

INLAND FISHERIES COMMISSION NEWSLETTER

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IN BRIEF

Atlantic Salmon for Waterhouse

Following grading of Atlantic salmon at the Saltas Wayatinah hatchery, surplus fish have been made available to the Commission for public stocking.

As the stocking of Great Lake with salmon is still under evaluation, it was decided to trial these fish in a lowland storage. Big Waterhouse Lagoon was chosen and about 50 000 fingerlings ranging in size from 30 to 70g have been released.

These fish should be of catchable size next season but best value fishing should be experienced the following year if the trial is successful.

The Commission is most grateful to Saltas for providing these fish free of charge and for their generous assistance with transport costs.

Fishing Near Spawning Streams Banned

New regulations prohibiting fishing within 50 metres of the mouth of spawning streams were gazetted on 15 August 1990.

These regulations are designed to give further protection to spawning fish and apply to all those streams and canals that are presently closed to fishing.

A full list of the waters can be obtained from the Commission but examples are; Liawenee Canal and any other stream flowing into Great Lake, Arthurs Lake, Lake Sorell, Lake Pedder etc.

CHANGES TO COMMISSIONERS

On 24 July 1990 Wayne Fulton was appointed Commissioner to replace Dr Rob Sloane who resigned on 19 April after six years in the job.

Wayne commenced his association with the Commission in 1970 when he received a scholarship to undertake a biological science degree at the University of Tasmania. After working for the Commission in summer vacations he commenced work full-time as a scientific officer in 1973.

During the course of employment Wayne also obtained a Master of Science degree through part-time study at the University of Tasmania and a Graduate Diploma of Professional Management through the External Studies section of the Tasmanian

State Institute of Technology.

He held the position of Senior Scientific Officer (Hobart) before taking on the job of Acting Commissioner prior to official appointment as Commissioner.

Mr Joe Millen also retired as Associate Commissioner representing the Southern Tasmanian Licensed Anglers' Association on 11 June 1990 after holding the position for six years. He has been replaced by Mr Bob Ward from Granton.

Bob has a long background in angling and angling clubs. He is a life member of the Bridgewater Anglers Club and is a life member and past president of the STLAA. He is naturally a keen angler and owns a shack at Tods Corner, Great Lake.

New Members. Associate Commissioner Bob Ward and Commissioner Wayne Fulton.



New Kiosk for Salmon Ponds

A sum of \$100 000 has been allocated by the State Government for the construction of a new toilet block and tea room facility at the Salmon Ponds.

The existing toilets are substandard with difficult access especially to handicapped persons who frequently visit the area whilst the present kiosk is also very small and in need of major renovation.

The new facility will be built in a style in keeping with the historic surroundings which are classified by the National Trust and construction should be completed by the end of this financial year.

New Fisheries Act

The news that the revision of the Fisheries Act will not affect freshwater fisheries was certainly welcomed by concerned anglers.

The Minister has confirmed that a revision of legislation relating to Sea Fisheries was his primary objective and he is quite happy to see separate Acts prepared that will retain the present structure and functions of the Inland Fisheries Commission.

The process of separating the various sections of the Fisheries Act is already well in course.

Studies funded

Anglers may recently have noticed advertisements in the newspaper for four positions with the Commission.

Two of these persons will work on a project funded by the Federal Water Resources Assistance Program in cooperation with the Rivers and Water Supply Commission. The project aims to look at river flow requirements for maintenance of fisheries and will concentrate on the South Esk and Mersey catchments for the field work component.

The other two persons will join Scientific Officer Dr. Andrew Sanger in an expanded consultancy arrangement with the Hydro Electric Commission. This team will have certain specific projects such as Lagoon of Islands, Lake Burbury and Pieman River water quality, but will also look at any other biological problems or potential problems associated with HEC storage management.

Further progress reports on these projects will appear in a future Newsletter.

LAGOON OF ISLANDS UPDATE

Following representations to the Inland Fisheries Commission and Hydro-Electric Commission over a decline in the Lagoon of Islands fishery in 1988 and a severe deterioration in water quality at about the same time, biological investigations into the problems facing the lagoon and its fish populations commenced in September 1989. This research is being carried out by the IFC with funding from the HEC.

The Problem

The cause of the reduced water clarity is a bloom of microscopic green algae (phytoplankton), which has persisted at unacceptable levels throughout the first twelve months of the study. There have been up to 200 million algal cells per litre of water at times during the study. This is probably about 50 to 100 times the number of algal cells which would have been found in the lagoon prior to the bloom occurring. The same group of species that is causing the problem in Lagoon of Islands is not unusual; it has been present as part of a diverse flora in lakes Crescent and Sorell for many years without having bloomed to the same extent. It is apparent that the conditions in Lagoon of Islands are particularly suitable for some reason.

As all algae require plant nutrients to grow, the chemical composition of the water has been analysed regularly. These analyses have shown that there is an excess of iron and nitrogen in the water, and that the availability of phosphorous is limiting the growth of the algae at present. No data are available prior to the onset of the algal bloom to indicate what the pre-existing nutrient levels were.

Interim management strategies, aimed at reducing the concentration of nutrients in the lagoon, have been adopted by the HEC.

These strategies include:-

- limiting the residence time of water in the lagoon (ie maximising the annual changeover of water);
- using natural catchment inflows to fill the lagoon in preference to water from the Ripple Creek diversion which has higher nutrient levels;
- limiting the depth of the water in the lagoon to about 1.7m to encourage the growth of strap weed. This will stabilise the bottom of the lagoon, and compete for nutrients and light with the algae.

Local landowners are being kept informed of the progress of the study and are cooperating in efforts to reduce the transport of nutrients into the lagoon via the Ripple Creek diversion and other inflowing creeks.

Effects on Fish

As anglers are only too well aware, the fish populations in the lagoon have undergone dramatic changes in the last few years. A decline in condition of both rainbows and browns was first noted by anglers in about the 1987 season, and had become a serious problem by the 1988 season. Following the commencement of the Lagoon of Islands study, the fish populations have been sampled regularly and monitoring of the numbers and condition of fish in the spawning runs has been continued. Regular netting surveys have shown a severe decline in the adult rainbow and brown trout numbers in the last twelve months as shown below.

Results of netting surveys of Lagoon of Islands in 1989-90

	Juveniles	Rainbow Adults	Triploids	Brown Adults
Sept 89	12	20	24	15
Nov 89	14	4	7	36
Jan 90	9	-	1	6
April 90	9	1	14	2
July 90	28	-	10	1
Sept 90	51	-	6	1

Fish like this rainbow were the attraction of Lagoon of Islands.



A brown trout recently taken from the lagoon shows the effects of the present problem.

The population is now dominated by a large number of very small (350g) two year old naturally spawned rainbows, as well as a reasonable number of sterile triploid fish of about 1kg which were stocked in 1986 and 1987. An examination of this year's spawning run supported the results of the netting survey, with only 13 rainbows older than two years running up the Ripple Creek spawning channel. The bulk of the two year old fish will spawn for the first time next season, and it remains to be seen whether these can recover from the stress of spawning.

