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AUSTRALIAN MARINE SCIENCES ASSOCIATION

COUNCIL ELECTIONS JANUARY 1975

:: CALL FOR NOMINATIONS FOR COUNCILLORS AND OFFICE-BEARERS ::

The next general meeting of A.M.S.A. will be held at Canberra in January, 1975 in conjunction with the ANZAAS Congress. All members of Council shall retire at that time but all except the President are eligible for re-election.

NOMINEE.....

NOMINATED FOR POSITION OF:.....

OCCUPATION.....

PRESENT EMPLOYMENT.....

EDUCATION.....

PREVIOUS EMPLOYMENT.....

PROPOSED BY.....

SECONDED BY.....

NOMINEE'S SIGNATURE.....

Please complete all details and send nominations to:—

Mrs. P. Dixon,
Hon. Secretary A.M.S.A.,
C/- School of Zoology,
University of N.S.W.,
P.O. Box 1, Kensington, N.S.W. 2033

Nominations close at 5.00 p.m. on Friday, 15th November, 1974.

News and Letters

FISHERIES LEAFLET

The January issue of the Bulletin carried an article entitled 'Committees in Australia Concerned with Aspects of Marine Science'. This has been reproduced in leaflet form and copies are available from the Secretary, Mrs. P. Dixon.

NEWS FROM VICTORIA

The Victorian Branch of A.M.S.A. is excelling itself with a constant stream of seminars, and talks on various aspects of marine science during the last few months. Most of the meetings are held in Clunies-Ross House, Melbourne and recent speakers have been —

July 3rd

Dr. A. Gilmour, 'A general view of the Port Phillip Bay environmental studies'

The talk centred on stage 1 of the Port Phillip Bay study and included an introduction to the effects of heated effluent in Hobson's Bay on the phytobenthos, phytoplankton benthos, wood boring animals and fish at the outfall.

August 7th

Dr. I. O'Brien, 'Ion transport in Bacteria'

Dr. I. O'Brien talked on the metal ions in solution and the biological processes involved in their uptake in animals.

October 2nd

Prof. B. Morton, 'The Crown of Thorns Survey'

During October and November 1973, and June 1974 a detailed survey was carried out over 20 reefs in four transects across the Great Barrier Reef between latitudes about 19° and 20° South. The survey was carried out by divers towed on manta boards and covered numbers of Acanthaster planci and of feeding scars, and estimates of live and of dead coral cover. The data have been analyzed thoroughly and results will be presented for 20 reefs, some of which are carrying substantial aggregations while others have low levels of A. planci populations. A second survey of the same area will be carried out later this year.

Further groups have also been holding meetings in Victoria, all connected in some way to Marine and Environmental Science. These have included —

'A symposium on Westernport Bay', arranged by the Royal Society of Victoria,

'Chemical Management of the Marine Environment — A Symposium', arranged by the Royal Australian Chemical Institute.

NEWS FROM SOUTH AUSTRALIA

A MARINE BIOLOGICAL STATION FOR SOUTH AUSTRALIA

The University of Adelaide has a submission before the Australian Universities Commission for a marine biological station to be established on the South Australian coast. Spearheaded by the Zoology and Botany Departments, the submission has strong support from other departments within the University.

It is envisaged that the station will be of a multi-disciplinarian nature, with, of course, a strong emphasis on the teaching of marine biology. The facilities of the station may be used by Physical Oceanography and Mine Geology Departments of both Adelaide and Flinders Universities. The State Fisheries Department may wish to utilize the station, or establish their own station in conjunction with the University station. The facilities may be utilized by other non-university organisations such as Colleges of Advanced Education and Government Departments such as the Department of Environment and Conservation.

One of the most important aspects in the establishment of a marine biological station is the selection of a suitable site. Consequently, the meeting on 24.6.74 of the S.A. Branch of the A.M.S.A. was devoted to a discussion of the sites being considered by the University of Adelaide Committee. Special invitations had been extended to members of non-university organizations who were interested in utilizing a marine station.

Sites under consideration include Robe, on the south-east coast, the American River inlet – Pennington Bay region on Kangaroo Island, and a site near Pt. Lincoln.

Professor H. B. S. Womersley and Mr. I. M. Thomas spoke on behalf of the Botany and Zoology Departments respectively, and Mr. A. M. Olsen gave the Fisheries Department points of view. The meeting was then given over to a general discussion. All speakers were overwhelmingly in favour of the Port Lincoln site, its main advantages being access to a good seawater supply, excellent harbour facilities, access ability to a variety of coastal types and its being a major fishing centre. One other major advantage of the particular site favoured (Spalding Cove) is that it is within a large national park.

The major business of the meeting came to an end with a motion by Paul Zed, seconded by A. M. Olsen "That this meeting of the S.A. Branch of the A.M.S.A. strongly supports the submission to establish a marine biological station in South Australia, and that this support be formally communicated to the University Committee handling the submission".

AUSTRALIAN UNDERWATER FILM FESTIVAL

The Australian Underwater Film Festival is the first of its type to be organised in Australia. It will be held every two years and will feature only brand new pre-release underwater film adventures of a commercial and non-commercial nature.

Australian made films will be given priority over imported films, excluding those made in New Zealand.

Lectures at afternoon programme will be limited to twenty minutes each and will cover medical, industrial and sport diving subjects.

Underwater photography will be encouraged and special subsidies are offered to interstate film festival participants.

The aim of the A.U.F.F. is to encourage and promote contact between all people who have a love of the sea and its creatures, to encourage a better understanding of diving principles, and to inform the general public of advances made in all aspects of underwater exploration.

The tentative programme is as follows —

(a) Friday, November 8th, 8-11 p.m.

Sydney Opera House. Tickets $5 each available Opera House September 1st (and agencies).

(b) Saturday, November 9th, 2-5 p.m.

Union Theatre, Sydney. Tickets $2 each available Union Theatre September 1st (all agencies).

