It is to be hoped that proper steps will shortly be taken as to the housing of the Survey Collection, for the present arrangement precludes the possibility of the department properly fulfilling its functions, besides being in other respects unsatisfactory.

PUBLICATIONS.

During the past year the following publications were issued to the public :—

Annual Progress Report for the Year 1911.

Bulletin 43.—Petrological Contributions to the Geology of Western Australia. I. : by R. A. Farquharson.

Bulletin 45.—Geological Investigations in part of the North Coolgardie and East Murchison Goldfields : by H. W. B. Talbot.

Bulletin 46.—Part of the Yilgarn and North Coolgardie Goldfields : by H. P. Woodward.

Bulletin 47.—The Kanowna Main Reef Line of Lode : by T. Blatchford and J. T. Jutson.

Bulletin 50.—The Geology and Mineral Industry of Western Australia : by A. Gibb Maitland and A. Montgomery.

In addition to the above there are now in the hands of the Government Printer :—

Bulletin 42.—Contributions to the study of the Geology and ore deposits of Kalgoorlie, Part I. : by E. S. Simpson and C. G. Gibson.

Bulletin 44.—The South-West Division of Western Australia : by E. C. Saint-Smith.

Bulletin 48.—Miscellaneous Reports, Nos. 9 to 32.

Bulletin 51.—Contributions to the study of the Geology and Ore Deposits of Kalgoorlie, Pt. II. : by R. A. Farquharson and F. R. Feldtmann.

Bulletin 52.—The Mineral Resources of the North-West : by T. Blatchford.

The following will it is hoped be shortly in the hands of the printer :—

General Index to Reports, 1870–1910.

The Geology of Ora Banda.

The Country to the South and West of Kalgoorlie :

whilst a memoir on—

The Geology and Mineral Resources of Western Australia, accompanied by a four-sheet Geological Sketch Map, on the scale of 1 /1,584,000 is in course of active preparation.

GENERAL.

In addition to the ordinary work of the Department there were made during the year 39 special reports in connection with the alienation of mining lands, and 34 connected with proposals to grant subsidies under the Mining Development Act.

Several requests have been made during the year, for reports upon individual mining properties, by private persons. None of these requests have been complied with, for the reason that it is hardly within the province of the Geological staff to examine and report on individual or private mining properties except when they form part of a larger investigation embracing the district in which the mine may be situated ; exceptions are of course made in those cases in which application for State Aid is made under the terms of the Mining Development Act.

Good progress has been made, in pursuance of the policy for which the staff was increased in 1911, with the mapping of the country in the mining districts, with the ultimate aim of meeting the demand for geological information of outside and lesser known areas and thus tending to direct prospecting into legitimate channels. The attached map shows the work which has been so far accomplished. The geological sketch maps are issued on the scale of four miles to the inch, and each is numbered in accordance with the 300-chain series issued by the Department of Lands and Surveys.

Principal Results of the Year's Operations.

WATER SUPPLY.

Interstate Conference on Artesian Water Supplies.

1. In accordance with instructions I attended. as the representative of Western Australia, the Interstate Conference on Artesian Water Supplies, which sat in Sydney between the 30th April and the 18th of May inclusive, with a short interruption between the 3rd and 8th, when opportunity was taken to visit an important portion of the New South Wales Artesian Water Area, near the Queensland border.

2. The members attending the Conference were as follows :—

E. F. Pittman, Government Geologist and Under Secretary for Mines, New South Wales—Chairman.

J. B. Henderson, Government Hydraulic Engineer, Queensland.

L. Keith Ward, Government Geologist, South Australia.

A. Gibb Maitland, Government Geologist, Western Australia.

A. S. Kenyon, Engineer in Charge of Water Boring, Victoria.

H. H. Dare, Engineer in Charge, Water Conservation and Drainage, New South Wales ; and

R. F. Jenkins, Officer in Charge, Artesian Water Bores, New South Wales.

3. On the 18th May a preliminary report upon the results of the deliberations of the Conference was signed by all the members, subsequently printed and issued to the public.

4. Amongst the more important facts elicited during the course of the deliberations of the Conference were :—

(*a.*) The very large portion of Australia occupied by Artesian Water Areas, and the extent to which the interest of several States are involved in regard to more than one of the known artesian basins ;

(*b.*) The amount of work which has been officially done in this connection in Australia, and the very variable degree of precision of the investigations carried out in the different States of the Commonwealth ;

(*c.*) The very marked and serious diminution both in the flow and pressure of those artesian wells of which periodical measurements have been made under direct Government supervision ; and

(*d.*) The very serious corrosion of bore casings which up to the present time, however, seems confined to certain restricted, though extensive, areas of Australia.