The Future

Prospects for angling in the lagoon this season are very poor by the standards of this water. The gut contents of the two year old fish and the triploids show them to be feeding well on stick caddis, midges and phreatoicids, but very few fish have been feeding on the perch fry. Although the small rainbows are in good condition, they are much smaller for their age than would have been expected prior to the present problem.

Midging fish have been seen along the sandy eastern shore, and may be approached quite closely, no doubt due in part to the very discoloured water. Perhaps these fish offer the fly fisherman the best chance of securing a catch. Lure fishing will be difficult in all parts of the lagoon due to the heavy growth of strap weed which is being encouraged, as stated above.

Time will tell if a marked improvement in water quality can be achieved. However, it is expected that the quality of the fish in the lagoon would improve and approach the outstanding quality of earlier years if clear water and a balanced ecosystem can be obtained.

OTHER THAN TROUT

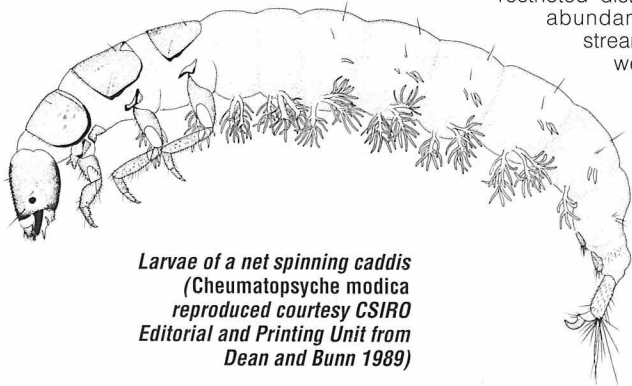
A regular article on animals of interest to the angler

NET SPINNING CADDISFLIES

by Stuart Chilcott, Scientific Officer, Inland Fisheries Commission

The caddisflies or Trichoptera as they are technically known, is a group of aquatic insects well known to most anglers. There are more than 440 species of caddisflies in Australia and they can be found in a wide diversity of habitats; from large rivers and small streams to lakes and soaks. At present there are 163 species of caddisflies known from Tasmania with 70% of these being endemic (i.e. found only within Tasmania) (Neboiss 1981).

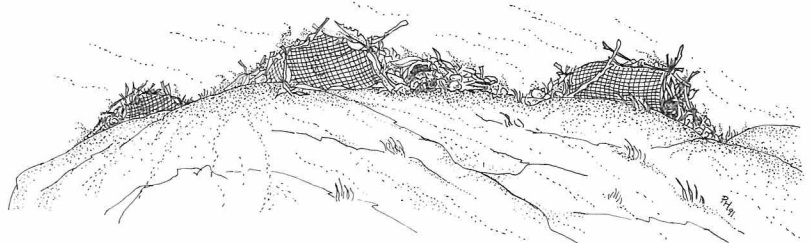
The life cycle of caddisflies involves four stages. The first stage is the egg stage which generally lasts between two and four weeks (although some species may over-winter as eggs). The eggs hatch into larvae which, depending on the species, build cases or retreats, or else are free-living. The larvae moult five times, increasing in size with each successive moult until ready to enter the pupae stage. The larvae either seal their case or construct a small chamber of silk and small rocks that provides protection during the pupation stage. Generally the period of pupation lasts between two and four weeks after which the adults emerge to mate in sometimes spectacular flying 'clouds'. The adult stage is the most frequently observed stage and may last from



Larvae of a net spinning caddis (Cheumatopsyche modica reproduced courtesy CSIRO Editorial and Printing Unit from Dean and Bunn 1989)

several days to a couple of months depending upon the species.

This article describes a small but important family of caddisflies known scientifically as the Hydropsychidae or typically to the angler as the snowflake caddis. In the strict sense, the popular name of snowflake caddis refers only to two species of caddis from this family, both contained within the genus Asmicridea. As a whole family the group are more commonly referred to as net spinning caddisflies. In Tasmania the family Hydropsychidae is represented by nine species in four genera (Neboiss 1977). The adults emerge during November to March after a period of pupation. The following table lists the species of Hydropsychidae recorded from Tasmania and shows the months of adult activity.



The net and retreat of the net spinning caddis

List of species and months of adult activity of Tasmanian Hydropsychidae

Species	Periods of Adult Activity
<i>Cheumatopsyche modica</i>	Nov.- Feb.
<i>Smicrophylax creektona</i>	Nov.- Feb.
<i>Smicrophylax simplex</i>	Dec. - Feb
<i>Asmicridea grisea</i>	Dec. - Jan
<i>Asmicridea edwardsi</i>	Nov. - Mar.
<i>Diplectrona bispinosa</i>	?
<i>Diplectrona tasmanica</i>	?Feb
<i>Diplectrona lyella</i>	Nov.-Dec.
<i>Diplectrona castanea</i>	?Dec.

Most species of the Hydropsychidae are endemic to Tasmania however two species, *C. modica* and *A. edwardsi*, are also found on the south east

Australian mainland. Within Tasmania these two species are very common and widely distributed, although *C. modica* is absent from alpine rivers. The remaining species are not as common and have restricted distributions. *S. creektona* is abundant in, but restricted to, streams of the south west and west coast. The species, *D. tasmanica*, *D. lyella* and *S. simplex* are less common and are restricted to rivers of the west and north west coast. The species *D. bispinosa* was first collected in 1922 and has not been recorded since. It was originally collected from a single river on the north coast but a suspected labelling error places doubt on its occurrence in Tasmania

(Neboiss 1977). The remaining species and perhaps the most famous is *A. grisea* which was responsible for the Shannon Rise at Miena in the years prior to the construction of the Poatina diversion. This species is known to be restricted to highland streams although recent attempts to collect it have been unsuccessful.

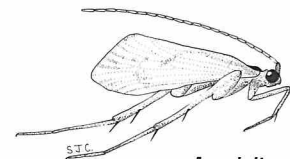
The larvae of these species (Figure 1) build retreats constructed of rocks, sticks and leaves which are fastened together with fine silk. The retreat (Figure 2), as well as providing shelter, supports a fine silk mesh net which is used to filter and trap food from the water column. The larvae emerge from the retreat periodically to clean the net of food. Hydropsychids have a diverse diet and feed upon items such as animal fragments,

drifting and sessile algae, and leaf and wood fragments. Although obtaining most food by filtering water, larvae occasionally forage for food close to the retreat.

Snowflake caddisflies are present in most streams in Tasmania and can be found in abundance in streams that receive water from still water habitats, such as lake outflow streams and riffles between river broadwaters. These types of habitat are preferred by the larvae due to the rich food laden water which drains from the still waters. Generally, the abundance of larvae decreases with distance from a lake.

During calm warm afternoons and evenings the adult caddis are often responsible for initiating trout activity and creating an idyllic challenge for anglers. The behaviour of the adults is the principle reason why the snowflake caddisflies are such an important food item to trout. Swarming behaviour causes the adults to congregate near the stream edges around overhanging branches and sedges and consequently they are within easy reach of preying trout.

