

CHAPTER XXVI.

WATER CONSERVATION AND IRRIGATION.

§ 1. Artesian Water.

1. **General.**—In every country subject to droughts, the provision of adequate systems of water conservation is a matter of prime importance. Much has been done in Australia so far as the supply of water to centres of population is concerned, and a description of the principal water-works in each State will be found in Chapter IV.—Local Government.

Interstate Conferences on the subject of artesian water were held in 1912, 1914, 1921, 1924, and 1928, when combined Governmental action was agreed upon with reference to delimitation of the artesian basins, hydrographic surveys, reason for decrease in flow, analyses and utilization of artesian water, etc. A map showing the extent of the known artesian basins will be found on pages 845-6.

2. **The Great Australian Artesian Basin.**—The area known as the "Great Australian Artesian Basin," includes (a) considerably more than one-half of Queensland, taking in practically all that State lying west of the Great Dividing Range, with the exception of an area in the north-west contiguous to the Northern Territory; (b) a considerable strip of New South Wales along its northern boundary and west of the Great Dividing Range; and (c) the north-eastern part of South Australia proper, together with the extreme south-eastern corner of the Northern Territory. This basin (shown approximately by the map on pages 845-6) is said to be the largest yet discovered, and measures about 600,000 square miles, of which 376,000 square miles are in Queensland, 118,000 square miles in South Australia, 80,000 square miles in New South Wales, and 25,000 square miles in the Northern Territory. The area of the intake beds is estimated at 60,010 square miles, viz., 50,000 square miles in Queensland and 10,010 square miles in New South Wales. A description of the basin and its geological formation will be found in previous issues of the Official Year Book (see No. 6, p. 569).

3. **The Western Australian Basins.**—The Western Australian Basins fall naturally within five distinct groups, viz., the Eucla Basin, in the extreme south-east of the State, extending well into South Australia along the shores of the Great Australian Bight; the Coastal Plain, west of the Darling Range; the North-West Basin, between the Murchison and Ashburton Rivers; the Gulf Basin, between Cambridge Gulf and Queen's Channel; and the Desert Basin, between the De Grey and Fitzroy Rivers.

The Recent and Tertiary strata which enter Western Australia at its eastern border, and which have a prevailing dip towards the Great Australian Bight, form the Eucla artesian water area. Where boring operations have been undertaken, the water has been found to be salt or brackish, and there are other conditions affecting the supply, such as local variations in the thickness of the beds, their relative porosity, and the unevenness of the floor upon which they rest, which, so far, have not been examined with sufficient thoroughness to enable many particulars to be given in regard to this basin.

In the Coastal Plain Basin to the west of the Darling Ranges, artesian boring has, on the other hand, been carried on successfully for many years.

4. **The Murray River Basin.**—The Murray River Basin extends over south-western New South Wales, north-western Victoria, and south-eastern South Australia. It is bounded on the west by the azoic and palæozoic rocks of the Mount Lofty and other

ranges extending northwards from near the mouth of the Murray to the Barrier Range, and on the east and north-east by the ranges of Victoria and New South Wales. This tertiary water-basin is occupied by a succession of sedimentary formations, both porous and impervious. It is of interest to note that the waters of the Murray River are partly supplied by influx from the water-bearing beds of this basin; this is proved by the fact that, at low water, springs are observed at certain places flowing into the river bed from beneath the limestone cliffs from Pyap Bend downwards. Similar springs exist along the courses of other branches of the River Murray system, where they cut through the tertiary formation. On the Victorian side, bores have been put down, and water has been struck at various levels.

5. *Plutonic or Meteoric Waters.*—In previous Year Books will be found a statement of the theory of Professor Gregory* as to the origin of the water in the Australian artesian basins, together with the objections held thereto by a former Government Geologist of New South Wales.† (See Official Year Book No. 6, p. 570).

6. *Artesian and Sub-Artesian Bores.*—(i) *General.* The following table gives particulars regarding artesian and sub-artesian bores in each State and in the Northern Territory:—

ARTESIAN AND SUB-ARTESIAN BORES, 1933-34.

