DEPARTMENT
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Vol. X, No. 1 January, 1961.

STAFF NOTES

We are relieved to report that the health of Cadet Inspector P.K. Enright, who has been dangerously ill with a brain infection, has greatly improved. It is expected that he will be discharged from Royal Perth Hospital early in January to undergo a course of physiotherapy at his home town of Northam.

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The Director, Mr. A.J. Fraser, will accompany the Minister for Fisheries, Mr. Hutchinson, on a visit to Denmark and Albany on January 19-20. They will meet the Denmark Road Board and representatives of the South Coast Licensed Fishermen's Association to discuss certain aspects of the fisheries of the respective centres.

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As Secretary of the Fauna Protection Advisory Committee, Mr. H.B. Shugg, of Head Office, accompanied committee member A.J. Milesi to Narrogin on December 22. They were joined there by another committee member, Mr. J.B. Higham, of Albany. After being entertained by the Narrogin Road Board at luncheon, they addressed the Board on the future status of the headwaters of the Arthur River and replied to questions by members who were anxious to find out the Committee's management plans for this wetland habitat.

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The Pearling Inspector, Mr. R.J. Baird, of Broome, will commence biennial leave on January 13 and on its completion he will commence three months' long service leave. Inspector E.I. Forster will leave Perth by air on January 6 to take over Mr. Baird's duties during his absence.

Inspector H.D. Kavanagh, of Shark Bay, will commence annual leave on January 4.

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Fauna Warden S.W. Bowler will commence his annual leave on January 5.

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Inspector R.M. Crawford, of Geraldton, resumed duty after annual leave on December 28.

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The Relieving Inspector, Mr. G.C. Jeffery, will be stationed at Lancelin from January 5.

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We regret to report that Assistant Inspector D.H. Smith, who returned to the metropolitan area just prior to Christmas after serving for a period at Jurien Bay, suffered a traffic accident during the Christmas holidays at Busselton. His left foot was severely lacerated and he spent a week in the Busselton District Hospital before being transferred to the care of a doctor in the metropolitan area. It is expected that he will be on sick leave for a number of weeks.

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Cadet Inspector G.J. Hanley, who has been assisting on the p.v. "Kooruldhoo" for some time, will be transferred to the metropolitan area early this month. Cadet Inspector J.T. Kelly has been assigned to the r.v. "Peron", vice Cadet Inspector P.A. Smith, who has been transferred to the Fremantle office. Cadet Inspector I.L. Cardon has been assigned to the r.v. "Lancelin".

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We welcome to the staff Mr. Peter Charles Willey, of Claremont, who commenced duty on December 14. He has been appointed Cadet Inspector and will be stationed at Geraldton to assist Inspector A.T. Pearce on p.v. "Kooruldhoo". We also welcome Mr. J.P. O'Sullivan, who has been appointed to the permanent crew of the r.v. "Peron" as general deck hand.

Inspector B.A. Carmichael will return to duty on February 1 after long service leave. Inspector J. Traynor, who is in charge of the Albany district during Mr. Carmichael's absence, will then return to Perth.

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Inspectors A.V. Green, of Mandurah, and T.B. Baines, of Bunbury, who were called to the metropolitan area to assist in the inspection of crayfish tails towards the end of the white crayfish run, returned to their respective stations immediately prior to Christmas. Assistant Inspector E.H. Barker, of Mandurah, has been transferred to Jurien Bay for the balance of the crayfish season. He will be assisted by Cadet Inspector R.G. Emery.

MOVEMENT OF DEPARTMENTAL VESSELS

As reported last month, the r.v. "Peron" returned to Fremantle on December 7 after her northern cruise.

The r.v. "Lancelin", under command of Mr. C.J. Seabrook, Master, with Mr. C.R.C. Haynes, Mate, and Cadet Inspector I.L. Cardon, is working in the Fremantle-Jurien Bay area, principally in co-operation with Dr. R.W. George, of the Western Australian Museum, on the co-operative crayfish research programme now in progress. Additionally, at least once a month, the "Lancelin" will be assisting with patrols of the crayfishing grounds north to Jurien Bay.

The p.v. "Misty Isle", under command of Inspector F.J. Campbell, with Assistant Inspector D.P. Gordon as crew member, is operating from Fremantle on crayfish patrol work. For a period last month Messrs. Campbell and Gordon assisted in the inspection of crayfish tails at Fremantle.

It is expected that p.v. "Dampier" will transfer to Geraldton within the next few weeks and "Korruldhoo" return to Fremantle.

SEASONAL GREETINGS AND PERSONAL PARS

The Minister for Fisheries, Mr. Hutchinson, with his Secretary, Mr. J.M. Driscoll, attended the informal departmental Christmas party held at Head Office on December 23. At the

function the Director read the following message received from the Minister :

"Dear Mr. Fraser,

I would like you to convey to all members of the staff my most sincere appreciation of a year's work well done.

