

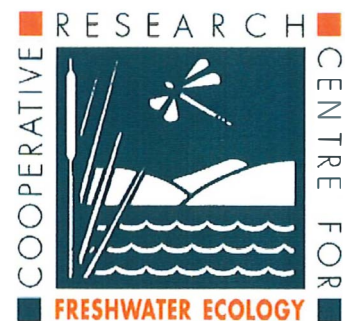
# NSW INLAND COMMERCIAL FISHERY

## DATA ANALYSIS

*D D Reid, J H Harris and D J Chapman*



FISHERIES  
RESEARCH &  
DEVELOPMENT  
CORPORATION



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**PRINCIPAL INVESTIGATOR:** Dr J.H Harris  
New South Wales Fisheries  
Fisheries Research Institute  
PO Box 21  
Cronulla NSW 2230  
Telephone: 02 9527 8411 Fax: 02 9527 8576

### **NON-TECHNICAL SUMMARY:**

The inland commercial fishery in New South Wales had a mean annual catch of 344t over the past three decades, and is currently worth \$1.7 million per annum (1995/96 value). The commercial fishery commenced in the late 19th Century, and although production figures are available from 1883 onwards, coverage for years earlier than 1947 was very limited, with an unknown fraction of the total catch reported. The major species currently exploited by the fishery are golden perch, carp, Murray cod and freshwater yabby, while prior to 1980 redfin perch, silver perch and freshwater catfish were also significant components of the catch.

From the commencement of the commercial fishery there were resource conflicts between commercial fishers, traditional rights of the indigenous fishers, recreational fishers and a continual problem with widespread illegal fishing activities. The geographical extent of the fishery was gradually reduced to the current boundaries, which allow commercial fishing for finfish in approximately 5% of the linear measure of the inland waters of NSW.

There has been a long-established need for reliable data for the fishery, and while fishers have officially reported catches since 1947, the data have been poorly managed, and no comprehensive analysis has previously been attempted.

The present study has identified and corrected a number of errors in the previous datasets. Summaries are given for the catch, effort and catch-per-unit-effort over the period 1947/48 to 1995/96. The catches of golden perch have been relatively stable for the past three decades, with peaks in production following good flood years. Catches of Murray cod declined sharply from a peak in the mid-1950s but have been relatively stable since the mid-1960s, annual catches generally falling within a range of 10-20t. For silver perch and catfish declines have continued to the present situation of a voluntary ban on their capture. Catches of carp stabilised at about 150t after rising rapidly in the 1970s to a peak of 548t.

South Australian catches of golden perch were historically fairly similar to the NSW catches, but since 1992/93 they have increased markedly to approximately three times the NSW catch. Validation of the combined catch data for NSW and South Australia was possible for golden perch, by using data obtained from Melbourne and Sydney Fish Markets. While the information collected from commercial fishers seems to have provided reliable estimates of the total catch and trends in CPUE by species, the data

are not adequate for the application of age-based stock assessment techniques. Additional information would have to be collected from fishers and/or from market-based sampling to provide the required information for useful stock assessments. Another important consideration is that even with complete information on the commercial fishery, the geographical extent of the fishery is extremely limited, so that the status of a stock in the commercial fishery may not necessarily reflect the stock status over the whole Murray-Darling system.

While it is possible to collect some summary information on catch and effort relatively easily from the recreational sector, alternative methods would need to be developed to collect the information required for detailed age-based stock assessments from this source. For proper management of the stocks, it is important to have estimates of the catches of the recreational sector, and the long-standing paucity of comprehensive information needs to be remedied.

This study confirms the strong correlation between time series of river levels or flows and catches of Murray cod and golden perch, as suggested in previous studies.

**It is recommended**

- that the paucity of data for the recreational catch of inland species be redressed;
- that more detailed, daily records of commercial catches and effort be collected, and a sampling program for lengths/ages and other required biological information be undertaken, particularly for Murray cod and golden perch, in order to ascertain the status of inland fish in the currently fished areas of the Murray-Darling.

**KEYWORDS:** Inland commercial fishery, freshwater, native species, alien species, carp, Murray cod, golden perch, freshwater yabby, silver perch, freshwater catfish, redfin perch.

## **BACKGROUND**

A commercial freshwater fishery for finfish and crustaceans has operated since the late 19th Century in the western waters of New South Wales. The number of licences was reduced from a postwar peak of 280, in 1971, to 40 in 1996/97, while total production peaked at 840t in 1977/78 and is currently around 300t. The total production figures mask the decline of the dominant species of the 1950s - Murray cod, golden perch and silver perch - and the rapid rise in catches of carp. The fishery for silver perch and freshwater catfish collapsed in the last decade. This period of decline in catches of the formerly dominant and highly valued native species coincided with a rapid increase in river regulation, and consequent increases in barriers to fish migration, changes in river flow and temperature regimes, and reduction in water quality. Operation of the commercial fishery has been contentious because of perceived resource conflicts with anglers, but the basis for these conflicts is uncertain, and the commercial fishery has the potential to provide valuable monitoring data on the status of fish stocks.

This study evaluates the utility of the inland commercial fishery (ICF) data as a stock-monitoring tool. By evaluating the relationships between fish stocks and environmental factors such as droughts, floods, streamflows and changes generated by human activity, the study indicates the potential usefulness of the commercial data as a measure of the well-being of the ecosystem that supports the fishery.

## **NEED**

A comprehensive analysis of the historical data on the commercial fishing industry would be a powerful and timely influence in the management of inland waters and the fisheries they support. Demonstration of the utility of the commercial fishery data as a stock-monitoring tool, and as an index of the ecosystems that support it, would contribute strongly to the achievement of future viability for the industry.

The ICF dataset is the only available information of value for resource assessment in NSW inland fisheries, other than recreational datasets, which are fragmentary and relatively recent. Secondary inferences about the condition of stocks are provided from environmental research projects (e.g work on fish migrations in the Murray River (Mallen-Cooper 1993; Mallen-Cooper *et al.* 1995)). None of these projects aimed specifically at fish-resource assessment.

The NSW ICF data have considerable significance as a national resource. The NSW fisheries have been historically larger and more widespread through the Murray-Darling basin than those of Victoria and South Australia. Recent genetic research (Musyl and Keenan 1992) and unpublished data (B. Pierce, S.A Fisheries, personal communication) indicate that, at least for golden perch, there is a need to manage the Murray-Darling basin fishery as a single stock, principally recruiting in NSW waters.

While some brief summary analyses of the ICF historical dataset have been published (Pollard *et al.* 1980, Rowland 1989), there is a great need to assess the validity of the data, to estimate inter-annual and regional variability to provide reliable indices of abundance, and to elucidate long-term trends.

## **OBJECTIVES:**

The general objective of the study was to show the utility of the inland commercial

fisheries as a stock-monitoring tool, and as an index of the ecosystems that support it. The specific (original) objective was to test the applicability of the dataset as an index of fish-stock abundance over the history of the fishery, with emphasis on recent trends.

The project analysed the dataset to quantify and generalise from regional and temporal trends in total catch, catch composition, effort and catch per unit effort.

## DESCRIPTION OF THE FISHERY

### *Data availability*

Records for the fishery are available from 1883 onwards, although coverage and accuracy of the data were poor until fishers' returns were introduced in 1947. The paucity of reliable and comprehensive data was discussed by Dakin & Kesteven (1938) and again by Langtry (published in Cadwallader, 1977). The data from 1883 to 1947 have been extracted from reports of the NSW Fisheries Department and are tabulated and are summarised in Appendix 1, together with a summary of comments from the annual reports which chronicle management decisions in the fishery. The data for the fishery prior to 1947 were restricted to consignments of fish from inland rail stations to Melbourne and there was no information on species composition, apart from occasional qualitative references in the NSW Fisheries Annual Reports (e.g. in the 1898 report, the comment was made that "fish forwarded are generally of the cod species"). Two other sources which provide a fascinating insight into the early fishery are Dakin and Kesteven (1938) and Leslie (1995). One of the interesting management initiatives discussed by Dakin and Kesteven is the "Utilisation of Nature's Waste" policy, whereby, between 1910 and 1920, fish were transported from rivers and lakes which were almost dry, to more permanent bodies of water. An important point raised in Leslie (1995) is that, as early as 1860, there were conflicts between commercial, recreational and indigenous interests over the fish resources of the Moira Lakes.

The main focus of the current study is on the period 1947/48 to 1995/96, for which data are available from monthly returns by fishers.

### *Fishery Restrictions*

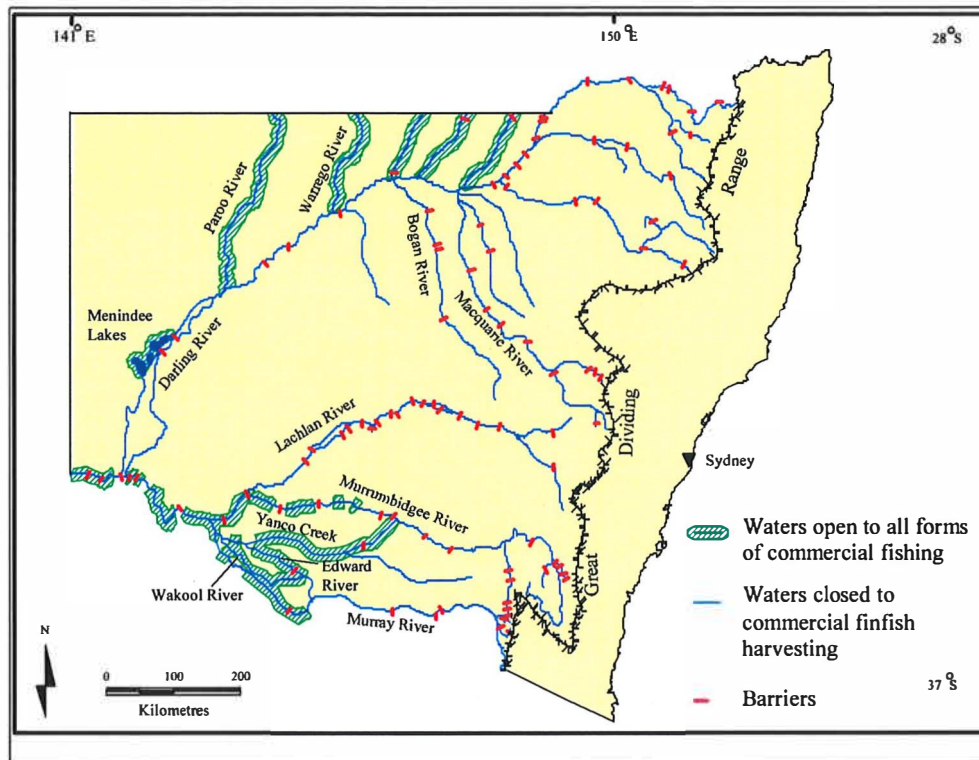
The commercial inland fishery for finfish has been progressively restricted, and now only operates on about 5% of the total available linear measure of waterways in the state, with closures being enforced along the full length of many rivers. There has been a closed season from September to November since 1938. A closed season during October and November applied from 1918, and various seasonal closures applied annually from 1903 to 1917. Figure 1 indicates the waterways currently available for commercial finfish harvesting and the locations of major barriers such as dams and weirs. Harvesting of yabbies by commercial traps is restricted to the same waters, but commercial fishers are also allowed to harvest yabbies over a much larger area using hoop nets, which may also be used by recreational fishers.

There are more than 150 dams and large weirs (in addition to thousands of smaller weirs, causeways and other small barriers) which obstruct fish movement on the western side of the Great Dividing Range. Walker *et al.* (1995, p.98) pointed out that "small weirs, barrages, causeways, levees and river training structures may be no less influential than dams by way of their numbers and ubiquity ... the cumulative effects may represent a far more extensive level of regulation than suggested by dams alone".

Most or all exploited native fish require unimpeded migration pathways, and the cumulative effects of barriers have contributed significantly to the declines of these fish (Harris and Mallen-Cooper 1994).

**Figure 1:**

Map indicating waterways open to commercial finfish harvesting.



Commercial fishing is now centred mainly on the lower Murray River around Wentworth, the Murray/Wakool/Edward rivers complex and the Menindee Lakes. The rivers in the north of the state which are open to commercial fishing (Paroo, Warrego, Culgoa and Narran) are subject to long periods of low or zero flows, so they may only be fished infrequently, and by very few fishers. Table 1 shows the number of days' effort in each of the fiscal years 1984/85 to 1995/96, the total for the 12 years, and at the drainage basin level, the percentage of the total represented by each inland region.

**Table 1(a):** Number of fisher-days for each inland region in 1984/85 to 1989/90.

Drainage Code No.	Waterway	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90
1100	Bulloo River	30	0	0	164	132	81
1200	Lake Bancannia	0	14	0	0	0	0
40900	Murray Riverina	2197	2620	2963	2251	1239	1849
41000	Murrumbidgee River	1072	903	1137	1482	3234	1348
41001	Lake Urana	18	0	254	0	0	151
41002	Lake Yanga	293	276	344	504	565	384
41003	Barren Box Swamp	113	75	106	579	336	313
41200	Lachlan River	0	0	0	0	0	30
41201	Lake Brewster	10	90	20	0	14	12
41202	Lake Cargelligo	0	41	193	89	0	88
41203	Lake Cowal	2416	3876	1331	414	0	569
41300	Murrumb. Riverina	3303	3187	2484	2196	569	289
41301	Lake Benanee	0	0	0	0	0	0
41302	Dry Lake	0	0	0	0	0	0
41700	Moonie River	0	0	0	0	0	0
42100	Macquarie-Bogan	0	0	0	24	0	0
42200	Barwon-Condam.- Culg.	137	19	0	170	363	138
42201	Narran Lake	64	0	0	0	0	0
42300	Warrego River	0	156	317	139	57	79
42400	Paroo River	0	112	75	149	124	0
42401	Copago Lake	0	0	0	0	0	0
42500	Darling River	3998	3157	2722	2682	2808	2180
42501	Menindee L.,Gen.	399	238	186	295	26	0
42502	Lake Cawndilla	466	229	101	493	285	222
42503	Lake Tandure	265	230	356	209	228	130
42504	Lake Menindee	1352	879	913	836	1244	965
42505	Lake Pamamaroo	541	506	365	531	95	20
42506	Lake Bijiji	0	101	31	0	0	145
42507	Anabranh Lakes	0	28	0	0	0	0
42508	Speculation Lake	0	30	0	0	31	0
42509	Lake Teryawnya	0	0	28	0	0	0
42509	Lake Balaka	244	57	0	0	0	0
42509	Kangaroo Lake	318	138	0	0	148	31
42600	Lower Murray	394	485	499	788	501	392
42601	Lake Victoria	209	183	219	290	290	386
42700	Murray River (General)	1407	1646	1139	806	5371	6883
43000	Boundary Lake	0	0	0	0	0	0
45000	Farm Dams, Inland	373	354	304	291	263	273
49000	Other Waters, Inland	760	811	461	383	503	40
<b>ALL REGIONS</b>		<b>20379</b>	<b>20441</b>	<b>16548</b>	<b>15765</b>	<b>18426</b>	<b>16998</b>



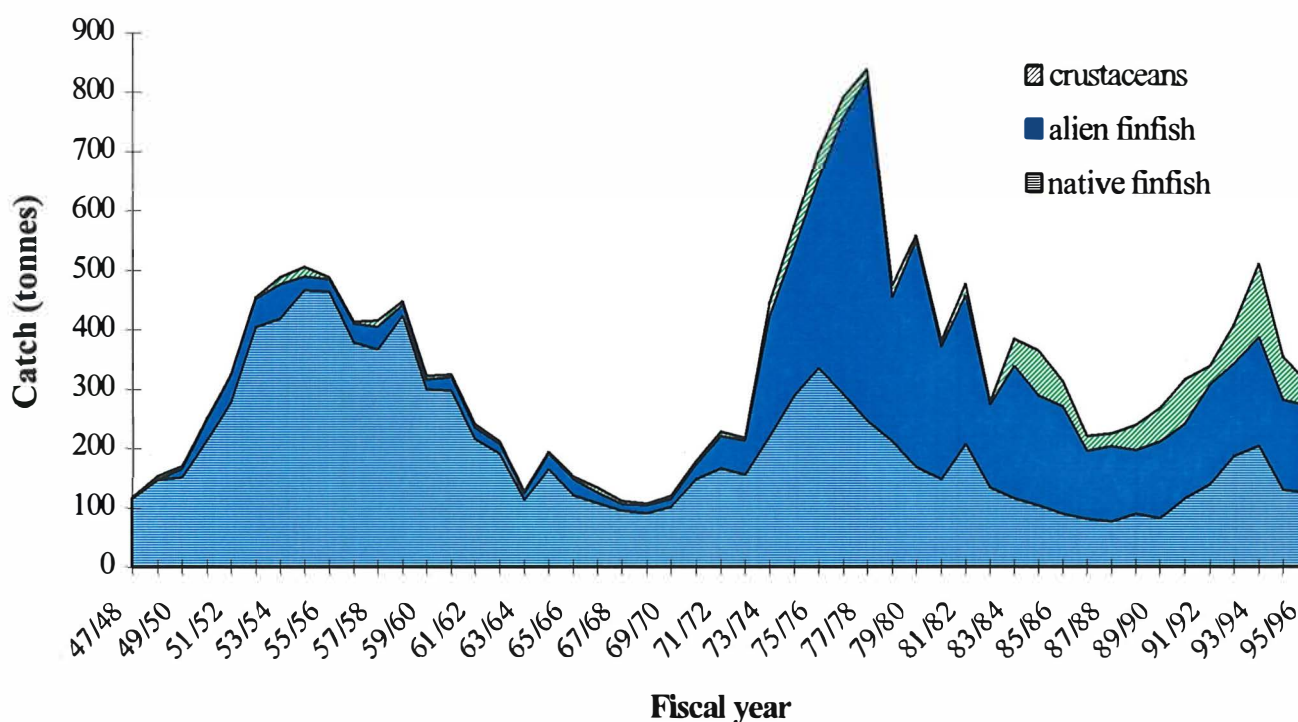
**Table 1(b):** Number of fisher-days for each inland region in 1990/91 to 1995/96, and total for all regions 1984/85 to 1995/96.

