



NSW DEPARTMENT OF
PRIMARY INDUSTRIES

Carp in NSW: Assessment of distribution, fishery and fishing methods

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4. COMMERCIAL FISHING METHODS

4.1. Introduction

Commercial fishing methods for carp appropriate for NSW were described and discussed by Wilson & Hyde (1999). Methods that have proven effective include electro-fishing, hauling, mesh-netting and trapping. The efficiency and viability of each of these methods vary and are dependent on the environmental conditions at the fishing locations, and ultimately the economic return to the fisher. Carp harvesting methods are reviewed, and a locally successful commercial carp harvesting venture is discussed.

4.2. Carp harvesting methods

4.2.1. *Electro-fishing*

Electro-fishing has been effective for carp harvest or removal in areas of high density, but its high capital cost and labour intensity make it unlikely to be a cost-effective commercial method in most locations (Wilson & Hyde 1999). They also observed that electro-fishing equipment requires substantial maintenance and operation by well-trained people. With proper use, species other than carp that are stunned during electro-fishing will recover unharmed if left in the water. However, the use of higher than optimal voltage can result in mortality of non-target species.

At present, no carp are commercially harvested in NSW using electro-fishing equipment. In Victoria, supplies of carp to the processing factory at Sale (*see* Bell 2003) are regularly supplemented with electro-fished carp from tributaries into Gippsland Lakes, particularly during drought conditions when carp retreat into the rivers as the lakes become more saline (K. Bell, personal communication).

4.2.2. *Hauling*

Hauling (seining or 'drag-netting') is potentially the most effective method for catching large quantities of carp. Protected bycatch species (native fish and air-breathing animals) taken during hauling operations can be sorted from the carp catch and released unharmed. The method is best suited to locations such as shallow lakes or dams where the bottom is relatively smooth, firm, and clear of snags. However, most natural waterways are probably unsuited to hauling as lake and river beds are normally littered with woody debris and other snags. As these provide important refuges and breeding sites for native fish (Koehn *et al.* 2000), clearing (de-snagging) areas for carp hauling is not an option.

However, artificial lakes and irrigation impoundments or canals may provide suitable opportunities for hauling. During times of low water levels (e.g. during droughts), potential hauling sites around the shores of lakes can be identified and mapped. In practice, carp catch rates by hauling may be increased by first attracting carp with berley into the hauling area before shooting the seine.

Catch records show that hauling has only occasionally been employed for carp in the NSW inland (see Section 5.2.1). In 2001/02 about 15 t were caught by drag net from Lake Brewster, after carp were attracted to the hauling area with berley (P. Angel, NSW DPI, personal communication). In Victoria, up to 1000 t of carp are harvested annually, mostly by seine, from Lake Wellington,

Gippsland (Bell 2003), and during recent years around 5 tonnes per week are hauled from Lake Boga to supply a small factory in Deniliquin producing fertilizer and berley products.

4.2.3. Trapping

Unbaited drum-nets (drum shaped traps; see Reid *et al.* 1997) were used commercially across inland NSW until 2001 for trapping native fish in streams and rivers; a relatively small bycatch of carp was also reported for this method (Figure 5.2). Larger baited rectangular traps can also be effective for carp but, because of their shape and size are restricted to locations with easy access to the water (Wilson & Hyde 1999). Baited traps are most effective in flowing waterways (see Section 7.3) and catches are enhanced if the traps are fitted with netting wings to one or both banks to guide carp into the trap. The traps are set facing down-current to optimise the effect of the bait; carp also tend to move upstream when feeding. Bait found to be effective includes bread, chicken pellets (Wilson & Hyde 1999), and dog-food pellets.

However, trapping has the potential to adversely impact on native bycatch species if unmodified traps are set fully submerged. While native fish can be released unharmed when traps are cleared, air-breathing vertebrates may drown in traps that have no inbuilt escape device or accessible air space. Rectangular traps can be set with sufficient of the trap projecting above water to allow animals such as turtles to breathe. In deeper water, traps can be floated to maintain a space above the water or, if fully submerged, be fitted with an escape 'sock' to the surface. Care must be taken to prevent twisting or blockages in a netting sock or codend by securing it to a stake or other fixed point above the surface (see Grant *et al.* 2004). Regular clearing of traps is also essential as crowding can result in turtle or platypus mortality if too many animals are forced into the codend at the surface (D. Gilligan, NSW DPI, personal communication).

4.2.4. Mesh-netting

Historically, mesh-netting was the principal method of harvesting native fish in inland NSW, and carp was the main bycatch (see Figure 5.2). The minimum mesh size specified by the Fisheries Management Act 1984 was 130 mm. Through their design, mesh-nets can damage captured fish (by scale loss etc.) and drown air breathing animals that become entangled in the net. However, with modified procedures, mesh-nets can be used to catch carp while having minimal impact on bycatch species.