Much has been achieved in the past twelve months, and I have no doubt that this is due in great part to the teamwork of departmental staff.

May I take this opportunity of wishing yourself and officers a very enjoyable Christmas and a Happy New Year.

Yours sincerely,

Ross Hutchinson,
MINISTER FOR FISHERIES."

Other guests at the function included the Chief Vermin Control Officer, Mr. A.R. Tomlinson, the Secretary of the Agriculture Protection Board, Mr. B.J. Gorey, and our old friend, Mr. E.J. Brownfield, who since leaving this Department has risen to the high office of Registrar General. Mr. Bruce Collier, the new General Secretary of the Civil Service Association, was also present.

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Among the many greetings received from allied Departments and the public generally, the following two are perhaps particularly noteworthy -

"Dear Mr. Fraser,

Thank you for your kind letter of 15th December, 1960. The little help which the Museum staff have been able to give to the Fisheries Department on occasions during the past twelve months is insignificant as compared with the great material assistance and friendly co-operation which has been provided by your Department during the same period. In fact, it might well be said that the

increasing success of our activities here is very largely due to the facilities and co-operation which we receive from yourself and your officers.

Will you please give them our sincere Christmas greetings and every wish for your success in the coming year.

Yours sincerely,

W.D.L. Ride,
DIRECTOR,
WESTERN AUSTRALIAN MUSEUM."

"Dear Mr. Fraser,

It was very pleasant to receive your letter of appreciation this morning and I have put it on the staff notice-board.

I may say, of course, that all of your remarks apply to yourself and your staff too. I think we may both take pride in the fact that our two Departments (including the earlier Fisheries phase) have always worked in the closest harmony and I cannot recall a case when material help or advice, from either side to the other, was not forthcoming when needed. I don't think any other State can equal us in friendly and well-integrated relations.

With kind regards and seasonal greetings to you and your staff from all of us here,

Yours sincerely,

D.L. Serventy,
PRINCIPAL RESEARCH OFFICER,
WILDLIFE SURVEY SECTION, C.S.I.R.O."

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The Officer-in-Charge of the Wildlife Survey Section, C.S.I.R.O., Mr. F.N. Ratcliffe, of Canberra, called on the Director during the month. Mr. Ratcliffe was making a final call on his branches before proceeding overseas on long service and sabbatical leave. During his absence from Australia he will attend a number of conferences and take the opportunity to pursue certain enquiries on behalf of his Section. On his return to Australia, about October, he will retire from the Wildlife Survey Section and take up appoint-

ment as Assistant Chief of the Division of Entomology. Writing to the Director just before his visit, Mr. Ratcliffe said, among other things -

> "It is not only my favourite colleagues that I am sorry to leave (though I'll be able to keep in touch with them, and keep up an interest in their work) - it is the world of wild animals that I like, and the people in that world (such as yourself) who have been so helpful and decent to me, and to my colleagues. You particularly have been outstandingly generous and co-operative; and I'd like you to know how much I appreciate it."

INTERNATIONAL VISITORS.

During the stay in Fremantle of the Japanese oceanographic training vessel "Umitaka Maru", the Research Officer, Mr. B.K. Bowen, and Captain H.C.W. Piesse, of the r.v. "Peron", were entertained on the ship and inspected her in company with Mr. K. Godfrey, of the Division of Fisheries and Oceanography, C.S.I.R.O., who had accompanied her from Darwin. The ship, which is a 1,452-ton vessel, is used for training cadets in modern fisheries techniques. She remained in Fremantle for about five days.

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A second oceanographic research vessel is at present in Fremantle. She is the "Argo", a 1,900-ton ship, operated by the University of California for the Scripps Institute of Oceanography. With 17 scientists on board, the "Argo" is currently engaged in research in the Indian Ocean as part of an international scientific programme. The research team is led by Dr. Robert L. Fisher. "Argo" is proudly described as one of the best equipped vessels of her kind in the world. She is expected to remain in Fremantle for some weeks.

SALMON RESEARCH TO RESUME.

The Assistant Chief of the Division of Fisheries and Oceanography, Dr. G.L. Kesteven, to whom the Director some time ago mentioned the decline in the Western Australian catch of Australian salmon, telephoned recently from Canberra. Dr. Kesteven advised that Dr. W.B. Malcolm, who last year returned from overseas after a year or more in British Columbia (Canada), would be carrying out further research on the species. He would be needing biometrical

data of salmon in Western Australian waters, and Dr. Kesteven was anxious to learn to what extent we could assist. The Director has now approved of our co-operation, and details of the required studies will be worked out by Dr. Malcolm and our Research Officer, Mr. Bowen. It is expected that the necessary field work will be placed in the hands of Technical Officer L.G. Smith.