Waterway	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	TOTAL	%
Bulloo River	0	0	100	0	78	0	585	0.3
Lake Bancannia	0	0	45	0	58	0	117	0.06
Murray Riverina	1847	1700	2132	2315	1952	1359	24424	12.68
Murrumbidgee River	883	1291	1214	1194	586	701	15045	11.46
Lake Urana	284	194	0	0	0	0	901	
Lake Yanga	522	373	180	247	223	384	4295	
Barren Box Swamp	54	59	77	35	0	75	1822	
Lachlan River	5	0	0	0	22	0	57	8.79
Lake Brewster	0	0	0	0	0	0	146	
Lake Cargelligo	205	0	55	0	0	138	809	
Lake Cowal	1115	2067	598	1605	1482	448	15921	
Murrumb. Riverina	180	0	0	483	0	0	12691	6.93
Lake Benanee	0	2	0	0	0	0	2	
Dry Lake	288	123	141	110	0	0	662	
Moonie River	0	90	10	0	0	0	100	0.05
Macquarie-Bogan	0	0	0	0	0	0	24	0.01
Barwon-Condam.- Culg.	76	0	0	9	0	59	971	0.5
Narran Lake	12	0	0	0	0	0	76	0.04
Warrego River	90	7	113	21	64	53	1096	0.57
Paroo River	0	60	0	92	9	6	627	0.43
Copago Lake	0	0	121	71	0	6	198	
Darling River	1984	1030	743	807	157	62	22330	23.75
Menindee L.,Gen.	77	209	183	85	54	44	1796	
Lake Cawndilla	74	182	418	564	0	3	3037	
Lake Tandure	298	189	123	149	182	165	2524	
Lake Menindee	580	478	243	172	31	509	8202	
Lake Pamamaroo	184	75	176	294	484	574	3845	
Lake Bijiji	58	15	69	107	40	124	690	
Anabranh Lakes	268	515	340	102	0	0	1253	
Speculation Lake	0	0	61	177	51	0	350	
Lake Teryawnya	38	92	51	5	0	3	217	
Lake Balaka	25	93	44	0	102	112	677	
Kangaroo Lake	0	151	0	14	21	0	821	
Lower Murray	1668	1076	2809	3173	2734	1501	16020	11.49
Lake Victoria	539	519	787	1096	899	689	6106	
Murray River (General)	2458	2393	2930	2270	1806	2445	31554	16.38
Boundary Lake	0	0	0	35	0	0	35	0.02
Farm Dams, Inland	275	304	335	265	287	138	3462	1.8
Other Waters, Inland	835	711	1251	905	1197	1247	9104	4.73
<b>ALL REGIONS</b>	<b>14922</b>	<b>13998</b>	<b>15349</b>	<b>16402</b>	<b>12519</b>	<b>10845</b>	<b>192592</b>	<b>100</b>

### ***Total Production and Effort***

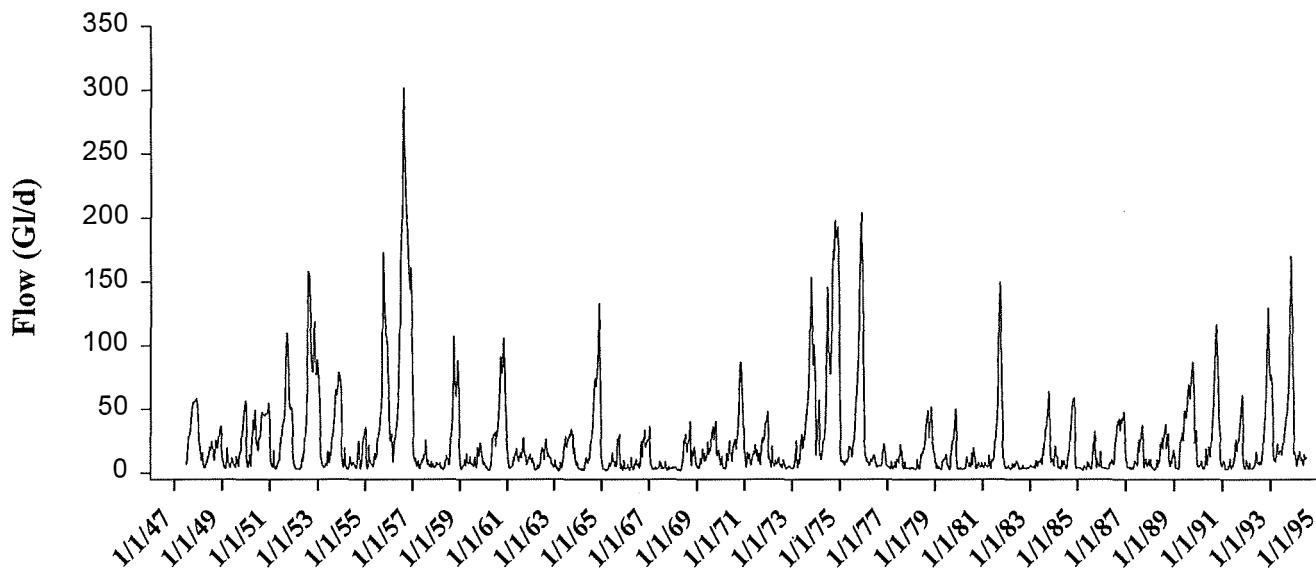
Production of all inland species peaked at 836t in 1977/78 (Figure 2), and in recent years has generally been in the range of 350t to 500t. The peak figure for 1977/78 included 548t of carp (66% of the total), with native finfish production being 246t. The maximum recorded catch for the pre-1947 period was 410t of inland fish species in 1920, however this figure covers only fish consigned to market by rail. This is similar to the postwar native finfish peak catch of 450t in 1955/56, however the latter figure is probably a more accurate measure of the actual total catch.

**Figure 2:** Annual catches of all inland species, 1947/48 to 1995/96.



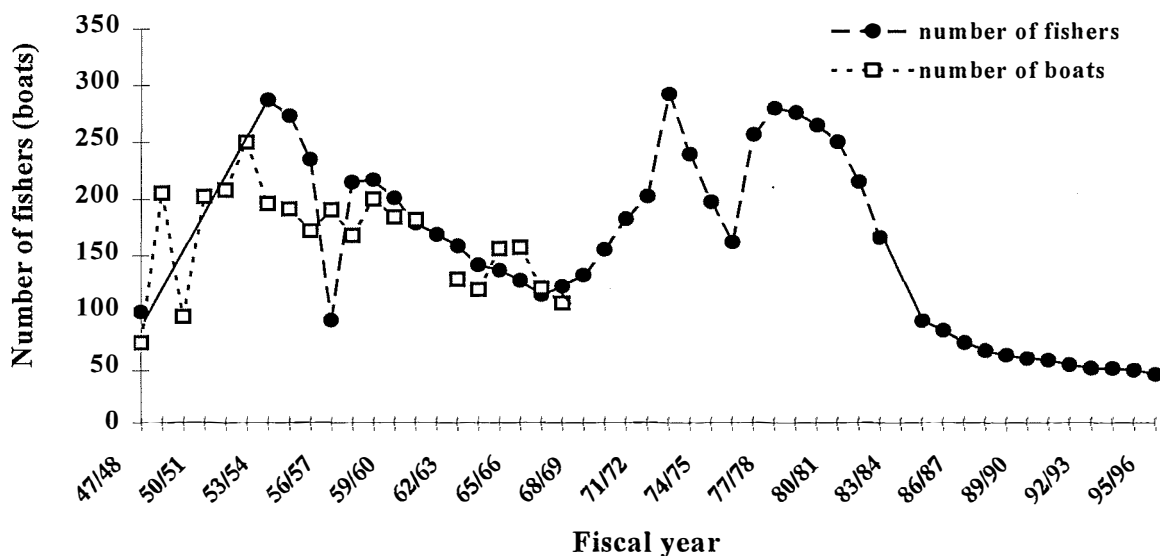
It is interesting to note that over the 113 year period for which we have records for the fishery, only eight substantial peaks for catches of native finfish occur, *viz.* in 1883, 1900, 1918, 1934, 1943, 1955, 1976 and 1993. Dakin and Kesteven (1938) commented on the cyclical nature of the first four peaks, concluding that a cycle of about 17 years was evident. Data since 1934 generally fit that pattern, with a 17 to 20 year cycle, the only exception being a peak in 1943. Not surprisingly, the time between major floods has followed a very similar cyclical pattern: Figure 3 shows the data for the flow in the Murray River at Euston over the period 1947 to 1994, indicating the successive major flood years of the mid- 1950s, 1970s and 1992-1993. Note the long drought from 1976 to 1989 except for 1981. This aspect is discussed more fully in a later section of this report.

**Figure 3:** Mean daily flow of the Murray River at Euston (d/s) 1947/48 to 1993/94



The number of licences for commercial fishing peaked at about 290 in 1953/54 and 1972/73, and gradually decreased to 40 in 1995/96 (Figure 4). An unknown proportion of the fishers prior to 1982 operated only part-time. From 1982 NSW Fisheries required as a condition for licence renewal, that the major proportion of a fisher's income was from fishing. Since November 1983 there has been a freeze on new licences for this fishery.

**Figure 4:** Number of fishers 1947/48 to 1995/96 and number of boats 1947/48 to 1967/68.



## **RESULTS:**

### **The database**

Since 1947 commercial fishers have completed monthly returns indicating weight of catches (kg) by species. Information on effort prior to 1978 is restricted to number of fishers per month. Since 1979, information on number of days fished has been collected.

The database compiled for the present study has brought together, in a Microsoft-ACCESS database, a number of previously disparate and incomplete datasets. A comprehensive revision of the data was carried out, and a number of very significant errors were identified and eliminated. Five of these errors were: the overstatement of catches of Macquarie perch in previously compiled statistics of the fishery; a major correction of the figure for Murray cod in 1973/74; and incorrect figures for freshwater catfish, freshwater yabby and Murray crayfish catches. The Murray cod figure was incorrect because of a transcription error in the conversion to metric weights, while the overstatement of Macquarie perch catches over the period 1970 to 1982 was the result of a poorly designed fisher's return form which had an ambiguous alignment of species names with the quantity response line. The problem with yabby and crayfish statistics arose from the long changeover period between return forms after "freshwater yabby" was added as a separate category.

The MS-ACCESS database for the NSW ICF is now complete for all months in the period 1954/55 to 1994/95, apart from the financial year 1979/80, for which only the total figure for the financial year is available. A listing of the database is provided in Appendix 2, and has also been supplied to the Fisheries Research & Development Corporation (FRDC) on compact-disc media.

### **Summary of trends in NSW commercial catches**

Table 2 and Figures 5-11 indicate the annual catches by species over all NSW inland regions for the period 1947/48 to 1995/96. Following is a brief summary of the trends in catches over this period.

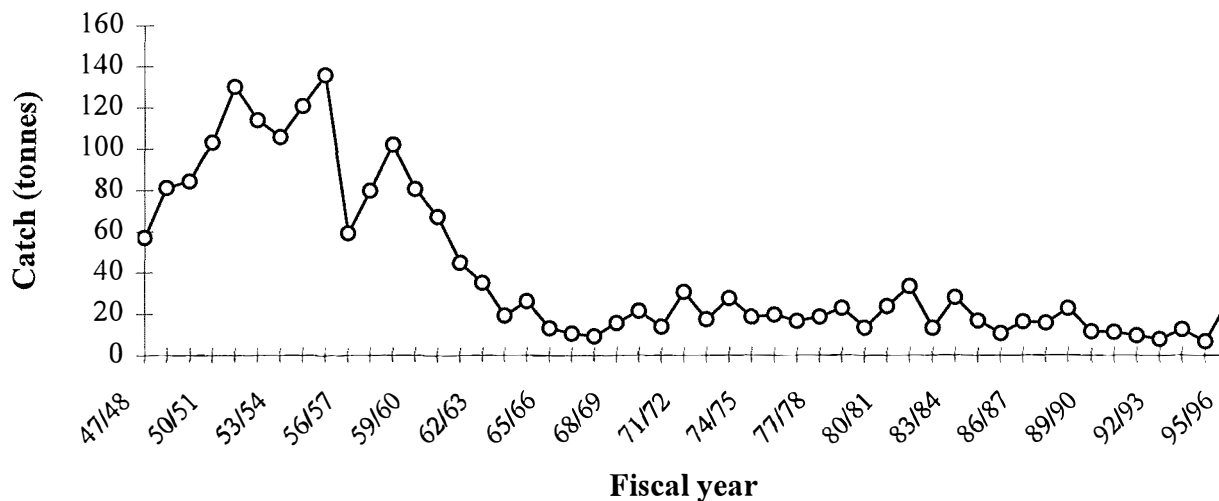
**Table 2: Annual Catches of major finfish species and freshwater yabby from the NSW inland commercial fishery (tonnes) 1947/48 to 1995/96.**

Fiscal Year	Murray cod	Golden perch	Silver perch	Freshwater catfish	Carp	Redfin perch	Freshwater yabby	Total finfish	Total all species
47/48	57.1	40.4	10.5	1.2				115.9	118.3
48/49	81.2	49.1	6.6	2.2				146.8	154.0
49/50	84.2	48.5	7.3	2.7		13.9		165.3	169.7
50/51	103.3	90.6	9.6	4.9		34.5		248.6	250.9
51/52	130.2	119.3	13.3	3.1	0.9	44.7		323.4	324.7
52/53	114.0	252.9	16.8	2.0	4.8	42.4		452.0	454.8
53/54	105.8	274.8	17.4	2.0	4.0	53.3		476.2	488.2
54/55	120.7	309.9	17.4	2.9	4.3	19.2		489.6	505.6
55/56	135.6	287.9	23.3	2.7	7.1	13.7	0.0	470.3	487.5
56/57	59.2	280.6	24.8	4.0	5.0	26.7	0.1	400.2	412.6
57/58	79.6	234.9	29.8	7.3	7.5	29.6	0.1	388.7	414.4
58/59	101.8	247.8	43.9	9.5	3.9	13.5	0.0	420.4	446.5
59/60	80.4	146.1	32.9	22.4	4.3	12.2	1.1	298.3	322.0
60/61	66.9	159.9	35.0	21.2	1.9	21.7	0.2	306.6	324.4
61/62	44.7	121.0	29.1	10.3	3.0	15.6	0.0	223.7	241.1
62/63	34.9	112.1	24.5	11.5	0.9	14.7	0.0	198.6	211.0
63/64	19.2	64.0	11.8	12.9	3.5	8.9	1.0	120.3	126.8
64/65	26.0	97.8	16.4	14.7	7.6	19.4	0.3	182.0	193.7
65/66	14.2	67.9	13.2	14.1	4.4	21.9	0.0	135.8	151.9
66/67	10.4	63.0	12.4	12.1	5.4	11.6	0.0	114.9	133.9
67/68	9.0	58.9	12.2	7.8	3.4	7.7	0.0	99.1	110.8
68/69	15.4	49.1	13.0	6.4	2.9	9.4	0.0	96.1	107.9
69/70	21.3	49.6	13.7	8.7	3.3	8.6	0.8	105.1	119.6
70/71	13.9	101.1	13.4	9.2	9.7	16.5	0.6	163.7	178.3
71/72	26.5	87.4	17.6	13.9	31.1	22.3	2.1	198.7	226.4
72/73	17.3	72.1	18.9	19.5	42.5	13.7	2.7	183.9	214.4
73/74	34.8	140.3	10.7	19.6	166.3	36.2	11.4	407.8	446.2
74/75	35.1	242.0	5.2	43.2	242.2	54.3	41.4	622.1	692.9
75/76	19.6	292.7	4.5	13.1	280.4	37.7	33.5	648.1	692.6
76/77	16.6	241.8	4.2	14.8	445.4	19.9	31.0	742.5	791.5
77/78	18.5	204.5	4.7	9.0	547.6	15.0	9.6	799.4	835.7
78/79	20.5	165.3	3.0	15.4	237.7	4.6	17.6	446.4	473.9
79/80	13.3	116.0	6.2	25.9	369.7	9.5	10.3	548.0	558.4
80/81	21.3	98.4	6.4	11.2	217.9	5.6	8.0	360.7	381.0
81/82	29.7	155.5	7.4	9.9	246.6	3.4	14.9	452.5	477.2
82/83	11.5	105.9	8.2	4.4	132.0	8.4	2.3	270.3	277.6
83/84	25.1	78.4	5.2	2.6	218.2	5.3	44.5	334.7	384.6
84/85	15.0	79.2	1.4	1.8	174.9	10.1	74.5	282.5	364.3
85/86	10.3	71.8	0.5	1.5	175.5	5.0	40.7	264.6	312.3
86/87	15.3	50.6	1.3	0.9	113.8	4.0	25.9	185.8	224.4
87/88	14.5	48.1	0.6	3.4	118.7	9.0	22.2	194.3	226.3
88/89	22.2	58.9	1.1	1.6	102.1	4.7	42.8	190.6	239.8
89/90	11.2	61.5	2.2	1.1	122.0	6.3	57.1	204.3	266.9
90/91	11.2	90.0	0.5	0.1	120.1	6.9	73.4	228.8	315.6
91/92	9.5	122.1	1.3	0.1	168.0	3.5	31.3	304.4	350.0
92/93	7.7	159.8	0.4	0.1	164.6	2.8	64.9	343.6	410.0
93/94	12.4	173.3	0.4	0.0	180.4	2.6	124.0	387.2	512.1
94/95	6.8	105.4	0.5	0.0	148.1	3.7	73.2	280.9	354.2
95/96	25.9	91.1	0.3	0.0	141.1	4.1	37.3	271.9	309.2

## Native Species:

### Murray Cod (*Maccullochella peelii*)

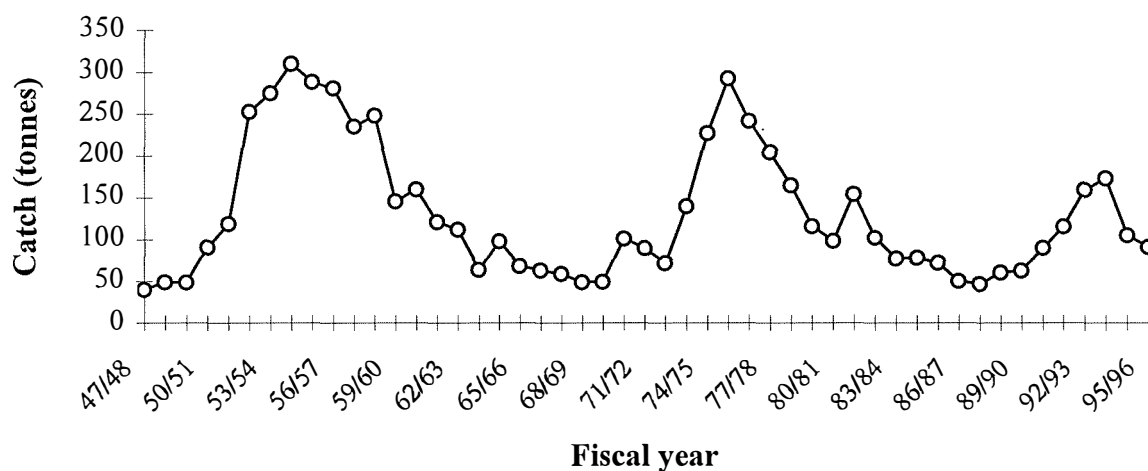
**Figure 5:** Total catches of Murray cod, 1947/48 to 1995/96



During the mid-1950s total annual catches ranged from 105t to 136t. The fishery showed a rapid fall over the period 1960 to 1967, from 80t to less than 10t. Over the last 30 years the catches of Murray cod have remained relatively stable, fluctuating about a mean of approximately 17t (however commercial fishing effort has been strongly reduced over this period). Catches on a decade-by-decade basis are analysed by region in a later section (catch-composition). Over the last three decades slightly higher annual catches have generally been associated with the magnitude and timing of floods. This aspect is treated more fully in a later section of this report. The 1994/95 catch of Murray cod was only 7t, however the 1995/96 catch was 26t.

