

## SUPPLEMENTARY MATERIAL

**Table A.** Number of tiles used in statistical analysis. Some tiles were lost due to wave action or other disturbances.

| <i>A. Sponge transplants</i> | Period 1 |           |       | Period 2 |           |       | Period 3 | Period 4 |
|------------------------------|----------|-----------|-------|----------|-----------|-------|----------|----------|
|                              | Living   | Skeleton  | Blank | Living   | Skeleton  | Blank | Blank    | Blank    |
| Black Point                  | 9        | 7         | 4     | 8        | 6         | 5     | 10       | 10       |
| Coculus Rock                 | 7        | 6         | 5     | 8        | 9         | 3     | 11       | 10       |
| Magens Bay                   | 7        | 5         | 4     | 8        | 7         | 4     | 10       | 10       |
| Botany Bay                   | 9        | 8         | 3     | 8        | 9         | 3     | 10       | 10       |
| Buck Island                  | 8        | 9         | 3     | 9        | 6         | 3     | 10       | 11       |
| Savana Island                | 7        | 6         | 5     | 8        | 8         | 3     | 9        | 10       |
|                              |          |           |       |          |           |       |          |          |
| <i>B. Plots</i>              | Cleared  | Uncleared |       | Cleared  | Uncleared |       |          |          |
| Black Point                  | 9        | 9         |       | 9        | 9         |       |          |          |
| Savana Island                | 8        | 8         |       | 9        | 9         |       |          |          |

**Table B.** Average percent cover ( $\pm$  SEM) of benthic categories representing > 88% of living benthic cover recorded by the Virgin Islands Territorial Coral Reef Monitoring Program in 2016 (Smith et al. 2016).

| Site               | % Hard Coral   | % Sponges      | % Macroalgae   | % Epilithic Algal Community |
|--------------------|----------------|----------------|----------------|-----------------------------|
| Black Point (BP)   | 18.2 $\pm$ 2.6 | 10.9 $\pm$ 0.7 | 27.3 $\pm$ 1.7 | 28.2 $\pm$ 2.5              |
| Coculus Rock (CR)  | 12.9 $\pm$ 0.9 | 5.7 $\pm$ 0.8  | 36.8 $\pm$ 3.7 | 38.9 $\pm$ 3.9              |
| Magens Bay (MB)    | 4.1 $\pm$ 0.9  | 5.5 $\pm$ 1.3  | 33.2 $\pm$ 4.9 | 30.4 $\pm$ 3.3              |
| Botany Bay (BB)    | 8.8 $\pm$ 1.1  | 4.2 $\pm$ 1.2  | 51.9 $\pm$ 3.5 | 24.6 $\pm$ 2.6              |
| Buck Island (BI)   | 5.8 $\pm$ 0.7  | 8.4 $\pm$ 0.6  | 57.9 $\pm$ 2.1 | 14.5 $\pm$ 1.7              |
| Savana Island (SV) | 7.3 $\pm$ 1.6  | 1.2 $\pm$ 0.6  | 67.2 $\pm$ 3.2 | 10.6 $\pm$ 2.3              |

**Table C.** Overall recruitment rates for each time period for all recruitment tiles deployed, regardless of treatment.

| <b>Time Period</b> | <b>Date Range</b>   | <b>Avg # day<sup>-1</sup> m<sup>-2</sup> ± SE</b> | <b>N</b> |
|--------------------|---------------------|---------------------------------------------------|----------|
| Period 1           | Aug 2015 – Mar 2016 | 0.24 ± 0.04                                       | 146      |
| Period 2           | Mar 2016 – Aug 2016 | 0.20 ± 0.04                                       | 151      |
| Period 3           | Aug 2016 – Mar 2017 | 0.16 ± 0.05                                       | 60       |
| Period 4           | Mar 2017 – Aug 2017 | 0.24 ± 0.04                                       | 61       |

