1980), noted that depending on the season and the weather, there may be up to 300 small boats launched in Cairns on any one weekend. A further 29 tonnes of whole weight of reef fish, were estimated as being caught by charter boats (Hundloe et. al.,1984). A combined recreational figure of 262 tonnes can be calculated from these actual figures. Consideration of all charter boats in the area would make this estimate considerably higher.

In comparison, a report by D.P.I.. (1979), found that in 1979 there were approximately 78 tonnes of whole weight of reef fish, processed through the Q.F.B, in the Innisfail to Cooktown area. A further 12 tonnes was handled by Supreme Fisheries, Babinda. This was the only official private processor which handled reef fish caught in the Northern fisheries section. Thus an estimated 98 tonnes of reef fish were handled by commercial processors. A combined recreational and commercial catch of 360 tones of reef fish, for the Northern fisheries section was estimated. Of this, recreational fishermen would account for at least 73 percent of the total weight, of whole fish, caught in the Northern Section. An average mean weight 2.0 kg per fish was calculated from the recreational and charter boat data (Table 10.1). On the basis of these figures, an estimated of 180,000 fish, could be landed, per annum, in the Northern fisheries section. Clearly, the recreational fishery has been responsible for the majority of reef fish caught in recent years. As noted, there are many amateur fishermen who sell their catch for profit and to cover the costs of their outings.

ii CENTRAL FISHERIES SECTION

Little evidence exists for estimates of the quantities of reef fish handled by private processors in the Central section. From the available results, an estimated 414.6 tonnes of fish could be caught in the Central Section by charter boats and private anglers. An estimated average of 282 tonnes of reef fish were processed through Q.F.B. depots for 1980 and 1981. These figures give a possible combined total estimate of reef fish production of 696 tonnes. Recreational fishing would accounts for 59 percent of this total catch. The mean weight per fish, in this section of the GBR, was calculated as being 2.0 kg per fish, (Table 10.1) giving an estimated 296,000 fish caught per annum.

iii. CAPRICORNIA FISHERIES SECTION

A combined estimate of 248.4 tonnes of reef fish was calculated as being taken by recreational and charter boat fishermen in the Capricornia Section. An average of 179 tonnes of whole reef fish were processed by Q.F.B. depots for 1980 and 1981. Of a combined estimate of 427 tonnes of reef fish possibly caught per annum, recreational fishing could potentially account for 58 percent of this figure. Craik (1981) estimated recreational anglers catch three times more demersal fish than commercial anglers (390 vs 130 tonnes). An average weight of 1.6 kg per fish was estimated for reef fish in the Capricornia section, suggesting a possible 267,000 fish could be caught annually.
Furthermore, an estimated 250 tonnes of fish caught by amateurs in this section are believed to pass through commercial channels each year (Jensen 1979).

10.6 ANECDOTAL INFORMATION

Surveys undertaken by various authorities, have demonstrated that reefs are subjected to varying amounts of fishing pressure. The abundance of preferred reef fish such as coral trout, and red emperor was shown to be proportional to the distance from major population centres. Craik (1981) showed that the numbers, weight, and mean weight of of fish caught increased proportionally with increasing distance from shore for reefs both off Cairns and off Innisfail. Likewise Ayling (1983) in surveys of coral trout populations on 44 reefs in the Cairns Section of the GBRMP found that shelf position was the primary factor affecting the distribution and abundance of coral trout. Evidence suggested that some of the mid-shelf reefs were subjected to a lower fishing pressure than others. The grand mean of *P.leopardus* on 7 relatively low fished reefs was 29 per ha compared with a grand mean of 21 per ha on 7 relatively highly fished reefs. (Ayling and Ayling, 1983). This indicated that a high fishing pressure can have a small but significant affect on coral trout numbers.

Anecdotal information from a variety of sources including champion spearfishermen and old commercial fishermen suggest that 25 to 30 years ago catches were bigger and there were a greater number of large fish around (Craik, 1981).

CONCLUSIONS

The concept of a sustainable industry is basic to successful management of any fishery. This is somewhat more difficult in a tropical multispecies fishery as on the Great Barrier Reef which has a number of user groups with often conflicting ideals and objectives.

This study has suffered from a lack of consistent data on which to base any catch per effort data. Without this data it is impossible to differentiate between stochastic processes such as recruitment failure, and stock depletion through overfishing. Based on the available commercial Q.F.B data, annual estimates of catch returns of several reef fish species, and region have been calculated in the report. Given the paucity and inconsistencies of the data, these results remain inconclusive and should at best be regarded as indicating trends in annual production. Little can be inferred with repect to any real changes in species composition over time. Likewise, the catch per effort estimates for spearfishing and charter boats remain speculative. This information, along with available estimates of other commercially important species on the GBR is stored in an electronic database at GBRMPA. This database of fisheries related information should form the basis for further investigations of fisheries related activities on the GBR.

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APPENDIX A: ESTIMATED LANDINGS OF FISH SPECIES BY REGIONAL PORT.

TABLE A1: TOTAL ESTIMATED LANDINGS OF FISH (Kg) AT Q.F.B DEPOTS IN THE NORTHERN FISHERIES SECTION.

YEAR	SPECIES	CAIRNS	INNISFAIL	PORT DOUGLAS
57	Bream	1135	1576	0
57	Cod	4430	2867	0
57	Emperor	0	0	0
57	Mixed	2280	2998	0
57	Morwong	265	215	0
57	Nanygai	0	0	0
57	Parrot	23	42	0
57	Sweetlip	6984	7837	0
58	Bream	512	2036	0
58	Cod	3802	4816	0
58	Emperor	256	200	0
58	Mixed	833	1819	0
58	Morwong	185	353	0
58	Nanygai	0	0	0
58	Parrot	21	251	0
58	Sweetlip	6393	11620	0
59	Bream	58	673	0
59	Cod	924	2744	0
59	Emperor	0	45	0
59	Mixed	347	139	0
59	Morwong	5	112	0
59	Nanygai	840	5	0
59	Parrot	0	134	0
59	Sweetlip	1302	6052	0
60	Bream	322	729	0
60	Cod	1175	2106	0
60	Emperor	251	1199	0
60	Mixed	4401	130	0
60	Morwong	6	85	0
60	Nanygai	0	0	0
60	Parrot	0	24	0
60	Sweetlip	1700	4245	0
61	Bream	428	741	0
61	Cod	415	2029	0
61	Emperor	250	2039	0
61	Mixed	5224	371	0
61	Morwong	0	41	0
61	Nanygai	83	18	0
61	Parrot	0	100	0
61	Sweetlip	1705	3495	0