(c) Saturday Evening, 7 p.m. to midnight.
Menzies Hotel Banquet Room. A special reception to honour an outstanding individual of the sea with a special award. Admission free. More film and slides plus an exhibtion of the latest diving, photographic & technical equipment available in Australia.

A.O.D.C. BULLETIN 11

The Australian Oceanographic Data Centre has recently released its July Bulletin (Number 11) and copies are available from —

Hydrographic Office R.A.N.

Post Office

Garden Island, N.S.W. 2000

The Bulletin carries details of current projects in Oceanography and Marine Science being conducted in and about Australia. The current issue contains details on a wide range of topics including the study of surface winds and water waves by high frequency radar back scatter; Physical, Chemical and Biological sampling within 200 miles of the Western Australian coast, between Fremantle and Shark Bay; a survey of the fishes of Sydney Harbour and its drainage area, including Parammatta and Lane Cove Rivers an dother research projects. Details of recent cruises by the Oceanographic vessels H.M.A.S. Diamantinia, H.M.A.S. Kimbla and H.M.A.S. Moresby are also given.

COUNCIL BUSINESS

Council meetings were held on Friday July 5th and August 15th, and a further meeting is scheduled for October 21st. Points which have raised discussion include —

(a) **Finances**

The publication of the Bulletin is still our major commitment and costs are rising. While the financial situation is not desperate, it was decided to prune the Bulletin to twelve pages for the time being. It is hoped to be able to raise subscriptions in July next year and then to reconsider the matter of finances and the Bulletin. The reduction in size is to be achieved at the expense of detailed council minutes, and by restricting the size of articles. We hope to be able to maintain the news component of the Bulletin.

(b) **General Meeting**

It was decided to hold the next general meeting in Canberra on January 18th and 19th, 1975. Mr. B. Newell has agreed to act as convenor and is arranging details of the conference. Further details are given elsewhere in this issue. Details of Junior Travel Awards are also included. Council has also discussed the possibility of holding the following conference in Tasmania in May 1976.

(c) **The Directory**

The preparation of the next edition of the Australian Marine Science Directory is well in hand and computer print-outs of the entries are being circulated for checking.

(d) **Submision to O.E.C.D.**

Council decided that a submission should be made to O.E.C.D. (Organisation for Economic Co-operation and Development) requesting that an investigation into the needs of Marine Science in Australia be made. The submision is to be prepared by Dr. A. Gilmour and will be further discussed in the next Council meeting.

JUNIOR TRAVEL AWARD

The Association wishes to stimulate interest in marine research in Australia amongst young scientists and to further this objective has established a Junior Travel Award.

The Award will be made on the results of a competition to select the best paper prepared for presentation by a young scientist at an A.M.S.A. Conference. Papers will be solicited prior to each conference and a panel of referees appointed by Council will select one or more authors to receive the Award.

Each Award will consist of, the value of a return economy class air fare from the recipients normal address to the location of the A.M.S.A. meeting.

All marine scientists in any discipline who are within five (5) years of attaining their primary degree or similar qualification, are eligible to submit a manuscript to the Association before the date specified (see below).

Intending candidates should submit an abstract not later than five weeks prior to the closing date for acceptance of final manuscripts.

The paper submitted may be the result of original marine research or may be a review of studies covering some field of marine research. The manuscript should be in a form suitable for submission to the Australian Journal of Marine and Freshwater Research. Each submission mut be accompanied by a letter of sponsorship by a member of A.M.S.A. stating that the paper is the sole work of the candidate for the Award.

Recipients of Awards will be expected to present their paper, suitably modified to fit into a standard oral presentation time (say 20 minutes), at the next conference as designated by the Association. Candidates for this Award may also be eligible for the Student Prize.

Council reserves the right not to make an Award in any year that it may solicit entries if it deems that no entry is of sufficient calibre.

Closing Date in 1974 — Manuscript: November 6th.

Conference: Canberra, A.C.T., January 18-19th, 1975.

STUDENT PRIZE

The primary purpose of this Award is to stimulate interest in marine sciences amongst students and to encourage a high literary standard of scientific writing.

RULES

1. There shall be a prize of $50 and, if there are more than five suitable entries, a second prize of $25.
2. Prizes shall be awarded for student papers presented at meetings of the Association as designated by Council.

3. The term "student" shall be taken to denote a person enrolled as a student at a secondary school, college, institute or university, and if a post graduate student shall be within five (5) years of attaining their first degree.

4. Papers may include review, expository, progress report, or substantive contribution.

5. The prize shall be awarded on the determination of an Award Committee consisting of three members of A.M.S.A. appointed by the Council of the Association. The decision of the Award Committee shall be final.

6. In examining papers submitted for this prize, the Committee —

   (a) may submit any paper for comment to a specialist in the subject area with which the paper deals;

   (b) shall consider for each paper:

      (i) its arrangement and layout;

      (ii) its clarity of expression;

      (iii) the standard of the scientific contribution reported; and

      (iv) its originality;

   (c) shall rate each paper according to its qualities in respect of features listed in 6(b) above. A paper on experimental work should not, because of its dealing with experimental restults, be preferred over, nor valued less than, a theoretical or review or other type of peper;

   (d) shall list the paper in order of merit and transmit this list to the Council.

7. Students who wish to have their paper considered for this prize must submit three copies of the paper, with evidence of their student status, to the Secretary of the Association not later than January 10th, 1975.

Closing Date in 1975 — January 10th.

IUGG TSUNAMI COMMITTEE MEETING

VICTORIA UNIVERSITY, WELLINGTON, NEW ZEALAND
1 FEBRUARY 1974

Members Present:

S. L. Soloviev (U.S.S.R., Chairman)
K. Iida (Japan, Vice-Chairman)
W. M. Adams (U.S.A.)
J. W. Brodie (New Zealand)
K. Kajiura (Japan)
G. D. Miller (U.S.A.)
T. S. Murty (Canada)
G. L.Pickard (Canada, Acting Secretary)

Members Absent:

R. Braddock (Australia)
L. Murphy (U.S.A., Secretary)
C. Lomnitz (Mexico)
V. Sousa Moreira (Portugal)
R. O. Reid (U.S.A.)
E. F. Savarensky (U.S.S.R.)
E. Silgado (Peru)
S. S. Voyt (U.S.S.R.)

