

TROUT ACCLIMATISATION IN WESTERN AUSTRALIA

- by -

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INTRODUCTION

A few brief notes in old departmental files show that during the 'nineties some desultory attempts were made to establish trout in Western Australia. Plantings of fry were made in the Preston River and the Collie River, but no record exists of the localities in which liberations occurred. Neither is there any record or report of trout having been caught or seen, and the only conclusion that we can reach is that the whole project proved abortive.

The history of trout acclimatisation as we know it really began in 1930 at Pemberton, a saw-milling town about 215 miles from Perth, situated at the centre of the State's beautiful karri forests in the Warren River district. Mr. Cyril A. Glew, the local schoolmaster, had recently during a holiday visit to the eastern States been impressed with the similarity between some of the best Victorian trout streams and the unstocked streams of the Warren and Donnelly River systems in Western Australia. He could not see why if trout had been successfully acclimatised in Victoria, the same thing could not be done here, and the almost barren waters be made to provide food and sport. He talked the matter over with executive officers of the Ballarat Acclimatisation Society and the Department of Fisheries and Game in Melbourne, and decided to "do something about it" when he returned to the West. In 1930 a consignment of 10,000 ova, of which the Victorian Fisheries Department had made a gift to Pemberton, was sent to Western Australia by ship. Unfortunately when opened up at Fremantle they had hatched out and the fry were all dead. This was indeed a severe blow, but nothing daunted Mr. Glew and his associates, who thought that the experiment was sufficiently important to be repeated, and decided to try again.

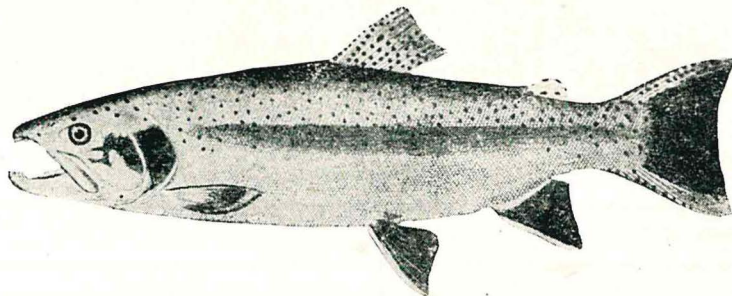
At the instance of Mr. Glew, the Victorian Department in 1931 made a further donation of ova. On this occasion 20,000 eyed eggs were brought across by the newly-inaugurated air service. Seventy-two hours after being loaded on the aircraft in Melbourne they were being unpacked at Pemberton and laid out on improvised hatching trays at the rear of the schoolmaster's quarters. From these eggs there was a hatch of approximately 15,000 alevins, of which perhaps 12,000 reached the fry stage and were planted in nearby streams.

For a few years no further importations of eggs were made, as it was desired to observe the effect of the initial plantings, but the Pemberton people had to wait until 1936 before there was any result. Then a report was received of a strange fish, quite a large fish, in a pool in the East Brook, six miles from the town. This proved to be a female brown trout, $11\frac{1}{4}$ lb. in weight, and great was the delight of the local enthusiasts. The trout was brought to Perth and displayed in a fishmonger's window, where it attracted considerable attention.

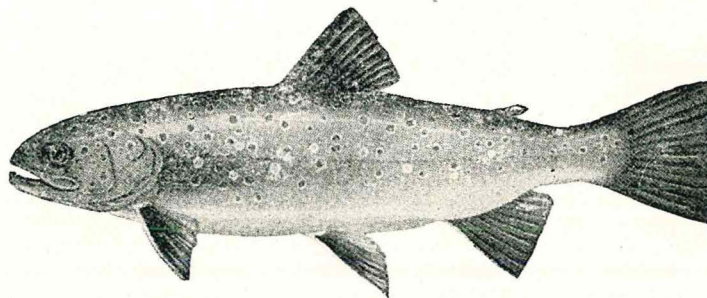
In the same year the Fish and Game Society of Western Australia was created, and was successful in securing a grant of £500 from the Government. With this sum the Society built a small hatchery on the banks of the Lefroy Brook, Pemberton, drawing water from the dam built to supply the turbines of the local hydro-electric scheme (this is known locally as the "Power Dam"). The Society purchased 100,000 eyed brown and rainbow trout ova from the acclimatisation society at Ballarat, Victoria, and brought them to Western Australia by air. From this parcel of eggs about 60,000 fry were hatched and released in the streams in the vicinity of Pemberton and elsewhere in the South West.

In 1938 the Fish and Game Society went into recess and the Pemberton Trout Society was established and assumed control of the local hatchery. Two years later an amendment to the Fisheries Act empowered the Governor to register trout acclimatisation societies whose main objects were hatching, rearing, distribution and protection of trout. Registration would grant autonomy in relation to trout acclimatisation activities within the area for which the society was registered, and would vest the property in all trout in that area in the society. In 1942 the Pemberton Society was registered under the style of "Pemberton-Warren Trout