Particulars.	N.S.W.	Vic.	Q'land.	S. Aust. (c)	W. Aust.	N. Ter.	Total.
Bores existing .. No.	575	380	4,808	207	255	191	6,416
Total depth of existing bores .. feet	940,484	104,000	4,203,744	122,657	232,348	62,375	5,665,608.
Daily flow .. 1,000 gals.	75,795	715	267,782	12,971	75,351	7,723	240,338
Depth at which artesian water was struck—							
Maximum .. feet	4,338	2,750	6,000	4,851	4,006	1,760	6,000.
Minimum .. feet	100	22	10	233	30	42	10.
Temperature of flow—							
Maximum .. °Fahr.	142	147	212	208	(b)	(b)	212
Minimum .. °Fahr.	74	70	78	82	(b)	(b)	70

(a) Flowing bores only. (b) Not available. (c) Government bores only. (d) Total depth of all bores. (e) Incomplete.

(ii) *Details for States.*—Considerations of space preclude the insertion of separate particulars of operations in the States during the year 1933-34. Details for earlier years will, however, be found in issues of the Official Year Book prior to No. 24, 1931.

§ 2. Irrigation.

1. *General.*—Australia's first experiments in irrigation were made with the object of bringing under cultivation areas in which an inadequate rainfall rendered agricultural and even pastoral occupations precarious and intermittent, and, although these original settlements have generally proved fairly successful, most of the States, instead of promoting new settlement in unoccupied regions, are adopting the policy of making existing settlements closer, by repurchasing large estates, sub-dividing them into holdings of suitable sizes for cultivation, and selling the land upon easy terms of payment. It is in connexion with this Closer Settlement policy that the special value of irrigation is recognized. Information regarding the various irrigation schemes in operation was given in some detail in preceding issues of the Official Year Book (see No. 23, pages 637 to 661).

* See J. W. Gregory, F.R.S., D.Sc.: "The Dead Heart of Australia," London, John Murray, 1906; and "The Flowing Wells of Central Australia," Geogr. Journ., July and August, 1911.

† E. F. Pittman, A.R.S.M., formerly Government Geologist of New South Wales: "Problems of the Artesian Water Supply of Australia, with special reference to Professor Gregory's Theory." (Clarke Memorial Lecture, delivered before the Royal Society of New South Wales, 31st October, 1907); "The Great Australian Artesian Basin," Sydney, 1914; and "The Composition and Porosity of the Intake-Beds of the Great Australian Artesian Basin," Sydney, 1915.

2. Areas Irrigated.—The following table gives the area irrigated in each State in the years 1924-25 to 1933-34. Victoria shows the largest irrigated acreage, the area so returned in 1933-34 amounting to 435,324 acres, or 66.3 per cent. of the total for Australia. New South Wales for the same year returned an area of 131,772 acres, or 20 per cent. of the total. The areas under irrigation in the remaining States are relatively very small :—

IRRIGATION.—AREAS IRRIGATED.

Season.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Total.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
1924-25 ..	73,432	375,503	18,235	35,313	3,126	7,267	512,876
1925-26 ..	83,795	343,685	21,669	36,409	3,551	7,361	496,470
1926-27 ..	89,528	406,532	38,044	35,443	3,756	7,882	581,185
1927-28 ..	102,533	477,500	21,411	38,379	4,292	7,016	651,131
1928-29 ..	123,129	471,695	25,344	39,236	4,907	7,054	(a)671,475
1929-30 ..	126,321	566,577	26,282	40,002	4,943	6,693	770,818
1930-31 ..	135,121	463,098	26,947	43,538	5,661	6,488	680,853
1931-32 ..	114,777	418,415	28,414	42,813	6,104	7,768	618,291
1932-33 ..	130,977	474,716	31,109	42,556	6,434	7,605	693,697
1933-34 ..	131,772	435,324	29,363	42,898	7,640	9,194	656,191

