

The South Australian arid zone plantation and natural regeneration work of Albert Morris

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September 2018ⁱ

The Traditional Owners and Custodians of the subject lands are acknowledged and respected

INTRODUCTION

Albert Morris (1886-1939) was the instigator of the Broken Hill regeneration area project (1936-58), an international and Australian pioneering natural area re-vegetation undertaking that utilised *natural regeneration* principles and techniques and exhibited characteristics of the contemporary practice *ecological restoration* (Ardill 2017; McDonald 2017a & 2017b). The regeneration area still functions today, with national and state heritage status (Jones 2016 pp.50-53). Morris was a noted arid zone botanist of the 1920s and 1930s and contributed considerably to the development of this field of study in Australia (Jones 2016 p.45). He developed expertise in the establishment of arid zone tree plantations in Australia, successfully developing at least three plantations in Broken Hill in the 1920s and 1930s (Ardill 2017 p.5 & 13).

The historical documentation indicates that during the period 1932-37 Albert Morris, in a volunteer consultancy capacity:

- designed and had constructed in Whyalla an innovative native flora propagation nursery and trained local staff in standardised nursery management and flora propagation and planting techniques;
- developed an unspecified number of planted tree and shrub plantations consisting of Australian flora in Whyalla and Iron Knob, for amenity purposes;
- developed two natural regeneration re-vegetation projects in Whyalla, for amenity purposes and possibly for conservation or ecological restoration purposes; and
- advised on soil and hydrology matters in Port Pirie, with a view to establishing some form of tree and shrub planting regime there.

SOUTH AUSTRALIA

In the 1930s Whyalla, located on the upper west coast of Spencer Gulf, in the state of South Australia, was a small but important port town, shipping iron ore mined at the even smaller settlement of Iron Knob, located 50 kilometres inland from and west of Whyalla. They were corporate towns, administered by the Broken Hill Proprietary Company (BHP), a large Australian mining and metals processing company. Port Pirie, located opposite Whyalla on the east coast of the Gulf, was an industrial centre and subject to local government rule. The Broken Hill Associated Smelters company was a significant corporate influence in the town.

Whyalla, the main focus of this article, is located in the Gawler bioregion of South Australia.

The Gawler bioregion is characterised by rounded landscapes, rocky hills, plains and salt-encrusted lake beds. Vegetation types include spinifex grasslands, open woodlands and chenopod shrubs.....The Gawler bioregion has an arid climate..... (Environment and Energy 2008)

Whyalla experiences hot summers with average maximum temperatures of nearly 30°C, and moderate winters, with average maximums of approximately 17°C (BOM 2018a). Average rainfall per annum is 270mm and winter and spring are the wetter months (BOM 2018b). It is a challenging environment for humans, flora and fauna.

PLANTATIONS AND URBAN LANDSCAPING

Background

The historical documentation for the South Australian projects of Albert Morris clearly distinguished between “tree cultivation”/ “tree plantation” projects, which involved propagating and raising tree seedlings in a nursery and manually planting them on a chosen site, and “regeneration” projects, or *natural regeneration* as it is known today (Anon., “Tree Cultivation at Whyalla and Iron Knob”, *BHP Review*, pp.20-21, April, 1939). Natural regeneration is a re-vegetation technique which utilises the naturally distributed seeds of indigenous flora and in situ remnant vegetation to re-vegetate a degraded site by excluding adverse influences such as introduced grazing animals.

Prior to the arrival of Albert Morris in Whyalla and Iron Knob in 1932, BHP sponsored attempts to establish tree plantations there had met with mixed results. Australian native species had failed, as they were selected from areas that had considerably higher rainfall than Whyalla. However, Aleppo pines (*Pinus halepensis*) and Norfolk Island pines (*Araucaria heterophylla*) were planted, in unknown quantities, and apparently did well, although the latter required a lot of attention (Anon., “Tree Cultivation at Whyalla and Iron Knob”, *BHP Review*, p.21, April, 1939).

