**Table S1.** Details of collection locations, methods and depths from Balleny & Scott Islands, and the inner and outer Ross Sea. Reference specimens are either deposited at Te Papa (WELT number format Axxxxxx, e.g., A023616) or are held at NIWA (all other numbers). Where available GenBank numbers are included in the Species collected column.

| **Location** | **Ref #** | **Voyage** | **Station** | **Collection date** | **Collection method** | **Depth (m)** | **Latitude (˚S)** | **Longitude**  **(˚E)** | **Species collected** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Balleny Islands & Scott Island** | | | | | | | | | |
| Young Island | A023616  A023591  ASJ366 | TAN0402 | 257 | 5-Mar-04 | Trawl | 1261-1395 | 66.216167 | 162.4415 | *Desmarestia menziesii Ballia* sp.  *Georgiella confluens* |
| Young Island | ASJ369  ASJ370A  ASJ370B  ASJ368  ASJ372  ASJ371 | TAN0402 | 258 | 5-Mar-04 | Sled | 1505-1570 | 66.219667 | 162.4813333 | *Desmarestia menziesii Himantothallus grandifolius Palmaria decipiens* Halymeniaceae *Plocamium* sp. |
| Young Island | A023602 | TAN0402 | 254 | 5-Mar-04 | Trawl | 720-985 | 66.359833 | 162.5418333 | *Himantothallus grandifolius* |
| Young Island | A025995  A025987  A025997  A025996  A025989  A025990  A025998  A025988  A025999/B  A025999/A  A026000/A  A026000/B  A026000/C  A026000/D | TAN0102 | K0809 | Feb-01 | Dredge | 238-292 | 66.488 | 162.369 | *Desmarestia menziesii Himantothallus grandifolius Georgiella confluens Notophycus fimbriatus* |
| Young Island | A023677  A023674  A023657  A023626  A023673  A023606  ASJ408A  ASJ402  ASJ403  ASJ404  ASJ406  ASJ409  ASJ413  ASJ414  ASJ417 | TAN0602 | 448 | 11-Mar-06 | Sled | 85-63 | 66.556816 | 162.5698333 | *Himantothallus grandifolius Desmarestia menziesii*  *Ballia* sp.  *Palmaria decipiens Pterothamnion* sp.  *Antarcticothamnion polysporum*  *Georgiella confluens Phyllophora antarctica* Halymeniaceae  *Plocamium* sp. |
| Young Island | A023609 | TAN0402 | 249 | 5-Mar-04 | Trawl | 555-574 | 66.558333 | 163.018 | *Himantothallus grandifolius* |
| Young Island | A023589  A023655  A023668  A023682  ASJ357  ASJ361  ASJ363 | TAN0402 | 245 | 5-Mar-04 | Sled | 378-380 | 66.675167 | 162.757 | *Desmarestia menziesii Himantothallus grandifolius Ballia* sp*.*  *Palmaria decipiens Georgiella confluens*  *“Pugetia” Phyllophora antarctica Plocamium* sp. |
| Young Island | A023603 | TAN0402 | 246 | 5-Mar-04 | Trawl | 377-383 | 66.6815 | 162.783 | *Himantothallus grandifolius* |
| Borradaile Island, east | A023698 | TAN0602 | 447 | 11-Mar-06 | Sled | 130-74 | 66.48165 | 162.7108167 | *Ballia* sp*.*  *Palmaria* *decipiens* *Plocamium* sp. |
| Borradaile Island | A023695  A023631  A023594  A023638  A023652  A023687  A023666  A023618  A023671  A023675  A023659  A023628  ASG434A  ASG436  ASG435  ASG440 | Tiama | Wendy's Rock | 22-Feb-06 | Dive | 15 | 66.531167 | 162.72195 | *Desmarestia menziesii Ballia* sp. *Antarcticothamnion polysporum*  *Georgiella confluens Phycodrys antarctica* Delesseriaceae *Notophycus fimbriatus "Pugetia"*  *Phyllophora antarctica* (GQ323775)  *Phyllophorella* sp. (ON211594)  *Plocamium* sp. (ON211594) *Hymenocladiopsis* sp. *Rhodymenia* sp. |
