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*New Zealand Fisheries Assessment Research Document 89/8*

# Flatfish fishery assessment 1989

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This series documents the scientific basis for stock assessments and fisheries management advice in New Zealand. It addresses the issues of the day in the current legislative context and in the time frames required. The documents it contains are not intended as definitive statements on the subjects addressed but rather as progress reports on ongoing investigations.

# FLATFISH FISHERY ASSESSMENT 1989

P.D.Kirk

## 1. INTRODUCTION

Flatfish ITQ provides for the landing of eight species of flatfish. These are: the yellow–belly flounder *Rhombosolea leporina*; sand flounder *Rhombosolea plebeia*; black flounder *Rhombosolea retiaria*; greenback flounder *Rhombosolea tapirina*; lemon sole *Pelotretis flavilatus*; New Zealand sole *Peltorhamphus novaezeelandiae*; brill *Colistium guntheri*, and turbot *Colistium nudipinnis*. For management purposes landings of these species are combined.

MCY for the 1988–89 fishing year was estimated at 2400t for the New Zealand commercial fishery as a whole (Kirk, 1988). MCY was based on reported catch during the period 1977-82 multiplied by c = 0.7. Yield was subsequently pro–rated to each Quota Management Area (QMA) on the basis of current TAC allocations.

It is now considered more appropriate to calculate MCY for the combined 'flatfish fishery' found within each QMA.

## 2. REVIEW OF THE FISHERY

### 2.1 Catch, landings, and effort data

Total Allowable Catch (TAC) limits have purposely been set at high levels to provide established flatfish fishers with the flexibility to take advantage of years of high flatfish abundance and were not established to directly control the rate of flatfish exploitation. Because TACs are set at high levels, they are generally not expected to be caught each year.

Reported catch by QMA is shown in Table 1. Flatfish catches have fallen short of gazetted TACs in all QMAs since the 1983–84 fishing year (except QMAs 1 & 9 in 1983–84). However, catches increased during the 1987–88 fishing year, particularly in QMAs 3 & 4 (South East/Southland) and QMA 7 (Challenger).

Table 1. Reported landings (t) from 1983–84 to 1987–88 and gazetted and actual TACs for 1987–88

| QMA | | Reported Landings 1983-84* | 1984-85* | 1985-85* | 1986-87† | 1987-88† | Gazetted TAC | Actual TAC |
|---|---|---|---|---|---|---|---|---|
| Auckland | 1 & 9 | 1215 | 1050 | 722 | 629 | 688 | 1100 | 1145 |
| Central | 2 & 8 | 378 | 285 | 261 | 323 | 374 | 670 | 677 |
| Challenger | 7 | 1486 | 951 | 385 | 563 | 1000 | 1840 | 1899 |
| South-East, Southland, & Sub-Antarctic combined | 3,4,5 & 6 | 1564 | 1803 | 1537 | 1235 | 2010 | 2430 | 2535 |
| Kermadec | 10 | 0 | 0 | 0 | 0 | 0 | 10 | 10 |
| National Total§ | | 5160 | 4467 | 3215 | 2750‡ | 4072 | 6050 | 6256 |

* FSU data.
† QMS data.
‡ Includes 11t Turbot, area unknown but allocated to QMA 7.
§ Includes data for area unknown.

Total monthly catches (all methods) and the number of boats reporting catch to the Fisheries Statistics Unit (FSU), are shown for important fishing areas for the period October 1983–September 1988 in Fig 1. Monthly landings recorded during the 1987–88 fishing year are incomplete due to fewer fishers completing fishing returns and all the data not being

entered into the FSU database. This is especially true of the last three months of the fishing year (July–September).

Catch per unit effort (CPUE) has been monitored in ten important flatfish fisheries over the period October 1983–September 1988 (Fig 2). In the Auckland FMA, set net CPUE (catch/day fished) was monitored in three fisheries: Manukau Harbour, Kaipara Harbour, and in the Firth of Thames. In the Central North FMA, single trawl CPUE was monitored in Hawke Bay. In the Challenger FMA, single trawl CPUE was monitored in Tasman/Golden Bay. In the South–East and Southern FMAs, single trawl CPUE was monitored in four fisheries: Pegasus Bay, Canterbury Bight, Otago, and Southland.

Although catches in most areas declined to a low point during the 1986–87 fishing year (before increasing again in 1987–88), seasonal CPUE has remained reasonably stable over the period October 1983–September 1988. One exception is the Hawke Bay fishery, where CPUE has consistently declined over this period.

## 3. RESEARCH

### 3.1 Estimation of Maximum Constant Yield (MCY)

MCY was estimated using the equation, MCY = $cY_{av}$ (Method 6 of McKoy, 1988). $Y_{av}$ is the average reported catch over the period October 1983 to September 1988, and c = 0.7. Flatfish catches have fallen short of gazetted TACs in all QMAs since the 1983–84 fishing year (except QMAs 1 & 9 in 1983–84). TACs have therefore not restricted catch levels, and the fishery can be considered an 'open' fishery. It is assumed that by–catch has not restricted target fishing in flatfish fisheries. The MCY estimated for each QMA using this method is given in Table 2. These estimates of MCY are based on recently reported landings during a period of declining effort and are therefore likely to be conservative.

Table 2. Estimates of MCY (t) by QMA

| QMA | | MCY |
|---|---|---|
| Auckland | 1 & 9 | 603 |
| Central | 2 & 8 | 227 |
| Challenger | 7 | 612 |
| South-East, Southland & Sub-Antarctic combined | 3,4,5,& 6 | 1141 |
| Kermadec | 10 | - |
| National Total | | 2583 |

Recruitment of juvenile flatfish to the adult stock is highly variable from year to year. Because the adult populations generally consist of only one or two year classes at any time, the size of the populations depend heavily on the strength of the recruiting year class and are therefore highly variable. Fluctuations in seasonal CPUE are more likely to reflect variations in recruitment success, rather than the effect of fishing mortality on annual biomass. Catches may therefore fall below MCY in some years as a result of poor recruitment.

### 3.2 Estimation of Current Annual Yield (CAY)

No estimate of current annual yield is available for flatfish stocks.

## 4. MANAGEMENT IMPLICATIONS

In theory fishers stop target fishing for flatfish when they run out of quota for associated by–catch species. For a variety of reasons many do not. Some fishers in this situation point to their still largely uncaught flatfish quotas as a reason to continue target fishing, regardless of by–catch. This is a problem particularly with multi–species trawl fisheries. The high TACs set for species like flatfish, whose availability is highly variable, provides an incentive to maximise target catch regardless of how much by–catch quota is held. In some cases the productivity of by–catch species may be threatened if their TACs are exceeded.

Flatfish were included in the catch/quota trade–off scheme operating during the 1987–88 fishing year in QMAs 3 & 4 (South East/Southland) and QMA 7 (Challenger). The amount of flatfish quota leased back to the Crown in exchange for by–catch retained was 60.4 t in QMAs 3 & 4, and 362.0 t in QMA 7 (QMS data). In QMA 7 this was principally to cover the gurnard by–catch.

## 5. REFERENCES

Kirk P. D. 1988. Flatfish. New Zealand Fisheries Assessment Research Document 88/13. MAFFish, N.Z. Ministry of Agriculture and Fisheries (discussion paper, held in Fisheries Research Centre Library, Wellington).

McKoy J. L. (Comp.) 1988. Report From The Fishery Assessment Meeting April–May 1988. MAFFish, N.Z. Ministry of Agriculture and Fisheries (discussion paper, held in Fisheries Research Centre Library, Wellington).

## FIGURE CAPTIONS

Fig. 1. Total monthly catch (all methods) and the number of boats reporting catch to the Fisheries Statistics Unit (FSU) in ten important flatfish fisheries from October 1983 to September 1988. Numbers are fishing return statistical area numbers.

Fig. 2. Catch per unit effort (catch in kg/per day)in ten important flatfish fisheries from October 1983 to September 1988. Numbers are fishing return statistical area numbers.