**Table D. Wet weight and displacement volume of sponges removed from cleared (initial and final) and uncleared (final only) plots by species and site.**

| Site / Treatment / Date                     | Sponge Species                | wet weight (g) | Displacement volume (ml) | wet weight (g) | Displacement volume (ml) |
|---------------------------------------------|-------------------------------|----------------|--------------------------|----------------|--------------------------|
| Black Point<br>Cleared Plot 1<br>6 Aug 2015 | <i>Aplysina cauliformis</i>   | 655.96         | 637                      | 52.9           | 52.9                     |
|                                             | <i>Neopetrosia proxima</i>    | 156.62         | 140                      | 12.6           | 11.6                     |
|                                             | <i>Verongula rigida</i>       | 116.96         | 120                      | 9.4            | 10.0                     |
|                                             | <i>Smenospongia</i> sp. 1     | 101.71         | 95                       | 8.2            | 7.9                      |
|                                             | <i>Amphimedon compressa</i>   | 68.37          | 75                       | 5.5            | 6.2                      |
|                                             | <i>Callyspongia armigera</i>  | 37.22          | 40                       | 3.0            | 3.3                      |
|                                             | <i>Niphates erecta</i>        | 25.67          | 25                       | 2.1            | 2.1                      |
|                                             | <i>Oscarella filipoi</i>      | 17.3           | 20                       | 1.4            | 1.7                      |
|                                             | Small unidentified fragments  | 16.52          | 14                       | 1.3            | 1.2                      |
|                                             | <i>Neopetrosia</i> sp. 1 soft | 13.34          | 12                       | 1.1            | 1.0                      |
|                                             | <i>Aiolochoxia crassa</i>     | 13.31          | 10                       | 1.1            | 0.8                      |
|                                             | <i>Desmapsamma anchorata</i>  | 10.99          | 10                       | 0.9            | 0.8                      |
|                                             | <i>Amphimedon complanata</i>  | 6.71           | 6                        | 0.5            | 0.5                      |
|                                             |                               |                |                          |                |                          |
| Black Point<br>Cleared Plot 1<br>1 Aug 2016 | <i>Aplysina cauliformis</i>   | 4              | 3                        | 53.3           | 54.5                     |
|                                             | <i>Scopalina ruetzleri</i>    | 3              | 2                        | 40.0           | 36.4                     |
|                                             | <i>Chondrilla caribensis</i>  | 0.5            | 0.5                      | 6.7            | 9.1                      |
|                                             |                               |                |                          |                |                          |
| Black Point<br>Cleared Plot 2<br>8 Aug 2015 | <i>Aplysina cauliformis</i>   | 887.98         | 801                      | 68.3           | 69.1                     |
|                                             | <i>Neopetrosia</i> sp. 1 soft | 151.5          | 145                      | 11.6           | 12.5                     |
|                                             | <i>Aplysina lacunosa</i>      | 82.26          | 70                       | 6.3            | 6.0                      |
|                                             | <i>Amphimedon compressa</i>   | 48.16          | 41                       | 3.7            | 3.5                      |
|                                             | <i>Smenospongia</i> sp. 1     | 45             | 40                       | 3.5            | 3.5                      |
|                                             | <i>Neopetrosia proxima</i>    | 43.19          | 31                       | 3.3            | 2.7                      |
|                                             | <i>Niphates erecta</i>        | 19.73          | 15                       | 1.5            | 1.3                      |
|                                             | <i>Pandaros acanthafolium</i> | 15.18          | 10                       | 1.2            | 0.9                      |
|                                             | <i>Amphimedon complanata</i>  | 6.54           | 5                        | 0.5            | 0.4                      |
|                                             | <i>Desmapsamma anchorata</i>  | 1.12           | 0.5                      | 0.1            | 0.0                      |
|                                             |                               |                |                          |                |                          |
| Black Point<br>Cleared Plot 2<br>1 Aug 2016 | <i>Niphates erecta</i>        | 4              | 5                        | 61.5           | 66.7                     |
|                                             | <i>Aplysina cauliformis</i>   | 2              | 2                        | 30.8           | 26.7                     |
|                                             | Small unidentified fragments  | 0.5            | 0.5                      | 7.7            | 6.7                      |
|                                             |                               |                |                          |                |                          |
| Black Point                                 | <i>Aplysina cauliformis</i>   | 269.65         | 255                      | 30.0           | 29.7                     |

