...NT, WESTERN AUSTRALIA

MONTHLY SERVICE BULLETIN

Vol. II, No. 6 June 1, 1953

STAFF NOTES

Assistant Inspector G. Coombes has tendered his resignation from the Department. His last day of service will be June 18.

Inspector F. A. L. Connell left for Albany towards the end of May to assist Inspector Jeffery during the whaling season.

Cadet Inspector D. Wright, who has been serving on m.v. "Lancelin" for several months, has been transferred to Pemberton for the trout hatching season.

Mr. I. Bartholomew and Cadet Inspector M. J. Simpson have returned to duty after four months' national service training with the Navy.

Towards the end of May the Superintendent, in the capacity of Chairman of the Fauna Protection Advisory Committee, visited the South-West with other members of the Committee. He was accompanied by Mr. H. B. S. Shugg and Warden J. Traynor.

Assistant Inspector J. L. Gallop has been enjoying three weeks' annual leave.

Cadet Inspector B. A. Carmichael has joined m.v. "Kooruldhoo" at the Abrolhos Islands.

Assistant Inspector V. J. Sinclair returned to Perth from the Abrolhos on May 18 and left on May 28 for Point Cloates, where he will act as whaling inspector for the ensuing season.

Inspectors H. J. Murray and J. S. Simpson have completed the 1953 distribution of advanced fingerling trout from Pemberton hatchery.

"OCEAN FRESH"

Through the courtesy of Mr. F. F. Anderson, Director, Commonwealth Fisheries Office, the Department was fortunate in being able to secure the loan for about 10 days of the film "Ocean Fresh", which is the property of Hawaiian Tuna Packers Ltd. Through the kindness of Mr. N. A. Uren, Superintendent of Visual Education, Department of Education, Perth, Miss Anderson, Headmistress of Princess May Girls' High School, Fremantle, Mr. H. Laing, Headmaster of Albany High School, and Mr. G. Lambert, Headmaster of Geraldton High School, the film was shown to fishermen, Commonwealth and State government officials and others. In addition "Purse Seining" (colour), "Atlantic Trawler", "Shell Fishing" and "Salmon Story", mainly from Mr. Uren's library, were shown. All who saw "Ocean Fresh" and "supporting features" were greatly impressed with what they had seen.

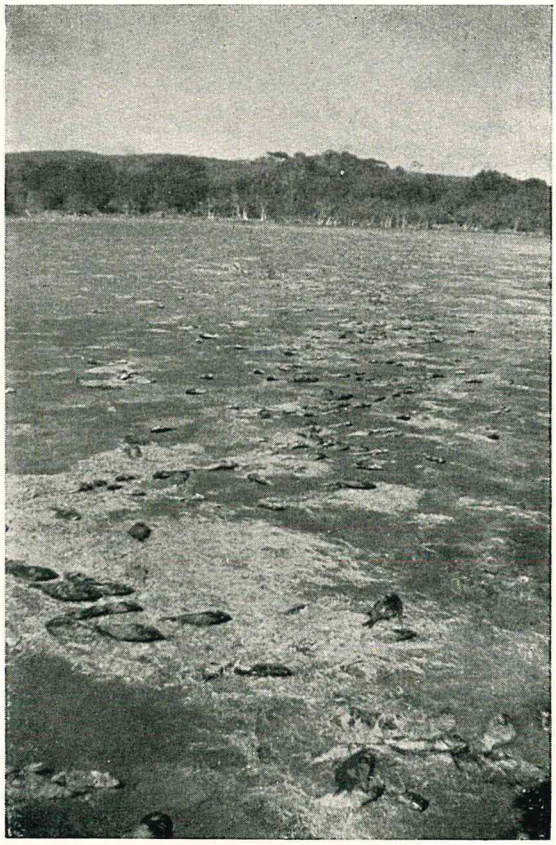
FISH MORTALITY, BEAUFORT INLET

In the May, 1952, issue appeared a note concerning the heavy mortality of fish at Beaufort Inlet (Pallinup Estuary). The photographs on the opposite page give some idea of the great losses of fish which occurred at this place.

WESTERN AUSTRALIAN MULLET FISHING

It was intended to publish this month the story of the W.A. mullet fishery, but circumstances beyond our control have made this impossible. Instead we have reprinted (from "The Conservation Volunteer") Mr. Thomas K. Chamberlain's paper "The

HEAVY FISH MORTALITY AT BEAUFORT INLET (PALLINUP ESTUARY)



65735/5/53—100

Most Trout Fishing for the Most Trout Fishermen". A limited number of separates has been prepared and are available to any person requiring them.

BUMPER RUFF SEASON

Although at the date of writing Ruffs (sea herring) have not yet been taken on any of the metropolitan beaches in any quantity, this has been a bumper season all around the coast and at Rottnest and Garden Islands.

The following summary of a report submitted by Inspector G. C. Jeffery, of Albany, will give an indication of the occurrences of ruffs in his district.

The total catch in January was only 5,380 lb., of which 5,085 lb. was taken in Princess Royal and Oyster Harbours. In February the take declined to 2,832 lb., but this was due not so much to any scarcity of fish, but rather to the fact that most fishermen were busy catching salmon.

March saw the commencement of the main run of ruffs. During that month a catch of 62,350 lb. was recorded, of which 53,600 lb. was taken at Cheyne Beach.

In April the fish came in with a rush, and a total of 422,504 lb. was landed by professional fishermen. Of this total 391,500 lb. came from Cheyne Beach; 12,000 lb. from Cape Riche; 10,600 from Pallinup; 6,300 lb. from Perkin's Beach and 2,000 lb. from Princess Royal Harbour.

Inspector Jeffery remarks that the April figures are by no means indicative of the quantity of fish available. In the first place there was such a spate of fish at the local cannery that it was impossible to handle them and the cannery was forced to limit its purchases. The Cheyne Beach fishermen continued to haul for ruff and penned all in excess of the cannery's immediate requirements against the day when Mr. Hunt would be buying again. It is estimated that 75 tons of fish was unsaleable when finally taken from the pens. Secondly, the cannery was compelled to

reduce the price to the fishermen, who refused to catch at the price offered.