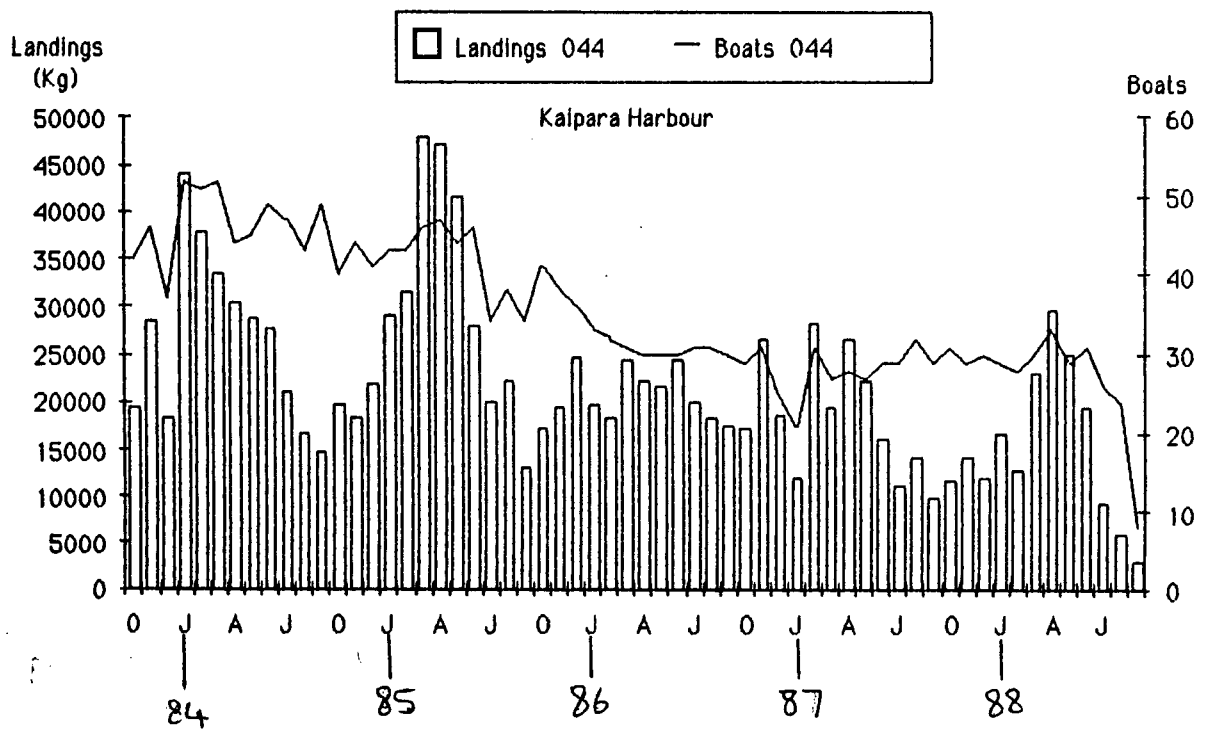

Landings 044
Boats 044
Landings (Kg)
Boats
Kaipara Harbour
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
60
50
40
30
20
10
0
O J A J O J A J O J A J O J A J O J A J
84
85
86
87
88

Fig. 1a

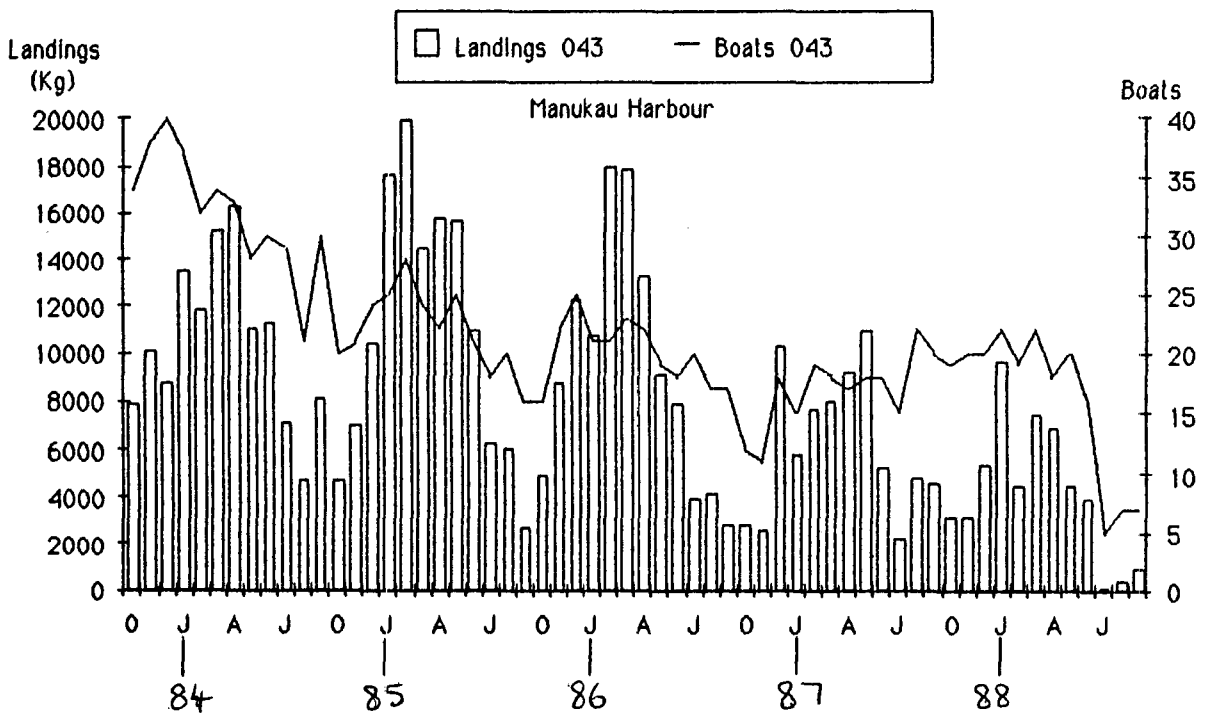

Landings 043
Boats 043
Landings (Kg)
Manukau Harbour
Boats
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
40
35
30
25
20
15
10
5
0
O J A J O J A J O J A J O J A J O J A J
84
85
86
87
88

Fig. 1b

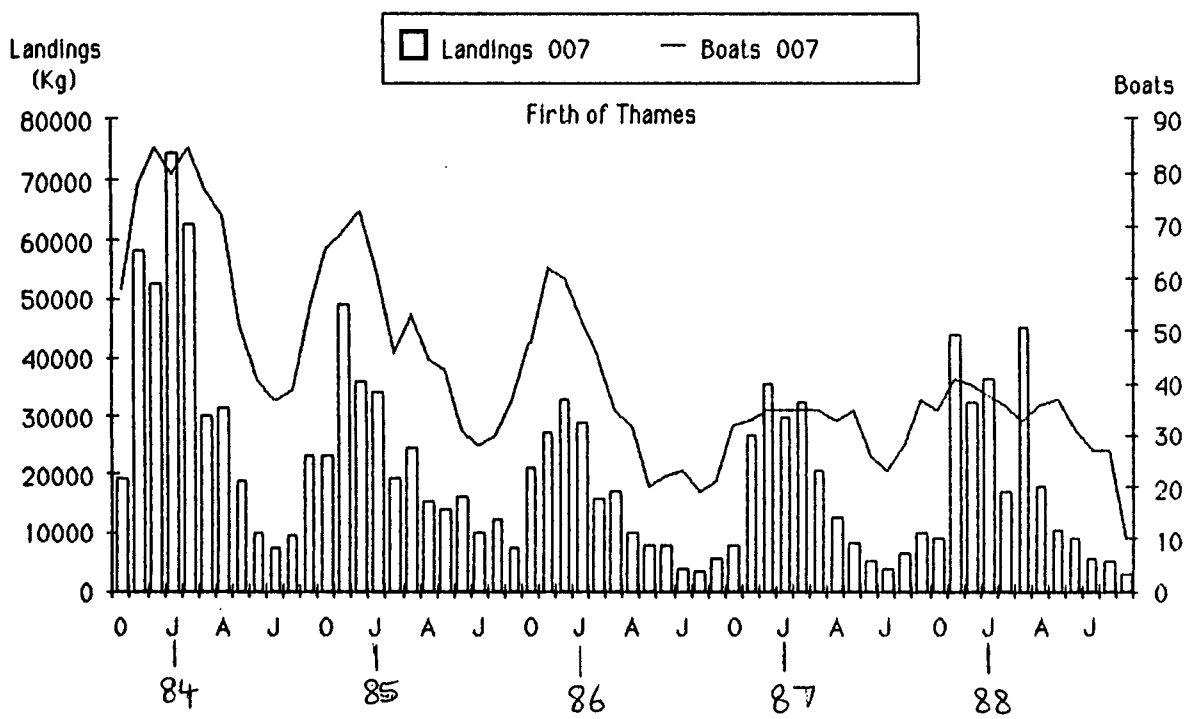

Landings 007
Boats 007
Landings (Kg)
Boats
Firth of Thames
80000
70000
60000
50000
40000
30000
20000
10000
0
90
80
70
60
50
40
30
20
10
0
O J A J O J A J O J A J O J A J O J A J
84
85
86
87
88

