**Appendix A. Supporting information**

**Supplementary Table 1.** Details of each video survey for all three study areas. RB = Rockall Bank, HB = Hatton Bank, BMP = Belgica Mound Province. % CFW is the mean percentage of coral frame work coverage calculated from every frame (1min interval).

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study site** | **Date**  **(dd-mm-yy)** | **Station** | **Duration**  **(hr:min:ss)** | **Survey area (m2)** | **Mean depth (m)** | **%CFW** | | |
| RB | 10-08-03 | 20 | 00:11:00 | 472 | 775 |  | 0 |
| RB | 12-08-03 | 26 | 00:19:00 | 674 | 799 |  | 0 |
| RB | 28-06-05 | 39 | 00:50:00 | 2451 | 789 |  | 27.7 |
| RB | 01-07-06 | 52 | 01:01:28 | 4650 | 584 |  | 88.9 |
| RB | 01-07-06 | 57 | 00:49:21 | 3094 | 568 |  | 88.9 |
| RB | 02-07-06 | 62 | 01:07:00 | 2831 | 554 |  | 98.7 |
| RB | 02-07-06 | 67 | 00:52:15 | 3133 | 704 |  | 74.6 |
| RB | 03-07-06 | 72 | 00:22:00 | 1990 | 777 |  | 100 |
| RB | 04-07-06 | 78 | 00:58:00 | 6212 | 623 |  | 100 |
| HB | 24-06-08 | 33 | 00:55:47 | 2677 | 784 |  | 58.5 |
| HB | 24-06-08 | 35 | 00:59:50 | 2676 | 813 |  | 70.9 |
| HB | 24-06-08 | 36 | 00:49:04 | 3266 | 683 |  | 6.3 |
| HB | 29-06-08 | 58 | 00:56:00 | 1168 | 781 |  | 100 |
| HB | 29-06-08 | 59 | 00:56:30 | 1135 | 790 |  | 96.6 |
| HB | 02-07-08 | 88 | 00:58:44 | 2550 | 830 |  | 97.9 |
| HB | 02-07-08 | 89 | 00:58:16 | 2601 | 868 |  | 90.2 |
| HB | 02-07-08 | 90 | 00:53:51 | 1586 | 636 |  | 55.9 |
| HB | 02-07-08 | 91 | 00:59:14 | 2472 | 590 |  | 17.4 |
| HB | 02-07-08 | 92 | 00:25:00 | 918 | 822 |  | 18.8 |
| HB | 03-07-08 | 96 | 00:17:00 | 776 | 767 |  | 98.1 |
| HB | 03-07-08 | 97 | 00:08:00 | 371 | 781 |  | 98.8 |
| HB | 06-07-08 | 117 | 00:59:06 | 2738 | 940 |  | 98.9 |
| HB | 06-07-08 | 118 | 00:42:07 | 2699 | 862 |  | 95.7 |
| HB | 06-07-08 | 119 | 00:34:07 | 2096 | 883 |  | 40.1 |
| HB | 10-07-08 | 151 | 00:57:23 | 1893 | 715 |  | 98.4 |
| HB | 10-07-08 | 152 | 00:56:00 | 2021 | 614 |  | 59.5 |
| BMP | 22-10-09 | 37 | 01:31:01 | 5741 | 985 |  | 29.5 |
| BMP | 23-10-09 | 42 | 01:32:14 | 7069 | 874 |  | 47.9 |
| BMP | 23-10-09 | 47 | 01:25:16 | 7197 | 726 |  | 0 |
| BMP | 25-10-09 | 59 | 01:09:49 | 4903 | 923 |  | 65.6 |
| BMP | 26-10-09 | 64 | 01:20:52 | 6704 | 967 |  | 29.5 |
| BMP | 16-09-10 | 8 | 01:46:30 | 6543 | 732 |  | 0.8 |
| BMP | 16-09-10 | 11 | 01:46:30 | 6635 | 770 |  | 2.6 |
| BMP | 02-10-11 | 14 | 02:49:40 | 5858 | 890 |  | 33.1 |
| BMP | 02-10-11 | 17 | 01:14:43 | 2596 | 785 |  | 0 |
| BMP | 03-10-11 | 21 | 01:13:30 | 4046 | 796 |  | 0 |
| BMP | 03-10-11 | 28 | 00:49:00 | 2576 | 860 |  | 30.7 |