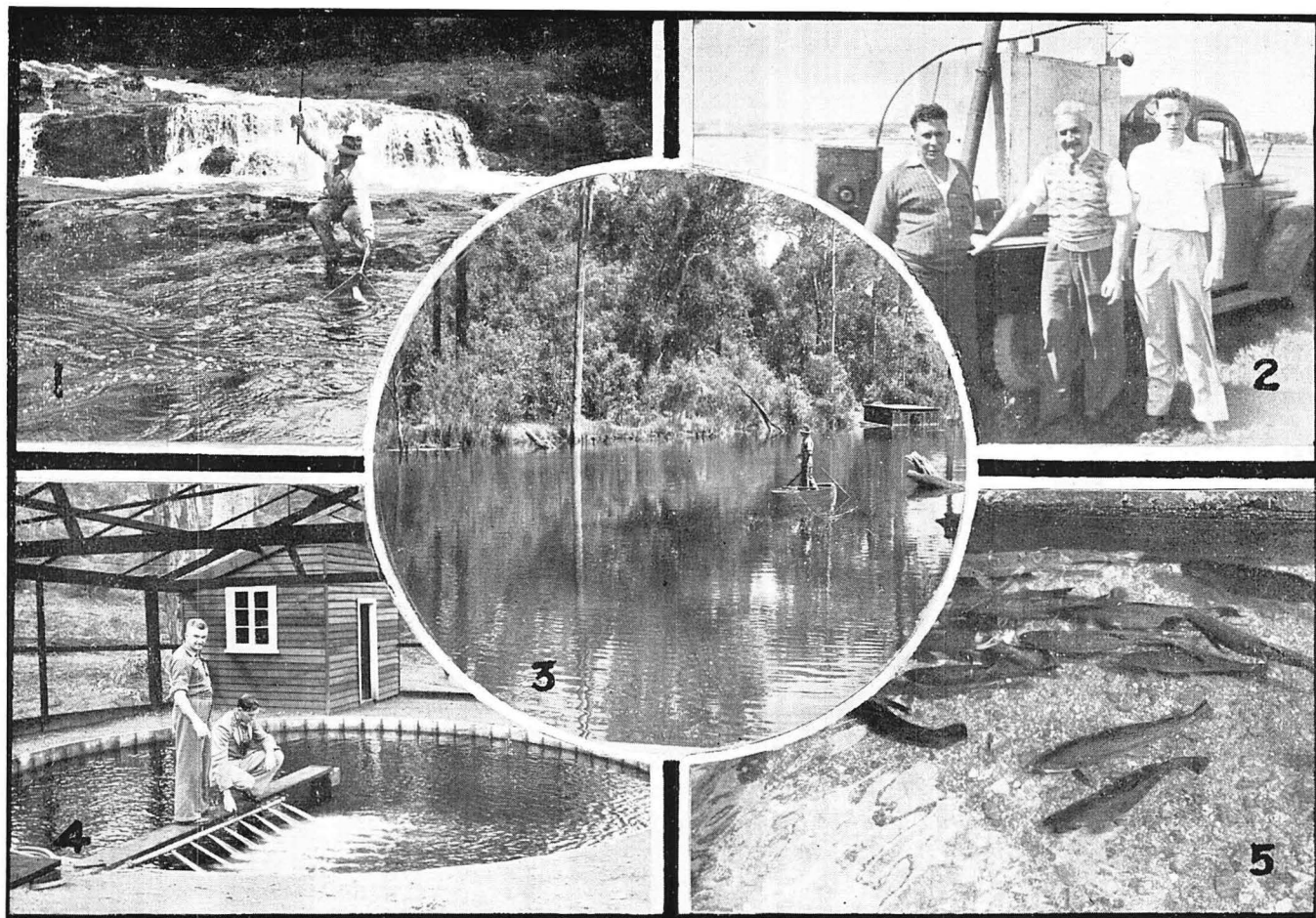
TROUTS ACCLIMATISED IN W.A.



RAINBOW TROUT (*Salmo irideus*)



BROWN TROUT (*Salmo trutta*)



1. J. B. Grosser lands a "big one" in Lefroy Brook.
2. The new fish transport unit. (Left to right: F. Shoobridge, Curator Pemberton hatcheries; Inspector J. S. Simpsen; Cadet Inspector B. A. Carmichael.)
3. Casting on the "Power Dam," Pemberton.
4. One of the new circular ponds at Pemberton. The man standing is A. R. Kelly.
5. Some of the brood stock at Pemberton hatchery ponds.

Acclimatisation Society", with authority over the whole of the Manjimup Road District and of Lake Jasper in the Nannup Road District.

Since then other districts in the South-West have become trout-minded, and societies have been registered as shown -

Collie and District Trout Acclimatisation Society (1943)
Murray Trout Acclimatisation Society (1947)
Serpentine-Jarrahdale Trout Acclimatisation Society (1948)
Blackwood Trout Acclimatisation Society (1949)
Harvey Fish, Game and Trout Acclimatisation Society (1951)
Gingin Trout Acclimatisation Society (1952)

The Collie Society at the outset was most active, and set up a hatchery and holding ponds. However, in 1945 a disastrous bush fire destroyed the ponds, and since then the Society has been in recess.

POLICY

Provision exists under the 1940 amendment to the Fisheries laws for the cancellation of the registration of a society which fails in its duty or neglects to carry out efficiently the functions imposed by the Act, and for the transfer to the Minister of the whole of any such society's powers and for the vesting in the Minister of the whole of the society's assets. In this sense, therefore, although the control of the hatching, rearing, distribution and protection of trout in its area is vested in a registered society, the Fisheries Department is given overriding authority to ensure that a society does its job properly. Furthermore, all registered societies are to a greater or lesser extent dependent on Government subsidies and these would most likely be withheld if the Department were not satisfied with the bona fides or general efficiency of any society. Without such subsidies some at least would be compelled to go out of existence. Departmental control of the overall policy of all societies is thus retained, and in practice the Department is invariably consulted in relation to all matters of major policy. The Department has never had need to crack the whip, as it were, because relations between the societies and the Department have been of a most cordial nature and on the highest plane always.