Commercial carp fishers in northern NSW have used their experience of 'splash-meshing' for mullet in estuaries to successfully catch carp (see Section 4.6). Splash-meshing involves setting mesh-nets in shallow water where carp are feeding and then frightening the fish towards the net with noise and/or splashing the surface. Carp hit the net hard and entangle their serrated dorsal and/or ventral spines. The nets are immediately retrieved and the carp are landed alive; any native fish or air-breathers such as turtles are quickly released. To allow easy release and to minimise injury to bycatch animals, relatively heavy netting (18 ply) is used; the heavy ply also reduces damage to the net should it become snagged on underwater obstructions such as tree branches.

4.2.5. Angling (line fishing)

Large numbers of carp are caught on line by recreational fishers (see Section 5.2.2). While line fishing is unlikely to have commercial potential, it may be possible to reduce carp density in small waterways by angling, particularly by encouraging competitions or other similar angler activity.

4.3. Discussion and summary

The characteristics of commercial methods applicable for harvesting carp in NSW are summarised in Table 4.1. The viability of any of these methods is dependent on local logistic and environmental conditions, and ultimately on the likely economic return. The low acceptability of carp in Australia as a food fish, with the consequent limited market and low price, make commercial fishing for carp economically marginal at best. For any substantial carp fishery to be profitable, bulk supplies must be readily available for little effort (Roberts & Ebner 1997). Wilson (1998) suggested that fishers, at the time of writing, needed to catch 5-6 tonnes of carp per week (at 80 cents/kg) to make an economic return. Hauling is the only method likely to produce catch rates of that magnitude but, as discussed above, suitable hauling sites are limited in the NSW inland. While one fisher-crew is successfully employing the splash-meshing method for carp, their viability relies on marketing relatively small quantities (< 2 tonnes per week) of fresh carp through the Sydney Fish Market and surviving the fragility of that market.

Electro-fishing, hauling, meshing and trapping, with appropriate modifications and deployment procedures, can safely be used for commercial carp fishing with minimal effects on bycatch species. Industry is aware and, for the most part, experienced in the use of most methods effective for carp. If the economic viability for carp improves, fishers will be in the best position to develop the most effective fishing gear. However, any gear or methods used to harvest carp must be environmentally safe and conform to any legislative conservation requirements. Government and non-government organisations frequently contact NSW Fisheries about carp control in public and private waterways. Any of the above methods can be adapted to help control carp numbers in relatively small waterways and streams.

The carp fishery in the USA preceded that in Australia but has many similarities, both in its history and in the methods of harvest. Broodstock was imported in the 1870s and during the following 40 years waterways throughout the USA were deliberately stocked with carp to create a fishery (Cooper 1987). A carp fishery quickly developed, peaking at almost 20 000 t in the early 1900s; the current harvest in the USA is about 10 000 t per year. As in Australia, most carp in the USA are harvested by large seines; in southern states carp are also caught in trammel nets, mesh-nets (including splash-meshing) and hoop nets (fykes). In some areas during the summer, the carp harvest is increased by chumming. Grains such as corn or barley, used fresh or soaked for several days to sour, are used to concentrate the carp before seining. Bags of ground grain, soybean cakes or alfalfa pellets are also put inside hoop-nets to increase the catch (Cooper 1987).

Table 4.1. Summary of carp harvesting methods applicable to NSW inland waters.

| Gear type | Fishing locations | Potential bycatch | Remedy | Advantages | Disadvantages |
|---------------------|-----------------------------------|---------------------------------------|---|---|--|
| electro-fisher | shallow rivers, channels | none if operated correctly | | potential high volume catch | high capital cost; labour intensive |
| hauling net | open water with no snags | native fish, turtles | release bycatch alive | potential high volume catch | needs clear, firm lake-bed |
| mesh-net | open shallow water with few snags | native fish, platypus, turtles, birds | short soak-time; release bycatch alive | quality product, low capital cost | moderate to low catch rate; labour intensive |
| traps and drum-nets | rivers, channels with flow | native fish, platypus, turtles, birds | release alive; escape aperture or space for air-breathers | quality product, low capital cost; suitable for small streams, channels | moderate to low catch rate |

4.4. Case Study: Mesh-netting in northern NSW storage dams by C & P Hyde

4.4.1. Introduction

Messrs Cec. and Paul Hyde work together as a two-man fishing operation in the carp fishery. Before entering the fishery in 1999, they investigated the commercial feasibility of carp fishing in northern NSW, tested a variety of gear, and participated in a project to collect and test carp for pesticide residues (Wilson 1998, Wilson & Hyde 1999).

