Glenshera Swamp hydrological restoration update – 2018

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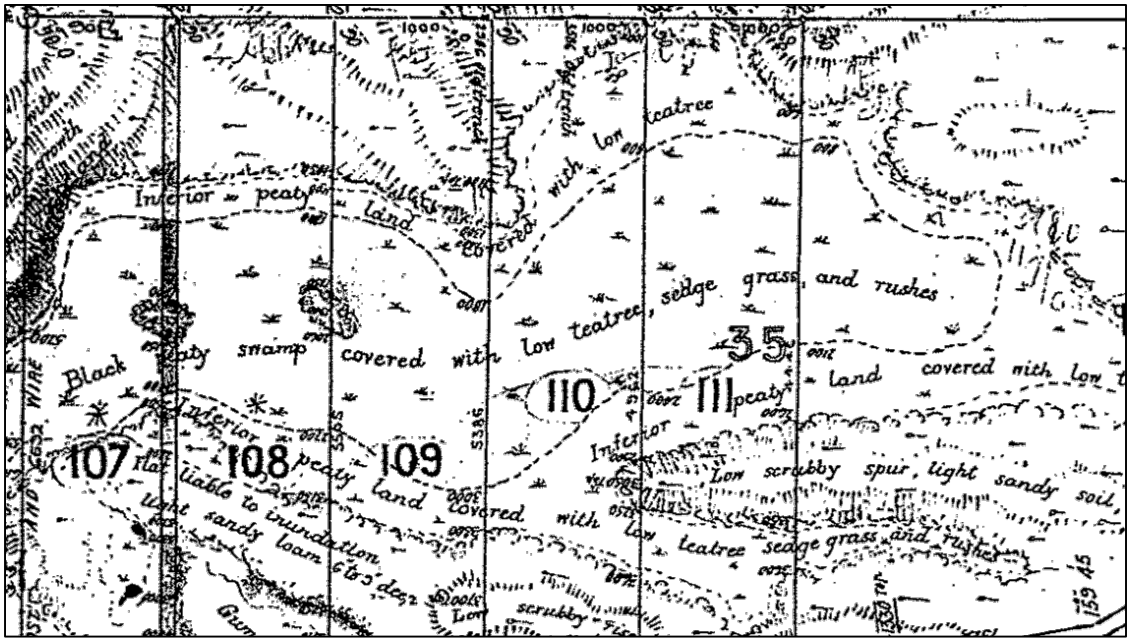
Introduction

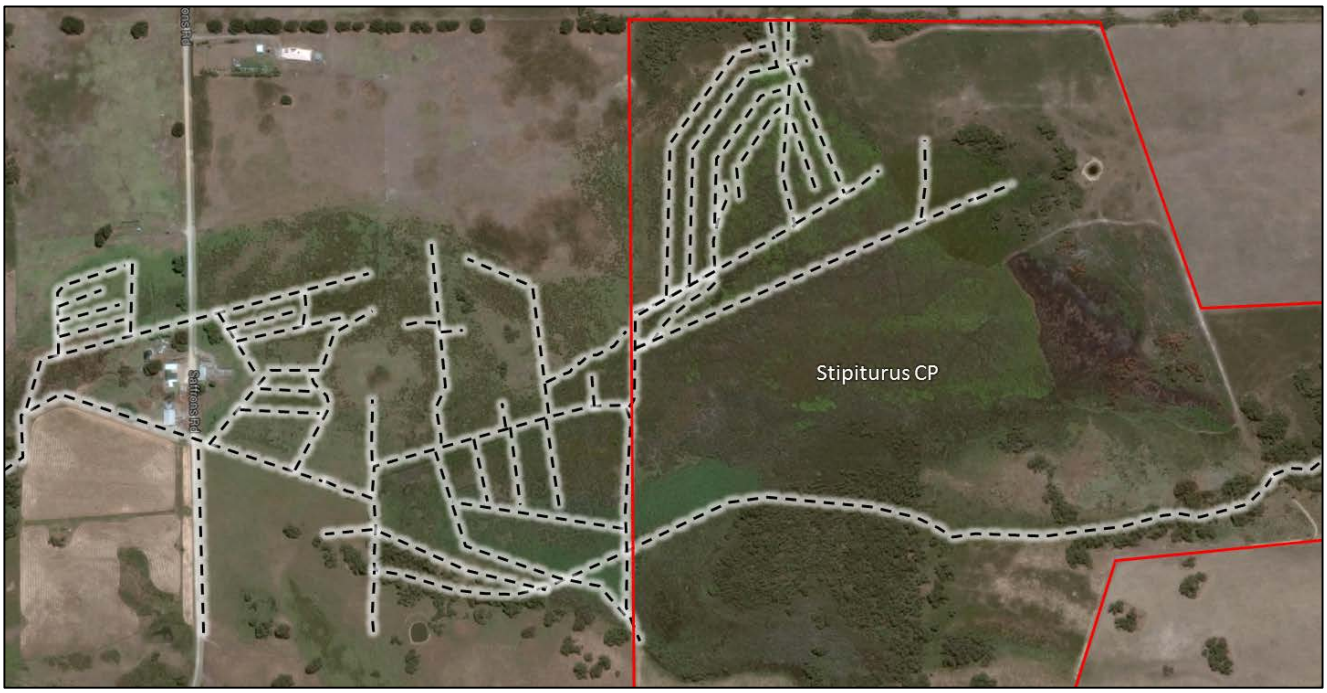
Glenshera Swamp, situated six kilometres west of Mount Compass, was first mapped in detail when the area was surveyed in February 1899, and remained largely intact when the first aerial photograph was taken in April 1949. In addition to early clearance, the main change by that time was the diversion of surface flows.