OPENING OF DUCK SHOOTING SEASON

Four groups of officers left Perth on the weekend before Christmas to patrol the final hours of the close season and to witness activities generally at some of the more important duck shooting areas. This was the first occasion when so many officers attended the opening shoot of the season.

The Research Officer, Mr. Bowen, accompanied by Technical Officer J.S. Simpson, first went to Gundaring Lake, near Wagin, but the shooting was so poor there that they later proceeded to Taarblin, where they inspected shooters' bags and aged and sexed a number of birds.

Messrs. H.B. Shugg and W.K. Cherrington, of Head Office, called in at Benger Swamp, near Harvey, and contacted honorary wardens and shooters before going on to the Stirling Estate at Capel. Well over 100 guns operated at both areas. The shooting at Benger was more successful than in previous years, shooters bagging on the average more than six birds. No count was taken at the Stirling Estate, but the party reported that there were more ducks present than in previous years and shooters appeared to achieve reasonable bags. Full details were not secured as the two officers left the area before the shooting concluded to patrol the closed Vasse and Wonnerup Estuaries, and to inspect the Broadwater south of Busselton which local residents had petitioned to be closed.

Fauna Warden S.W. Bowler attended the opening shoot at Lake Wannamal, north of Gingin, where he contacted honorary wardens. His arrival on the afternoon before the opening was timely as he was able to apprehend four men who commenced shooting at 6.45 p.m. on December 17. The opening time in that area, it will be remembered, is 5 a.m. on December 18. Mr. Bowler estimated that approximately 60 guns were present at the opening on Sunday morning but, contrary to expectations, ducks were rather scarce although the Lake was at a high level. The average bag was approximately three.

Fauna Warden N.E. McLaughlan, accompanied by Honorary Warden D.G. Bathgate, went to Walyormouring or Oak Park Lake in the Goomalling District. Mr. McLaughlan estimated that about 2,000 ducks were on the Lake as well as large aggregations of banded stilts and coot. As in all other areas (except the Stirling Estate), grey teal predominated. Mr. McLaughlan reported that a number of shooters had taken the bag limit by 7.30 a.m. He and Mr. Bathgate were able to sex and weigh 235 ducks, a really commendable effort on their part. 80% of the birds examined were grey teal and 11.5% were mountain duck. The percentage of black ducks was only 2.5.

The following comparison of the weights of grey teal has been prepared by the Research Officer :-

Year and Place	Males		Females	
	Juvenile	Mature	Juvenile	Mature
	oz.	oz.	oz.	oz.
1957 (Gundaring)	16	17	14½	16½
1958 (Taarblin)	15½	18	14	16
1960 (Taarblin)	17	20	16	18
1960 (Oak Park)	16½	19	16	17

Mr. Bowen says it is obvious that there has been very little variation in the year-by-year weights of teal sampled in 1957, 1958 and 1960. It is of interest to note that the teal examined at Oak Park in 1960 were similar in weight to those at Taarblin.

IMPORTANT BAND RECOVERIES

The first record of a trans-Australia flight by a black duck was received recently. The bird concerned was banded in the Woodanilling district of Western Australia with band number 7437 on April 3, 1958. It was caught on November 14, 1960, in a wire trap on a house dam at Nyngynderry Station, Menindee, by Mr. D.H. Lennon. Menindee is on the Darling River in the Western Division of New South Wales. The banding and recovery points were 1,483 miles apart. While research work has established that black duck are far more sedentary than grey teal, this recovery demonstrates that under certain conditions "blackies" will also move over great distances. It will be remembered that some time ago a black duck banded in New Zealand was later recovered in Victoria.

A second important recovery has been received from Mr. C.L.E. Orton, of Moora. He forwarded to Dr. Serventy, of C.S.I.R.O., who sent it on to us, band number 1380, which was placed on a grey teal at Wardering Lake, Woodanilling, on February 14, 1953. The teal was shot by Mr. Orton on a swamp at Moora on opening day, December 18, 1960. The bird was then in its eighth year of banding, which is an interesting record of longevity.

FURTHER BOAT LOSSES

Accidents to fishing craft continue to happen at a rate almost comparable with road traffic mishaps. The 30-ft. cray boat "Galeb" was only 4½ hours out from Fremantle on her maiden voyage on December 2 when she hit a reef at Ledge Point and sank in 10 minutes. Both Skipper R. Latter, of Medina, and his crew hand reached shore safely. The "Galeb", which was valued at £6,000, was not insured. She was later washed ashore and patched up sufficiently to be towed back to Fremantle.