They are based in Port Macquarie and market their catch through the Port Macquarie Fishermens Co-operative. Formerly estuary fishers, they have applied their knowledge of estuary fishing for mullet and other species to the harvesting of carp. A principal source of fishery income for the Hyde businesses is now carp, and in recent years they have been the main supplier of carp to the Sydney Fish Market. Their businesses are licensed for the Inland Restricted Fishery with one non-transferable and one transferable Class D Carp endorsements. These licences allow them to harvest carp from inland waters (western drainages).

4.4.2. Fishing area

Most fishing is done in the artificial water storages of Lake Keepit and Chaffey Dam in the Tamworth area (Figure 4.1).

4.4.3. Fishing gear and methods

The fishing set-up is self-contained and mobile. Two 5-6 m net-boats are towed on trailers by pickup trucks (Figure 4.2). Fishing gear is contained in the boats, and large ice-containers are carried on the trucks. The principal fishing method is “splash meshing”, a technique practised in estuaries for species such as mullet. A large rectangular trap was also developed to catch carp, and catches are occasionally supplemented by line fishing.

4.4.3.1. Splash-meshing

Two 350 m x 5 m monofilament mesh-nets are used; the netting is 18 ply and mesh size 150 mm (6 inch). Nets are set in shallow water (< 4 m depth) either in areas where carp have previously been caught, or where carp are seen feeding along the shoreline (Figures 4.3, 4.4). The nets are streamed from the boats while being rowed quietly, to avoid frightening the fish from the area. Along a shoreline, the ends of the net are run into the water edge. At the completion of setting, fish are scared into the net by motoring the boat along the shallow side, and/or “splashing” with an oar. The nets are then retrieved after a soak time of about 15 minutes. Total time per set is about one hour, but will vary depending on the number of fish caught. There are up to four sets per day, but varies according to catch rates and/or weather. Fish are retained under cover in the boat until landed; in hot weather, fish maybe kept alive in a pen before being iced-down.

The net-boats are of traditional low freeboard design that offers minimal windage (Figure 4.5). Construction is of wood and fibre-glass, making them quiet to operate. The 18-ply monofilament netting may not be optimal for meshing but the relatively heavy netting was selected as a compromise to withstand damage on snags, and to facilitate the untangling of carp and any protected bycatch. In their flight-response to splashing, carp hit the net hard and are usually tangled by their serrated dorsal and/or ventral spines (Figure 4.6).

This style of fishing produces a high quality product but is only economically viable when the catch is destined for human consumption i.e. attracts prices greater than about \$1.50 per kg. The short soak for each set (usually less than one hour) ensures that the catch is landed alive and any

bycatch of native fish or turtles can be released alive. Bycatch in Keepit and Chaffey Dams has comprised mainly freshwater turtles (fam. Chelidae), with very small numbers of catfish (*Tandanus tandanus*), silver perch (*Bidyanus bidyanus*), golden perch (*Maquaria ambigua*) and bony bream (*Nematalosa erebi*). Catches of any of these species have averaged less than four (in number) per set.

4.4.3.2. *Trapping*

A large rectangular box-trap was also developed by the Hydes to catch carp (Figure 4.7). The dimensions of the trap is approximately 3 m x 2 m x 1 m, and it is covered with 100 mm (4 inch) 36 ply trawl netting. The netting at one end is shaped into a funnel entrance. The frame is of light-weight square steel tubing (20 mm sides) with right-angle collars at the corners which are pinned. The trap can then be dismantled and rolled up for easy handling and transport (Figure 4.8).

The trap can be set in shallow water with the top clear of the surface to allow air-breathing animals room to breathe. Carp have been trapped in water as shallow as 50 cm with much of trap above the surface. In deeper water, two sealed plastic pipes attached along the sides of the trap about 25 cm from the top float the trap. In operation, the trap was baited with bread and chicken pellets contained in a berley-bag made from shade-cloth; small holes were punched in the bag to allow some dispersal of the bait, and also to allow some feeding by carp in the trap which encourages more to enter.

Experience has shown that the trapping is most effective in streams or channels with some water flow; in these situations, the trap is set facing down-stream. However, catches up to 700 kg were taken with the trap set near the edge of a lake. When using the box trap in still water, carp were first attracted to the area with berley; after about a day the berley and a bait-bag was placed inside the trap and carp then entered the trap to feed.

4.4.4. *Carp production*

Usually, 10 to 15 days per month are fished for monthly landings of 4-8 tonnes. Daily catch rates are usually between 200 and 500 kg, but can exceed 1000 kg. Since the year 2000, relatively high catch rates were reported for most months with no obvious seasonality to the catches. Factors that have impacted on their operations have included weather, lake-levels, water quality, interaction with other water users, and market acceptance (see below).