February 1899 survey diagram of Glenshera Swamp

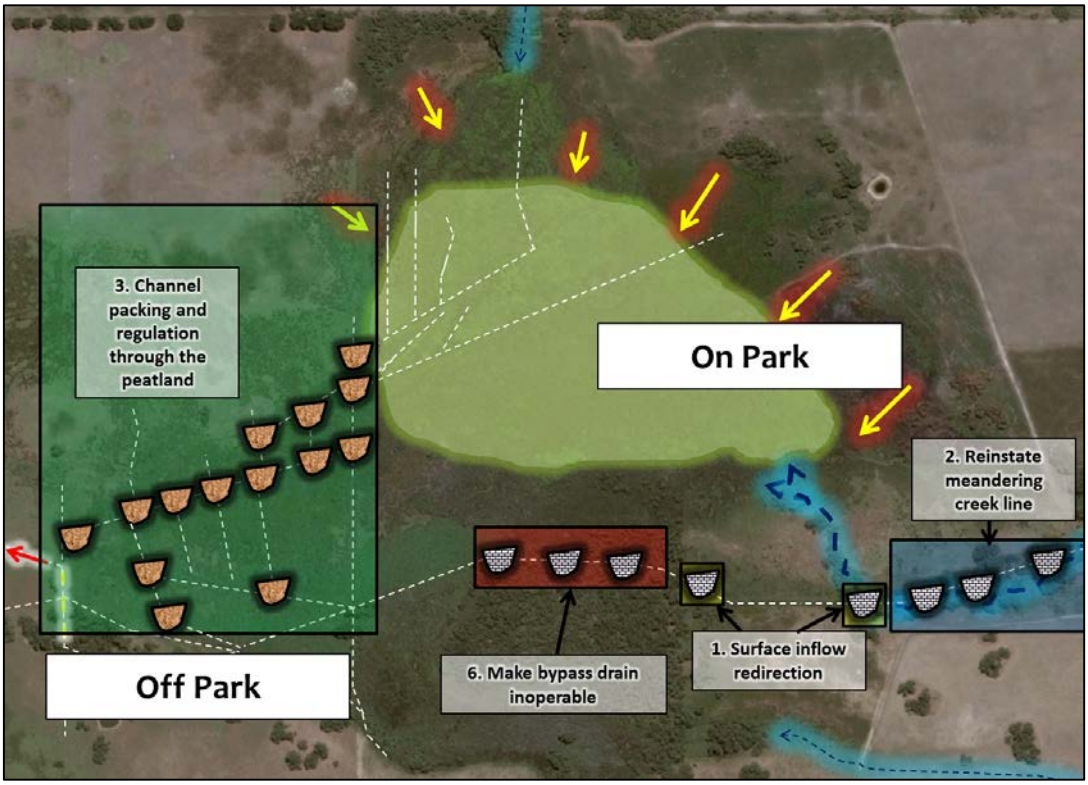
April 1949 aerial photograph of Glenshera Swamp

Today a sizeable portion of the former extent of Glenshera Swamp is situated within Stipiturus Conservation Park, proclaimed in December 2006. Glenshera is widely considered one of the most important remaining swamps of the Fleurieu Peninsula, a critically endangered ecological community. The site retains a suite of important biodiversity values, despite efforts over several decades up to its reservation to make the area more suitable for agricultural production through drainage and vegetation clearance.