Fig. 1C

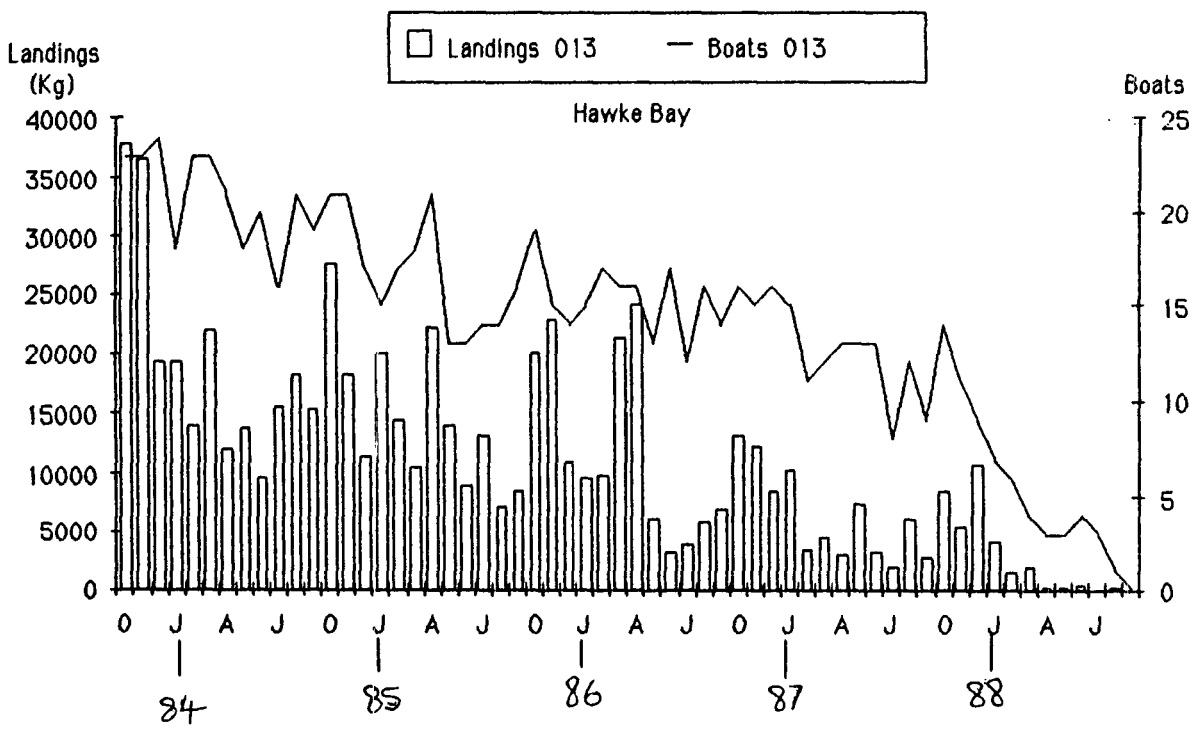

Landings 013
Boats 013
Landings (Kg)
Boats
Hawke Bay
40000
35000
30000
25000
20000
15000
10000
5000
0
25
20
15
10
5
0
O J A J O J A J O J A J O J A J O J A J
84
85
86
87
88

Fig. 1d

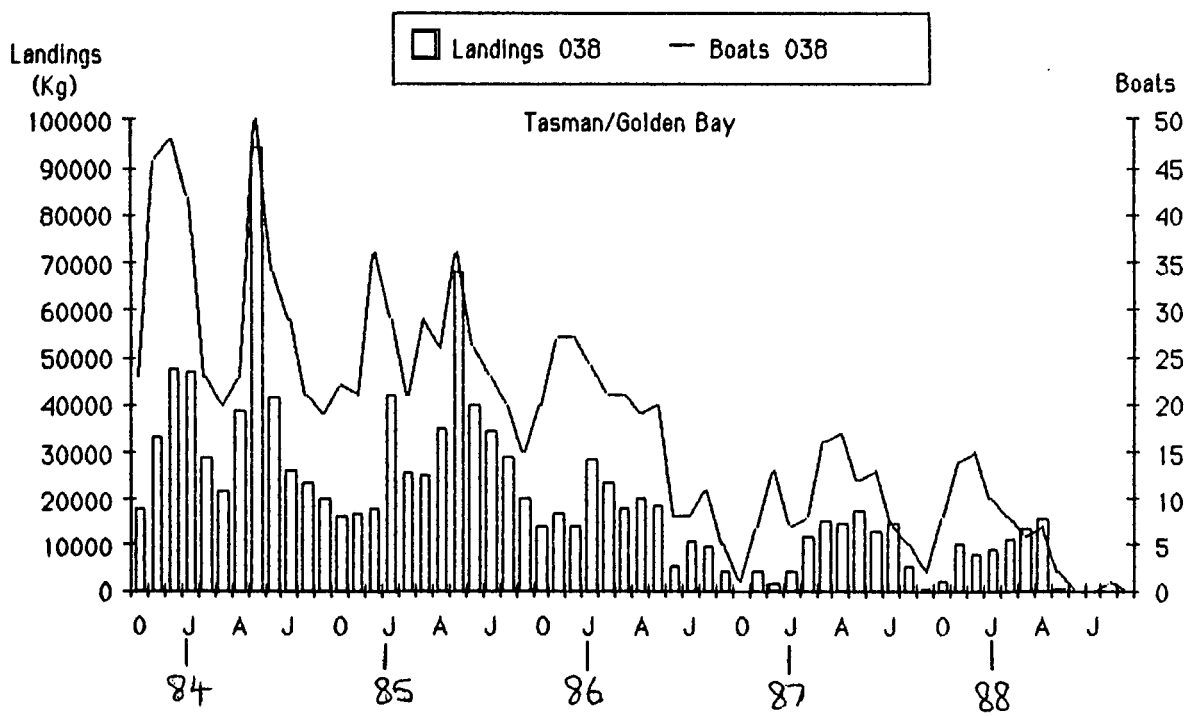

Landings 038
Boats 038
Landings
(Kg)
Boats
Tasman/Golden Bay
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
50
45
40
35
30
25
20
15
10
5
0
O J A J O J A J O J A J O J A J O J A J
84
85
86
87
88

Fig. 1e

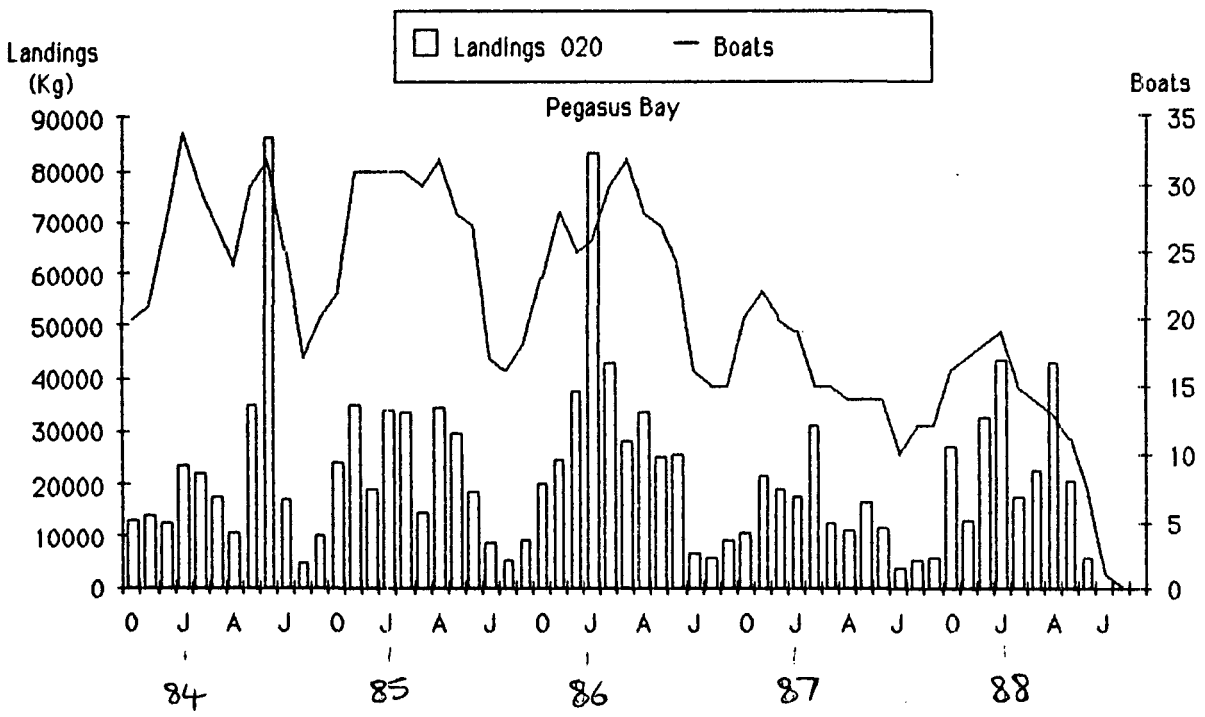

Landings 020
Boats
Landings
(Kg)
Pegasus Bay
Boats
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
35
30
25
20
15
10
5
0
O J A J O J A J O J A J O J A J O J A J
84
85
86
87
88