In general, carp catches are greatest during the afternoons in the warmer part of the day (particularly during winter), and during calm conditions; windy weather makes fishing difficult and carp less available in the shallows. Carp were most abundant in shallow water when the lake-levels were rising or were close to full (C. Hyde, personal communication). As carp cannot be taken for human consumption from waters with high blue-green algae concentrations, water quality impacts on the fishery. Blue-green algal concentrations are usually greatest during periods of low water levels in the dams, and advice on algal concentrations in Keepit and Chaffey Dams is obtained from the local Catchment Authority and/or NSW Fisheries. Fishing is usually suspended during holiday periods when large numbers of recreational craft and water skiers utilise the lakes.

4.4.5. *Markets*

The catch is sold through the Sydney Fish Market and, since 2000, the Hydes have supplied about 50% of all carp through the SFM. Carp are consigned from the Port Macquarie Fishermen's Co-op, and trucked to Sydney in ice slurry. Relatively strong demand on the market floor is limited to about two tonnes per week, usually realising prices between \$1.50 and \$2.00 per kg. When weekly supply exceeds about 2.5 t, the selling price can fall to about \$1.00 per kg or less, making the operation unprofitable. Consequently, the Hydes regulate their consignments to Sydney but additional supplies from other sources readily depress the floor price.



Figure 4.1.

Lake Keepit with net boat in foreground.



Figure 4.2.

Fishing unit of truck and trailer with net boat. A large insulated container containing ice is on the back of the truck.



Figure 4.3.

The nets are set along shallow shorelines in 2-3 m depth. Carp feeding in the shallows are then frightened into the net by “splashing” and making noise between the shore and the net.



Figure 4.4.

Net set through flooded woodland.



Figure 4.5.

Scouting for feeding carp in shallows.



Figure 4.6.

Untangling carp caught by its dorsal spine.



Figure 4.7.

Collapsible box-trap. The frame is bolted together and a netting trap is secured to it. The trap can be fished on the bottom, or floated at the surface.



Figure 4.8.

Rectangular trap dismantled and ready for transport.



Figure 4.9.

Fresh carp catch.

5. NSW CARP PRODUCTION & MARKETS

5.1. Introduction

Inland NSW fishery production for the years 1947-1996 was summarised in Reid *et al.* (1997). Reported carp catches to 1970/71 were less than 10 kg per year but following the introduction of carp into the Murray/Darling River system (in 1968), carp production rose quickly to peak at almost 550 t in 1977/78. Reported landings then declined to less than 200 t in 1984/85, and until 1995/96 fluctuated between 100 and 200 t per annum. In the early years, most of the catch was dumped, and the decline in catches was attributed mainly to the limited market opportunities combined with its low value, and changes in fishing practices in an effort to avoid carp while targeting native species (Reid *et al.* 1997).

In 1997, the NSW Rivers Survey reported that native fish were under threat from habitat degradation, fishing pressure, disease, and introduced species (Harris & Gehrke 1997). Following a review of the inland commercial fishery in early 1998, a decision was made to phase out commercial fishing for native finfish by 1 September 2001, and to redirect fishing effort towards under utilised yabby and carp resources. A structural adjustment package was developed to enable transition from native finfish to the yabby and carp only fishery. The inland commercial fishery is now managed as a 'restricted fishery' and includes endorsements that authorise fishing for carp and yabbies only. Since 2001, there have been about 30 fishers licensed to fish inland waters, and most have targeted yabbies. In that time, only six fishers reported carp catches in excess of five tonnes.

Relatively small but regular sales of fresh carp are made through the Sydney Fish Market (SFM), and occasionally some NSW production is processed in Sale, Victoria (Bell 2003). There is also some industrial processing of carp for pet-food and fertiliser.

In this section, the commercial and recreational catch data is updated and recent market data are presented. The impact of closing the inland fishery to native finfish is discussed.

5.2. Annual production

5.2.1. Commercial catch

Annual production of carp from NSW inland waters reported by commercial fishers between 1970/71 and 2002/03 (from Comcatch, August 2003) is shown in Figure 5.1. Over recent years, annual landings gradually declined from 110 t 1997/98 to about 70 t in 2002/03. The number of participants in the fishery has also declined in recent years (Table 5.1). More than 30 fishers reported carp catches prior to 1999 and this number decreased to about 20 fishers in 2000/02. In these years, the majority of fishers landed less than 5 tonnes per annum, mostly as bycatch when targeting native fish. In 2002/03, the first full year after the native finfish fishery was closed, only 7 fishers landed carp; four fishers each reported between 7 and 13 tonnes and a two-fisher operation caught 33 t in northern NSW.