| Borradaile Island | A023577  A023601  A023648  A023623  A023619  A023685  A023663  A023680  A023664  A023661  A023660  A023662  A023665  A023583  A023639  A023642 | Tiama | Landing | 15-Feb-06 | Dive | 14 | 66.59325 | 162.6941667 | *Monostroma hariotii Elachista antarctica Desmarestia menziesii Himantothallus grandifolius* Dumontiaceae(ON211589)  *Ballia* sp. (GQ323777) *Tethysphytum antarcticum* (GQ323782, GQ323776) *Palmaria decipiens* (ON211587) *Antarcticothamnion polysporum*  *Georgiella confluens Iridaea* sp.  *Phyllophora antarctica* *Plocamium* sp. |
| Buckle Island | A023636  A023608  A023679  A023667  A023620  A023684  A023592 | TAN0602 | 430 | 9-Mar-06 | Sled | 70-120 | 66.69665 | 163.1838333 | *Desmarestia menziesii Himantothallus grandifolius Antarcticothamnion polysporum*  *Iridaea* sp. Halymeniaceae  *Plocamium* sp. *Trematocarpus*? |
| Buckle Island | A023669  A023672  ASJ392 | TAN0602 | 436 | 10-Mar-06 | Sled | 772 | 66.601817 | 163.08965 | *“Pugetia”*  Halymeniaceae  *Plocamium* sp. |
| Buckle Island | A023678  A023607  ASJ393  ASJ395B | TAN0602 | 442 | 10-Mar-06 | Sled | 140-150 | 66.75615 | 163.06015 | *Desmarestia menziesii*  *Himantothallus grandifolius Palmaria decipiens*  Halymeniaceae |
| Buckle Island | A027861/A  A027861/B  A027861/C | Tiama | Cape McNab | 18-Feb-06 | Dive | 0 | 66.887517 | 163.29615 | *Prasiola crispa* |
| Buckle Island | A023615  A023629  A023617  A023622  A023686  A023643  A023653  A023595 | Tiama | Scott Cove | 18-Feb-06 | Dive | 15 | 66.8792 | 163.2973833 | *Lambia antarctica Desmarestia menziesii Ballia* sp.  *Palmaria decipiens Antarcticothamnion polysporum Georgiella confluens Phyllophora antarctica Plocamium* sp.  *Rhodymenia* sp. |
| Sturge Island | A023625  ASJ373B  ASJ374B | TAN0602 | 420 | 8-Mar-06 | Sled | 103-108 | 67.231317 | 164.7115 | *Desmarestia menziesii Georgiella confluens* |
| Sturge Island, east | A023630  ASJ376 | TAN0602 | 422 | 8-Mar-06 | Sled | 315-288 | 67.204317 | 164.761 | *Ballia* sp*.*  *Georgiella confluens* |
| Sturge Island | A023658  A023670  A023676  A023637  A023593  A023641  A023624  A023621  A023612  A023600  A023627  A023614 | Tiama | Cape Smythe | 19-Feb-06 | Dive | 15 | 67.616667 | 164.666667 | *Antarctosaccion applanatum Geminocarpus geminatus Desmarestia menziesii Palmaria decipiens Antarcticothamnion polysporum Georgiella confluens Notophycus fimbriatus Phyllophora antarctica* Halymeniaceae *Plocamium* sp.  *Rhodymenia* sp. |
| Sturge Island | A025992  A025994  A025991  A025993 | TAN0102 | K0807 | Feb-01 | Dredge | 134-148 | 67.568 | 164.9583 | *Desmarestia menziesii Georgiella confluens Phycodrys antarctica*  *“Pugetia”* |
| S-100 | ASJ433 | TAN0402 | 228 | 4-Mar-04 | Grab | 99 | 67.422167 | 163.916667 | NGC indet. |
| S-100 | ASJ356 | TAN0402 | 232 | 4-Mar-04 | Sled | 96-117 | 67.420167 | 163.9428333 | *Phycodrys antarctica* |
| Scott Island | A023590  ASJ419 | TAN0802 | 247 | 7-Mar-08 | Sled | 150-137 | 67.3875 | 179.8971667 | *Desmarestia menziesii Palmaria decipiens* |
| **Outer Ross Sea** | | | | | | | | | |
| Cape Adare | A023579  ANT096  ANT099  ANT100 | Italica | IT 17, 18, 19,23,24 | 15-Feb-04 | Dredge | 230.0 | 71.307617 | 170.482967 | *Desmarestia menziesii Palmaria decipiens Phycodrys antarctica Phyllophora antarctica* |
| Cape Adare | A023645  A023640  A023578 | Italica | IT 20, 21, 22 | 15-Feb-04 | Dredge | 421.6 | 71.289733 | 170.65335 | *Desmarestia menziesii Palmaria decipiens* (ON211588) *Phycodrys antarctica Phyllophora antarctica* |