Observers Present:

R. A. Eppley (U.S.A.)
R. D. Heath (New Zealand)
B. J. Thompson (U.S.A.)
A. S. Alekseev (U.S.S.R.)

1. The Chairman opened the meeting and remarked that the papers presented at the symposium had indicated substantial development of our undertaking of tsunamis, and he expressed the thanks of the participants to the New Zealand hosts for the pleasant arrangements for the meeting.

2. The Chairman then reviewed the main activities of the Committee during the period 1971-73 in fulfilling the resolutions of the Moscow meeting. These included:

(a) publication in Russian in book form of the papers presented at the Moscow meeting and distribution of information on the meeting and tsunami symposium to publications and journals, and the presentation of a special report and Committee recommendations to the Tokyo 1972 meeting of the International Co-ordination Group for the Tsunami Warning System for the Pacific (ICG/ITSU);

(b) a visit by Mr. Murty to South America to stimulate interest in tsunami studies;

(c) arrangement by the Chairman of the Symposium on Tsunamis for the meeting of I.A.S.P.E.I. in Lima in 1973, and visits to local authorities to stimulate interest in tsunamis;

(d) arrangement by the officers of the Committee of the Symposium just held in Wellington.

3. Professor Iida announced that the revised catalogue of Pacific tsunamis has been assembled and is being checked. It should be ready for printing by the end of 1974 and would consist of more than 300 pages.

It was RESOLVED that the Catalogue of Pacific Tsunamis prepared by D. Cox (U.S.A.), K. Iida (Japan) and S. L. Soloviev (U.S.S.R.) should be published and the Committee RECOMMENDS that IUGG seek ways and means to publish the Catalogue.

4. Dr. Eppley reported that the International Tsunami Information Centre is now within the U.S. National Weather Service and is located on the campus of the University of Hawaii in Honolulu in association with the Joint Tsunami Research Effort directed by Dr. Miller. Dr. Eppley was appointed Director of I.T.I.C. in December 1973.

The Chairman raised the question of the collection of marigrams of tsunami by I.T.I.C. and after discussion —

It was RESOLVED that, considering the importance of the I.T.I.C. for tsunami research, the attention of the Intergovernmental Oceanographic Commission should be drawn to the need for I.T.I.C. to be adequately staffed, in particular so that it may be able to collect marigrams, associated seismograms and relevant descriptive data and observations for all tsunamis so that they will be available for research and to distribute data on Pacific tsunamis on a regular basis.

5. Officers of the Committee had discussed the possibility of publishing the paper presented at the Wellington symposium. The Committee agreed that the papers described significant advances in our knowledge of tsunamis and that it would be desirable to publish them. Dr. Brodie stated that the Royal Society of New Zealand had agreed to assemble the papers for publication and that financial support would facilitate publication.

It was RESOLVED that the attention of ICG/ITSU be drawn to the fact that the Royal Society of New Zealand has offered to arrange for the publication of the papers presented at the Wellington Tsunami Symposium and that early publication would be facilitated if financial support could be secured through external sources such as IOC.

6. In reply to the request of IOC, the Committee then discussed possible recommendations to be put to ICG/ITSU. These recommendations are assembled in Appendix A to these minutes.

7. It was agreed that the IUGG Tsunami Committee should meet for one day during the IUGG General Assembly in Grenoble, France in 1975. It was also sug-

gested that future meetings of this Committee and of ICG/ITSU should be close together.

8. It was agreed that the Chairman and Vice-Chairman should continue in office until the Grenoble meeting.

The Chairman announced that Mr. L. M. Murphy, on retirement from Government service, had tendered his resignation as Secretary of the Committee, and it was agreed that a letter of thanks should be sent to him for his service.

The Chairman then announced that Dr. G. R. Miller (U.S.A.) had agreed to accept the office of Secretary of the IUGG Tsunami Committee.

Dr. Brodie (New Zealand) announced his wish to resign from membership of the Committee, saying that he had enjoyed being a member but felt the press of other responsibilities; he suggested that Dr. R. A. Heath (New Zealand), who is active in the tsunami field, might be considered for membership. The Committee expressed its regret at Dr. Brodie's resignation and thanked him for his many contributions to the work of the Committee since its formation in Helsinki. Dr. Heath was then unanimously elected to membership of the IUGG Tsunami Committee.

Dr. W. G. Van Dorn was elected to membership of the Committee and the Chairman stated that he would appoint him Chairman of a Working Committee to make the comprehensive analysis of numerical modelling as suggested by Dr. Van Dorn and as related to Recommendation 4 of Appendix A. Dr. Van Dorn would be free to co-opt members for the Working Committee.

9. Votes of thanks were given to New Zealand for hosting the Tsunami Symposium and this Committee Meeting, and to IUGG itself for providing travel funds for some of those attending.

APPENDIX A

I. **Recommendations** by the IUGG Tsunami Committee to the International Co-ordination Group for the Tsunami Warning System.

The IUGG Tsunami Committee at its meeting on 1 February 1974 in Wellington recommended:

1. That bottom mounted tide gauges should be installed in the deep ocean to provide information to increase our knowledge of tsunami behaviour to permit improved prediction techniques.

2. That simple land-based instruments be installed to ensure records of tsunamis, such instruments being designed to have adequate range for water levels for likely tsunamis and with recording components located above the reach of tsunamis or able to continue recording even if inundated.

3. That microbarograph and ionospheric sounding data be collected in association with tide or tsunami gauge and seismograph records for tsunamis to permit further investigation of the practicality of using atmospheric motions resulting from surface motions to provide additional information for the TWS.