Perhaps the habits of the adults (Figure 3) were best described by the late Dr. R. J. Tillyard (in Mosely and Kimmins 1953); "The males have pure white wings, sometimes with dark markings, and fly in clouds on the mountain streams in the late afternoon, rising rhythmically and giving the appearance of a miniature snowstorm. The females are dull brownish insects which seldom escape from the water; for, as soon as one emerges from the pupal shell, the whole swarm of males descends upon her, and she is often drowned in the act of releasing her eggs."



An adult snowflake caddis (Asmicridea edwardsi)

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MANAGEMENT OF THE GIANT TASMANIAN FRESHWATER CRAYFISH

Commission Seeks Input

Tasmania's freshwater crayfish fauna is diverse and includes some of the most interesting crayfishes in the world. The largest of these, *Astacopsis gouldi*, the giant freshwater crayfish, or "lobster", as it is called in northern Tasmania, can attain a weight of more than four kilograms and a total length of over half a metre. The species occurs only in Tasmania and is restricted to the north of the State where it can be found in streams, rivers and reservoirs draining into Bass Strait as well as in the Arthur River system in the extreme north west.

For these reasons it is probably the most significant element of Tasmania's native freshwater fauna. It's potential for aquaculture has been investigated without encouraging results as reported in an earlier Newsletter. However, there is a substantial wild fishery for the crayfish with limited regulation or management provisions in place.

Added to this there is a school of opinion that considers the species to be under threat; certainly the larger individuals at least. It was classified as a 'vulnerable' species by the International Union for the Conservation of Nature (IUCN) in 1983. Whilst the Commission does not support that classification, it is aware of valid reasons for concern for the future of the species. Consequently, it is considered time that the regulations pertaining to this species were

reviewed and that a Management Plan should be produced for freshwater crayfish in general.

The Management Plan should include –

- the species to be covered;
- history of the species;
- the objectives of the plan.

Particular emphasis would be given to the recreational fishery for *Astacopsis gouldi* where specific regulations covering future recreational fisheries would be provided for.

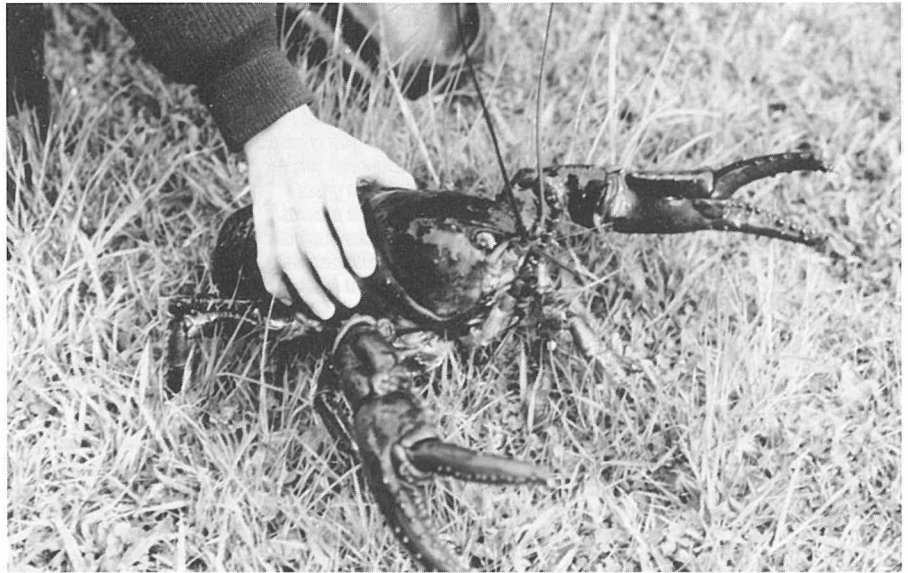
The Inland Fisheries Commission therefore seeks input from the public with regard to any or all of the following –

- equipment and methods of fishing;
- seasons;
- areas to be fished;
- size, sex and bag limits;
- licences;
- research and management objectives;
- penalties for offences.

Submissions in any form will be accepted and should be forwarded to the Secretary, Inland Fisheries Commission, 127 Davey Street, Hobart 7000. If you know someone who is interested in this subject, please pass the information on.

Two further articles below provide some additional background information.

A large crayfish recently taken from the north east.



LIFE HISTORY OF THE GIANT FRESHWATER CRAYFISH

by Premek Hamr
Scientific Officer, Inland Fisheries Commission

Over the past four years I have been studying the biology of *Astacopsis gouldi* as a part of my PhD dissertation dealing with crayfish reproduction. The following is a brief summary of some of the results obtained during that study.

Habitat

A gouldi prefers cool water, well shaded by streamside vegetation. Adults are usually found in deep pools sheltering under submerged rocks and logs. Smaller juveniles also inhabit shallower swift-running sections.

Feeding

The natural diet of *A gouldi* consists of semi-decayed wood, aquatic insects, leaves and detritus, but it also has a voracious appetite for animal flesh.

Reproduction

The average age at sexual maturity in *A gouldi* is approximately nine years in males (at a carapace length of approximately 75mm) and 14 years in females (at a carapace length of approximately 120mm), while the maximum life span is at least 26 years (at a carapace length in excess of 200mm).

Mature females of *A gouldi* mate and spawn in April/May, eggs are carried over winter, hatch in January, and young stay attached until late into the summer (March/April). After the release of their broods, females overwinter, then moult in mid summer (January/February) and mate and spawn again in autumn, two years after their previous mating. Adult females therefore exhibit a biennial breeding and moulting cycle.

This strategy results in two distinct female reproductive groups:–

- those moulting, mating and spawning in a given summer; and
- those incubating young and larvae in a given summer.

Adult males appear to mate every year but, like the females, probably moult only once every two summers.

Moulting

Moulting activity occurs between spring and autumn when temperatures rise above 10°C. The moulting frequency of crayfishes decreases with increasing size. The amount grown at each moult varied between 1mm in small juveniles and 15mm in large adults. As a result, the large adults, especially mature females who moult only once every two years, have some of the lowest growth rates (5-10mm per year).

Summary

In conclusion, the results of my study show that the giant crayfish grows very slowly, reaches maturity at a late age and reproduction in females occurs only every second year. These characteristics make crayfish populations particularly vulnerable to environmental disturbance and over-exploitation which may in turn account for the low numbers of large adults in some rivers.

THE FISHERY FOR FRESHWATER CRAYFISH IN TASMANIA

by Dr Peter Davies
Senior Scientific Officer, Inland Fisheries Commission

Introduction

Freshwater recreational fisheries in Tasmania are limited to a small number of target species. Fishing for introduced trout (principally *Salmo trutta* and *S gairdneri*) has been the principal pastime of inland sport fishermen in Tasmania since the first introduction of these species in the 1860's. This fishery is substantial, with over 25 000 participants each year exerting an average of 600 000 angler days effort statewide.

Other inland fisheries target blackfish (*Gadopsis marmoratus*), freshwater crayfish, (principally *Astacopsis gouldi*), redfin perch (*Perca fluviatilis*), whitebait (in 1990 at least) and eels (principally *Anguilla australis*). The latter fishery is primarily commercial whereas the others are recreational. There is also some limited recreational fishing for adult lampreys and tench.