### Golden Perch (*Macquaria ambigua*)

**Figure 6:** Total catches of golden perch, 1947/48 to 1995/96

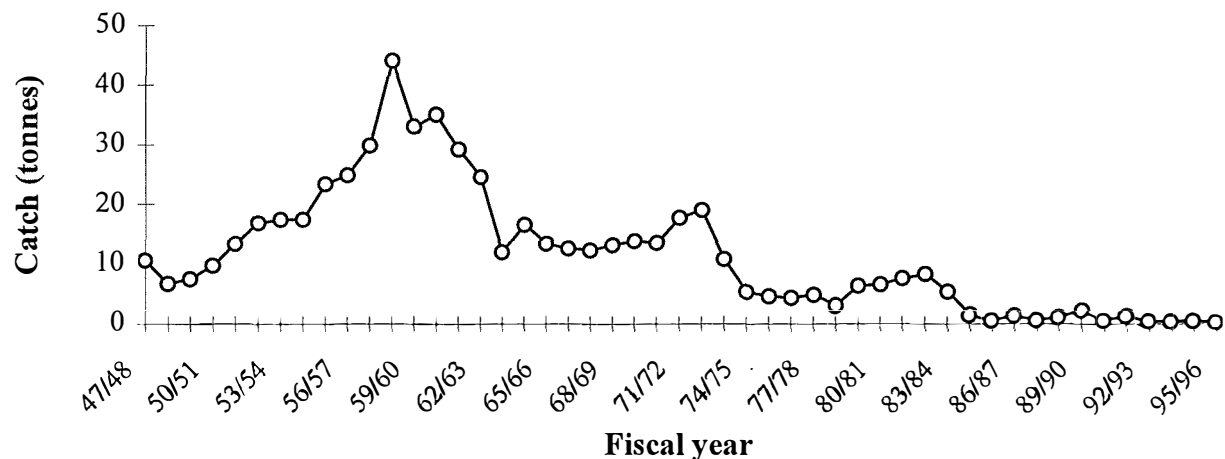


Three major peaks are evident in the catches of golden perch in the last 50 years. The first was in 1954/55 (310t), the second in 1975/76 (293t) and the next in 1993/94

(173t). These peaks may be attributable to large floods which gave rise to greatly increased recruitment three years later (see e.g. Reynolds, 1976b). During the 1960s, early 1970s and most of the 1980s, catches remained around 50-100t. These were generally periods of low flows in the Murray-Darling. From 1990/91 catches increased gradually to the most recent peak.

### Silver Perch (*Bidyanus bidyanus*)

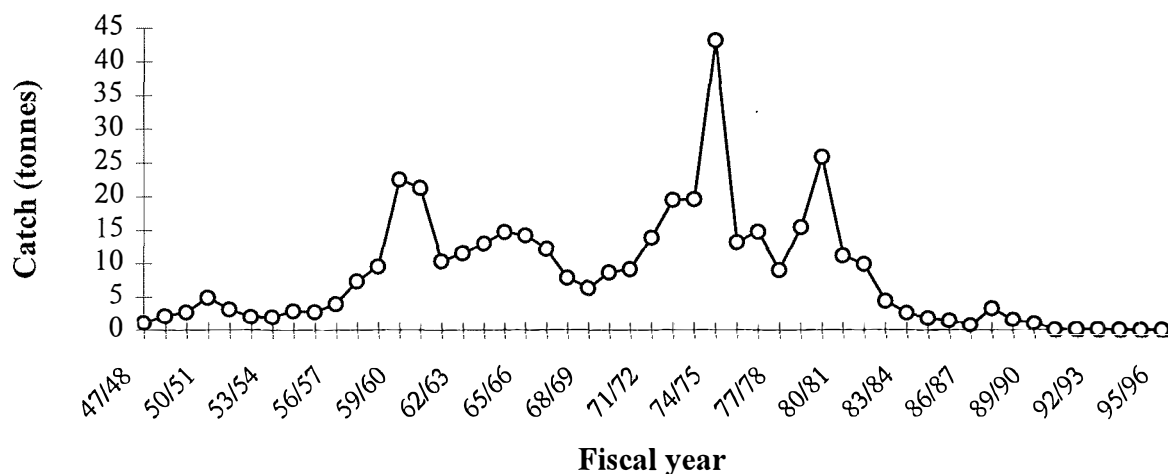
**Figure 7:** Total catches of silver perch, 1947/48 to 1995/96



The catch of silver perch reached a peak of 44t in 1958/59. The catch declined to 13t over an eight year period starting 1964/65. A further decline to 5t occurred in 1974/75. The catch of silver perch again remained stable for eight years at about 5t. The fishery collapsed in 1984/85. Commercial fishers introduced a voluntary ban on commercial landing of silver perch in 1993.

### Freshwater Catfish (*Tandanus tandanus*)

**Figure 8:** Total catches of freshwater catfish, 1947/48 to 1995/96

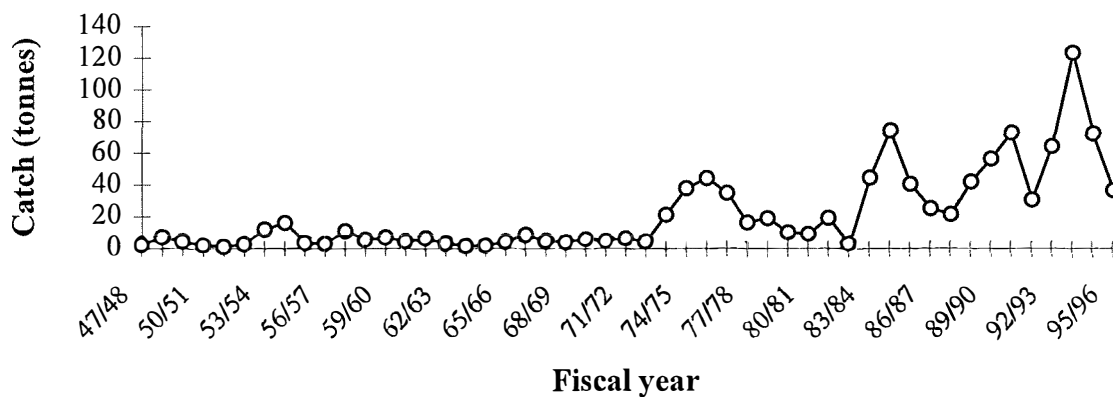


For the 40 years of data on this fishery, there were six years in which catches

exceeded 16t. Otherwise catches varied from 6t to 15t. Peak catches occurred in 1959/60 (22t), 1974/75 (43t) and 1979/80 (26t). After 1979/80, catches declined to 1t in 1986/87 and finally collapsed in 1990/91. Barren Box Swamp and the lakes of the Lachlan River (especially Lake Cowal) were the main contributors to the total catch. In 1979/80, Barren Box Swamp accounted for 18t of the 26t total for all inland waters. Since 1993, commercial fishers have observed a voluntary ban on the taking of this species. The demise of Barren Box Swamp as a suitable environment for freshwater catfish has been described by Moorfield (1995).

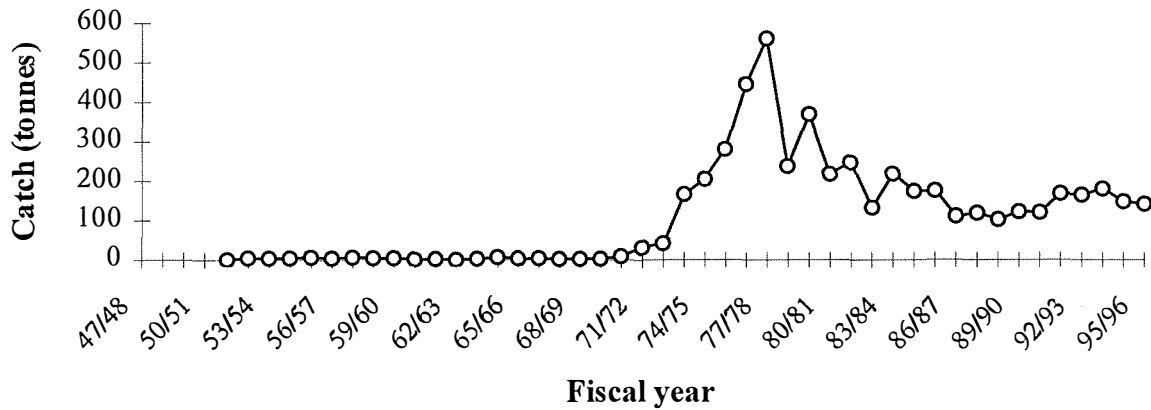
### Freshwater Yabby (*Cherax destructor*)

**Figure 9:** Total catches of freshwater yabby, 1947/48 to 1995/96

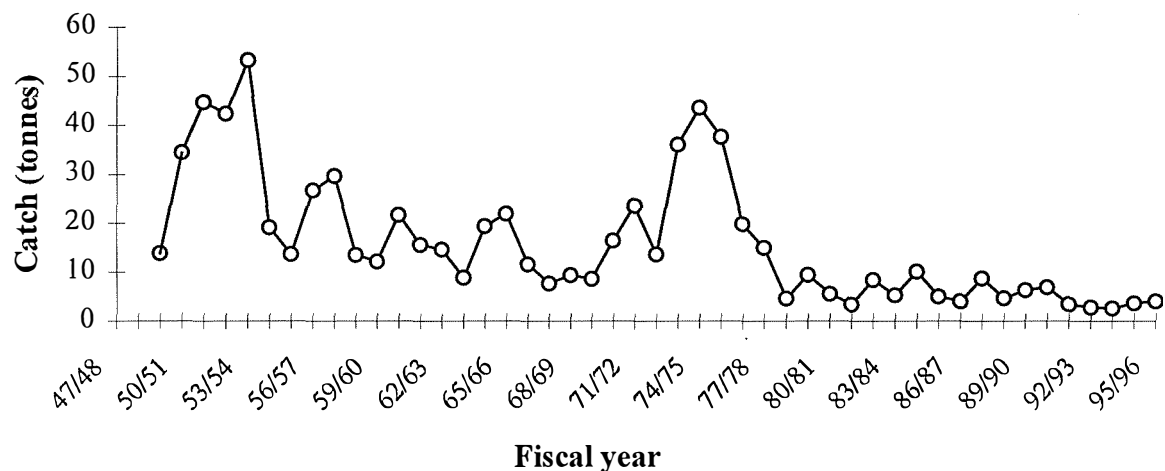


The yabby fishery did not start to develop until 1974/75, and has subsequently shown large variability in catches. The Murray and Edward rivers, and lakes in the Lachlan River catchment are the major areas of yabby production.



**Alien Species:****Carp (*Cyprinus carpio*)****Figure 10:** Total catches of carp, 1947/48 to 1995/96

The dramatic rise from 1971/72 to 1977/78 followed introduction of the Boolara strain into the Murray-Darling in 1968 and heavy floods in mid-1970s (Sheare and Mulley 1978; Brumley 1996). A factor contributing to the decline in total catch from 1984/85 was that some lake fisheries were abandoned because of drought or dominance of the fishery by this low-value species. The rapid increase in catches to 548t, which then declined to a fairly stable level at about 150t is very similar to the situation in Ontario, Canada, where catches rose to a peak of 1180t then declined to a long-term mean of about 450t (McCrimmon, 1968).

**Redfin perch (*Perca fluviatilis*)****Figure 11:** Total catches of redfin perch, 1947/48 to 1995/96

Redfin perch were introduced to Victoria in 1868. Catches of Redfin perch have declined gradually from 53t in 1953/54 to 3t in the 1990s. The seven years in which catches exceeded 30t (50/51 to 53/54 and 73/74 to 76/77) correspond to periods with

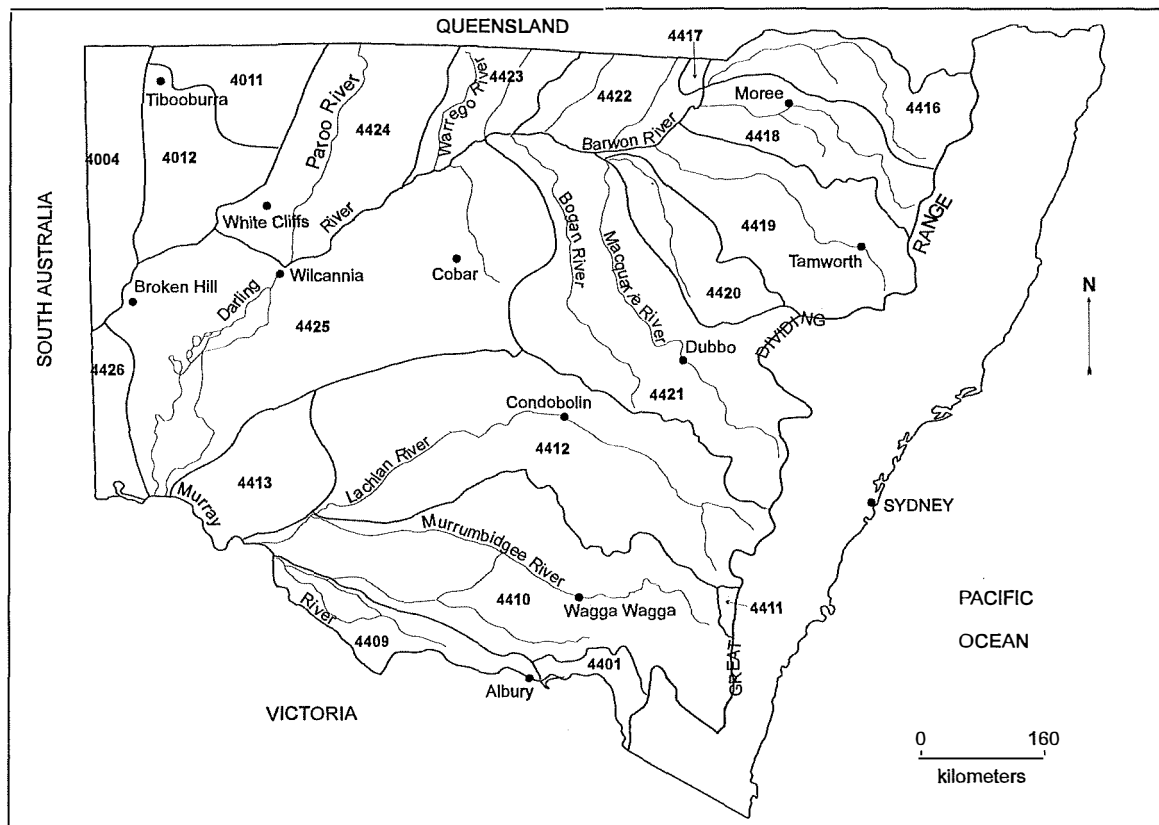
three successive major floods (see Figure 3 which shows flow of the Murray River downstream of Euston).

### **Changes in species composition**

Figure 12 shows the species composition of catches over four decades, for the total inland fishery and separately for each of the major drainages. A map and listing of locations in each drainage region are provided in figure 12a. Note that the vertical scales are not the same for the four series on each page of Figure 12b-f. The reported total catch for the period for each species is shown at the top of each column in the graph.

**Figure 12(a):**

Map indicating drainages by region codes (heavy lines) for the NSW inland commercial fishery.



4011 Bulloo River	4417 Moonie River	4425 Darling River
4012 Lake Bancannia	4421 Macquarie-Bogan Rivers	Menindee Lakes (general)
4409 Murray Riverina	4422 Barwon-Condamine-Culgoa Rivers	Lake Cawndilla
4410 Murrumbidgee River	Narran Lake	Lake Tandure
Lake Urana	4423 Warrego River	Lake Menindee
Lake Yanga	4424 Paroo River	Lake Pamamaroo
Barren Box Swamp	Copago Lake	Lake Bijijie
4412 Lachlan River	4426 Lower Murray	Anabranche Lakes
Lake Brewster	Lake Victoria	Speculation Lake
Lake Cargelligo	4427 Murray River (general)	Lake Teryawynya
Lake Cowal	4430 Boundary Lake	Lake Balaka
4413 Murrumbidgee Riverina		Kangaroo Lake
Lake Benanee		

For the total inland fishery, the major features of Figure 12b are: (i) The very strong increase in carp catches in the third decade, and a subsequent halving of the catch in the last decade; (ii) The decline in catches of Murray cod and the other fish species making up relatively minor proportions of the catch. (iii) The lack of trend over the four decades in golden perch catches; and (iv) The strong increase in yabby production over the last two decades.

The reduction in total catch is partly a function of the reduced number of fishers (shown as bracketed term after the period in the four plots). The mean number of fishers was quite steady for the first three decades, but dropped sharply in the final decade.

#### Murray River (combined regions) (Fig 12c).

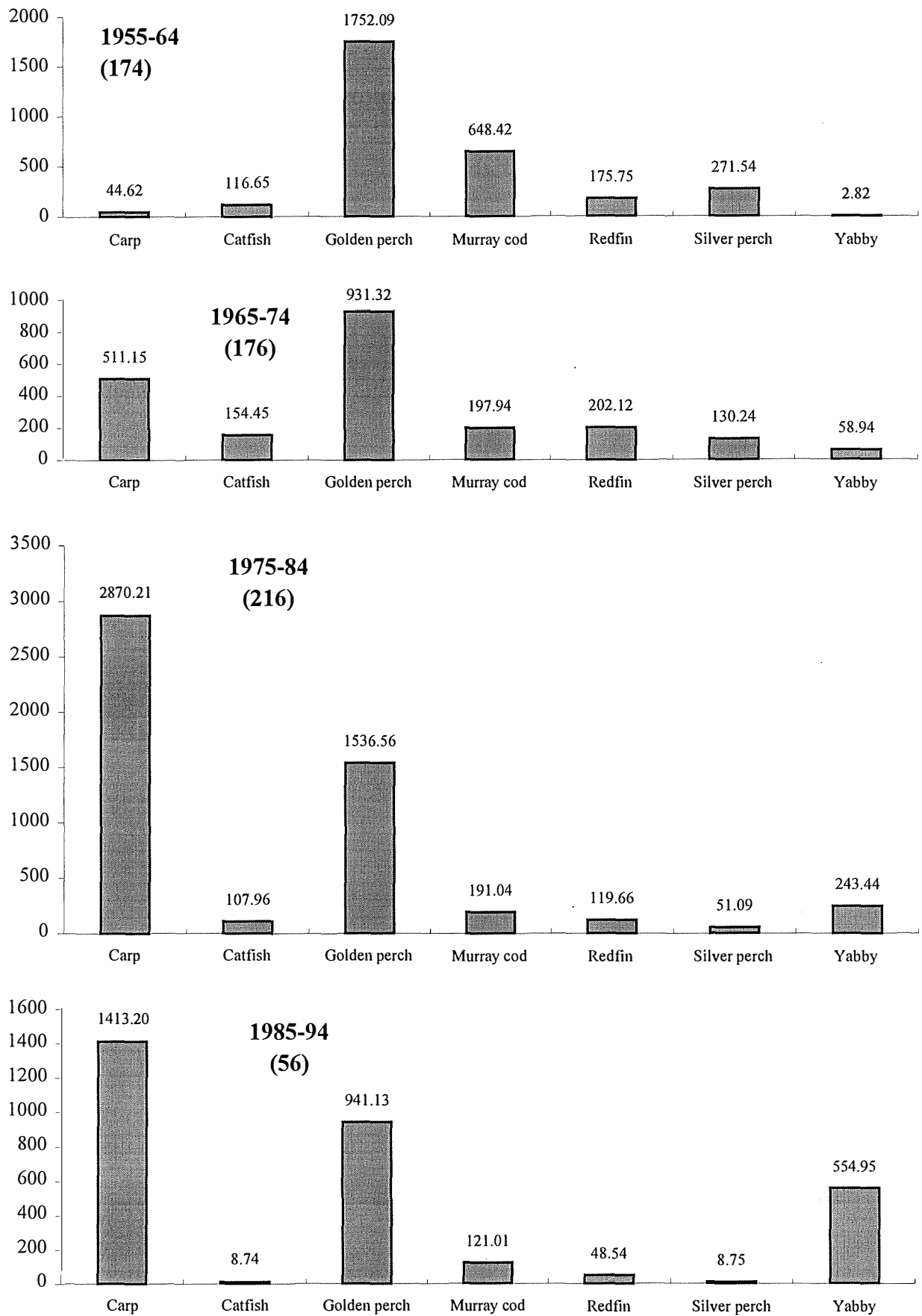
The assignment of the reported area fished (in fishers' returns) to particular drainages was sometimes problematical: from this information, it was not always possible to assign a fisher's catch to one of the three Murray River drainages, and in these cases catches were assigned to a Murray River (general) category. The proportion of returns assigned to this category was substantially reduced in the last two decades, so for the purposes of describing catch composition by species, data have been combined for the Murray River (general), Lower Murray and Murray Riverina Drainage basins. For this combined Murray region category, important features of the catch composition are: the rise of the carp catches in the second and third periods and a decline in the fourth; a decline through the last three decades in catches of Murray cod, silver perch, freshwater catfish and redfin perch; decreases in catches of golden perch in the second and fourth decades, but relatively lower decreases than for the other species. The yabby fishery increased very strongly in the last two decades.