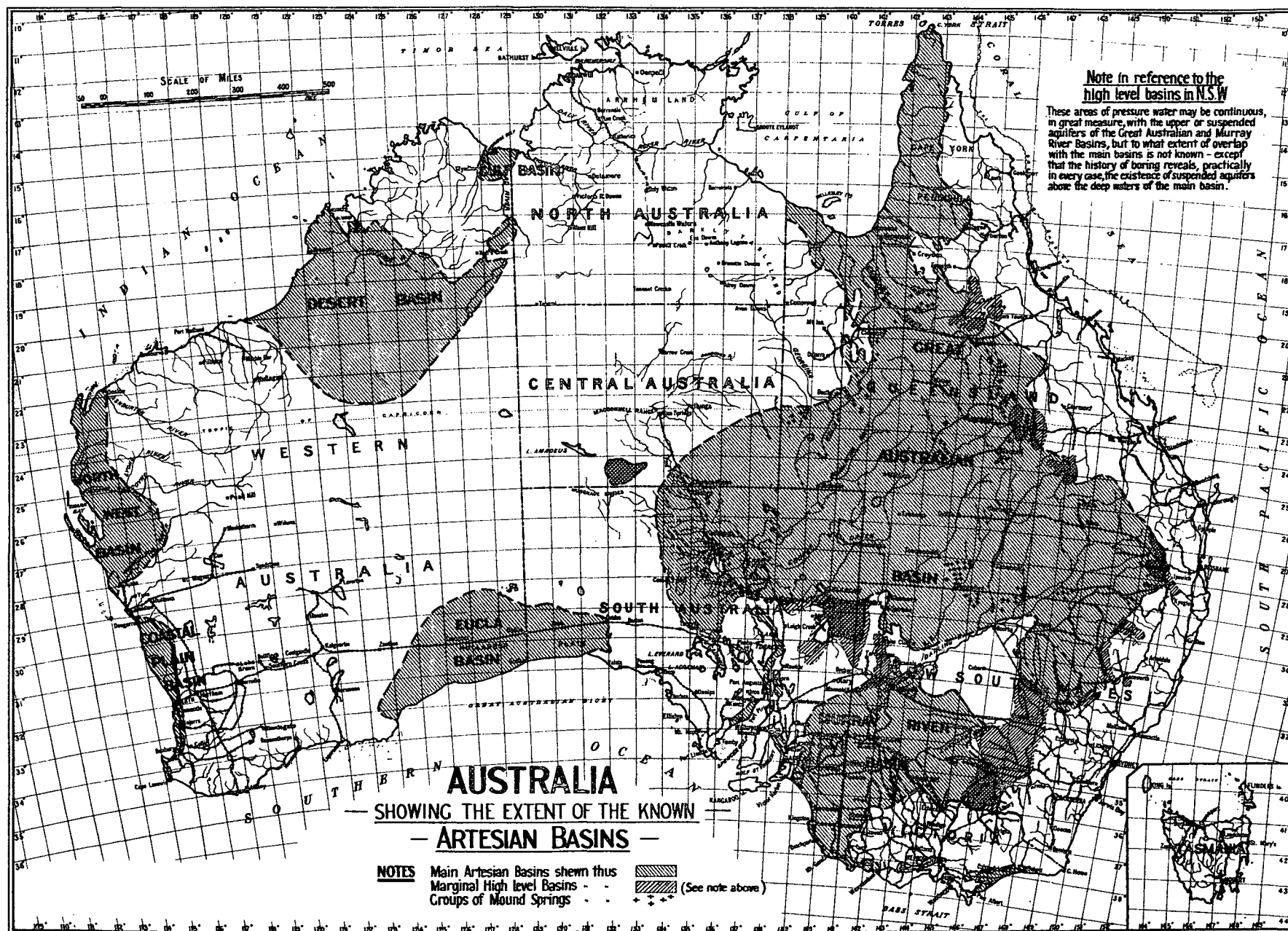
(a) Including 100 acres Northern Territory and 10 acres Federal Capital Territory.

3. Crops on Irrigated Areas.—A classification of the crops grown on the irrigated areas in each State during the year 1933-34, together with the averages for Australia during the quinquennium 1927-28 to 1931-32, will be found in the table hereunder. Lucerne, grasses and green forage accounted for 57 per cent., cereals for 17 per cent., orchards and vineyards for 19 per cent., and root crops, market gardens, &c., for about 7 per cent. of the total area under irrigation in 1933-34 :—

IRRIGATION.—CROPS ON IRRIGATED AREAS, 1933-34, AND 1927-28 TO 1931-32.

Crop.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Total.	Average 1927-28 to 1931-32.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Cereals ..	71,845	(a)38,639	110,484	142,205
Lucerne, Grasses and Green Forage ..	26,855	323,434	1,079	11,962	3,810	6,579	373,719	364,686
Orchards and Vineyards ..	25,680	64,669	2,683	27,268	2,551	1,409	124,260	126,882
Root Crops, Market Gardens and other Crops	7,392	8,582	(b)25,601	3,668	1,279	(c) 1,206	47,728	44,740
Total ..	131,772	435,324	29,363	42,898	7,640	9,194	656,191	678,513

(a) Including Fallow, 5,096 acres. (b) Including Sugar Cane, 21,998 acres; Cotton, 483 acres; and Tobacco, 1,023 acres. (c) Including Hops, 840 acres.



This map was published in the Report of the Fifth Interstate Conference on Artesian Water, Sydney, 1928, and is reproduced with the permission of the Water Conservation and Irrigation Commission of New South Wales.