**FACT SHEET NO. 2**

**November 2013**
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# Boosting Soil Carbon, Nth Vic

## Landscape and History

KILTER RURAL

***Sequestering Soil Carbon in an Irrigated Landscape turned Dry Ecological Grazing***

**This *Action on the Ground* project* is demonstrating on-farm practices that aim to boost soil carbon levels. These practices are based around the conversion of historical flood irrigated cropping to dryland cell grazing on native forage, interspersed with protected biodiversity corridors. The project is located near Lake Boga in northern Victoria.**

**This fact sheet summarises important baseline knowledge gathered in the formative stages of the project to aid interpretation of results.**

This project entails measurement across 9 trial paddocks encompassing replicates of 4 treatment types, ranging from cell grazing to protected biodiversity in the case of both 'active' (e.g. direct seeding) and 'passive' (e.g. destocking) forms of revegetation.

### Soils and Landform

The project area lies in a semi-arid, mature riverine landscape abutting the eastern margin of the Mallee dune country. Though now extensively cleared, the remnant indigenous vegetation comprises variants of grassy woodlands of the *Murray Fans* and *Victoria Riverina* ecological bioregions.

Low topographic grades, together with low permeability soils and floodplain silts across the region, result in both sluggish surface and groundwater drainage, predisposing the region to land salinisation risk. Salt is natural to this landscape, but human activity has altered the water balance to build the concentration of salt in the plant root zone.

The currently active floodplain (at least prior to human intervention) has likely the highest potential for soil carbon storage and lies within around 5kms of the meandering Loddon and Murray River systems. Beyond this lies the older, higher and drier floodplain terrace that is punctuated with naturally occurring ephemeral lakes - both fresh and saline - with their characteristic crescent shaped windblown ridges (lunettes). Being stranded from moisture resources the older floodplain is more quickly exhausted of carbon and nutrients.

Refer to project website for full report, Tech Rpt #2

**Trial Paddock KCLO3 on the active floodplain (2012)**

Though not mapped in great detail, two key soil classes of soils are associated with the project landscape. Uniform grey and brown cracking clays (or *Vertosols*) predominate, these characteristically shrinking (in summer) and swelling (in winter). This gives rise to seasonal vertical movement of soil particles in the profile that typically results in a 'mulch' of loose aggregates at the surface. The more elevated ground tends to be occupied by vertically contrasting red soils but with a clayey subsoil (*Sodosols*) and with local build-up of carbonate (or natural lime) rich layers.

### Paddock histories

The '5-On-7' grazing & biodiversity block - incorporating 4 trial paddocks - sits on what was known as the Tutchewop Plains to the south and east of the Tresco horticultural ridge. The plains were naturally heavily covered in grey box timber before being cleared for irrigation from around 1913. Early agricultural production ranged from flood

irrigated fodder crops to pastures for dairying, wool and fat lambs. However within a decade of development there were production impacts from soil salinity through excessive watering of the plains and adjacent horticultural ridge.

East of the highway the Winlaton district was part of the original Murrabit Station that ran a substantial sheep grazing operation in more sparsely timbered grasslands. Irrigation was introduced in the early 1890s with the first land watered between Lake Tutchewop and the Loddon River to irrigate pastures, oats and barley.

**Looking over the Mystic Park Forest and the 5-on-7 grazing block to Lake Tutchewop (Angus, 2009)**

With production stifled by salinity and soil degradation the intensity of irrigation steadily declined across the landscape during the course of the 1900s and became largely confined to early season watering of winter pastures and crops. By 2000 the 'millennium drought' had begun to bite and heralded a period of generational change in irrigation distribution and practice.

Refer to project website for full report (In Press)

Angus G., 2009. *Between the Rivers*

## Paddock soil carbon

A baseline soil carbon survey for the project was undertaken in October 2012. 18 soil samples were collected and analysed for each trial paddock.

Some clear early trends have emerged in the spatial distribution of the initial results. All 4 paddocks in the 5-On-7 block exhibited low Soil Total Organic Carbon (TOC) stocks, with 3 paddocks averaging 11 to 14 Mg/ha C in the top 10cm. Most interestingly, Mystic Park State Forest, a reference area for the project (a proxy for an uncleared native patch), averaged no better. Predictably TOC was greater in paddocks closer to the river system, with the 3 trial paddocks near Fish Point in the range 23-30 Mg/ha C. A reference paddock near Benjeroop representing the case of very recent flood irrigation was significantly denuded of TOC, with a mean of 15 Mg/ha C.

TOC in the 10-30cm interval of the soil profile followed a similar spatial pattern though with less relative concentration of soil carbon levels.

Refer to project website for full report (In Press)

## Implications

While at one level there has been a consistent history of irrigation across a relatively homogeneous riverine landscape, it seems that nuances in landscape position as well as individual histories of trial paddocks explain a more complicated pattern of soil carbon distribution and therefore sequestration potential. This will be a particular point of exploration in Yr 2 of the project.


***For further information:***

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Project Website: http://www.nccma.vic.gov.au/Land/Dryland/BoostingSoilCarbon%28Kilter%29/index.aspx


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