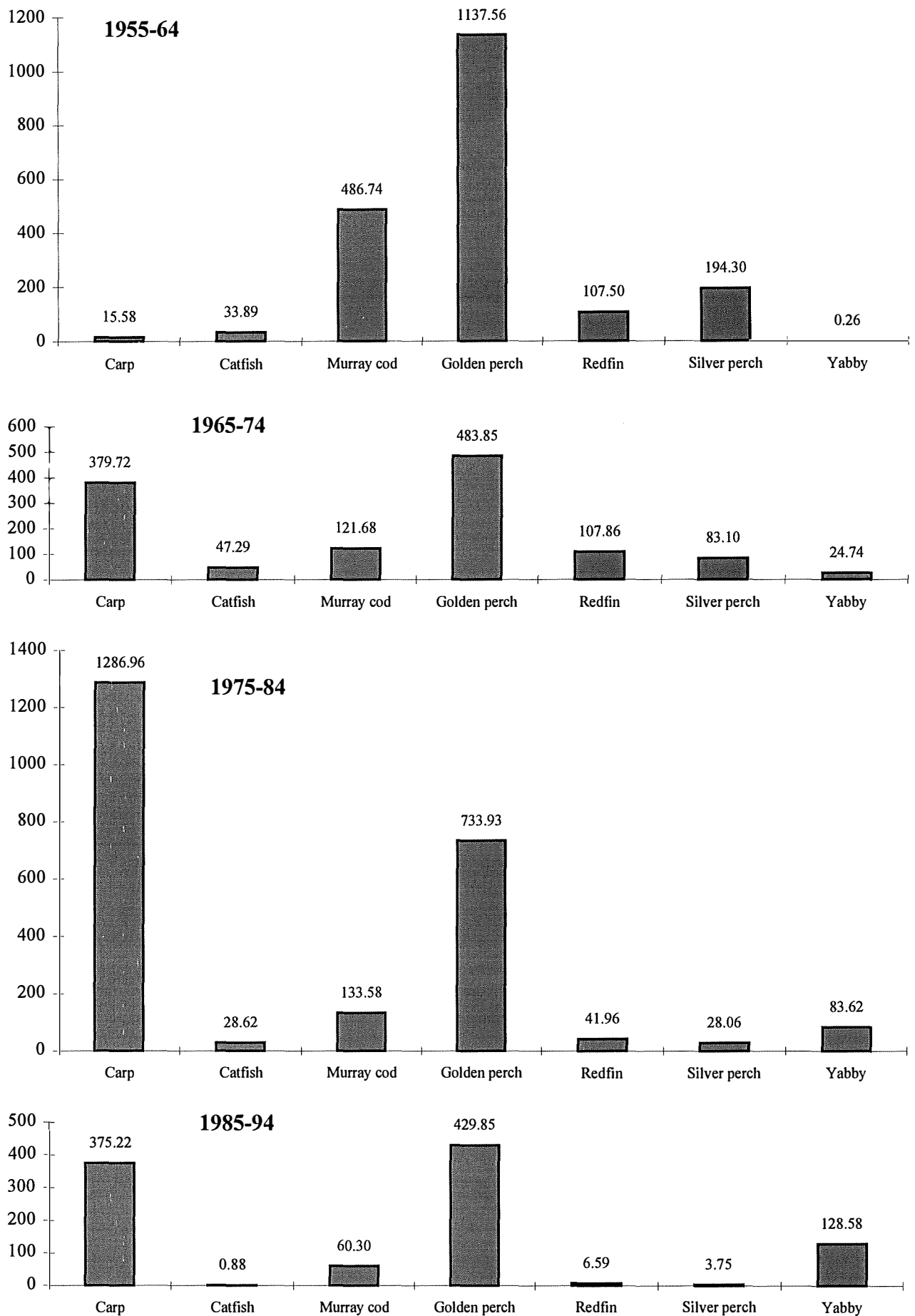
For the Murrumbidgee drainage basin (Figure 12d), the most striking change in the species composition of the catch composition was the increase in carp catches in the third decade, and subsequent halving in the fourth decade of the period. Redfin perch catches were maintained through the whole period. Silver perch declined in the third and fourth decades, and freshwater catfish catches peaked in the third decade and declined rapidly in the fourth. The major source of catfish production was Barren Box Swamp. Murray cod and golden perch catches were low in the second decade, but were fairly even in the other three. The yabby fishery only developed strongly in the last decade of the period.

The fishery in the Lachlan River Drainage Basin has been restricted to Lakes Cowal, Cargellico and Brewster since 1959, when the river was closed to commercial fishing (Figure 12e). Catches of carp were at a maximum for the final decade, freshwater catfish declined after the second decade, as did redfin perch. Catches of golden perch were quite stable over the four periods, and freshwater yabby catches were highest for the last decade.

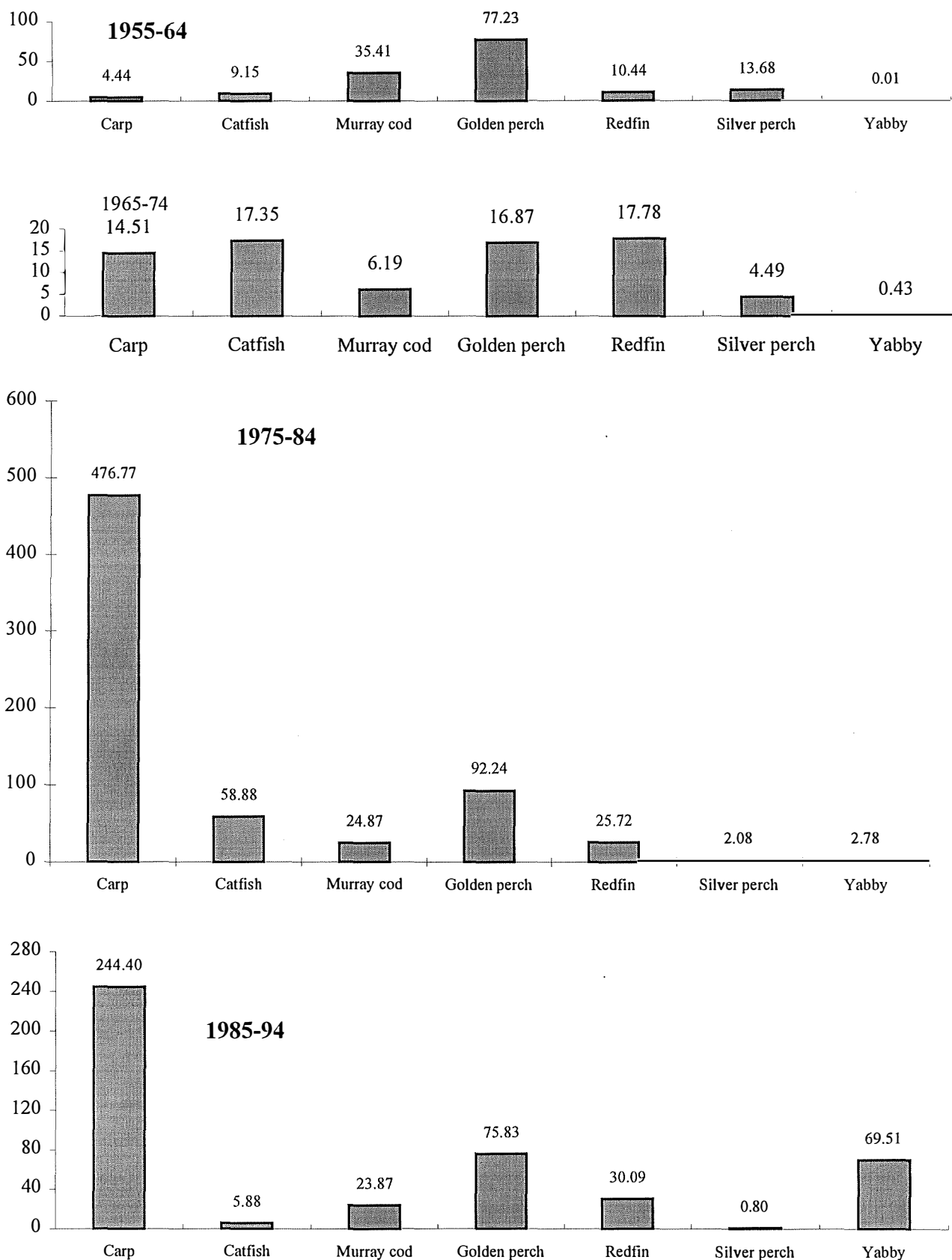
Commercial fishing in the Darling River Drainage Basin (Figure 12f) centres on the Menindee Lakes, the Anabranch system and the Murray River around Wentworth. The Darling River proper is closed to commercial finfish harvesting. Catches of carp increased in the third period and dropped back in the fourth period. Golden perch catches, as was the case in the other drainages, were very strong in the 1975-84 decade, following large floods in 1973, 1974 and 1975. Murray cod catches averaged 3t to 4t per year in the early decades and were around 2t per year in the last two decades.

**Figure 12(b):** Total catch (tonnes) in each of four decades for all regions.  
 Number in brackets after period is mean number of fishers per year.

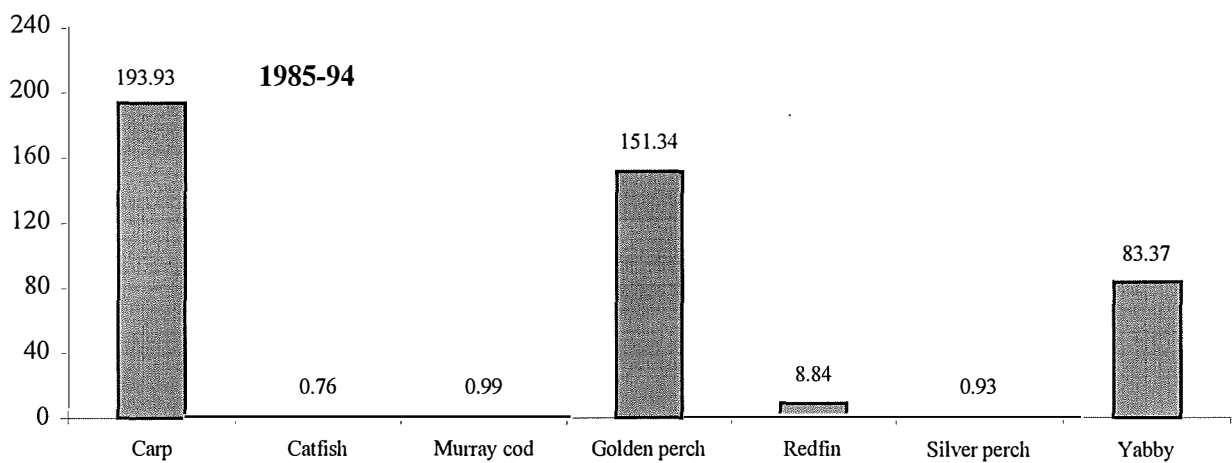
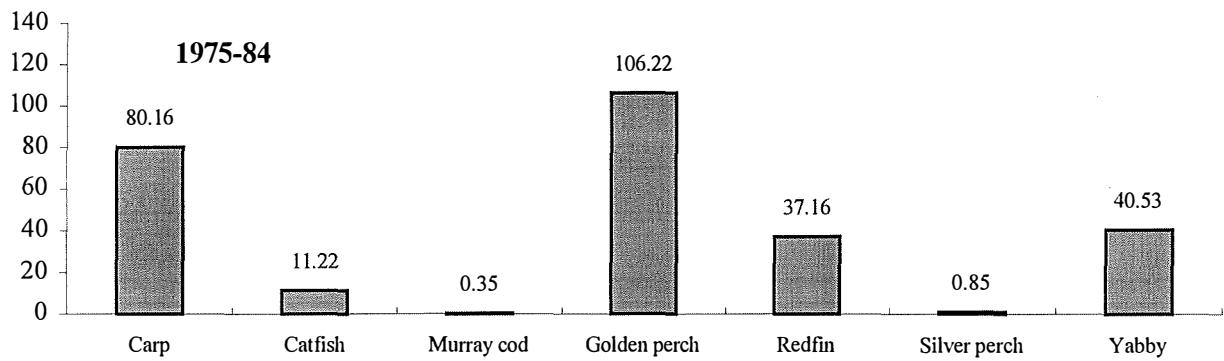
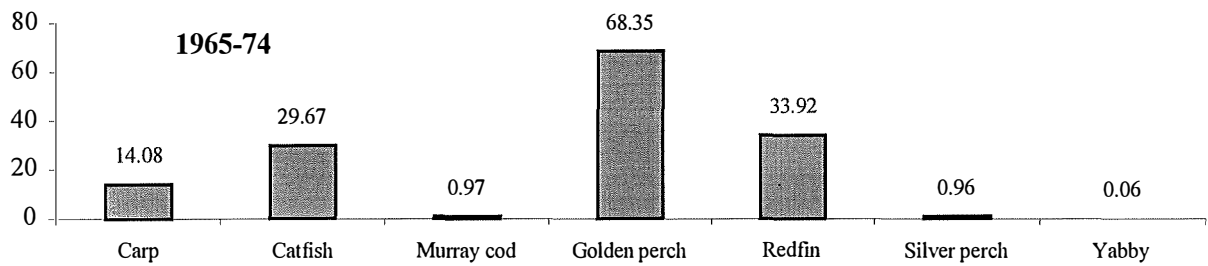
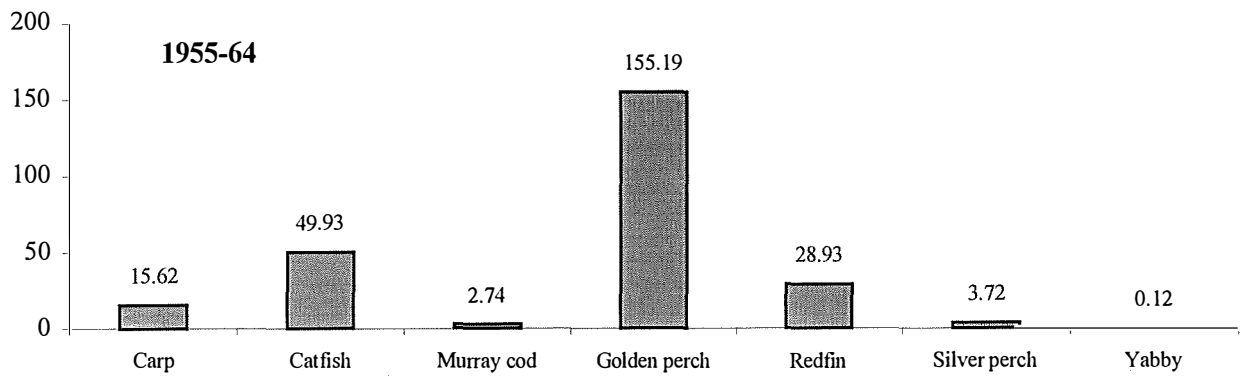


**Figure 12(c): Total catch (tonnes), combined Murray River drainages**

**Figure 12(d):** Total catch (tonnes) Murrumbidgee drainage.

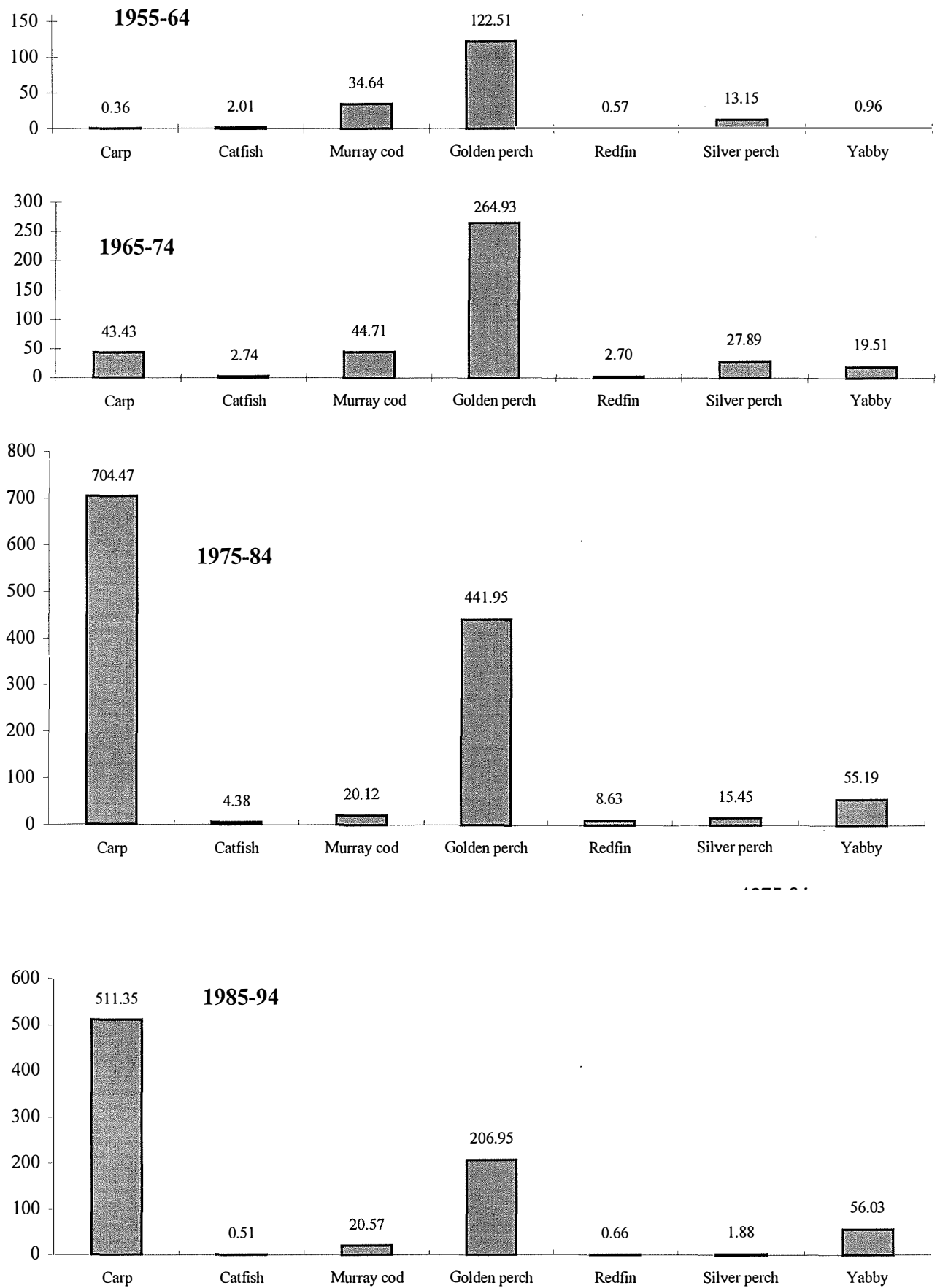


**Figure 12(e): Total catch (tonnes) Lachlan River drainage.**





**Figure 12(f): Total catch (tonnes), Darling River drainage**



## **EFFORT**

Fishing methods used in the inland commercial fishery have changed very little over the period of the fishery: finfish are caught in gill-nets in slow-flowing or still waters and drum nets in flowing waters (Photos 1, 2). Traps and hoop nets are used for harvesting freshwater yabbies (Photo 3). The specifications for gill-nets in Regulations under the Fisheries Management Act (1994) are for a maximum length of 27.5m and minimum mesh-size of 130mm. Drum-nets may be up to 1.25m in diameter, with hoops not more than 1.5m apart, and wings up to 3m long. Minimum mesh-sizes are 130mm on the hoops and 150mm on the wings. Licence-holders are limited to 20 drum nets, but there is no limit present on the number of gill-nets. Gill-nets and drum-nets must be checked at least every 24h and a minimum distance of 90m between nets must be maintained. In addition, two restricted permits have been issued (in 1992 and 1994) for electrofishing of carp in specific waters.