September 2014 aerial image of Glenshera Swamp, showing drains (black dashed lines) and Stipiturus Conservation Park boundary (red line)

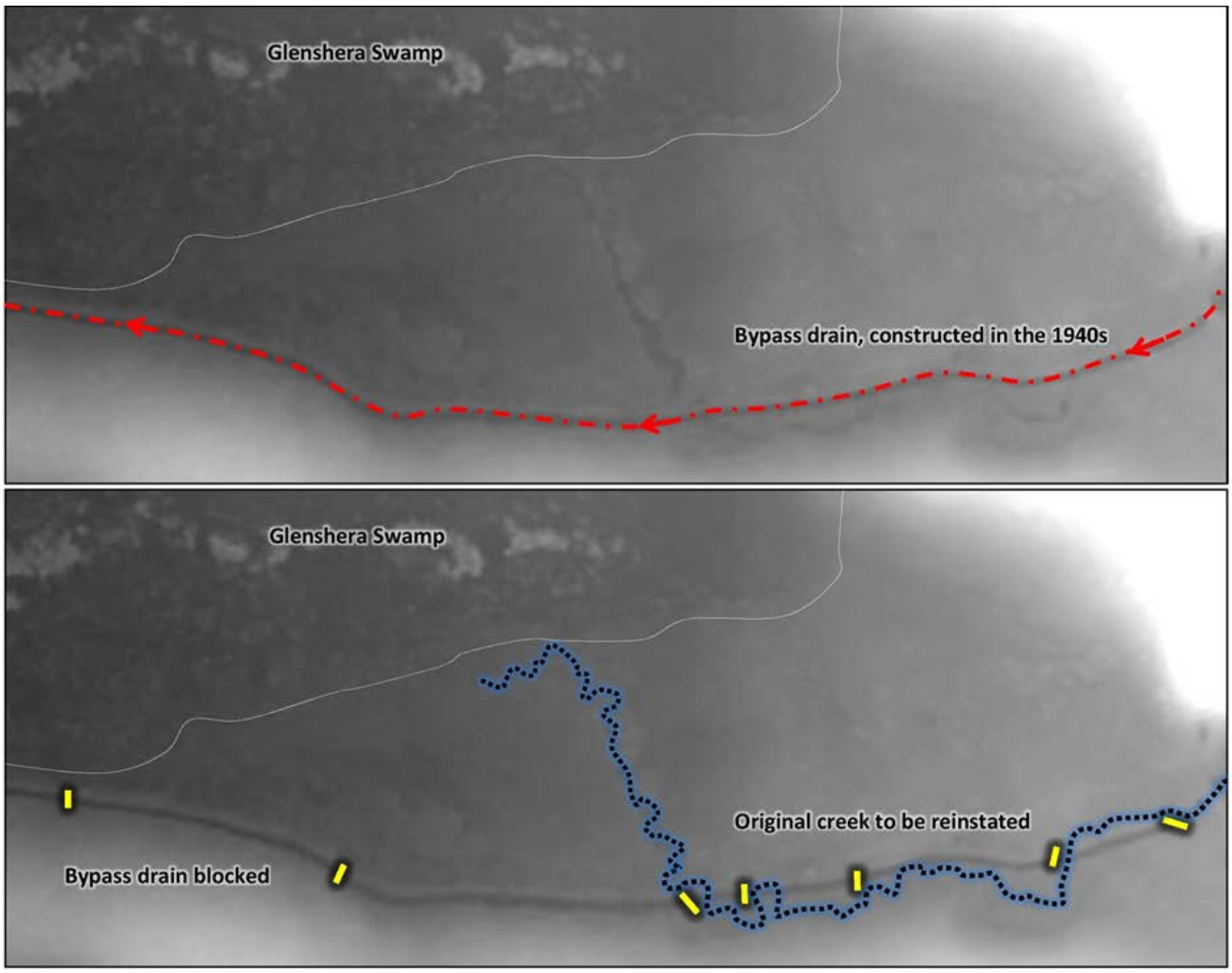
A restoration options report, completed by Nature Glenelg Trust in March 2016 (see Bachmann and Farrington, 2016), comprehensively described the history of change that led to the current modified condition of the site; by defining the location, past purpose and impact of the artificial drains across the entire wetland for the first time. In the report, six proposed actions were suggested to address key elements of the hydrological regime, and four of these were implemented in autumn 2017.