According to Maurice Mawby, a Zinc Corporation (Broken Hill) mine manager, in 1932 Essington Lewis, the managing director of BHP, invited Albert Morris to visit Whyalla and advise on how tree planting there could be placed on a more successful footing (Anon., *Memorial Gates at Zinc Corporation*, p.2, 22 August, 1944). Morris had acquired a degree of fame for his ability to successfully establish hardy tree plantations comprised of Australian flora in the equally precipitation challenged inland mining city of Broken Hill, New South Wales, located 400km to the east of Whyalla, and for his arid zone botanical expertise (Blainey and Smith 1986; Morris, M. 1939, p.13).

Nursery and plantations

Morris, a mineral assayer employed by the Central Mine company in Broken Hill, accepted the invitation, initially visiting Whyalla and Iron Knob during his holidays in August, 1932. He took with him seeds and plants, with the intention of starting a nursery in the region and training locals to manage it (Anon., “Special Trees Wanted”, *Barrier Miner*, p.2, 18 August, 1932). Margaret Morris (1887-1957), wife of Albert and collaborator in his Broken Hill arid zone re-vegetation projects, may have accompanied him and may have worked on these projects but is not referred to in the historical documentation of the South Australian projects.

On this first visit Albert established tree plantations of “gum and wattle trees” in Whyalla and Iron Knob. “They are dry country trees, natives of both Broken Hill and Whyalla districts.” (Anon., “Tree

Planting at Whyalla”, *Barrier Miner* p.2, 14 August, 1933). The exact locations of the plantations were not specified in the historical documentation.

Reflecting on this first trip after another visit of three weeks duration in August, 1933, Morris was pleased with the outcomes. A “fairly big” nursery had been established in Whyalla, staff had been trained, the plantings had grown well and further plantations for Whyalla and Iron Knob were planned (Anon., “To Advise on Planting of trees”, *Barrier Miner* p.2, 21 July 1933; Anon., “Tree Planting at Whyalla”, *Barrier Miner* p.2, 14 August, 1933).

Morris was always meticulous with the design of his nurseries and the flora propagation methods that he employed. The Whyalla nursery appears to be the first that he developed outside his own and Margaret’s residence in Railway Town, Broken Hill. It was constructed of timber and chicken wire, open to the air, protected from the prevailing winds and capable of being enclosed when severe weather threatened.

A sophisticated and standardised system of seed germination, pricking out of seedlings, passive watering, transplanting into progressively bigger containers and acclimatisation was employed. Fully transplanted trees and shrubs were protected from the prevailing winds with hessian guards and carefully watered until well established (Anon., “Tree Cultivation at Whyalla and Iron Knob”, *BHP Review*, p.20, April, 1939). Possibly Morris insisted on deep watering of his fully transplanted plants, as he was acquainted with Edwin Ashby, an Adelaide estate agent and naturalist who developed the “Ashby system” of watering, with plants receiving deep soakings instead of regular but light watering (Webber 1992, p.45; Robertson 1979).

The results were “remarkably gratifying”. The plant survival rate was very high and Morris attributed this to his strict propagation and planting-out regime, contrasting it with the prevailing horticultural practice of purchasing imported, non-acclimatised, potted seedlings. As well as trees, Morris raised shrubs in his Whyalla nursery: “Many of the small local shrubs have also been raised from seed collected locally” (Anon., “Tree Cultivation at Whyalla and Iron Knob”, *BHP Review*, p.20, April, 1939).

Albert’s final visit to Whyalla and presumably Iron Knob was in 1937, but the details of the month and his activities on this trip were not recorded (Anon., “Tree Cultivation at Whyalla and Iron Knob”, *BHP Review*, p.20, April, 1939). He visited Port Pirie once. In October, 1937, at the invitation of the Broken Hill Associated Smelters company, he inspected the town and reported on the possibility of establishing plantings of trees and shrubs there (Anon., “Tree and Shrub Culture in Pirie”, *Recorder* p.2, 16 November, 1937). This appears to have been his only involvement with the Port Pirie region. It is likely that his 1937 visit to Whyalla also took place at this time.