The Inland Fisheries Commission (IFC) is the licensing authority for the exploitation, both commercial and recreational, of all inland fish species both strictly freshwater and migratory. A licence is required for any rod fishing for introduced species carried out in inland waters by persons above the age of 14 who do not receive a pension. A licence is not required for fishing with a bush pole (more than 1m in length), but is required for the taking of crayfish with string, bait and hand net. This is the most common method of taking freshwater crayfish.

To date, little effort has been exerted regarding the management of any species other than trout, eels and whitebait. Management for the eel fishery consists of licensing controls and, for the whitebait populations, policing a substantial illegal fishery on the north and north-west coasts is a major commitment, alongside a new limited recreational fishery.

Little is known of the recreational fishery for the Tasmanian endemic crayfish, *Astacopsis gouldi*, despite claims that recreational fishing is having a detrimental effect on the size distribution in populations and that the species has been listed in the IUCN Red Book as vulnerable. No active management is carried out for the species and licensing for the fishery is not specific. Policing of catches is minimal and a reserve for the species on Caroline Creek is of little conservation value.

The IFC carried out postal surveys of recreational fishers for the 1985/86 to 1989/90 fishing seasons (see in part IFC Newsletter 17(2)). In the light of the need for basic information it was decided to include an initial survey of blackfish and freshwater crayfish catches by licensed trout fishermen by placing several questions regarding these species on the postal questionnaire for the 1987/88 and 1989/90 fishing seasons.

Questions were asked regarding fishing for freshwater crayfish during the previous year. The total harvest and numbers of people fishing are estimated from the replies within the questionnaire sample by correcting for all the freshwater angling

licence holders (this includes full and part season licence holders, pensioners and juvenile fishers).

1987/88 Survey Results

Seventy-eight people (representing 8.65% of the returns) stated that they had fished for crayfish during the 1987/88 season. The number of licence holders fishing for crayfish throughout the State was, therefore, approximately 2 500. In the north west area, around 25% of trout fishers also fish for crayfish. The average crayfish catch was 7.4 per fisher in a season, with a total harvest of 15 000 crayfish during the 1987/88 season.

Crayfish are not a by-catch of trout fisheries as there are marked differences in fishing techniques. Only 33% of crayfish fishers fished the same water(s) for trout and 71% fished only one water for crayfish. Only one respondent caught blackfish and crayfish and did not fish for trout and no respondents only fished for crayfish indicating that the licence was essentially bought for another purpose. Fewer waters overall were visited by a crayfish fisher than by a trout fisher during the 1987/88 season.

The waters at which crayfish were caught are shown in Fig. 1 along with the number of fishers. Sample sizes were too small to allow the calculation of average catches in more than a few cases, but details for some of the more popular rivers are shown in Table 1. Only three lakes were reported, none with significant catches or visitation.

Table 1: Crayfish catch rates for the more popular rivers (1987/88)

Water	Mean catch per person
Black River	3.8
Leven River	9.8
Inglis River	3.8
Cam River	8.8
Overall average catch	7.4

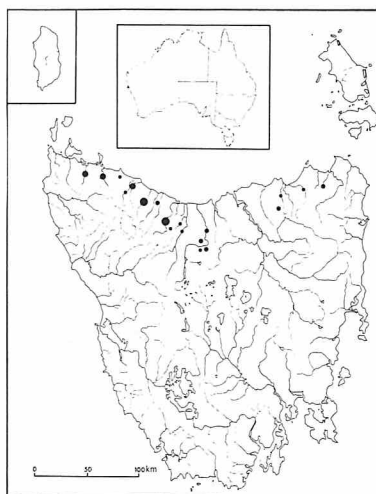


Fig. 1: Location (by river) of total catches of freshwater crayfish for 1987/88 season

The distribution of fishers and catches closely follows the recognised distribution for *Astacopsis gouldi* along the north coast of the State. It is also of interest that the fishing effort within the Tamar drainage system (South Esk, Macquarie, Meander and North Esk river systems) is minimal and that no catches of *A gouldi* were recorded from this area in this survey.

1989/90 Survey Results

Sixty (5%) responses were received from fishers who stated that they had fished for crayfish during the 1989/90 season, representing some 1 500 crayfish fishers in all. A further 20 (1.7%) fishers stated that they had caught crayfish without intentionally fishing for them, representing some 550 fishers in all. The estimate of the total crayfish harvest for the 1989/90 season was 11 000.

Details of fishing sites were not requested in this survey, it was essentially included as a form of verification of the numbers recorded in the previous survey.

Discussion

The fishery for freshwater crayfish is restricted to the north and north-west and is predominantly riverine with both large and small streams receiving significant attention.

The annual harvest of freshwater crayfish appears to be in the region of 10 000 to 15 000, which is higher than generally expected. These results are drawn from full season licence holders, the majority of whom fish exclusively for trout. The Fisheries Act 1959 states that a licence is required for the taking of blackfish and crayfish other than by the use of a bush pole. There may also be a population of local fishers on the north and north-west coast of Tasmania who fish for crayfish without buying a licence, but there is insufficient information to suggest how large the population of such fishers is. It certainly includes a number of unlicensed fishers under the required licence bearing age of 14. The figures derived in this survey could therefore be conservative. The Commission is doubtful, however, that the population of such unlicensed crayfish fishers is significant as fishing is generally carried out as an additional pastime to trout fishing, for which licensing is mandatory.

This level of exploitation is considered to be quite high for a species with a relatively low reproductive capacity and slow growth rate, especially when the larger size classes are targeted in the fishery. It is of interest that the major rivers fished were not isolated and presumably therefore suffer consistently high fishing pressure (Black, Leven, Inglis, Cam etc). However, the high diversity of streams fished by small numbers of fishers with occasional records of good catches indicates that small stream populations are under at least occasional high fishing pressure. Such fishing may be as damaging to the population of a small stream as high consistent pressure is to a large river, especially for a slow growing, relatively sedentary species such as *A gouldi*.

There is, as a result of the large harvests revealed here, a need for more basic research to be performed on the distribution and state of populations of *Astacopsis gouldi* and on the impact of the recreational fishery.

Acknowledgment

The Inland Fisheries Commission would like to thank the fishers who returned questionnaires as part of this study.

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The average age at sexual maturity in *A gouldi* is approximately nine years in males (at a carapace length of approximately 75mm) and 14 years in females (at a carapace length of approximately 120mm), while the maximum life span is at least 26 years (at a carapace length in excess of 200mm).

Mature females of *A gouldi* mate and spawn in April/May, eggs are carried over winter, hatch in January, and young stay attached until late into the summer (March/April). After the release of their broods, females overwinter, then moult in mid summer (January/February) and mate and spawn again in autumn, two years after their previous mating. Adult females therefore exhibit a biennial breeding and moulting cycle.

This strategy results in two distinct female reproductive groups:–

- those moulting, mating and spawning in a given summer; and
- those incubating young and larvae in a given summer.

Adult males appear to mate every year but, like the females, probably moult only once every two summers.