YEAR	SPECIES	CAIRNS	INNISFAIL	PORT DOUGLAS
62	Bream	224	451	0
62	Cod	132	1677	0
62	Emperor	16	3533	0
62	Mixed	4789	44	0
62	Morwong	0	21	0
62	Nanygai	1	0	0
62	Parrot	2	28	0
62	Sweetlip	387	4526	0
63	Bream	145	420	0
63	Cod	45	1406	0
63	Coral trout	5110	9625	0
63	Emperor	0	2490	0
63	Mixed	16401	225	0
63	Morwong	0	11	0
63	Nanygai	0	0	0
63	Parrot	0	104	0
63	Sweetlip	32	3014	0
64	Bream	58	747	0
64	Cod	0	1369	0
64	Coral trout	4649	8906	0
64	Emperor	0	1954	0
64	Mixed	15030	1326	0
64	Morwong	0	3	0
64	Nanygai	0	4	0
64	Parrot	0	13	0
64	Sweetlip	26	3621	0
65	Bream	156	525	0
65	Cod	33	1960	0
65	Coral trout	7000	10554	0
65	Emperor	0	2517	0
65	Mixed	11384	1881	0
65	Morwong	0	0	0
65	Nanygai	0	0	0
65	Parrot	0	23	0
65	Sweetlip	534	7398	0
66	Bream	50	347	0
66	Cod	49	1722	0
66	Coral trout	0	7715	0
66	Emperor	0	2060	0
66	Mixed	17544	2740	0
66	Morwong	0	51	0
66	Nanygai	0	0	0
66	Parrot	0	19	0
66	Sweetlip	0	4042	0

YEAR	SPECIES	CAIRNS	INNISFAIL	PORT DOUGLAS
67	Bream	107	251	0
67	Cod	13	2287	0
67	Coral trout	10883	22008	0
67	Emperor	3805	4118	0
67	Mixed	13149	4121	0
67	Morwong	0	2	0
67	Nanygai	1745	0	0
67	Parrot	0	33	0
67	Sweetlip	694	12186	0
68	Bream	446	340	0
68	Cod	519	2980	0
68	Coral trout	9611	19041	0
68	Emperor	5476	6069	0
68	Mixed	2823	4061	0
68	Morwong	0	24	0
68	Nanygai	288	0	0
68	Parrot	0	104	0
68	Sweetlip	460	15491	0
69	Bream	216	390	0
69	Cod	832	2355	0
69	Coral trout	5441	16351	0
69	Emperor	1813	8097	0
69	Mixed	5935	4179	0
69	Morwong	0	12	0
69	Nanygai	269	0	0
69	Parrot	0	32	0
69	Sweetlip	619	11092	0
70	Bream	6567	208	0
70	Cod	3344	1268	0
70	Coral trout	24672	10165	0
70	Emperor	1257	4416	0
70	Mixed	35382	4767	0
70	Morwong	0	0	0
70	Nanygai	260	0	0
70	Parrot	12	0	0
70	Sweetlip	991	7309	0
71	Bream	895	321	0
71	Cod	3055	740	0
71	Coral trout	4327	11103	0
71	Emperor	3768	6520	0
71	Mixed	28726	4622	0
71	Morwong	0	0	0
71	Nanygai	248	134	0
71	Parrot	0	179	0
71	Sweetlip	1049	6779	0

YEAR	SPECIES	CAIRNS	INNISFAIL	PORT DOUGLAS
72	Bream	406	157	0
72	Cod	6373	983	0
72	Coral trout	13163	14262	0
72	Emperor	2996	5113	0
72	Mixed	25221	5252	0
72	Morwong	0	5	0
72	Parrot	0	122	0
72	Sweetlip	1307	9651	0
73	Bream	415	640	0
73	Cod	2418	301	0
73	Coral trout	6391	1421	0
73	Emperor	1039	3750	0
73	Mixed	25973	3898	0
73	Morwong	3376	710	0
73	Nanygai	398	2	0
73	Parrot	0	102	0
73	Sweetlip	690	2690	0
74	Bream	3011	350	0
74	Cod	2162	17	0
74	Coral trout	8081	5562	0
74	Emperor	4778	9310	0
74	Mixed	23987	4079	0
74	Morwong	0	15	0
74	Nanygai	101	917	0
74	Parrot	0	83	0
74	Sweetlip	1880	8430	0
75	Bream	243	160	0
75	Cod	7379	402	0
75	Coral trout	7042	4664	0
75	Emperor	4830	8595	0
75	Mixed	28055	3886	0
75	Morwong	0	0	0
75	Nanygai	243	886	0
75	Parrot	0	25	0
75	Sweetlip	2243	8380	0
76	Bream	511	257	0
76	Cod	14829	461	0
76	Coral trout	10170	8646	0
76	Emperor	1560	6839	0
76	Mixed	20012	4639	0
76	Morwong	3	0	0
76	Nanygai	0	907	0
76	Parrot	0	12	0
76	Sweetlip	2351	11181	0

YEAR	SPECIES	CAIRNS	INNISFAIL	PORT DOUGLAS
77	Bream	758	1391	0
77	Cod	5598	996	0
77	Coral trout	20228	9239	0
77	Emperor	2875	4392	0
77	Mixed	7368	5542	0
77	Morwong	0	22	0
77	Nanygai	502	819	0
77	Parrot	4	14	0
77	Sweetlip	2069	9992	0
78	Bream	1298	823	0
78	Cod	3790	1420	0
78	Coral trout	18266	12671	0
78	Emperor	4515	452	0
78	Mixed	18125	7935	0
78	Morwong	4	65	0
78	Nanygai	1206	2475	0
78	Parrot	4	5	0
78	Sweetlip	2919	5609	0
79	Bream	515	92	0
79	Cod	2924	631	0
79	Coral trout	12855	9756	0
79	Emperor	3706	1037	0
79	Mixed	16549	7359	0
79	Morwong	0	0	0
79	Nanygai	355	1277	0
79	Parrot	27	0	0
79	Sweetlip	2564	4000	0
80	Bream	848	19	0
80	Cod	1313	293	0
80	Coral trout	7930	8510	2897
80	Emperor	1891	787	2104
80	Mixed	18765	6000	0
80	Morwong	5	0	9
80	Nanygai	52	1159	2
80	Parrot	11	5	0
80	Sweetlip	1475	2404	626
81	Bream	701	113	0
81	Cod	2566	503	0
81	Coral trout	11030	6519	2934
81	Emperor	4211	489	2386
81	Mixed	4254	29432	0
81	Morwong	6	160	0
81	Nanygai	102	350	18
81	Parrot	78	0	0
81	Sweetlip	2947	2433	1225

TABLE A2: ESTIMATED TOTAL LANDINGS OF FISH (Kg) RECEIVED AT Q.F.B. DEPOTS IN THE CENTRAL FISHERIES SECTION.