Fig. 1f

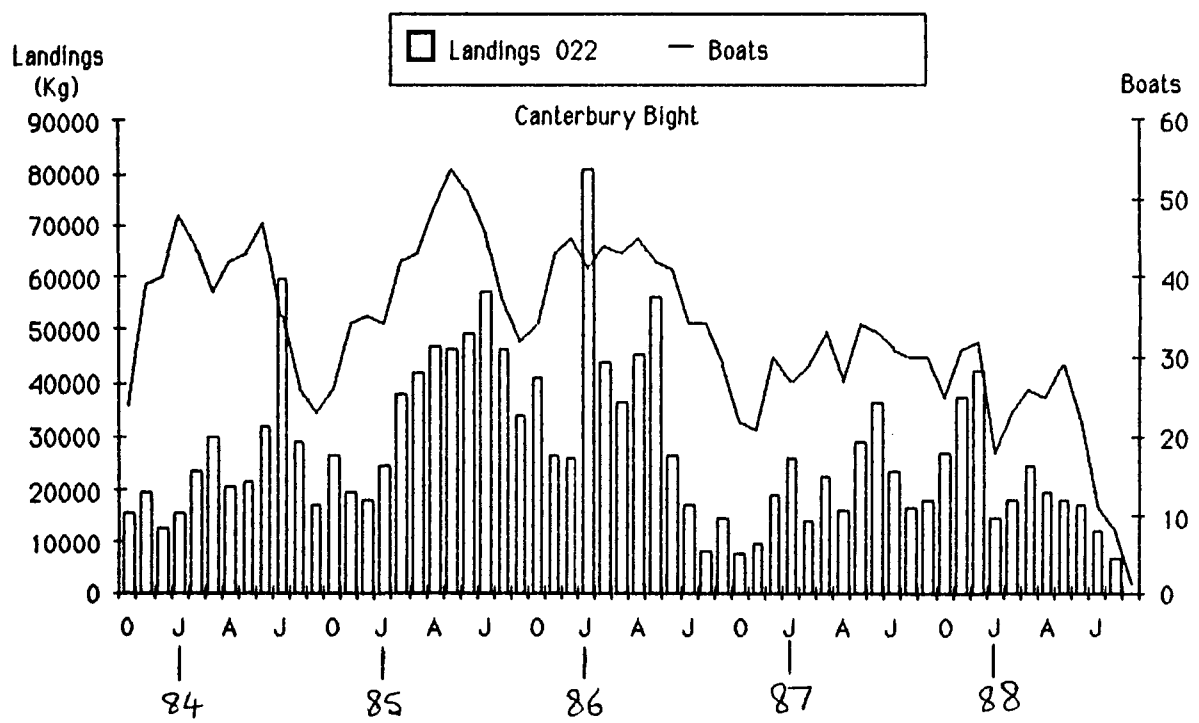

Landings 022
Boats
Landings
(Kg)
Boats
Canterbury Bight
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
60
50
40
30
20
10
0
O J A J O J A J O J A J O J A J O J A J
84
85
86
87
88

Fig. 1g

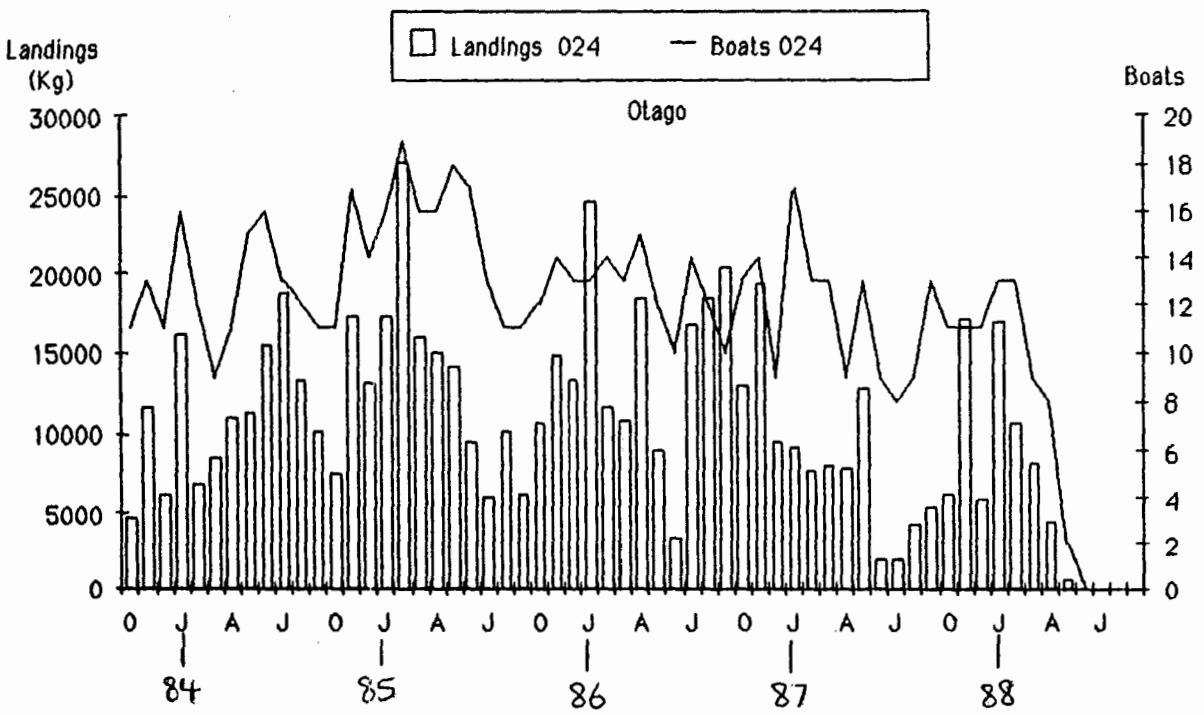

Landings 024
Boats 024
Landings (Kg)
Boats
Otago
30000
25000
20000
15000
10000
5000
0
20
18
16
14
12
10
8
6
4
2
0
O J A J O J A J O J A J O J A J O J A J
84
85
86
87
88

Fig. 1h

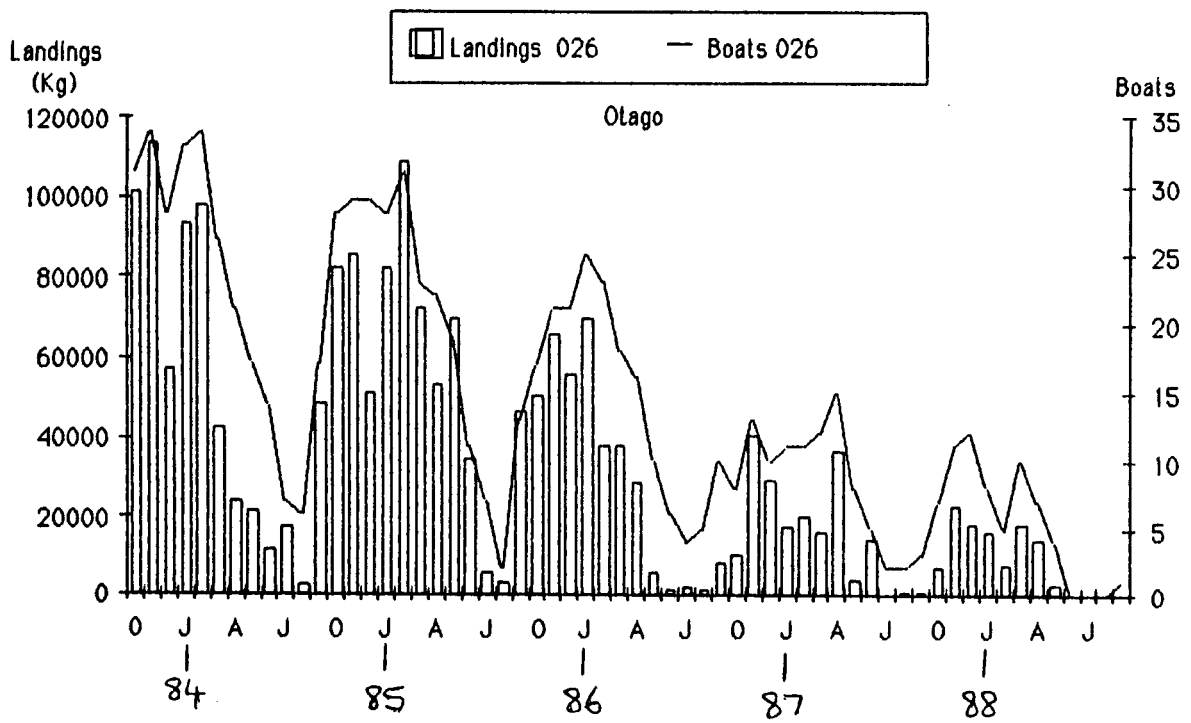

Landings 026
Boats 026
Landings (Kg)
Otago
Boats
120000
100000
80000
60000
40000
20000
0
35
30
25
20
15
10
5
0
O J A J O J A J O J A J O J A J O J A J
84
85
86
87
88

