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PORT PHILLIP SURVEY 1957-1963.

INTRODUCTION.

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HISTORICAL BACKGROUND.

Port Phillip is the most important body of sheltered water in Victoria and probably in Southern Australia. Its importance is due to a number of factors.

- I. Its large land-locked tidal area of 735 square miles.
- II. Its shores, particularly to the north, are densely populated, this is not entirely due to its size but to the fertility of the surrounding land and to the good rainfall encouraging settlement.
- III. It affords one of the few safe anchorages for big shipping on a long inhospitable coast.
- IV. Its resources which are utilized by commercial and recreational interests.

Port Phillip was discovered on 5th January, 1802, by John Murray in the *Lady Nelson*. Murray named the bay Port King after Governor King who later renamed it Port Phillip.

Fears of Governor King that France intended to establish a colony somewhere in Australia and the favourable reports of Bass, Grant, Murray and Flinders led to the decision of the British Government to establish a penal colony at Port Phillip under the command of Lieutenant-Colonel David Collins.

In the meantime Governor King instructed Lieutenant Charles Robbins in H.M.S. *Cumberland* to make a detailed survey of Port Phillip. His party included Charles Grimes the Acting Surveyor General of N. S. Wales, and James Fleming, who were to report on the nature of the country explored. The *Cumberland* sailed from Sydney on 23rd November, 1802, entering Port Phillip on 20th January, 1803, after a prolonged call at King Island. Grimes and Fleming's report (Grimes 1803 and Shillinglaw 1876) was sent to England but before its arrival, Collins had sailed in H.M.S. *Calcutta* on 27th April, 1803, and reached Port Phillip on the 9th October of the same year. Lieutenant Governor Collins considered the place unsuitable for settlement and in January, 1804 removed the entire establishment to Hobart. During the *Calcutta's*

* Present address: Inland Fisheries Commission, Tasmania.

stay J. H. Tuckey the First mate, and Deputy-Surveyor G. P. Harris, made a survey of the area, Harris's report of the country was unfavourable (Harris, 1803). After his return to England, Tuckey published an account of the expedition (Tuckey, 1805).

Permanent settlement was established under the leadership of John Batman in 1834.

From this date the settlement spread and the population in the bayside districts increased rapidly to almost 1,900,000 in 1959 when Melbourne and Geelong with 1,770,000 and 88,000 inhabitants respectively were the main centres.

TOPOGRAPHY.*

The general topography of Port Phillip Bay is shown in the Admiralty Chart No. 1171. (Chart 1 back of volume.)

The entrance to the bay is restricted in depth by two rocky banks of dune limestone. The 600 feet wide main shipping channel passes over the outer Rip Bank and the inner Nepean Bank. This channel has been deepened by blasting, over the past 60 years, from a least depth of 30 feet to its present declared minimum depth of 48 feet.

Between the two rocky banks lies a gorge with depths exceeding 300 feet, while south of Rip Bank the depths increase to approximately 90 feet 1 mile offshore.

The strong tidal flow through the very irregular constricted entrance produces the race, which is known as "The Rip".

TIDES AND TIDAL STREAMS.*

Owing to the narrow entrance and the large area of Port Phillip Bay, the range of tides within the bay is small in comparison with that at the entrance. Although tidal ranges exceeding $5\frac{1}{2}$ feet do occur at Port Phillip Heads, the mean range normally varies from approximately $2\frac{1}{2}$ feet to $3\frac{1}{2}$ feet. At the northern end of the bay the tidal range normally varies from $1\frac{1}{4}$ feet to 2 feet.

The in-coming flood tide streams through the entrance from the south and east. At high tide, under normal conditions, the flood tide may reach a maximum of about 6 knots as it passes through the Heads. It then turns and spreads out towards Shortland Bluff and Point King, before passing through the sand banks with diminished strength.

The out-going ebb tide sets towards the bight between Point Lonsdale and Shortland Bluff, and then out through the entrance and away south-eastward along the shore. Slack water occurs near mid-tide when the levels inside and outside the Heads are the same.

Extreme weather conditions can cause the level in the bay to be raised or lowered, and thus change the strength and duration of the tidal streams.

* Extract of information supplied by Ports and Harbours branch of Public Works Department, Victoria.

HISTORY OF THE SURVEY.

The need for a biological survey of this important body of water was recognized quite early in the history of settlement and on 14th July, 1888, the Council of the Royal Society of Victoria elected a Committee of its most eminent scientists to direct the task. This Committee was instructed to arrange and carry out a systematic biological survey of Port Phillip and were allotted a grant of £50 to commence the work. The first report of this Committee for 1889 was published in Proc. roy Soc. Vict., 1890, together with a short account of the Crinoids by P. H. Carpenter and Alcyonaria and Zoantharia by S. J. Hickson. It also stated that other reports had been presented through the year and that Dr. J. Bracebridge Wilson had established a small Biological Laboratory and Aquarium at Sorrento. The Annual Report of the Royal Society for 1890 gave a detailed account of the committee's activities and mention was made of work on Hydrozoa by Professor W. Baldwin Spencer; Sponges by Dr. A. Dendy; Algae by Professor Agardh and a shark and *Argonauta* were recorded.

The 1892 committee report showed progress in the identification of material by specialists and the Royal Society Annual Report recorded the publication of a Monograph of Victorian Sponges Part I. but commented on the difficulty in getting specimens in other groups identified. Also it expressed appreciation of J. B. Wilson on whom sole responsibility for the collecting seemed to fall.

The report of the committee for 1894 again showed some progress but recorded difficulty in getting identifications of Tunicata, Polycheta and Pycnogonida. The Mollusca were to be incorporated in a general catalogue for Victoria being compiled by E. R. Pritchard.