YEAR	SPECIES	BOWEN	HOMEHILL	INGHAM	MACKAY	PROSERPINE	TOWNSVILLE
57	Bream	2237	0	869	900	0	2707
57	Cod	920	0	933	2154	0	3632
57	Emperor	138	0	7	0	0	44
57	Mixed	101	0	1748	2998	0	784
57	Morwong	106	0	59	116	0	52
57	Nanygai	0	0	0	0	0	0
57	Parrot	457	0	0	358	0	40
57	Sweetlip	1071	0	490	19152	0	6762
58	Bream	3507	0	389	1689	582	3129
58	Cod	1284	0	271	1982	447	3079
58	Emperor	77	0	0	505	16	175
58	Mixed	576	0	1132	5591	694	3031
58	Morwong	0	0	8	100	8	47
58	Nanygai	0	0	0	0	0	3
58	Parrot	34	0	161	161	52	44
58	Sweetlip	1128	0	49	15192	1466	7743
59	Bream	690	0	440	487	190	1750
59	Cod	402	136	311	1376	101	2617
59	Emperor	89	5	8	589	0	161
59	Mixed	698	141	681	3803	690	3998
59	Morwong	6	22	19	61	0	35
59	Nanygai	0	0	0	0	0	0
59	Parrot	310	0	0	187	4	7
59	Sweetlip	722	0	19	5926	14	5576
60	Bream	82	859	151	1130	185	1439
60	Cod	251	327	102	1605	94	595
60	Emperor	11	0	14	407	20	1
60	Mixed	125	1920	276	1832	272	3692
60	Morwong	10	92	0	3	0	14
60	Nanygai	0	0	0	0	0	0
60	Parrot	0	7	0	288	3	4
60	Sweetlip	1135	113	193	2506	37	2048
61	Bream	500	4525	58	2767	999	1579
61	Cod	170	785	0	697	89	90
61	Emperor	97	12	0	308	45	23
61	Mixed	1554	5728	121	1076	712	17222
61	Morwong	0	0	0	33	0	0
61	Nanygai	0	0	0	0	0	20
61	Parrot	9	135	0	135	2	0
61	Sweetlip	1629	702	162	4205	106	682

YEAR	SPECIES	BOWEN	HOMEHILL	INGHAM	MACKAY	PROSERPINE	TOWNSVILLE
62	Bream	2	4646	104	3095	507	3893
62	Cod	227	1248	0	1749	220	1033
62	Emperor	76	375	0	1020	4	217
62	Mixed	0	6511	82	1520	534	9380
62	Morwong	0	0	0	84	25	41
62	Nanygai	0	0	0	0	20	0
62	Parrot	0	40	0	259	48	30
62	Sweetlip	1728	2122	0	11797	404	3355
63	Bream	0	4829	0	3380	330	6418
63	Cod	0	0	908	2056	188	1294
63	Coral trout	0	2150	0	12560	239	4621
63	Emperor	0	198	0	1100	116	211
63	Mixed	0	3080	0	2397	9	7910
63	Morwong	0	0	0	55	2	9
63	Nanygai	0	0	0	0	0	0
63	Parrot	0	3	0	180	15	11
63	Sweetlip	0	2660	0	14453	475	1473
64	Bream	76	3166	0	2862	383	6085
64	Cod	16	1116	0	1267	203	1226
64	Coral trout	69	1289	0	8390	189	4230
64	Emperor	19	336	0	539	77	147
64	Mixed	220	3325	0	1942	116	8043
64	Morwong	0	2	0	87	0	18
64	Nanygai	0	0	0	0	0	0
64	Parrot	2	9	0	197	16	10
64	Sweetlip	210	2571	0	8839	351	3339
65	Bream	1955	0	0	2211	25	6
65	Cod	1514	0	0	1505	141	1427
65	Coral trout	967	0	0	4950	235	4001
65	Emperor	579	0	0	664	275	488
65	Mixed	3746	0	0	3180	7	6851
65	Morwong	1	0	0	120	0	11
65	Nanygai	0	0	0	0	0	0
65	Parrot	15	0	0	160	25	6
65	Sweetlip	2274	0	0	6289	114	6213
66	Bream	94	3020	0	4225	197	4745
66	Cod	1	790	0	2619	145	1644
66	Coral trout	103	27	0	3808	0	7419
66	Emperor	28	89	0	604	11	575
66	Mixed	862	3291	0	5103	228	9835
66	Morwong	0	2	0	45	0	6
66	Nanygai	0	0	0	0	0	0
66	Parrot	0	10	0	353	30	10
66	Sweetlip	381	299	0	4340	7	6178

YEAR	SPECIES	BOWEN	HOMEHILL	INGHAM	MACKAY	PROSERPINE	TOWNSVILLE
67	Bream	323	2557	0	3380	0	2913
67	Cod	58	783	0	1615	45	1024
67	Coral trout	1345	1114	0	9659	44	11208
67	Emperor	1126	1135	0	1201	8	665
67	Mixed	0	2721	0	2929	0	9459
67	Morwong	0	0	0	69	122	14
67	Nanygai	0	1	0	25	0	0
67	Parrot	9	55	0	355	0	14
67	Sweetlip	0	3134	0	11452	4	8999
68	Bream	375	1291	0	3665	0	2651
68	Cod	70	1098	0	2130	0	1364
68	Coral trout	1259	2030	0	10810	0	6891
68	Emperor	1239	649	0	1046	0	718
68	Mixed	117	1955	0	2105	0	8720
68	Morwong	0	0	0	45	0	0
68	Nanygai	0	0	0	15	0	0
68	Parrot	0	20	0	91	0	47
68	Sweetlip	1605	4563	0	7549	0	11022
69	Bream	105	930	0	2809	0	1739
69	Cod	58	1278	0	2192	0	938
69	Coral trout	357	3184	0	14111	0	5520
69	Emperor	65	740	0	1677	0	556
69	Mixed	15139	2318	0	2880	0	9505
69	Morwong	8	0	0	98	0	7
69	Nanygai	0	0	0	0	0	0
69	Parrot	16	43	0	53	0	36
69	Sweetlip	402	6435	0	14131	0	4867
70	Bream	0	992	0	1509	0	29620
70	Cod	0	946	0	4026	0	1128
70	Coral trout	0	4191	0	73819	0	8076
70	Emperor	0	838	0	20600	0	472
70	Mixed	4702	3466	0	2450	0	10163
70	Morwong	0	0	0	63	0	5
70	Nanygai	0	10	0	9	0	0
70	Parrot	0	30	0	165	0	9
70	Sweetlip	0	4027	0	26094	0	4378
71	Bream	0	453	0	2069	0	763
71	Cod	0	816	0	4711	0	866
71	Coral trout	0	3720	0	7062	0	5316
71	Emperor	0	497	0	51414	0	603
71	Mixed	0	3600	0	6206	0	6484
71	Morwong	0	0	0	24	0	22
71	Nanygai	0	27	0	21	0	151
71	Parrot	0	9	0	170	0	20
71	Sweetlip	0	5786	0	11878	0	8514