|                                             |                              |        |     |      |      |
|---------------------------------------------|------------------------------|--------|-----|------|------|
| Cleared Plot 3<br>8 Aug 2015                | Neopetrosia proxima          | 251.71 | 240 | 28.0 | 27.9 |
|                                             | Amphimedon compressa         | 134.94 | 135 | 15.0 | 15.7 |
|                                             | Smenospongia sp. 1           | 91.85  | 90  | 10.2 | 10.5 |
|                                             | Niphates erecta              | 51.45  | 54  | 5.7  | 6.3  |
|                                             | Neopetrosia sp. 1 soft       | 49.21  | 45  | 5.5  | 5.2  |
|                                             | Small unidentified fragments | 26.37  | 23  | 2.9  | 2.7  |
|                                             | Aplysina fulva               | 12.86  | 10  | 1.4  | 1.2  |
|                                             | Mycale laxissima             | 7.45   | 5   | 0.8  | 0.6  |
|                                             | Callyspongia armigera        | 4.8    | 3   | 0.5  | 0.3  |
|                                             |                              |        |     |      |      |
| Black Point<br>Cleared Plot 3<br>1 Aug 2016 | Aplysina fulva               | 7      | 5.5 | 50.0 | 47.8 |
|                                             | Niphates erecta              | 4      | 4   | 28.6 | 34.8 |
|                                             | Chondrilla caribensis        | 3      | 2   | 21.4 | 17.4 |
|                                             |                              |        |     |      |      |
| Black Point<br>Control Plot 1<br>1 Aug 2016 | Aplysina cauliformis         | 161    | 140 | 33.9 | 31.8 |
|                                             | Amphimedon compressa         | 90     | 90  | 18.9 | 20.5 |
|                                             | Xestospongia muta            | 81     | 70  | 17.1 | 15.9 |
|                                             | Neopetrosia proxima          | 30     | 30  | 6.3  | 6.8  |
|                                             | Aplysina fulva               | 26     | 30  | 5.5  | 6.8  |
|                                             | Amphimedon complanata        | 24     | 25  | 5.1  | 5.7  |
|                                             | Ircinia felix                | 17     | 15  | 3.6  | 3.4  |
|                                             | Mycale laxissima             | 11     | 10  | 2.3  | 2.3  |
|                                             | Niphates erecta              | 10     | 9   | 2.1  | 2.0  |
|                                             | Niphates digitalis           | 10     | 9   | 2.1  | 2.0  |
|                                             | Neopetrosia sp. 1 soft       | 8      | 5   | 1.7  | 1.1  |
|                                             | Small unidentified fragments | 7      | 7   | 1.5  | 1.6  |
|                                             |                              |        |     |      |      |
| Black Point<br>Control Plot 2<br>1 Aug 2016 | Smenospongia sp. 1           | 310.9  | 280 | 69.8 | 66.0 |
|                                             | Aplysina cauliformis         | 61.91  | 55  | 13.9 | 13.0 |
|                                             | Niphates erecta              | 38.14  | 55  | 8.6  | 13.0 |
|                                             | Amphimedon compressa         | 19.94  | 20  | 4.5  | 4.7  |
|                                             | Aplysina fulva               | 6.31   | 6   | 1.4  | 1.4  |
|                                             | Amphimedon complanata        | 3.58   | 4   | 0.8  | 0.9  |
|                                             | Neopetrosia sp. 1 soft       | 2.61   | 3   | 0.6  | 0.7  |
|                                             | Scopalina ruetzleri          | 1.7    | 1   | 0.4  | 0.2  |
|                                             | Chalinula molitba            | 0.36   | 0.5 | 0.1  | 0.1  |
|                                             |                              |        |     |      |      |
| Black Point<br>Control Plot 3<br>1 Aug 2016 | Verongula rigida             | 470.11 | 435 | 55.2 | 52.9 |
|                                             | Niphates digitalis           | 200.99 | 215 | 23.6 | 26.1 |
|                                             | Neopetrosia proxima          | 111.75 | 105 | 13.1 | 12.8 |