Initial works funded by Natural Resources – AMLR in autumn 2017

On Park Restoration Works

Addressing alternations to hydrology caused by the bypass drain constructed in the 1940s was the initial primary focus of work in the Conservation Park, as shown below. These works, funded by the Department for Environment, Water and Natural Resources, were primarily intended to reinstate inflows to the swamp. Additional works included three weirs downstream of the original creek, which were installed to slow flows and/or prevent lateral drawdown of water from the swamp margin.



Before and after: proposed reinstatement of the meanders in the creek, and bypass drain decommissioning

With the support of a range of volunteers, including the CCSA supported CVA Green Army Team, the YACCA group and a range of other helpers, NGT completed the construction of a series of 7 restoration structures along the drain in the Park. The works took place over several days in April 2017.

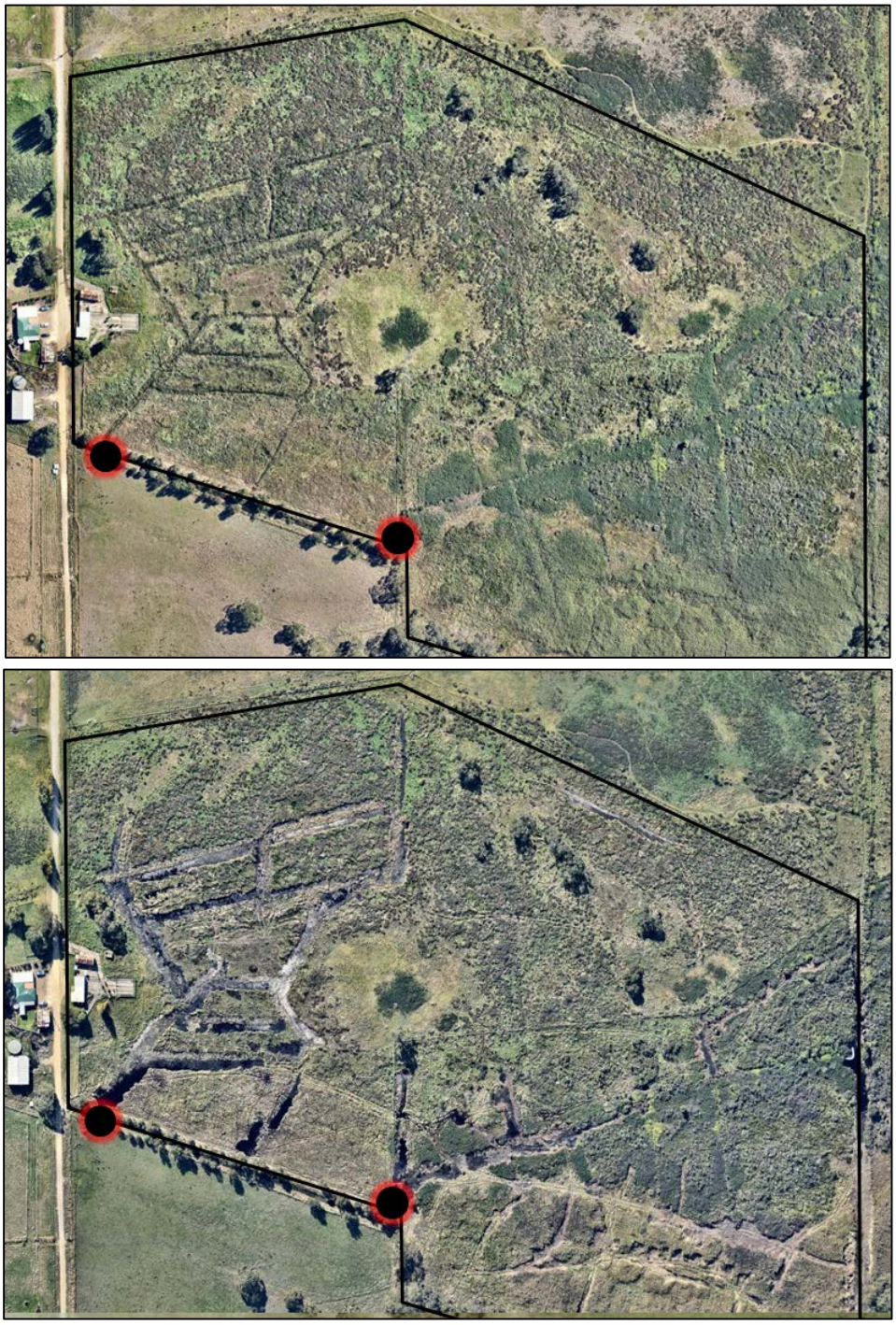
Green Army Team and NGT staff (left) and YACCA group (right)

