**Challenges to select suitable habitats and demonstrate ‘additionality’ in Blue Carbon projects: a seagrass case study**

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**Table S1**. Radiocarbon dating of the shells from the 12 cores used for this study. All radiocarbon dates were calibrated with CALIB software v.7.1 [1]. The reservoir effect (RE) affecting the ages was 71 years [2] and was accounted in the corrected ages (Cal years BP) were BP stands for ‘before the present’, set to AD 2014.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Site | Core ID | Depth | AMS Direct | Raw age | Age error | Calib 7.1 | Corrected age | Corrected age error | |
|  |  | cm | sample ID | (year BP) | (+/−) | Cal AD/BC | (Cal years BP-RE) | + | - |
| Resilient | 1Rs | 46.8 | D-AMS 010423 | 443 | 27 | − | − | − | − |
| 1Rs | 94.2 | D-AMS 010424 | 1813 | 30 | 449 Cal AD | 1400 | 165 | -117 |
| 1Rs | 163.6 | D-AMS 010425 | 46855 | 795 | − | − | − | − |
| 2Rs | 162.2 | D-AMS 010412 | 20651 | 99 | 22636 Cal BC | 24354 | 296 | -326 |
| 3Rs | 107.0 | D-AMS 010420 | 1466 | 30 | 788 Cal AD | 1055 | 171 | -144 |
| Recovered | 1Rc | 159.7 | D-AMS 010413 | 48457 | 937 | − | − | − | − |
| 2Rc | 120.8 | D-AMS 010419 | 1482 | 36 | 774 Cal AD | 1072 | 168 | -148 |
| 3Rc | 36.1 | D-AMS 010400 | 419 | 24 | − | − | − | − |
| 3Rc | 85.4 | D-AMS 010401 | 1875 | 27 | 417 Cal AD | 1460 | 137 | -123 |
| 3Rc | 139.8 | D-AMS 010402 | 3633 | 30 | 1722 Cal BC | 3568 | 168 | -151 |
| 4Rc | 130.1 | D-AMS 010417 | 2855 | 32 | 778 Cal BC | 2638 | 154 | -200 |
| 5Rc | 111.9 | D-AMS 010418 | 5061 | 33 | 3612 Cal BC | 5453 | 173 | -130 |
| 6Rc | 32.9 | D-AMS 010426 | 638 | 26 | 1535 Cal AD | 311 | 168 | -181 |
| 6Rc | 93.6 | D-AMS 010427 | 4107 | 31 | 2385 Cal BC | 4185 | 214 | -199 |
| 6Rc | 148.7 | D-AMS 010353 | 12491 | 53 | 12186 Cal BC | 14010 | 190 | -191 |
| Bare | 1B | 176.0 | D-AMS 010406 | 51765 | 1162 | − | − | − | − |
| 2B | 160.0 | D-AMS 010405 | 53959 | 1527 | − | − | − | − |
| 3B | 37.8 | D-AMS 010397 | 3663 | 28 | 1751 Cal BC | 3602 | 163 | -166 |
| 3B | 78.6 | D-AMS 010398 | 2264 | 28 | 278 Cal AD | 1903 | 389 | 53 |
| 3B | 160.0 | D-AMS 010399 | 5502 | 29 | 4044 Cal BC | 5910 | 148 | -173 |

**Table S2.** Statistical report of the Kruskal-Wallis (K-W) test for the top 20 cm (a) and 100 cm (b) of seagrass soil. Rs = Resilient meadows; Rc = Recovered meadows; B = Bare soil; N = number of samples

**a)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| K-W test | Density (g cm-3) | | | Corg (%) | | | 13C (‰) | | | Corg stock (kg m-2) | | |
| Rs | Rc | B | Rs | Rc | B | Rs | Rc | B | Rs | Rc | B |
| N | 3 | 6 | 3 | 3 | 6 | 3 | 3 | 6 | 3 | 3 | 6 | 3 |
| Mean Rank | 6.0 | 5.7 | 8.7 | 6.7 | 7.3 | 4.7 | 7.7 | 6.7 | 5.0 | 6.3 | 7.2 | 5.3 |
| *H*-value | 1.5 | | | 1.1 | | | 0.8 | | | 0.5 | | |
| *p*-value | 0.5 | | | 0.6 | | | 0.7 | | | 0.8 | | |

**b)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| K-W test | Density (g/cm-3) | | | Corg (%) | | | 13C (‰) | | | Corg stock (kg m-2) | | |
| Rs | Rc | B | Rs | Rc | B | Rs | Rc | B | Rs | Rc | B |
| N | 3 | 6 | 3 | 3 | 6 | 3 | 3 | 6 | 3 | 3 | 6 | 3 |
| Mean Rank | 5.3 | 5.7 | 9.3 | 8.0 | 7.0 | 4.0 | 9.3 | 5.7 | 5.3 | 9.0 | 6.3 | 4.3 |
| *H*-value | 2.5 | | | 2.1 | | | 2.5 | | | 2.5 | | |
| *p*-value | 0.3 | | | 0.4 | | | 0.3 | | | 0.3 | | |