4. Recognizing that numerical methods are now at the stage in which it would be possible to provide useful wave time histories on an ocean-wide basis in the Pacific and that calculations for a modest number of potential sources (about 15) would provide sufficient information to permit local effect calculations anywhere in the Pacific, that such calculations be made, including the selection of representative sources, calculations of normalized height wave histories over the entire Pacific, numerical evaluation of response factors for key tide stations for rapid normalization of oceanic propagation codes, and provision of standardised local shelf and harbour oscillation codes to member countries to be used for calculation of local effects, particularly flooding.

5. That the use of commercial satellite communication facilities be considered for the TWS until government operated satellites are available or as well as these.

6. That, where pertinent, existing warning systems be expanded to include the natural hazard of tsunamis.

7. That the visits of tsunami scientists, particularly from countries whose tsunami observing and warning systems are still developing, to other institutions should continue to be encouraged as a very effective means for improving experience and facilitating intercommunication of ideas for the better understanding of all aspects of tsunami research.

II. **Resolutions** of the IUGG Tsunami Committee.

1. It was resolved that the "Catalogue of Pacific Tsunamis" prepared by D. Cox (U.S.A.), K. Iida (Japan) and S. L. Soloviev (U.S.S.R.) should be published and the Committee recommends that IUGG seek ways and means to publish the Catalogue.

2. It was resolved that, considering the importance of the ITIC for tsunami research, the attention of the Intergovernmental Oceanographic Commission should be drawn to the need for ITIC to be adequately staffed, in particular so that it may be able to collect marigrams, associated seismograms and relevant descriptive data and observations.

3. It was resolved that the attention of ICG/ITSU be drawn to the fact that the Royal Society of New Zealand has offered to arrange for the publication of the papers presented at the Wellington Tsunami Symposium and that early publication would be facilitated if financial support could be secured through external sources such as IOC.

FOURTH MEETING OF THE INTERNATIONAL CO-ORDINATION GROUP FOR THE TSUNAMI WARNING SYSTEM IN THE PACIFIC

WELLINGTON, NEW ZEALAND, FEBRUARY 4-7 1974

Background

This Group was officially established in 1966 by the Intergovernmental Oceanographic Commission's Resolution (IOC/IV-Res 1) adopted at the IOC Paris meetings of November 3-12, 1965. The first meeting of the Group was held in Honolulu, Hawaii on March 25-28, 1968. Since then the Group has met every two years. The functional responsibilities of the Group have been defined by the IOC as follows: (1) effect liaison among the participating IOC Members; (2) promote exchange of information on developments of observing methods and of techniques of tsunami forecasting; (3) effect liaison with other interested organizations; and (4) provide advice on the operation of the International Tsunami Information Centre. The Group is now comprised of the following Member States: Canada, Chile, China, Ecuador, France, Guatemala, Japan, Korea, New Zealand, Peru, Philippines, Thailand, U.S.A. and U.S.S.R.

Summary of the Meeting

The Session was opened by the Chairman of the Group, Dr. Suyehiro, who welcomed the participants and guests to the opening session and expressed his sincere thanks to the Government of New Zealand for its kind offer to host the meeting. On behalf of the host country, Mr. F. Turnovsky, Deputy Chairman of the New Zealand National Commission, welcomed the delegates and observers to the Victoria University of Wellington, and wished the Group a successful meeting. The representative of UNESCO and the Intergovernmental Oceanographic Commission, Dr. Giermann, then welcomed the members of the Group, the representative of IUGG and the observers of Mexico

and Fiji in the name of the Director-General of UNESCO and of the Secretary of the IOC. He expressed the wish that the two observer countries may no longer hesitate to become members of the Group, as the success of the warning system depends largely on the participation of all countries in the Pacific region.

Dr. Suyehiro stressed two important events which had taken place during the period between the 3rd and the 4th sessions: the 4th session of the Joint WMO/IOC Group of Experts on Telecommunications, held in Geneva, 12-19 December, 1972, and the 8th session of the IOC Assembly held at Paris, 5-17 November, 1973. He expressed his deep satisfaction with the decision taken by the Assembly to continue the Ground in its existing form.

The delegates of Canada, Japan, New Zealand, Philippines, U.S.A., and U.S.S.R, presented reviews of their reports on the national activities in their respective countries. The observers of Fiji and Mexico made relevant statements. Some of the significant items from the National Reports can be summarized as follows:

Canada announced that a new tide station for the TWS has been established at Langara Islands, a small island at the northwestern corner of the Queen Charlotte Islands, British Columbia. A comprehensive book on tsunamis, entitled, "Tsunamis – A Review" has been written by Dr. T. S. Murty of Ottawa. The book is expected to be published in 1975; Japan reported that arrangements were completed for the automatic exchange of tsunami messages between Khabarovsk, Tokyo and Honolulu through ADESS (Automatic Data Editing and Switching System) at JMA. Plans for additional seismic stations to improve the Japanese Regional Warning Centres' capability for rapid epicenter determinations were also announced; the Philippines has established a Special Committee on Tsunami Warning System to deal with tsunami matters on both local and international levels. An Emergency Broadcast System has been organized for the dissemination of warnings in the Philippines. Two new Philippine tide stations are planned for the TWS, Davoa and Aparri; the U.S.A. reported on organizational changes which have affected the TWS. Four new U.S. tide stations have been added to the TWS: Canton Island, Sand Point, Alaska, Fort Point, California and San Diego, California. U.S. plans for the instrumentation of one seismic station and one tide station for satellite telemetry by July 1, 1974 were described; the U.S.S.R. reported the installation of new recording instruments for seismic stations in the warning service and an off-shore wave sensor for detecting tsunamis. An experimental seismic tripartite array was operated for determination of epicentral azimuth.

The new Director of ITIC, Mr. Robert Eppley, reported on the latest developments and activities of the Centre. In discussions concerning the ITIC, a proposal was made by Canada to introduce the post of an Associate Director at ITIC, from another country than the United States, in order to make the Centre more international. The IOC representative informed the Group that funds were available to send two scientists to the Centre, preferably from developing countries, for a period of about 6 weeks. The Director of the Centre also agreed to be of assistance in the exchange of scientists between different regions.