Mr. Jeffery is of the opinion that an additional 300 tons of ruff could have been landed at Cheyne Beach alone had there been a market for them. He says that aerial surveys by Mr. Hunt indicated similar concentrations of ruff all along the coast from Cape Leeuwin to east of Hopetoun.

Approximately 95% of the total catch was sold to Hunt's Canneries Pty. Ltd., perhaps 10 tons were sent to Perth fresh and the balance was disposed of in Albany and surrounding districts.

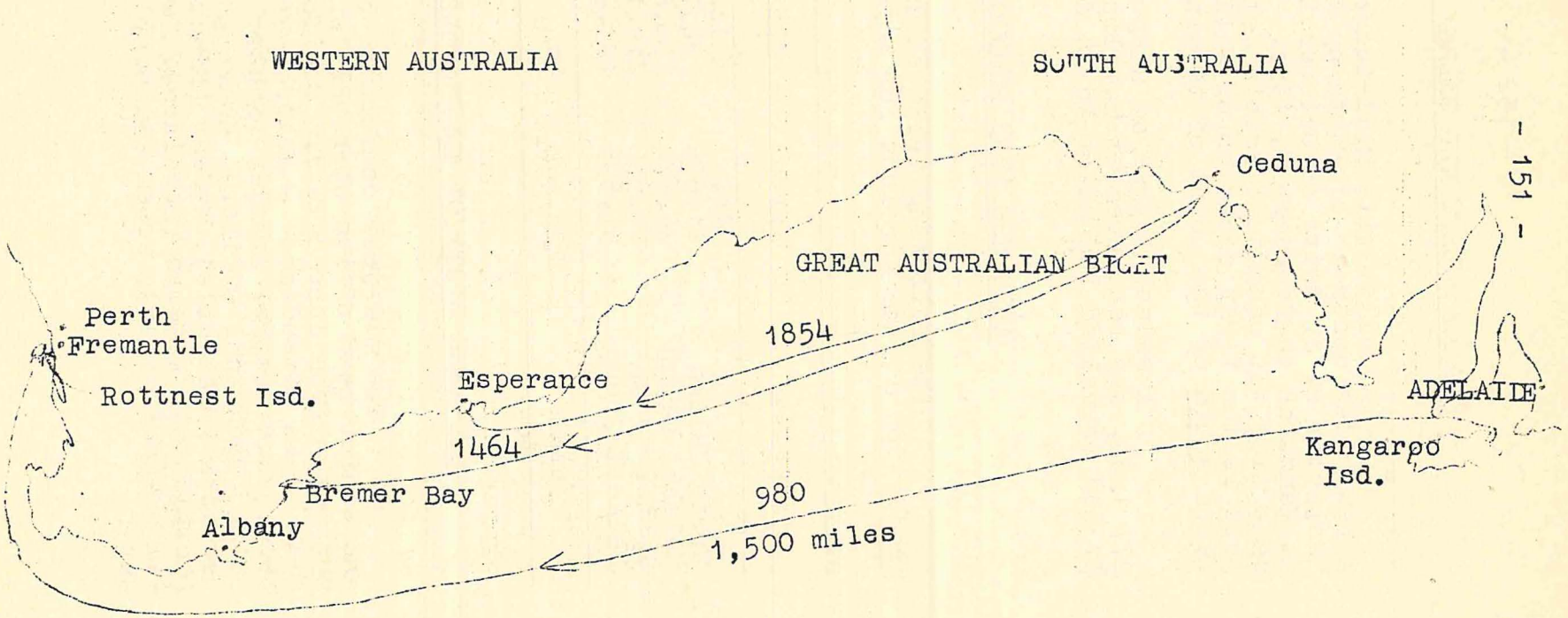
RUFF TRAVEL GREAT DISTANCES

In the March issue of the Bulletin it was reported that a ruff tagged at Ceduna, South Australia, in June, 1952, was recovered at Esperance, W.A., in February, 1953. Two further recoveries of tagged ruff which have made large-scale migrations from South Australia to the West have been made. Another tagged and released at Tourville Bay, Ceduna, on June 18, 1952, (tag no. 1464) was recovered at Bremer Bay on April 22, 1953, after a journey of approximately 800 miles. Ruff with internal tag No. 980, which was released at American River, Kangaroo Island, on November 30, 1952, was caught at Rottnest Island towards the end of April, 1953. It had covered the 1,500 miles at an average speed of 10 miles a day!

The map on the opposite page gives an idea of the distances covered by these three individuals. Commonsense refuses to allow us to believe these are just flashes in the pan, but that an east-west migration of one common stock is a regular thing. There has been much ruff tagging activity in South Australia and Western Australia in recent weeks. Mr. K. Godfrey tagged and released over 3,000 at Eba and Thistle Islands (S.A.), in April, and Mr. L. G. Smith and Inspector Jeffery 1,000 at Cheyne Beach and 435 at Bremer Bay (W.A.) during the same month.

SOUTH AUSTRALIA-WESTERN AUSTRALIA RUFF MIGRATIONS

Map showing approximate route followed by tagged fish



TAGGED MULLET AND SALMON RECOVERED

A mullet with gill-tag released in Swan River a few miles upstream of Perth by Mr. L. G. Smith and Inspector R. J. Baird on October 2, 1951, was recovered at Mandurah on February 7, 1953. Another tagged at the same time was caught at Robb's Jetty on April 12, 1953. This is the first occasion on which mullet have been taken south of the point of tagging.

A salmon tagged at Cheyne Beach on February 27, 1953, was recovered at Hamelin Bay on March 13. It had travelled 264 miles in 14 days.

ABROLHOS 1953 PRODUCTION

The following table shows the crayfish production at the Abrolhos for March and April -

Locality	March	April	Totals
	lb.	lb.	lb.
North Island	11,625	34,740	46,365
Wallabi Group	76,674	210,696	287,370
Easter Group	88,550	219,127	307,677
Pelsart Group	51,595	129,913	181,508
Totals	228,444	594,476	822,920

MID-YEAR DISTRICT INSPECTORS' CONFERENCE

The mid-year conference of district inspectors and senior head office personnel will take place at Geraldton from June 3 to 7. The following officers will be in attendance - Messrs. Fraser and Saville (H.O.) and Messrs. Bramley (Supervising Inspector), Smith (Technical Officer), Munro (Metropolitan Inspector), Davidson (Fremantle), Murray (Mandurah), Bowler (Geraldton), Bateman (Abrolhos), Jeffery (Albany), Melsom (Relieving), Green (Bunbury) and Baird (Shark Bay).