Fig. 11

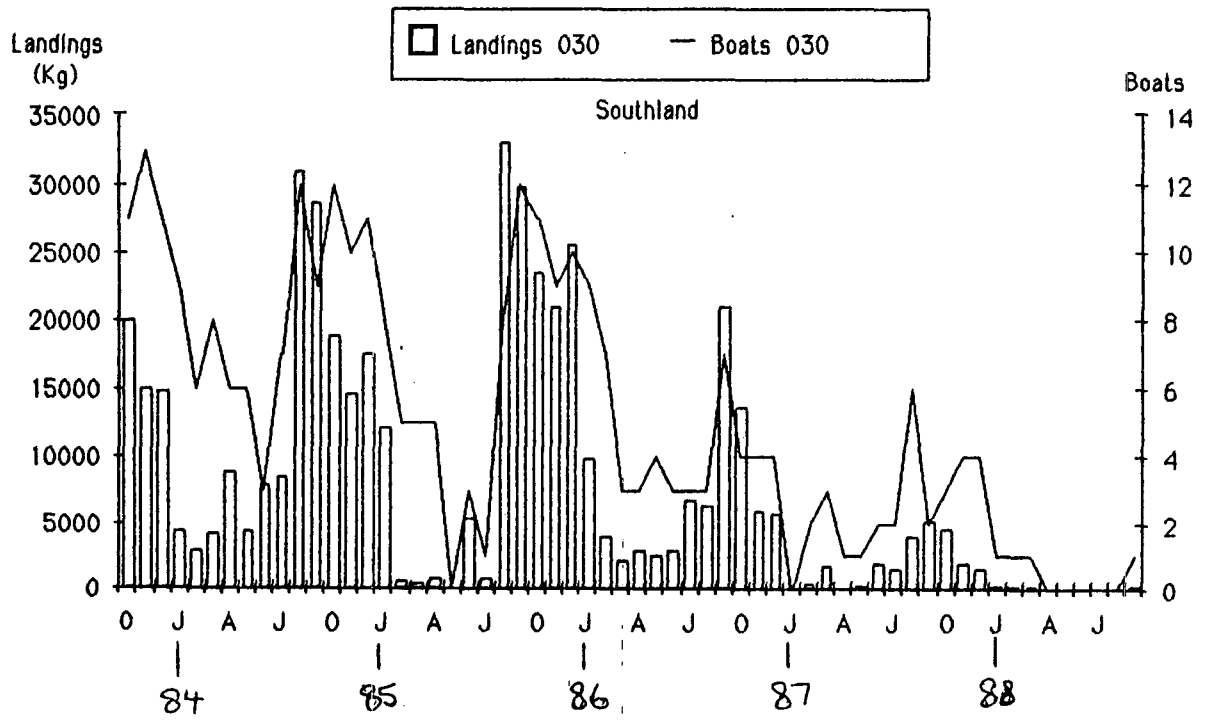

Landings 030
Boats 030
Landings (Kg)
Boats
Southland
35000
30000
25000
20000
15000
10000
5000
0
14
12
10
8
6
4
2
0
O J A J O J A J O J A J O J A J O J A J
84
85
86
87
88

Fig. 1j

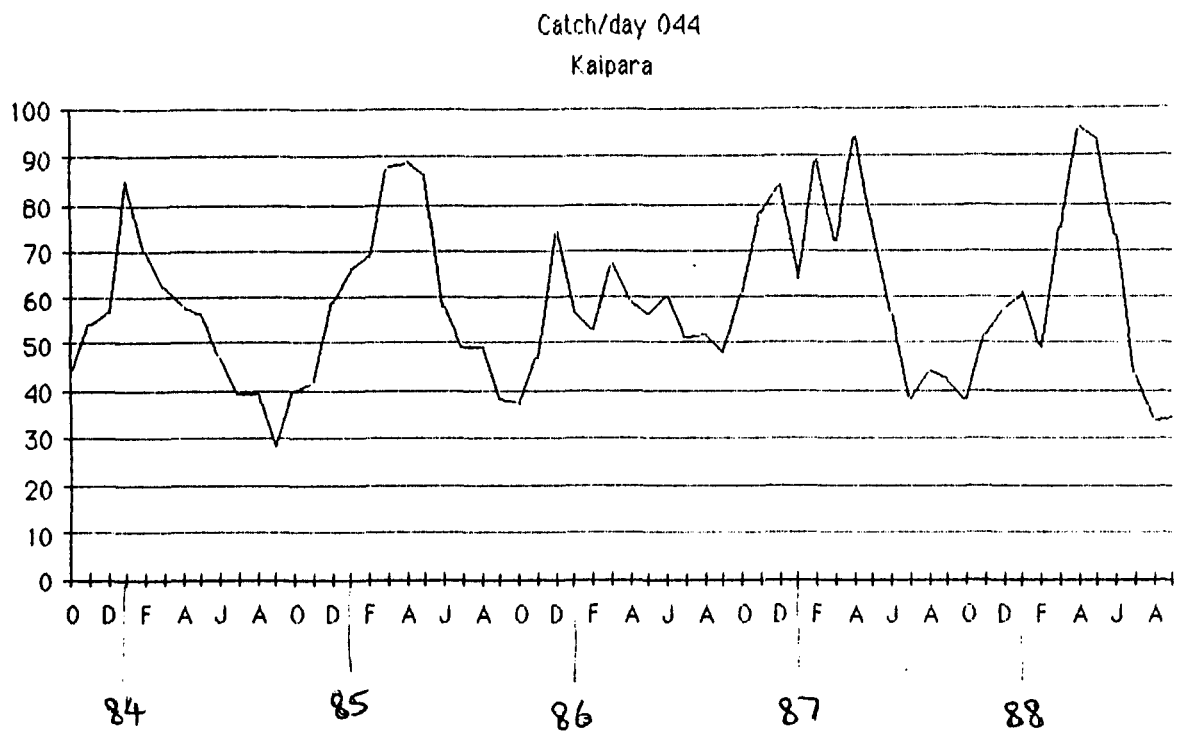
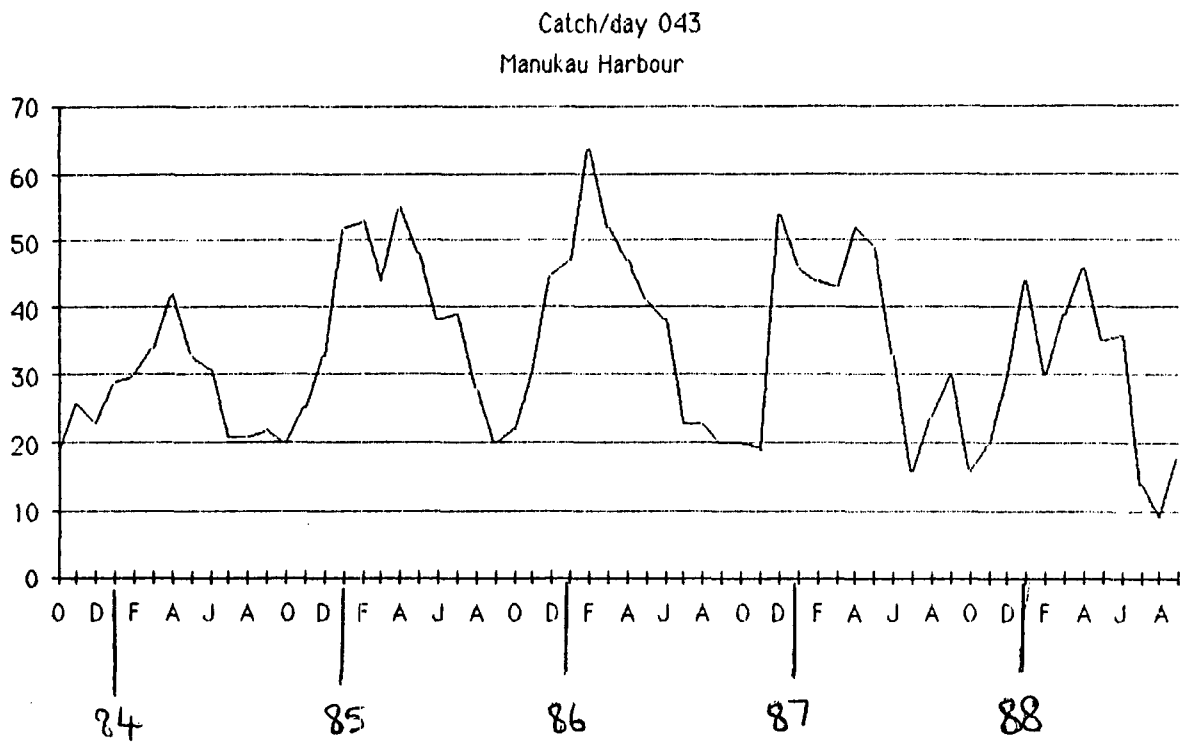

