Seagrass science report for LT3 (Thorneside, Redlands, Moreton Bay, QLD) November 2016.

Introduction

On 9th October, 2016 a small team as part of Reef Blitz undertook seagrass monitoring at Thorneside at Wildlife Queensland Coastal Citizen Science intertidal seagrass monitoring site LT3. LT3 is located within the LT3 seagrass meadow that extends from Tingalpa Creek to the entrance of Aquatic Paradise Canal Estate (See Figure 6).

Given difficult weather conditions two methodologies were undertaken. The standard Seagrass Watch methodology was applied to transect 2 only. At the completion of this transect and given the change in tide and weather conditions the team switched to the perimeter monitoring method. Results are shown in Figure 3 to Figure 6.

Methodology

Two methodologies were used at LT3, the Seagrass Watch and Perimeter methods. The methodology devised by Seagrass- Watch and utilised by citizen scientists in Moreton Bay is ideal as it is a simple and scientifically robust methodology. This methodology is based upon the collection of data about of seagrass, sediment and biological condition examined within a 50cm * 50cm quadrat placed every 5 metres along three parallel lines each 50m long by 25m apart (Figure 1).

Perimeter mapping of seagrass meadows uses smartphone technology to produce high definition geo-referenced digital imagery at regular 5metres increments along the perimeter of a seagrass meadow and including major gaps in that meadow. More specifically the perimeter methodology involves GPS recording around 250 x 250 metre square, boxing the study site. A study site will generally be located over an existing monitoring site that utilizes the Seagrass Watch methodology. When an edge of the seagrass meadow is encountered, the citizen scientist does not continue ‘boxing’ but follows the margin of the meadow. As the citizen scientist proceeds along the perimeter they record their observations of the type and condition of the seagrass and other environmental parameters (Figure 2).

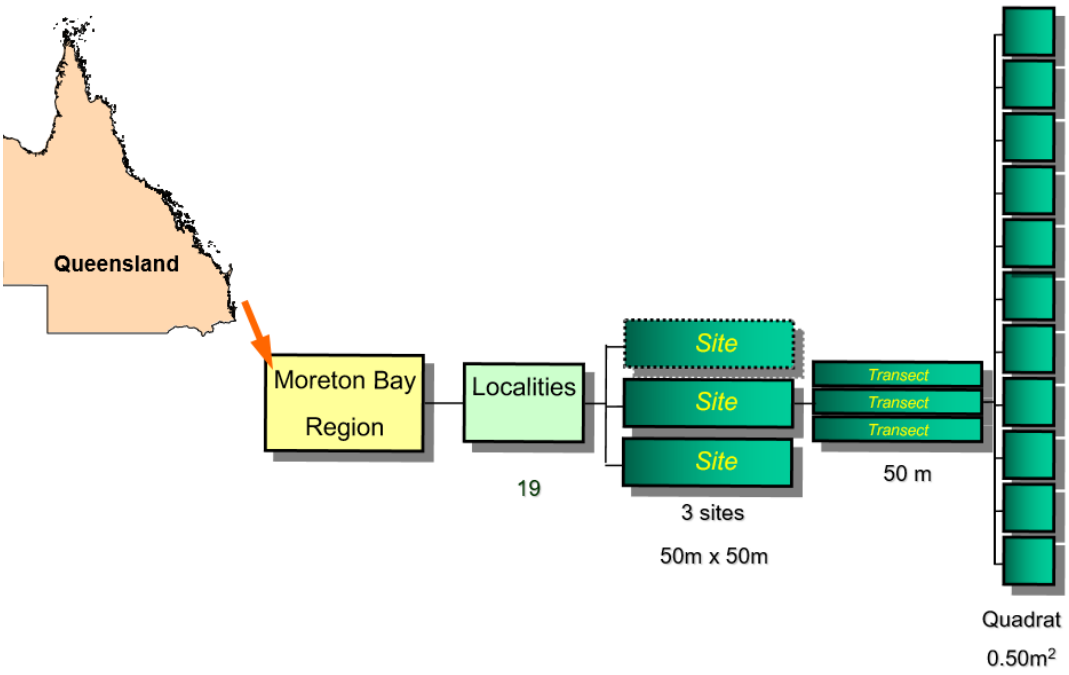


Figure 1: The Seagrass Watch methodology. Available at http://seagrasswatch.org/publications.html