The Australian Pearling Company's cray boat "Trixen", a converted pearling lugger, broke a tail shaft at Lancelin on December 29. She was taken in tow by the 68-ft. l.f.b. "Nanango", which is owned by the same company.

The biggest cray boat on the coast, the 270-ton "Laakanuki", suffered damage when her stern drifted on to the stone groyne at the Fremantle fishing boat harbour on December 27. One tail shaft was bent and will require replacing and one of the ship's two gear boxes was also damaged. A former naval refrigeration lighter, the "Laakanuki" was just on her way back to Jurien Bay with bait for her fleet of catcher-boats after the Christmas recess when the mishap occurred.

ADDITIONAL SANCTUARIES

In recent weeks five new sanctuaries have been set aside as reserves under section 29 (g) of the Land Act. The first is at Elashgin Soak in the Wyalkatchem Road District. It is a "C" class reserve, No. 19002, set aside as a picnic ground and for the conservation of flora and fauna. It is 640 acres in extent but, as its principal purpose will be as a local picnic area, it will not receive more than general oversight by the Department, and control of the reserve has, under the Land Act, been vested in the local Road Board.

Although Reserve 25210 of 3,803 acres at Lake Eganu has been set aside as a waterfowl breeding area, shooters will be allowed to operate there during the open season for wild ducks. Notwithstanding that the purposes of the reserve are recreation and the conservation of flora and fauna, it is considered its main purpose is the protection of waterfowl breeding habitat. Control has therefore been vested under the Land Act in the Fauna Protection Advisory Committee.

Another wetland area has been reserved in the Albany district. It comprises Lake Powell or Grassmere in the western section of the Albany Road District. This reserve is 458 acres in extent.

A third section of wetland habitat has been set aside as "A" Class Reserve 25798. It includes Lakes Unicup and Little Unicup in the western section of the Cranbrook Road District, between Lake Muir and Mordalup. This reserve comprises 7,000 acres and has been vested in the Fauna Protection Advisory Committee.

The fifth reserve comprises most of Chiddarcooping Rock, a huge granite outcrop, and a section of the surrounding "wodjil" * country. For the time being the reserve will be confined to 6,523 acres but it will probably be increased to take in the whole of the outcrop when a lease over an adjoining area expires in about 10 years' time. This reserve, which is in the Westonia Road District, has also been vested in the Committee.

These additional sanctuaries increase the total number under the Advisory Committee's jurisdiction to 101, and the total area to 2,766,282 acres. Of these, 30 are vested in the Committee under the Land Act while the remaining 70 are subject to the control of the Committee pursuant to the provisions of the Fauna Protection Act.

With the progressive agricultural and industrial development of the State these sanctuaries must become increasingly important and require a progressive degree of active protection and management. For the present, due to shortages of staff and finance, departmental activities must largely be restricted to occasional inspection to ensure that they are not being subjected to illicit grazing or to other interference. Records of their

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* "Wodjil" country is a term used to describe a peculiar association of plants occurring in sand and lateritic gravel soils of the eastern wheatbelt.

general ecology, including floral and faunal associations, soil groups and general conditions will be made as opportunity offers.

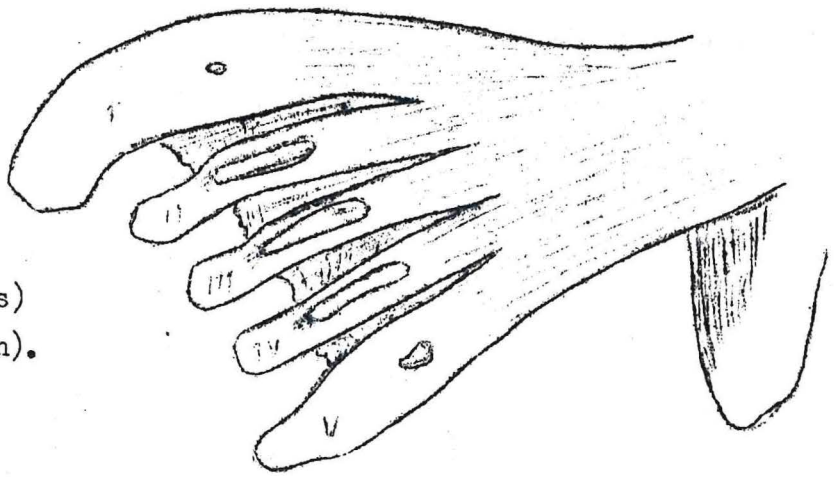
SEALS

The finding of a baby seal on the rocks near Fish Market Jetty, Fremantle, on December 28 might remind inspectors of the request published in a previous issue of this Bulletin for reports on sightings of seals around our coast. Staff might recall that at the annual conference it was agreed that photographs and diagrams of fur and hair seals would be supplied to all departmental inspectors to assist in the identification of the different species. Photographs have not been obtained but the following information and sketches should be of assistance to inspectors in identifying any seals sighted.