Fishing method was not recorded for a large proportion of the carp catch but, where specified, most carp were caught by mesh-nets, with small but consistent catches in drum-nets (Figure 5.3). One large catch of 36 t was taken by a 'drag net' or seine in 2001/02 when the net was set across the outlet of a small lake (Moira Lake; see Stuart & Jones 2002) after it was opened to the Murray River; in the same year about 15 t were caught by drag net from Lake Brewster.

NSW was arbitrarily divided into three broad regions (Appendix 4) showing the main areas of carp production since 1984 (Figure 5.2). Prior to the year 2000, most carp were caught in the southwest (Murray, Murrumbidgee and Lachlan River drainages) and the far western (Lower Murray) and northwestern (Darling River and Menindee Lakes) areas of NSW, mostly as bycatch from the native fish fishery. However, by 2000, catches from the southwest had declined to very low levels. Apart from the 50 t caught by drag-net in 2001/02, almost no carp have been recorded from the southwest since the fishery was restricted. Similarly, carp catches were very small in the western part of NSW after the native finfish fishery closed; the 35 t of carp reported in 2002/3 were harvested from drying lakes. There have been significant catches from northern NSW since 1999/2000 (30-70 t per year), principally from a single fishing enterprise that targets carp in storage lakes around Tamworth (see Section 4.6).

5.2.2. Recreational catch

The National Recreational and Indigenous Fishing Survey (Henry & Lyle 2003) found that carp was the most common species caught by anglers fishing NSW inland waters. The estimated annual catch by recreational fishers in NSW was approximately 1.2 million carp weighing 877 t; the survey found that about 11% of carp were released after capture. Although some recreational fishers target carp ('Coarse Fishing'), it is probable that most are captured while targeting native fish.

5.3. Sydney Fish Market Sales

Sydney Fish Market (SFM) sales data were available from Annual Reports (1980/81 to 1991/92), and subsequently from their website (www.sydneyfishmarket.com.au). A breakdown of sales according to size grades and presentation were detailed on the website from 1992.

5.3.1. Annual sales and price

In the years between 1980/81 and 1991/92, total annual sales through the SFM ranged between 33 and 65 tonnes (Figure 3.4). Sales more than doubled in 1991/92 to 124 t, the maximum volume for any single year to date. Annual sales have remained in excess of 70 t since, but show an overall slow decline.

The average market price for carp slowly increased from about 80 c/kg in 1980/81 to about \$2.00/kg in 2000/01 (Fig. 3.4). A sharp rise in average price to about \$1.85/kg occurred in 1989-91 when supplies were relatively small. Possibly in response to this price increase, the quantity of carp offered for sale in 1991/92 more than doubled, but the price sharply declined and fell back to below the 1987 level. Another marked increase in price occurred in 2001/02, this time to over \$2.00/kg, again possibly as a response to lower supplies. However, despite similarly low levels of supply to the market in 2002/3 (and the calendar year 2003), the average price reverted to the near the trend average of \$1.63/kg.

There was little size-grading of carp until 1999; since then, between 50 and 80% have been graded for sale. Most carp have been graded as 'large' or 'extra-large', with only small quantities as 'small' or 'medium' (Fig. 3.5). Generally, small and medium carp attracted higher prices than were paid for larger carp. In 2001, the mean price for small carp was 16c/kg higher than for medium carp and, in turn, mediums were 16c/kg higher than for large/extra-large carp. In 2003, medium, large and ungraded carp attracted similar average prices of \$1.57-\$1.69 (Figure 3.5).

About 95% of carp are presented for sale as whole fish on ice or in ice slurry; a very small quantity is presented for sale headed and gutted or 'cleaned'. There appeared to be no price advantage for any of the different methods of presentation.

In summary, annual volumes of carp through the SFM have ranged between 33 t (1980/81 and 1989/90) and 124 t (1991/92); sales have declined from 98 t to 70 t over the last three years. Average price has gradually risen, but appears to be sensitive to supply with supplies in excess of two tonnes within any week receiving very low prices. The market seems to favour small to medium sized carp (although only small quantities were graded as small or medium), and carp in ice or ice-slurry are equally accepted.

5.4. Other markets

Apart from the SFM, the only other southeastern Australian outlets for carp for human consumption are the Melbourne Fish Markets and K & C Fisheries in Sale, Victoria. The Melbourne Fish Markets handle similarly small quantities of carp to the SFM, and most is supplied by K & C Fisheries.