The works have been fully operational since July 2017, when the catchment started to generate sufficient runoff to reactivate the former creek channel, a narrow band of adjacent floodplain and restore all low-moderate creek flows towards the main swamp for the first time in seventy years.

Structure #5: The point where flows are now diverted northwards, back towards the swamp

Off Park Restoration Works

Thanks to the fantastic support of the downstream neighbours and funding provided by Natural Resources – AMLR, a significant amount of restoration work also occurred on the more heavily drained and degraded portion of the former Glenshera Swamp outside the reserve boundary. After discussion about the range of ways in which the objective of rehydrating this area of deeply drained peat might best be achieved, it was decided to attempt continuous drain backfilling to pack the channels, to counteract the continuous fall in gradient across the peat bed, utilising former spoil material left on-site from when the network of drains was first constructed. The majority of drains in the network across the area of private peatland were successfully backfilled, enabling the rehydration of the peat (from groundwater discharges and seepage) to commence.



High resolution aerial imagery before and after the completion of peat channel packing (backfilling) in April 2017. Note the surface water visible (black) in the second image, from permanent groundwater discharges. The two black dots are the locations of regulating structures to maintain water levels in the swamp before flow enters the main drain exiting the property.

At the location of the regulating structures, installed to manage flows back down into the main arterial drain that still fringes the restored peatland, the results were both immediate and visually dramatic.

Upstream of Flow Regulation Point #2: before (top), a short time after works were completed in Autumn 2017 (centre) and one year later in Autumn 2018 (bottom) – what a difference a year makes!

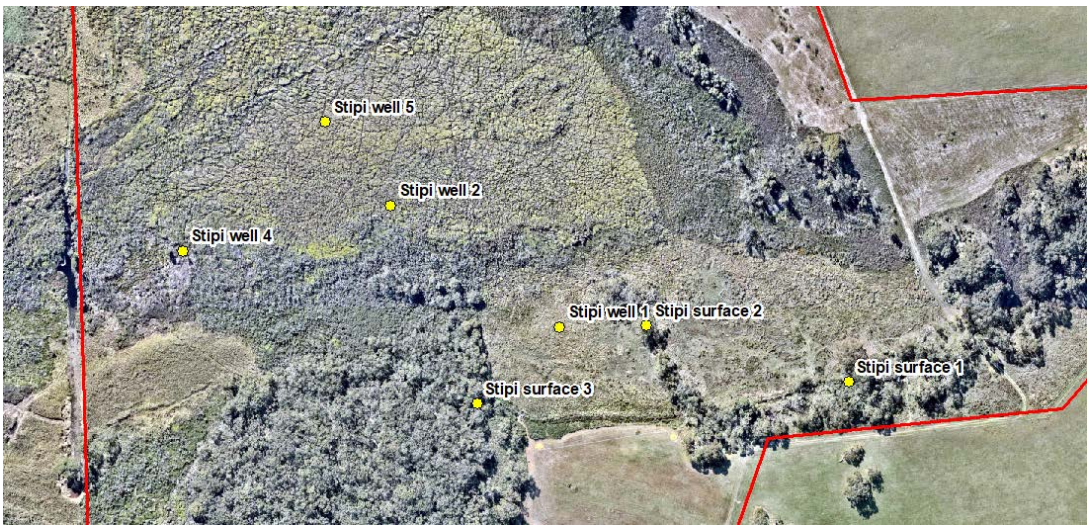
The most pronounced impacts across the rehydrated peatland are now being observed upstream (to the east) of this area in the portion of the swamp on private land. Here, the peat has re-saturated, and the swamp vegetation is quickly bouncing back; helped along by the fact that a significant amount of remnant swamp vegetation was still present in this area. Despite the tea-tree (*Leptospermum* sp.) shown right being drowned, as it was growing in the now back-filled drain, the importance of leaving these adult plants in place is clearly apparent. As the adult plants die, they release masses of seed from their fruit capsules. This process, which is the same as occurs after a fire, is resulting in the emergence of thousands of seedlings that are happily growing at the right elevation (i.e. on the surface) of the now re-saturated peat – meaning the self-sustaining process of swamp recovery we were hoping to kick-start has now begun.