**Table S3.** Fetch and wave energy data for False Bay (FB), Oyster Harbour (OH) and Port Pirie (PP). Fetch is reported for each wind (North=N, East=E, South=S and West=W) and as average of the dominant winds in the sampling site. *P. australis* and *P. sinuosa*: *Posidonia australis* and *Posidonia sinuosa*.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Core ID** | **Location** | **Species** | **Latitude** | **Longitude** | **Water depth (m)** | **Quadrants of dominant wind** | **Fetch (km)** | | | | | **Wave energy (kW/m)** |
| **N** | **E** | **S** | **W** | **Average dominant wind** |
| 1B | FB | unvegetated | -32.9982 | 137.6212 | 5 | S | 2.6 | 22 | 92 | 1.1 | 92 | 1.4 |
| 2B | FB | unvegetated | -32.9982 | 137.6212 | 5 | S | 2.6 | 22 | 92 | 1.1 | 92 | 1.4 |
| 3B | FB | unvegetated | -32.9982 | 137.6212 | 5 | S | 2.6 | 22 | 92 | 1.1 | 92 | 1.4 |
| 1Rc | FB | *P. australis* | -33.0083 | 137.6095 | 5 | S | 1.6 | 22 | 61 | 0.6 | 61 | 0.8 |
| 2Rc | FB | *P. australis* | -33.0083 | 137.6095 | 5 | S | 1.6 | 22 | 61 | 0.6 | 61 | 0.8 |
| 3Rc | FB | *P. australis* | -33.0083 | 137.6095 | 5 | S | 1.6 | 22 | 61 | 0.6 | 61 | 0.8 |
| 4Rc | FB | *P. australis* | -32.9982 | 137.6212 | 5 | S | 2.6 | 22 | 92 | 1.1 | 92 | 1.4 |
| 5Rc | FB | *P. australis* | -32.9982 | 137.6212 | 5 | S | 2.6 | 22 | 92 | 1.1 | 92 | 1.4 |
| 6Rc | FB | *P. australis* | -32.9982 | 137.6212 | 5 | S | 2.6 | 22 | 92 | 1.1 | 92 | 1.4 |
| 1Rs | FB | *P. australia + P. sinuosa* | -32.9795 | 137.6720 | 5 | S | 2.8 | 11 | 21 | 6.0 | 21 | 0.2 |
| 2Rs | FB | *P. australia + P. sinuosa* | -32.9796 | 137.6720 | 5 | S | 2.8 | 11 | 21 | 6.0 | 21 | 0.2 |
| 3Rs | FB | *P. australia + P. sinuosa* | -32.9796 | 137.6720 | 5 | S | 2.8 | 11 | 21 | 6.0 | 21 | 0.2 |
| F | OH | *P. australis* | -34.9809 | 117.9595 | 3 | S, E & W | 3.1 | 2 | 1.8 | 1.7 | 1.8 | 0.005 |
| #D | OH | *P. australis* | -34.9809 | 117.9595 | 1.5 | S, E & W | 3.1 | 2 | 1.8 | 1.7 | 1.8 | 0.005 |
| #E | OH | *P. australis* | -34.9809 | 117.9595 | 1.5 | S, E & W | 3.1 | 2 | 1.8 | 1.7 | 1.8 | 0.005 |
| #V | OH | *P. australis* | -34.9829 | 117.9750 | 1.5 | S, E & W | 2.4 | 0.5 | 1.2 | 3.0 | 1.6 | 0.004 |
| #W | OH | *P. australis* | -34.9826 | 117.9745 | 1.5 | S, E & W | 2.4 | 0.6 | 1.3 | 3.0 | 1.6 | 0.004 |
| #X | OH | *P. australis* | -34.8939 | 118.3333 | 1.5 | S, E & W | 0 | 0.1 | 0.1 | 0.2 | 0.1 | 0.0002 |
| AK | OH | *P. australis* | -34.9829 | 117.9741 | 1.5 | S, E & W | 2.5 | 0.6 | 1.2 | 3.0 | 1.6 | 0.004 |
| AJ | OH | unvegetated | -34.9832 | 117.9745 | 3 | S, E & W | 2.5 | 0.6 | 1.2 | 3.0 | 1.6 | 0.004 |
| 6Rev-94 | OH | *P. australis* | -34.9828 | 117.9750 | 1.5 | S, E & W | 2.4 | 0.5 | 1.2 | 3.0 | 1.6 | 0.004 |
| 60om | OH | *P. australis* | -34.9714 | 117.9707 | 1.5 | S, E & W | 2.0 | 0.8 | 2.5 | 2.7 | 2.0 | 0.006 |
| 73sand | OH | unvegetated | -34.9720 | 117.9715 | 1.5 | S, E & W | 1.9 | 0.7 | 2.4 | 2.8 | 2.0 | 0.006 |
| A12 | PP | *P. australis* | -33.11624 | 137.9668 | 4 | S | 21.7 | 6.3 | 3.6 | 39.4 | 3.6 | 0.02 |
| A13 | PP | *P. australis* | -33.11624 | 137.9668 | 4 | S | 21.7 | 6.3 | 3.6 | 39.4 | 3.6 | 0.02 |
| A15 | PP | *P. australis* | -33.11624 | 137.9668 | 4 | S | 21.7 | 6.3 | 3.6 | 39.4 | 3.6 | 0.02 |

**References**

1. Stuiver M, Reimer PJ, Reimer RW. 2018 CALIB 7.1. See http://calib.org (accessed on 13 January 2018).

2. Bowman GM. 1985 Oceanic reservoir correction for marine radiocarbon dates from Northwestern Australia. *Aust. Archaeol.* **20**, 58–67.