**SUPPLEMENTARY TABLES**

**Table S1.** Sources of aerial images used to estimate the extent of the main subtidal seagrass beds of the eastern Bay of Islands. (‘Aerial’ images were also taken to include a few from highpoints overlooking beds.) Whi, Whites Aviation Ltd photograph with National Library of New Zealand reference; RNZAF, Royal New Zealand Air Force reference (held by Air Force Museum of New Zealand); 1951 (SN 209), images part of NZ Aerial Mapping Ltd (NZAM) Survey No. 209; 1959 (SN 1223), images part of NZAM Survey No. 1223; 1961 (SN 1223), images part of NZAM Survey No. 1223; 1971 (SN 3406), images part of NZAM S.N. 3406; 1972 (SN 3406), images part of NZAM S.N. 3406; 1978 (SN 5006), images part of NZAM S.N. 5006; 1980 (SN 5651), images part of NZAM S.N. 5651; 1981 (SN 5932A), images part of NZAM S.N. 5932A; Walls, Walls (1987); NRC, Northland Regional Council image; Kerr, image held by Kerr & Associates, Kamo; Salt, image held by Salt Air Paihia; Harte, Mountain Harte et al. (2010); OS 20/20, November 2009 Ocean Survey 20/20 aerial images (NZAM SN50765X); Wri, Dean Wright Photography, Kerikeri. Waipao takes in Wai-iti; Kaingahoa takes in Te Tawa. (Kaing, Kaingahoa; Kaima, Kaimarama; Haha, Hahangarua; Kapura, Kapurarahurahu; Urupuk, Urupukapuka)

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Bay** | **193?/1939**  **(Whi)** | **1942/1947**  **(RNZAF/ Whi)** | **1950**  **(Whi)** | **1951**  **(SN 209)** | **1952/53 (Whi)** | **1955/58**  **(Whi)** | **1959**  **(SN 1223)** | **1961**  **(SN 1223)** | **1971**  **(SN 3406)** | **1972 (SN 3406)** | **1973**  **(Whi)** | **1978 (SN 5006)** | **1980**  **(SN 5651)** |
| **1 Otarepo** | - | 235 A1 | - | 543-16 | - | - | 2789-3 | 2606-1 | 4479-15 | - | 1404906 | 5006 J2 | 5651 J2 |
| **2 Lagoon** | 1367622 | 235 A3 | 1419850 | 543-16 | - | - | 2789-3 | 2606-1 | 4479-15 | - | 1404906 | 5006 J2 | 5651 J2+ |
| **3 Waipao** | - | 138 A5 | - | 542-16 | - | - | 2789-2 | 2606-1 | 4478-16 | - | - | 5006 J2+ | 5651 J4+ |
| **4 Opunga** | - | 138 A5 | - | 542-16 | - | - | 2789-2 | 2606-1 | 4478-16 | - | - | 5006 J2 | 5651 J4+ |
| **5**  **Haha** | - | 138 A5 | - | 542-16 | - | - | 2789-2 | 2606-1 | 4478-16 | - | - | 5006 J2 | 5651 J4+ |
| **9**  **Otiao** | - | - | - | 542-19 | - | - | 2789-1 | 2607-1 | 4478-19 | 4477-24 | - | 5006 J2 | 5651 J6 |
| **10 Oneura** | WA-03198-G | WA-04655(&9)-F | WA-23783-F | 542-19 | - | - | 2789-1 | 2607-1 | 4478-19 | - | - | 5006 J2 | 5651 J6 |
| **11 Otehei** | WA-03198-G | WA-04655(&9)-F | 1419860+ | 542-19 | WA-30579-F/1458962 | WA-45131 & 9 | 2789-1 | 2607-1 | 4478-19 | - | - | 5006 J2+ | 5651 J6+ |
| **13 Kapura** | - | - | 1419859+ | 542-19 | - | WA-39655-F | 2789-1 | 2607-1 | 4478-19 | - | - | 5006 J3+ | 5651 J6+ |
| **14 Urupuk** | WA-03198-G | WA-04655(&59)-F | 1419790+ | 542-19 | - | - | 2789-1 | 2607-1 | 4478-19 | - | - | 5006 J2+ | 5651 J6+ |
| **15 Kaima** | - | - | - | 542-21 | - | 1269872 | 2791-2 | 2607-1 | 4478-23 | - | - | 5006 J2+ | 5651 J8+ |
| **16 Hauai** | - | - | 1419855 | 542-21 | - | 1269872 | 2791-2 | 2607-1 | 4478-23 | - | - | 5006 J2+ | 5651 J8+ |
| **18 Kaing** | - | - | - | 543-23 | - | 1246361 | 2791\_2 | 2607-1 | - | 4479-23 | - | 5006 J2+ | 5651 J8+ |