In purely domestic matters the societies are supreme. The Department has no desire to interfere in matters of this nature. As a matter of fact, the Department's confidence in the ability of the societies to run their domestic affairs efficiently had grown to such an extent that in 1949 the Government was prevailed upon to amend the law and grant them the right, with the consent of the Minister, to make by-laws. By-laws may now be made to have effect in the area in which a society is registered for -

- (a) prescribing the limits in or about the mouth of or within any river, creek, stream, etc., within which it shall not be lawful for any person to fish by means of net or fixed engine;
- (b) determining the times and seasons at which the taking of any species of fish shall commence and cease or be permitted or prohibited;
- (c) prohibiting all persons from taking any fish of any specific species by means of any specified capture or by any means of capture whatsoever;
- (d) providing that under license from the society fish may be taken from waters to which the by-laws apply;
- (e) fixing the fees payable for and the duration of a license;
- (f) prescribing the conditions on which any license shall be granted and providing that on the breach of any condition a license shall be cancelled;
- (g) providing for all matters which are necessary or convenient to be prescribed for the purposes of carrying out or giving effect to by-laws as fully as if they were regulations or proclamations under the Act;
- (h) the detention, punishment and apprehension of offenders and the prevention of offences;
- (i) the forfeiture to His Majesty of property or articles used or intended to be used and fish taken in breach of any by-law; and
- (j) imposing a penalty not exceeding five pounds for the breach of any by-law.

There is a further provision that where any by-laws made by a society relate to the same subject matter as or are in conflict with the provisions of the Act, the latter shall prevail.

Broad hatching and distribution policy is however determined by the Trout Acclimatisation Council of Western Australia. This non-statutory body, which came into existence in 1949, consists of the Chief Inspector (Superintendent) of Fisheries as Chairman, the Deputy Chief Inspector as Vice Chairman, and one representative of each affiliated trout acclimatisation society. In addition, the Government Entomologist, the Conservator of Forests, a representative of the Division of Fisheries C.S.I.R.O., a representative of the State Gardens Board, and a representative of the Government Tourist Bureau, are named as honorary members without voting rights. It is further provided that the Secretary-Treasurer shall be a person who does not hold any executive office in any member-society. The Council meets quarterly in each society's area in turn, all annual meetings being held at Pemberton. Among its objects are -

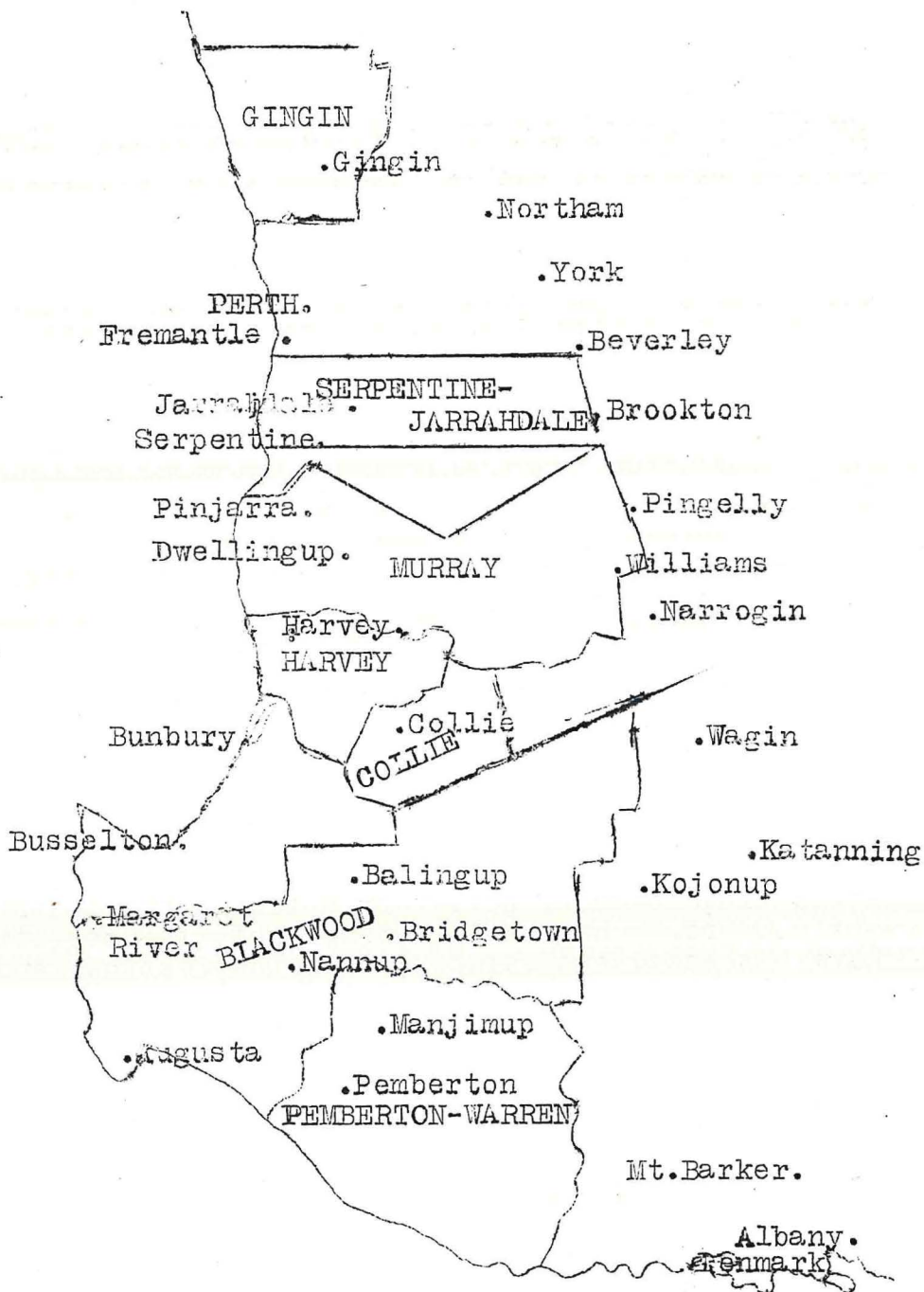
- (1) the co-ordination of the activities of registered trout acclimatisation societies; and
- (2) the determination of the manner and numbers in which trout fry and yearlings produced at Pemberton hatcheries shall be distributed.