|                                                |                               |        |      |      |      |
|------------------------------------------------|-------------------------------|--------|------|------|------|
|                                                | <i>Aplysina lacunosa</i>      | 35.59  | 35   | 4.2  | 4.3  |
|                                                | <i>Niphates erecta</i>        | 24.77  | 25   | 2.9  | 3.0  |
|                                                | <i>Amphimedon complanata</i>  | 5.94   | 5    | 0.7  | 0.6  |
|                                                | <i>Aplysina fulva</i>         | 1.01   | 0.5  | 0.1  | 0.1  |
|                                                | Small unidentified fragments  | 0.84   | 1    | 0.1  | 0.1  |
|                                                | <i>Neopetrosia</i> sp. 1 soft | 0.7    | 1    | 0.1  | 0.1  |
|                                                |                               |        |      |      |      |
| Savana Island<br>Cleared Plot 1<br>10 Aug 2015 | <i>Aplysina cauliformis</i>   | 116.05 | 110  | 27.1 | 27.9 |
|                                                | <i>Mycale laevis</i>          | 115.11 | 105  | 26.8 | 26.6 |
|                                                | <i>Aplysina insularis</i>     | 89.3   | 80   | 20.8 | 20.3 |
|                                                | <i>Amphimedon compressa</i>   | 60.03  | 56   | 14.0 | 14.2 |
|                                                | <i>Niphates erecta</i>        | 15.68  | 20   | 3.7  | 5.1  |
|                                                | Small unidentified fragments  | 11.73  | 10   | 2.7  | 2.5  |
|                                                | <i>Iotrochota birotulata</i>  | 9.64   | 5    | 2.2  | 1.3  |
|                                                | <i>Neopetrosia proxima</i>    | 7.73   | 5    | 1.8  | 1.3  |
|                                                | <i>Amphimedon complanata</i>  | 2.05   | 2    | 0.5  | 0.5  |
|                                                | <i>Ptilocaulis walpersi</i>   | 1.55   | 1    | 0.4  | 0.3  |
|                                                |                               |        |      |      |      |
| Savana Island<br>Cleared Plot 1<br>1 Aug 2016  | <i>Mycale laevis</i>          | 21     | 15   | 51.2 | 60.0 |
|                                                | <i>Niphates erecta</i>        | 9      | 5    | 22.0 | 20.0 |
|                                                | <i>Verongula rigida</i>       | 3      | 2    | 7.3  | 8.0  |
|                                                | <i>Amphimedon compressa</i>   | 3      | 1    | 7.3  | 4.0  |
|                                                | <i>Callyspongia fallax</i>    | 3      | 1    | 7.3  | 4.0  |
|                                                | <i>Mycale laxissima</i>       | 2      | 1    | 4.9  | 4.0  |
|                                                |                               |        |      |      |      |
| Savana Island<br>Cleared Plot 2<br>10 Aug 2015 | <i>Erylus formosus</i>        | 282.66 | 261  | 36.4 | 37.4 |
|                                                | <i>Agelas conifera</i>        | 219.96 | 205  | 28.3 | 29.4 |
|                                                | <i>Niphates digitalis</i>     | 76.59  | 70   | 9.9  | 10.0 |
|                                                | <i>Agelas clathrodes</i>      | 56.45  | 44.5 | 7.3  | 6.4  |
|                                                | <i>Aplysina cauliformis</i>   | 30.57  | 25   | 3.9  | 3.6  |
|                                                | <i>Xestospongia muta</i>      | 25.2   | 25   | 3.2  | 3.6  |
|                                                | <i>Aplysina insularis</i>     | 24.1   | 25   | 3.1  | 3.6  |
|                                                | <i>Mycale laevis</i>          | 17.27  | 10   | 2.2  | 1.4  |
|                                                | Small unidentified fragments  | 17.22  | 10.5 | 2.2  | 1.5  |
|                                                | <i>Niphates erecta</i>        | 11.64  | 10   | 1.5  | 1.4  |
|                                                | <i>Amphimedon complanata</i>  | 4.34   | 4    | 0.6  | 0.6  |
|                                                | <i>Aplysina fulva</i>         | 3.93   | 3.5  | 0.5  | 0.5  |
|                                                | <i>Neopetrosia proxima</i>    | 3.24   | 3.5  | 0.4  | 0.5  |
|                                                | <i>Iotrochota birotulata</i>  | 2.97   | 1    | 0.4  | 0.1  |

