FISHING INDUSTRY RESEARCH TRUST ACCOUNT

FINAL REPORT

Biological and Life History Studies of the Yabbie, Cherax destructor and its potential for aquaculture.

The funding for this three year study was terminated on June 30, 1979 after a two year study of the wild yabbie populations of Lakes Alexandrina and Albert, South Australia.

A long established pot (trap) fishery for yabbies in the River Murray system and Lakes Alexandrina and Albert has serviced a local demand for this gourmet crustacean. When the Swedish "Kraftor" fishery collapsed in the late 1960's, due to an introduced disease, there was a world wide search for exploitable freshwater crayfish resources to export to this Scandanavian market. As a result of this export demand South Australian commercial catch of yabbies, in six years, rose from 29 984 kg in 1968 to a peak of 273 000 kg in 1974. The Lakes Alexandrina and Albert commercial yabbie fishery supplies approximately 75% of the South Australian total catch of yabbies. After reaching the Lakes peak catch in 1974, there followed a disastrous and continuous drop in total yield to less than 1 000 kg in 1979.

The present biological study, unfortunately, did not commence until July 1977 and despite intensive effort to obtain sufficient numbers of yabbies to study their biology and to determine growth patterns from tagging, requisite numbers of specimens could not be obtained through experimental or commercial fishing operations to implement the objectives of this investigation.

ENVIRONMENTAL DATA

Concurrently with the regular experimental yabbie fishing trials, a regular monitoring programme for the collection of such environmental data as air and bottom water temperatures, salinity levels, dissolved oxygen, turbidity and nutrient levels at selected sites in Lake Alexandrina was undertaken.

In the 1977-8 report data were presented on certain environmental parameters. There was no evidence of oxygen depletion or below normal nutrient levels in the aquatic environment to account for the decline in yabbie total catches. Comparable environmental data collected during the following year showed no departures from those ranges encountered during the previous sampling period. Maximum bottom water temperatures of the order of 20-24^{o}C were recorded between December 1978 and March 1979 while the July 1979 minimum temperatures went to 9.2^{o}C.

As reported above experimental fishing trials trapped only small numbers of yabbies on recognized commercial fishing areas and similar negligible results were obtained also from areas with differing bottom sediment types i.e. mud, clay and sand. The numbers of yabbies caught in these fishing trials did not provide adequate numbers of yabbies to permit analyses of data on growth and variation in size with bottom type. In the summer months slightly more yabbies were trapped in pots set on clay bottom areas than on sand and/or pure mud bottoms. Yabbies did appear to trap easier when temperatures were higher i.e. during the summer months.

There were no consistent differences between length frequencies of males and females trapped on the same types of bottom i.e. similar habitats.

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Length frequencies of male and female yabbies caught experimentally in pots covered with small wire mesh (10 mm) showed a similar range in total carapace lengths to those taken commercially with pots covered with 25 mm wire mesh (see 1977-8 report).

STUDIES ON FLOOD LEVELS IN RIVER MURRAY

In the 1977-8 report to the Committee, it was stated that an examination of flood peaks and water level records held by the Engineering and Water Supply Department of South Australia (EWS) would be undertaken to ascertain if it would be possible to establish a relationship or nexus between flood peaks, their magnitude and duration in the River Murray and the fluctuations in yabbie catches. From such a study it may be possible to postulate the reasons for the decline in the commercial yabbie fishery.

Figure 1B depicts graphically the pool levels measured on the E.W.S. Department river levels gauge at Morgan on the River Murray. The graph shows the maximum height reached by the flood peaks and the duration of the river levels of the floods. It is evident from this pool level graph that in the six years between 1967 and 1973 there were only minor sharp rises in the pool levels before the two large and sustained high peak floods that occurred between the end of 1973 and early 1975. The third sharp high peak flood crest occurred in late 1975-early 1976 followed by the fourth in mid 1976. A minor flood of the same order of magnitude as those of 1968 and 1969 and the fifth in 1978 of medium order range of magnitude of the 1970 and mid 1976 floods.

In order to show a relationship, which is believed to exist, between the high pool levels and the total annual catches of yabbies, European carp and callop (golden perch) taken from the River Murray and Lakes system graphs were prepared for:-

European carp	(1970-1976)
Callop (golden perch)	(1968-1976)
Total yabbie catch	(1968-1978)
Yabbies (Lakes Alexandrina & Albert)	1968-1978

and these graphs have been superimposed on that for the pool levels for the period 1967 to 1979.

These graphs Fig 1 (A & B) show that there was a relatively rapid rise to a total annual catch of yabbies to peak at 273 000 kg in 1973 before an equally rapid decline to 11 800 kg in 1978. This sudden fall in annual catch from the whole River Murray system coincided with the first of the three big floods of late 1973 - early 1976 period and the decline has been continuous since that first big flood through to 1979.

As the annual yabbie catch from the Lakes system has followed the rise and fall pattern of catches for the whole River Murray system, the factor(s) causing the decline throughout the whole River system must be common and from the evidence available from the Lake Alexandrina data on environmental parameters, it is deduced that the series of high and sustained floods are the responsible factors for the continued decline in the commercial yabbie catches. There has been no such effect on the fin fish species, one a native species (callop) and the other one an introduced species, the European carp. In fact the annual catches have risen and the floods have served to distribute more widely throughout the lower River Murray system, the non migratory European carp which first appeared in the South Australian section of the River Murray in 1970.