A prerequisite to membership of the Council is agreement on the part of a trout acclimatisation society to surrender to the Council so much of its autonomy as will permit the Council to develop a properly streamlined overall policy on hatching and distribution, but no more. Under this arrangement, the societies have not lost, but rather gained in prestige, and the Council has worked exceptionally well as a policy-building body. The independence of the Council's executive officers (Chairman and Secretary) ensures a completely objective approach to the problems of acclimatisation.

HATCHING

The all-important consideration in hatchery practice is water. Given an abundant and constant supply of good water, uncontaminated by deleterious

MAP OF SOUTH-WESTERN PORTION OF WESTERN AUSTRALIA
SHOWING THE APPROXIMATE AREAS CONTROLLED BY REGISTERED TROUT ACCLIMATISATION SOCIETIES (Feb. 28, 1952)



industrial or agricultural pollutants, and not subject to violent temperature fluctuations, little difficulty should be experienced in operating a successful trout hatchery. Unfortunately one of the most important of these desiderata, constancy of supply, was lacking in the hatchery built in 1936. Several stoppages occurred, and it was necessary on one occasion to bring water in buckets from Lefroy Brook to the hatchery throughout the whole of one night. In view of this unsatisfactory state of affairs, it was decided in 1939 to abandon the existing hatchery and to design a new building to be erected closer to the town on One-Mile Brook. It was felt that a hatchery with the capacity of 1,000,000 eggs should be the goal, and about the year 1943 plans were prepared by the Society accordingly. An adequate and suitable water supply was found in a spring providing 100 gallons of excellent water a minute, with a 20-foot head above the proposed site of the hatchery. An approach was made to the Government in the following year for funds for construction of the new building and installation of the necessary equipment. In 1944 World War II was still at its height, and the Government felt it would be hard put to justify the expenditure of £1,100, the estimated cost of the new structure, on non-essential works. At the same time it indicated its preparedness to finance the construction of a hatchery at half the estimated cost, and to this proposal the society readily agreed. In the same year a new building just half the size of that planned and capable of incubating 500,000 ova only was erected at a cost of £550, which was made available by the Treasury.

In the interim, from 1941 to 1943, hatching was carried out with makeshift plant in races in the newly constructed holding and rearing ponds in One-Mile Brook, just below the site of the proposed new hatchery. Conditions here were most difficult and the operations met with but indifferent success. During the 1944 season 50,000 ova were most successfully handled in the new hatchery in raised cement troughs, an interesting innovation as far as hatchery practice in Australia was concerned. This was the source of much gratification to the Pemberton Society, who were now satisfied they had broken the back of the job of hatching, and of considerable satisfaction to the Government and the Fisheries Department, who were most happy that their confidence had not been misplaced.

In 1945 a quarter-of-a-million eggs were laid down, and in 1946 the number was increased to 400,000, which in those days was considered the maximum quantity which could safely be handled in one season. From 1947 onwards no hatching problems have been met with - as a matter of fact in 1952 1,053,000 eggs were incubated with a total hatch of 825,000 alevins. This is indeed remarkable!

To secure ova for incubation it is first necessary to get ready the trout which will be "stripped". Males and females are segregated and corralled, and when all is ready they are placed in "cradles" constructed of small mesh fishing net on wooden frames. Three or four females are stripped, the eggs being deposited in an aluminium dish, and the milt from one male is then extruded over the eggs, which are gently shaken and stirred to ensure complete fertilisation. After being allowed to stand for approximately 30 minutes (the "hardening-up" time, as the hatchery workers call it) the eggs are removed to the hatchery where they are laid out on shallow wire mesh trays in troughs through which water is coursing. Covers of masonite are finally placed on top of the troughs to exclude light, experience having shown that the mortality among eggs and newly-hatched alevins is much higher in troughs exposed to light. Every morning the eggs are inspected, and any unfertilised or dead eggs are removed, as dead material is highly subject to attack by a fungus (Saprolegnia) which quickly spreads to and suffocates live eggs.

After approximately 14 days the eye of the embryo trout becomes visible through the "shell" - this is known as the "eyed" stage - and it is not until this stage is reached that the eggs are removed from one trough to another, or from hatchery to hatchery. The experience at Pemberton indicates that in the "green", or uneyed stages, the ova are very delicate, and it is almost impossible to move them without heavy mortality. Hatching commences about 14 days after the eggs "eye". On emerging from the egg the alevin has attached to its body a sac known as the yolk sac which contains the nutriment on which the young fish obtain all the food they require for the first three weeks (in the case of rainbows) or five weeks (in the case of browns). It is not until the sac is practically absorbed that the fish commences to feed by the mouth.

At first the food given to the young fish consists solely of very finely divided bullock's liver, and this diet is not varied while they remain in the hatching troughs. In normal practice this lasts for about four weeks, at which stage the fry are either transferred to the rearing ponds or liberated in the streams.