YEAR	SPECIES	BOWEN	HOMEHILL	INGHAM	MACKAY	PROSERPINE	TOWNSVILLE
72	Bream	41	1270	0	2405	0	1018
72	Cod	129	964	0	4808	0	1727
72	Coral trout	272	5328	0	72973	0	11747
72	Emperor	210	393	0	59665	0	870
72	Mixed	360	2956	0	5325	0	9907
72	Morwong	0	0	0	16	0	0
72	Parrot	0	7	0	171	0	47
72	Sweetlip	458	3550	0	9124	0	8346
73	Bream	707	726	0	2536	0	21393
73	Cod	1177	944	0	1350	0	6712
73	Coral trout	2720	370	0	74064	0	7081
73	Emperor	1685	18	0	42413	0	810
73	Mixed	2472	3745	0	1906	0	14570
73	Morwong	546	1541	0	6138	0	1557
73	Nanygai	0	0	0	0	0	0
73	Parrot	72	3	0	350	0	10
73	Sweetlip	1052	382	0	28768	0	7475
74	Bream	407	653	0	12489	0	1694
74	Cod	869	860	0	4407	0	1654
74	Coral trout	2338	841	0	87975	0	13151
74	Emperor	3016	255	0	113607	0	1752
74	Mixed	1914	2072	0	9365	0	4500
74	Morwong	0	0	0	0	0	6
74	Nanygai	0	0	0	0	0	0
74	Parrot	0	9	0	937	0	18
74	Sweetlip	2503	2221	0	4295	0	15909
75	Bream	392	286	0	9540	0	1172
75	Cod	879	447	0	3342	0	1357
75	Coral trout	2859	852	324	72878	0	7786
75	Emperor	5063	80	0	109293	0	1760
75	Mixed	1597	1800	0	2349	8880	4874
75	Morwong	0	0	0	0	0	7
75	Nanygai	0	0	0	0	0	0
75	Parrot	13	12	0	312	0	12
75	Sweetlip	3209	3044	0	11248	0	18979
76	Bream	484	67	0	3615	0	2284
76	Cod	618	47	0	2607	0	1655
76	Coral trout	4313	895	0	62998	0	5889
76	Emperor	1314	250	0	17041	0	299
76	Mixed	1931	248	0	15290	0	11371
76	Morwong	0	0	0	0	0	0
76	Nanygai	4	0	0	0	0	2
76	Parrot	37	0	0	190	0	0
76	Sweetlip	6979	2889	0	46845	0	12788

YEAR	SPECIES	BOWEN	HOMEHILL	INGHAM	MACKAY	PROSERPINE	TOWNSVILLE
77	Bream	860	0	0	3573	0	1748
77	Cod	441	0	0	3844	0	4910
77	Coral trout	1659	0	0	49461	0	8046
77	Emperor	551	0	0	39254	0	2491
77	Mixed	2528	0	0	3017	0	24768
77	Morwong	0	0	0	0	0	0
77	Nanygai	53	0	0	55	0	66
77	Parrot	42	0	0	232	0	0
77	Sweetlip	4036	0	0	63869	0	8475
78	Bream	338	0	0	1609	0	883
78	Cod	129	0	0	2285	0	1218
78	Coral trout	88	0	0	2061	0	8239
78	Emperor	5	0	0	12307	0	860
78	Mixed	449	0	0	4542	0	45711
78	Morwong	0	0	0	2	0	21
78	Nanygai	0	0	0	6	0	278
78	Parrot	0	0	0	238	0	0
78	Sweetlip	195	0	0	64675	0	6865
79	Bream	123	0	0	1944	0	1199
79	Cod	270	0	0	2630	0	999
79	Coral trout	1228	0	0	86439	0	6195
79	Emperor	716	0	0	17886	0	673
79	Mixed	1153	0	0	4246	0	14190
79	Morwong	0	0	0	0	0	0
79	Nanygai	0	0	0	2	0	806
79	Parrot	14	0	0	823	0	0
79	Sweetlip	2584	0	0	84288	0	3726
80	Bream	117	0	0	6792	0	1236
80	Cod	336	0	0	3545	0	1450
80	Coral trout	13980	46	0	103271	0	6620
80	Emperor	1559	445	0	22189	0	1282
80	Mixed	172	0	0	2396	0	15648
80	Morwong	0	0	0	0	0	8978
80	Nanygai	67	0	0	126	0	63
80	Parrot	92	0	0	521	0	15
80	Sweetlip	12272	205	0	77316	0	6519
81	Bream	582	0	0	1664	0	685
81	Cod	156	0	0	2840	0	1822
81	Coral trout	4279	19	0	117389	0	8972
81	Emperor	274	291	0	12744	0	1266
81	Mixed	565	0	0	20473	0	12472
81	Morwong	0	0	0	0	0	4
81	Nanygai	7	0	0	6	0	0
81	Parrot	0	0	0	374	0	3
81	Sweetlip	1507	48	0	81845	0	6808

TABLE A3: ESTIMATED TOTAL LANDINGS OF FISH (Kg) RECIEVED AT Q.F.B. DEPOTS IN THE CAPRICORNIA FISHERIES SECTION.