| Cape Adare | A023647  ANT101  ANT102 | Italica | IT 25 | 15-Feb-04 | Dredge | 120.4 | 71.3121 | 170.4227 | *Monostroma hariotii Palmaria decipiens Phycodrys antarctica* |
| Cape Adare | ANT104  ANT105 | Italica | IT 26, 27, 28 | 16-Feb-04 | Dredge | 515.6 | 71.259317 | 170.7042 | *Himantothallus grandifolius Palmaria decipiens* |
| Possession Island | A026038  A026037  A026044  A026025  A026032  A026026  A026027  A026024  A026033  A026035  A026045  A026031/B  A026031/A  A026041  A026042/B  A026040  A026042/A  A026039  A026043  A026028  A026030  A026023  A026034  A026029  A026036  A026021  A026022 | TAN0102 | K0802 | Feb-01 | Dredge | 26-30 | 71.876 | 171.1992 | *Monostroma hariotii Geminocarpus geminatus Elachista antarctica Desmarestia menziesii Himantothallus grandifolius Ballia* sp. *Palmaria decipiens Antarcticothamnion polysporum Notophycus fimbriatus Gainia mollis*  *Plocamium* sp. |
| Possession Island | A026007  A026005  A026006 | TAN0102 | K0805 | Feb-01 | Hand | 1 | 71.89365 | 171.1664333 | *Palmaria decipiens* |
| Possession Island | A026001  A026002  A026012  A026018  A026013  A026010  A026015  A026019  A026011  A026020  A026016  A026014  A026009  A026017  A026003  A026004 | TAN0102 | K0806 | Feb-01 | Dredge | 90-95 | 71.8745 | 171.2398 | *Desmarestia menziesii Callithamnion* sp.  *Phycodrys antarctica “Pugetia”* |
| Possession Island | A023613  A023604 | TAN0402 | 136 | 25-Feb-04 | Grapnel | 24-38 | 71.879667 | 171.16 | *Geminocarpus geminatus Himantothallus grandifolius* |
| Cape Hallett | ASF024 | Italica | IT 1 | 05-Feb-04 | Dredge | 475 | 72.269 | 170.46095 | NGC indet. |
| Cape Hallett | ANT094 | Italica | IT 15 | 11-Feb-04 | Dredge | 406.8 | 72.28615 | 170.1928833 | *Iridaea* sp*. Palmaria decipiens Phycodrys antarctica* |
| Cape Hallett | ASF016 | Italica | IT 16 | 11-Feb-04 | Dredge | 408.8 | 72.316667 | 170.266667 | *Phycodrys antarctica* |
| Cape Hallett | ANT107 | Italica | IT 29 | 16-Feb-04 | Dredge | 196.0 | 72.286233 | 170.2341333 | *Phycodrys antarctica* |
| Cape Hallett | A023644 | Italica | IT 4 | 9-Feb-04 | Dredge | 105.2 | 72.281916 | 170.2849 | *Phycodrys antarctica* |
| Cape Hallett | A023654  A023611  A023610/A  A023610/B  A023649  ASF017 | Italica | IT 5, 6, 9, 10, 11, 12, 13, 14 | 11-Feb-04 | Dive | 16-18 | 72.3104 | 170.25615 | *Himantothallus grandifolius* NGC indet.  *Phyllophora antarctica* (GQ323778) |
| Cape Hallett | ANT112 | Italica | IT 7 | 10-Feb-04 | Dredge | 391.2 | 72.282467 | 170.2035 | *Phycodrys antarctica* |
| Cape Hallett | A023646 | Italica | IT 8 | 11-Feb-04 | Dredge | 353.2 | 72.292133 | 170.4905 | *Phycodrys antarctica* |
| Cape Hallett | A026008 | TAN0102 | K0803 | Feb-01 | Dredge | 30-49 | 72.31167 | 170.1875 | *Phycodrys antarctica* |
| Ross1 | A023585 | TAN0402 | 101 | 18-Feb-04 | Sled | 565-571 | 71.201167 | 170.9405 | *Desmarestia menziesii* |
| Ross1 | A023586 | TAN0402 | 105 | 18-Feb-04 | Sled | 470-462 | 71.2575 | 170.6346667 | *Desmarestia menziesii* |
| Ross1 | A023587 | TAN0402 | 116 | 18-Feb-04 | Sled | 312-315 | 71.298833 | 170.5405 | *Desmarestia menziesii* |
| Ross1 | A023588 | TAN0402 | 122 | 18-Feb-04 | Trawl | 395-400 | 71.272167 | 170.594 | *Desmarestia menziesii* |
| Ross1 | ASJ349 | TAN0402 | 123 | 19-Feb-04 | Grab | 243 | 71.313167 | 170.501 | *Palmaria decipiens* |