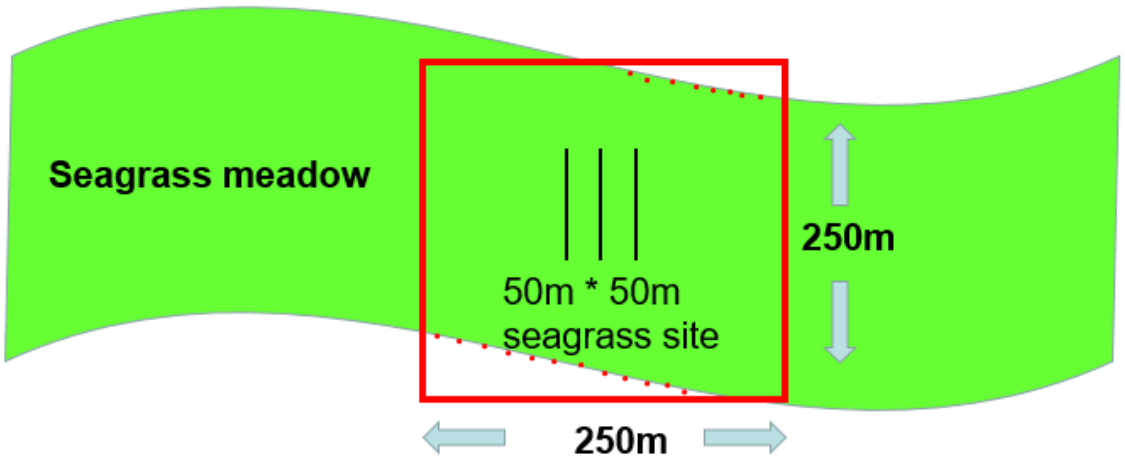


Figure 2: WQCCS Perimeter methodology.

Results

The results are shown in figure Figure 3 to Figure 6.

Figure 3 shows the area of interest, Thorneside Wildlife Queensland Coastal Citizen Science (WQCCS) site LT3.

The total percentage cover (34.41%) and species cover (*Zostera muelleri 100%*) as calculated by the quality assurance data entry process based on CPcE (Kohler and Gill, 2006) is shown in Figure 3. The Citizen Scientists found 32.45% seagrass comprised of 29.73% *Zostera muelleri* and 2.72% *Halophila ovalis* (Figure 3). This demonstrates the level of accuracy achievable using Citizen Scientists and the detail they can extract, more so than the automated analysis process that is used to help check on the quality of the citizen scientist data.