|                                                |                              |       |     |      |      |
|------------------------------------------------|------------------------------|-------|-----|------|------|
|                                                |                              |       |     |      |      |
| Savana Island<br>Cleared Plot 2<br>1 Aug 2016  | Small unidentified fragments | 9     | 7   | 42.9 | 40.0 |
|                                                | Plakortis angulospiculatus   | 8     | 7   | 38.1 | 40.0 |
|                                                | Aplysina fulva               | 1     | 1   | 4.8  | 5.7  |
|                                                | Mycale laevis                | 1     | 1   | 4.8  | 5.7  |
|                                                | Neopetrosia proxima          | 1     | 1   | 4.8  | 5.7  |
|                                                | Chondrilla caribensis        | 1     | 0.5 | 4.8  | 2.9  |
|                                                |                              |       |     |      |      |
| Savana Island<br>Cleared Plot 3<br>10 Aug 2015 | Plakortis angulospiculatus   | 133.7 | 120 | 31.8 | 30.4 |
|                                                | Xestospongia muta            | 88.02 | 80  | 20.9 | 20.3 |
|                                                | Aplysina cauliformis         | 73.78 | 70  | 17.5 | 17.7 |
|                                                | Niphates erecta              | 36.5  | 40  | 8.7  | 10.1 |
|                                                | Amphimedon compressa         | 32.4  | 30  | 7.7  | 7.6  |
|                                                | Aplysina insularis           | 31.52 | 35  | 7.5  | 8.9  |
|                                                | Small unidentified fragments | 17.62 | 15  | 4.2  | 3.8  |
|                                                | Amphimedon complanata        | 2.55  | 1   | 0.6  | 0.3  |
|                                                | Agelas clathrodes            | 2.18  | 2   | 0.5  | 0.5  |
|                                                | Aplysina fulva               | 1.4   | 1   | 0.3  | 0.3  |
|                                                | Ptilocaulis walpersi         | 1.16  | 1   | 0.3  | 0.3  |
|                                                |                              |       |     |      |      |
| Savana Island<br>Cleared Plot 3<br>1 Aug 2016  | Neopetrosia proxima          | 13    | 20  | 54.2 | 67.8 |
|                                                | Aplysina insularis           | 4     | 3.5 | 16.7 | 11.9 |
|                                                | Small unidentified fragments | 4     | 3   | 16.7 | 10.2 |
|                                                | Ptilocaulis walpersi         | 3     | 3   | 12.5 | 10.2 |
|                                                |                              |       |     |      |      |
| Savana Island<br>Control Plot 1<br>1 Aug 2016  | Aplysina insularis           | 193   | 180 | 64.1 | 65.6 |
|                                                | Mycale laevis                | 26    | 25  | 8.6  | 9.1  |
|                                                | Niphates erecta              | 23    | 20  | 7.6  | 7.3  |
|                                                | Plakortis angulospiculatus   | 21    | 20  | 7.0  | 7.3  |
|                                                | Aplysina lacunosa            | 16    | 10  | 5.3  | 3.6  |
|                                                | Neopetrosia proxima          | 11    | 10  | 3.7  | 3.6  |
|                                                | Aplysina fulva               | 7     | 7   | 2.3  | 2.6  |
|                                                | Chalinula molitba            | 2     | 1.5 | 0.7  | 0.5  |
|                                                | Small unidentified fragments | 2     | 1   | 0.7  | 0.4  |
|                                                |                              |       |     |      |      |
| Savana Island<br>Control Plot 2<br>1 Aug 2016  | Aplysina insularis           | 172   | 160 | 44.7 | 43.2 |
|                                                | Mycale laevis                | 148   | 130 | 38.4 | 35.1 |
|                                                | Niphates erecta              | 45    | 40  | 11.7 | 10.8 |
|                                                | Agelas dispar                | 13    | 10  | 3.4  | 2.7  |

|                                               |                                  |     |     |      |      |
|-----------------------------------------------|----------------------------------|-----|-----|------|------|
|                                               | <i>Ptilocaulis walpersi</i>      | 6   | 20  | 1.6  | 5.4  |
|                                               | <i>Amphimedon compressa</i>      | 1   | 10  | 0.3  | 2.7  |
|                                               |                                  |     |     |      |      |
| Savana Island<br>Control Plot 3<br>1 Aug 2016 | <i>Cinachyrella kuekenthalli</i> | 329 | 300 | 50.2 | 49.9 |
|                                               | <i>Verongula rigida</i>          | 186 | 165 | 28.4 | 27.5 |
|                                               | <i>Aplysina lacunosa</i>         | 97  | 90  | 14.8 | 15.0 |
|                                               | <i>Mycale laevis</i>             | 24  | 25  | 3.7  | 4.2  |
|                                               | <i>Aplysina cauliformis</i>      | 6   | 6   | 0.9  | 1.0  |
|                                               | <i>Chalinula molibta</i>         | 5   | 7   | 0.8  | 1.2  |
|                                               | Small unidentified fragments     | 4.7 | 5   | 0.7  | 0.8  |
|                                               | <i>Ptilocaulis walpersi</i>      | 2   | 2   | 0.3  | 0.3  |
|                                               | <i>Aplysina fulva</i>            | 2   | 1   | 0.3  | 0.2  |