The statistics for fishing effort are very coarse over most of the study period; data for fisher-days are only available from 1979/80 onwards (Figure 13). Data prior to this only give number of fishers and (until 1967/68) number of boats in the fishery (Figure 3). Monthly returns have never required information from fishers on the number of gear units employed, so no effort data at this level are available.

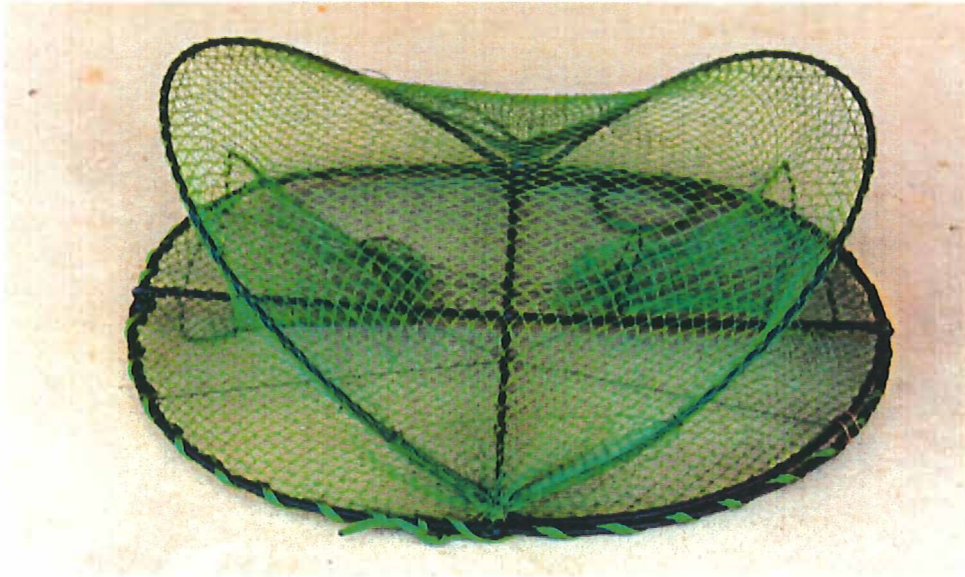
**Photograph 1:** Gill net with entangled golden perch



**Photograph 2:** Drum net.



**Photograph 3:** 'Opera House' yabby trap.



**Photograph 4:** Commercial fisher clearing yabby trap



Figure 13: Days fished per year and number of fishers, 1984/85 to 1995/96.

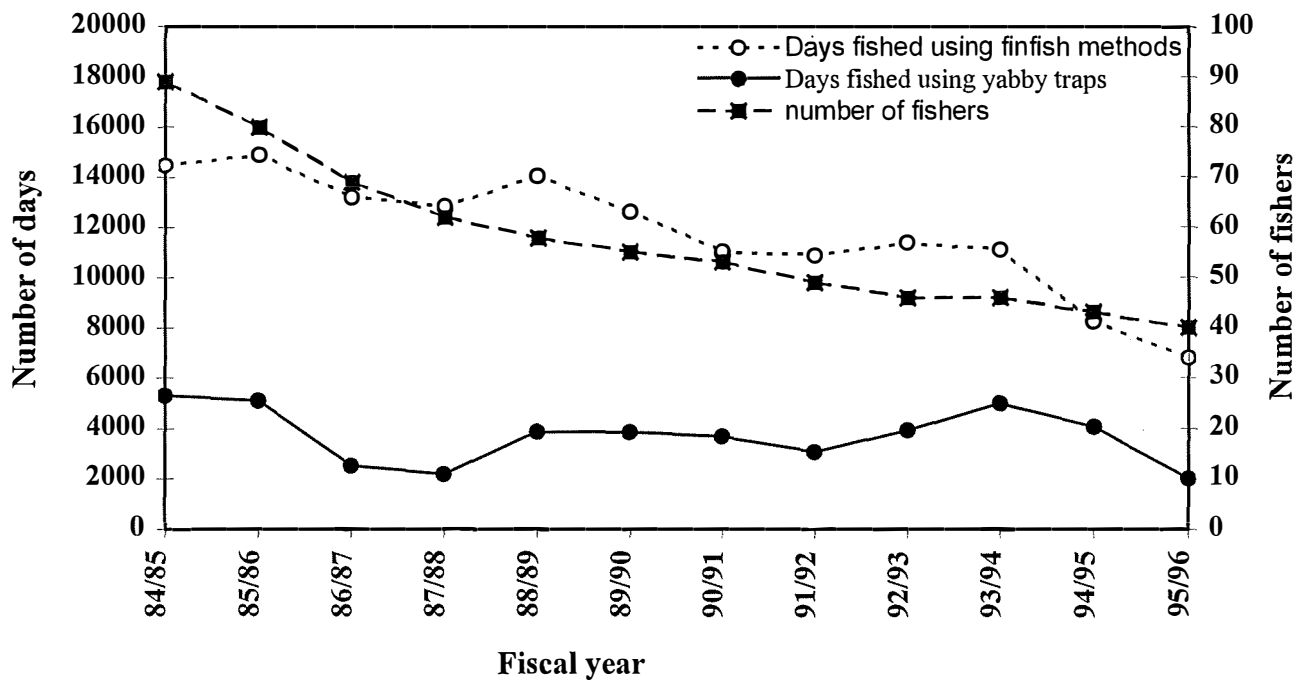
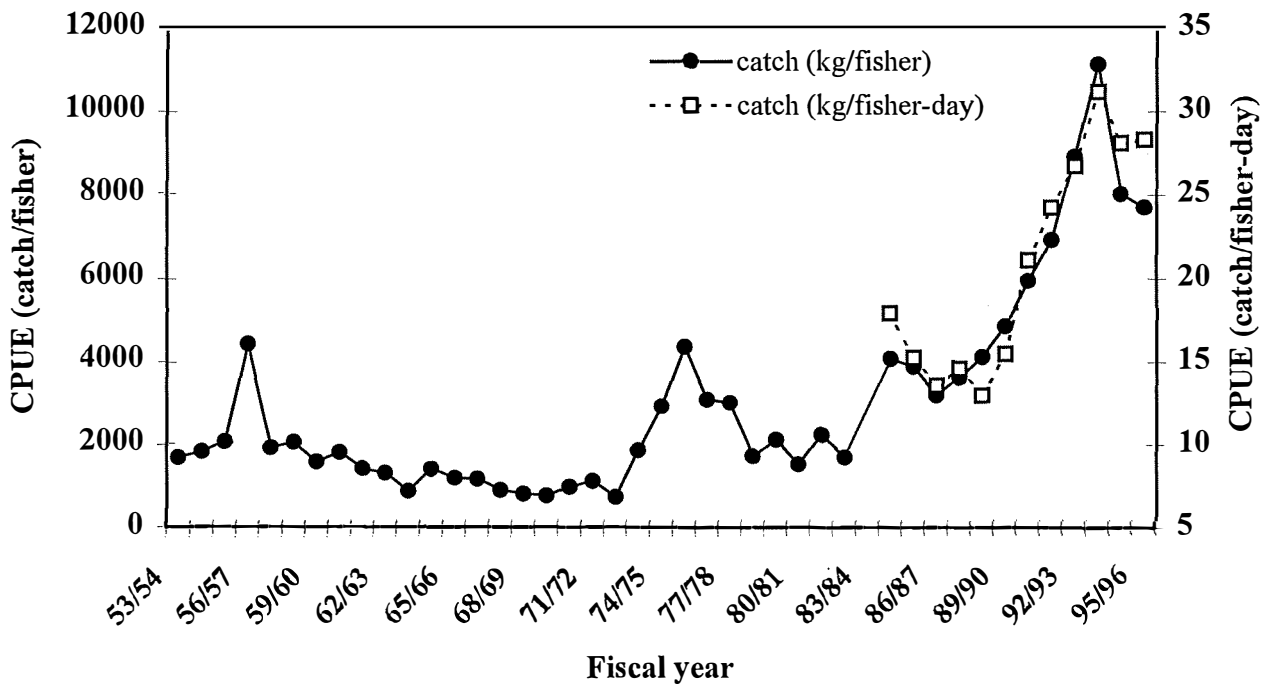


Figure 14: Annual average catch per unit effort (catch per fisher and catch per fisher-day), for fiscal years 1953/54 to 1995/96.



### Catch per unit effort (CPUE)

The two measures which may be calculated for catch per unit effort (CPUE) for the fishery are catch per fisher year ( $CPUE_y$ ) and catch per fisher day ( $CPUE_d$ ). The first series is available for the whole period, but number of days fished has only been reported since 1984/85, so the second series only covers the period since 1984/85.

A sharp rise in CPUE from 1990/91 to 1993/94 is evident for both  $CPUE_y$  and  $CPUE_d$ , shown in Figure 14. As would be expected if the mean number of days fished per year does not vary significantly, the two series move similarly except for a slight difference in 1988/89, where the series moved in opposite directions. The rise in CPUE reflects the three-fold increase in catches of golden perch over the same period, as reported in fishers' returns (Figure 6). Two additional factors which may have contributed to the sharp rise in CPUE are:

(a) An increase over time in the proportion of the catch reported in fishers' returns. This is impossible to quantify accurately, but two factors have been operating recently to reduce the incidence of underestimates of catches in fishers' returns, *viz.* the reduction in cash transactions following changes in taxation legislation, and the proposals for share-managed fisheries, which are based on catch history. These factors provided positive incentives for accurate reporting of catches. (b) With a long-standing freeze on the issue of new licences in NSW, there has been a movement of less-active fishers from the fishery. This could affect both catch per fisher and catch per fisher-day if the amount of gear deployed was less for retiring fishers than for those continuing in the fishery.

Given the comparison of total reported catches and total market throughput (see following section), it is possible that the above factors may have been of some significance up to 1993, but very substantial changes in the Melbourne Market do not allow any reliable estimation of these factors before that time.

### ***Catch validation***

To provide an assessment of the accuracy of fishers' returns, the data were compared with the information available from the Sydney and Melbourne Fish Markets. The only species for which a high proportion of the catch is marketed through these venues is golden perch, thus analyses were restricted to this species. Murray cod and yabbies are also sold through the Sydney and Melbourne Fish Markets, but there is a very substantial and variable proportion of the catch sold outside these markets, so the market data are not useful measures of the catch for these species.

The strong rise in reported catches of golden perch (discussed above) is also shown in records from the Melbourne and Sydney markets (Table 3). The Melbourne Fish Markets were corporatised in 1990, and the pre-1991 data were from a number of small markets for which the data coverage is unknown, thus the pre-1991 data for the Melbourne Market are not usable for our purposes. Because the Sydney and Melbourne market offer more favourable alternatives than the Adelaide market for South Australian fishers, the bulk of the SA catch of golden perch is sold in Sydney and Melbourne, so the combined SA and NSW catches need to be considered in attempting to validate the accuracy of fishers' returns.

The last two years of market data indicate that the catches as reported by NSW and SA fishers are at about the level that would be expected from the market data, with market throughput representing about 80% of the NSW and South Australian reported catches of golden perch. For 1993/94, there is some indication that the fishers' returns understated the actual catch, as market throughput equalled reported catches, however this is not conclusive because sales outside the official Sydney and Melbourne markets could have been offset by sales through the markets of fish caught by unlicensed operators. The number of buyers in Melbourne declined when tax-file legislation was introduced in 1993.

### ***Recreational Fishing***

Another issue raised in many studies of inland fisheries in Australia is the paucity of data on recreational catches (see e.g. Pollard *et al.* (1980), Walker (1983), Appendix 1). No comprehensive data are available for either the NSW or SA fisheries. From the limited studies which have been completed, it is known that the participation rate in fishing activities for freshwater species is very high. Pepperell (1996) estimated that in the year to April 1996, 265,000 anglers in NSW fished exclusively in freshwater. Estimates of the number of anglers who fished in both fresh- and salt-water were not available from this study. Rohan (1979) commented on the general lack of information on the recreational fishing effort in the South Australian river fishery, but supplied an estimate of 2,569 to 2,860 drum-nets used for "recreational purposes" in 1986. Note that this was more than double the maximum total number of drum-nets available for use in the NSW commercial fishery in that year. Poole (1984) cited data from a 1983 report on the SA fishery, which estimated that around 69,000 people (of an estimated total recreational fishing population of 290,000) fished in freshwater areas, including the Murray, outside of the metropolitan area. Collins (1976), in reporting results of a survey of inland fishing licence holders, estimated that 27% of the time spent fishing by inland recreational licence-holders was targeting non-salmonids. In a study of the recreational fishery of Lake Keepit (on the Namoi River, NSW), Battaglione (1986) estimated the annual catch as 52 tonnes from the storage for the 1981/82 season, comprising 94% golden perch and 5% catfish. These studies

clearly point to the significance of the recreational catch, and the need for a comprehensive survey of the recreational fishery to establish reliable estimates of catches from current recreational fishing activities.

***Significance of illegal fishing*** - The issue of illegal fishing has been a long-standing problem, which has been raised since the very beginning of records for the inland fishery, and is still a significant and perplexing problem to management authorities and legitimate fishers (see numerous examples in Appendix 1 of this study, Langtry's investigations as reported in Cadwallader 1977, Walker 1983, continued illegal use of wire traps discussed in Murtagh, 1994). The basic problem is the vast area of waterways, which are very difficult to monitor for illegal activity with the existing resources available. The increase in accessibility of inland waters with the advent of 4WD vehicles and outboard motors, are factors which have provided difficulties in reducing the illegal catch in this fishery, and recent strong increases in the value of golden perch, Murray cod and yabbies have provided further incentives for illegal fishers.

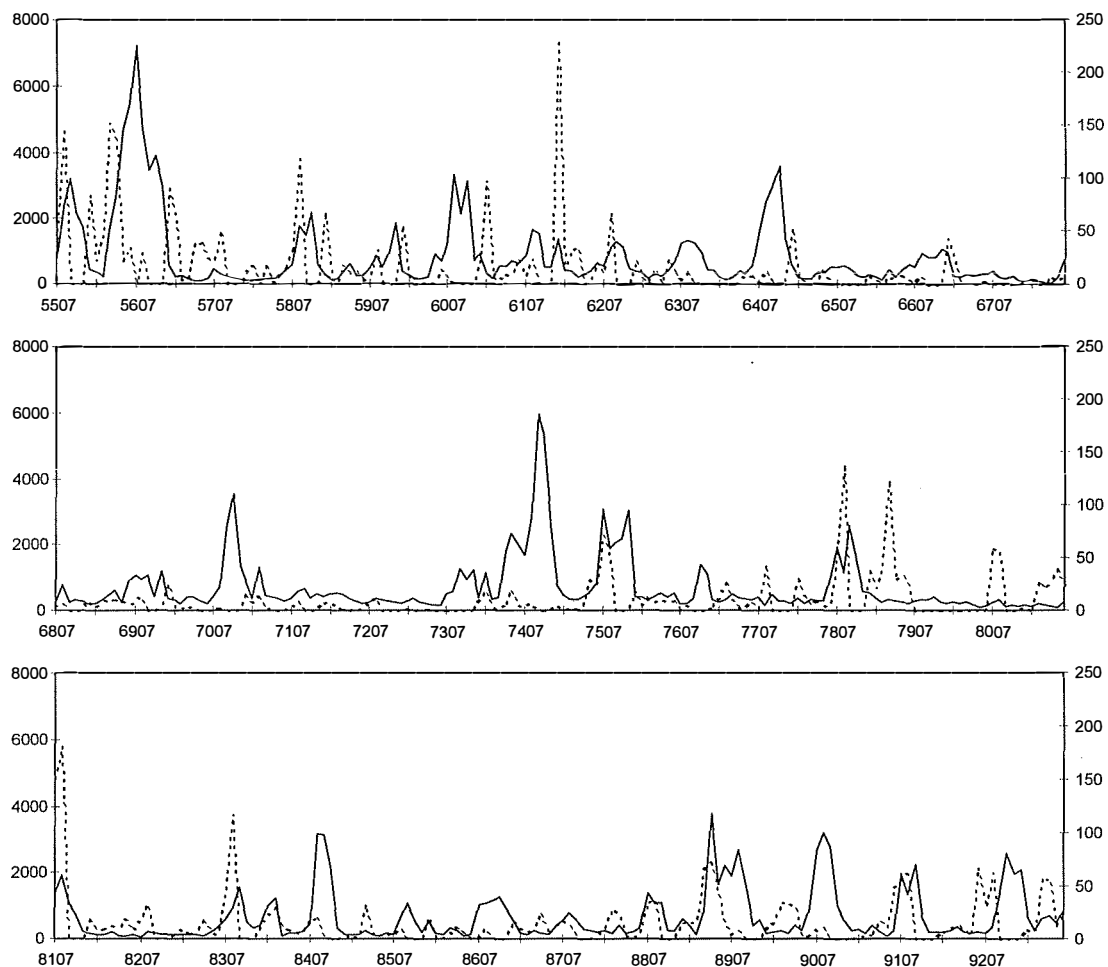
#### ***Relationship between catches and water flow/height***

A number of studies have hypothesised a relationship between catches of golden perch and river height or flow: Reynolds (1976b), Cadwallader (1978), Pollard *et al.* (1980), Cadwallader and Lawrence (1990), Walker and Thoms (1993), Davison (1995). These studies have pointed out the strong correlation between the time series of catches of golden perch and river heights near the catch location.