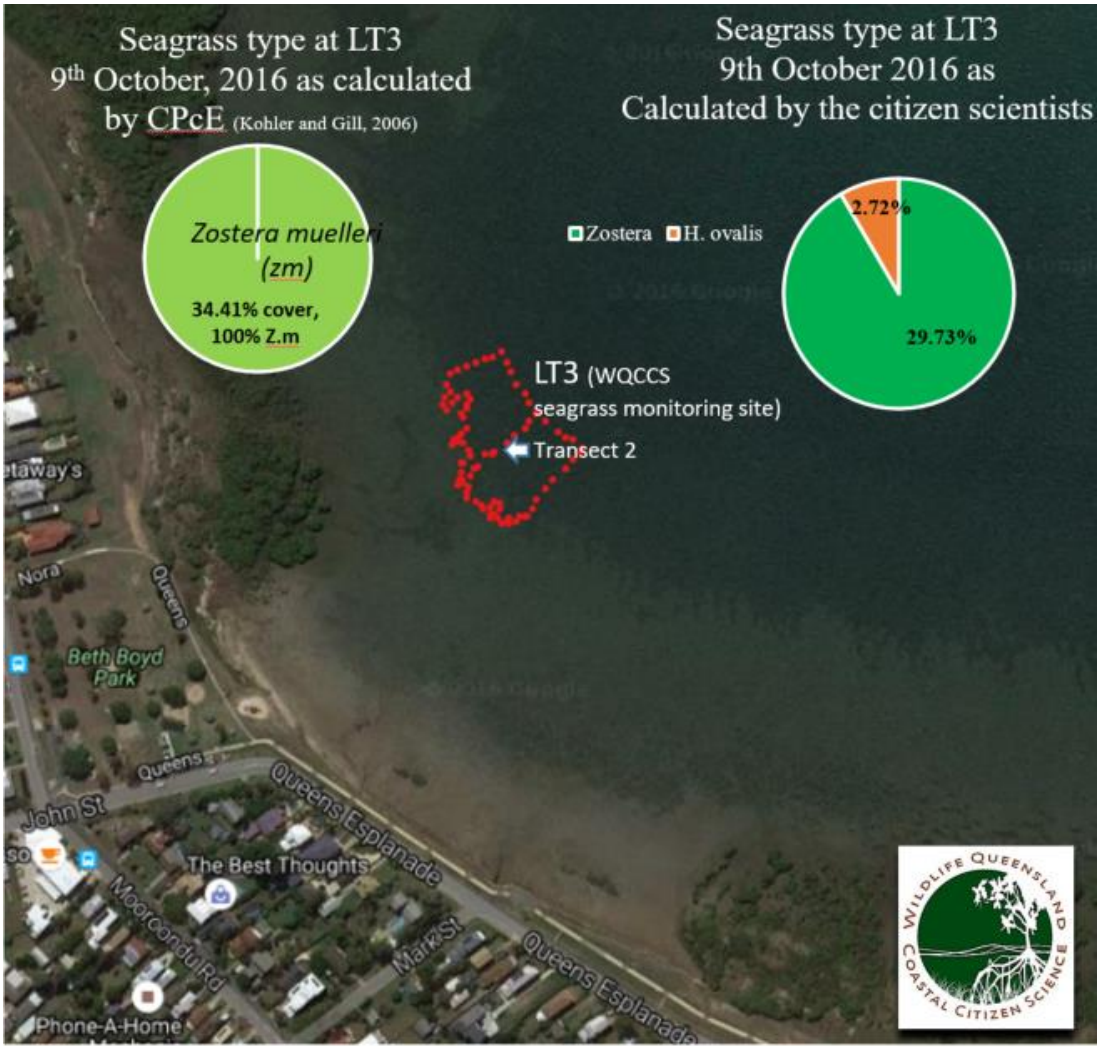


Figure 3: Area of interest. Thorneside, WQCCS seagrass monitoring site LT3.

Figure 4 shows the seagrass extent as identified using the LT3 data collected by citizen scientists and using it to guide the extraction of seagrass objects from an August 2016 Landsat 8 satellite image.