YEAR	SPECIES	BUNDABERG	GLADSTONE	MARY BOROUGH	ROCK HAMPTON	ROSSLYN BAY	YEPPOON
57	Bream	6115	3798	31307	560	22803	213
57	Cod	1011	3619	1138	751	383	957
57	Emperor	501	2958	16	0	14	626
57	Mixed	926	3569	1400	1486	140	47
57	Morwong	116	3096	92	78	30	30
57	Nanygai	0	2	0	0	54	22
57	Parrot	561	1857	98	132	97	193
57	Sweetlip	853	22183	226	634	197	3541
58	Bream	5702	3386	36346	698	10615	395
58	Cod	688	3832	1188	1640	704	1563
58	Emperor	282	3701	110	0	112	456
58	Mixed	3853	4115	3281	3617	5833	150
58	Morwong	65	3366	278	83	46	45
58	Nanygai	53	0	14	0	57	0
58	Parrot	1091	3725	84	168	425	270
58	Sweetlip	1710	33923	278	4619	482	4155
59	Bream	4381	1554	44355	305	22802	736
59	Cod	801	3838	1042	663	460	1151
59	Emperor	1234	3198	20	0	1684	342
59	Mixed	6352	4182	2870	543	3900	38
59	Morwong	25	238	314	42	16	78
59	Nanygai	57	4	3	2	219	2
59	Parrot	787	2356	78	81	408	78
59	Sweetlip	3956	37566	152	1631	484	4159
60	Bream	2339	856	11824	165	6857	29
60	Cod	1570	4277	660	429	1185	250
60	Emperor	2444	5340	39	104	106	71
60	Mixed	3516	4369	2413	906	1420	55
60	Morwong	169	1257	0	49	197	7
60	Nanygai	100	1	18	27	190	0
60	Parrot	967	2052	95	126	282	10
60	Sweetlip	5417	41283	256	4978	522	630
61	Bream	2700	1079	14834	1774	9246	332
61	Cod	713	3720	135	378	157	238
61	Emperor	876	4044	5	0	91	74
61	Mixed	5073	2954	3560	100	975	27
61	Morwong	35	158	0	19	0	14
61	Nanygai	0	10	0	2	60	0
61	Parrot	1402	1361	14	186	287	20
61	Sweetlip	1794	19530	59	479	60	504

YEAR	SPECIES	BUNDABERG	GLADSTONE	MARY BOROUGH	ROCK HAMPTON	ROSSLYN BAY	YEPPOON
62	Bream	6203	770	25641	702	15975	640
62	Cod	1754	6010	484	352	309	841
62	Emperor	4185	8519	0	0	293	397
62	Mixed	6913	2820	4255	38	855	50
62	Morwong	171	1010	38	46	14	84
62	Nanygai	45	8	2	0	21	1
62	Parrot	2416	3951	32	129	181	479
62	Sweetlip	4637	35053	137	846	394	2223
63	Bream	6117	1283	40701	691	33643	1352
63	Cod	776	4295	238	686	90	1228
63	Coral trout	423	7352	27	1904	0	1651
63	Emperor	910	4646	3	278	24	510
63	Mixed	5092	3384	7065	26	1042	17
63	Morwong	12	1890	0	32	0	29
63	Nanygai	15	10	48	0	32	0
63	Parrot	1623	1820	543	125	29	457
63	Sweetlip	1343	25282	439	1991	24	6640
64	Bream	8416	1647	38752	13879	27876	870
64	Cod	1751	5697	528	215	150	1195
64	Coral trout	369	9415	27	67	21	1921
64	Emperor	3423	4184	0	0	168	743
64	Mixed	6158	4106	7164	88	1137	163
64	Morwong	110	2	92	27	2	175
64	Nanygai	51	24	0	0	27	335
64	Parrot	1697	2824	248	215	150	1195
64	Sweetlip	2321	30310	15410	231	239	2521
65	Bream	8530	766	39412	13575	14952	681
65	Cod	2610	4068	704	769	322	787
65	Coral trout	1093	18814	20	609	23	1590
65	Emperor	2530	4830	25	227	328	236
65	Mixed	7326	10303	7536	134	835	214
65	Morwong	59	77	103	25	34	141
65	Nanygai	129	10	0	25	234	0
65	Parrot	5632	2569	870	769	322	787
65	Sweetlip	5415	32568	193	1382	781	1530
66	Bream	7490	1045	38485	1586	17664	2739
66	Cod	6014	2510	1274	322	248	829
66	Coral trout	6003	14772	59	335	20	1240
66	Emperor	3605	3344	383	3	222	318
66	Mixed	9306	17792	5095	123	951	221
66	Morwong	101	160	35	11	20	60
66	Nanygai	170	94	12	6	266	0
66	Parrot	5996	1225	1679	123	951	221
66	Sweetlip	8766	24963	2563	1240	324	1673

YEAR	SPECIES	BUNDABERG	GLADSTONE	MARY BOROUGH	ROCK HAMPTON	ROSSLYN BAY	YEPPOON
67	Bream	7540	1085	59304	956	24481	138
67	Cod	8340	870	1112	454	377	665
67	Coral trout	10067	4501	26	343	85	938
67	Emperor	2082	2740	472	35	151	926
67	Mixed	9728	9528	4506	82	1152	21
67	Morwong	25	14	5	16	2	8
67	Nanygai	143	22	50	67	140	7
67	Parrot	3347	1910	720	159	497	137
67	Sweetlip	14038	21938	442	1203	572	919
68	Bream	8923	933	60575	1170	15550	203
68	Cod	5874	386	450	688	504	577
68	Coral trout	5292	2848	0	935	73	350
68	Emperor	1814	1108	261	875	90	609
68	Mixed	9922	7306	4200	20	3280	125
68	Morwong	0	0	0	18	0	0
68	Nanygai	38	0	0	0	40	12
68	Parrot	2448	86	8	231	69	110
68	Sweetlip	9079	6850	230	3566	110	1397
69	Bream	4667	1572	44885	294	12423	188
69	Cod	5040	1885	1260	873	169	927
69	Coral trout	4592	2964	70	1266	28	941
69	Emperor	1795	2330	133	945	107	723
69	Mixed	8831	1275	3235	471	5711	257
69	Morwong	78	118	28	57	0	0
69	Nanygai	26	10	0	9	70	0
69	Parrot	2698	731	606	216	138	42
69	Sweetlip	8355	8433	505	3322	472	1485
70	Bream	9207	1052	33091	417	5135	45
70	Cod	6662	1276	1163	1101	705	647
70	Coral trout	13074	7212	90	9263	27	3238
70	Emperor	2010	1836	115	1493	767	473
70	Mixed	7054	495	1932	490	4006	52
70	Morwong	17	24	7	0	0	0
70	Nanygai	38	20	69	64	3	9
70	Parrot	1516	655	294	100	304	44
70	Sweetlip	26570	13607	1303	9181	1856	2634