**Supplementary Table 2.** List of all fish species encountered and their length-weight relationship if available. Abbreviations: a = intercept, b = slope. Values represent calculated means from FishBase records.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Species** | **Family** | **Common name** | **a** | **b** |
| *Brosme brosme* | Lotidae | Tusk | 0.0092 | 3.095 |
| *Chimaera monstrosa* | Chimaeridae | Rabbit fish | 0.0019 | 3.038 |
| *Helicolenus dactylopterus* | Sebastidae | Blackbelly rosefish | 0.01001 | 3.169 |
| *Hoplostethus atlanticus* | Trachichthyidae | Orange roughy | 0.06908 | 2.802 |
| *Lepidion eques* | Moridae | North Atlantic codling | 0.00095 | 3.541 |
| *Lophius piscatorius* | Lophiidae | Monkfish | 0.02465 | 2.932 |
| *Molva dypterygia* | Lotidae | Blue ling | 0.0019 | 3.149 |
| *Mora moro* | Moridae | Common Mora | 0.0038 | 3.276 |
| *Phycis phycis* | Phycidae | Forkbeard | 0.00584 | 3.202 |
| *Pseudotriakis microdon* | Pseudotriakidae | False catshark | - | - |
| *Raja fyllae* | Rajidae | Round ray | - | - |
| *Sigmops bathyphilus* | Gonostomatidae | Spark anglemouth | - | - |
| *Synaphobranchus kaupii* | Synaphobranchidae | Northern cutthroat eel | 0.00135 | 3 |

**Supplementary Table 3.** Variance inflation factor (VIF) values for all terrain variables and VIF values for remaining variables after co-linearity has been removed by sequentially deleting the highest VIF value until all VIFs were below 5. Terrain variables were obtained from 1000 random points of each study site extracted from the multibeam data. The meaning of different variables is explained in the text.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **VIF (all variables)** | | | | |  | **VIF (co-linearity removed)** | | | | |
| **Variables** |  | RB |  | HB |  | BMP |  | RB |  | HB |  | BMP |
| depth |  | 1.06 |  | 1.45 |  | 1.23 |  | 1.05 |  | 1.35 |  | 1.2 |
| aspect |  | 2.14 |  | 2.21 |  | 6.48 |  |  |  |  |  |  |
| eastings |  | 2.18 |  | 1.9 |  | 6.37 |  | 1.03 |  | 1.1 |  | 1.22 |
| northings |  | 1.06 |  | 1.45 |  | 1.24 |  | 1.04 |  | 1.28 |  | 1.05 |
| roughness |  | 46.18 |  | 50.38 |  | 34.22 |  |  |  |  |  |  |
| rugosity |  | 4.73 |  | 7.26 |  | 5.91 |  | 1.08 |  | 1.13 |  | 1.07 |
| slope |  | 38.42 |  | 87.09 |  | 93.57 |  |  |  |  |  |  |
| BPI broad |  | 13.88 |  | 6.07 |  | 5.58 |  | 1.83 |  | 2.17 |  | 1.34 |
| BPI fine |  | 35.66 |  | 12.46 |  | 6.89 |  |  |  |  |  |  |
| plan curve |  | 45.04 |  | 94.54 |  | 39.56 |  |  |  |  |  |  |
| prof curve |  | 10.22 |  | 6.39 |  | 3.7 |  |  |  |  |  |  |
| tang curve |  | 36.55 |  | 68.62 |  | 36.35 |  | 1.76 |  | 2.04 |  | 1.3 |
| TPI |  | 17.68 |  | 21.27 |  | 5.72 |  |  |  |  |  |  |
| TRI |  | 57.5 |  | 123.76 |  | 122.54 |  |  |  |  |  |  |