5. The members of the Conference, after discussing fully the source, utilisation and conservation of the Artesian Water Supplies of the Commonwealth, unanimously recommend, *inter alia*, for the serious

consideration of the respective Governments of Australia :—

(*a.*) A uniform system of delimiting the different Artesian Water basins of Australia ;

(*b.*) A hydrographic survey, with the view of arriving, so far as is possible, at an estimate of the water annually absorbed by the respective basins ;

(*c.*) Legislation to prevent an unnecessary multiplication of bores, with the object of effectively conserving for all time the underground water resources of all Australian artesian basins ;

(*d.*) Uniform legislation to ensure the effective control by the States of all exisitng and future bores within all artesian basins ;

(*e.*) No new irrigation enterprises, which depend for their supplies of water upon artesian wells, being inaugurated until certain investigations recommended by the Conference have been carried out ;

(*f.*) A uniform system of casing all artesian wells ;

(*g.*) Investigations into the composition and structure of the metals of which bore casings are made, and into the efficiency of coatings or linings in such casings in so far as their powers of resisting corrosion are concerned ;

(*h.*) The formation of a permanent Interstate Board for the discussion, correlation and recording data in regard to the artesian basins of the Commonwealth ; and

(*i.*) The cost of any special investigations recommended by the present Conference to be borne in equitable proportions by the respective States.

It may perhaps be of interest to note that this Conference virtually forms a part of that great modern scientific movement of the Conservation of Natural Resources which is slowly but surely making itself felt throughout the whole civilised world.

Rottnest Island Bore.

A deep bore in search for artesian water was put down to a depth of over 2,500 feet.

Owing to difficulties in connection with the boring plant operations were stopped, without the (Jurassic) water-bearing sandstones, which are believed to be beneath Perth, having been reached.

The strata pierced in this bore hole were of considerable geological interest and the bore cores were submitted to Mr. Etheridge, of the Australian Museum, Sydney, who reported :—

"The core pieces can be at once divided into two series, Nos. 20ft.-209ft. and 1285ft.-2185ft.

Nos. 20ft.-209ft. are clearly of very recent geological date, probably upraised Post Tertiary marine beds, a chalk-like calcareous deposit. Numbers 1285ft.-2185ft. can only be one of two things, viz., Tertiary or Late Mesozoic. Many of the core portions, comprised within these numbers (except 2021ft.-31ft.) shown on the fractured surfaces broken up shells quite impossible of determination or of significance. On numbers 1480ft.-1541ft. charred vegetable tissue is visible. The small objects on numbers 1575ft.-95ft.A and numbers 1595ft.-2021ft.A puzzle me very much. If they be not fragments of a Crustacean integument, I do not know what they are. Numbers 1595ft.-2021ft.B are certainly portions of one of the higher Crustacea. Numbers 1595ft.-2031ft.C I believe to be one of the valves of an Entomostracan. Numbers 1595ft.-2021ft.D is, I think, a very elegant and small example of a *Pinna*. Of the several little objects under No. 1595ft.-2021ft. I know not what to make, unless they are small bivalve shells, and yet they seem too delicate and thin for this to be the case. I at first took them to be an *Estheria*, but have failed to detect the characteristic sculpture of that genus.

The objects, so far as they go, are all new to me. The character of the matrix is similar to that of some of our Lower Cretaceous beds, but of course, matrix alone is not of much value. I think it will be quite safe to assume the age of the deposit to be not older than that mentioned."

AGRICULTURE.

Limestone Deposits of the South-West.

An examination of the principal limestone deposits in portion of the South-West District was made in the interests of Agriculture by Mr. E. C. Saint-Smith.

This officer submitted the following preliminary report. The localities visited were—Pinjarra, Capel, Busselton, and Waroona.

At *Pinjarra* there is an apparently extensive deposit of limestone on the property of Mr. Paterson. This deposit has already been reported upon and sampled to a limited extent by Messrs. Mann, Government Analyst, and H. P. Woodward, Assistant Government Geologist. There is nothing to add to their reports other than that before any action in the direction of purchase be taken the deposit should be systematically bored and analysed. By far the greater portion of the deposit is soil-covered, and the exact delimitation of the area over which the limestone extends can only be determined by boring operations. The deposit is situated right on the railway line, about 1½ miles north of Pinjarra railway station.

A fairly extensive deposit of limestone also occurs in the district between "Ravenswood" and Mandurah ; the material here is also for the most part sand and soil covered.

Capel.—On what is known locally as the Tuart Reserve, about three miles West of Capel, there is a very extensive deposit of Coastal Limestone which outcrops to a few inches above the surface in odd places. This deposit is largely composed of shells. Where any considerable outcrop was visible the loose blocks were collected and burnt for lime with, it is stated, good results. As this deposit could be worked without the initial cost of purchase, being on a Government Reserve, and also appears to be of fairly pure composition in parts, it should, in my opinion, be bored and accurately mapped.

Busselton.—Around Busselton are several deposits of coastal limestone which find their greatest development in the Yallingup district and Southwards thereof, but in view of the more conveniently situated deposits at Capel, Pinjarra, etc., I am not of opinion that much attention need be paid to these Southerly situated occurrences for the present, seeing that similar material more centrally situated is to be found all along the coastline between Busselton and Perth.

Lake Clifton, Waroona.—Lake Clifton is situated about 14 miles West of Waroona, and about three miles from the ocean. It is approximately 10 miles in length and half a mile in average width.

At the time of my examination in December, the water was only slightly brackish, but I am informed that by the end of summer it is noticeably more saline though not nearly so salt as the ocean water. In winter the water is practically fresh.

The lime occurs in the form of a very loose white material forming the bed and shores of the lake. Trials of the depth of the deposit were made by me with a pole across the centre of the lake at frequent intervals, from which it is certain that a minimum average depth of 13ft. 6in. of the material