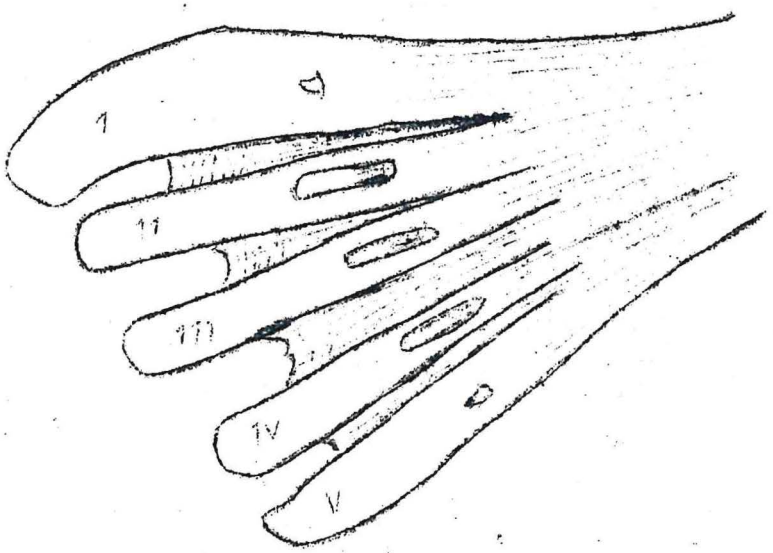
As far as is known, the only seals which are endemic to Western Australian coastal waters are members of the family of eared seals, Otariidae, which includes the hair seals and the fur seals. Untrained observers have long confused fur seals with hair seals due to their similarities in size and colouration.

Perhaps the best means of distinguishing between the hair seal and the fur seal, or the 'sea lion' and the 'sea bear', as they are also known, is by the differences in their hind flippers or feet. The first and fifth toes of the hair seal are longer than the second, third and fourth, while the nails reach the free edge of the webbing between toes, as illustrated on page 12. In the fur seal the toes on the hind flippers are all more or less of the same length while the nails are placed very much farther back from the tips of the toes. Both the hair and the fur seal are able to use their hind flippers in moving about on land.

In the family of true seals, Phocidae, two genera occasionally occur in our waters. The true seals can be distinguished from the preceding group by their entire lack of external ears. Additionally, their hind flippers cannot be turned forward and are not used in terrestrial movement. Furthermore, in the water they rise so that just their head protrudes beyond the surface and then they sink backwards. The eared seals, after surfacing, dive forward. The members of the family of true seals which might be encountered in our waters include the Antarctic breeding Weddell's Seal and the Leopard Seal, which ranges over the Southern Ocean generally. The latter may be further distinguished by its elongated body, which gives it a fine appearance, and it is one



Left hind flipper (pes)
of Hair Seal (Sea lion).



Left hind flipper (pes)
of Fur Seal (Sea bear).

(after Wood Jones)

seal whose colouration is of assistance in identification. It has white blotches and black spots over its generally ash-grey body. It is exceedingly agile and ferocious and no attempt to handle it should be made.

SCARCITY OF CRABS

1961 appears as if it will be a poor season for crabbers. Reports coming to hand indicate that it is probably the worst year on record. At least at the moment crabs appear to be scarce or non-existent everywhere in the Swan River. Professional fishermen are averaging only about 35-40 lb. of crabs each for a whole night's work. At Bunbury too there is a very poor season.

DEPARTMENTAL PROSECUTIONS

October 1 to December 31, 1960

Date	Defendant	Court	Charge	Result
		Fisheries Act		
24.10.60	Ftle.Fishermen's Co-op.	Fremantle	U/size crayfish	" £12
"	do.	"	do.	" £ 5
"	Melvin, John	"	do.	" £ 3
"	Morck, Hans	"	do.	" £ 3
"	Stacey, Adrian	"	do.	" £ 3
28.11.60	Wheeler and Annear	"	do.	" £ 5
7.10.60	Tipping, Patrick	Geraldton	do.	" £20
"	Chambers, Geoffrey	"	do.	" £ 5
3.11.60	Tipping, Patrick	"	do.	" £20
"	Saavenoja, Toiuo	"	do.	" £ 5
"	Cross, Brian	"	do.	" £ 5
"	Glazier, Maurice	"	do.	" £ 5
"	Whittaker, Herbert	"	do.	" £ 5
"	Strom, Bengt	"	do.	" £ 5
"	Donatti, Peter	"	do.	" £20
"	Cuthbert, Roy	"	do.	" £ 2
30.8.60*	Lansdell, Joseph J.	"	do.	" £10
24.11.60	Horn, David	"	do.	" £ 5

* Late notification.