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It is further postulated that the large total annual yabbie catches up to 1974 were the result of relatively stable aquatic environmental conditions in the whole River Murray system, but these eminently suitable conditions for yabbies were destroyed by the three big floods. As these floods occurred in successive years the habitats, preferred by yabbies, have had little or no chance to recover from scouring effects of each of the big floods. The yabbie stocks, without adequate food and shelter from predators, have had no chance to rebuild their numbers and as a consequence their populations are small and cannot support a commercial fishery.

The cause of the decline in the populations of yabbies in the whole River Murray system in South Australia is not a result of intensive fishing practices during the period 1968 to 1974, but to an ecological change to the yabbie ecosystem. There have been no such serious and sustained series of floods in New South Wales and Victorian river and lake systems as those of the River Murray system and as a result there have been no such catastrophic effects on the developing yabbie fisheries of those States.

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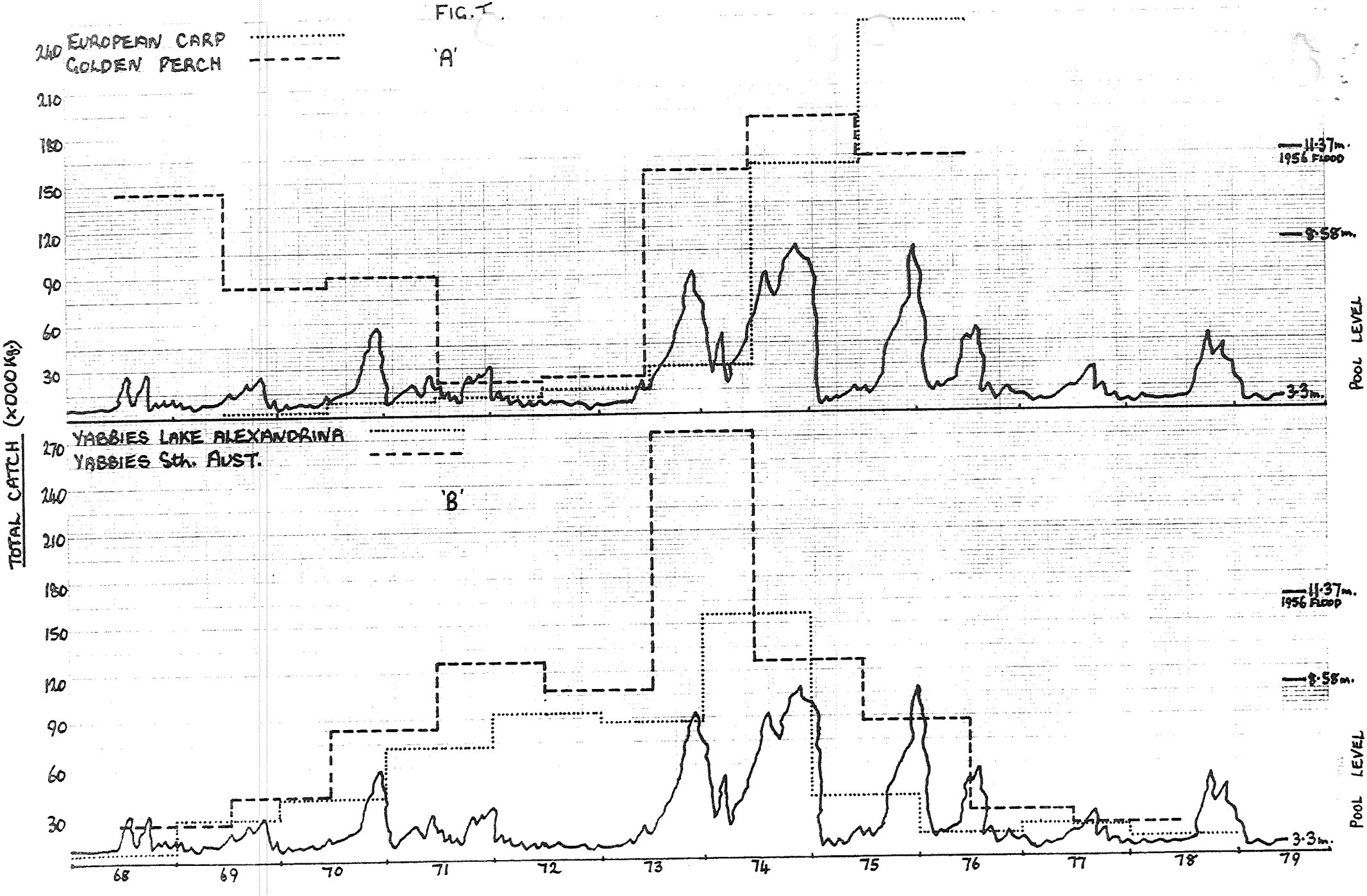
FIG. 1.


'A'
EUROPEAN CARP
GOLDEN PERCH
240
210
180
150
120
90
60
30
11·37m.
1956 FLOOD
8·58m.
3·3m.
POOL LEVEL
'B'
YABBIES LAKE ALEXANDRINA
YABBIES Sth. AUST.
270
240
210
180
150
120
90
60
30
11·37m.
1956 FLOOD
8·58m.
3·3m.
POOL LEVEL
TOTAL CATCH (×000 KG)
68
69
70
71
72
73
74
75
76
77
78
79
YEARS 1968/79.