Hatching statistics prior to 1943 are rather sketchy, but each year since then the Pemberton-Warren Trout Acclimatisation Society has put out a printed annual report which contains hatch figures. The following table has been compiled from that source -

<u>Year</u>	<u>Ova incubated</u>	<u>Fry produced</u>
1943	141,000	91,000
1944	50,000	No record
1945	250,000	150,000
1946	400,000	300,000
1947	300,000	180,000
1948	304,000	235,000
1949	208,000	145,000
1950	233,000	140,000
1951	520,000	392,000
1952	1,053,000	825,000

REARING

Trout are reared for two purposes - firstly as brood stock for producing eggs for hatching and, secondly, for liberation in suitable streams as fingerlings or yearlings.

It was early appreciated that the cost of importing eyed ova year after year from Victoria or Tasmania would be greater than the Pemberton Society could afford. It was felt too that the source of supply in the eastern States might at any time dry up and leave Western Australia in the lurch. The only alternative was to establish an independent source of supply right at the society's doorstep.

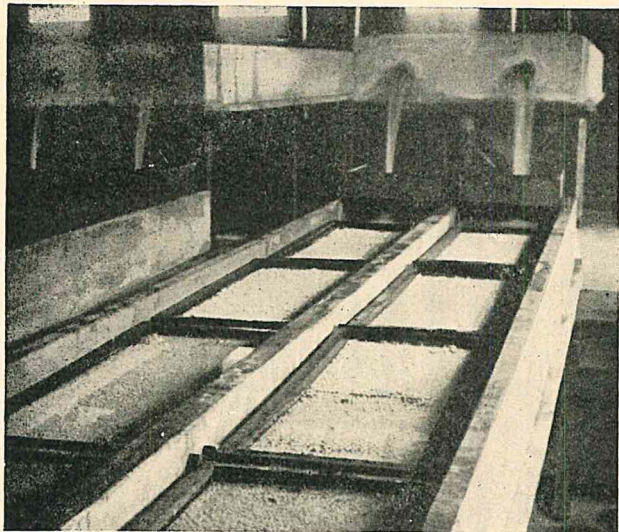
Holding ponds, in which would be held fry, yearlings and mature fish, were an essential. An

approach to the Government resulted in the grant of £185 towards the cost of a series of six ponds, for which the plans had been drawn by the Hydraulics Branch of the Public Works Department. More money was required, but a timely legacy from the late J. MacCallum Smith took care of that aspect. Finally, by dint of hundreds of hours of voluntary labour given by local enthusiasts, the ponds were constructed in One-Mile Brook in Pemberton National Park and were ready to receive trout by the end of 1941. The official opening ceremony was performed on July 19, 1942, by the Hon. W. H. Kitson, M.L.C., Chief Secretary, who named them "The MacCallum Smith Memorial Ponds".

Brood fish also were needed. The job of securing them turned out to be an epic task, and the story of the Society's efforts in this direction is best told in "Trout in the Karri Country" (Government Printer, Perth, 1947) produced jointly by the Pemberton-Warren Trout Acclimatisation Society and the W.A. Tourist and Publicity Bureau, as follows -

"This task proved a much more difficult job than putting them (fish) into the streams. We tried to net them, but the logs and snags proved too good a cover for the wily trout. We tried driving them upstream and downstream; we tried baited traps, 'tickling' and hooking. Perhaps the last-named was the most successful. Parties of half-a-dozen would go out after work, spend the evening until midnight catching a few fish which they would hold in a cage and bring in the next morning to the ponds. One enthusiast rode two miles along a railway track at midnight with a solitary 12 in. trout in a bucket on the handlebars, and kept it alive in the bath until morning.

"By 1940, it was evident that we would never get enough trout by this means, so an attempt was made to trap them on the spawning 'run'. Many week-ends were spent in building several traps of an American design. This consisted of a boom with wooden slats one inch apart across the main stream at the mouth of a small feeder. The idea was to divert the ascending fish up the feeder into a cone trap made to receive them. This was a total failure. The slatted grilles collected the floating debris holding up the water which flowed over the top and allowed the spawners to go over. We got one trout out of that season's work!

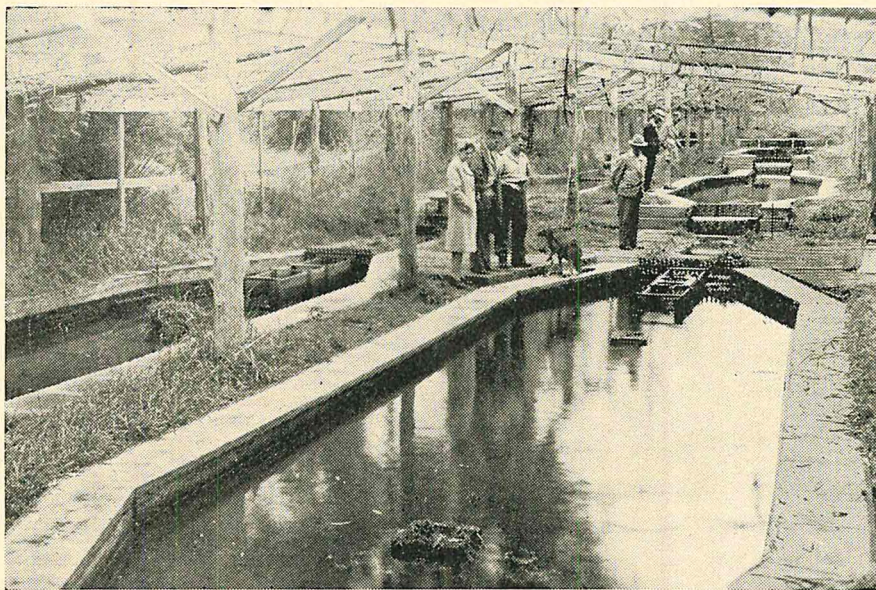


CEMENT HATCHING TROUGHS, PEMBERTON.