STATE LAW UPHELD

In the April issue of the Bulletin reference was made to the dismissal by Mr. Dougall S.M. of a case against M. Rotondella for having consigned under-size fish (crayfish) for sale. An appeal by Inspector W. Davidson (original complainant) against the Magistrate's decision was heard by Mr. Justice Virtue in the Supreme Court on May 8. Mr. R. D. Wilson, of the Crown Law Department, appeared for the appellant, and Dr. J. S. Marian for the respondent.

In upholding the appeal and fining Rotondella £2, the Judge held that the Department had the right to exercise local laws over fish caught outside the three-mile territorial limit. He said: "It may not be an offence to catch such fish outside territorial limits, but there is no reason why the State should not exercise its jurisdiction once they are brought inside".

While Dr. Marian had agreed that the ground on which the Magistrate dismissed the charge was no ground for dismissal, he had argued that the decision was correct because the State had no jurisdiction over fish caught outside its territorial waters.

EXCHANGE OF FUEL DRUMS

The Secretary to the W.A. Government Tender Board advises as follows -

> "Departments are advised that the Companies supplying Fuels under Contract Schedule 101 have agreed to accept an inter-change of other Companies' drums in the fulfil-ment of Government orders and credit will be given accordingly on such drums irrespective of their individual marking.
>
> "This will permit of the rotation of orders as in the past without expense or inconvenience to the Department."

This will greatly facilitate the exchange of drums by officers purchasing by means of local purchase orders.

BANDING OF WILD DUCK

With the onset of winter rains and the dispersal of ducks, banding operations were finalised at Queen's Gardens on May 12, 1953. The total of ducks banded since June 4, 1952, and recoveries made, are set out hereunder -

	Banded	Recovered
Black Duck	749	16
Grey Teal	205	4
Mountain Duck	15	-
Coot	12	-
Mallard Duck	8	-
Moor Hen	5	-
Blue Bald Coot	2	-
Maned Goose	1	-
Totals	997	20 (= 2%)

During May three more recoveries of black duck were reported, as follows -

No.	Date ringed	Place where ringed	Date recovered	Place where recovered	Distance travelled
1305	30.1.53	Yanchep	2.5.53	Wanneroo	10 miles
1793	21.4.53	Queen's Gardens	4.5.53	Hyde Park, Perth (found dead)	1 "
1917	30.4.53	Karinyup Lake	17.5.53	Boyanup	110 "

CONFERENCE OF FISHING INDUSTRY

The Minister for Fisheries (Hon. L. F. Kelly, M.L.A.) has expressed his desire to meet as good a cross-section of the fishing industry as possible, to allow the various interests concerned to place before him their views on any subject connected with fisheries, and generally to inform himself in relation to the problems confronting the industry.

A conference has accordingly been arranged for Monday, June 8, 1953, in Perth, and invitations have been sent out to all professional fishermen's associations, to canners, freezer-boat operators, crayfish processors and fishermen's co-operatives, to C.S.I.R.O. Division of Fisheries and members of the Fishermen's Advisory Committee. Departmental officers who will be present are Messrs. Fraser, Saville and Bramley.

THE MOST TROUT FISHING FOR THE MOST TROUT FISHERMEN

by Thomas K. Chamberlain*

There has been so much emphasis lately on the fact that a properly cared for farm pond may support a first population of 500 or more pounds of fish per surface acre, and yield annual catches of as much as 200 pounds of fish of edible size from the same area, that it may come as a jar to some trout enthusiasts to realize that trout streams produce no such poundage. Also such poundage as is produced is grown much more slowly because of the colder water.

It is a rare trout stream indeed that has enough food available to support a trout population much over 100 pounds of fish to the surface acre, and 50 pounds is definitely more than average. This is certainly true in the east where the figure probably runs between 25 and 35 pounds for most trout streams. When it is considered how thoroughly a trout stream can be fished as compared with a farm pond, and that a stream a mile long and eight and one-third feet wide contains only one surface acre, it can be seen that if a stream is subjected to any considerable amount of fishing, it is very easy to remove most of the trout of interest to anglers, before the season is over.

But if the number of pounds of trout that an acre of trout stream will support is less than the number of pounds of warm-water fish supported by an acre of farm pond, the limit in weight of fish that can be supported per unit area is just as real in the one case as in the other. Because the limit is low in trout streams it can be reached all too easily through extensive but ill-advised stocking efforts.

The significance of this limit to the weight of fish population an area of stream or pond can support deserves consideration. It might be called the weight saturation point for a fish population, as determined by the amount of fish food present. It

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* Mr. Chamberlain, who for some years was an aquatic biologist with the U.S. Fish and Wildlife Service, is now living in retirement. The Department is deeply grateful to him for allowing this matter to be reprinted.

is the point in weight of the fish population above which no more fish can be maintained. When that point is reached, theoretically all individual fish cease to grow. Actually the more aggressive fish will still flourish by taking the greater share of available food for themselves, while the less aggressive will cease growing or starve. The fish population, as a whole, will not only fail to increase in weight through the growth of individual fish, but the addition of more fish to the population will only temporarily increase the total weight. Starvation conditions will simply become more acute when more fish are planted, and the weight of the total fish population will again drop to the established level, through loss of weight by individual fish, and through the death of the weaker members. If the super-saturated fish population consists essentially of small trout, no addition of other small trout will improve the fishing.

Application of the above facts to the stocking program for a trout stream area may be better understood if we divide all trout streams into the three obvious groupings, according to how heavily these streams are fished. First is that group of streams that are fished so lightly that natural reproduction is sufficient to maintain satisfactory fishing. In fact, the addition of hatchery fish would injure, and not help, these streams. The streams may be presumed to have as heavy a total weight of trout to start with as available food will permit. When a few fish are caught, the food these fish would have eaten becomes available to the others. These others then use the extra food to grow until the total weight of trout possible for the stream to sustain is reached.