| Ross2 | A023581  ASJ354  ANT089  ANT090 | TAN0402 | 194 | 28-Feb-04 | Grab | 246 | 71.6215 | 170.9261667 | *Desmarestia menziesii Himantothallus grandifolius Palmaria decipiens Phyllophora antarctica* |
| Ross3 | A023580 | TAN0402 | 20 | 5-Feb-04 | Trawl | 400-415 | 71.740667 | 171.644 | *Desmarestia menziesii* |
| Ross3 | ASJ431  ASJ432  ANT087 | TAN0402 | 26 | 9-Feb-04 | Trawl | 230-219 | 71.778167 | 170.963833 | *Desmarestia menziesii Himantothallus grandifolius* |
| Ross3 | A023584  ASJ342 | TAN0402 | 29 | 9-Feb-04 | Trawl | 270-275 | 71.756 | 171.2635 | *Desmarestia menziesii Himantothallus grandifolius* |
| Ross3 | ANT088 | TAN0402 | 30 | 9-Feb-04 | Grab | 277 | 71.746333 | 171.291333 | *Himantothallus grandifolius* |
| Ross4 | A023582 | TAN0402 | 140 | 26-Feb-04 | Sled | 231-240 | 72.0135 | 170.7745 | *Desmarestia menziesii* |
| Ross5 | A023605 | TAN0402 | 67 | 13-Feb-04 | Trawl | 272-286 | 72.321 | 170.4751667 | *Himantothallus grandifolius* |
| **Inner Ross Sea** | | | | | | | | | |
| Faraglione | A023651  A023635  A023650 | Italica | IT 30, 31, 32, 33, 36 | 20-Feb-04 | Dive | 16-20 | 74.7177 | 164.1129167 | *Iridaea* sp. (GQ323780)  *Phyllophora antarctica* (GQ323779, GQ323781) |
| Terra Nova Bay | ANT108 | Italica | IT 34 | 20-Feb-04 | Dredge | 362.8 | 74.727317 | 164.22445 | *Phyllophora antarctica* |
| Terra Nova Bay | ASF022 | - | - | 30-Jan-04 | - | 80 | 74.8 | 164.649 | NGC indet. |
| Sth of Adelie Cove | A023681 | Italica | IT 40 | 22-Feb-04 | Dive | 20.0 | 74.843667 | 164.0096 | *Plocamium* sp. |
| Nth of Cape Russell | ANT110  ANT111  ASF006 | Italica | IT 37, 38, 39 | 21-Feb-04 | Dive | 13.5 | 74.8725 | 163.9671667 | *Iridaea* sp. (ON211586)  *Phyllophora antarctica* |
| Cape Russell | ANT109 | Italica | IT 35 | 21-Feb-04 | Dredge | 208.0 | 74.83465 | 164.09345 | *Phyllophora antarctica* |
| Franklin Island | ASM074  ASM070  ASM071  ASM075  ASM072  ASM073 | - | - | 13-Feb-12 | Hand | - | 76.08 | 168.32 | *Desmarestia menziesii*  *Iridaea* sp. (ON211582, ON211583, ON211585)  *Plocamium* sp. |
| Dunlop Island | A028361 | - | DI3 | 25-Oct-02 | Dive | 19 | 77.233333 | 163.5 | NGC indet. |
| Spike Cape | A028211  A028364  A028359  A028365/A  A028365/B  A028360/A  A028360/B | - | SC1, SC2, SC3 | 30-Oct-02 to  02-Nov-02 | Dive | 15-19 | 77.3 | 163.5666 | NGC indet. |
| Cape Evans | A023123 | - | - | 24-Nov-01 | Dive | 19.5 | 77.3 | 163.5666 | *Iridaea* sp. |
| Cape Evans | A023124 | - | - | 30-Nov-01 | Dive | 19 | 77.6393 | 166.4033 | *Iridaea* sp. |
| Cape Evans | A023120  A023121 | - | - | 17-Nov-01 | Dive | 21 | 77.6393 | 166.4033 | *Phyllophora antarctica* |
| Cape Evans | A034416  A034417  A034418  ANT115  ANT116  ANT119 | - | - | 08-Nov-04 | Dive | 16-21 | 77.6359 | 166.4163 | NGC indet.,  *Tethysphytum antarcticum* (ON211596, ON211597, ON211598) |
| Cape Evans | ASK019 | - | - | 19-Nov-09 | Dive | 18 | 77.6393 | 166.4033 | *Phyllophora antarctica* |
| Cape Evans | A034415 | - | - | Nov-13 | Dive | 14 | 77.635258 | 166.414382 | *Iridaea* (ON211584) |
| Cape Evans | ANT007  ANT008  ANT009  ANT010  ANT011  ANT012  ANT013  ANT014  ANT017  ANT018  ANT019  ANT020 | - | - | 24-Oct-16 | Dive | 22 | 77.634917 | 166.414056 | NGC indet.  *Phyllophora antarctica* |
| McMurdo Jetty | A034411  A034412  A034413  A034414 | - | - | 08-Dec-14 | Hand | - | 77.847636 | 166.6576889 | *Phyllophora antarctica* (ON211590, ON211591, ON211592, ON211593) |