K & C Fisheries catches and processes about 80% of Australia's carp production (Bell 2003). The business handles in excess of 1000 tonnes of carp per annum with most coming from Lake Wellington (Gippsland) where the factory is located. K & C Fisheries have developed markets for carp and carp products in Europe and the Middle East, as well as supplying the limited domestic market in Victoria. Other outlets for their carp include rock lobster bait, pet food and fertiliser products. This business is also licensed to fish in NSW and occasionally accesses significant quantities of carp from inland NSW when suitable opportunities arise (e.g. Moira Lake catch: see *Section 4.2.1* above).

Some carp is processed for industrial use in NSW. The "Charlie Carp" factory in Deniliquin processes 5-10 tonnes per week into liquid fish emulsion for plant fertiliser and 'berley marinade'; at present almost all the carp supplied to this factory comes from nearby Victorian waters (Lake Boga).

5.5. Discussion

There have been no formal stock assessments for carp because its widespread distribution and range of habitats would require enormous effort and expense that would be difficult to justify (Koehn *et al.* 2000). However, it is clear from the early commercial catch history and the present recreational catch that the carp stock in the NSW inland could support a fishery well in excess of 1000 tonnes per annum. Wilson (1998) made a simplistic estimate of the NSW carp stock to be about 76 000 t, and suggested an annual harvest of 15 000 t. Even if these estimates cannot be validated, the standing stock of carp is very large and grossly underutilised. Nevertheless, with catching techniques applicable to most NSW waterways, there is a limited amount of carp that can be economically harvested. Wilson (1998) investigated the commercial opportunities for carp in NSW but concluded that the very low demand and consequent low value of carp in NSW provided no financial incentive for any expansion of the commercial fishery.

Less than 100 t of carp are sold in NSW each year for human consumption and there appears to be little likelihood of any marked increase. The main outlet is through the SFM but analysis of the SFM sales shows that the demand for fresh carp is very limited. The sale-price is very susceptible to volume and during 2003, average price regularly fell below \$1.50 per kg when weekly supply exceeded one tonne. Most of the carp sold through the SFM is supplied by one fishing operation, and it limits its production to market demand. The SFM data also show that any variation from the normal presentation of whole fish (e.g. headed and/or gutted) derives no price advantage.

The distance from market outlets appears to inhibit any development of the carp fishery in the west and southwest of NSW (Murray-Darling Basin). K & C Fisheries in Sale, Victoria, is a successful carp processing enterprise with well-developed infrastructure. However, because of distance from the company's processing base, they have found it difficult to maintain quality and remain cost effective when accessing carp from northern Victoria and NSW (Bell 2003). With fresh carp attracting less than \$2.00 per kg, and carp for industrial use (bait, fertiliser, pet food) less than \$1.00 per kg, the cost of catching, handling and transport means that fishers in remote areas will not cover costs on relatively small amounts of fish (Wilson 1998, Bell 2003).

Table 5.1. Number of licensed fishers landing carp between 1996/97 and 2002/03 (* single carp fishing operation).

| No. of fishers per catch weight category | | | | | | | |
|--|---------|---------|---------|---------|---------|---------|---------|
| Annual catch (t) | 1996/97 | 1997/98 | 1998/99 | 1999/00 | 2000/01 | 2001/02 | 2002/03 |
| < 0.5 | 6 | 9 | 8 | 11 | 4 | 7 | 1 |
| 0.5-1.0 | 3 | 5 | 7 | 2 | 2 | 3 | 0 |
| 1.0-2.5 | 8 | 10 | 6 | 9 | 5 | 3 | 0 |
| 2.5-5.0 | 8 | 7 | 7 | 3 | 6 | 2 | 1* |
| 5.0-10 | 3 | 2 | 5 | 1 | 0 | 1 | 3 |
| 10-20 | 2 | 0 | 0 | 0 | 3 | 1 | 1 |
| >20 | 1 | 2 | 0 | 1 | 1 | 2 | 1* |
| Total | 31 | 35 | 33 | 27 | 21 | 19 | 7 |