The second group of streams includes those so heavily fished that they cannot grow the weight of large trout required to continue fishing throughout the season at a satisfactory level. This being the case, if the streams are still to be managed to make the most people happy, the food present in the stream must be thought of as having a distinctly different primary use from that of giving growth to fish. During the fishing season, at least, the food supply cannot be spared particularly for the purpose of giving growth, but instead must be used for keeping in good condition the large fish already present, and those additional large hatchery trout that must be planted

in time to meet the fishing efforts of the many anglers. Depending on the degree of fishing pressure, a greater or lesser number of large hatchery fish should be stocked at intervals before and during the fishing season in the streams of this group.

The third group of streams has an intermediate position between the other two. Its borders are not clearly defined, for individual streams associated with this group tend to merge into one or the other of these two. It is undoubtedly the smallest group of the three, particularly if streams now incorrectly placed in this group by stream management practice were accredited where they belong. Perhaps its position can be established best by showing first how it differs from the other groups. It differs from the first because it requires the planting of hatchery fish if the best fishing is to be provided. It differs from the second in that the main function of the stream's supply of fish is to give growth to the individual trout of the fish population.

A characteristic of many of the streams of this group, and one which may be the group's main justification for existing as a distinct unit, is the apparent inadequacy in these streams of natural reproduction. Not enough young trout appear to be spawned to consume the fish food available, even though fishing may be so light that the young trout have ample time to grow to legal size. In some streams this may be due to unsatisfactory spawning areas, but usually the removal by fishing of a large proportion of the larger trout automatically removes those fish that would spawn. Moderate plants of hatchery fish are required to maintain fishing at the satisfactory point, though care must be taken that the resulting total trout population of both native and hatchery raised fish does not exceed the weight saturation point before a fair proportion of the undersized trout have attained legal length. It is obvious that some of the serious uncertainties involved could be eliminated by the use of larger trout at the start. Still, it is recognized that if considerable caution and moderation are shown, the smaller sized trout can be planted successfully in the streams of this group.

It should be borne in mind that this discussion applies entirely to trout streams. Small

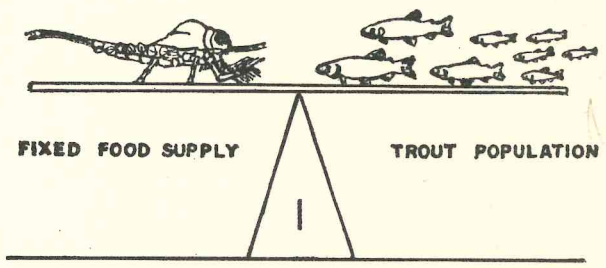
hatchery trout have a far more important role to play when stocked in many trout lakes.

It is the second group of streams that recently has come to the attention of the outdoor-loving public, now that stream management practices for them have been worked out. Some "simon pure" anglers have been slow to approve these practices, which frankly recognize an important place for the fish hatchery in the stream management program. But a careful investigation of the better managed streams of this group has convinced most of these old timers that the best compromise possible has been made, and that the proper use of large trout in stocking streams is the logical solution, in a democratic nation, to the problem of the most fishing for the most people.

It is to be remembered that this does not mean the elimination of wild or native trout from the picture. It means supplementing an inadequate supply of wild fish with sufficient additional hatchery fish to meet the amount of fishing effort that the stream in question is experiencing. That all anglers prefer to catch wild, or native, trout may be taken for granted. But much as they may love trout fishing for its own sake, and the spending of a few hours by the side of a favorite stream, the individual angler experiences a very definite sense of dissatisfaction if he can show only one, or at most two, trout at the end of a long day of casting. That stream, however satisfying and alluring in all other respects, has lost something essential. On the other hand, if to the one or two native trout the angler can add three or four fair-sized hatchery reared trout that had been properly conditioned for some time before planting, as would be true if they had been held in an earth holding pond on a light maintenance diet, the angler is going to return home satisfied, and thereby reap the full benefits of the day's vacation and outdoor experience.

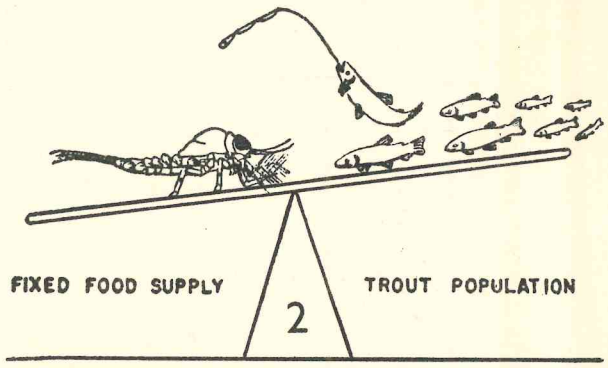
One should keep in mind that catching a few hatchery fish means that the native fish are being supplemented. In the stream management experiments on the Pisgah National Forest, of which more will be said later, the catch of wild trout remained about the same year after year, while the catch of hatchery

AN UNFISHED TROUT STREAM



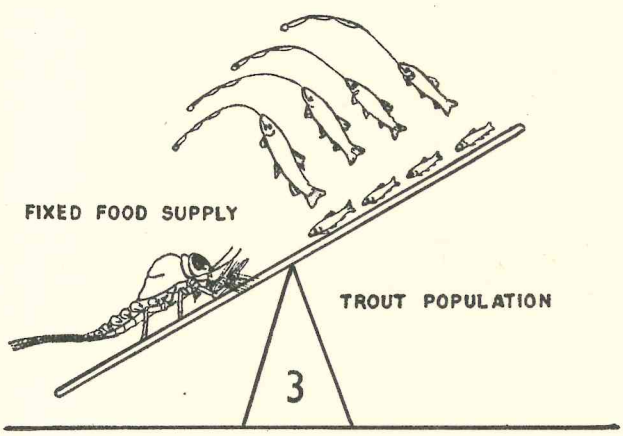
Upper Weight Limit of Trout Population Fixed by Food Supply.