Moulting

Moulting activity occurs between spring and autumn when temperatures rise above 10°C. The moulting frequency of crayfishes decreases with increasing size. The amount grown at each moult varied between 1mm in small juveniles and 15mm in large adults. As a result, the large adults, especially mature females who moult only once every two years, have some of the lowest growth rates (5-10mm per year).

Summary

In conclusion, the results of my study show that the giant crayfish grows very slowly, reaches maturity at a late age and reproduction in females occurs only every second year. These characteristics make crayfish populations particularly vulnerable to environmental disturbance and over-exploitation which may in turn account for the low numbers of large adults in some rivers.

THE FISHERY FOR FRESHWATER CRAYFISH IN TASMANIA

by Dr Peter Davies
Senior Scientific Officer, Inland Fisheries Commission

Introduction

Freshwater recreational fisheries in Tasmania are limited to a small number of target species. Fishing for introduced trout (principally *Salmo trutta* and *S. gairdneri*) has been the principal pastime of inland sport fishermen in Tasmania since the first introduction of these species in the 1860's. This fishery is substantial, with over 25 000 participants each year exerting an average of 600 000 angler days effort statewide.

Other inland fisheries target blackfish (*Gadopsis marmoratus*), freshwater crayfish, (principally *Astacopsis gouldi*), redbfin perch (*Perca fluviatilis*), whitebait (in 1990 at least) and eels (principally *Anguilla australis*). The latter fishery is primarily commercial whereas the others are recreational. There is also some limited recreational fishing for adult lampreys and tench.

The Inland Fisheries Commission (IFC) is the licensing authority for the exploitation, both commercial and recreational, of all inland fish species both strictly freshwater and migratory. A licence is required for any rod fishing for introduced species carried out in inland waters by persons above the age of 14 who do not receive a pension. A licence is not required for fishing with a bush pole (more than 1m in length), but is required for the taking of crayfish with string, bait and hand net. This is the most common method of taking freshwater crayfish.

To date, little effort has been exerted regarding the management of any species other than trout, eels and whitebait. Management for the eel fishery consists of licensing controls and, for the whitebait populations, policing a substantial illegal fishery on the north and north-west coasts is a major commitment, alongside a new limited recreational fishery.

Little is known of the recreational fishery for the Tasmanian endemic crayfish, *Astacopsis gouldi*, despite claims that recreational fishing is having a detrimental effect on the size distribution in populations and that the species has been listed in the IUCN Red Book as vulnerable. No active management is carried out for the species and licensing for the fishery is not specific. Policing of catches is minimal and a reserve for the species on Caroline Creek is of little conservation value.

The IFC carried out postal surveys of recreational fishers for the 1985/86 to 1989/90 fishing seasons (see in part IFC Newsletter 17(2)). In the light of the need for basic information it was decided to include an initial survey of blackfish and freshwater crayfish catches by licensed trout fishermen by placing several questions regarding these species on the postal questionnaire for the 1987/88 and 1989/90 fishing seasons.

Questions were asked regarding fishing for freshwater crayfish during the previous year. The total harvest and numbers of people fishing are estimated from the replies within the questionnaire sample by correcting for all the freshwater angling

licence holders (this includes full and part season licence holders, pensioners and juvenile fishers).

1987/88 Survey Results

Seventy-eight people (representing 8.65% of the returns) stated that they had fished for crayfish during the 1987/88 season. The number of licence holders fishing for crayfish throughout the State was, therefore, approximately 2 500. In the north west area, around 25% of trout fishers also fish for crayfish. The average crayfish catch was 7.4 per fisher in a season, with a total harvest of 15 000 crayfish during the 1987/88 season.

Crayfish are not a by-catch of trout fisheries as there are marked differences in fishing techniques. Only 33% of crayfish fishers fished the same water(s) for trout and 71% fished only one water for crayfish. Only one respondent caught blackfish and crayfish and did not fish for trout and no respondents only fished for crayfish indicating that the licence was essentially bought for another purpose. Fewer waters overall were visited by a crayfish fisher than by a trout fisher during the 1987/88 season.

The waters at which crayfish were caught are shown in Fig. 1 along with the number of fishers. Sample sizes were too small to allow the calculation of average catches in more than a few cases, but details for some of the more popular rivers are shown in Table 1. Only three lakes were reported, none with significant catches or visitation.

Table 1: Crayfish catch rates for the more popular rivers (1987/88)

Water	Mean catch per person
Black River	3.8
Leven River	9.8
Inglis River	3.8
Cam River	8.8
Overall average catch	7.4

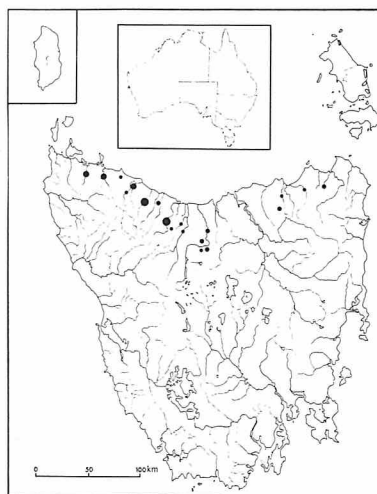


Fig. 1:
Location (by river) of total catches of freshwater crayfish for 1987/88 season

The distribution of fishers and catches closely follows the recognised distribution for *Astacopsis gouldi* along the north coast of the State. It is also of interest that the fishing effort within the Tamar drainage system (South Esk, Macquarie, Meander and North Esk river systems) is minimal and that no catches of *A. gouldi* were recorded from this area in this survey.

1989/90 Survey Results

Sixty (5%) responses were received from fishers who stated that they had fished for crayfish during the 1989/90 season, representing some 1 500 crayfish fishers in all. A further 20 (1.7%) fishers stated that they had caught crayfish without intentionally fishing for them, representing some 550 fishers in all. The estimate of the total crayfish harvest for the 1989/90 season was 11 000.

Details of fishing sites were not requested in this survey, it was essentially included as a form of verification of the numbers recorded in the previous survey.

Discussion

The fishery for freshwater crayfish is restricted to the north and north-west and is predominantly riverine with both large and small streams receiving significant attention.

The annual harvest of freshwater crayfish appears to be in the region of 10 000 to 15 000, which is higher than generally expected. These results are drawn from full season licence holders, the majority of whom fish exclusively for trout. The Fisheries Act 1959 states that a licence is required for the taking of blackfish and crayfish other than by the use of a bush pole. There may also be a population of local fishers on the north and north-west coast of Tasmania who fish for crayfish without buying a licence, but there is insufficient information to suggest how large the population of such fishers is. It certainly includes a number of unlicensed fishers under the required licence bearing age of 14. The figures derived in this survey could therefore be conservative. The Commission is doubtful, however, that the population of such unlicensed crayfish fishers is significant as fishing is generally carried out as an additional pastime to trout fishing, for which licensing is mandatory.