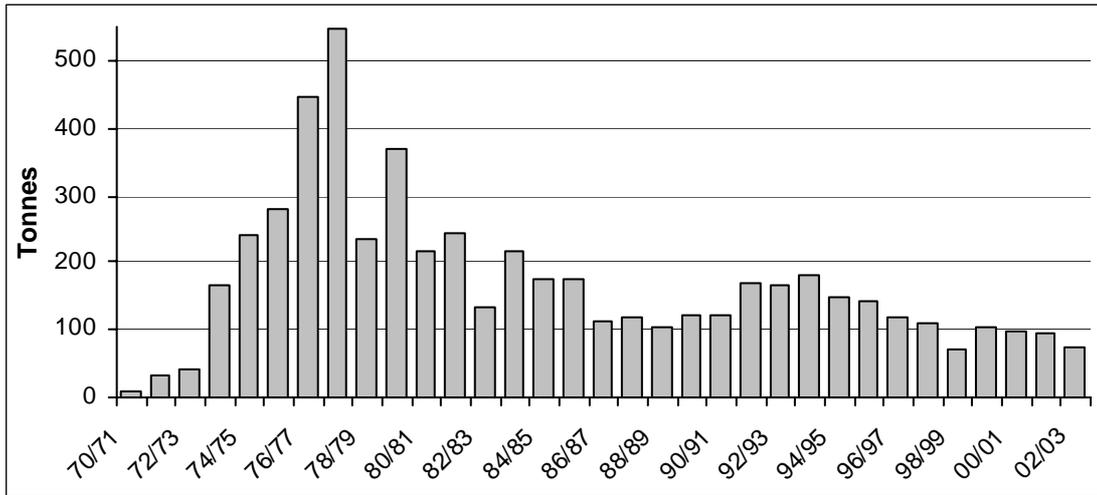


Figure 5.1. Annual catch of carp reported by NSW commercial fishers between 1970 and 2003 (source: NSW Fisheries CatchCom database).

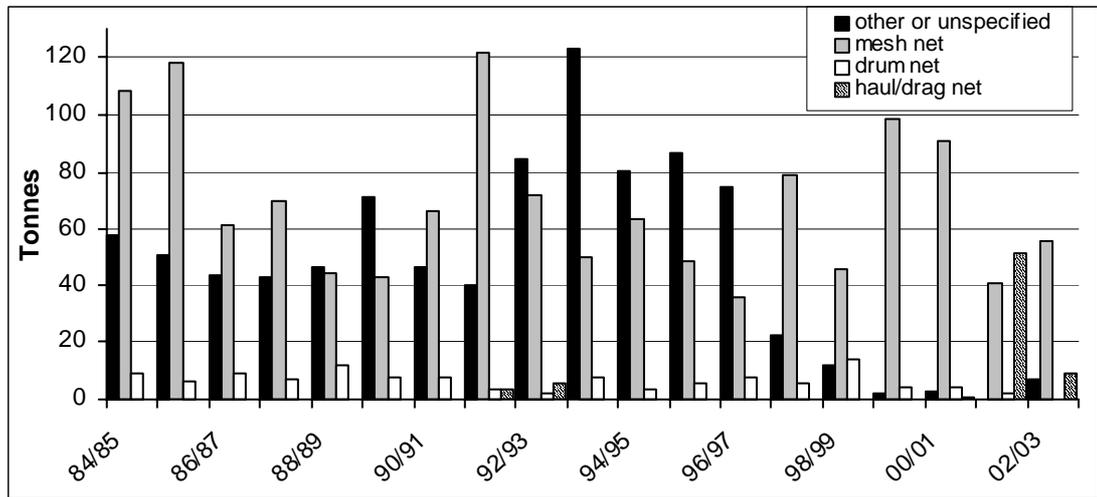


Figure 5.2. Annual catch of carp between 1984 and 2003 by fishing method (source: NSW Fisheries CatchCom database).

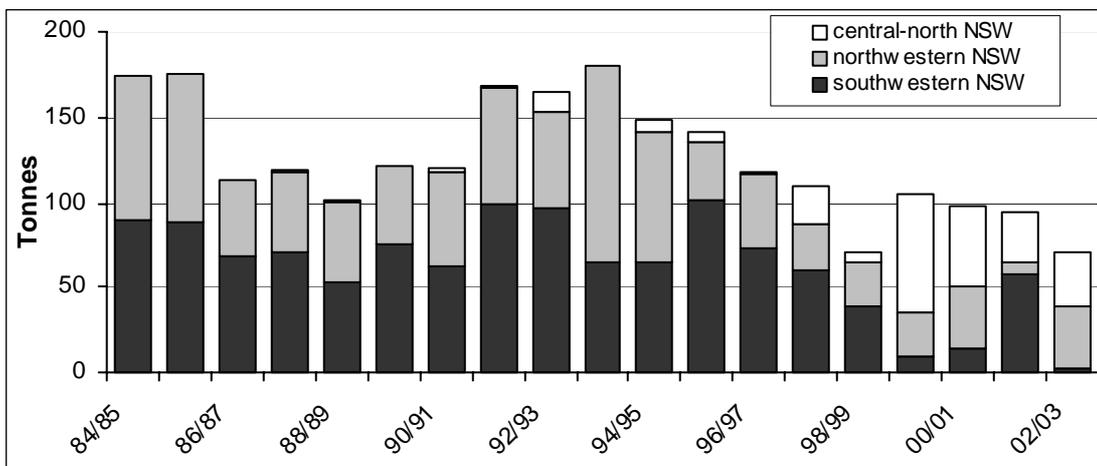


Figure 5.3. Annual catch of carp between 1984 and 2003 from main catchment areas of NSW (source: NSW Fisheries CatchCom database).