A LIGHTLY FISHED TROUT STREAM



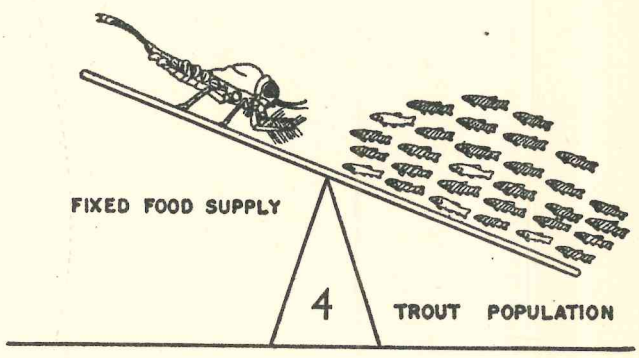
Each Large Trout Caught Makes More Food Available for Smaller Trout, Which Then Grow to Replace Those Caught.

A HEAVILY FISHED TROUT STREAM



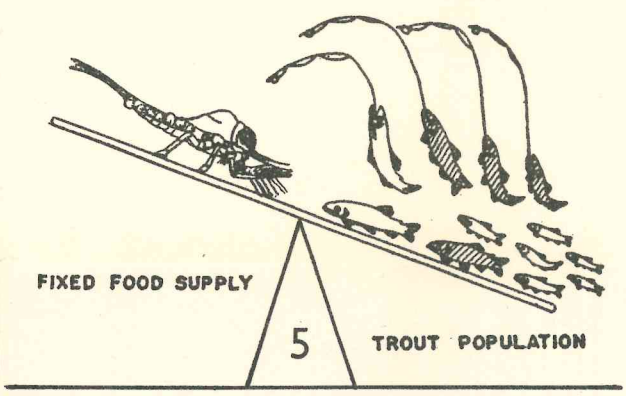
When Too Large a Proportion of the Legal Sized Trout are Caught, Too Few Survive to Carry on Satisfactory Reproduction. Intelligent Stocking Then Becomes Necessary.

A HEAVILY FISHED STREAM STOCKED WITH SMALL TROUT



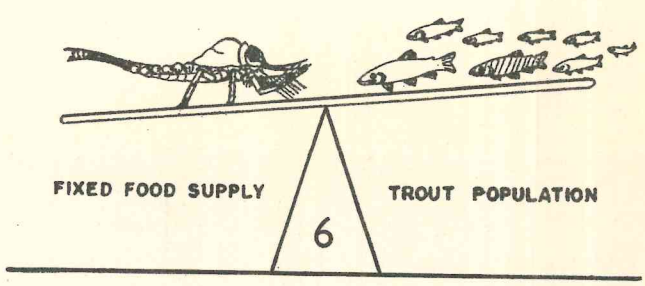
When More Fish Below Legal Size Are Planted Than the Stream is Able to Carry, There is Not Enough Food for the Fish to Grow.
Hatchery Fish Indicated by Transverse Lines.

A HEAVILY FISHED STREAM STOCKED WITH LARGE TROUT



Just Enough Large Trout to Supplement the Native Fish, Planted Before and During the Fishing Season, Will Provide Sustained Fishing All Season. During this Period There May Not Be Enough Fish Food for Growth, But There Should Be Plenty to Keep the Big Fellows in Condition While the Heavy Fishing Goes On.

AFTER THE SEASON IS OVER. A HEAVILY FISHED STREAM WHICH HAD BEEN STOCKED WITH LARGE TROUT.



A Trout Stream that Has Had Its Fishing Sustained with Large Hatchery Trout and at the Same Time Has Been Properly Fished, Should Close the Season with a Trout Population Not Too Large for the Food Supply, and with Enough Large Trout Surviving, Both Native and Hatchery, to Provide Satisfactory Reproduction.

trout rose steadily after the practice of planting larger hatchery fish in the spring of the year was begun. The presence of the hatchery trout took care of the extra amount of fishing above that which the native fish could support. In addition, most of the large hatchery trout that survived the fishing season spawned and so maintained the supply of native fish.

Careful stream management will gauge most carefully the number of hatchery trout to be planted in order to just meet the actual amount of fishing. This makes not only for maximum efficiency and economy, but also assures that all the fish in the stream will have sufficient food to keep in fair condition. Sufficient food may not be available for growth, at least during the fishing season, but it is important that the fish have enough food to keep in condition to furnish the utmost sport.

In addition to the care which must be shown to avoid overstocking, all plantings of the larger trout should be made not later than four to six weeks prior to the close of the season. This will assure that if fishing continues normal to the end of the season, the trout population that remains, including the native spawned fish, large and small, as well as some of the larger hatchery trout that had survived, will not have a total weight in excess of the weight limit that the waters in question are able to support. If the total weight is below this figure, then it may be safely assumed that there will be ample food for the small native fish to grow, and for all larger surviving trout, whether native or hatchery raised, to be in condition to spawn.

The necessity of acre-full stream management is thus evident. In the case of trout streams near heavily populated communities, or fished by many touring anglers, the stream manager is faced with two choices. He may limit the fishing effort, and so deprive anglers of healthful time on the stream, or he may increase the number of fish available to the angler in the manner suggested. Perhaps both types of management have their places. Certain trout streams might be kept unstocked, even though within the reach of many anglers, and treated more as museum pieces than as living modern waters, to be gazed upon as pictures

of the untouched past, sterile now as far as the modern multitudes are concerned, and enjoyed, if at all, by a select few. On the other hand, streams not on the beaten path and lightly fished should, if natural reproduction is adequate, give satisfaction without hatchery assistance of any kind to those making the effort to reach them.

But the other type of management - that calling for the planting of large trout in heavily fished streams - is a practical solution to a problem that can give a great deal of satisfaction to a great number of anglers, as was proved by the experience on the Pisgah National Forest of western North Carolina. Stream management experiments conducted there over a period of years based on stocking efforts with large trout, increased both fishing effort and the total catch many fold. In this, as in certain other Southern Appalachian fish and game managed areas of the national forests, a charge is made of one dollar for a permit to fish one day, so fishing has to give satisfaction on those areas, and the results one way or the other may be gauged by the number of permits sold. The fact that the number of daily fishing permits sold for the area in question rose from 1,100 in 1937 to 3,500 in 1941, and to well over 5,000 after that, would appear to prove the success of the management practice in question. Such extra costs as were involved by the practice were far more than made up by the additional permits sold.