**Supplementary Table 4.** Fish abundance for each fish species (ind. ha-1) at the three study sites. n = number of transects conducted in each region. Mean ± S.E. and range in (parentheses). N = number of individuals observed.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Fish abundance** | **RB (n = 9)** | | | **HB (n = 17)** | | | **BMP (n = 11)** | | |
| **Fish species** | Mean ± 1 S.E. | Range | N | Mean ± 1 S.E. | Range | N | Mean ± 1 S.E. | Range | N |
| *Brosme brosme* | - | - | - | 3.2 ± 1.3 | (0 - 18.2) | 11 | - | - | - |
| *Chimaera monstrosa* | 3.6 ± 2.3 | (0 - 21.2) | 4 | 6 ± 3.4 | (0 - 52.6) | 27 | 3.4 ± 1.3 | (0 - 15.4) | 18 |
| *Helicolenus dactylopterus* | 54.4 ± 29.1 | (0 - 231.9) | 160 | 2 ± 1.4 | (0 - 18.9) | 6 | 6.7 ± 1.3 | (0 - 17.1) | 43 |
| *Hoplostethus atlanticus* | - | - | - | 0.2 ± 0.2 | (0 - 4) | 1 | 1.6 ± 1.6 | (0 - 18.1) | 13 |
| *Lepidion eques* | 33.8 ± 9.4 | (0 - 81.8) | 100 | 203.6 ± 20.7 | (76.3 - 382.1) | 631 | 138.1 ± 23.4 | (46.3 - 268.3) | 811 |
| *Lophius piscatorius* | 0.4 ± 0.4 | (0 - 3.4) | 1 | 0.2 ± 0.2 | (0 - 4.1) | 1 | 5.4 ± 2 | (0 - 18.8) | 33 |
| *Molva dypterygia* | 0.2± 0.2 | (0 - 1.6) | 1 | 1.9 ± 0.8 | (0 - 11) | 6 | 1.8 ± 0.8 | (0 - 7.7) | 10 |
| *Mora moro* | 3 ± 1.6 | (0 - 14.8) | 4 | 6.3 ± 1.5 | (0 - 19.2) | 24 | 10.1 ± 1.8 | (0 - 20.9) | 67 |
| *Phycis phycis* | - | - | - | - | - | - | 0.1 ± 0.1 | (0 - 1.5) | 1 |
| *Pseudotriakis microdon* | 1.6 ± 1.6 | (0 - 14.8) | 1 | 0.2 ± 0.2 | (0 - 3.9) | 1 | 0.1 ± 0.1 | (0 - 1.4) | 1 |
| *Raja fyllae* | 4.7 ± 4.7 | (0 - 42.4) | 2 | - | - | - | 0.6 ± 0.4 | (0 - 3.8) | 2 |
| *Sigmops bathyphilus* | 2.3 ± 2.3 | (0 - 20.4) | 5 | 25.8 ± 7.3 | (0 - 100.1) | 77 | 16.1 ± 6.8 | (0 - 71.7) | 75 |
| *Synaphobranchus kaupii* | 24.6 ± 15.2 | (0 - 127.1) | 16 | 1.8 ± 1.1 | (0 - 18.3) | 8 | 26.5 ± 11.9 | (0 - 99) | 124 |
| **Total** | 128.7 ± 32.6 | (19.5 – 317.2) | 294 | 250.9 ± 26.7 | (87.2 – 500.4) | 793 | 210.7 ± 34.4 | (103.9 – 428.5) | 1198 |

**Supplementary Table 5.** Fish biomass for all fish species (kg ha-1), where length-weight relationship available, at the three study sites. n = number of transects conducted in each region. Mean ± S.E. and range in (parentheses).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Fish biomass** |  |  |  | |
| **Fish species** | **RB (n = 9)** | **HB (n = 17)** | **BMP (n = 11)** | |
| *Brosme brosme* | - | 8.7 ± 3.86 (0 - 53.92) | - | |
| *Chimaera monstrosa* | 9.33 ± 5.06 (0 - 35.76) | 4.41 ± 2.3 (0 - 31.67) | 1.59 ± 0.71 (0 - 7.05) | |
| *Helicolenus dactylopterus* | 14 ± 7.85 (0 - 67.49) | 0.65 ± 0.45 (0 - 5.71) | 1.94 ± 0.37 (0 - 3.96) | |
| *Hoplostethus atlanticus* | - | 3.27 ± 3.27 (0 - 55.51) | 5.02 ± 5.02 (0 - 55.18) | |
| *Lepidion eques* | 5.24 ± 1.39 (0 - 10.46) | 14.83 ± 2.27 (3.77 - 40.98) | 17.15 ± 4.3 (5.55 - 52.34) | |
| *Lophius piscatorius* | 5.1 ± 5.1 (0 - 45.94) | 2.63 ± 2.63 (0 - 44.75) | 80.23 ± 30.64 (0 - 304.84) | |
| *Molva dypterygia* | 0.54 ± 0.54 (0 - 4.87) | 4.38 ± 2.18 (0 - 30.40) | 1.69 ± 0.78 (0 - 7.91) | |
| *Mora moro* | 12.4 ± 5.58 (0 - 46.58) | 2.6 ± 0.88 (0 - 13.94) | 12.16 ± 3.48 (0 - 38.36) | |
| *Phycis phycis* | - | - | 0.18 ± 0.18 (0 - 1.97) | |
| *Synaphobranchus kaupii* | 0.14 ± 0.08 (0 - 0.74) | 0.02 ± 0.01 (0 - 0.15) | 0.3 ± 0.13 (0 - 1.21) | |
| **Total** | 46.78 ± 11.43 (13.71 – 123.70) | 41.46 ± 8.65 (3.81 – 131.79) | | 120.25 ± 33.74 (14.21 – 358.71) | |