Date	Defendant	Court	Charge	Result
24.11.60	Klimck, William	Geraldton	U/size crayfish	Fined £ 5
"	Bunney, Ronald Frank) Gibson, Alfred John)	"	do.	" £ 5
12.10.60	Benson, Charles	Perth	U/size fish	" £ 5
"	Dawe, Norman Lawrence	"	U/size yellow-eye mullet	" £ 5
27.10.60	Sweetman, Alfred Walter	"	U/size sea mullet	" £ 4
17.11.60	Waters, William Alfred	"	" yellow-eye mull.	" £ 5
"	Quadrio, Sergio	"	" crayfish	" £ 3
"	Wright, Walter	"	Netting closed waters	" £ 3
7.12.60	Kailis, Michael George	"	U/s crayfish	" £ 2
3.12.60	Kenworthy, John W.	"	U/s fish	" £ 5
"	do.	"	Fishing without license	" £ 5
"	Pusey, Kevin B.	"	U/s fish	" £ 5
"	do.	"	Fishing w/o lic.	" £ 5
"	Holden, Stanley J.	"	Unlawful gear	" £ 5
"	do.	"	U/s fish	" £ 3
"	do.	"	Fishing w/o lic.	" £ 3
"	Reeves, Thomas A.	"	Unlawful gear	" £ 5
"	do.	"	U/s fish	" £ 3
"	do.	"	Fishing w/o lic.	" £ 3
	Fauna Protection Act			
12.10.60	Franz, Frank	Perth	Shooting protected bird	" £ 2
1.11.60	Jackson, Errol A.	Midland Junction	Illegal shooting	" £ 5
"	Miles, Malcolm B.	"	do.	" £ 5
"	Wills, Gordon J.	"	do.	" £ 5
27.10.60	Cameron, Norman B.	Pinjarra	Shooting protected fauna	" £ 2
"	Stone, Robert	"	do.	" £ 2
"	Palmer, Jeffery	"	do.	" £ 2
20.9.60	Master, Barry C.	Midland Junction	do.	" £ 3
"	Foster, Albert E.	"	do.	" £ 3

CLEARING HOUSE

Sprays and Fishlife

By Eric Hardy, F.Z.S.

Much publicity has been given recently to the damaging effects of deadly modern chemical sprays used for insecticides, herbicides and other purposes, and destruction to fishlife is amongst the listed results. So far as the fishing industry is concerned, there is only its influence upon salmon stocks which has any immediate problem in this country.

So far the more serious effects have been in North America where widespread aerial spraying of D.D.T. to control spruce budworm over millions of acres of forests has been unable to avoid open streams feeding into salmon rivers.

Although many chemical insecticides like aldrin, dieldrin, melathion endrin, heptachlor and chlordane are more toxic than D.D.T., and aerial spraying is not so common in Britain as in the colonies and the U.S.A., it is interesting to consider the influence of the above upon stocks of Atlantic salmon, the same species which forms the basis of the salmon-fishery here.

Much of the loss can be from delay and indirect effects. Most of the aquatic insects upon which salmon feed in their river life are killed, so that fish may be starved or may die indirectly from eating poisoned insects, or even earthworms, in which D.D.T. accumulates until in about a year it is concentrated in fatal doses.

On the other hand, fish have been unaffected in other streams, and they have not always died from eating poisoned insects. Much depends upon the strength of the chemical and frequency of application, the amount of rainfall, and the type of local vegetation to take it up.

Keenleyside showed that D.D.T. sprayed from aeroplanes at the rate of only half-a-pound per acre caused heavy mortality to up-river salmon in their first year of life.

In the Miramichi salmon-river system, Kerswull and Elson showed that spraying over a third of the watershed caused drastic loss of salmon fingerlings. In some parts small parr

were reduced to one in five, in others to one in three. Less than half the larger parr remained. Older salmon were reduced sufficiently to make smaller runs of descending smolts smaller; but a June spraying did not reduce the number of grilse and older salmon entering the river that year. Mayflies, stoneflies, caddisflies, midges, both adult and larval, were killed, and there was virtually no suitable insect food for salmon for several months afterwards.

Salmon could die from direct contact with oil suspended D.D.T. on the surface, but while some research showed that D.D.T. in water solution was more deadly than D.D.T. in oil emulsion, others showed that an oil solvent for the spray was also harmful to the fish, even when it contained no D.D.T.