This level of exploitation is considered to be quite high for a species with a relatively low reproductive capacity and slow growth rate, especially when the larger size classes are targeted in the fishery. It is of interest that the major rivers fished were not isolated and presumably therefore suffer consistently high fishing pressure (Black, Leven, Inglis, Cam etc). However, the high diversity of streams fished by small numbers of fishers with occasional records of good catches indicates that small stream populations are under at least occasional high fishing pressure. Such fishing may be as damaging to the population of a small stream as high consistent pressure is to a large river, especially for a slow growing, relatively sedentary species such as *A. gouldi*.

There is, as a result of the large harvests revealed here, a need for more basic research to be performed on the distribution and state of populations of *Astacopsis gouldi* and on the impact of the recreational fishery.

Acknowledgment

The Inland Fisheries Commission would like to thank the fishers who returned questionnaires as part of this study.

THE 1990 WHITEBAIT SEASON

by Wayne Fulton, Commissioner of Inland Fisheries

Following considerable debate over the last few years a recreational season for the taking of whitebait was recently allowed for the first time since 1973.

Background

The commercial fishery for whitebait in Tasmania dates back at least until the 1930's. Significant commercial fisheries began in the south in 1941 and in the north in 1943.

The catch was always greater in the north of the State with the total harvest reaching a peak of around 480 tonnes in 1947. However, the fishery had already started to decline by that time as the catch per licence was down from the previous year.

Catches continued to decline despite various regulation changes including the transfer of control of the fishery from Sea Fisheries to the Inland Fisheries Commission in 1965. The fishery was eventually closed after the 1973 season by which time the total catch had declined to less than two tonnes for the State.

There have been various reasons given for the decline in stocks but with the reduction being so prolonged and evident right across the State, there is little doubt that overfishing was the primary cause. Pollution and poaching certainly have not assisted recovery.

In the early 1980's some improvements were evident in whitebait stocks. The Inland Fisheries Commission did not wish to make a hasty decision to re-open the fishery as no studies had taken place since the closure (or since the CSIRO work around 1950, for that matter). Consequently, funds were obtained from the Commonwealth and a three year study was initiated in the 1985 season.

This study was completed in late 1987 and a recommendation was made to the Government for a limited recreational season in 1989.

The implementation of this recommendation was delayed by a change in Government but the 1990 season is essentially the result.

The 1990 Whitebait Season

As well as support for a whitebait season there was also considerable concern from many trout anglers that stocks of whitebait may again be wiped out. The resultant regulations were therefore a compromise and an attempt to cater for all interests. In particular, the compromise resulted in all waters from the Inglis River to Franklin Rivulet remaining closed. With opposing views it was simply impossible to please everyone, but no apologies are made for the basic intention of the regulations; **a trial fishery with no chance of over-exploitation.**

The regulations were deliberately designed to prevent over-exploitation in a number of ways –

- an early season;
- a short season;
- open only a few rivers;
- limit daily and total catch;
- restrict gear size; and
- season timed to avoid peak migration time.

Whilst this strategy was certainly unpopular to some who expected that the purchase of a licence automatically meant they should get 10kg of whitebait, it nevertheless allowed people to once again take a small but ample quantity of whitebait without returning to the wholesale destruction of previous open seasons.

The IFC monitored the fishery and collected information from a number of sources –

- analysis of licence sales;
- interview program on particular rivers;
- questionnaire returns from licence holders.

Additional information on the populations of adult galaxiids will be obtained during summer from fished and unfished areas to monitor effects of the open season.

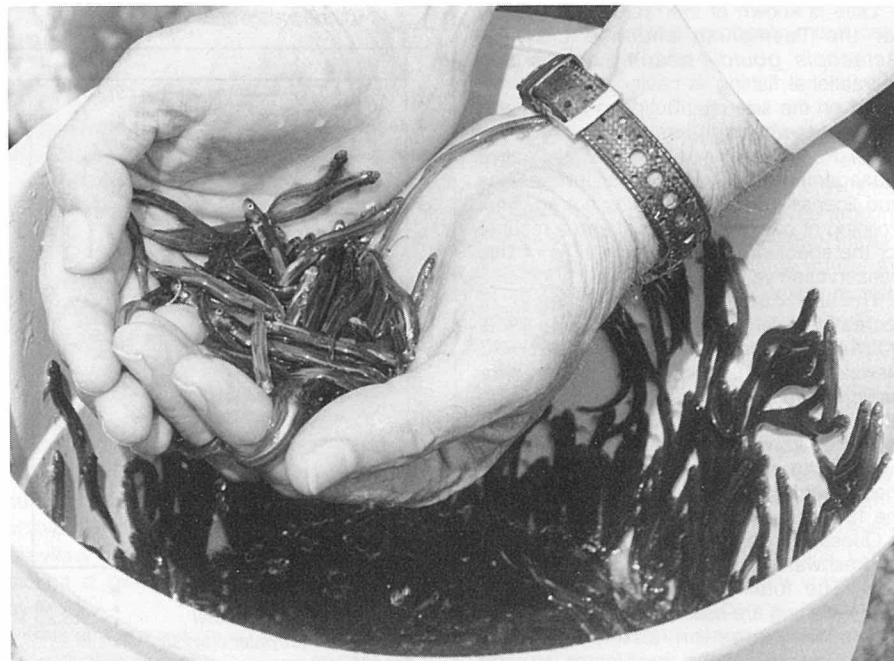
Licence Sales

A total of 583 licences were sold during the season; 70% of these being purchased in the north – north west region with 36% sold in Smithton alone. A summary of sales is as follows –

Region	% of total licences sold
Queenstown – Savage River	5
Smithton – Wynyard	45
Burnie – Latrobe	25
Launceston	2.5
Scottsdale – Bridport	10
Derwent	10
Huon	2.5

The sales realistically reflect the waters that were available to fish. Greater numbers would certainly have been sold in the central north coast region if rivers in this area were open. The low sales in the south reflect both lower interest in whitebait in that area as well as the absence of significant runs during the season.

A bucket o' bait : the object of the recent season.



Interview Program

Fishers were asked for details of their catch by interview on the river bank during the season.

The rivers censused were Duck/Inglis, Great Forester and Derwent/Huon, which involved a visit to the major fishing section of each river at a set time.

The general findings of this census were that –

- most people fished during the period approaching and through the high tide as expected;
- most people were satisfied with the net size and catch limit restrictions;
- most comments were to the effect that the season should be longer and that more rivers should be open;
- inspection of catches showed that no *Lovettia* were caught which was an intention of the regulations;
- patronage of the season in the south was very low. Many people were interested but preferred to wait for bait to arrive.

From the interview program, an average catch per day for the Duck River (0.45kg), Inglis River (0.34kg) and Great Forester (0.57kg) was estimated.

Insufficient information was obtained in the south to warrant analysis.

Questionnaire Results

A survey form was included as part of the information handed out with each licence. About 12% of fishers responded to this survey after the end of the season, which was a good response. The age range of respondents was from 20 to 84 years of age, most (95%) were male and 76% were trout anglers.

The following catch information was obtained from these returns. Where gaps occur, insufficient responses were obtained to make a reliable estimate.

PROSECUTIONS

Infringement Notices

During 1990 several more offences were added to the list for which infringement notices could be issued. In particular, the use of bottles and cans as strike indicators as well as offences related to the taking of whitebait, were added.