The IOC representative introduced a resolution adopted by the 8th Session of the IOC Assembly which asked UNESCO and UNDP (United Nations Development Programme) to provide support and assistance to the developing countries in order to enable them to set up their own national warning systems. It was suggested that the Group assist developing countries through providing an action plan for establishing a national warning system and participating in the international tsunami warning system. It was decided that the Director of ITIC will advise the Governments on sources of international funds for such purposes.

The Group discussed ways and means of how the Tsunami Warning System in the Pacific might be expanded. A list of preferred sites for the establishment of tide and seismic stations was approved by the Group.

The IOC representative informed the Group that the Secretariat is preparing a tsunami prospectus in several languages, and that it is also negotiating with the UNESCO film division on the production of a film on tsunami warning in which elements of national films might be incorporated.

The Group expressed the wish that liasison should continue to be effected with countries which are members of the Tsunami Warning System but not of the ICG. The Secretary is requested to invite those countries (such as Mexico, Fiji, Western Samoa, Papua New Guinea, etc.) to join the Group.

The Group agreed to have the next meeting in the first quarter of 1976, and asked the IOC Secretary to start negotiations about the location of the next meeting with countries in Latin America.

New TWS Tide Station at Langara Island

At the Wellington meeting of the ICG, the Canadian delegation reported on the successful installation of a gauging station at Langara Island. The following description of the installation was extracted from the Canadian National Report.

Langara Island is located at the northwestern corner of the Queen Charlotte Islands, British Colunbia, at Latitude 54° 15' N, Longitude 133° 02' W. The only means of transportation from the island to the mainland, about one hundred miles, exists by government operated or chartered aircraft or ship . A lighthouse is located at Langara Island, however, to watch around the clock is not maintained. Unfavourable weather conditions which occur quite frequently, make it often impossible to visit the island. For these reasons, and several others, a type of installation was required which could be called unique in the tsunami warning network.

Water levels had to be measured by a sensor carried 1.5 miles over land line, then transmitted 110 miles as the crow flies to the mainland and again carried twenty miles by land line where the data is recorded.

The placing of a sensor in a 2.5 ton concrete block at a depth of more than twenty feet at low tide and at about 250 feet from the water's edge proved to be in vain. The cable connection between transmitter and sensor was severed several times and finally the 2.5 ton concrete block disappeared.

A last and final attempt was made utilizing the 151 foot, 1.5 inch diameter, diamond drilled hole which was required previously for the transducer cable and to be utilized at this time in conjunction with a bubbler system. This suggestion proved successful and since June, 1973, excellent data are obtained from Langara Island.

Tsunamis in 1973

Only moderate tsunami activity was observed during the year, 1973. There were no fatalities and only a minor amount of damage was attributed to tsunamis. Three of the five tsunamis during the year were generated in the Japan-Kuril region. The others resulted from earthquakes in Chile and Mexico.

Tsunamis in Solomon Islands

Two earthquakes on January 31 and February 1, 1974 centred near Bougainville Island in the Solomon Islands generated tsunamis which caused minor damage but no casualties. Damage to wharves, roads and bridges was reported on Choiseul Island and the Shortland Islands. Wave heights at these localities were reported to be 3 to 4½ metres. At Torokina on Bougainville, the sea rose

about 1 metre. The Loloho (Anewa Bay) tide gauge recorded maximum peak to trough waves of about 15 cm. Preliminary epicentral data for the two earthquakes are as follows:

Date	Origin Time	Epicentre	Focal Depth	Magnitude
Jan. 31, 1974	23-30-05.3 U.T.	7.5S, 155.9E	34 km	7.0
Feb. 1, 1974	03-12-33.1 U.T.	7.4S, 155.6E	40 km	7.1

No tsunami watch or warning was issued by the Pacific Tsunami Warning Centre after determination that no Pacific-wide tsunamis had been generated.

WESTERN FISHERIES RESEARCH COMMITTEE

FOURTEENTH ANNUAL MEETING – JUNE 1973

Report by Research Co-ordinator

The Western Fisheries Research Committee was appointed in 1961 by the W.A. Minister for Fisheries and Fauna. Since then it has met annually for discussions of progress and programmes by research personnel included in their jurisdiction.

The terms of reference of the Committee are:
"In respect of the fish resources of the waters off Western Australia,

(a) to consider
  (i) the research programme and other measures which should be implemented in order to achieve optimum exploitation of the resources; and
  (ii) practical arrangements for the co-operation of such research programmes and other measures; and

(b) to formulate advice on these matters and, in its discretion and according to the nature of the matter considered, to communicate its advice to persons and/or institutions associated with the committee."

In June 1973 the Committee met under the chairmanship of Mr. B. K. Bowen, Director of Fisheries and Fauna. Its members comprise Professor A. R. Main (University of W.A.), Dr. K. Radway Allen (Chief, C.S.I.R.O. Division of Fisheries and Oceanography), Mr. T. Burdon (Dept. of Primary Industry), Mr. A. M. Olsen (Director of Fisheries, S.A.) and Dr. D. A. Hancock (Research Co-ordinator).

The Committee heard reports of the wide ranging programmes undertaken by research officers of the Department of Fisheries and Fauna, progress reports from CSIRO research scientists on their rock lobster, prawn, Australian salmon and herring programmes in W.A., accounts of research on sperm whales and crown-of-thorns starfish undertaken by officers of W.A. Museum, together with information on studies being undertaken at W.A. University, research in South Australia and economic research by the Australian Department of Primary Industry.

As part of its function of co-ordinating research, Western Fisheries Research Committee was presented with the results of the important co-operative research programme on rock lobster and on Australian salmon and herring being undertaken jointly by the Department of Fisheries and Fauna and the CSIRO.

The rock lobster programme was commenced in 1963 as a joint research project on the western rock lobster, the Department of Fisheries and Fauna being responsible for studies on the exploited phase (commercial fishery) and CSIRO Division of Fisheries and Oceanography for the recruitment phase.