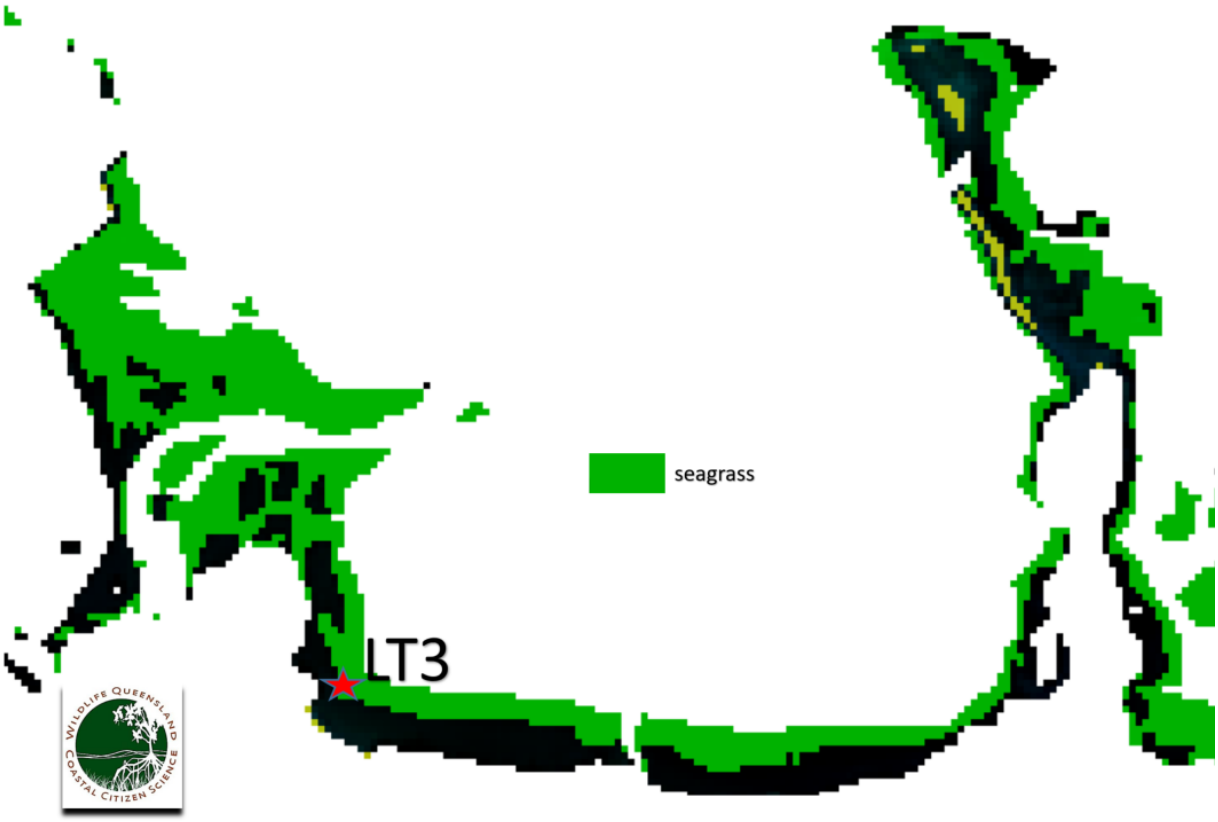
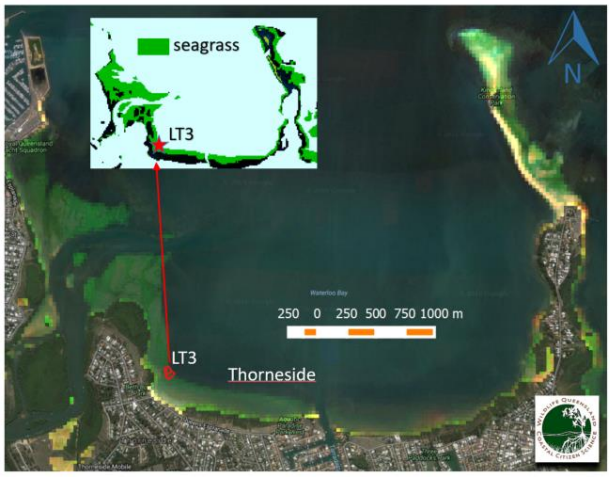
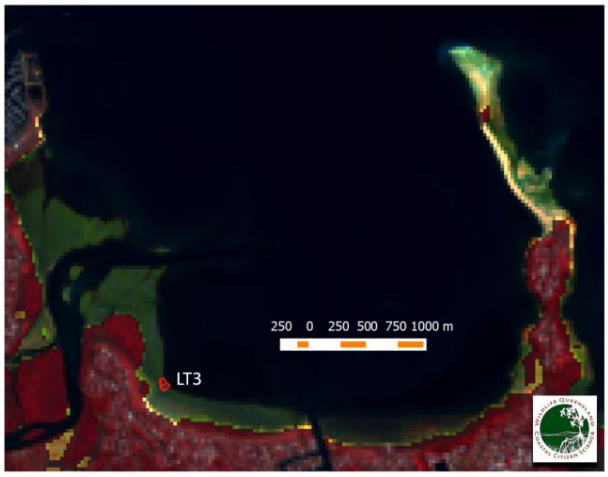