During the full year, notices were issued for a total of 237 offences with fines for these amounting to \$29 600. A summary of the infringements includes:

Possession of whitebait net without permit	30
Take whitebait without permit	21
Possession of whitebait without permit	8
Use unmarked whitebait net	1
Fishing without licence	35
Fishing with more than one rod and line	41
Unattended set rod	41
Use bottle or can as strike indicator	21
Possession of assembled rod when unlicensed	10
Possession of assembled rod in closed waters	2
Fishing in closed waters	3
Take undersized fish	1
Possession of natural bait in artificial waters	4
Use natural bait in artificial waters	19

River	No. Fishers	Av. No. Days Fished	Av. Hrs/day	Av. Catch (kg)	Total Harvest (kg)
Pieman River	20	5	2.1	5	100
Duck River	200	5.9	3.1	3.3	660
Black River	130	3.1	3.3	1.1	140
Deep Creek	95	3.6	3.6	2.8	270
Inglis River	160	7.3	3.8	3.4	540
Franklin Rivulet	120	10.1	3.5	2.4	290
Tamar River	<10				
Forester River	110	11.8	2.1	6.7	740
Ringarooma River	<10				
Derwent River	<10				
Huon River	17				

There was also space for comments on these forms, and whilst most responses received were constructive, others obviously did not appreciate or understand the intentions of the season and the consequent regulations.

A summary of the major comments is given below -

Happy with fishery being open:	12	(22%)
Season too short:	21	(31%)
Season should be later:	25	(37%)
Season should be earlier:	2	(3%)
Cost of licence too high:	12	(18%)
Suggested lower cost for licensed anglers:	5	(8%)
Net should be larger:	7	(10%)
Net size okay:	3	(5%)
More rivers should be opened:	17	(25%)
Choice of river inappropriate:	8	(12%)
Quota regulations okay:	10	(15%)
Daily quota should be larger:	7	(10%)
Total quota should be larger:	1	(2%)
Tony Fletcher for Premier:	1	(2%)

Of the 17 people who suggested more rivers be opened, all suggested either the Mersey or a river in the Latrobe - Devonport area. Of the eight who were displeased with the choice of rivers, seven were displeased with the Franklin Rivulet and one with the Ringarooma as being chosen.

Summary

The Commission is quite pleased with the overall results of the trial season. It has enabled many people to once again catch this delicacy legally. The catch has been well within reason and there is little likelihood that this harvest could not be sustainable in the future.

The comments received will be evaluated for the future. Obviously some were expected (season too early; too short; net larger etc) as they were specific intentions to limit over-exploitation. As indicated, the closure of rivers in the Devonport-Burnie area was a compromise with concerned anglers. This situation will be reviewed this year along with the whole question of future whitebait fishing. Any comments regarding any aspect of whitebaiting would be most welcome.

Court Procedures

Other offences that were proceeded with by summons are listed below:

Offender	Offence Summary	Total Fine Plus Costs \$
John Terrance SMITH, Latrobe	Whitebait	71-10
Paul Michael SHEEHAN, Devonport	Whitebait	71-10
Dean Francis WHITEHOUSE, Devonport	Disturb spawning fish/Assault	126 hours community service
		131-10
		549-10
Michael Glen REDPATH, Port Sorell	Whitebait	424-10
Vernon Trevor HOLDEN, Devonport	Whitebait	449-10
Anthony Paul KITSON, Port Sorell	Whitebait	99-10
James Christopher GEORGE, Old Beach	Take fish from closed waters	124-10
Lional James BROWN, Georgetown	Other than rod and line	224-10
Anthony James SAWFORD, Ross	Unlicensed/Alter licence	160-00
Mathew Lloyd FREE, Claremont	Disturb spawning fish/Take fish from closed waters	648-20
Harry Desmond SHAW, Port Sorell	Whitebait	224-10
Laurence Mervyn CLARKESON, Smithton	Possess net/Take freshwater crayfish	216-10
Douglas Edgar BISHTON, Devonport	Whitebait	424-10
Mervin Collin FLANAGAN, Heybridge	Whitebait	64-10
Rodric Karl SCHWESINGER, Bellerive	Take fish from closed waters	450-00
David Leslie REEVE, Calder	Disturb spawning fish/Obstruction	124-10
Graham Jeffrey NEAL, Yolla	Disturb spawning fish/Obstruction	124-10
Hans Joachim SCHUMANN, Yolla	Disturb spawning fish/Obstruction	124-10
Rodney Thomas MCCARTHY, Yolla	Disturb spawning fish/Obstruction	124-10
Geoffrey William SHORT, Shorewell	Unattended set rod	116-10
Trevor James MATHEWSON, Orford	Unattended set rod	424-10
Lawrence Phillip MANEY, Heybridge	Whitebait	424-10
Michael KUGA, Montello	Whitebait	424-10
Darron William HAMPSON, Smithton	Whitebait	324-10
Dale Anthony LAPHAM, Wynyard	Whitebait	137-10
Robert Shane MUNNINGS, New Norfolk	Other than rod and line	524-10
David Judson CAPELL, Rosebery	Whitebait	316-10
Graham James LINNETT, Ravenswood	Unlicensed/Falsely represent to be licensed	174-10
Boyd Keveall GLEESON, Longford	Unlicensed	225-00
Quinton Andrew GREY, Smithton	Whitebait	425-00
Quinton Andrew GREY, Smithton	Whitebait	174-10
Wilmot Keith CLARK, Primrose Sands	Disturb spawning fish/Take fish from closed waters	475-00
Gerrard William ALLFORD, Railton	Whitebait	475-00
Bruce George STEPHENS, Railton	Whitebait	99-10
Stephanie Ann SMITH, Devonport	Whitebait	125-00
Danny Laurence SMITH, Port Sorell	Unattended set rod	276-00
Craig Arthur CUNNINGHAM, Burnie	Possess net/Take freshwater crayfish	276-00
Maxwell Roy BOWDEN, Heybridge	Possess net/Take freshwater crayfish	125-00
John Lester BESTER, Bridgewater	Unattended set rod	126-00
Nigel Mark HARDY, Ridgley	Unlicensed	225-00
Royce Charles MATHER, Port Sorell	Whitebait	425-00
John Phillip STAFFORD, Port Sorell	Whitebait	125-00
Danny Maxwell BARKER, Wynyard	Disturb spawning fish	425-00
Gregory Allan DIXON, Wynyard	Whitebait	125-00
Carl Anthony SMALLBON, Devonport	Unattended set rod	225-00
Leon WILSON, Claremont	Disturb spawning fish/Other than rod and line	175-00
Simon John HOBDEN, Berriedale	Disturb spawning fish/Take fish from closed waters	125-00
Mark Anthony BAXTER, Longford	More than one rod and line	125-00
Barry William MCDONALD Jnr, Longford	More than one rod and line	275-00
Eric Raymond NEW, Port Sorell	Disturb spawning fish/Other than rod and line	150-00
Ricky Leonard BYE, Port Sorell	More than one rod and line	359-00
Lloyd Maxwell MUNDAY, Burnie	Whitebait	359-00
David McGeorge BANNER, Latrobe	Whitebait	225-00
Shane Andrew LEWIS, Evandale	More than one rod and line	125-00
William George MILLS, Launceston	Unattended set rod	125-00
Shane Peter FRAZER, South Launceston	Unattended set rod	125-00
Robin Lucas PINNER, Launceston	Unattended set rod	68-00
Barbara Kaye CORDWELL, Lenah Valley	More than one rod and line	150-00
David Andrew SHEEHAN, Latrobe	Unlicensed	200-00
Ian Michael JONES, Chigwell	More than one rod and line/Unattended set rod	550-00
Robert Neil PENNICOTT, Piersons Point	Sell Atlantic salmon	445-00
Geoffrey BRIAN, Northern Territory	Disturb spawning fish/Take fish from closed waters	465-00
PETS INTERNATIONAL, Launceston	Import live yabbies and crabs	331-00
Neville Lauton WALKER, Latrobe	More than one rod and line/Unattended set rod/	131-00
	Use strike indicator	155-00
	Unlicensed	Suspended
Brett Anthony LAWLESS, Royal George	Unlicensed/Assembled rod	221-00
Nicholas Leo BELLINGER, Wynyard	Other than rod and line/Unlicensed/	331-00
Gary John KING, Dover	Possess salmon and trout	225-00
	Unlicensed/Other than rod and line	325-00
	Falsely represent to be licensed/Unlicensed	325-00
	More than one rod and line/Unattended set rod	325-00
	Unattended set rod/Unlicensed/	325-00
	Falsely represent to be licensed	150-00
Leslie Robert GREEN, Triabunna	Other than rod and line/Possess unclean fish/	231-00
	Take fish from closed waters/Disturb spawning fish	
	Unlicensed/Assembled rod	
Stephen RADOSAULJEVIC, Cambridge		