The development of semi-quantitative sampling by CSIRO using artificial seaweed collectors for settling rock lobster puerulus has allowed annual comparisons of year class strengths in selected areas. The unusually poor number of puerulus from the 1968-69 hatching was reflected also in the number of juveniles subsequently on the reefs and pointed to a poor fishery in 1973-74. However improvements in following years may be expected to restore the level of recruitment. Tagging of juvenile rock lobsters showed that they have a relatively small home range, but when transplanted to other reefs they tend to become disorientated and disperse. This observation is of particular significance to the successful outcome of current experiments using artificial shelters as a means of improving recruitment. Detailed aquarium experiments have continued to provide information on the effects of temperature, food, shelter, crowding, limb loss, etc., on growth rates and breeding, which will be important for evaluating the potential for rock lobster culture. Final stage larvae (puerulus) have been reared to maturity (5-6 years) under controlled environmental conditions, achieving a much faster growth rate than in the wild population. Rate of breeding has also been accelerated.

In 1969 studies were begun on the physiology of growth of the rock lobster. These aimed in the long term, at achieving an understanding of the internal mechanisms controlling moult frequency and size increment with each moult, but because of the lack of relevant data most of the research up to the present has been concentrated on establishing physiological 'base-lines'. The results of part of this work have been extended to establish a simple index of nutritional state.

A new segment of the CSIRO research programme commenced in 1973 is a study of the feeding behaviour of rock lobster, including the effects of a variety of factors on food seeking activity, dominance order in feeding and location of chemo receptors. Observational techniques include infra-red time-lapse photography.

A major breakthrough in the CSIRO programme has been the allocation of funds for the long term charter of a vessel to undertake sampling of larval rock lobsters, and water circulation on and adjacent to the continental shelf region of the west coast of Australia. From the quantitative surveys of newly hatched larvae and a knowledge of fecundity it should be possible to estimate the relative size of the breeding stock of the western rock lobster, which would be an important contribution to the understanding of the stock/recruitment relationship of the species.

From the results of the Department's research on the exploited phase, attention was drawn to the fact that despite the limitation on the number of pots permitted in the rock lobster fishery there has been a steady increase in the level of effective effort accompanied by a noticeable decline in the catch per unit of effort, which could only be partly explained by increased fishing during periods of poor catches. In view of these findings, as well as the serious concern expressed by rock lobster fishermen, it was recommended that a full appraisal of available data and technique of management of this important fishery should be undertaken as a matter of priority, and that meanwhile opportunities should be seized to reduce the level of effort. Another point of interest was confirmation of the conclusion that "catchability" of rock lobster is affected by moulting and by water temperature as well as by the well known influence of moon phase. In addition a strong deterrent effect by dead rock lobster flesh in pots was demonstrated. The successful results of comparative trials with large pots with multiple eyes, and experiments with a sorter of

South African design, were reported. Monitoring of commercial catches from selected ports and depth categories, financed by Commonwealth funds, is providing a basis for evaluating management measures and changes in the stocks. Additional funds have been made available for a study to be commenced on the role of octopus as a predator of rock lobster.

A full report of a comprehensive 'workshop' on the Australian salmon and herring fishery was presented and this made provisions for co-ordinated research by both State and CSIRO officers. Monitoring of the Australian salmon and herring fishery based on Albany has been recommended by CSIRO research staff, and an intensive measuring and scale reading programme will form the basis for the study recommended by the Workshop on Salmon and Herring at a time when catches of salmon have been progressively poor. Recent catches of herring have however been extremely high. Preliminary results were given of a 'creel census' inquiry to determine the relative catches of herring by amateur and professional fishermen. In view of the increasing diversity of scalefish problems support was given to a proposal to appoint an additional State research officer.

The W.A. Department of Fisheries and Fauna is also currently undertaking research on prawn and scallop fisheries, scalefish fisheries, problems in estuaries, freshwater fisheries and development of new fisheries, as well as a range of pollution problems.

The experimental programme of prawn tagging in Cockburn Sound has been concluded and has provided important experience on which to base an expanded programme of research in Shark Bay. Monitoring of the important prawn fisheries of Shark Bay and Exmouth Gulf has been continued and the Committee discussed and endorsed a recommendation that an additional 3 licenses should be issued in each area for the 1975-77 triennium.

The Committee was also informed of arrangements between the W.A. Government and a prawning company to develop the banana prawn resources of Admiralty Gulf. As part of its Northern prawn project CSIRO has undertaken tagging experiments and monitoring of prawns in the nurseries and commercial fisheries of Nickol Bay aimed at developing a method of forecasting the annual catch.

Scallop research has been continued in the ephemerally very important stocks of Cockburn Sound and Shark Bay. Intensive tagging programmes have given important information on saucer scallops which will help towards better management of the Shark Bay resource, which is showing promise of recovery, while Cockburn Sound stocks of Pecten remain at a low level.

A report was received on the continuing programme on Shark Bay whiting, and the Committee noted an increasing problem in the snapper fishery. The emphasis on estuarine programmes has been maintained with a historical survey of professional fishing, recreational usage and development in the south and west coast estuaries together with specific studies on estuarine fish and fishing gear. The Chairman outlined the role of the Estuarine and Marine Advisory Committee recently appointed by the W.A. Environmental Protection Authority and its proposed close working relationship with Western Fisheries Research Committee.

Important advances in fisheries development research included an intensification of aerial spotting for tuna, in association with a Government sponsored evaluation by an industry vessel equipped with purse seine equipment, and advised by an overseas consultant. Another project involves echo sounding for pilchards, and the provision of a pilchard purse seine net, power block and winch for a joint research/industry investigation of pilchard resources off the west coast. Experiments on deep drop lining are being continued, and support is being given to an Australia wide study of mussel raft culture by the University of New South Wales.