Amenity benefits

The BHP company sought to establish tree plantation projects in Whyalla and Iron Knob in order to provide instrumental, or amenity, benefits for the residents and the company:

...the dual aim being to beautify the townships [Whyalla and Iron Knob] and develop civic pride. Results are to be seen in the streets, in the recreation reserves, and in the school grounds.
(Anon., 1935 p. 39)

At Broken Hill Morris had intended, with his plantations of c1930-37, to provide amenity services for the residents and mining companies, in the form of dust abatement, drift-sand (eroded topsoil) control and beautification. However, he also intended, with those plantations, to restore a limited degree of ecological function to the severely degraded surrounds of that city (Ardill 2017 p.16).

At the time of the Morris visits to Whyalla it was a small port town, a fraction of the size of the important mining city, Broken Hill. Historical records do not indicate that the natural areas of Whyalla had been devastated by the wholesale tree cutting and vegetation destruction that had reduced the surrounds of Broken Hill to a bare waste by c1910. Photographs of Whyalla taken in 1933 reveal trees, a low shrub storey and grasses (Figures 1 & 2).



Figure 1 Whyalla township 1933

Source: SLSA B-62488

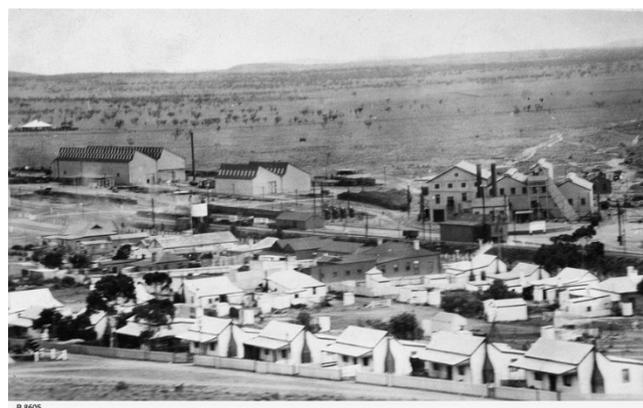


Figure 2 Whyalla port works 1933

Source: SLSA B-8605

It is unlikely then that Albert anticipated that significant conservation or ecological outcomes would arise from his plantation work in Whyalla and Iron Knob. His most likely aim was the provision of amenity benefits, primarily beautification and perhaps leisure opportunities, for the residents of those towns.

NATURAL REGENERATION PROJECTS IN WHYALLA

The second major re-vegetation technique that Albert Morris utilised in Whyalla was natural regeneration, on two separate sites.

One other feature always strongly emphasised by Mr. Morris was the possibility of the regeneration of eroded or eaten-out country by simply protecting it from stock.

Two examples of such regeneration exist at Whyalla. One is Hummock Hill itself, which a few years ago was a bare rocky hill. Since access to the hill by local dairyherds was prevented the saltbush has

recovered, and numerous species of local shrubs have re-established themselves, and although as yet small, are growing well.

The second example is an area adjacent to the Whyalla bathing beach, on to which four years ago blown beach sand was heavily encroaching. Since being enclosed with a rabbit and cattle proof fence, and assisted by a little artificial planting, the drift has been completely stopped, and the area is now in the condition shown in the photograph [Figure 4]...

The system of regeneration has recently been applied, largely at Mr. Morris' instigation, to the bare areas surrounding Broken Hill, with marked success. [sic] (Anon., "Tree Cultivation at Whyalla and Iron Knob", BHP Review, p.21, April, 1939)

There is no doubt that a natural regeneration technique was the dominant re-vegetation approach used in these two projects. The indigenous flora re-established itself "simply" as a result of introduced herbivores being excluded; the now protected indigenous flora regenerated via naturally distributed seed and recovering remnant vegetation. The article draws a clear distinction between "regeneration" and "artificial planting". No further historical details or accounts of these two projects appear to exist.