In the absence of aerial spraying there is the risk of "run-off" from sprayed land with following rainfall. Tarzwell and Henderson have studied this in Ohio. After the first rainfall on land treated with 4.66 lb. of dieldrin per acre, the run-off contained 0.128 ppm, which was toxic to fish; but after the third rainfall less than 50 per cent of the fish died, and very few died after the fourth rainfall. The toxic level of run-off varied from 0.042 ppm. to 1.0056 ppm.

At Quebec, Gagnon has studied the sensitivity of salmon to D.D.T. in hatchery troughs. A dose equal to 0.32 ppm. or 0.5 lb. per acre caused 93-100 per cent mortality even with part-time circulation of the water. Sensitivity of the salmon decreased with age. He found the average lethal dose in water to be 0.072 ppm. D.D.T. of course has a secondary effect upon plankton and so upsets the food chain for fishes.

It is well proved that certain chemicals are highly toxic to salmon and other fish, but with precaution they need not necessarily reach the water. It is surprising that so little chemical residue has affected fish stocks. The danger seems to be the use of stronger and stronger chemicals as pests become more resistant. One hundred and eighty chemicals are listed in a standard American reference book on pesticides, without considering fertilisers. Where is the end to be?

(The Fishing News London November 11, 1960)

Australia's Fisheries Could Be Expanded.

Australian fishermen need more help to develop the industry, says Dr. G.L. Kesteven, assistant chief Fisheries and Oceanography officer of the C.S.I.R.O.

Fishermen need a better account of the resources; they should be provided with fishing maps; they should be provided with a service of prediction, not only of where to find fish, but the quantities and varieties as well, he said.

In a special article in "The Sydney Morning Herald" recently, Dr. Kesteven said that on any scale of comparison the fisheries of Australia are small and of relatively little importance.

The total annual catch, excluding whales, is about 65,000 tons.

Comparisons.

Compare this with Australian production of beef (about 800,000 tons), or butter (about 200,000 tons), or with the fish production of Japan (5.5 million tons), or of Iceland (580,000 tons).

It cannot be said that this low production is due to the smallness of Australia's population since there are countries with even smaller populations whose fish production is far greater than Australia's; Iceland, for example.

Nor can it be said that Australian fishermen have only limited access to fishery resources since Australia lies in the midst of the world's greatest seas, and fishing vessels these days can rove the seas of the world.

However, it must be conceded that the resources immediately accessible, such as the rivers and just off the coast, have never shown much promise, and it would seem fair to say that fishery resources offered less attractive prospects than did other resources, and in the rough and tumble of Australia's pioneering days drew fewer people and attracted less investment than did other resources.

In consequence, there was, in the early decades of this century, no substantial body of experienced fishermen.

Neither was there a fishing fleet (however small) to embark on exploration and to effect development such as has taken place in other Australian industries and in the fisheries of other countries in the last few decades.

But the situation is more complex than this, and an understanding of it can be got only by examining all three phases on the industry: Primary (fishing), secondary (processing), and tertiary (marketing and distribution).

The situation of Australian fishing may be summarised as follows :

- Commercial fishing of freshwater species in rivers and lakes is not great (production about 1,000 tons).
- Fish culture is being started in some areas but can scarcely be regarded as being yet an industry.
- The most important section of this industry operates in brackish waters and along the beaches of the east, south-east and south-west coasts, for mullet, salmon, bream and other species.
- Oyster cultivation is productive and profitable.
- Pelagic (open sea) fisheries are small, with well-established operations for Spanish mackerel and barracouta and an undeveloped industry for tuna.
- There is a limited and unreliable trawl fishery on the east coast, and at present trawling by one vessel in the Great Australian Bight.
- Since World War II significant fisheries have developed for crayfish and prawns.

Diverse

Thus, Australian commercial fishing is as diverse as that of most countries but if 60,000 tons is a small total, the production from each of so many separate fisheries is also bound to be small.

Compare the Australian prawn catch of 3,000 tons with the Mexican of 44,000 tons or to the United States, about 100,000 tons; or compare the Australian freshwater catch of about 1,000 tons with that of India, about 300,000 tons.

In crayfish production, however, Australia holds a leading position.

There is no significant fishery concentration anywhere on the Australian coast.

Irregular

Irregularity of supply has been the nightmare of secondary industry; there are canneries and other processing establishments, but their operations are irregular and their fortunes uncertain.

For the retailer the whole picture is one of uncertainty; irregular supplies of a heterogeneous catch with no substantial quantity of any principal species.

Many people say that Australians are poor fish-eaters, and point to the production of beef and mutton as explanation. From this observation (whether accurate or not) they draw the conclusion that the Australian market for fish is inherently limited.

It could be pointed out with regard to the Australian market that, in fact, relatively little has yet been done, after the fashion of what has been done in America and other countries, to increase the demand for fish, and to make this demand effective by developing the retail outlets.