YEAR	SPECIES	BUNDABERG	GLADSTONE	MARY BOROUGH	ROCK HAMPTON	ROSSLYN BAY	YEPPOON
71	Bream	9112	1875	35571	303	12237	19
71	Cod	9432	1810	1173	323	828	1102
71	Coral trout	23530	7336	270	6461	1505	621
71	Emperor	5535	1296	230	771	1106	560
71	Mixed	4810	999	2348	221	5212	215
71	Morwong	18	62	0	14	0	30
71	Nanygai	35	16	118	196	115	26
71	Parrot	2879	604	176	123	438	88
71	Sweetlip	40835	9157	489	4573	5674	2437
72	Bream	4194	1338	40168	180	18563	430
72	Cod	8177	1665	396	730	268	1562
72	Coral trout	24534	6426	24	13015	188	960
72	Emperor	1840	1143	66	698	142	943
72	Mixed	6840	1162	1712	393	8806	200
72	Morwong	0	43	0	0	67	8
72	Nanygai	23	27	74	94	23	37
72	Parrot	630	178	58	15	35	127
72	Sweetlip	20247	11408	353	8550	281	2107
73	Bream	6806	1145	34240	121	15441	202
73	Cod	9977	2335	1984	575	478	1646
73	Coral trout	22038	6210	1186	14151	12	3133
73	Emperor	2935	2364	579	104	203	415
73	Mixed	7429	780	1278	105	8007	194
73	Morwong	0	45	0	12	48	2
73	Nanygai	772	19	122	57	113	88
73	Parrot	2745	1186	922	41	67	100
73	Sweetlip	22740	10621	1875	5709	136	2175
74	Bream	9134	1181	29788	113	20741	319
74	Cod	4260	1867	2090	294	196	1982
74	Coral trout	17114	7545	794	8623	561	2526
74	Emperor	2222	3824	916	504	217	1580
74	Mixed	6661	1136	4096	1315	10545	863
74	Morwong	39	105	20	4	2	1
74	Nanygai	0	0	0	0	0	0
74	Parrot	1805	414	2188	59	188	102
74	Sweetlip	25086	12425	3875	2787	341	1789
75	Bream	6554	1503	26542	248	21152	1083
75	Cod	3541	1447	2075	348	265	1851
75	Coral trout	6160	3823	682	14343	9	4286
75	Emperor	3128	2578	2034	1692	354	1823
75	Mixed	6113	986	2766	409	8244	680
75	Morwong	8	29	0	0	42	2

YEAR	SPECIES	BUNDABERG	GLADSTONE	MARY BOROUGH	ROCK HAMPTON	ROSSLYN BAY	YEPPOON
75	Nanygai	0	0	0	0	0	0
75	Parrot	2530	902	1845	25	479	113
75	Sweetlip	18605	16585	5437	4088	340	5919
76	Bream	1893	775	24220	6	12346	771
76	Cod	2053	1120	1631	155	527	2338
76	Coral trout	10982	6351	217	13998	43	6908
76	Emperor	2415	3025	1116	179	274	2728
76	Mixed	4705	942	8428	431	6309	2652
76	Morwong	100	12	101	0	45	0
76	Nanygai	84	54	38	0	0	37
76	Parrot	1369	684	2731	0	287	103
76	Sweetlip	15633	10627	1198	2890	520	8347
77	Bream	8410	554	20848	374	11578	304
77	Cod	4327	2159	1042	311	564	1906
77	Coral trout	6228	11868	245	4511	78	9456
77	Emperor	2548	5891	540	1405	325	1349
77	Mixed	8089	2010	13063	649	8048	1185
77	Morwong	47	27	12	77	136	30
77	Nanygai	338	241	171	33	51	333
77	Parrot	2171	595	533	35	267	81
77	Sweetlip	17422	22227	463	1024	282	2902
78	Bream	2404	286	18472	288	19380	184
78	Cod	2750	2072	954	480	426	1169
78	Coral trout	4410	7831	30	882	8	9177
78	Emperor	2146	3651	183	1689	248	874
78	Mixed	6042	1531	11170	542	10698	1163
78	Morwong	59	81	84	26	7	0
78	Nanygai	473	0	35	2	372	117
78	Parrot	2718	1426	362	63	412	61
78	Sweetlip	6408	17519	70	1523	209	1079
79	Bream	3594	834	25205	862	15807	168
79	Cod	3801	1875	572	778	1437	749
79	Coral trout	3092	12584	159	965	56	4606
79	Emperor	3980	5458	293	358	1488	356
79	Mixed	7074	863	9285	1497	8398	1543
79	Morwong	0	57	0	51	24	2
79	Nanygai	374	20	306	10	611	84
79	Parrot	3095	1692	1483	90	1452	71
79	Sweetlip	7404	26213	824	1016	1378	997
80	Bream	4357	593	26107	862	8938	143
80	Cod	3392	1847	1228	5133	1369	509
80	Coral trout	9463	19942	186	3540	134	103
80	Emperor	4066	3765	754	811	2286	988

YEAR	SPECIES	BUNDABERG	GLADSTONE	MARY BOROUGH	ROCK HAMPTON	ROSSLYN BAY	YEPPOON
80	Mixed	7247	513	15076	3078	6931	488
80	Nanygai	321	0	193	4	862	17
80	Parrot	2252	1575	1060	19	1531	31
80	Sweetlip	9736	31683	605	2412	992	568
81	Bream	4678	876	23112	276	11268	73
81	Cod	4880	1457	789	1348	732	121
81	Coral trout	7572	8485	169	2561	11	438
81	Emperor	3555	2210	576	2061	1177	26
81	Mixed	5686	513	3368	1427	6350	251
81	Morwong	9	22	140	74	0	0
81	Nanygai	678	418	114	67	445	0
81	Parrot	3250	337	873	179	1086	16
81	Sweetlip	11585	9529	461	2660	493	34