TROUT STOCKING 1990

BROWN TROUT JUVENILES

Water Stocked	Locality	Stage	Number
Major Public Storages			
Blackmans Lagoon	Bridport	adv fry	12 000
Brushy Lagoon	Birralee	fry	20 000
Curries River Dam	George Town	fry	50 000
Tooms Lake	East Coast	fry	20 000
			102 000

North West

Circular Head		*	5 000
North Motton		*	85 000
Guide Dam	5 000		
Pet River Dam	20 000		
Forestry Commission	10 000	Togari	
Farm Dams	balance		
Penguin Rearing Pond		*	3 000
Preston-Gunns Plains Rearing Pond		*	2 000
Sassafras Rearing Ponds		*	55 000
			150 000

North

T Badcock	Toiberry	fry	10 000
Beaconsfield Water Supply	Beaconsfield	fry	25 000
F C Bond	Cressy	fry	3 000
R C Dickson	Hadspen	fry	500
Hagley Farm School	Hagley	fry	3 000
I McFarlane	Hagley	fry	1 000
I McFarlane	Westbury	fry	3 000
M McGee	Westbury	fry	6 000
R Michelson	Westbury	fry	15 000
L Plunkett	Westbury	fry	6 000
I H Trickett	Deloraine	fry	15 000
			87 500
			339 500

TOTAL LIBERATIONS

* Fry from Salmon Ponds grown on for later release
List of release sites available from IFC

BROWN TROUT ADULTS

Date	Water Stocked	Origin	Number
07.05.90	Carters Lagoon	Great Lake	200
07.05.90	Rocky Lagoon	Great Lake	100
08.05.90	Lake Botsford	Great Lake	200
08.05.90	Bruisers Lagoon	Great Lake	50
31.05.90	Lake Dulverton	Salmon Ponds	250
			800

BROOK TROUT

Date	Water Stocked	Stage	Number
09.11.90	Clarence Lagoon	fingerlings	6 870
			6 870

RAINBOW TROUT

Date	Water Stocked	Origin	Stage	Number
02.02.90	Lake Leake	Sevrup Fisheries	fingerlings	14 000
03.02.90	Lake Crescent	Sevrup Fisheries	fingerlings	16 000
06.02.90	Brushy Lagoon	Sevrup Fisheries	fingerlings	16 000
06.02.90	Curries River Dam	Sevrup Fisheries	fingerlings	16 000
07.02.90	Blackmans Lagoon	Sevrup Fisheries	fingerlings	18 000
08.02.90	Lake Cethana	Sevrup Fisheries	fingerlings	16 000
27.03.90	Dee Lagoon	Salmon Ponds	fingerlings	3 000
02.04.90	Leven River	Great Lake	fingerlings	850
11.08.90	Craigbourne Dam	Safcol	fingerlings	2 200
10.10.90	Curries River Dam	Corra Linn	fry	5 000
	Curries River Dam	TSIT	yearlings	1 150
				108 200

ATLANTIC SALMON

Date	Water Stocked	Origin	Stage	Number
28.05.90	Canal Bay, Great Lake	Salmon Ponds	yearlings +	400
22.08.90	Big Waterhouse Lake	Saltas	fingerlings	12 159
23.10.90	Big Waterhouse Lake	Saltas	fingerlings	14 029
29.10.90	Big Waterhouse Lake	Saltas	fingerlings	16 077
31.10.90	Big Waterhouse Lake	Saltas	fingerlings	8 763
				51 428



Some of the illegal nets recently confiscated from whitebait poachers.

Rainbow trout spawning runs – Great Lake

During the 1990 spawning run of rainbow trout in Liawenee Canal, 1 554 fish were handled through the bottom trap. The run consisted of 530 males and 1 024 females.

A sample of 100 fish had the following characteristics:

Average weight	1 501g
Range of weight	1 000- 2 700g
Average length	497mm
Range of length	438 - 610mm

The total number of fish through the trap was slightly above the average for the eight years since the program of counting the rainbow trout began in 1983.

Details of rainbow trout through Liawenee Canal

Operating Dates	Males	Females	Total	Tag Capture
10 Sept 90 - 9 Oct 90	530	1 024	1 554	5
5 Sept 89 - 13 Oct 89	553	1 005	1 558	10
6 Sept 88 - 13 Oct 88	309	964	1 273	18
9 Sept 87 - 30 Oct 87	386	987	1 373	61
20 Aug 86 - 24 Oct 86	338	716	1 054	46
9 Sept 85 - 16 Oct 85	480	1 126	1 606	-
2 Sept 84 - 2 Nov 84	406	766	1 172	-
15 Aug 83 - 9 Nov 83	471	867	1 338	-

Book Finally Released

The Inland Fisheries Commission, in conjunction with the University of Tasmania, has finally published 'Freshwater Fishes of Tasmania' by Wayne Fulton. This project initially began in 1978 and has many times only awaited printing.

The booklet contains information on identification and life histories of all of

Tasmania's fresh-

water fish. It

is available

directly from

the Commis-

sion (127

Davey Street,

Hobart) or

from the Zobl-

ogy Depart-

ment, University

of Tasmania, for

\$9-50 (\$10-50 in-

cluding postage).

Profits from the

sale of this book

will assist the Fauna

of Tasmania Com-

mittee to produce

further books in its

handbook series.