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| **Bay** | **1981**  **(SN 5932A)** | **1985**  **(Whi)** | **1987**  **(Whi)** | **1987 (Walls)** | **1993**  **(NRC/Kerr)** | **2000 (NRC)** | **2003**  **(Harte)** | **2005/06 (Kerr/NRC)** | **2009**  **(OS20/20)** | **2011**  **(Salt)** | **2014-16 (NRC)** | **2017**  **(Wri)** |
| **1 Otarepo** | 5932A I42 | 1429867 | 1434804+ | - | √ | √ | - | DSC\_0686 | AV30-3645/46 | 110+ | √ | DW80312 |
| **2 Lagoon** | 5932A I42 | - | - | √ | √ | √ | - | DSC\_0690 | AV30-3647/48 | 102+ | √ | DW80304 |
| **3 Waipao** | 5932A I44 | - | - | √ | √ | √ | - | - | AV30-3501 | - | √ | DW80293 |
| **4 Opunga** | 5932A I44 | - | - | √ | √ | √ | - | - | AV30-3502 | 093 | √ | DW80283 |
| **5**  **Haha** | 5932A I44 | - | - | √ | √ | √ | - | - | AV30-3502 | 093 | √ | DW80283 |
| **9**  **Otiao** | 5932A I44 | - | - | √ | √ | √ | - | √ | AV30-3307/08 | 066 | √ | DW80249 |
| **10 Oneura** | 5932A I45 | WA-78090-F | 1435052+ | - | √ | √ | - | √ | AV30-3409 | - | √ | DW80245 |
| **11 Otehei** | 5932A I45 | 1429874+ | 1435053+ | - | √ | √ | - | √ | AV30-3409 | - | √ | DW80239 |
| **13 Kapura** | 5932A I46+ | 1429875+ | - | √ | - | √ | - | √ | AV30-3509/10 | - | - | DW80233 |
| **14 Urupuk** | 5932A I45 | 1429879+ | 1435050 | √ | √ | √ | √ | √ | AV30-3410/11 | - | √ | DW80221 |
| **15 Kaima** | 5932A I45+ | - | 1435064 | - | √ | √ | - | √ | AV30-3414 | 022 | √ | DW80218 |
| **16**  **Hauai** | 5932A I45+ | - | 1435062+ | - | √ | √ | - | √ | AV30-3515 | 022 | √ | - |
| **18**  **Kaing** | 5932A I45+ | - | 1435057 | - | √ | √ | - | √ | AV30-3614 | - | √ | DW80203 |

**Table S2.** Area\*% (ha) of the 12 major plus enduring (and three other - small/ephemeral) subtidal seagrass beds in the Bay of Islands by year. Blank, no data