This particular success reflects careful stream management by the U.S. Fish and Wildlife Service and the U.S. Forest Service, acting co-operatively. Working out the best management practices in this manner for different trout stream areas takes time and personnel. Studies must be made to determine the amount of food present, the weight of fish that the stream may be expected to produce, and the success of spawning efforts. Data must be collected year after year to determine the number of man days of fishing, and the number of fish taken each day of fishing by each individual. Armed with this knowledge one is able to adjust stocking to obtain maximum benefits from hatchery stocked fish. Except for a few isolated areas, such as the one mentioned, information is not available.

Until sufficient funds are allotted for such studies, the Fish and Wildlife Service along with state conservation departments must continue to stock on a "hit or miss" basis.

But the greatest gain to the country at large through such research as that on the Pisgah is not in terms that can easily be reduced to dollars and cents. In the case of the stream management practice developed in this instance, thousands of men and women during the war period, who could not otherwise have done so, took time out for the finest of tonics and used their precious allowance of gasoline to travel from the cities and factories of not only North Carolina, but of Tennessee and South Carolina as well, to enjoy the green forested mountains of the Pisgah Forest and spend a few health-giving hours on the hundred and more miles of tumbling streams. The stream management practice in question is democratic and therefore American. It means the most trout fishing for the most trout fishermen.

THE CLEARING HOUSE

Norway's Whaling Earnings Smaller

The seven Norwegian pelagic expeditions in the Antarctic this winter produced altogether about 123,000 tons of whale oil, states the Oslo newspaper "Aftenposten". The one Norwegian shore station in the Antarctic produced another 7,000 tons, so that total output was about 130,000 tons, compared with 170,000 tons last winter when the number of Norwegian pelagic expeditions was 10.

This year most of the oil has been sold at an average price of £71.10.- a ton, and the earnings of the whaling companies are put at £9,300,000, compared with £14,000,000 last year when not only was output higher but the price averaged £82.10.- a ton.

("The Fishing News", London, April 4, 1953.)

Drastic Action Needed

The British fish-canning industry is in the throes of a major crisis. This has been brought about by a number of factors, the chief being (1) the Ministry of Food's ridding itself of huge stocks of bulk-purchased foreign-canned fish at about half-price through normal trade channels in direct competition with home canners; (2) continuing imports, particularly of pilchards from South Africa; and (3) the closing of the Australasian market - the British industry's principal export outlet.

Cannery workers are being thrown out of employment, and those ranks are being augmented by some of the fishermen who can find no market for their catches. Members of Parliament have been approached by those concerned and are taking up the matter with Ministers. It is certain that some questions will be asked in the House of Commons after Parliament has reassembled next week.

Regarding factor (2) above, it is acknowledged that we have to take produce - some of which we might not particularly want - from other countries in order to facilitate our own purchases and/or our own export trade. Factor (3) is said to be only temporary - though

it has been going on since the beginning of 1952. Factor (1) is a horse of quite a different colour, however.

("The Fishing News, London, April 11, 1953.)

Brown Trout Research

Experiments in Fertilisation

Fertilisation experiments to test the practicability of increasing the productivity of lochs and rivers have been begun by the Brown Trout Research Laboratory at Pitlochry. Work has been carried out at three lochs, but it will be some time before an assessment of the results can be made. Details of the experiments conducted are contained in the "Fourth Annual Report of the Supervisory Committee for Brown Trout Research, 1951-1952", published by H.M. Stationery Office, price 2s. net.

The lochs at which the experiments have been made lie in the Tummel-Garry catchment area. Calcium alone was added in Lochan an Daim, calcium and phosphate to certain areas in Loch Choin, and phosphate only was added to Loch Kinardochy. At the time the report was written, only preliminary results were available. These mainly concerned the immediate chemical effects of the various treatments; the effect of adding phosphate seems to have increased the amount of fine vegetation associated with marginal needs and to have had some effect on plant plankton. The biological effects will probably not be detectable until the summer of this year, and a still longer interval may well elapse before the effects on the fish can be ascertained.

Meanwhile, detailed surveys of every aspect of the freshwater community of each loch are being continued. It may be some years before the results of experiments of this kind can be fully known.

Effects of Silt

Studies on the biology of trout, the report states, have included observations on the effects of silt on the eggs and alevins. Though the eggs can quickly become coated with a layer of silt which is

evidently fatal, the young fish after hatching can survive short periods of exposure to silt. In the youngest fish, immediately after hatching, the rhythmic beating of the pectoral fins serves to remove silt. Later, when the mouth opens, small accumulations of silt which might clog the gills are removed by entanglement in mucus secreted by the gills themselves. Later still, this latter process is supplemented by a "coughing" reaction, which serves to expel particles of silt direct from the mouth. Prolonged exposure to silt can be fatal at any stage, but exposure to silt for short periods need not have deleterious effects.

Other work on trout has induced detailed observations on the spawning runs, in order to try to discover the factors which influence these runs. Much work remains to be done in this field, but it is already clear that the fish are ripe some time before the run begins. The spawning run seems to be associated with spate conditions, but the particular condition set up by a spate which favours the run is not yet known with certainty.

As well as these major items, the report gives an account of other topics which have been investigated such as the studies which are being made on the parasites of trout, investigations of the effects of electric currents on freshwater fish, and work on the food of the bottom fauna.

(The Fishing News, London, April 11, 1953.)

Who Owns the Oceans?

Freedom of the Fishery Resources Threatened

There are few maritime nations so blessed as the United States is with rich fishery resources immediately off their own shores. Yet, like the fisheries of all other nations, much of our fleets' production draws on ocean resources found off the coastline of foreign countries. This is no invasion of these nations' resources; it is one of the oldest and most basic principles of international law that the seas and their treasures are free and under the sovereignty of no nation outside of a three-mile belt of "territorial waters" bordering their coastlines. Today this principle is threatened from several directions - yet nothing is more vital for our fisheries than its preservation.

The plight of our Gulf shrimp fleets, which have been subjected to seizure by the Mexican Government on the charge of violating her territorial waters, is of direct interest to all our fisheries. Now restricted to Gulf waters, its implications are significant to all fleets operating off the shores of foreign countries.