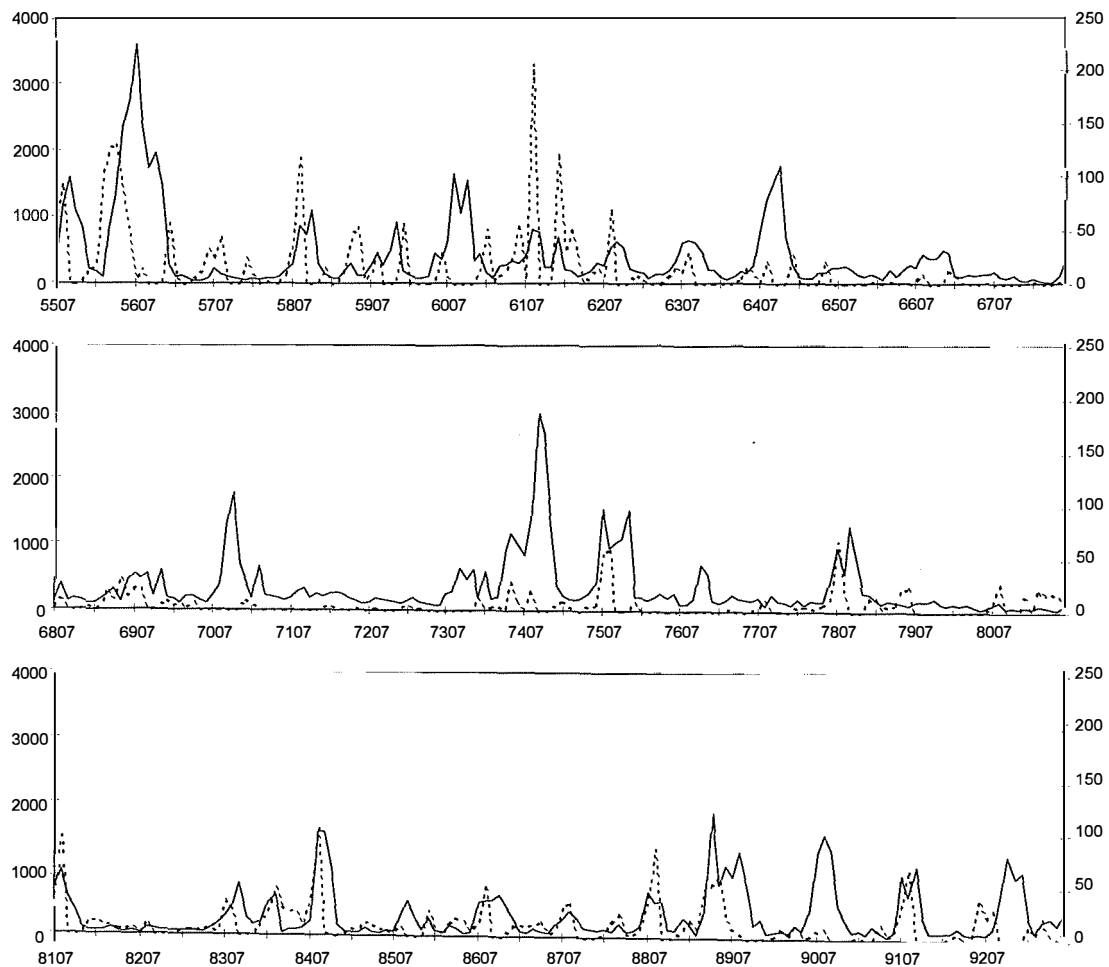
Flow data for analyses carried out for this study were provided by the NSW Department of Land and Water Conservation (Pinneena 5 software), and by the Murray Darling Basin Commission for the drainages not covered by the Pinneena database. Examples are given in Figures 15-17, which show plots of river flow and catches of golden perch, Murray cod and yabbies in the Murrumbidgee drainage zone. The plots for Murray cod and golden perch cover the period 1955 to 1993, while that for freshwater yabby covers the 1981-1993. These analyses confirm the strong relationship between flow and catches of golden perch, Murray cod and yabbies. The two aspects of the relationship between water level (or flow) and catches are: (a) the effect of flooding on recruitment; (b) the effect of flow (and water level or stage) on the catchability of fish. Effect (b) is apparent in the time series from the present and previous studies; peaks in catches are closely associated with significant increases in water level. The effect of floods on recruitment is a more complex issue which is discussed the following section.



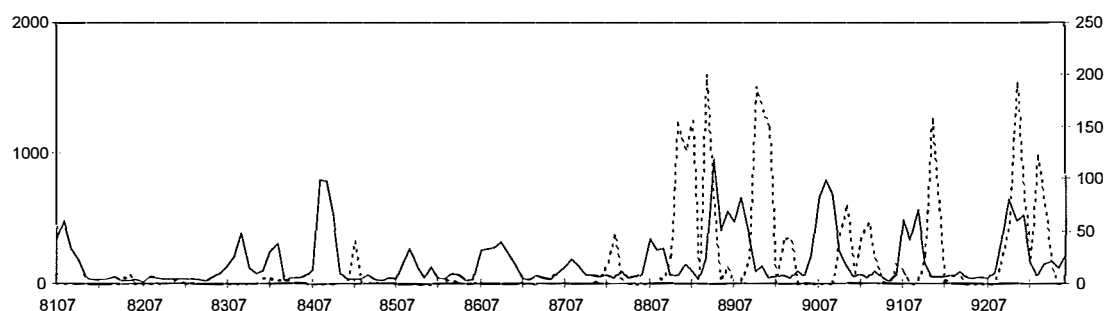
**Figure 15:** Monthly catches of golden perch (kg) in the Murrumbidgee River (dotted line) and daily flow (Megalitres  $\times 10^4$ ) over the period 1955 to 1993.



**Figure 16:** Monthly catches of Murray cod (kg) in the Murrumbidgee River and daily flow (Megalitres x 10<sup>4</sup>) over the period 1955 to 1993.



**Figure 17:** Monthly catches of freshwater yabby (kg) in the Murrumbidgee River and daily flow (Megalitres x 10<sup>4</sup>) over the period 1981 to 1993.



## DISCUSSION

A number of factors have been put forward as possible reasons for the decline in the fishery for native species in the Murray-Darling basin: the effects of commercial and recreational fishing, environmental changes, and the direct and indirect effects of alien species. The freeze on the issue of new commercial licences since 1983 has meant the fishing effort of the commercial sector is stable or declining. Environmental impacts on the river systems have been favoured as the most pervasive influence by a number of workers. Extensive river regulation has resulted in barriers to fish migration, changes in river flows and temperature regimes and reduction in water quality. Other activities such as desnagging and channelisation have also adversely affected fish habitat. The effects of carp on native fish stocks are currently being investigated in a number of projects.

Walker *et al.* (1995) make a number of observations which are very relevant to the present study, including the very long temporal scale which applies to the biological response to regulation of a large dryland river system such as the Murray-Darling. One of their important conclusions is that because the flow regime is unstable within a 50-year time-frame, changes in physical responses of the lower Murray to weir construction are still incomplete, hence a time-span of 100-200 years may be required to represent the ecosystem response adequately. The suggested strategy to address this problem is to consider “the trajectory (of the ecosystem) more than its status at merely a few points in time and space” (p.88). This point underlines the urgent need to improve the level of information collected on the fishery if progress is to be made in understanding the nature of the fish stocks of the Murray-Darling. In discussing the flood-pulse concept, Walker *et al.* (1995) point out the potentially complex character of a flood pulse, including the following observations: big floods are likely to result in extensive recruitment of river and floodplain species (see also the discussion in Gehrke *et al.* 1995); floods which are large enough to sustain recruitment may not do this if the flood timing is decoupled from temperature cycles and other spawning cues; species adapted to low-flow conditions may be displaced by suddenly increasing flows; successive floods may result in different recruitment responses than a pattern in which a flood year is preceded and followed by drought periods. This is confirmed by data from the the ICF dataset - successive flood years in the 1950s, 1970s and mid-1990s correspond to peaks in the catch series two to three years later.

Welcomme (1995, p.127) also provides insight into the general topic of the flood -

fish catch relationship, and particularly the importance of the flood history of the system. Walker *et al.* (1995) further note the possibility that the flora and fauna of dryland rivers managed for irrigation use could converge to a global standard, the same complement of species recurring in geographically remote, regulated systems.

The current project has corrected and analysed the available data for the NSW ICF, and has identified the information requirements for proper stock assessments of this fishery. The specific objective of the project (to test the dataset as an index of fish-stock abundance) could not be met, as at present there is no fishery independent measure of abundance. The very restricted geographic range of the commercial fishery also places severe limitations on inferences from the data in the context of the whole Murray-Darling system, even if complete age-based information were available from the fishery.

## **RECOMMENDATIONS**

### **It is recommended**

- that the paucity of data for the recreational catch of inland species be redressed;
- that more detailed, daily records of catches and effort be collected, and a sampling program for lengths/ages and other required biological information be undertaken, particularly for Murray cod and golden perch, in order to ascertain the status of inland fish in the currently fished areas of the Murray-Darling.

## **Benefits**

Information on the fish stocks of the Murray-Darling system is critical to the management of the New South Wales and South Australian inland fisheries and in the wider context of the management of the Murray-Darling System. Data from the project have already been supplied for information in the Yorta Yorta Native Title case, for Queensland Fisheries genetics studies (Clive Keenan), State of the Environment Report (NSW Department of Land & Water Conservation), Lachlan River studies (Jane Roberts and Brendan Ebner, CSIRO Division of Land and Water).

## **Intellectual Property and Valuable Information**

Data and analyses from this project will be published in the appropriate scientific literature. There is no information in this report of a confidential or commercially sensitive nature.

## **Further Development**

The authors recognise that NSW Fisheries has established a research group on recreational fishing, with a view to gathering information, on fisheries throughout the state. It is recommended that methods be established to evaluate catch and effort of recreational fishers in the inland waters of NSW.

### **Staff:**

J. H. Harris, Principal Scientist, Rivers Conservation, Principal Investigator  
D. D. Reid, Senior Biometrician  
G. A. White, Technical Officer (half-time 12/95 to 6/96)  
D. J. Chapman, Fisheries Technician (9/96 to 12/96)  
A. Kathuria, Fisheries Technician

### **Distribution:**

Fisheries Research and Development Corporation  
PO Box 222  
Deakin West ACT 2600

Cooperative Research Centre for Freshwater Ecology  
University of Canberra  
PO Box 1  
Belconnen ACT 2616

CSIRO Division of Marine Research  
Castray Esplanade  
Hobart Tas 7000

CSIRO Division of Land and Water

Clunies Ross Street  
Black Mountain ACT 2601

Department of Primary Industries and Fisheries  
Fisheries Research  
Cnr Hay and Harvey Sts  
Darwin NT

Mr H Davison  
Advisory Council on Commercial Fishing  
20 Wakoola Road  
Wakool Vic 2710

Fisheries Department of Western Australia  
WA Marine Research Laboratories  
PO Box 20  
North Beach WA 6020

Marine and Freshwater Research Institute  
PO Box 114  
Queenscliff Vic 3225

Murray-Darling Basin Commission  
GPO Box 409  
Canberra ACT 2601

Murray-Darling Freshwater Research Centre  
PO Box 921  
Albury NSW

Lower Murray Laboratory MDFRC  
PO Box 3428  
Mildura Vic 3502

NSW Department of Land and Water Conservation  
Office of Natural Resources Policy  
Level 5,  
3 Spring Street  
Sydney NSW 2001

NSW Inland Fishermen's Association  
PO Box 626  
Robinvale Vic 3549

Queensland Department of Primary Industries  
GPO Box 46  
Brisbane, Queensland 4001

Riverland Fishermen's Association Inc.  
82 Sixteenth Street  
Renmark SA 5341

South Australian Aquatic Sciences Centre  
SARDI  
PO Box 120  
Henley Beach SA 5022

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## APPENDIX 1

Summary of historical data and management issues affecting the inland fishery, extracted from reports of the NSW Fisheries Department, 1883 to 1954/55.

1883

Regulations for the Inland fisheries not covered to any great extent by Fisheries Act: Describes size of nets to be used, stipulating that the net should not be set wholly across a river or creek. Also gives the minimum weight of fish to be legally offered for sale, but gives no power to close waters against the use of fishing nets. No requirement for fishing licences or fees.

Monthly catch figures from Moama to Melbourne.( quantity of fish consigned by rail, no species information).

1884-86

Inland fisheries poorly protected by the Fisheries Act. The decrease in catch from 1883 to 1886 attributed to the high state of the waters and the vigour with which the Inspector has suppressed the use of destructive bag nets previously in use.

12 fishermen engaged in fishing and they are not required to pay any licence fee. A one pound boat licence fee introduced.

Monthly catch figures from Moama to Melbourne for 1884-5.

1886

Monthly quantity of fish exported from Murray River to Melbourne.

Inspectors report: increase in catches, attributed to the seizure and confiscation of several large bag nets and to the destruction of cormorants since 1st January 1886. About 12 men engaged in fishing, most of whom reside in Victoria, difficulty in policing illegal netting.

Principal fish species are Murray cod, trout, golden perch, silver perch. A large proportion were caught by gill nets and lines.

Most of the fishermen using night lines ; these lines are stretched right across the rivers with ten or a dozen hooks. They catch large Murray cod.

Suggestions for the protection of the Murray Fisheries, by Assistant Inspector Wilshire:

1. That power should be given to close from net fishing all waters within the counties of Cadell, Townsend and Wakool for a period not exceeding two years.
2. All fishermen to hold a licence, as well as having their boats licensed.
3. No bag nets allowed
4. No nets to be of mesh less than 4 inches.
5. No nets to be set within 14 feet of each side of water's edge.
6. No nets to be set within 500 yards of each other.
7. Netting to be prohibited in all lagoons.
8. No nets allowed to be doubled or set together.
9. A spawning season to be proclaimed and no netting allowed during that time.

1887

Monthly quantity of fish exported from Murray River to Melbourne.

Great improvement in the number of fish following introduction of the new Fisheries Act.

There are about 12 licensed fishing boats and 20 men employed in fishing. But these men do not fish all the year round.

7957 shags were killed, 1145 in 1886 and 933 in 1885.

‘These birds have most voracious appetite for small fish.’

1888

Closing of rivers and creeks against netting have been productive of much good.

There is every evidence of increase of various species. Bounties paid on 17000 shags.

Netting is entirely banned in rivers

Monthly quantity of fish exported from Murray River to Melbourne

1889

Prospects for the Murray and Edward rivers are said to be brighter than for years past , possibly attributable to the benefits accruing from amended legislation.

15500 heads of shags

Osbourne Wilshire (Deniliquin):

10 boat licenses, under which about 20 men are employed.

238 baskets were sent by rail from Deniliquin and Methoura and double this number were sent away from this district ( Deniliquin ) to Victoria by the way of Koondrook, Gonn and Swan Hill.

Moama Report:

“I am sorry that I am unable to furnish any statistical information as to the quantity of fish caught in the waters under my supervision. The only way I could get something of an approximation would be to get a return from each of the Victorian railway stations from where fish is taken from the Murray to Melbourne and other towns in that colony. The local consumption is very small compared to the large quantity exported.”

Monthly quantity of fish exported from Murray River to Melbourne

1890

Nearly all the fishermen have their homes in Victoria, evade license regulations and use illegal nets.

Narrandera: the river is protected against netting for a distance of 7 miles on each side of the town.

Monthly quantity of fish exported from Murray River to Melbourne

9223 heads of shags (John Manton)

(Osborne Wilshire): Opening of Swan Hill station mentioned.

10319 heads of shags in his district.

16 boat licenses

1891

Monthly quantity of fish exported from Murray River to Victoria.

Wilshire:

During the year 1891 there were 162 baskets of fish sent to the Victorian markets by the way of the Deniliquin and Moama Railway company, the gross weight of which was 6 tons 10 cwt 2 qtr, (=6630kg, 41Kg/basket),but this does not represent the quantity caught even by those who follow fishing as an occupation. A very large quantity is sent away to Echuca and thence by rail to various towns in Victoria and

much more is caught on the lower portions of the district and forwarded either via Koondrook or Swan Hill to the same place. From the last named place I estimate at least 20 to 30 tons of fish caught in the Murray and adjacent anabranches, lakes and lagoons on this side of the main stream are annually sent away. Besides there is an immense quantity caught by those who follow angling as a pleasure, so that a fair estimate of the quantity of fish caught within the year would be about 1000 baskets (=41tonnes).

There were 11 boats licenses issued last year.

1892

The quantity of fish exported to Victoria was 30,092 lb via Moama and 26600 lb via Koondrook making a total of 56692 lb or over 25 tons but fish of which account cannot be obtained are sent via Barmah, Tocumwal, Cobram, Yarrawonga, Corowa and other points along the Murray River. It is thought that 120 tons would not be too high an estimate of the weight of fish captured and exported besides the quantity destroyed in the nets and fish boxes through long confinement and overcrowding. Both inspectors Wilshire and Manton have been using their best efforts in protecting these fisheries but they are continued to be placed at a great disadvantage by fishermen on the Victorian side of the river who being outside the jurisdiction of NSW are in a position to infringe law almost at pleasure.

Monthly quantity of fish exported from Murray River to Victoria via Moama and Koondrook (separately).

8 boat licenses.

1893

Reports returns from Moama and Koondrook, two principal centres on the Murray River from which Victoria draws her principal supply of fish. There is a substantial decrease in the quantity of fish captured. We have no account of the distribution made from numberless points along the extensive course of this river or the supply obtained on the Victorian side, so that we are quite unable to estimate whether the lessened quantity reported from the two sources named represents actual diminution. Monthly quantity of fish exported from Murray River to Victoria via Moama and Koondrook (separately).

(Inspector Wilshire and Manton are no longer with Inland section of the Department.)

1894

“The Inland Fisheries Act is very defective, as was pointed out by the Commissioners in 1891 and up to the present our suggestions have not been carried out.”

Monthly quantity of fish exported from Murray River to Victoria via Moama and Koondrook (separately).

1895

The returns from Moama and Koondrook showed an increase out of which 2413 lb were sent to the Woolloomooloo markets during the year.

We note with regret the number of Murray cod which have been sent to market in full roe and think the time has come for restrictions to be placed upon the fish being caught at those periods when the spawning is at hand, the Victorian authorities having taken in hand the matter of protecting the Murray River in conjunction with this colony.

Monthly quantity of fish exported from Murray River to Victoria via Moama and

Koondrook (separately)

1896

The decrease in the quantity of fish sent to Victoria is caused through excess netting activities.