Fresh water research on marron has been given a stimulus by a Commonwealth Grant to study the possible commercialisation of this, as-yet, amateur species, commencing with a study of the potential for commercial production in farm dams. Detailed research reported over the years on this species has underlined its suitability for farming and will provide a firm basis for this extended programme, which is intended eventually to cover intensive culture of marron. Investigations of the sport fishery for marron have been maintained, and further observations on the natural distribution of the species are now being made.

The Department is expected to advise on a wide range of pollution problems including fish kills by insecticides, oil spills, dumping of chemicals, and heavy metal contamination of fish and shellfish. A Research Officer responsible for pollution studies is shortly to be appointed.

Other programmes brought to the attention of Western Fisheries Research Committee included W.A. Museum studies on sperm whales and on crown-of-thorns starfish. The study of the Albany-based whale fishery is a continuing commitment, and the Committee supported a proposal for W.A. to be involved in a whale marking programme jointly with the United Kingdom and South Africa. A population of crown-of-thorns starfish has been encountered off the north west coast of W.A. and a monitoring programme commenced to study changes in its numbers and distribution and the factors influencing them.

W.A. University research programmes described include marine sedimentation studies of the Continental shelf, Shark Bay, Exmouth Gulf, the Harvey Estuary and Lake Preston. Post graduate research is being pursued on cobbler in the Swan Estuary, as well as on a number of other topics of interest to the Committee.

A LOOK AT THE POLLUTION PROBLEMS OF PEEL INLET

by Warrant Officer W. J. CROSS

presented at A.M.S.A. Conference, Tewantin, May 1974

Some 80 km south of Perth near the coastal town of Mandurah, the Peel and Harvey inlets combine to form a large estuary comprising some 72,000 acres (29,137 hectares). From the nearby Darling Range a number of rivers and lesser streams once drained into the estuary which was characterized by clean tidal channels, white sandbanks and beaches, and extensive shallow feeding flats. Strong tidal flows brought an abundance of marine fish species to all parts of the estuary, and prevailing southerly winds created wave patterns over the banks, helping maintain high levels of dissolved oxygen.

Construction of the Serpentine and North Dandalup dams for a metropolitan water supply scheme, and the Stirling, Harvey and Logue Brook dams for an agricultural irrigation system has resulted in a greatly reduced flow of fresh water. Siltation, algae growth and pollution now present a threat to the environment of the whole area. Causes of the present decline can perhaps be traced back to 1830, when the first impact of white settlement was felt in the district.

Within a year of the establishment of the Swan River Settlement, Thomas Peel was allotted a land grant, from which the inlet takes its name. The locality was developed as farmland, mainly grazing, with some orchards. A local estuarine fishing industry has existed since the turn of the century, with some 70 licenses still issued for net fishing in the area. Most of these fishermen are employed full time in the industry; a few supplement their income from other sources. Several have recently switched to rock lobster or deep-sea wet fishing. The main commercial fishes caught in the inlet at the present time are sea mullet, yelloweye mullet and cobbler (eel-tailed catfish).

A retired fisherman recalls that in 1910 a cannery on the west bank processed catches of a wide variety of fish species, many of which are rarely seen in the estuary in present times. Fish were seined with 5-inch mesh, sea mullet averaged 5 lb or better, and huge schools of mullet, ruff and Australian salmon entered the estuary seasonally. Minimum mesh size is now 2½-inch, and the miles-long schools of fish cruising the shallows are just a wistful memory.

Interim data for fish catches from Peel inlet during the years 1952-1971, compiled by Mr. R. C. Lenanton, senior research officer of the W.A. Marine Research Laboratory, shows that despite evidence of a gradual deterioration in the estuary, catches remain constant in all but one recorded commercial species. A slight increase has in fact occurred in catches of sea mullet and yelloweye mullet.

The Serpentine pipehead dam was completed in 1957, and the main dam in 1961. In the late nineteen-fifties, in a period of lower than average rainfall, the diminished scouring effect of the fresh flow increased siltation, consolidating the effect of the sandbar forming at the mouth of the estuary. The bar was a normal summer phenomena, usually dispersed by north-westerly gales during the winter months, but a series of mild winters closed the estuary from access to the ocean for several years. A noticeable change occurred in the inlet during this period and several species of algae, including enteromorpha and cladophore, became established.

Attempts to bulldoze or dregde channels through the estuary bar were repeatedly frustrated by the northerly sand drift. The west bank was reshaped and stabilized by a retaining wall, and a groyne was constructed on either side of the dredged channel, providing a temporary solution to the sandbar problem. An extensivve build-up of sand now reaches well beyond the west groyne and the outlet is very shallow. In the long term it may become necessary to deflect the sand drift by constructing a mole at Point Robert, seaward of the west groyne. Some ten years ago a channel was dredged through the narrow waterway which precedes the open estuary. Fishermen are of the opinion that this channel should be much wider to permit stronger tidal flow and reduce siltation.

Despite the measures taken, algae growth has increased greatly in recent years, diminishing the attraction of Peel inlet as a recreational area and threatening the livelihood of the professional fishermen. The president of the local professional fishermen's association reports that three or more crops of weed ripen annually, breaking away and floating in raft-like masses on the surface. Southerly and easterly winds blow huge quantities of rotting algae on to the shoreline in some of the residential areas, bringing offensive smells and rendering formerly clean, white beaches completely unusable, in places deep in black ooze. Some residents have sold their homes and moved from the locality. Inhabitants of communities such as Nairns, Coodanup, Novarra, Wannanup and Dawesville, with their beaches reduced to quagmires, now travel to the ocean beaches to enjoy a swim in clean water. Decaying weed extends up to 500 m from the shore, piled by the wind into banks up to 1 m in depth. When water level is low many areas are thick in plagues of flies, with the weedbanks alive with fly larvae.

Offshore bubbles erupt from the sun-warmed water, and the stench of H_2S testifies to the presence of anaerobic bacteria at work. Dead swans have been reported by fishermen and botulism has been suggested, but this has yet to be established. A water sample recently taken proved to have an intolerable H_2S concentration of 5 ppm. In such areas dissolved oxygen is virtually non-existant.