Catch/day 044
Kaipara
100
90
80
70
60
50
40
30
20
10
0
O D F A J A O D F A J A O D F A J A O D F A J A O D F A J A
84
85
86
87
88

Fig. 2a


Catch/day 043
Manukau Harbour
70
60
50
40
30
20
10
0
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84
85
86
87
88

Fig. 2b

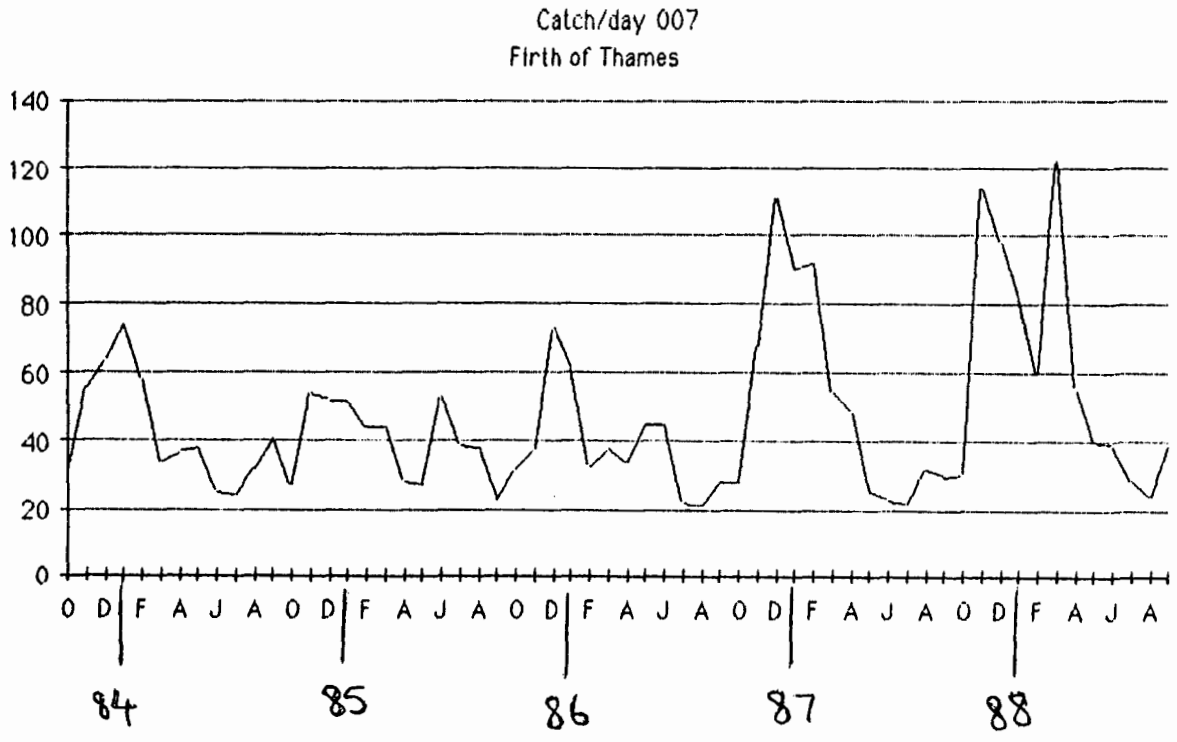
Catch/day 007
Firth of Thames
140
120
100
80
60
40
20
0
O D F A J A O D F A J A O D F A J A O D F A J A O D F A J A O D F A J A
84
85
86
87
88

Fig. 2c

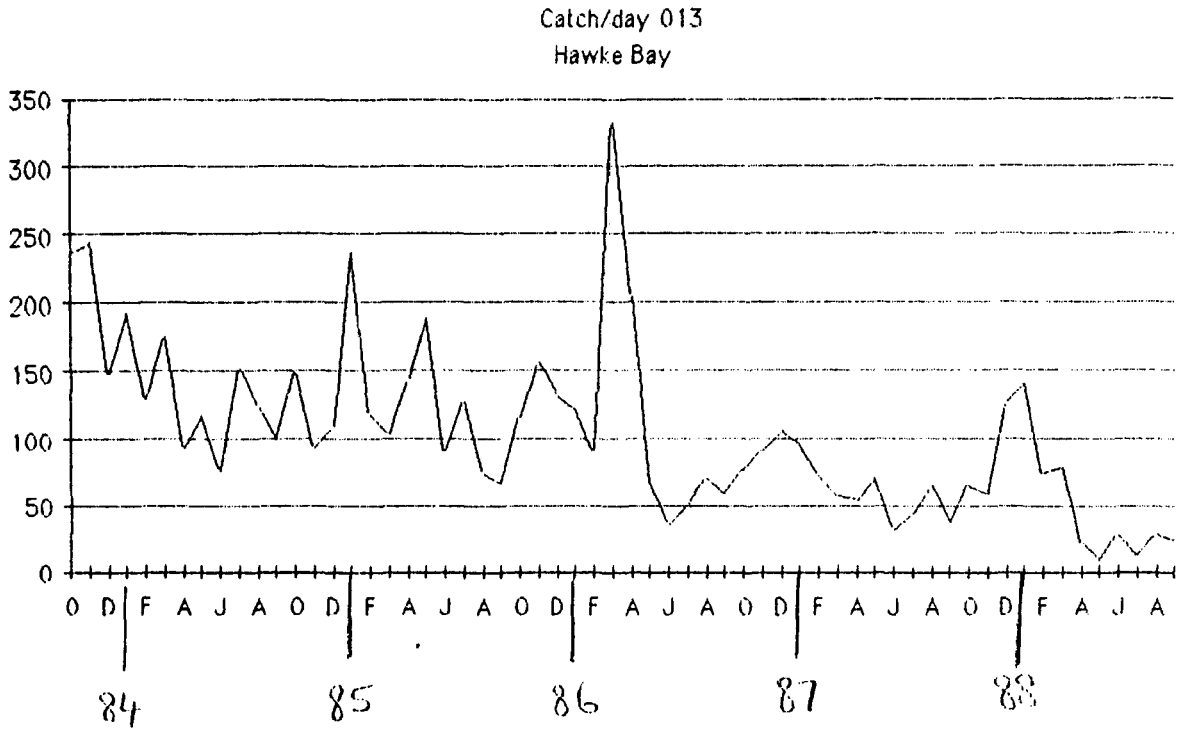
Catch/day 013
Hawke Bay
350
300
250
200
150
100
50
0
O D F A J A O D F A J A O D F A J A O D F A J A O D F A J A O D F A J A
84
85
86
87
88