Closure of the river from 1<sup>st</sup> of July to the 15<sup>th</sup> of October.

Quantity of fish exported from Murray River to Victoria via Moama and Koondrook reported.

1897

Increase in the fish caught due to the closure.

Bulk of the fish caught on long lines stretched across the river with a number of hooks attached.

Monthly quantity of fish exported from Murray River to Victoria via Moama and Koondrook (combined).

1898

The fish forwarded are principally of the cod species. The past year has not alone been disastrous to stock and cultivations but has been terribly disastrous to fish life in the waters of the interior. Thousands of fish have been reported to have died as a result of river stopping running and lakes drying up.

Attention of the Commissioner has been drawn to the fish traps used in various inland rivers which are of a very objectionable character and from their manner of working tend to prevent the free passage of fish up and down the river.

Monthly quantity of fish exported from Hay, Wagga, Bourke, Wellington, Forbes and Gunnedah to Sydney ( in t c q lb).

Monthly quantity of fish exported from Swan Hill, Moama and Koondrook to Victoria

1899

Endeavours have been made to obtain live codfish during the spawning season with a view to taking the spawn and hatching the ova so that the species of fish might be introduced into some of the rivers of the coast.

There is nothing absolutely known about the spawning time of codfish. Information from practical fishermen revealed that it is from October to January.

Monthly quantity of fish exported from Swan Hill, Moama and Koondrook and Mulwala to Victoria

Monthly quantity of fish exported from Hay, Narrandera, Wagga, Bourke, Nyngan, Dubbo, Forbes, Gunnedah, Narrabri and Corowa to Sydney.( in t c q lb), some in January no figures (or zero ?) in February and December. Otherwise monthly figures given.

1900

Monthly quantity of fish exported from Swan Hill, Moama, Koondrook and Mulwala to Victoria

Monthly quantity of fish exported from Hay etc. to Sydney.( in t c q lb) March to November.

1901

In some of the inland rivers, traps which consist of wire netting in the shape of boxes



with extended funnel shaped entrances, are placed about midstream in the rivers and wire netting wings are connected from the trap to each bank.

Another difficulty with the Inland Waters Act is that Murray cod and other fish in the Murray River may be protected from being caught by nets but there is nothing to prevent their capture by line where the waters are closed.

Monthly quantity of fish exported from Hay and Bourke to Sydney ( in t, cwt, qtr, lb) March-October.

Monthly quantity of fish exported from one town of the interior to the other (in t, cwt, qtr, lb ) April-October.

Monthly quantity of fish exported from Albury, Corowa, Swan Hill, Moama, Barham Crossing and Mulwala to Victoria

1902

Monthly quantity of fish exported from Albury, Corowa, Swan Hill, Moama, Barham Crossing and Mulwala to Victoria.

Monthly quantity of fish exported from Hay and Bourke to Sydney and to Dubbo and Orange (in t, cwt, qtr, lb) in April May June July August September October November for Sydney and April May June for others.

1903

Complaints received from the residents of various inland rivers and lakes regarding the great destruction to fresh water fish by cormorants.

Owing to decrease of Murray cod in the Western waters, a close season was declared against fishing in general and by any method of capture from the 1st of September to the 20th of December to give absolute protection to fish during the spawning season.

Monthly quantity of fish exported from Albury, Corowa, Swan Hill, Moama and Mulwala to Victoria (in t, cwt, qtr, lb).

Monthly quantity of fish exported from Hay to the interior of NSW (in t, cwt, qtr, lb) in April May July.

1904

Monthly quantity of fish exported from Albury, Corowa, Swan Hill, Moama and Mulwala to Victoria (in t c q lb).

Monthly quantity of fish exported from Hay to the interior of NSW and Sydney.( in t, cwt, qtr, lb) only March April June.

1905

With regard to the resolution adopted by the interstate conference on Murray River fisheries that pike and non indigenous fish of a predacious nature should not be introduced into the state without the permission of the state fisheries authorities, the collector of customs was requested to notify any proposed introduction of such fish and the Commonwealth Government was requested to issue a proclamation prohibiting the introduction of such fish.

Conference on Murray River fisheries decided on an absolute closure for the two months of October and November.

A conference of representatives of the States of NSW, Victoria and SA met at Melbourne on the 3-4th of August to deal with Murray River fisheries.

Monthly quantity of fish exported from Albury, Corowa, Swan Hill, Moama and Mulwala to Victoria (cwt).

1906

Monthly quantity of fish exported from Albury, Corowa, Swan Hill, Moama and Mulwala to Victoria (cwt)

1907

In the returns published in the Appendices of export of fish for 1907 to Victoria the following transfers of Murray cod from Murray River are included (via Moama and via Swan Hill) in cwt.

1908

In the returns published in the Appendices of export of fish for 1908 to Victoria the following transfers of Murray cod from Murray River are included. (Via Moama and via Swan Hill, Mulwala and Corowa) in cwt.

Consideration was given to the question of establishing an inter-State hatchery for Murray cod.

1909

In the returns published in the Appendices of export of fish for 1907 to Victoria the following transfers of Murray cod from Murray River are included (via Moama and via Swan Hill) in cwt.

Several Murray cod, perch and catfish were caught and labelled by fixing a small silver disc bearing a distinctive number on each fish and the fish were then returned to the water.

1910

From the evidence forthcoming it would seem that many reports of the destruction of fish life by cormorants have been grossly exaggerated. Their food consists generally of non-economic kinds of fishes of the smaller kinds.

1913

Return of fish sold at the Metropolitan Markets and at the Newcastle (Murray River 344.5 baskets

1915

In the Murrumbidgee and its tributaries, where the drought has brought great destruction, Murray cod and Golden Perch were dying in countless numbers in a number of water holes in Yanko Creek.

Darling River investigations recommended that the mesh size of drum nets used in those waters be increased to 6 inches.

Fresh water fish consigned by rail from a number of stations, no monthly figures.

Returns of fish and crustaceans consigned to Sydney markets including quantity sold at Sydney, Manly, and Newcastle without passing through the markets.

Capacity of a basket of fish is taken as 84 lb.

1916

The eggs of Murray cod and golden perch were artificially fertilised and hatched. A successful transplant of Prussian Carp to Lake Windermere was conducted early in the year.

Investigations in various parts of the State having revealed that fish were becoming alarmingly scarce it was recommended that the regulations governing fish nets for use

in western waters be revised making 6 inch the legal mesh of drum nets.  
The number of nets that may be used by any one fisherman is restricted to twenty.  
Murrumbidgee River at Hay had five professional fishermen working but not  
regularly.

The use of drum nets in narrow portions of the river was said to be causing serious  
depletion of the waters, but it was shown that in setting these nets space was allowed  
for fish to pass them and no breach of the regulations was committed.

The question of total prohibition of net fishing in the river Murray was discussed. It  
was pointed out that this would result in the unrestricted liberty of the large cannibal  
Murray cod whose voracity probably caused greater destruction of the fish life than  
any other agency.

Records of fish consigned from inland railway stations (15 stations and annual figures  
for them), plus returns of fish and crustaceans consigned to Sydney markets  
including quantity sold at Sydney, Manly, and Newcastle without passing through the  
markets.

1917

Regulations under the Fisheries Act 1902 and the Fisheries Amendment act 1910,  
were amended and a number of new regulations adopted which come into force on  
the 11th may 1917.

Transplantations of Macquarie perch were to have been conducted early in the year  
but was not possible due to unexpected rise in the river.

The work for the artificial propagation of Murray cod and Golden Perch in the spring  
of 1916 was resumed in October under abnormal weather conditions (no apparent  
success ).

The use of wire netting fish traps in the inland waters of this state both east and west  
of Great Dividing Range was prohibited.

Figures were only given for fish and crustaceans consigned to Sydney markets  
including quantity sold at Sydney, Manly, and Newcastle without passing through the  
markets.

1918

In some cases closures were effected against the use of nets only; whilst in others in  
addition to these methods the use of drum or hoop net having a minimum mesh of 6  
inches was authorised. Sections of the principal western rivers in the vicinity of the  
main towns were closed for practically the whole course of the year against various  
methods of fishing. With the objective of conserving that most estimable and  
economically valuable fresh water fish, the Murray cod the whole of the waters of the  
state west of the Great Dividing Range were closed during the months of October  
and November against all methods of fishing other than rod and line or hand-line with  
one hook.

Wire netting traps for the capture of fish in the waters beyond tidal influence on the  
east of the Great Dividing Range are now permanently prohibited.

Records of fish consigned from inland railway stations (annual figures for them)  
and returns of fish and crustaceans consigned to Sydney markets including quantity  
sold at Sydney, Manly, and Newcastle without passing through the markets.

1919

Various measures of protection ranging from closures against every method of fishing  
whatsoever to a minimum of restriction. Handline or rod and line with one hook were

the only methods allowed in certain inland waters, whilst some such waters were only restricted to the use of drum or hoop nets of not less than 6 inch mesh and single rod and line and hand line with one hook during part of the year and were closed against the use of meshing nets during another period. In other cases prohibition was in respect of the use of nets only. Some closures were for several years, whilst others were for one year and less, so as to meet special supervision.

Owing to severe drought which prevailed over the greater part of western NSW the operations of the inland fisheries staff were severely hampered.

A list of the cormorant rookies in the state is in course of preparation with a view to destroying the birds, eggs and young at nesting time and the Colonial Treasurer has provided funds for the destruction of the birds.

Records of fish consigned from inland railway stations (annual figures for them) And returns of fish and crustaceans consigned to Sydney markets including quantity sold at Sydney, Manly, and Newcastle without passing through the markets.

1920

Same protection measures as above.

Trout could be taken by lawful process during the month of November.

Inland Fisheries Inspector's report, Narrandera:

About 5 cwt of fish is sold for local consumption weekly, and a like quantity is consigned by train to market. Four ice-making plants whose product is supplied at an average price of 8s. 6d. per cwt. Fish were fairly plentiful, the average earnings by fisherman being 5 pounds per week.

IFI report Albury:

Large quantities of fish are consigned from Victorian stations but none from Albury, where the local consumption is 400 to 500 lb weekly. Fishermen's earnings range from 3-7 pounds per week.

Records of fish consigned from inland railway stations (annual figures for them) and returns of fish and crustaceans consigned to Sydney markets including quantity sold at Sydney, Manly, and Newcastle without passing through the markets.

1921

A large number of fishermen operating on the Murray and consigned great quantities of fish into Victoria and South Australia.

Great number of English perch and carp were netted in shallow waters near Corowa and Albury while indigenous fishes were in negligible quantities. The various English perch is rapidly increasing in numbers in the Murray River and adjacent creeks and is becoming a serious menace to the fishery.

Murrumbidgee river and tributaries - local consumption was about 10,000 lb and 22400 lb were consigned by rail.

Records of fish consigned from inland railway stations (annual figures for them) and returns of fish and crustaceans received at Commonwealth cooperative fish exchange, Redfern and the Sydney Municipal market also figures for condemnations (baskets).

1922

The unsuitability of the Commonwealth Cooperative Fish Exchange at Redfern and the abuses which had grown in the sale of fish at that centre, culminated on 29th November 1922 in assent being given to the Sydney Cooperative (Fish markets) Act 1922, empowering the municipal council of Sydney to acquire the assets of the fish

exchange referred to and to dispose of the same to authorise the said council to establish fish markets throughout a certain defined area within the county of Cumberland and to regulate the same to regulate the sale of fish by wholesale or by auction in the said county.

Records of fish consigned from inland railway stations (annual figures for them) and returns of fish and crustaceans received at Metropolitan Markets, together with condemnations (in lb).

1923

Same conservation measures as in 1920.

With a view to the conservation of Murray cod and golden perch the annual close season in October and November against all methods of capture except for the capture of trout in November by lawful process in the head waters of various streams was renewed.

Inspector of Fisheries at Narrandera was transferred to Hay from which centre the important fisheries of lower waters of Murray, Murrumbidgee and Darling River can be more easily supervised.

Albury district:

Earnings of fishermen 5-20 pounds a week.

Hay:

About 10 tons of fish consumed locally and 220 tons consigned from waters within the patrol area. Fishermen earned an average of 2 pounds and 10s per week.

Only returns of fish and crustaceans received at Sydney Municipal Fish Markets including market condemnations. (In lb and baskets)

Capacity of a basket of fish is taken as 70 lb.

1924

Conservation measures same as above.

Albury patrol district embracing Murray River and tributaries downwards from its source to confluence of Murrumbidgee river; Murrumbidgee river and its tributaries from its source downwards to outflow into Yanco Creek, Lachlan river and tributaries from Hillston upwards, including lake Cargellico, Darling and Barwon Rivers from Louth upwards.

Fishermen earned between 5-8 pounds per week

Hay patrol district: embracing Murray River and tributaries from confluence of Murrumbidgee river to South Australian border, Murrumbidgee river from Yanco Creek downwards, Lachlan river from Hillston downward, Darling River to 150 miles from confluence with Murray River.

Earnings of fishermen is 3 pound 10s per week.

Records of fish consigned from inland railway stations (annual figures).

Returns of fish and crustaceans received at Sydney Municipal Fish Markets including market condemnations (lb) just one total figure for condemnations.

1925

The inspector of fisheries at Hay was transferred to a coastal station.

The inspector of Inland Fisheries at Albury supervises the Murray, Murrumbidgee and Darling River and tributaries. The average earnings per fishermen approx. 6 pounds 10s. per week. Many follow other occupations during portion of the year, but a few earn their livelihood exclusively by fishing.

Returns of fish and crustaceans received at Sydney Municipal Fish Markets including

market condemnations (lb), just one total figure for condemnations.

1926

Total prohibition of net fishing over a very large area in Murrumbidgee River was urged by the residents of Hay district through their parliamentary representatives. The request was refused. A similar request by the residents of Forbes for Lachlan river was also refused.

Earnings of fishermen from 5-8 pounds per week on an average.

Records of fish consigned from inland railway stations (annual figures).

Returns of fish and crustaceans received at Sydney Municipal Fish Markets including market condemnations (lb), one total figure for condemnations.

1927

Reiterated statements were received from shire and municipal council and anglers that Murray was sadly depleted and prohibition of net fishing was urged.

Attempts were made to fertilise the ova from trout cod with the milt from male silver perch but without success.

Fisheries inspectors report at Albury:

About 600 lb of fish were consumed weekly at Albury . No fish consigned by rail from this station.

Earnings of fishermen 5-9 pound per week.

Records of fish consigned from inland railway stations (annual figures).

Returns of fish and crustaceans received at Sydney Municipal Fish Markets including market condemnations (lb).

1928

1929

Fisheries inspectors report at Albury:

Average quantity of fish consumed locally was 400 lb weekly. Murray was very seriously polluted due to Hume weir storage, but fish are not affected thereby.

Anglers are very seriously contributing to the depletion of our rivers ; many kill every little fish captured, failing to realise that such are the prospective spawners and 120 pounders.

Records of fish consigned from inland railway stations (annual figures for them)

Returns of fish and crustaceans received at Sydney Municipal Fish Markets. (In lb).

1930

Murrumbidgee and Murray Rivers are becoming very weedy due to weirs and locks retarding the flow.

Fisheries inspectors report at Albury:

Average quantity of fish consumed locally was 300-400lb weekly. No locally captured fish was consigned to markets. Earnings 5-6 pounds per week. Since the water has been backed up by Hume weir cormorants have collected in great numbers and new rookeries have been observed. The birds appear to destroy a large number of outlawed English perch.

Records of fish consigned from inland railway stations (annual figures for them)

Returns of fish and crustaceans received at Sydney Municipal Fish Markets.

Condemnations are included in the figures given.

1931

The majority of the fish captured were consumed locally, facilities existing only in a few centres for marketing the catch. Fish were plentiful during the year and licensed fishermen earned 5-6 pounds per week. Very good sport the best for many years was obtained by amateurs, Murray cod and golden perch were never having been so plentiful. Towards the end of the year many cod up to 70lb in weight were caught, mostly with a spinning bait, and large number of English perch up to 4-5lb were captured, it being a **common occurrence for anglers to catch from 100 to 200 of these fish in an afternoon's fishing.**

Records of fish consigned from inland railway stations (annual figures).

Returns of fish and crustaceans received at Sydney Municipal Fish Markets. (In lb).

1932

Certain inland waters were closed against the use of fishing nets and others against the use of nets and lines. In a number of trout waters closures were effected against all methods of fishing during the trout close season, whilst between seasons the use of single rod and line (in most cases with two hooks) was allowed.

A trout close season from the 14th April to the 30th October in the years 1932 to 1935, inclusive, were declared, provided that if in any year Easter Sunday should fall on or later than 13th April, the close season would commence on the Wednesday, inclusive, next following Easter Sunday in that year.

For the conservation of indigenous fishes, the whole of the western waters of the state were closed during October and November against all methods of fishing, except a single rod and line or hand-line with not more than two hooks attached.

Drum nets and meshing nets prescribed as lawful for use in inland waters were declared to be the only nets lawful for use in the western waters of the state, except in the Murrumbidgee irrigation area where a 3-fathom hauling net of 1½ inch mesh size may be used for stipulated period.

Owing to the closing down of Albury station in January, following the resignation of inspector Gorricks, no definite information is available in relation to the activities of licensed fishermen in inland waters.

*The total for quantity of fish consigned by rail in NSW is incorrect (instead of 322245lb 312245lb is written.*

Records of fish consigned from inland railway stations (annual figures).

Returns of fish and crustaceans sold at Sydney Municipal Fish Markets. (In lb).

1933

No reliable data are available as to the total catch of indigenous fish, there is every reason to believe that an improvement was shown in this respect over the previous year.

The activities of the licensed fishermen at Burrinjuck reservoir have been causing the Department some concern, by reason of the fact that during the winter months great number of trout are caught in their nets and these which are usually dead when the nets are lifted are commonly sold with the other fish. The new regulation made in 1932, prohibiting under a penalty of 5 pound, the sale or possession, offering, exposing or consigning for sale of any trout caught otherwise than by rod and line was not completely effective, owing to the fact that it would be impossible to prevent the capture of any one species whilst the other species could lawfully be netted.

Commercial fishing was therefore proscribed in the Murrumbidgee River below its junction with Goodradigbee river (which has been closed for some time against all

commercial methods), and the use of nets in Yass River was restricted to the waters below Woolgarlo.

The annual close season for indigenous western fishes during the month of October and November was modified in view of the prevailing unemployment, to allow of the use during those months of a rod and line with not more than two hooks attached, in order that fish might be readily available as food to persons in necessitous circumstances, although sale was still prohibited.

Returns of fish and crustaceans sold at Sydney Municipal Fish Markets. (In lb).

1934

No reliable data are available as to the total catch of indigenous fish, there is every reason to believe that the catch was not less than during the preceding twelve months. The capture of trout in nets by professional fishermen at Burrinjuck Reservoir continued to exercise the minds of departmental officers, and it was decided that the use of nets in the stored waters of Murrumbidgee River upwards from Taemas bridge be restricted to the months of October to April inclusive.

Returns of fish and crustaceans sold at Sydney Municipal Fish Markets. (In lb).