The Hummock Hill project

Hummock Hill is a prominent Whyalla coastal landmark adjacent to the original urban centre and approximately 10 hectares in extent (Figure 4). Today it is a popular recreation, tourism and historical site, with commanding views of the surrounding area.¹

The previously cited account of the natural regeneration projects does not indicate how much of the hill was actually fenced. The project achieved a high degree of success, with saltbush and other local shrubs re-establishing themselves well (Anon., "Tree Cultivation at Whyalla and Iron Knob", BHP Review, p.21, April, 1939). Today the hill is covered with stands of native vegetation, although a detailed analysis of this vegetation was not undertaken by the author (Figure 3).² No site evidence of this project remains today.

It is quite likely that the Hummock Hill natural regeneration project was undertaken with the aim of achieving certain amenity objectives. A previously "bare rocky hill" was covered in saltbush and "numerous species of local shrubs" by 1939 (Anon., "Tree Cultivation at Whyalla and Iron Knob", BHP Review, p.21, April, 1939). The hill dominated the 1930s Whyalla urban and commercial sector and it must have presented a more pleasant sight once re-vegetated. Dust spread and stormwater run-off may have been mitigated.

The project may also have been undertaken with the intention of achieving conservation objectives. Albert Morris would certainly have relished the thought of indigenous flora, and perhaps the associated fauna, again flourishing on the hill. He initiated a "natural bushland" natural regeneration project in the Broken Hill urban area in 1936 and may have similarly viewed Hummock Hill as a potential nature reserve (Ardill 2017 p.18). At the time of the project the hill was vegetatively linked to the sea, the adjoining dunes and also to wetlands to the south, so possibly he had in mind restoration objectives that today would be described as *ecological restoration*, but there is insufficient historical documentation to confirm this proposition (Figure 5) (SER 2004).