Fig. 2d

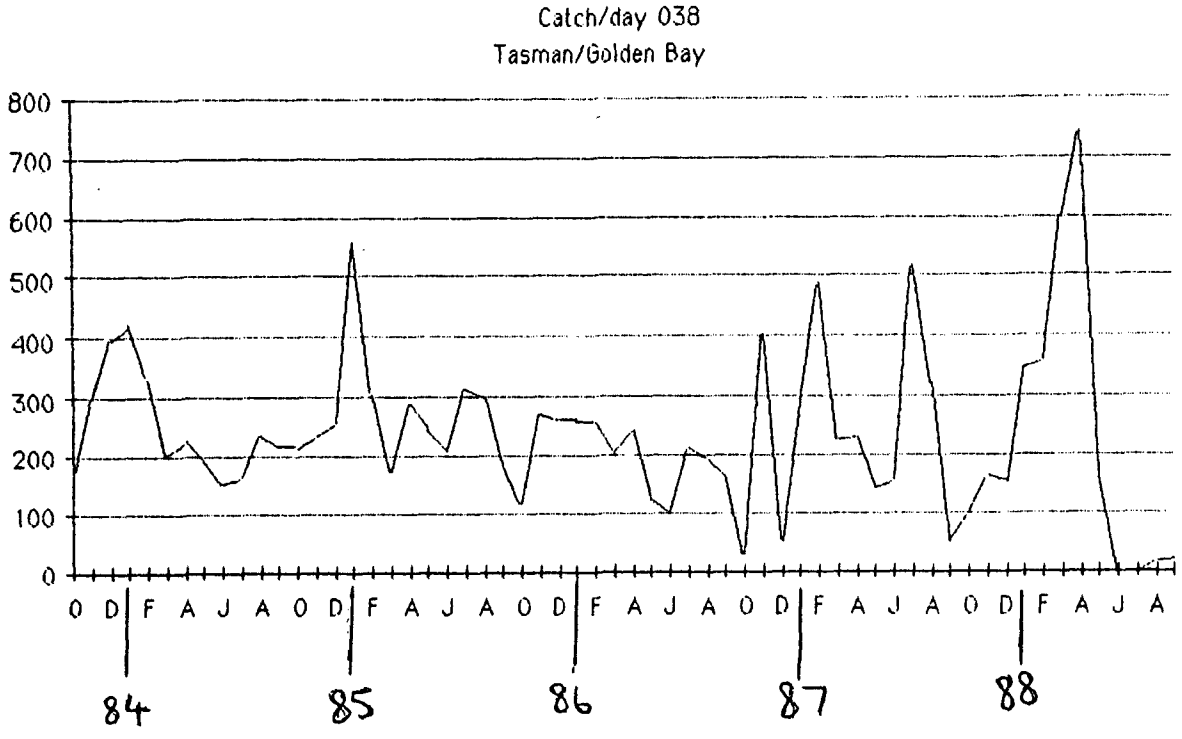
Catch/day 038
Tasman/Golden Bay
800
700
600
500
400
300
200
100
0
O D F A J A O D F A J A O D F A J A O D F A J A O D F A J A
84
85
86
87
88

Fig. 2e

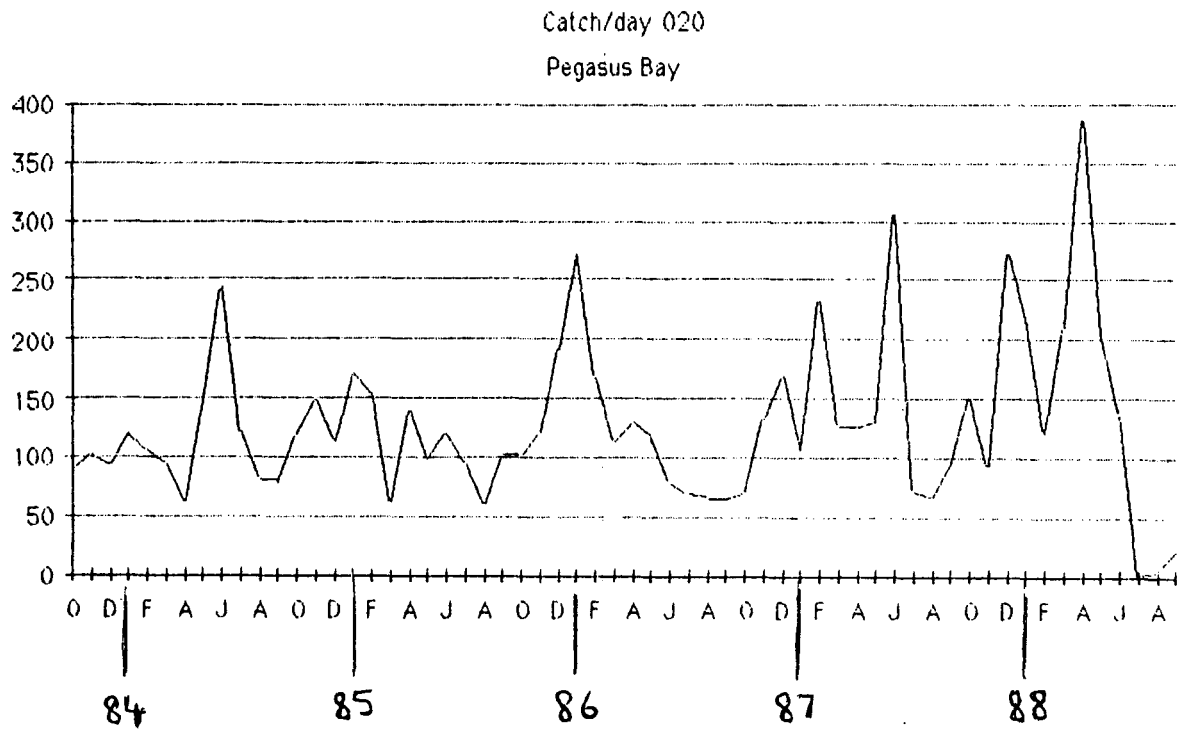
Catch/day 020
Pegasus Bay
400
350
300
250
200
150
100
50
0
O D F A J A O D F A J A O D F A J A O D F A J A O D F A J A O D F A J A
84
85
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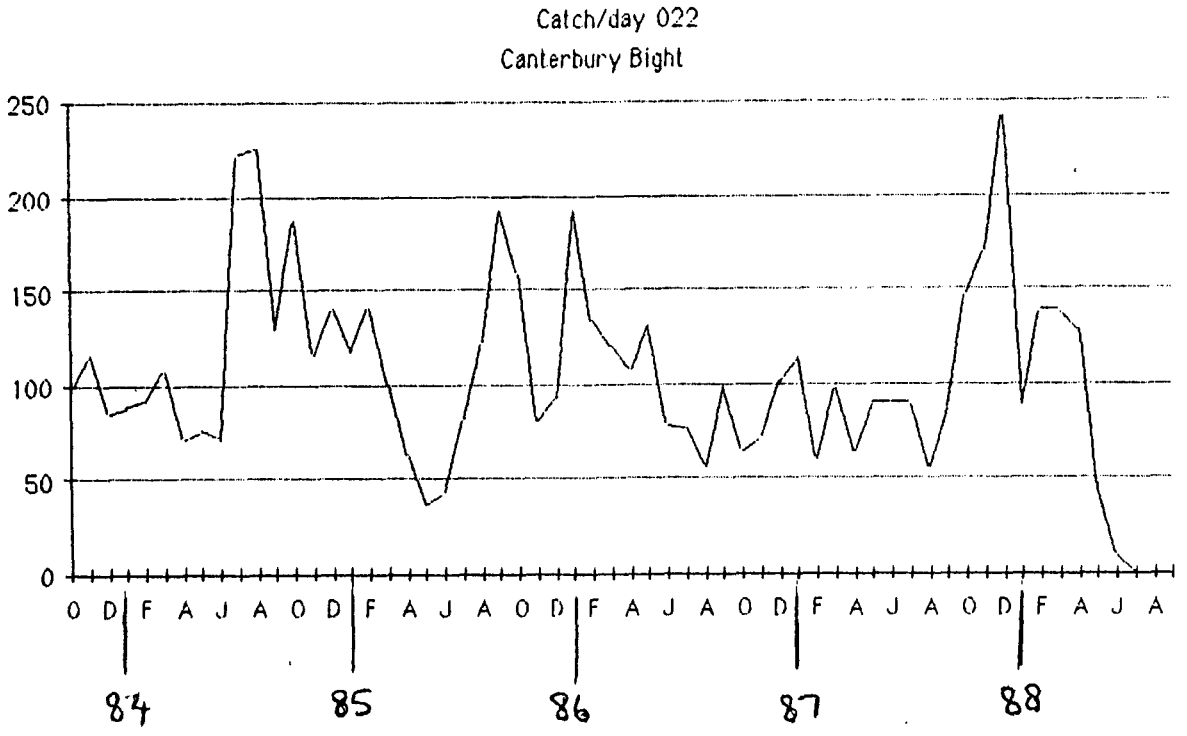
Fig. 2f