1935

During the year the quantity of fish marketed in Sydney totalled 46,638 lb, but it is realised that the quantity represents only a very small part of the catch. The great bulk of the catch from Murray River and other southern streams is consigned to Melbourne or to other towns in Victoria, and no particulars are available as to the quantities so despatched. In addition considerable quantities were disposed of in the fishing centres.

Fisheries and Oyster Farms Act 1935.

Only total inland figure for fish market.

1936 and 6 months of 1937

The estimated output of fishermen working in inland waters (for 1936 and Jan to June 1937).

Licensed fishermen were required to give details of the quantities of each species of fish or crustaceans taken by them, and the place of capture, as it was realised that it is essential that the total catch of each of the more important commercial species in the various fishing centres should be known from year to year.

Conference held in Melbourne.

One figure for inland catch and one for Sydney fish market summary figures

1937-38

A further advance was made in February 1938, by the appointment of an inspector for the supervision of Murray River fisheries. It was agreed that all expenses involved in the appointment should be shared equally by the fisheries authorities of NSW and Victoria.

Information was collected on the biology of Murray cod and experiments were conducted in collaboration with Professor W.J. Dakin of the Department of Zoology, Sydney University, in the artificial propagation of the species. The experiments were carried out in the Murrumbidgee River and resulted in the fertilisation and hatching of the eggs of the cod. The fry were kept alive for a period of six weeks.

The results of the experiments were published by Professor Dakin and Mr. GL Kesteven, as Fisheries Bulletin No. 1.



Summary figures for catch and Sydney market sale.

1938-39

The reduction in the inland output was attributed to the closure on netting for more than nine months of the period in the greater part of Murray River due to very low level of the water following drought conditions.

The taking of fish by all methods was prohibited in all inland waters situated to the west of great dividing range during the months of September, October and November in each of the years 1938, 1939 and 1940, with the exception that during the months of October and November in each of the years in question trout may be taken by lawful means in the waters open to trout fishing by persons holding the necessary licenses.

Fishing nets of any kind were prohibited in the waters of the Murray River and its tributaries, with the exception of the Murrumbidgee River, Benanee Creek and Lake Benanee between Gol Gol and Albury from 9th Dec, 1938. These restrictions were extended to the Murrumbidgee River, Benanee Creek and Lake Benanee on 17th Feb, 1939, but the Lachlan River was not included in the closure which was rendered necessary owing to the low levels of the rivers. On 17th June 1939, the area of the closure was reduced to that portion of the Murray River and its tributaries between Barham and Albury.

Summary figures for catch and Sydney market sale

1939-40

Summary figures for catch.

1940-41

The decrease in the inland catch can be attributed to the extremely dry conditions existing throughout the state during the year.

Murrumbidgee crayfish was the cause of much destruction to Murray cod, the most important of our inland fishes. The amendment has the effect of permitting fresh-water crayfish of any size to be taken.

Owing to the decline in the supply of fresh-water fish available for public during the later winter months of 1940, brought but various causes mainly associated with the war, some of the waters (for names see report) were opened to the use of certain type of nets until the 30th Nov., 1940.

Summary figures for catch and Sydney market sales.

1941-42

Regulation 27 amended to allow of the use of not more than 15 drum nets, in lieu of 10 previously prescribed, in inland waters west of the Great Dividing Range.

Summary figures for catch Sydney market sales.

1944-45

The inland catch showed a decrease from the previous year. This may be attributed in some measure to the extremely dry conditions that have existed through-out the State during the past years. Possibly the shortage of fishing net has also had an effect in this regard as since a control was imposed in May 1944, releases only being granted to full-time commercial fishermen.

Summary figures for catch and some break-down by species, also some effort information.

1945-46

Summary figures for catch and some break-down by species, also some effort information .

1947-48 onwards:

Catch by species by waters

Catch by species by months

1954-55

Fish Farming :

Preliminary steps are taken for experiments to be carried out in Swan Hill and Inverell districts next spawning season in connection with the artificial propagation of Murray cod and callop.

**\*\* The productivity of Inland waters have progressively increased during recent years which may be due to good seasons and full rivers.** Water conservation measures are also changing the character of these fisheries. The large water holding areas and backed up waters with cooler temperatures favour English perch and Callop.

**The important factor which must be borne in mind in estimating productivity of the fisheries is the increasing fishing intensity of the amateur fishermen whose combined annual catch cannot be measured.** The popularity of inland fishing resorts has increased tremendously since the war and the almost general use of motor car is in no small measure responsible.

## Lake George

In the 1883 annual report Lake George was described as a magnificent sheet of water, 22 miles in length with an average width of 9 miles and a mean depth of 8 feet. In 1854 the lake was almost dry, consisting of only a chain of ponds, waters being replenished by the flood of 1862. In 1883 the lake was "full of Murray cod". At that time only one fisherman operated in the lake, and it was noted that he sometimes secured "several hundredweight of fish in a week", but no definite figure is given for the catch.

The need to develop Lake George as an important source of freshwater fish for the Sydney market was stressed in a number of reports. Generally there was only one fisherman operating in the lake, with a maximum of three licensed fishermen (Table A1.1). From 1887 to 1891 monthly catch figures are available (Table A1.2). It can be seen that few fish were landed in June, July and August. It is mentioned in the 1887 report that the fishermen used very poor gear, but nevertheless obtained large quantities of fish. The fishermen complained of poor catches, but it was stated that this was because of the nets they used were not large enough (1888 Report). In the 1889 report it was mentioned that only one fisherman was fishing the lake and he used very crude and incomplete gear. The only catches were with cross lines with hooks placed 6 feet apart. The only fisherman operating in the lake confined his operations to the deep creek (or Butmeroo) and its entrance. This creek was the

principal affluent to the lake and it was a spawning site for fish. It was emphasised that the method for catching fish was not appropriate and not many fish were caught, so, experiments should be done to find out a suitable method for catching fish, e.g. otter trawl or seine, trammel and gill nets. Experiments for artificial propagation of Murray cod were also mooted.

In 1890 only 2700 lb fish were caught which was less than the previous years. The Bulmaroo Creek and a portion of the lake against was closed against net-fishing and it was mentioned that there was increase in the supply both of large and small fish.

In 1891 it was reported that the supply of fish at the lake increased considerably, coinciding with very high water levels. The number of small carp was increasing rapidly.

In the 1897 report it was mentioned that there was no regular fishing carried on Lake George although the waters were said to be full of fish. The total catch for the year “did not exceed 500 lbs”.

*‘Lake George and other lakes which at one time promised to become factors in the supply of fish to the metropolis, have suffered very severely, and in fact the water in several lakes has quite disappeared. The lake is 15 miles from north to south av. depth of 5 feet, water is quite brackish and unfit for drinking purposes. There was no professional fisherman as the waters offer little inducement to fishing as a livelihood. Mr. Patrick Osborne was appointed as senior constable’ (1898 report).*

In the 1899 report it was stated that *‘drought has had a disastrous effect on fish life in Lake George. The lake is about 10 miles in length with an average width of 3 miles and a mean depth of 3 feet. The water is quite brackish and unfit for drinking purposes and all the codfish are reported to be dead’.*

**Table A1.1:** Number of fishermen and catch (lbs) for lake George.

<b>Year</b>	<b>No. of fishermen</b>	<b>Catch</b>
1883	1	na
1884	-	na
1885	-	na
1886	3	na
1887	2 (half time)	6214.7
1888	3	2383.2
1889	1	1625.7
1890	1	1224.7
1891	-	906.7

**Table A1.2** : Monthly catches (lbs) from Lake George for the period 1887-91.

<b>Year</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>	<b>Total</b>
<b>1887</b>	861.8	841.9	873.6	877.7	136.1	0	0	0	589.7	812.8	914.4	306.6	6214.7
<b>1888</b>	355.6	512.6	362.9	272.2	249.5	0	0	0	45.4	186.0	108.9	290.3	2383.2
<b>1889</b>	365.6	95.3	77.1	86.2	56.7	0	0	15.0	149.7	385.6	149.7	244.9	1625.7
<b>1890</b>	208.7	158.8	127.0	0	0	0	0	0	0	340.2	181.4	208.7	1224.7
<b>1891</b>	158.8	0.0	0.0	0	0	0	0	0	0	140.16	408.2	199.6	906.7

Table A1.3: Consignments of fish from NSW and Victorian railway stations 1883 to 1933 (kg)

Year	Stations														
	Total	Moama	Koondroo	Swan Hill	Mulwala	Albury	Corowa	B'ham Cr	Brew'rina	Bourke	Balr'ld	Bann'ton	Boon'ar	Bown'g	Bringagee
1883	149943	149943	.	.	.	.	.	.	.	.	.	.	.	.	.
1884	70723	70723	.	.	.	.	.	.	.	.	.	.	.	.	.
1885	33453	33453	.	.	.	.	.	.	.	.	.	.	.	.	.
1886	21241	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1887	25122	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1888	47429	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1889	13899	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1890	18178	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1891	14216	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1892	25715	13650	12066	.	.	.	.	.	.	.	.	.	.	.	.
1893	21792	12629	9163	.	.	.	.	.	.	.	.	.	.	.	.
1894	24638	13066	11572	.	.	.	.	.	.	.	.	.	.	.	.
1895	29064	17997	11068	.	.	.	.	.	.	.	.	.	.	.	.
1896	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1897	8638	8638	.	.	.	.	.	.	.	.	.	.	.	.	.
1898	77303	9736	3810	63757	.	.	.	.	.	.	.	.	.	.	.
1899	44264	1455	1202	40997	610	.	.	.	.	.	.	.	.	.	.
1900	106872	9949	786	93587	2550	.	.	.	.	.	.	.	.	.	.
1901	64210	1909	.	57153	203	720	.	4224	.	.	.	.	.	.	.
1902	50690	644	.	50046	.	.	.	.	.	.	.	.	.	.	.
1903	19864	.	.	19864	.	.	.	.	.	.	.	.	.	.	.
1904	52022	.	.	52022	.	.	.	.	.	.	.	.	.	.	.
1905	55781	813	.	54968	.	.	.	.	.	.	.	.	.	.	.
1906	64163	1575	.	62588	.	.	.	.	.	.	.	.	.	.	.
1907*	96880	13920	.	82960	.	.	.	.	.	.	.	.	.	.	.
1908*	89768	13158	.	72241	3099	.	1270	.	.	.	.	.	.	.	.
1909*	92105	7163	.	84942	.	.	.	.	.	.	.	.	.	.	.
1910	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1911	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1912	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Year	Stations														
	Total	Moama	Koondroo	Swan Hill	Mulwala	Albury	Corowa	B'ham Cr	Brew'rina	Bourke	Balr'ld	Bann'ton	Boon'ar	Bown'g	Bringagee
1913	0														
1914	0														
1915	111474		6323	36291	.	.	.	6657	.	.	.	.	.	.	2044
1916	164733	.	6634	27624	.	.	.	8256	46497	.	.	.	.	.	.
1917	0														
1918	448349	.	13047	99916	.	.	.	13392	46507	.	.	.	.	.	.
1919	348713	.	21734	65064	.	.	.	13392	17553	.	.	.	.	.	.
1920	410336	.	24947	59752	.	.	.	3166	49951	.	.	.	.	.	.
1921	331085	.	8342	33250	.	.	.	14728	24049	.	.	.	.	.	.
1922	289946	.	4253	19267	.	.	.	9259	71038	.	.	.	.	.	.
1923	0														
1924	230533	.	.	25401	.	.	.	8929	26668	.	.	.	.	.	.
1925	244037	.	.	23227	.	.	.	8178	22580	.	.	.	.	.	657
1926	153739	.	.	14914	.	.	.	5668	9500	.	.	.	.	.	1017
1927	0														
1928	211047	.	.	9151	.	.	.	12650	19449	24798	2197	3889	553	.	.
1929	125780	.	.	6131	.	.	.	2159	13650	6517	3792	937	5366	.	.
1930	114233	.	.	8469	.	.	.	3963	10948	12034	3527	474	4161	.	.
1931	126788	.	.	6497	.	.	.	4712	13525	17413	3765	802	3180	.	.
1932	146168	.	.	5376	.	.	.	3917	19351	21130	3311	1044	3115	.	.
1933	440328	.	.	440328	.	.	.	.	.	.	.	.	.	.	.

Year	Bundure	Carwarp	Cobar	Condo'n	Coll'bri	Coonong	Deni'quin	Echuca	Gro'gal	Gro'dah	Gundagai	Hay	Hay (NrdraGr)	Hattah	Jerilderie	Kool'ng
1883	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1884	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1885	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1886	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1887	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1888	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1889	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1890	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1891	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1892	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1893	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1894	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1895	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1896	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1897	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1898	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1899	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1900	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1901	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1902	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1903	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1904	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1905	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1906	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1907*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1908*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1909*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1910	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1911	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1912	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Year	Hay															
	Bundure	Carwarp	Cobar	Condo'n	Coll'bri	Coonong	Deni'quin	Echuca	Gro'gal	Gro'dah	Gundagai	Hay	(NrdraGr)	Hattah	Jerilderie	Kool'ng
1913																
1914																
1915	76	.	203	762	196	343	.	3342	.	.	.	2753	.	.	1154	.
1916	.	.	.	225	1090	.	9521	3467	.	.	.	2400	.	.	152	.
1917	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1918	.	.	.	.	4529	.	71928	27049	.	.	.	.	.	.	.	.
1919	606	.	.	.	.	423	31745	14813	.	.	.	9840	1454	.	1473	.
1920	519	.	.	.	.	1072	39974	8842	.	.	.	12959	292	.	7912	78337
1921	367	.	.	.	.	53	40362	3591	.	.	.	3596	.	.	0	.
1922	126	.	.	.	.	95	13726	4728	.	.	.	696	.	.	0	.
1923	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1924	.	.	.	.	.	.	28946	7777	.	.	.	2583	.	.	.	16261
1925	.	.	.	.	.	.	18114	4429	.	.	.	18822	.	.	.	6466
1926	.	.	.	.	.	.	16488	4604	1089	.	.	12162	.	.	.	.
1927	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1928	.	.	.	.	.	.	6192	2077	.	1144	.	15364	.	1698	.	.
1929	.	.	.	.	.	.	4412	1544	.	.	.	7159	.	646	.	.
1930	.	508	.	.	.	.	6977	1168	.	.	.	10241	.	.	.	1139
1931	.	.	.	.	.	.	8534	1245	.	.	.	7849	.	.	.	1413
1932	.	.	.	.	.	.	10034	1271	.	.	.	13553	.	.	.	913
1933																



Year	Kerang	Lake Boga	L Carg'ligo	Lake Charm	Moree	Matong	Mildura	Moulam'n	Murr't	Morunda	Narrand'a	Nathalia	Nyah	Piangil	Picola	Pak'roo
1883	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1884	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1885	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1886	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1887	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1888	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1889	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1890	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1891	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1892	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1893	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1894	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1895	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1896	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1897	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1898	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1899	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1900	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1901	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1902	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1903	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1904	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1905	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1906	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1907*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1908*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1909*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1910	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1911	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1912	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Year	Kerang	Lake Boga	L Carg'ligo	Lake Charm	Moree	Matong	Mildura	Moulam'n	Murr't	Morunda	Narrand'a	Nathalia	Nyah	Piangil	Picola	Pak'roo
1913																
1914																
1915	.	.	.	.	.	.	46394	.	.	.	.	.	.	.	1592	.
1916	.	.	.	.	.	.	37142	.	.	.	.	38	.	.	14758	.
1917																
1918	.	.	.	.	.	.	130626	.	.	.	.	.	.	.	26322	.
1919	.	.	30240	.	.	559	118681	.	.	168	975	.	.	.	.	6327
1920	.	.	6734	.	.	241	91090	.	.	.	1320	368	1729	.	.	9957
1921	.	.	2476	.	.	140	55032	.	.	274	2056	232	.	113211	3731	8382
1922	.	.	2608	.	.	.	54562	.	.	89	1133	159	.	94965	.	4913
1923																
1924	.	.	7907	.	.	.	82902	.	.	.	310	.	.	19477	.	295
1925	.	.	5730	.	.	.	103950	.	.	.	420	.	.	28491	.	1692
1926	.	.	9137	.	.	.	54608	.	.	.	916	.	.	12713	.	123
1927																
1928	9888	15495	7731	.	.	.	48526	715	1359	.	714	.	.	5885	5233	940
1929	11880	6394	2229	991	.	.	29940	.	1415	.	1564	.	.	3966	2166	.
1930	.	3150	1915	.	.	.	23585	457	1332	.	733	.	.	3714	3302	.
1931	.	2667	5088	.	.	.	28729	.	833	.	794	.	.	2952	3337	.
1932	.	2032	7173	.	.	.	30065	.	5189	.	694	.	.	2521	3118	.
1933																

	no														
Year	Robinvale	Tocumwal	Tumut	Wagga	Wakool	Walgett	Whit'n	Wildg'a	Wilb'gie	Yanco	Y'wonga	Yath'g	Yung'a	Other	station cited
1883	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1884	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1885	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1886	.	.	.	.	.	.	.	.	.	.	.	.	.	.	21241
1887	.	.	.	.	.	.	.	.	.	.	.	.	.	.	25122
1888	.	.	.	.	.	.	.	.	.	.	.	.	.	.	47429
1889	.	.	.	.	.	.	.	.	.	.	.	.	.	.	13899
1890	.	.	.	.	.	.	.	.	.	.	.	.	.	.	18178
1891	.	.	.	.	.	.	.	.	.	.	.	.	.	.	14216
1892	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1893	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1894	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1895	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1896	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1897	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1898	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1899	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1900	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1901	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1902	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1903	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1904	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1905	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1906	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1907*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1908*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1909*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1910	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1911	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1912	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

	no													
Year	Robinvale	Tocumwal	Tumut	Wagga	Wakool	Walgett	Whit'n	Wildg'a	Wilb'gie	Yanco	Y'wonga	Yath'g	Yung'a	Other station cited
1913														
1914														
1915	.	1036	.	.	.	479	.	.	.	.	.	1829	.	.
1916	.	.	.	.	.	6898	.	30	.	.	.	.	.	.
1917														
1918	.	.	.	.	.	15035	.	.	.	.	.	.	.	.
1919	.	667	.	.	.	3672	7316	558	452	1002	.	.	.	.
1920	.	25	.	.	.	5378	3300	391	1160	919	.	.	.	.
1921	.	111	.	.	.	6751	483	741	9128	.	.	.	.	.
1922	.	394	.	.	.	2236	675	321	4706	.	.	.	.	.
1923														
1924	.	.	.	.	.	3076	.	.	.	.	.	.	.	.
1925	.	.	.	.	.	980	301	.	.	.	.	.	.	.
1926	.	.	.	.	.	702	72	233	1503	.	.	.	.	8293
1927														
1928	3817	.	.	.	457	2381	.	.	.	.	2023	.	5757	967
1929	3321	.	.	.	.	1482	.	.	.	.	674	.	4937	2508
1930	3441	.	.	.	1702	686	.	.	.	.	2187	.	4153	272
1931	4165	.	.	.	1016	.	.	.	.	.	1809	.	4675	1786
1932	4709	.	.	.	893	.	.	.	.	.	924	.	3651	2186
1933														

**Notes**  
. stations that are not mentioned in annual report