And the fact could also be emphasised that there still exists considerable opportunity for disposal of fish through channels of international trade, as has already been clearly demonstrated over the past few years by development of the West Australian crayfishery, of prawn fisheries on the east coast, and of the Australian whaling industry.

Three Modes.

Development of an industry may be in any one or more of three distinct modes :

Firstly, by improvement of existing industry;

Secondly, by expansion of existing industry; and

Thirdly, by establishment of new industry.

There is no doubt that existing industry can be improved; it is being done. Already our fishermen are developing their craft, installing modern electronic equipment to help them in searching for and capturing fish.

Some of them are fishing "with the thermometer", and their productivity is increasing.

However, they need help - they need a better account of the resources; they should be provided with fishing maps; they should be provided with a service of prediction, not only of where to find fish, but of the quantities and kind of fish that will be available to them.

Again, there is no doubt that the existing industry can expand since that also is being done. Greater efforts are being put to the capture of tuna, but more boats than are now available to pursue tuna will have to be built.

The Commonwealth Government is engaged on a venture to obtain information about the stocks of demersal fish in the Great Australian Bight and the problems involved in trawling these grounds.

The results of this venture may point the way to the establishment of this industry for which other trawlers would have to be provided.

Again, the Commonwealth is studying the factors determining the distribution of barracouta; it seems possible that this distribution varies from year to year and in some years is such that the fish are beyond normal reach of the existing barracouta fishing fleet.

The result of these studies might be a demonstration that the magnitude of the barracouta stocks is far greater than had previously been suspected and that a considerably greater catch could be taken if the boats were larger, able to range more widely and equipped to locate the barracouta.

These are some of the possibilities that the resources offer which fishermen must seize.

(Fish Trades Review Sydney December, 1960.)

Russia Decrees and Ottawa Considers Setting 12-Mile Fishing Limit

The Soviet government has decreed through an official publication a 12-mile limit for its territorial waters.

The decree was enacted and signed by Soviet President Leonid Brezhnev on August 5 this year. This is the first time Russia has enacted a law officially promulgating territorial waters of 12 miles.

The Canadian government has sent up a trial balloon on the question of setting a 12-mile fishing limit.

An unnamed source in Ottawa let it be known to the press October 19 that the 12-mile limit question is now under active consideration. The Canadian Press said that no indication was given by their source as to when a decision might be reached.

It is believed that Canada may follow the lead of Norway, which announced earlier this month that they would extend their limit from four to twelve miles sometime next year.

The action of the Canadian government in "leaking" this nebulous information to the press is common in such touchy diplomatic matters. The government would like to know in advance just how much opposition, and what type of retaliation, may be brought about by the U.S. over such a move.

The 12-mile fishing limit for all countries was voted down by one vote last April 26 at the Law of the Sea Conference at Geneva. Canada, the U.S., Britain and many other countries proposed a "six-plus-six" formula, which would have given countries six miles for territorial limits and a further six miles as a fishing limit.

The United States, Portugal, Spain, France, and other countries have long fished up to three miles off Canada's east coast. On the west coast, an active American trawl and troll fishery operates just outside the three-mile line.

External Affairs Minister Howard Green said after the Geneva conference last year that it would likely be a long time

before another attempt at a universal law of the sea can be made. The indications in Ottawa are that Canada, like Norway, is not willing to wait that long.

Fishermen and the fishing industries on both coasts have long demanded a 12-mile limit.

(Western Fisheries Vancouver October, 1960)

New South Wales Bans Live Decoys.

Duck shooters during the 1961 Open Season will not be allowed to use live decoys. Chief Guardian of Fauna In N.S.W. (A.A. Strom) announced this when he disclosed that the Open Season would coincide with the Victorian season - from 5 a.m. on the 18th February, to midnight on the 29th April, 1961.

"The use of live birds to attract ducks is not only lacking in sportsmanship, but abhorrent to the decent thinking shooter," said Strom.

"Black Duck, Grey Teal, Wood Duck, White-eyed Duck and Pink-eared Duck may all be taken during the season. The bag limit will remain at 10 birds per day, the use of a firearm being the only legal method of taking ducks.

"Our observations along the Lachlan, Murrumbidgee and Murray Valleys show that there has been some very good flooding of swamps," said Strom. "Duck breeding has been quite high this year. However, the situation on the North Coast and in the northern districts, has been very different, due to the drought conditions.

"The position of the genuine law-abiding shooter is clear under these circumstances. He should use his influence to deter all who are disposed to shoot out of season, particularly those who want to "beat the gun" and take ducks before February 18 or in the sanctuaries which afford refuge for reserve supplies of breeding ducks."

"The Open Season does not confer any right to shoot on private property without the consent of the owner. The Season applies to the whole State."

(Australian Outdoors Sydney January, 1961)