New England, for example, the cradle and birthplace of the commercial fishing industry in the U.S. over 300 years ago, is responsible for from 40 to 46% of that almost 2,000,000 lb. portion of the total U.S. catch which is sold in edible fresh and frozen fish form. This greatest food fish area of the nation (except the West Coast), and its fleet of large trawlers, draggers and seiners that have for over 3 centuries been the force to produce for New England a substantial part of its annual income find some of their most valuable fishing grounds off the coast of Canada - grounds which might be closed to American vessels should the Canadian Government attempt to extend its territorial waters to the 9-mile limit currently claimed by Mexico.

The seizure of 13 shrimp boats crewed by 50 sailors from Florida and Texas ports, is a fine example of the international tangles that can arise out of unorthodox regulations concerning coastal waters. The Captain of the Mexican gunboat which seized the American shrimpers maintains they were only 2 miles off the Mexican coast. Mexico maintains that her control extends out 9 miles - a claim in sharp opposition to the 3-mile limit our Government maintains for our nation's shores and recognizes for others. It was answered that the American vessels had anchored on the night previous to the seizure at about 7½ miles from the Mexican coast to escape a storm and were seized 10 miles from the coast, while on their way to the fishing grounds, though not actually yet engaged in fishing. The grounds they were headed for lie considerably beyond the 9-mile limit claimed by Mexico. Still another spokesman in Washington says the vessels were 13 to 17 miles off shore when seized. One of the Mexican Government's charges, that of fishing in Mexican waters without a permit, involved a regulation that owners say they had never been informed of. In Tampa, Florida, shrimp operators are angered and greatly disturbed over this. They feel that the

Mexicans are changing the laws so fast in an effort to discourage American shrimp operations off the rich Campeche area.

What emerges clearly out of this wrangle is not so much who is right in this particular incident, but the significance of the incident's occurrence at all. Namely, that once the well-recognised international law of freedom of the seas outside of a 3-mile territorial waters limit is abandoned - any nation can easily find "legal" reasons for restricting any selected fishing grounds.

Our Government has held rigidly to this principle, both in restricting our own jurisdiction to the 3-mile limit, and in its vigilance in warning other nations that we will not tolerate more extensive controls enacted by them. During 1951 the United States four times protested foreign legislation attempting to extend such jurisdiction, and in our note to the Honduras Government, which had declared its control over waters up to 200 miles from its shores, our Government stated firmly:

> "The U.S. has, in common with the majority of other maritime nations, long adhered to the principle that the belt of territorial waters extends 3 marine miles from the coasts. The area over which the coastal State may exercise exclusive jurisdiction is co-extensive with this belt of territorial waters. My Government desires to inform the Government of Honduras accordingly, that it will not consider its nationals or vessels as being subject to the provisions in question of these decrees or to any measures designed to carry them into execution".

That this 3-mile principle is still threatened is shown in a bill reported in the Canadian House of Commons to extend territorial waters on a cape-to-cape basis from Cape Sable, on the Southerly tip of Nova Scotia, to Cape Race at Newfoundland's south corner, which would enclose a large part of the Grand Banks. While this measure does not deal with the definition of territorial waters, during debate on the bill it was remarked that "if that does not prove feasible, the time will come when we shall have to give some

thought to whether or not we might extend our territorial waters to the continental shelf". This relatively shallow shelf extends out from the shore line varying distances up to 200 miles.

Chief provision of this Canadian proposal is one giving the Canadian Government right to license fishing vessels of any foreign country to enter any Canadian port.

Another example of this trend was the recent act of Norway in defining its territorial waters by drawing point-to-point lines between coastal promontories - an action which was heavily attacked by British fishing interests.

The various Tidelands Bills (over 34 of them) now pending in our own Congress must be studied by the fisheries for possible danger. In many of these bills, the States seek to extend their jurisdiction beyond the 3-mile limit in order to profit by off-shore oil resources. Extension of the 3-mile limit by individual states could set a precedent that would weaken our case for the 3-mile limit with other nations, doing harm to our national fisheries.

Senator John F. Kennedy, of Massachusetts, who has appeared personally at Committee Hearings on this subject to represent the fisheries of his State, pointed out:

> "Recent events in international law have shown that such action by this country could bring retaliatory actions by other nations, or else justify the action they have already taken in extending their seaward boundaries past the 3-mile limit".

He went on to warn that if Congress now acted to reverse that historic 3-mile policy, this country would be unable to prevent the exclusion or seizure of American vessels in coastal areas vital to the maintenance of a prosperous American fishing industry.

This situation calls for concerted effort and constant alertness on the part of our industry. It goes without saying that American fishing vessels must be careful not to lend validity to any other nation's claims by actually violating existing

territorial limitations, even where we disagree with them. Protest against unfair restrictions cannot be conducted by individual fishing vessels or chaos will result. The Texas Shrimp Association, for one, has adopted a Resolution firmly warning its members to recognize Mexico's current claimed 9-mile limit.

At the same time, we must watch every piece of legislation concerning coastal waters to see that neither specifically, nor by implication, does it weaken the principle of the 3-mile limit.

We have so long accepted this international principle of the sharing of the oceans and their resources, and so long benefitted from it, that we may tend to regard it as a God-given right which cannot bettaken from us. Like all liberties, however, this one was fought for and can only be kept alive by continuous vigilance. That vigilance should come from the fisheries; we are the industry most concerned.

(Fishing Gazette, New York, March 1953.)

Science and the Fishing Industry

Elsewhere in this issue we describe the vital role of fisheries research in the development of the South African fishing industry. The work of the Union's Division of Fisheries is the cautious, methodical work of the scientist studying the progress of an industry against the backdrop of resources and their rate of depletion. Not so long ago industries tended to regard the scientist as an obscure theorist completely unconnected with the realities of industrial progress. His warnings were ignored and the old school industrialist blithely went his own way depleting natural resources in a wild orgy of production. Today the picture has changed. With fewer resources to meet a greater demand, the modern industrialist is turning to the practical scientist of our new era of rational and carefully-guarded exploitation. The fishing industry in particular is becoming increasingly dependent on scientific research to discover latent resources and to keep a watch on known grounds.

Three Years . . .