APPENDIX B: SPEARFISHING DATA

APPENDIX B1: SPEARFISHING COMPETITIONS BY AREA

Year	No. Comps	No. Men	No. Hours	No. Fish	Total Weight	Mean Wt. per fish		S.D
Cairns								
1969	16		16	0.00	47	112.07	2.380	0.00
1970	43		43	0.00	215	459.10	2.130	0.00
1971	34		34	0.00	183	362.98	1.980	0.00
1972	23		63	0.00	342	639.72	1.870	0.00
1973	17		17	0.00	59	195.25	3.300	0.00
Ayr								
1968	1		13	0.00	19	28.640	1.500	0.00
1969	5		29	0.00	62	186.26	3.000	0.00
1970	3		32	0.00	70	195.27	2.780	0.00
1971	1		17	0.0	49	192.05	3.900	0.00
1972	1		16	0.00	56	213.07	3.800	0.00
Mackay								
1961	0		17	4.00	67	85.11	1.270	0.00
1967	1		54	5.00	329	1081.65	3.380	0.00
1971	5		139	20.00	551	981.81	1.780	0.00
1972	8		0	0.00	396	944.38	2.380	0.00
1973	6		0	0.00	234	701.25	2.990	0.00
1974	4		0	0.00	60	313.26	5.220	0.00
1975	2		85	8.00	393	721.10	1.830	0.00
Bundaberg								
1963	6		44	24.50	213	0.00	0.00	0.00
1964	12		119	48.75	225	308.25	1.37	0.00
1965	4		71	14.00	100	206.00	2.06	0.00
1966	6		23	12.00	5	12.45	2.49	0.00
1967	6		58	17.00	52	102.96	1.98	0.00
1968	10		91	40.00	103	224.54	2.18	0.00
1969	6		57	19.50	80	249.60	3.12	0.00
1970	6		65	24.00	54	103.10	1.91	0.00
1971	7		99	28.00	143	443.30	3.11	0.00
1972	4		34	8.00	54	112.32	2.08	0.00
Bundaberg Non-Competitive results								
Lady Musgrave island								
1974	14		56	36.00	88	148.04	1.68	0.00
Tryon Island								
1974	27		27	44.75	45	72.15	1.64	0.00

APPENDIX B1: CONTINUED

Year	Fish /man	Fish S.D.	Fish /M/Hr	Fish S.D.	Kg /man	Kg S.D.	Kg M/Hr	Kg S.D.
Cairns								
1969	2.94	2.30	0.00	0.00	7.000	8.59	0.00	0.00
1970	6.30	5.85	0.00	0.00	10.68	6.07	0.00	0.00
1971	6.32	5.76	0.00	0.00	10.68	10.07	0.00	0.00
1972	4.63	1.97	6.10	0.00	6.99	2.24	6.92	0.00
1973	7.74	2.49	0.00	0.00	11.00	2.74	0.00	0.00
Ayr								
1968	1.46	0.00	0.00	0.00	2.20	0.00	0.00	0.00
1969	2.35	1.69	0.00	0.00	6.51	1.91	0.00	0.00
1970	2.10	0.46	0.00	0.00	5.72	2.53	0.00	0.00
1971	2.88	0.00	0.00	0.00	11.30	0.00	0.00	0.00
1972	3.50	0.00	0.00	0.00	13.32	0.00	0.00	0.00
Mackay								
1961	3.90	0.00	0.99	0.00	5.00	0.00	1.25	0.00
1967	6.10	0.00	1.22	0.00	20.0	0.00	4.00	0.00
1971	4.70	2.10	1.20	0.54	8.03	3.70	2.01	0.93
1972	4.42	2.48	0.00	0.00	6.69	3.63	0.00	0.00
1973	3.87	2.27	0.00	0.00	11.05	2.70	0.00	0.00
1974	0.76	0.19	0.00	0.00	7.00	0.00	0.00	0.00
1975	5.10	1.50	3.69	2.90	5.74	1.04	0.00	0.00
Bundaberg								
1963	2.00	0.00	0.50	0.45	4.60	0.00	2.30	6.96
1964	2.00	0.00	0.50	0.47	1.26	0.00	0.63	1.38
1965	1.00	0.00	0.29	0.30	3.00	0.00	0.87	1.58
1966	0.20	0.00	0.06	0.00	0.40	0.00	0.20	0.004
1967	0.60	0.00	0.23	0.10	1.48	0.00	0.53	0.60
1968	1.52	0.00	0.38	0.29	3.76	0.00	0.94	2.50
1969	1.23	0.00	0.38	0.31	3.64	0.00	1.12	2.40
1970	2.16	0.00	0.54	0.42	2.36	0.00	0.59	0.95
1971	3.20	0.00	0.80	0.92	5.88	0.00	1.47	3.10
1972	3.90	0.00	1.97	2.40	11.2	0.00	5.68	15.3
Bundaberg Non-Competitive results								
Lady Musgrave Island								
1974	1.100	0.000	0.440	0.330	2.750	0.000	1.020	0.650
Tryon Island								
1974	1.760	0.000	1.100	0.640	2.810	0.000	1.740	1.640

APPENDIX B2: COMMONLY SPEARED FISH BY AREA

Year	Species	Total Weight	Number of Fish	Mean Wt./F	S.D.
Ayr					
1969	Coral trout	75.29	18	4.18	3.50
1970	Coral trout	38.83	15	2.59	0.97
1971	Coral trout	43.82	11	3.98	3.98
1972	Coral trout	42.50	13	3.27	0.86
1973	Coral trout	33.53	11	3.05	1.36
1969	Netted Sweetlip	5.51	2	2.71	1.30
1973	Netted Sweetlip	10.01	3	3.34	1.25
1969	Painted Sweetlip	14.82	5	2.97	0.96
1970	Painted Sweetlip	10.48	5	2.10	0.70
1971	Painted Sweetlip	6.25	2	3.10	0.05
1972	Painted Sweetlip	15.68	5	3.14	0.48
1970	Sweetlip Emperor	24.59	11	2.24	0.50
1971	Sweetlip Emperor	17.16	5	3.43	2.50
Mackay					
1967	Coral trout	250.5	79	3.17	5.45
1971	Coral trout	71.94	26	2.77	1.30
1974	Coral trout	56.29	19	2.96	1.37
1975	Coral trout	66.96	45	1.39	0.91
1974	Netted Sweetlip	37.48	27	1.39	0.43
1975	Netted Sweetlip	11.00	6	1.83	0.26
1967	Painted Sweetlip	227.5	57	3.99	3.10
1974	Painted Sweetlip	12.15	3	4.05	4.04
1975	Painted Sweetlip	73.60	34	2.16	0.55
1971	Manylined Sweetlip	49.65	35	1.42	0.14
1975	Brown Sweetlip	53.80	13	4.13	2.10
Bundaberg					
1966	Coral trout	12.15	6	2.01	0.43
1967	Coral trout	8.06	4	2.02	0.53
1971	Coral trout	71.19	20	3.56	2.63
1972	Coraltrout	10.46	4	2.62	1.03
1978	Coral trout	44.75	23	2.51	1.05
1967	Netted Sweetlip	2.61	3	0.81	0.27
1968	Netted Sweetlip	19.07	19	1.10	0.44
1969	Netted Sweetlip	12.25	9	1.36	0.96
1970	Netted Sweetlip	10.52	10	1.05	0.32
1971	Netted Sweetlip	9.56	7	1.37	1.36
1978	Netted Sweetlip	30.02	24	1.25	0.27

APPENDIX B1: CONTINUED

Year	Species	Total Weight	Number of Fish	Mean Wt./F	S.D.
1967	Painted Sweetlip	7.87	3	2.94	0.70
1968	Painted Sweetlip	15.39	12	1.28	0.39
1971	Painted Sweetlip	18.03	9	2.00	0.48
1972	Painted Sweetlip	24.13	12	2.01	0.73
1978	Painted Sweetlip	53.72	23	2.34	1.21

APPENDIX C: CHARTERBOAT DATA

APPENDIX C1: CATCHES OF REEF FISH BY CHARTER BOATS BY HOME PORT.