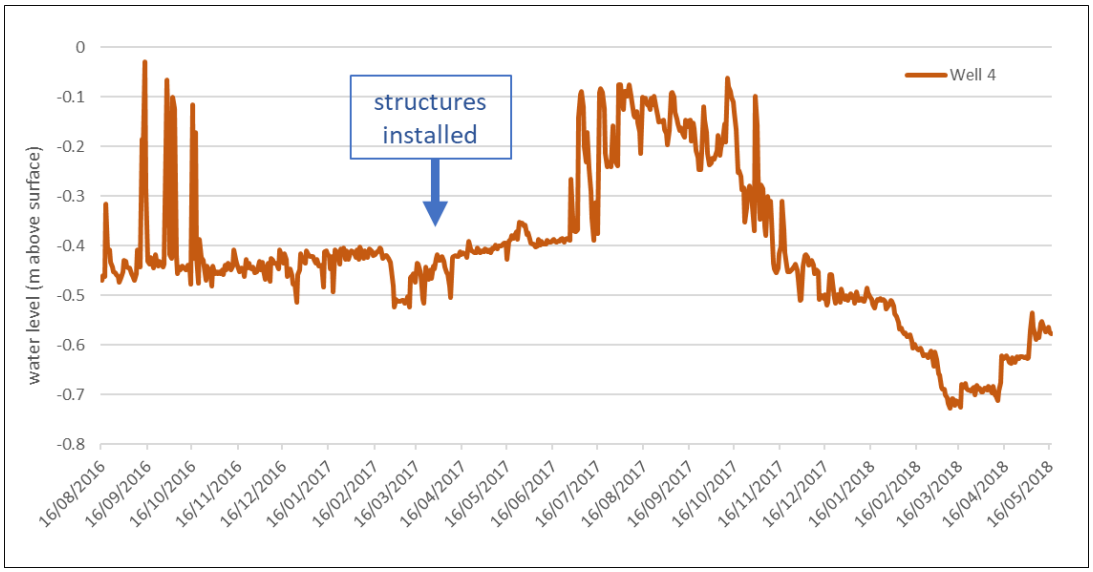
Another interesting effect of the drain backfilling works has been the emergence of some rare plants in the bare scrapes created by the excavator as it dug up the old spoil banks and placed them back into the drains. These spoil banks have been in place since the drains were originally excavated, some time prior to 1967. Some of the plant species that have emerged are not observable in the surrounding area, suggesting they have grown from propagules (seeds, tubers etc.) that have lain buried and dormant for at least 50 years! They include at least one rare species never previously recorded at Stipiturus Conservation Park, *Hypericum japonicum* (Clive Chesson, pers. com.).