In South Africa the Division of Fisheries has been engaged for three years investigating the

pilchard resource of the Union's largest fishing enterprise. Its findings could have far-reaching results on the pattern of world fishery development, but its work is being constantly hampered by lack of staff and insufficient funds. Unfortunately this problem has constantly haunted the South African fishery researchist over his nearly 60 years of service to the industry. When fishing was only a small feature of the South African economy, official parsimony might have been condoned, but it is now threatening to retard the expansion of a really big industry.

Healthy Share . . .

Last year the products of fishing were valued at £10½ million. Profits were high and the Government reaped a healthy share in taxes. Yet in return the industry's guardian and resource sleuth received the inadequate grant of £90,000 to conduct research programmes, run fishery harbours and carry out its administrative duties. Because of this, vital research work into the pilchard resource has been seriously retarded and there is already a backlog of 18 months in the analysis of accumulated data.

Although financially hamstrung, the Division of Fisheries still has the support of the industry it controls and serves. It has long been the stabilising factor in the rapid development of the pilchard fishery. Two years ago, in collaboration with the pilchard processing companies, it imposed certain restrictions on expansion until more was known about the resource. These restrictions still failed to halt the mounting catches which last year soared to the imposing total of nearly 550,000 tons, or some 3,300,000,000 fish. As yet there are no signs of overfishing and no positive indications that this catch could not be doubled without destroying the resources.

Caution . . .

But caution is the characteristic of a scientist serving an extractive industry and a short time ago the Division of Fisheries advised producers to level out the yearly catch at the already high figure of 500,000 tons. The problem of overfishing is one of the lesser known features of world fisheries. Many scientists give other reasons for the collapse of some important industries. However, the problem cannot

be lightly discarded and it is far wiser to be careful than sorry.

The leaders of the industry took the advice and have assisted the Division in drawing up a conservation scheme involving an extended closed season and a limitation on the number of fishing boats working the pilchard areas. Later results of the pilchard investigation may permit further expansion. Until they do, however, the industry is dipping carefully into the pilchard shoals to make sure that the fishery remains a permanent and valuable feature of our economy.

This farsighted action after a record fishing year should dispel the doubts of those who feared the industry would destroy itself by its own excesses. It also justifies the confidence of investors and should further enhance the good reputation of the West Coast pilchard industry in South Africa and oversea.

("The South African Shipping News and Fishing Industry Review", Cape Town, April, 1953.)

Big Demand for Aluminium Dinghies from Durban Boatyard

The construction of light aluminium craft for pleasure purposes in the yards of Fred Nicolls (Pty.) Ltd., Durban, has laid the foundations for a new form of boat construction in the Union which is showing indications of becoming of considerable importance.

Some nine months ago the first aluminium dinghy was constructed and since then the popularity of this type of craft has been spreading among private and public bodies. Constructed to a sturdy design that is extremely clean and combines great strength with remarkably little weight, these small craft are now to be found in many unexpected parts of the Union and Rhodesia.

Half-a-dozen are operated by the Municipality of Bethlehem in the Free State, Professor J. L. B. Smith, the noted ichthylogist owns one, the Rhodesian Government operates a number on the Zambezi and in Zululand and two have been obtained by the Natal Provincial Administration for work in the clearing of the St. Lucia estuary.

The dinghies are of all-welded construction and are fitted to take an outboard motor.

Ski Boat

In addition to the dinghies built, a special twin-hull ski boat (similar in general design) has been built for an amateur angler who is at present fishing in the Seychelles. Plans are also on hand for the construction of two aluminium life boats for the yacht "Verona".

At present, construction work is well advanced on the prototype of a medium-sized all-aluminium motor launch. In the construction of this craft there has been a considerable amount of experimental work required especially in relation to frame spacing.

Two aluminium welding sets, one of British and the other of Canadian manufacture, are used for building these craft. The aluminium is of different gauges depending on the size of the vessel and the purpose for which it is to be used.

In addition to the aluminium dinghies built by the firm, it is intended to design aluminium dories for use by pilchard fishing craft operating on the West Coast. The light weight and general handiness of such craft would be a considerable asset during fishing operations.

("The South African Shipping News and Fishing Industry Review, Cape Town, April, 1953.)

How Fish Swim

By Len Banfield
(Reprinted from Spearfishing News)

One of the commonest fallacies among fishermen is that a fish swims with its caudal or tail fin only. In reality, however, every part of a fish's body helps it to swim.

Extending the complete length of the body is a series of M-shaped bands of muscle, which are easily recognised in a skinned fish, by contracting the muscles on each side alternately a fanning motion is set up, driving the fish forward.

The streamlined shape of the body is perfectly designed to lessen water resistance. The top view shows a blunt nose tapering to the thin tail, much resembling an elongated water drop - said to be the perfect streamline form. The scales are overlaid like roofing tiles, a fine membrane covers them and over this is a layer of slime which while making the fish slippery to handle, allows it to slip through the water with the greatest of ease.

Fins are used not so much for swimming as for manoeuvring. When a fish wishes to remain stationary for any length of time it must paddle backwards with its pectoral fins, to offset the forward motion caused by the gills opening and closing. To turn abruptly in the water the fish erects its pectoral fin on the side it wishes to turn to and its forward motion momentum turns it, much as an oarsman turns his boat.

Most spearmen are familiar with the luderick's habit of coming up to have a look and then swimming round on an axis to shoot off in another direction. The blackfish does this by sticking its ventral fin straight down in the water and using it as a pivot to turn on. All in all, the fish is master of its element, more so than a bird or any land animal. The only animals that can match it in grace of movement are the porpoises and dolphins who use an up and down movement of the tail and lower body so effectively that they have timed at over 30 m.p.h. which is as fast as the tuna, one of the speediest of fish.

The only fish who obey none of the laws laid down for swimming are the trunk fish and the sea horse. The trunk fish have encased themselves in a rigid armoured box formed by their scales. They move along slowly by vigorously waggling their caudal fin from side to side and sculling their pectoral fins to and fro every now and then to increase their speed.

The sea horse can be seen, but not believed; he moves along by standing on his tail and feverishly fanning the water with his dorsal fin.

(Spearfishing Sportlight, Perth, May, 1953.)