LEFROY BROOK TRAP.

A. R. Kelly and J. S. Simpson cleaning the grilles.



ORIGINAL HOLDING PONDS, PEMBERTON HATCHERY.

(Courtesy A. R. Kelly.)

"In 1941, no trap construction was undertaken, and all efforts were concentrated on the building of holding ponds.

"The Chief Inspector of Fisheries, of Victoria, Mr. F. Lewis, visited Pemberton and gave us some ideas on Victorian trap construction, and for the 1942 run an experimental trap was built on the Treen Brook. This consisted of a netting barrier with a verandah downstream to prevent the spawners going over the top while still allowing the water to pass. This cord trap was specially made by Mr. J. E. Bramley of the Fisheries Department of W.A. Once more severe pressure of winter water proved too much and we saw our labour float downstream after catching two trout.

"It was now evident that we would have to design something suitable for our own conditions - it had to be of sufficient strength to stand the winter's water, and at the same time stop the ascending spawners. In the ultimate design, the wooden slats and netting were replaced with grilles of $\frac{3}{8}$ in. round iron, $1\frac{1}{2}$ in. apart, in wooden frames. Four of these were set in slots in a heavy log frame across the stream. The cylindrical cord trap was again used in 1943. The trap was a success inasmuch as it handled the water well, but didn't catch the trout because the corded trap rotted out at the critical moment. However, progress was being made and for 1944, the cord trap was replaced by a rigid wooden box arrangement. This worked splendidly and 107 breeders were captured and conveyed to the holding ponds.

"While experiments in trap construction were going on, we endeavoured to nurse a few fry through to two-year-olds in the ponds as a substitute for wild fish. These reached maturity in 1944, but the artificial conditions affected their fertility, and we were again thrown back to trapping. It was a source of great satisfaction to the Society that we had persevered with the trap design. Faced with the necessity of relying mainly on wild fish for 1945, we knew just what we required and set out on an arduous year's programme of trap construction. All resources were staked on the success of this programme. 1,600 hours of voluntary manual work went into the construction of three new traps.

Electrically welded grilles replaced wooden frames and lessons of previous failures were applied with the result that when the run commenced in 1945, 183 trout were captured in four weeks. The season closed then, owing to excessive winter waters.

"In 1946, 274 were taken with little effort. To the success of trapping for 1946 can be added the recovery of the pond-held breeders to something like normal fertility. Following experiments with diet and conditions, healthy eggs were produced by almost every female in the ponds."

A stock of brood fish was now becoming established and the next step was to perfect the technique of stripping. Actually stripping had first been undertaken in 1937, when seven rainbows were caught in the swimming pool at Pemberton. "Trout in the Karri Country" describes this first attempt in these words - "A master of ceremonies sat by reading instructions from a United States 'Wildlife' publication, while other enthusiasts endeavoured to interpret the words into actions. We took a few thousand eggs that year". By 1944 two or three of the local members were really expert strippers, and the loss of ova incurred during the very vulnerable stage immediately following fertilisation of the egg has been consistently low each season.

A change in distribution policy decided upon by the Trout Acclimatisation Council almost immediately after its creation in 1949, i.e., liberation of fingerlings or yearlings instead of fry, necessitated re-orientation of the rearing policy. Hitherto, although small numbers of fish had been sent out of the hatcheries at the fingerling or yearling stage, most of the fry retained in the ponds were kept as brood stock, and nearly all the fish liberated in the streams had not progressed beyond the fry stage. Immediately following the decision of the Council, the various societies began demanding fingerlings or yearlings. The existing setup however would not on account of restricted space permit the holding of sufficient fry to meet the societies' fingerling and yearling needs. More holding ponds were required. This time it was decided to instal circular ponds on the banks of the Lefroy Brook just below the Power Dam, which could supply all water needed. Experience overseas showed that from many angles

circular ponds were superior to the old rectangular type then (and still) in use. Once more the Government came to the rescue. The Hydraulics Branch again prepared plans, specifications and quantities, and the Premier approved grants totalling £4,500. To this sum the Society added £840, and by doing its own contracting and using pre-fabricated cement slab sides, it was able to build eight ponds 25 feet in diameter and a 10 in. cement pipe line 17 chains in length, as well as completely enclose the ponds with wire netting on timber frames, for the sum of £5,340. The new ponds were officially opened by the Hon. A. V. R. Abbott, M.L.A., Minister for Fisheries, on September 6, 1952.

As soon as the new ponds were brought into commission upwards of 250,000 fry were planted in them. Some have already been distributed as fingerlings, some are about to be distributed, some will be held to the yearling stage in August next and then liberated. The remainder will be retained as brood stock.

DISTRIBUTION

In the "good old days", when trout were sent out to the various streams as fry, very few transport problems were met with. Provided the water temperature in the 10-gallon cans in which the fish were carried was maintained at a fairly constant level, and the water itself did not suffer undue de-oxygenation, there was little that could go amiss. In warmer weather temperatures could be kept down by the use of ice in the cans, and oxygen could be, and in fact was, fed into the water through diffusers connected with an air pump and receiver carried on the transporting vehicle. Losses at times did occur, but rarely if officers of the Fisheries Department or the Pemberton Society were in charge of the transport unit. If they did happen it was frequently due to neglect or carelessness on the part of the person in charge.