Fish have changed their habitat, avoiding areas where stagnation and rotting algae conribute to anoxic conditions. Until the spring tides in February of this year, Harvey inlet was for many months badly discoloured and covered in an oil-like slick, a biological desert abondoned by fishes and aquatic birds alike. Concentration of fish are still to be found in the open estuary where drifting weed beds on shallow banks have created an ideal environment for grass-shrimps and many larval and planktonic life-forms which thrive in the nutrient-rich conditions. Changed fishing techniques are employed since seining with monofilament nets has become impractical. On locating feeding fish the weed beds are circled with gill netting into which the fish are panicked by engine noise and splashing oars. In water depth rarely greater than 1.5 m, fishing has never been easier. This may explain the paradox of favourable fish catches despite ample evidence of increasing pollution and weed growth. Suitable feeding grounds are becoming scarcer and despite accurate catch statistics it would be hard to give assurance of an undiminished total biomass.

Yundurup Canals, a marina-type development near the mouth of the Murray River, has provoked outcries from conservationists and assurances from the developers. Perhaps, on balance, the project has no more sinister portent than other human impact on this area. The lower reach of the Murray is heavily sub-divided on both sides and river flow is impeded by many private jetties and landings. Speeding boats are blamed for severe bank erosion which contributes to siltation problems. Water samples taken from the mouth of the Murray have, on several occasions during the last two years, shown the presence of coliforma and faecal E.coli in excess of 1100 mpn, a figure in the region of diluted, untreated sewage. Septic tank seepage and outfall must contribute, although similar readings have been taken from other river and estuarine areas where stock animals are the probable source. Evidence of siltation and organic enrichment can be seen near the mouth of the Murray River, where samphire, sedge grasses and small melaleucas flourish on what was a white sandbank only five years ago.

Cormorants and other aquatic birds congregate in large numbers on low sandbanks which are sometimes covered at high tide. Enrichment from this guano source is seen as part of a natural food chain, but still contributes significantly to high phosphate levels.

Debate continues into causes of the decline of the Peel inlet because no prolonged study in depth has been made of the area, although several leading researchers have made private studies of aspects of the problems of the inlet. A popular theory is that the algae explosion has been promoted by enrichment from stock animal manure sources and by run-off from chemical fertilizers washing nitrates and phosphates into the estuary via the rivers and drains. Despite diversion of the Harvey river for irrigation purposes some of this water finds its way to the inlet by seepage and run-off from agricultural land.

The eastern shoreline has several drain outlets, dug during a relief programme in the depression years with the good intention of providing employment whilst draining extensive wetlands. Some of the most prolific algae growth occurs near these outlets.

Dr. D. J. Rochford, CSIRO Division of Fisheries and Oceanography, Cronulla, has outlined his research into high concentrations of phosphates occurring in bottom sediments under conditions of high stratification and reduced oxygen content. The manner in which this accumulation has occurred with time and the mechanism by which these entrapped nutrients are released during anoxic conditions is not at this stage clearly established, but an understanding of this problem could help solve the enigma of Peel inlet algae growth.

Public concern in the deterioration of the inlet has greatly increased in recent years. A non-statutory body, the Peel Inlet Conservation Advisory Committee, was set up in 1971. Representation was included from the Mandurah, Murray and Waroona Shires, the Public Health Department, Public Works, Fisheries and Fauna, and recreational activity groups. The chairman, Mr. W. Courtney, is also chairman of the Swan River Conservation Board which has had much success in cleaning up the Swan River.

At the request of these committees the PWD Water Division commenced a monitoring programme in October 1972. Water samples have been taken at approximately three-monthly intervals from 15 points throughout the estuary and associated river systems. Results to date show that at the estuary mid-point salinity remains high and pollutants low. Most other areas show high proportions of phosphates and other pollutants. Enrichment is highest near the mouth of rivers and drain outlets.

In 1971 an environmental science group from WAIT commenced a limited study of the Mandurah-Pinjarra area. Government assistance was sought to conduct Peel inlet research but funds were unavailable. Happily, prospects for estuarine investigation and control have since brightened with the announcement that an Estuary and Conservation Management Authority is to be established.

Dr. Brian O'Brien, chairman of the Environmental Protection Authority, has outlined plans for estuarine management. In the current financial year the Federal Government has granted $338,000 to W.A. for preservation of the national estate. $40,000 of this total has been set aside for the study of estuarine problems, with $15,000 of this allocated for experimental clean-up work in Peel inlet. A tractor and rake is to be purchased, and weed removed from selected areas in a limited cosmetic operation.

The major part of the estuarine grant will be used in a 12 months survey of Hardy inlet, near Augusta. A team of researchers headed by co-ordinator Dr. E. P. Hodgkin, will conduct investigations including charting the inlet's physical characteristics, a geological study of the composition of its sediments, a hydrographic survey, studies of its fisheries prospects, the bottom fauna, wading birds and aquatic plants.

The final report is intended to provide a basis for future estuarine studies, but difficulties are envisaged here. While there are basic similarities between southwestern estuaries, in situations of dissimilar geomorphology ecosystems may have evolved as the result of unrelated factors and could show varying degrees of resilience to outside influences. Dr. Hodgkin has stated that extrapolation of the Hardy inlet study may not be feasible.

The fact that estuarine research has commenced is encouraging and it should not be too long before Peel inlet becomes the focus of scientific attention. Continued Federal Government support is vital to the cause of this long-overdue investigation, and it is hoped that the State Government will then implement without delay all recommendations and controls necessary to ensure that man-made changes will not deprive future generations of the enjoyment of this natural asset.

AMSA CONFERENCE 1975

CANBERRA — JANUARY 18-19

It is proposed to hold the next General Meeting of AMSA in conjunction with ANZAAS. The theme for the weekend will be —

"Marine Science and Government"

Contributions on this theme are welcomed from any members attending. Accommodation has been provisionally booked at Bruce Hall for the nights of January 17 and 18. The charge will be $15 for bed and full board.

All enquiries to —

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