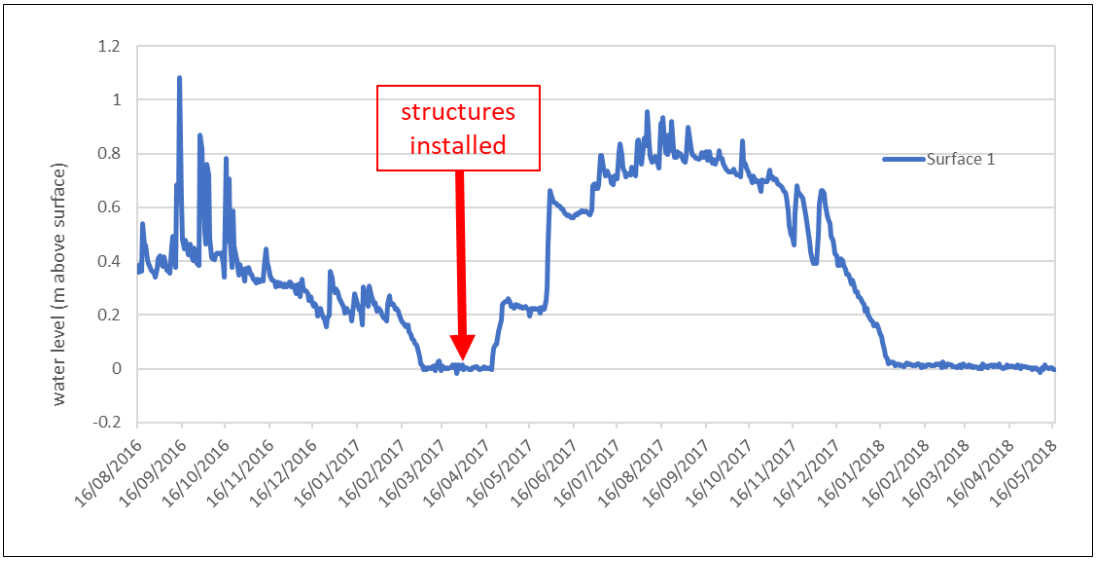
Elsewhere in this peatland, more dramatic signs of change are clearly visible – some of which even appear counter-intuitive at first glance. In the image below, the lowest elevation areas of the peatland next to the former (now back-filled) deep drain (right of image) through the peat bed are looking extremely brown / dead, despite the ground now being saturated or under water. This is because with the drain in place, this area had previously transitioned over many years to a terrestrial (dry) vegetation community – in this case dominated by Bracken and Blackberry. With the drain no longer functional, this area of unsuitable vegetation (for a wetland) has rapidly died off and should now begin to revert to wetland vegetation. The area to the left of the image, despite being of slightly higher elevation, actually retained remnant swamp vegetation as a result of bank seepage that kept this area moist – hence with the drain no longer functioning, it has been ready to bounce back and more quickly take advantage of the new conditions.

Monitoring Results

To measure the effects of hydrological restoration we are monitoring groundwater and surface water levels and vegetation throughout the swamp. Some of the water level monitoring locations, and some early results from two stations, are shown below.







The groundwater data for well 4 show that after the structures were installed, groundwater was maintained consistently higher in this area the following winter. This is an encouraging result given that winter 2017 had

slightly lower rainfall than winter 2016. The recent decline in groundwater level is likely due to the extended dry conditions since last winter. The surface water data for 'surface 1', which is located in the creek upstream of the swamp, are also encouraging, with higher water levels maintained in the winter following structure installation compared to the previous winter. Improved surface water levels increased the area of aquatic habitat in and around the creek and may have increased groundwater recharge.

The Future

This project is now shifting into its next phase, with a focus on continued monitoring the impact of works on the native flora of the restored creek line, floodplain, swamp and the portion of previously drained peatland downstream. When the opportunity arises, we are also hopeful of seeing the final actions in the restoration plan implemented, to further enhance the eco-hydrology of this important remnant Fleurieu Swamp.

Based on the extent of artificial drainage activities across the valleys of the Fleurieu Peninsula, there is significant potential for this proactive approach to water management be adopted elsewhere in the region. In fact, as a result of the early success at Glenshera Swamp, NGT has recently assessed the restoration feasibility of Fleurieu Swamps in the nearby Tookayerta Catchment (SA MDB NRM region, south and east of Mount Compass), looking at opportunities to initiate similar projects there, including at Hesperilla Conservation Park.

For more information on the progress of Fleurieu Swamps eco-hydrology or our other projects, please visit the NGT website: www.natureglenelg.org.au, or contact us by emailing info@natureglenelg.org.au.

Nature Glenelg Trust

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Australian Government

Government of South Australia

Natural Resources Adelaide and Mt Lofty Ranges

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