Fry were transported in this manner to all areas in Western Australia where trout were acclimatised, from Gingin in the north to Albany in the south. In later years fingerlings and yearlings have been carried successfully by the same means to places up to 300 miles distant from Pemberton. In the case of these larger fish, of course, the number carried in each can is very considerably reduced. However, when the new distribution policy was adopted it became necessary to consider the desirability of providing improved

means of transporting fingerlings and yearlings, not so much because of the likelihood of any undue losses in transit, but rather because of the great number of 10-gallon cans, with relatively few fish in each, required to transport any quantity of fish, and of the excessive costs which would be incurred in the hire of motor trucks.

About the same time "Progressive Fish Culturist", published by the U.S. Fish and Wildlife Service (Vol. 12, No. 3; July, 1950) carried an article describing a transport unit developed in North Carolina for distributing live shad. This incorporates an apparatus for re-oxygenating the water in the tank by means of an aspirator and mixing chamber. It appeared to be the answer to the problem and the Pemberton Society decided to build an experimental unit of its own. A 150-gallon iron crockery tank was procured and a unit based on the U.S. design, of which plans were furnished, was constructed. It was found in practice that certain modifications were needed, but it was not long before it was operating satisfactorily under test. The power unit which is mounted on the transport truck, is a $1\frac{1}{2}$ h.p. petrol motor belt-coupled to a small centrifugal water pump.

The first real test of the new equipment was made at the end of August, 1952, when 74,000 fry about 1 inch long were brought from Pemberton to Perth for distribution to trout societies and private buyers. This journey was made with a loss of only 4 fry, and a later visit to Gingin, nearly 60 miles north of Perth, with a smaller number of more advanced fry, proved completely successful, despite the fact that the transport unit was delayed on the road for over 4 hours while a broken axle was replaced.

It has been found that using the new delivery unit on a 15-cwt. utility allows for the transportation of as many fish at one time as were previously carried in a 3-ton truck, and there does not appear to be any doubt that when one or two refinements are introduced the saving in transport will be much greater still.

The Fisheries Department has now undertaken to transport all fish produced at Pemberton and the new delivery and power units have been made available to the Department for this purpose.

Formerly, when young fish were carried in 10-gallon cans, it was the practice of societies to arrange for voluntary workers to rendezvous at one or more convenient centres to take delivery of the cans of fish for liberation elsewhere in the district. Unfortunately it sometimes happened that through a breakdown in the arrangements the officers in charge of the consignment were left with several cans of fish on their hands, and they were compelled, despite their fatigue after an all-night journey, to find a suitable stream and liberate the fish themselves. But with the new transport unit this would not be possible. The young fish are now in fact decanted from the unit, and it is impossible to stay the flow of fish when any container is full. Under existing conditions it is completely impossible for departmental officers to liberate fish in the streams. Hence the societies, at the suggestion of the Trout Acclimatisation Council, are taking steps to instal holding ponds into which the fish are delivered direct and from which members can secure supplies at their convenience. The Murray Trout Acclimatisation Society has installed one such pond at Dwellingup, and the Harvey Fish, Game and Trout Acclimatisation Society one at Harvey.

PROTECTION

Although it is the function of registered societies to appoint wardens for the protection of trout in their respective areas, all inspectors appointed under the Fisheries Act have concurrent power. Frequently departmental inspectors have been made available to patrol trout streams, and a few years ago a full-time trout inspector was added to the Department's establishment. Generally speaking, however, no very great difficulty has been encountered in relation to the protection of trout, and the societies' wardens have never been unduly harassed by unlicensed or out-of-season anglers.

ANGLING

"A trout caught this summer is not so large as one caught last summer, but it will be by next summer."

(Saturday Evening Post)

It is not suggested that the foregoing

quotation applies generally to trout anglers in Western Australia. In fact many really big fish have been taken in different streams, although the orthodox fly-fisherman would undoubtedly be disappointed with the class of fishing available. Trout simply will not rise to a fly in our streams. This is possibly due to the virtual absence of the types of flies common to trout streams in the eastern States and elsewhere. Rod and line is compulsory in all acclimatisation districts, but the type of lure used is largely left to the taste of the individual angler. Devons, Indianas, grasshoppers, and gilgies are all used with success.

The first fly-and plug-casting competitions held in Western Australia was organised by the Trout Acclimatisation Council to be held at Pemberton swimming pool in conjunction with the ceremonies associated with the official opening of the new circular holding ponds in September, 1952. Several fine trophies were presented, and although the number of entries could have been higher, some excellent casting was witnessed.

Apart from the streams at Pemberton, good angling is obtainable in the Serpentine River (Serpentine-Jarrahdale area), Murray River and tributaries (Murray area), Harvey dam (Harvey area) and Blackwood River (Blackwood area). Licenses, the fee for which varies from area to area, must be obtained before angling for trout is indulged in. Licenses are obtainable from the respective trout acclimatisation societies.

FUTURE

Lately there have been a great many enquiries for trout for liberation in streams which hitherto for many reasons have not been regarded as being suitable for the purpose, and in farmers' dams. In November, 1952, Mr. A. R. Kelly, President of the Pemberton-Warren Trout Acclimatisation Society and the writer visited many centres in the Great Southern district, starting from York and travelling through Beverley, Brookton, Pingelly, Dwarda, Williams, Kojonup, Katanning, Kendenup, Mt. Barker and Albany. The Avon, Hotham, Hay and Kalgan Rivers were inspected, and numerous soakage and catchment dams. The rivers are all non-permanent, drying up during summer into a chain of pools. All contain an abundance of life - shrimps, beetles, dragon-fly and demoiselle-fly larvae, as well

as several varieties of small fishes, and it would appear at first sight that they would be capable of supporting a substantial trout population. The rivers are non-permanent, as already stated, but the waterholes remaining are all more or less permanent - many are as much as a mile in length and 20 to 30 feet in depth, and there must be an enormous concentration of food in them after the river has broken up.