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **MAINLAND** | **1935** | **1939** | **1942** | **1947** | **1950** | **1951** | **1953** | **1955** | **1959** | **1961** | **1971** | **1972** | **1973** |
| **15 Kaimarama** | |  |  |  |  | 1.0528 |  | 7.4173 | 5.7275 | 7.004 | 9.5997 |  |  |
| **16 Hauai** |  |  |  |  | 0 | 0.1935 |  | 0.108 | 7.763 | 12.4887 | 11.1172 |  |  |
| **18 Kaingahoa** | |  |  |  |  | 0 |  | 0 | 3.7359 | 4.0584 |  | 18.0424 |  |
| **S-FACING** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **1 Otarepo** |  |  | 0 |  |  | 0 |  |  | 0 | 0 | 0.1219 |  | 0.7854 |
| **2 Lagoon** | **0** |  | 0.3344 |  | 0.3713 | 0.2642 |  |  | 0.3111 | 0.2658 | 0.3733 |  | 0.2878 |
| **3 Waipao** |  |  | 0 |  |  | 0 |  |  | 0.0412 | 0.1164 | 1.0975 |  |  |
| **13 Kapurarahurahu** | |  |  |  | 0.0096 | 0 |  | 0 | 0 | 0 | 0.9171 |  |  |
| **14 Urupukapuka** | |  |  | 0 | 0 | 0 |  |  | 1.2861 | 3.9795 | 11.9087 |  |  |
| **E-FACING** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **4 Opunga** |  |  | 0 |  |  | 0 |  |  | 0.0878 | 0.1367 | 0.3057 |  |  |
| **5 Hahangarua** | |  | 0 |  |  | 0.0959 |  |  | 0.6722 | 0.6976 | 0.4139 |  |  |
| **W-FACING** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **9 Otiao** |  |  |  |  |  | 0 |  |  | 9.1783 | 14.1593 | 16.7557 | 17.2063 |  |
| **10 Oneura** |  | 0 |  | 0 | 0 | 0 |  |  | 0.3911 | 0.5552 | 0.0467 |  |  |
| **OTHER** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **6 Awaawaroa** |  |  |  |  |  |  | 0.0172 | 0 | 0 | 0.0244 | 0.051 | 0 | 0 |
| **7 Otupoho** |  |  |  |  |  | 0.0188 |  |  | 0.1943 | 0.0973 | 0.2707 |  |  |
| **11 Otehei** |  |  |  |  | 0.1955 | 0 | 0 |  | 0 | 0 | 0.0845 |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **1978** | **1980** | **1981** | **1985** | **1987** | **1993** | **2000** | **2003** | **2005** | **2009** | **2011** | **2015** | **2017** |
| **15** | 3.7019 | 2.9312 | 2.9199 |  | 3.5663 | 0.3834 | 0.031 |  | 0.3084 | 0.0709 | 1.493 | 2.5181 | 4.1646 |
| **16** | 8.8309 | 9.9158 | 12.3179 |  | 8.146 | 3.5578 | 0.7658 |  | 0.5652 | 0.8278 | 0.4658 | 2.3736 |  |
| **18** | 11.2821 | 10.2024 | 12.1699 |  | 10.6438 | 6.5838 | 4.2338 |  | 2.2721 | 0 |  | 10.6854 | 11.4694 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **1** | 1.4882 | 1.7732 | 1.8747 | 1.9727 | 2.2334 | 1.181 | 1.0208 |  | 0.9575 | 1.2524 | 1.3773 | 1.202 | 1.9094 |
| **2** | 0.8283 | 1.1852 | 0.7932 |  | 0.3655 | 0.4346 | 0.2692 |  | 0.4807 | 0.4142 | 0.5841 | 0.3518 | 0.6036 |
| **3** | 1.6322 | 1.7997 | 1.7849 |  | 1.7849 | 1.3445 | 1.6789 |  |  | 1.1552 |  | 1.0034 | 1.6994 |
| **13** | 1.239 | 0.5886 | 0.9976 | 0.5273 | 0.9637 | 0.1577 | 0.1245 |  | 0 | 0.3904 |  | 0.7003 | 0.6719 |
| **14** | 0.4746 | 2.5633 | 3.3454 | 6.3303 | 9.2014 | 0.7154 | 3.7762 | 2.4223 | 4.094 | 11.9966 |  | 11.7153 | 7.6007 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **4** | 0.4266 | 0.3541 | 0.5834 |  | 0.3541 | 0.0649 | 0.0402 |  |  | 0.0131 | 0.0683 | 0.1534 | 0.4759 |
| **5** | 0.614 | 0.6449 | 0.6269 |  | 0.6449 | 0 | 0.1178 |  |  | 0.0447 | 0.0472 | 0.3333 | 0.3406 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **9** | 12.5864 | 10.6633 | 11.9703 |  | 10.0821 | 6.484 | 13.2206 |  | 13.1215 | 14.1462 | 17.3828 | 14.0725 | 17.419 |
| **10** | 0.2457 | 0.5978 | 0.7777 | 0.5373 |  | 1.0626 | 0.6575 |  |  | 0.8665 |  | 1.3173 | 1.3789 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **6** | 0 | 0.0572 | 0 | 0 | 0 | 0 | 0 |  |  | 0.0059 | 0.0049 | 0.0331 | 0.066 |
| **7** | 0.0641 | 0.2722 | 0.2124 |  | 0.2722 | 0.013 |  |  |  | 0 | 0 | 0 | 0.0019 |
| **11** | 0.7253 | 0.7336 | 0.868 | 0.7755 | 0.5264 | 0.162 | 0 |  | 0 | 0 |  | 0 | 0.0407 |

**Table S3.** *rho* values for Spearman Rank Correlation Coefficient comparisons of Area\*% seagrass cover of beds according to direction faced, with level of significance (\*, *P* < 0.1; \*\*, *P* < 0.05; \*\*\*, *P* < 0.01). (Kaing, Kaingahoa; Kaima, Kaimarama; Haha, Hahangarua; Kapura, Kapurarahurahu; Urupuk, Urupukapuka)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **W-facing** | | | | **S-facing** | | | | | | **E-facing** | |
|  | **Mainland** | | **Islands** |  | **Mainland** | **Islands** | | | | **Islands** | |
|  | **18 Kaing** | **16 Hauai** | **10 Oneura** |  | **15 Kaima** | **1 Otarepo** | **2 Lagoon** | **3 Waipao** | **14 Urupuk** |  | **4 Opunga** |
| **16 Hauai** | 0.733\*\*\* |  |  | **1 Otarepo** | -0.096 |  |  |  |  | **5 Haha** | 0.578\*\* |
| **10 Oneura** | 0.201 | -0.091 |  | **2 Lagoon** | -0.123 | 0.716\*\*\* |  |  |  |  |  |
| **9 Otiao** | 0.450\*\* | 0.309 | 0.229 | **3 Waipao** | -0.213 | 0.801\*\*\* | 0.613\*\*\* |  |  |  |  |
|  |  |  |  | **14 Urupuk** | -0.036 | 0.390\*\* | 0.076 | 0.049 |  |  |  |
|  |  |  |  | **13 Kapuha** | 0.328\* | 0.622\*\*\* | 0.466\*\* | 0.571\*\* | 0.420\*\* |  |  |