The 1895 report again records progress but notes with regret the death of J. B. Wilson and therefore the cessation of collecting activities.

The 1896 report shows little further progress apart from work in hand and after this date mention of the Port Phillip survey and its committee lapsed.

With the death of Wilson the survey suffered a mortal blow as the large collections were almost entirely due to his activities. He had spent all his vacations in his yacht dredging within Port Phillip and along the adjacent coast. In spite of this the only stations adequately worked at the time of his death (Wilson, 1895) were round Port Phillip Heads. The much larger area of sheltered water within the bay remained unknown, its inhabitants to be discovered only at the whim of spasmodic itinerant collectors.

This was still more or less the state of knowledge of the biology of Port Phillip when the present survey was undertaken as a joint project by the Fisheries and Wildlife Department and the National Museum in 1957. To sum up this knowledge it could be said that a certain number of plants and animals had been recorded from Port Phillip but their distribution or numbers within the area were not known nor if the list was exhaustive.

The aim of the present survey was to record the macro flora and fauna and to plot its distribution and where possible at least make an assessment of the density of the populations present. In such a large area it was not possible to even attempt detailed quantitative investigation.

METHODS OF COLLECTING.

When the survey was initiated it was decided to carry out the investigation by direct observation and collecting with the aid of skin divers from the Underwater Explorers and Photographers' Club. This proved very satisfactory in reefy ground where it was impossible to use a dredge or grapple. In areas of sand or mud the preliminary investigation by divers was supplemented by dredge runs.

Also an underwater sledge, manned by a diver, was developed to make rapid preliminary examination of the bottom. The sledge was towed at a speed of about 1 knot behind the research launch and by manipulating hand controls a diver could regulate the distance of the sledge above the bottom. A series of bell signals allowed the diver to send simple direct messages to the crew of the launch. This method prevented the time-consuming effort of sending divers down on relatively barren ground and aided the quick mapping of large uniform areas such as *Zostera* beds.

If possible at least two divers examined each station and made separate collections. On return to the launch they were interrogated separately from a standard set of questions and their answers recorded on individual sheets. This procedure helped to remove any personal bias from the observations and collections made and allowed the data to be re-checked at any time.

Samples of bottom sediments and representative collections of all flora and fauna were kept from each locality. Members of the Marine Study Group of Victoria assisted in sorting and making preliminary separation into species. When the collecting for the day was completed all, except the very common and therefore well known species were preserved for examination and submission to a specialist in each particular group.

The fixing of stations was facilitated by the division of the Admiralty Chart No. 1171 into areas by means of a grid of 4' of latitude by 4' of longitude using 38° S and 145° E as base references. Commencing at the north-west corner of the chart the squares of the grid were numbered in running sequence as Areas 1 to 70 (Chart 1 back of volume). As convenient each section of the grid was visited until all areas had been covered. In this way it was possible to make an extensive coverage and to get an indication of the pattern of distribution of the flora and fauna. In actual fact it was not found necessary to work many stations within the 10 fathom line as this is a comparatively barren basin with either a mud or sandy mud bottom and a limited uniform population over large areas. After the initial diving and sledge runs to determine its limits it was found more practical to sample it by a series of spaced dredge runs.

Each dive or dredge position was given a station number (Chart 2 back of volume) and in the text a locality is recorded as an Area number followed by the station number in brackets, i.e., Area 23 (1). Table A back of volume records Area, station number, date, method of collecting (dive or dredge) and depth in fathoms.

An "Inshore Ferrograph" calibrated to 100 feet was used to fix the depths at the various stations.

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It was realized at the beginning of the survey that the authors could not hope to handle satisfactorily the wide range of plants and animals which would be collected, so the co-operation of a number of specialists was sought and the following people have helped with identifications. A number of them have or will contribute separate systematic papers on their special study. We wish to acknowledge the help of Dr. Federick Bayer, *Gorgonia*; Dr. P. R. Bergquist, *Porifera*; Mr. J. Bowler, *Geology*; Dr. C. E. Cutress, *Actinaria*; Dr. D. F. Squires, *Scleractinia*; Dr. P. M. Ralph, *Hydrozoa*; Professor George Knox, *Annelida*; Professor W. Stephenson, Mr. Frank McNeil, *Brachyura*; Dr. W. Williams, *Amphipoda*; Dr. E. Naylor, *Isopoda*; Dr. John Yaldwyn* and Dr. A. A. Racek, *Crustacea* (paper encompassing groups not listed separately); Miss E. Pope, *Cirripedia*; Dr. R. Endean, Miss Ailsa Clark, *Echinodermata*; Dr. R. H. Miller, *Ascidians*; Dr. A. Vigeland, *Bryozoa*; and Dr. H. B. G. Womersley, *Algae*; Dr. A. W. Beasley, *Bottom sediments*, Mr. J. Willis, *Flora and Marine Angiosperms of the Port Phillip area*; Dr. David Rocheford, *Hydrology*; Mr. J. Fryer, *Tides and Tidal Streams*; Dr. R. Southcott, *Medusae*; Dr. Huzio Utinomi, *Octocorals*; Dr. S. Edmonds, *Sipunculidae and Echinoidea*.

The present volume contains papers from only some of those listed above as authors. Due to previous commitments or the volume and nature of the material resulting from the survey, some authors have not been able to complete papers in time for this initial volume. These will be published at a later date when the remainder of the material has been worked together with detailed discussion on the communities present.

Finally thanks to all those "other" persons in both departments who have from time to time contributed in their various fields and in particular to Mrs. N. Wortley, who typed most of the manuscripts, Miss P. Hoggart, assistant in Conchology and Mr. J. Mooney, assistant in Mineralogy, all of the National Museum.

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Footnote: *Making a written contribution.