¹ Author's site inspection May 2018

² Author's site inspection May 2018



Figure 3 Hummock Hill vegetation May 2018

Photo: P Ardill 2018

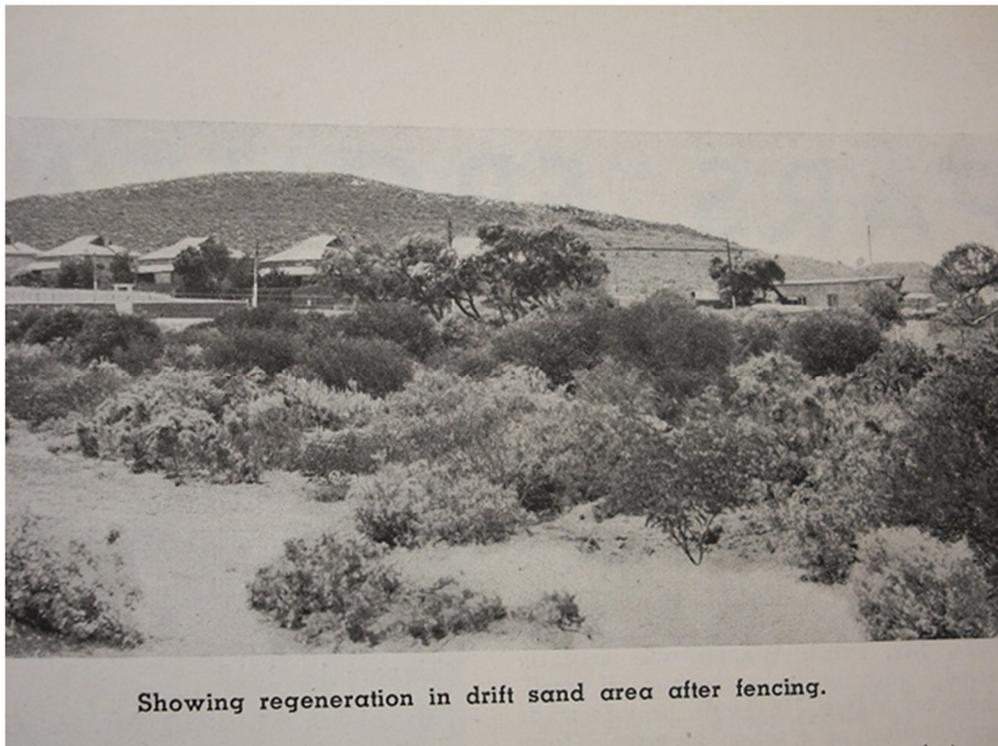
The Whyalla beach sand-drift project

The sand-drift project can also be precisely located, as the cited account taken from the “BHP Review” article of 1939 displayed a captioned photograph of the site (Figure 4) (Anon., “Tree Cultivation at Whyalla and Iron Knob”, *BHP Review*, p.21, April, 1939). Hummock Hill and a row of distinctly roofed houses are clearly visible in this photograph. These houses still exist today, in Delprat Terrace, Whyalla.³

Accordingly, it is possible to ascertain that the 1939 published photograph (Figure 4) was taken from what are today known as the Ada Ryan Gardens, Cudmore Terrace, Whyalla (Figure 7). The Ada Ryan Gardens are located on what was the original Whyalla cemetery, which was in use until 1918 (Whyalla City Council undated). Possibly the indigenous flora on the cemetery site was disturbed during the years that the cemetery was in operation, creating conditions for erosion and sand-drift.

The location of the sand-drift regeneration site is further confirmed by a panorama photograph dated “1935” (Figure 5). It was taken on Hummock Hill and from the directly opposite viewpoint of the 1939 photograph (Figure 4). The 1935 photograph depicts an extensive drift of sand that has spread inland from the beach and into a paddock and adjacent to housing, with a main dune that is many metres high. The remainder of the paddock had sparse tree and shrub vegetation and was probably grassed. The rears and outhouses of the houses in Delprat Terrace, their frontages visible in the 1939 (Figure 4) photograph, are visible from centre to the right hand side of the 1935 photograph, adjacent to the hill (Figure 5).

³ Author’s site inspection May 2018



Showing regeneration in drift sand area after fencing.

Figure 4 Sand-drift regeneration site with Hummock Hill in background Source: BHP Review 1939



Figure 5 Panorama of Whyalla from Hummock Hill 1935

Source: National Trust (SA)

The Whyalla beach sand-drift project appears to have been very successful. The previously cited documentation of 1939 stated that the sand-drift had been “completely stopped” by the natural regeneration technique. The accompanying photograph depicts significant tree and shrub layer vegetation re-growth (Anon., “Tree Cultivation at Whyalla and Iron Knob”, *BHP Review*, p.21, April, 1939) (Figure 4).

A further panorama of Whyalla, taken in 1941 and after the sand-drift project’s implementation, fortuitously offers an *after* view of the regeneration site, and further illustrates the success of the project (Figure 6). The main sand dune is now much diminished in size and the former extensive sand-drift area is almost completely covered in vegetation. Dense tree and shrub vegetation covers the paddock into which the sand-drift had been previously spreading. This vegetation, sparse in the 1935 photograph, is suggestive of natural regeneration techniques having been applied to the whole paddock i.e. the whole paddock was fenced. No site evidence of this project remains today.

Amenity outcomes were a high priority objective of the Whyalla beach sand-drift project. Dunes were threatening housing (Figure 5). The photograph of 1941 reveals that this encroachment had been checked, and more houses appear to have been built in the former sand dune area (Figure 6).