It is perhaps too early to predict the future of these streams, and although it is proposed at an early date to initiate hydrological investigations, which will include the rivers and certain farm dams (in some of which trout have thrived), it is felt that the final decision as to the suitability or otherwise of these waters for trout will have to be left to the fish themselves. Trial plantings have been made at several places, and if they prove successful there is little doubt but that demands for trout in the Great Southern will snowball.

On the farm of Mr. J. F. Haddleton, at Coompatine, near Katanning, there is a small soakage dam of perhaps $\frac{1}{4}$ acre in extent into which a few years ago a small number of fingerling rainbow trout were introduced. The shade temperature in this locality often approaches to 100° in summer, and analysis of the water in the dam towards the end of summer shows up to 550 grains of salt (NaCl) per gallon. In spite of these obvious disadvantages Mr. Haddleton reared his trout to 17 inches in length in two years. An achievement like this necessitates a change in outlook in relation to trout acclimatisation generally, and perhaps a more liberal approach to the question of fish farming in drier areas.

As far as the recognised trout areas are concerned, the societies will no doubt as time goes on be required to spend time and money in opening up many streams which at the moment are inaccessible to the angling community. There does not appear to be any need just now to be concerned with over-stocking. Most of the waters are understocked, and will carry all the young trout which can be produced at Pemberton hatchery for some time to come. At the same time some attention will need be given before many years are past to the problem of natural food for the trout in the streams.

It is quite evident that the purer waters of the nearer Hills and coastal areas are deficient in natural food resources. In March, 1952, Professor E. Percival, Professor of Biology, Canterbury University College, Christchurch, N.Z., who has done considerable work on the ecology of the trout streams of South Island, New Zealand, spent a day or two at Pemberton as the guest of the Trout Acclimatisation Council. The whole of one day was occupied in a hurried survey of some of the local streams, where some collecting was done, but Professor Percival subsequently expressed amazement at the paucity of the aquatic life to be found. In comparison with trout rivers in New Zealand, he said, our waters were virtually barren of natural food. At the same time he pointed out that trout were well established, and all he had seen were in good condition, which was evidence that they were able to obtain some form of food. By the same token, if as Professor Percival has indicated, the natural food supply is at a low level, what is there will become scarcer still as more fish inhabit the streams, and it may therefore be necessary in the not-too-distant future to consider the desirability of introducing into the streams forage fishes or suitable insect types to enable a good stock of trout to be maintained, or alternatively to plant only fish which have been reared to catchable size - fish which will be caught by the angler before they have had an opportunity of making too great inroads into the natural food stocks.

PERSONALITIES

It might not be out of place before concluding this paper to make brief reference to some of the people who have been prominently associated with the work of trout acclimatisation. The following thumb-nail sketches will serve to introduce them -

Cyril A. Glew, the schoolmaster who first thought of trout for Western Australia, must be regarded as the pioneer of trout acclimatisation. Not an angler himself, but a man who firmly believes that all natural resources should be fully developed, his whole interest has been propagation.

Now the headmaster of Perth Boys' High School, he is the diligent and efficient Secretary-Treasurer of the Trout Acclimatisation Council of Western Australia.

A. R. (Ralph) Kelly, Pemberton businessman, is the power behind the throne in the realm of trout acclimatisation. Associated with Cyril Glew in his earliest attempts to establish trout, he later became responsible for general policy direction and planning. In that capacity he has piloted his Society through all its trials and tribulations, and is still its guide and friend. Kelly is not an angler.

John S. Simpson, Inspector of Fisheries, was the first President of the Pemberton Trout Society, and acted as its chief executive for some years. Later appointed curator of the hatcheries, Simpson was responsible for all stripping, hatching and distribution. Later he was appointed to the staff of the Fisheries Department as trout inspector at Pemberton, and in 1951 was sent to Victoria and Tasmania to inspect and report upon trout acclimatisation methods in those States. He is now located in head office as liaison officer between the Department and the acclimatisation societies.

Sydney E. Young, first Secretary-Treasurer of the Pemberton-Warren Trout Acclimatisation Society, and formerly one of its "top" anglers, and Norman W. Martin, present Secretary-Treasurer, who has handled all financial arrangements in latter years.

Gil. Brown, Bob Cave, Laurie Mickle, Lionel Graham, Fred Anderson, Jack Grosser, Mick Love, all members at one time or another of the Council of the Pemberton Society. All have given service second to none in promoting trout acclimatisation in W.A.

Frank Shoobridge, the present Curator at Pemberton, and Howard Dunn, former hatchery operative - loyal and efficient servants.

Jos Simenson, one of the joint secretaries of the old Fish and Game Society, who did an excellent job of organising in the initial stages.

B.V. (Vic.) Cannon, James Morison and Samson Simpson, the men behind the gun in the defunct Collie Society.

W. M. (Bill) Green, foundation President of the Serpentine-Jarrahdale Trout Acclimatisation Society, a man of many parts and great organising capacity; Norman S. Fletcher, the existing President and Mrs. L. E. Shapcott, the present Secretary, who have done, and are doing, an excellent job.

Stanley R. Doust, of Bridgetown, the genial secretary and prime mover in the Blackwood Trout Acclimatisation Society setup.

H. Birmingham, President, and Charles W. Brown, secretary, of the Murray Trout Acclimatisation Society, who have done outstanding work in their district.

On the angling side John Adlard, Fred Anderson, Ted Birmingham, Stan Doust, John Grosser, Rex Hall and A. L. Smith have done as much as anybody to further the interests of anglers.

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