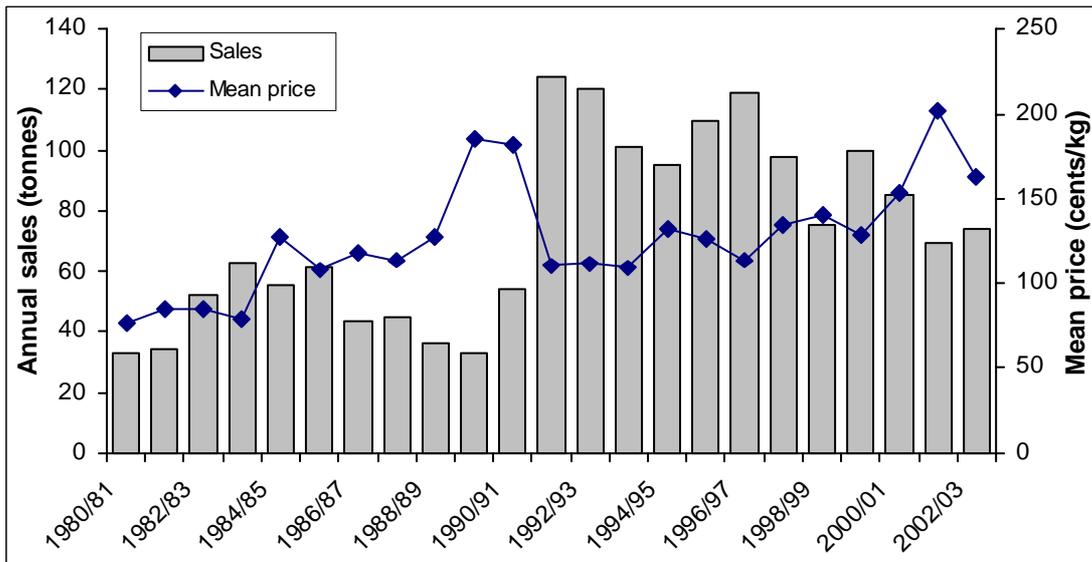


Figure 5.4. Annual sales and mean price of carp through the Sydney Fish Market 1980-2003 (source: FMA Annual Reports and SFM website).

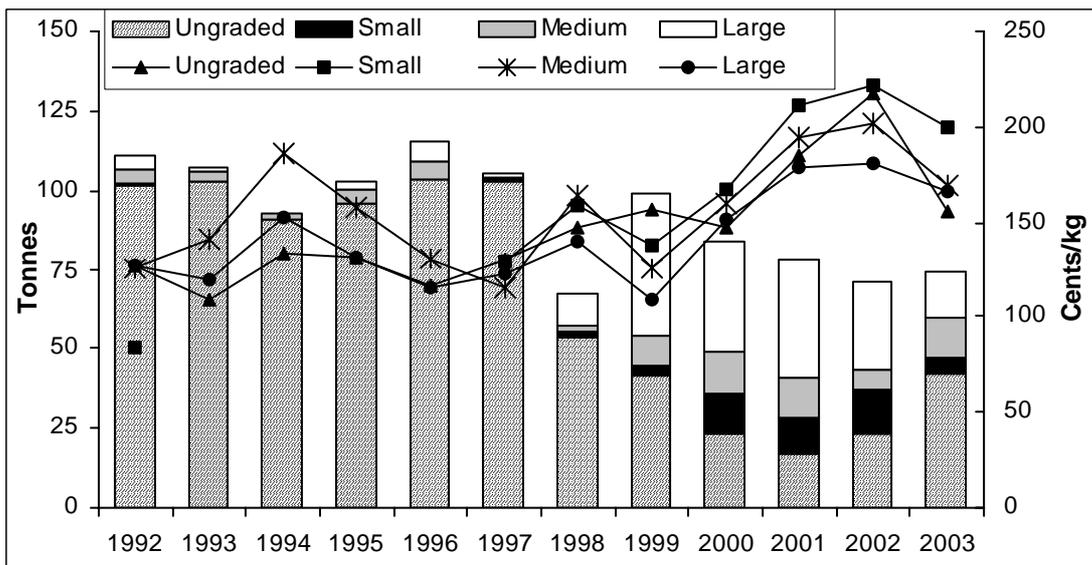


Figure 5.5. Annual sales (tonnes) and mean price (c/kg) for each size grade of carp sold through the Sydney Fish Market 1992-2003 (source: FMA Annual Reports and SFM website).