Figure 4: Seagrass extent (2016) from Manly / Mouth of Tingalpa Creek to Wellington Point. Using LT3 data and Landsat image.



2016 Seagrass extent for Thorneside environs. Background image: Google Imagery



2016 Seagrass cover for Thorneside environs. Background image: Landsat 8 false composite image. USGS products.

Figure 5: Seagrass extent from Manly/mouth of Tingalpa Creek to Wellington Point.

Seagrass at LT3 intertidal seagrass meadow has varied between 32.22ha and 80.28 ha from 1988 to 2016. In 2016 the LT3 seagrass meadow was covered 61.65ha of seagrass. The average seagrass cover for the LT3 monitoring site varies between 10% to 50% seagrass cover and is predominantly covered by *Zostera muelleri.* In October 2016 LT3 the Reef Blitz showed the site supported 34.41% seagrass cover and was dominated by *Zostera muelleri.*

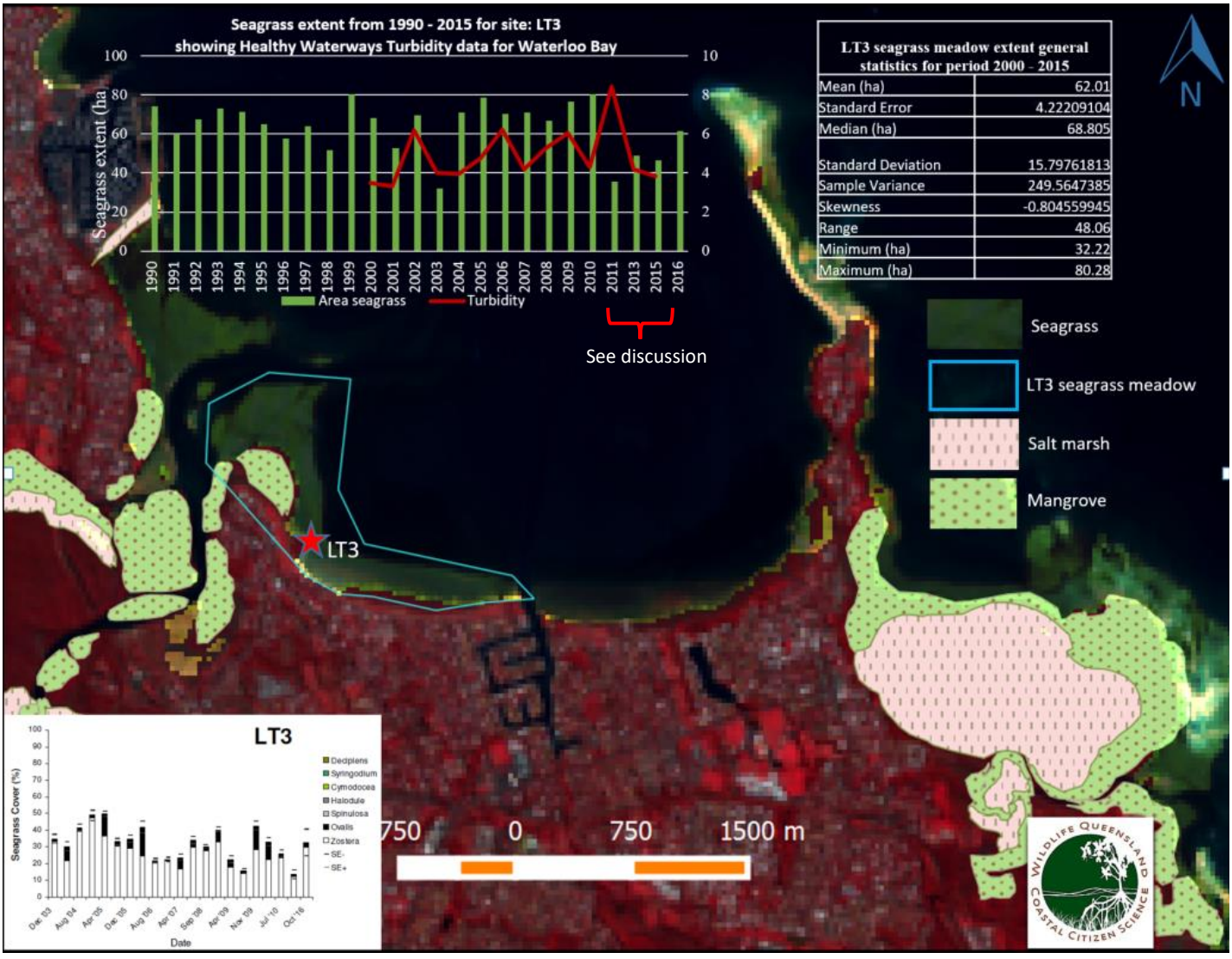


Figure 6: Long-term trend data showing coastal habitat from Manly/Tingalpa Creek to Wellington Point / Ormiston. Showing boundary of LT3 seagrass meadows (outlined in blue), the LT3 seagrass monitoring site (RED star). Historical seagrass cover for LT3 is shown, and seagrass extent (ha) trend data shown. Background imagery from Landsat 8 product of USGS.

Discussion

The LT3 seagrass meadow has been relatively stable until 2011. Turbidity data from Healthy Waterways was examined and no long-term relationship was found to exist between seagrass extent and turbidity at this site. This only suggests other variables were potentially the cause of seagrass decline. When the data was examined for the period 2010 - 2015 a moderate correlation ($r = -0.6336$) was found however no linear relation was found ($p = 0.4522$).