Morris may have intended that a further amenity and also limited conservation benefit would be derived from the sand-drift project, as the whole paddock was fenced. He may have intended that the re-vegetating paddock should retain its informal open space character or be developed into a more formal park, retaining regenerated local indigenous flora and plantings. He did undertake this form of project in Broken Hill and nearby Silverton (Ardill 2017 p.5 & 13; Morris A., 1938, p.49). In fact, the site did become well established as a park, the Ada Ryan Gardens (Figure 7).



B 69756

Figure 6 View of Whyalla 1941

Source: SLSA B-69756



Figure 7 Mid-picture: Ada Ryan Gardens on former sand-drift site

Photo P Ardill 2018

Dating the natural regeneration projects

The Whyalla natural regeneration sites are historically significant examples of their kind and precisely dating them is of considerable interest.⁴ Unfortunately, the historical documentation does not mention a precise date of commencement for these projects. The documentation does raise the possibility but does not demonstrate conclusively that they may have been initiated as early as 1935.

A “BHP Review” article of June, 1935, described Albert’s tree planting and nursery work in Whyalla but made no mention of the two natural regeneration projects (Anon., 1935). A further “BHP Review” article of 1939 repeated and elaborated on the tree planting and nursery material of the 1935 article and also included a description of the two regeneration projects, as previously cited, and stated that Albert’s final visit to Whyalla occurred in 1937 (Anon., “Tree Cultivation at Whyalla and Iron Knob”, *BHP Review*, p.21, April, 1939). These two documents suggest that the Whyalla regeneration work commenced between 1935 and 1937.

Furthermore, the same “BHP Review” article of 1939 referred to “... Hummock Hill itself which a few years ago...” and “...Whyalla bathing beach, on to which four years ago...”. This wording suggests that the Hummock Hill project could have commenced in 1936 and the sand-drift project in 1935. The same article stated that the “system of regeneration has recently been applied....” at Broken Hill,

⁴ In Broken Hill Albert Morris undertook natural regeneration field trials in 1935 and his pioneering regeneration area project there, an actual degraded area restoration project which primarily utilised a natural regeneration technique, commenced in the spring of 1936 (Ardill 2017 pp. 12&17). Other pioneering restoration projects at Alstonville, New South Wales (1935) and at the University of Wisconsin Arboretum, USA (1935) appear to have mainly consisted of planting and weeding work (Jordan and Lubick 2011 pp.73&81).

wording which suggests that the Whyalla regeneration projects preceded the Broken Hill regeneration area project (Anon., “Tree Cultivation at Whyalla and Iron Knob”, *BHP Review*, p.21, April, 1939).

This chronology was also used in an article in the Sydney “Land” newspaper of 1946:

*In asking that the [Broken Hill] fenced belt should be established, and that the land in the main should be allowed to regenerate itself, Morris was asking that considerable finance should be expended on a theory he alone was positive would revitalise the land. True, his theory had worked at Whyalla on a much smaller scale, but would it work on those larger areas, fully exposed, to the dessicating force of the westerlies and southerlies? (Anon., “Trees for Beauty and Utility”, *The Land*, p.9, 29 March, 1946).*

Determining the exact years in which Morris visited Whyalla might have assisted with dating the projects, but the historical documentation is again inconclusive. The author’s research only revealed precise references to 1932, 1933 and 1937 visits, as previously cited, but would Morris have neglected these projects for four consecutive years? Margaret Morris wrote in separate articles that Albert visited Whyalla three times and also four times (Morris, M. 1975 p.3; Morris, M. 1939 p.13). The “BHP Review” article of 1939 stated that he visited Whyalla in 1932 and made “several subsequent visits”, the last being in 1937 (Anon., “Tree Cultivation at Whyalla and Iron Knob”, *BHP Review*, p.20, April, 1939).

