Spring wetlands of the Great Artesian Basin

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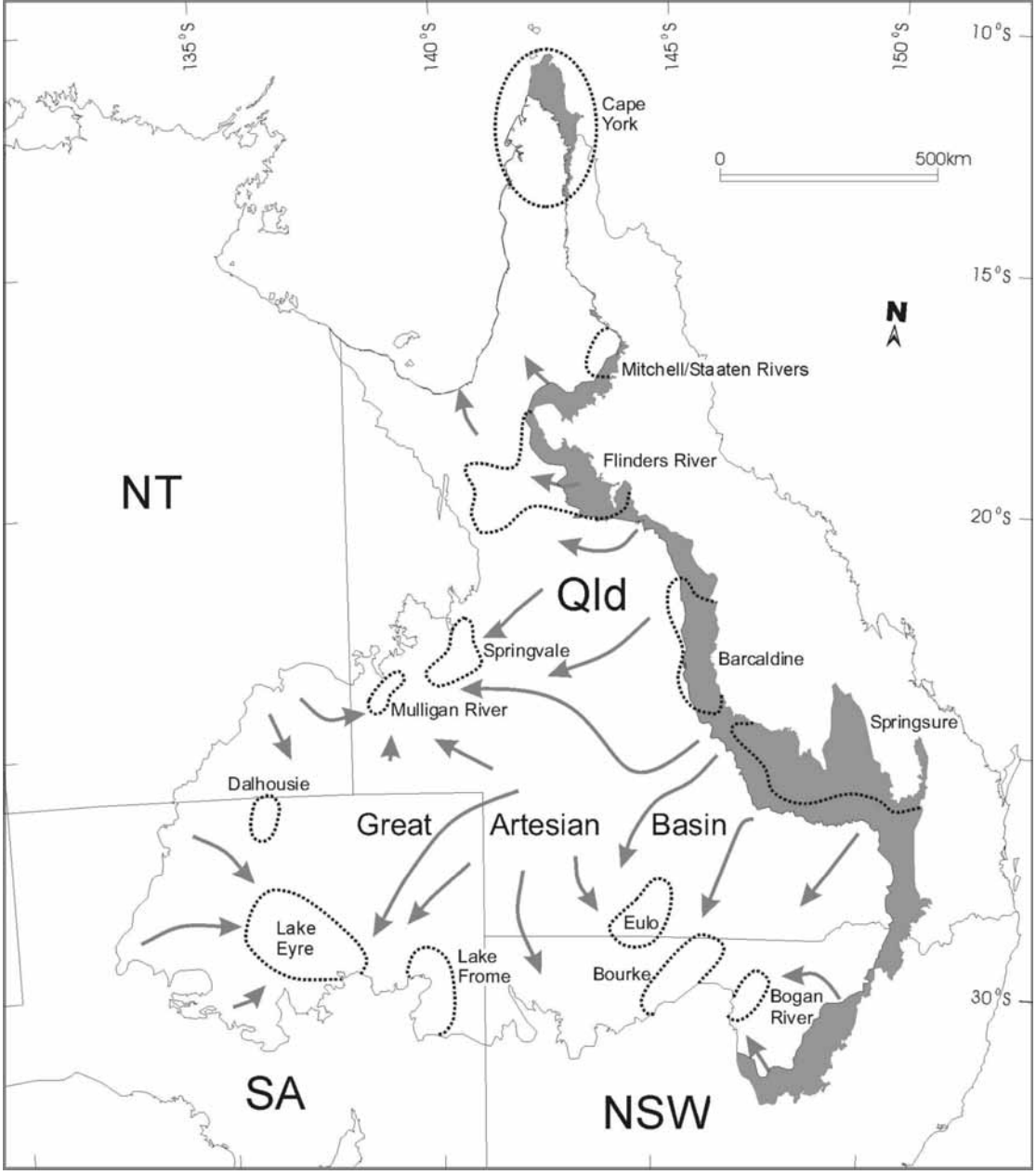
The Great Artesian Basin (GAB) is a vast aquifer comprised of porous sandstone spanning a huge portion of the continent. It is thought that the groundwater in the aquifer is recharged by rainwater, entering the aquifer principally where the sediments outcrop along its eastern margin. Water discharging from the southern and western margins of the Basin is probably more than a million years old having travelled underground for thousands of kilometres. The water emanating from the Great Artesian Basin feeds spring wetlands that can be distinguished from other wetlands in dry landscapes because of their permanent water source. The chemistry and temperature of the water feeding springs is affected by subterranean conditions and the wetlands have probably been stable environments over glacial time-scales and may well be one of the few habitats that are not impacted by human-induced climate change in the future.



Source:after Habermehl and Lau (1997). The shaded patterns broadly represent the recharge area; arrows represent modelled flow lines after Welsh (2000). Dashed lines represent spring clusters updated from Habermehl.

Because of the vast expanse of the Great Artesian Basin, the spring wetlands have a variety of forms ranging from desert ponds around Lake Eyre to evergreen rainforest supported by groundwater on Cape York Peninsula. At the broad level, springs can be divided into those that are in recharge areas where the sediments of the aquifer outcrop and those that are in discharge areas remote from the recharge areas.

The springs of the Great Artesian Basin feed permanent wetlands that provide oases for unique aquatic life forms in otherwise dry landscapes. For example there are a number of rare fish confined to spring-fed pools including five known only from Dalhousie Springs in South Australia and another two species known only from a small group of springs in central Queensland. An abundance of specialised invertebrates including ostracods, snails, spiders, flatworms and a dragonfly are known only from individual springs. There are 25 plant species that are also restricted to spring wetlands including grasses, herbs and sedges in the arid regions and trees and ferns on Cape York Peninsula.

Since European settlement a massive quantity of Great Artesian Basin groundwater has been lost to evaporation as it flows down open drains fed by bores. This has had a dramatic effect on aquifer pressure and hence spring-flows. Some excellent historical sources including the detailed diaries of nineteenth century surveyors in Queensland, have allowed comparison with the current status of springs. The impact has been most dramatic in the discharge areas of Queensland and only 44 per cent of the original 171 spring complexes have at least some springs that are still active. In recharge areas most of the springs are still active. Of the active spring-complexes surveyed in Queensland about 20 per cent have suffered major or total damage as a result of excavation of the wetlands.

An emerging threat is the use of exotic grasses as ponded-pastures, which have the ability to dominate the habitat of spring wetlands. The scenario of decline is similar in New South

Spring wetland in Central Queensland providing habitat for the Endangered fish the red-finned blue eye (*Scaturiginichthys vermeilipinnis*)
Photo by Queensland Herbarium

Wales, but is more optimistic in South Australia where the condition of most of the springs currently approximates their natural state.

Negotiations with the custodians of springs with high biodiversity values are underway to ensure their future protection. The spring wetland community in the discharge areas of the Great Artesian Basin has recently been listed under the Commonwealth EPBC Act 1999 as an endangered ecological community. The capping and piping of bores allows for the efficient use of groundwater and a joint government-landholder program funds these water conservation measures.

The successful completion of the bore capping program should provide a partial restoration of artesian pressure and enhance spring flows. However, emerging demands on Great Artesian

Basin groundwater, particularly from the mining sector and future groundwater allocations will have to be carefully controlled to avoid compromising the natural values of the springs.

References

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Welsh WD 2000, GABFLOW: A steady state groundwater flow model of the Great Artesian Basin, Bureau of Rural Sciences, Canberra.