Catch/day 022
Canterbury Bight
250
200
150
100
50
0
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84
85
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87
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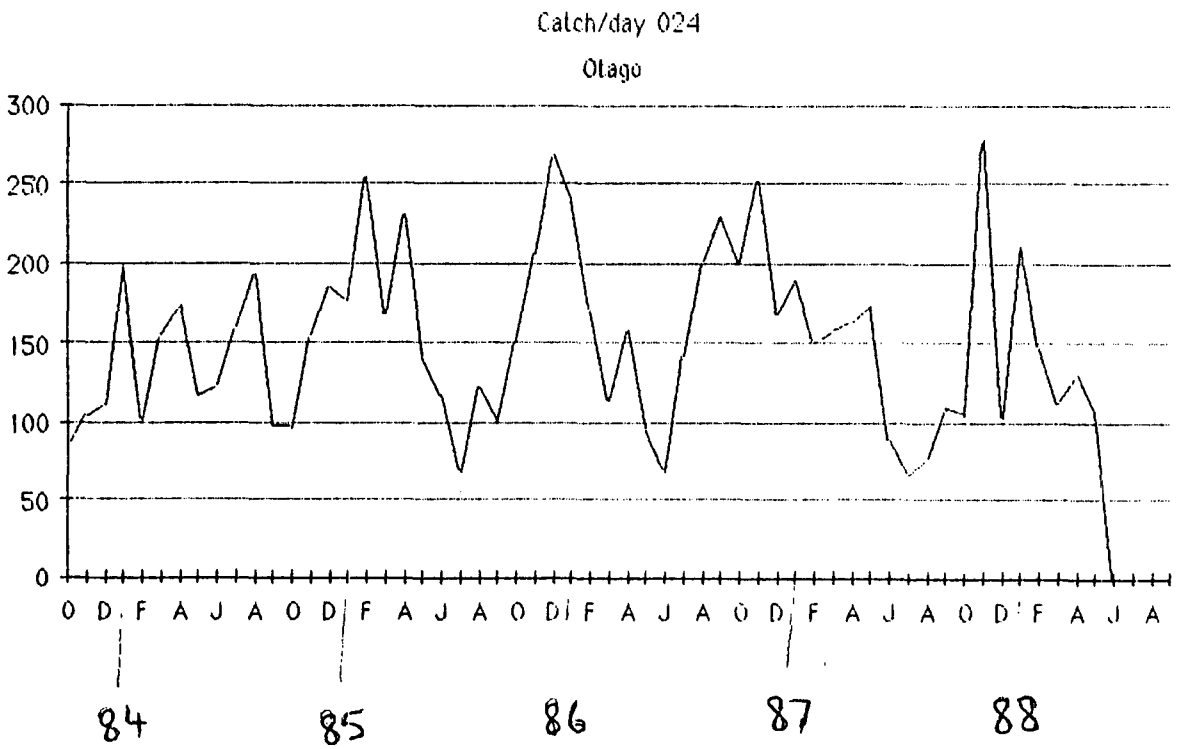
Fig. 2g


Catch/day 024
Otago
300
250
200
150
100
50
0
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84
85
86
87
88

Fig. 2h

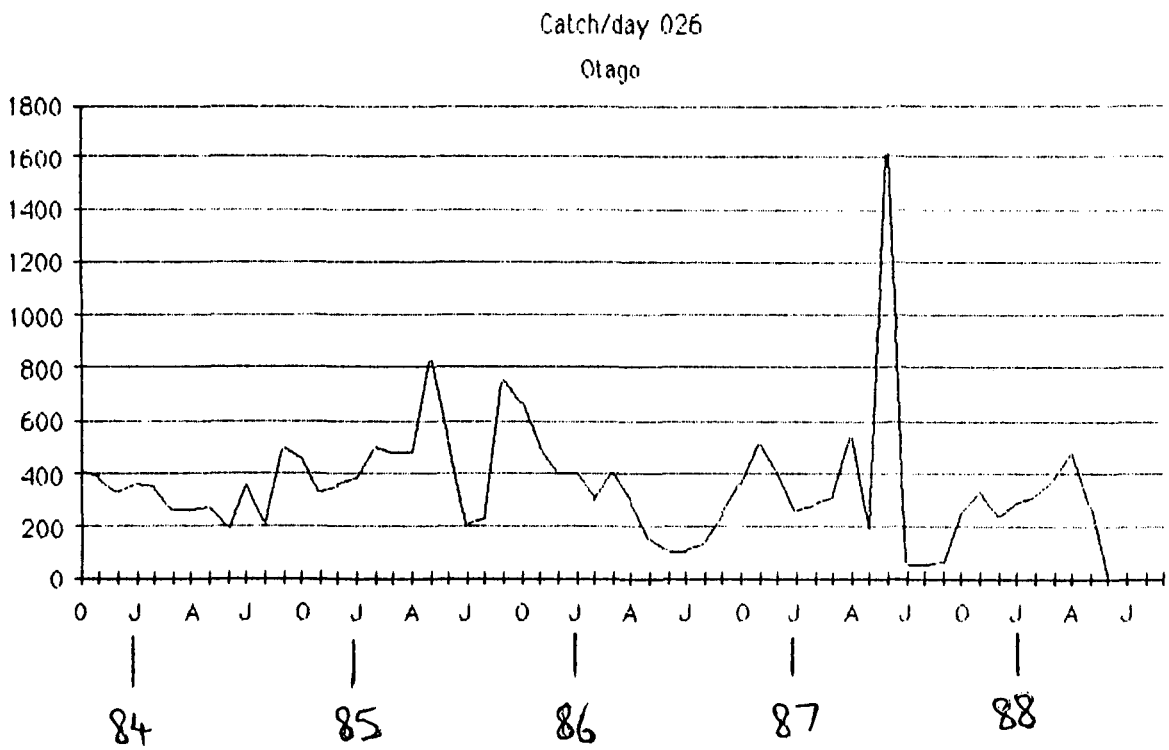
Catch/day 026
Otago
1800
1600
1400
1200
1000
800
600
400
200
0
O J A J O J A J O J A J O J A J O J A J
84
85
86
87
88

Fig. 21

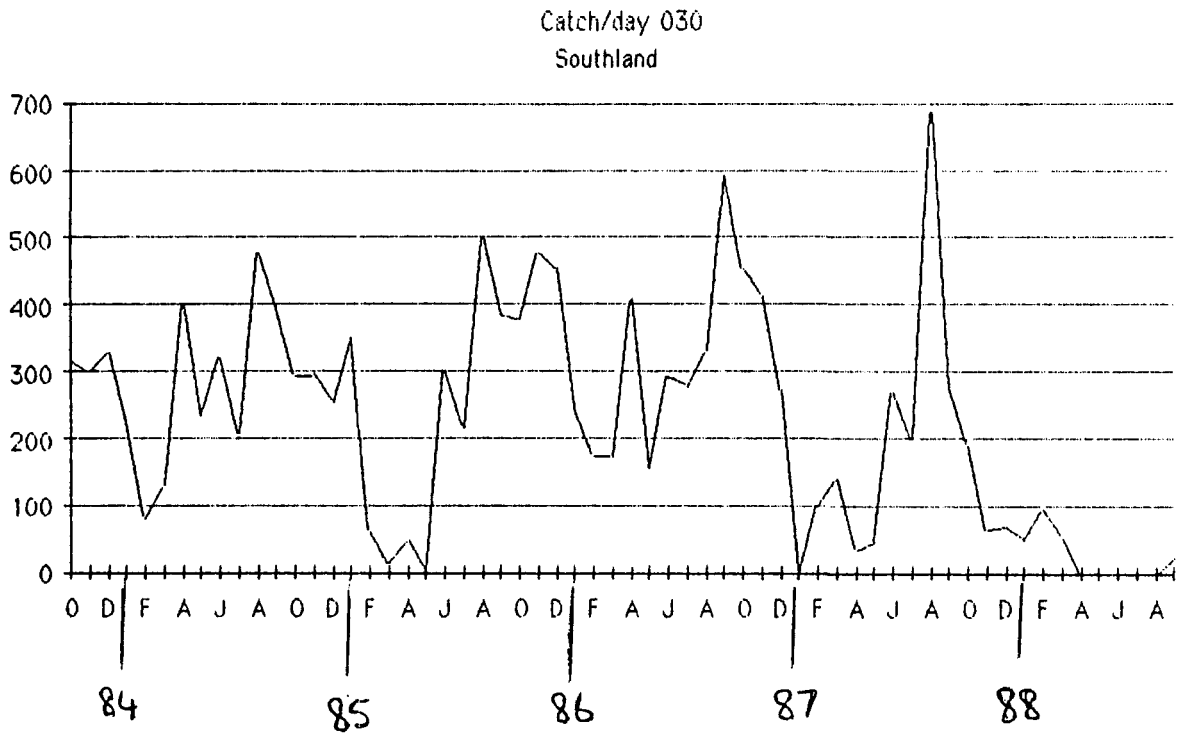
Catch/day 030
Southland
700
600
500
400
300
200
100
0
O D F A J A O D F A J A O D F A J A O D F A J A O D F A J A
84
85
86
87
88

Fig. 2j