Further complicating the matter is that while the 1939 “BHP Review” print media clearly attributed inspiration for the projects to Morris, he may not have been present when they were implemented. There is a distinct possibility that Morris trained BHP staff who then managed and monitored the projects, as the cited account does not specifically state that it was Morris who managed them, and he had a full-time occupation and many volunteer re-vegetation projects to manage in Broken Hill (Anon., “Tree Cultivation at Whyalla and Iron Knob”, *BHP Review*, p.21, April, 1939). In conclusion, it is highly likely that the projects commenced between 1935 and 1937, but it is not possible to ascertain precise dates of commencement.

THE SIGNIFICANCE OF THE SOUTH AUSTRALIAN PROJECTS

The Whyalla and Iron Knob tree plantations are historically significant examples of Australian arid zone amenity urban landscaping. Their development preceded the development of the Broken Hill “heritage curtilage” by Albert Morris in 1936-37 (Jones, 2016, p.53). As discussed, the two Whyalla natural regeneration projects are of national and international historical significance.

Furthermore, the South Australian projects represent important stages in the development of Morris’s re-vegetation techniques. They are significant components of his body of work.

The South Australian plantation projects successfully replicated the various standardised procedures of the plantation re-vegetation technique that Morris had established in Broken Hill, such as the establishment of a local propagation nursery, identification and selection of appropriate flora species and use of carefully developed propagation, transplanting and planting techniques.⁵ Following on from his c1930 Broken Hill hospital plantation project, the high plant survival rate in

⁵ Due to his extensive knowledge of arid zone botany, a field of study that he pioneered, Morris was able to identify site appropriate flora species that could be successfully propagated and transplanted, a far more commonly available skill and service today.

Whyalla must have further confirmed to Morris that indigenous flora could be locally propagated and established on a specific site, even under harsh arid zone conditions.

By the early 1920s Albert Morris had developed an interest in restoring degraded natural areas (Ardill 2017 p.7). The positive Whyalla plantation outcomes, confirmed by 1933, may well have initially or further illustrated and confirmed to Morris that plantations of indigenous flora could be utilised to re-vegetate tracts of degraded urban and natural areas, as well as for beautification and general landscaping purposes. He confidently planned for and utilised planting strategies in his 1936-37 plantation projects in Broken Hill, and in particular, that project's main plantation was primarily intended to re-vegetate a severely degraded area. Indigenous flora species, such as Old Man Saltbush (*Atriplex nummularia*), were extensively planted (Morris, A. 1938 pp.44 & 46). Limited planting of indigenous flora species was a technique utilised in the Whyalla sand-drift natural regeneration project and in his Broken Hill natural regeneration project (Ardill 2017 p.13&18; Morris, A. 1938 p.48).

It is quite possible that the two Whyalla natural regeneration projects, especially the sand-drift project, suggested and confirmed to Morris that natural regeneration techniques had the potential to be applied to a range of abiotically distinct sites as well as at Broken Hill. The climate of the two Whyalla regeneration sites was very similar to that of Broken Hill, but the former sites were comprised of a well-drained, steep hill with extensive rocky outcrops and shallow soils, and coastal sand dunes. Both sites were regularly exposed to maritime breezes and winds with salt content. Sadly, the premature death of Albert from illness in 1939 denied him the chance to fully exploit this experiential knowledge.

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Acknowledgements: Many thanks to editor Dr Tein McDonald. Many thanks to the librarians at Whyalla City Library and particularly to Jo-Anne Waters at the Mount Laura Museum, Whyalla, National Trust (South Australia) for providing access to research material. The "Trove" search facility of the National Library of Australia was invaluable. Thanks to State Library of South Australia (SLSA), and Jo-Anne Waters, Whyalla Branch, National Trust (South Australia) for permission to reproduce photographs.

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Citation: Ardill, Peter J. (2018) “The South Australian arid zone plantation and natural regeneration work of Albert Morris”, September, 2018. Australian Association of Bush Regenerators (AABR) Sydney.

ISBN: 13: 978-0-6482924-2-5

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