NAME	TOTAL FISH	TOTAL WEIGHT	VISIT DAYS	FISH DAYS	FISH /LOC	FISH /DAY	KG /FISH	KG /DAY
NORTHERN FISHERIES SECTION								
PORT DOUGLAS								
Aurora	0	1000	0	2500	2	0.0	0.00	0.40
Bluefin	0	0	0	385	2	0.00	0.0	0.00
Bubbles	1600	0	0	935	2	1.71	0.00	0.00
Reefer	0	0	0	0	2	0.00	0.00	0.00
CAIRNS								
Bali-hai	0	1400	1000	0	2	0.00	0.00	0.00
Betelgeuse	0	0	360	280	2	0.00	0.00	0.00
Billfish	0	0	0	216	2	0.00	0.00	0.00
Capstan	180	120	0	90	2	2.00	1.50	1.33
Ellie	550	0	200	0	2	0.00	0.00	0.00
Esperance star	0	6000	0	648	2	0.00	0.00	9.26
Kalimah	0	0	0	260	2	0.00	0.00	0.00
Nancey E	2400	0	0	800	2	3.00	0.00	0.00
Predator	0	0	0	0	2	0.00	0.00	0.00
Princess charlotte	720	0	0	33	2	21.82	0.00	0.00
Seababy	0	0	0	60	2	0.00	0.00	0.00
Seastar	2600	5500	4995	0	2	0.00	0.47	0.00
Wavelength	1000	2700	350	0	2	0.00	0.37	0.00
INNISFAIL								
Flemingo	0	3000	672	588	23	0.00	0.00	5.10
Forth	0	2000	799	537	2	0.00	0.00	3.72
Toranna	0	640	0	160	23	0.00	0.00	4.00

NAME	TOTAL FISH	TOTAL WEIGHT	VISIT DAYS	FISH DAYS	FISH /LOC	FISH /DAY	KG /FISH	KG /DAY
CENTRAL FISHERIES SECTION								
MISSION BEACH-LUCINDA								
Orpheus	1900	1300	0	0	3	0.00	1.46	0.00
Friendship	6000	7000	0	0	3	0.00	0.86	0.00
Pegasus	3600	900	400	380	3	9.47	4.00	2.37
TOWNSVILLE								
Alpha centauri	2160	6800	0	540	3	4.00	0.32	12.59
Amaroo	1400	0	0	200	3	7.00	0.00	0.00
Canute	500	0	200	140	3	3.57	0.00	0.00
Coralprincess	4600	11400	2820	370	3	12.43	0.40	30.81
Empress	1200	2400	0	500	3	2.40	0.50	4.80
Isa lei	0	9700	0	650	3	0.00	0.00	14.92
Jac-kel	6400	16000	0	640	3	10.00	0.40	25.00
Kalinda	3100	5600	0	840	3	3.69	0.55	6.67
Kurrakajarra	3400	6700	650	650	3	5.23	0.51	10.31
Reef adventure	15150	38400	1080	970	3	15.62	0.39	39.59
Sea safari	0	0	0	0	3	0.00	0.00	0.00
Sharmaloo	0	2000	0	830	3	0.00	0.00	2.41
Tuffnut	0	2100	0	240	3	0.00	0.00	8.75
BOWEN								
Arabesque	60	140	130	0	3	0.00	0.43	0.00
Ben lomond	1800	3000	2860	280	3	6.43	0.60	10.71
AIRLIE BEACH/ SHUTE HARBOUR								
Checkmate	4600	11400	6190	0	3	0.00	0.40	0.00
Escape	0	0	7690	1500	3	0.00	0.00	0.00
Gamefisher	1100	3750	1850	315	3	3.49	0.29	11.90
June	0	0	0	0	0	0.00	0.00	0.00
Jillian	0	0	0	0	0	0.00	0.00	0.00
Kc cat	1400	0	300	240	3	5.83	0.00	0.00
Paladin	7800	0	4030	2350	3	3.32	0.00	0.00
Rapscallion	540	750	0	60	3	9.00	0.72	12.50
Sea safari	0	0	0	0	0	0.00	0.00	0.00
Sunbird	0	11000	0	0	3	0.00	0.00	0.00
Tanguigue	0	0	0	0	0	0.00	0.00	0.00
Triton	1400	2000	5000	0	3	0.00	0.70	0.00
Utopia	100	150	120	0	3	0.00	0.67	0.00

NAME	TOTAL FISH	TOTAL WEIGHT	VISIT DAYS	FISH DAYS	FISH /LOC	FISH /DAY	KG /FISH	KG /DAY
CAPRICORNIA FISHERIES SECTION								
MACKAY								
Sea venture	6700	9000	200	0	3	0.00	0.74	0.00
Wyllaway	0	0	0	0	0	0.00	0.00	0.00
GLADSTONE								
Androse	0	0	0	0	4	0.00	0.00	0.00
Australiana	0	900	3200	0	4	0.00	0.00	0.00
Capricornstar	0	7100	2180	1960	4	0.00	0.00	3.62
Marlin	0	0	0	0	0	0.00	0.00	0.00
Norlaus	0	170	350	100	5	0.00	0.00	1.70
Norval	0	0	0	0	0	0.00	0.00	0.00
Pearlbay	0	5560	1800	1500	45	0.00	0.00	3.71
Pentana	0	0	0	0	0	0.00	0.00	0.00
Renegade	0	2100	0	250	4	0.00	0.00	8.40
Rigel kent	0	270	0	76	4	0.00	0.00	3.55
Rumrunner	0	0	0	0	0	0.00	0.00	0.00
Seabranzer	8200	11150	0	356	45	23.03	0.74	31.32
Tropicrover	0	0	0	0	0	0.00	0.00	0.00
ROSSLYN BAY								
Murphystar	0	14000	1740	1500	45	0.00	0.00	9.33
Newmoon	0	2400	0	18	45	0.00	0.00	133.3
BUNDABERG								
Adori	0	1120	270	150	5	0.00	0.00	7.47
Magnum	0	3500	390	290	5	0.00	0.00	12.07
Pedro	0	900	150	75	5	0.00	0.00	12.00
Reliance	0	3360	2100	0	5	0.00	0.00	0.00