The site was noted to have undergone heavy commercial bait worming starting sometime in early 2009. There has been an approximately 55 - 40% loss of the Thorneside seagrass meadow recorded between 2011 – 2015 when compared to the seagrass extent in 2010 (80.28ha). The seagrass cover in 2016 is 61.65ha, which is 77% of the 2010 seagrass extent. Further, the seagrass % cover at LT3 had declined from 29.59% in 2010 to 13.58% in 2013 increasing to 34.41% in 2016.

Prior to changes to the Marine Parks (Moreton Bay) Zoning Plan 1997 commercial harvesting of blood worms (bait worming) was confined to four defined locations totaling 373ha of intertidal habitat (Skilleter, 2004). However, since 2009 harvesting has expanded into the General Use (46%) and Habitat Protection zones (30%) within the Marine Park. This represents 76% (340,000 ha) of the Marine Park area (DERM, 2010). The change in the harvestable area has meant significant areas of intertidal habitat are now potentially open to commercial bait worming. Until 2009 commercial bait worming in Moreton Bay was a relatively small scale operation (EPA, 2008) however, the harvesting scars are still visible in aerial and high resolution satellite imagery after many years.

A study supported by WQCCS showed that there has been a 30.5 ha increase in commercial bait worming activity within non-traditional bait worming areas from 2009 to 2013, 30.47 ha of the Thorneside seagrass meadow was impacted.

Further studies will be undertaken to determine the extent of commercial bait worming in the Thorneside seagrass meadow. However, it appears that seagrass has recovered to 77% (61.65ha) of seagrass extent as noted in 2010 (80.28ha). This is just short of the mean seagrass extent (62.01ha) for the period 1990 - 2016.

Reference

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