**Supplementary Table 6.** Comparison of all estimated distributions from the full model (M15). Dispersion parameters and Akaike information criterion (AIC) values. All models apart from the Zeroinflated negative binomial (ZINB) GLM are over-dispersed and thus not representative. AIC also indicates that the ZINB GLM represents the model with the best fit (lowest AIC).

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study site** |  |  | **RB** |  |  | **HB** |  |  | **BM** |  |
| **Scale** | **Model** |  | Dispersion | AIC |  | Dispersion | AIC |  | Dispersion | AIC |
| **1 min** | Poisson GLM |  | 4.1 | 3185.2 |  | 3.93 | 7048.43 |  | 5.63 | 11694.58 |
|  | NB GLM |  | 3.79 | 3180.82 |  | 3.93 | 7050.44 |  | 4.29 | 11479.15 |
|  | ZIP GLM |  | 2.05 | 986.09 |  | 2.02 | 2236.89 |  | 1.55 | 3075.21 |
|  | **ZINB GLM** |  | **1.51** | **951.27** |  | **1.94** | **2237.52** |  | **1.2** | **3021.12** |
| **5 min** | Poisson GLM |  | 13.28 | 2167.86 |  | 7.92 | 3895.12 |  | 15.3 | 6740.51 |
|  | NB GLM |  | 6.82 | 1996.27 |  | 5.85 | 3850.1 |  | 6.46 | 6029.3 |
|  | ZIP GLM |  | - | - |  | - | - |  | 4.16 | 1337.75 |
|  | ZINB GLM |  | - | - |  | - | - |  | - | - |
| **10 min** | Poisson GLM |  | 24.28 | 1722.6 |  | 11.71 | 2820.74 |  | 26.36 | 5140.69 |
|  | NB GLM |  | 8.77 | 1466.41 |  | 6.75 | 2727.51 |  | 7.7 | 4216.52 |
|  | ZIP GLM |  | - | - |  | - | - |  | - | - |
|  | ZINB GLM |  | - | - |  | - | - |  | - | - |

**Supplementary Table 7.** Akaike information criterion (AIC) of all models compared within the three study sites for total fish count on the 1 minute time scale. Lowest AIC is indicated in bold and represents the model with the best fit.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Model** | **df** |  | **RB** |  | **HB** |  | **BMP** |
| M 1 | 3 |  | 1015.15 |  | 2253.35 |  | 3095.18 |
| M 2 | 5 |  | 976.01 |  | 2238.37 |  | 3067.14 |
| M 3 | 5 |  | 1006.77 |  | 2253.25 |  | 3063.53 |
| M 4 | 5 |  | 1000.52 |  | 2252.07 |  | 3079.85 |
| M 5 | 7 |  | 970.85 |  | 2236.04 |  | 3050.9 |
| M 6 | 7 |  | 958.63 |  | 2240.16 |  | 3052.36 |
| M 7 | 9 |  | 957.06 |  | 2235.74 |  | 3040.09 |
| M 8 | 9 |  | 974.5 |  | 2237.02 |  | 3025.33 |
| M 9 | 9 |  | 974.51 |  | 2238.46 |  | 3043.58 |
| M 10 | 11 |  | 977.54 |  | 2240.49 |  | 3028.07 |
| M 11 | 11 |  | 958.97 |  | **2235.27** |  | 3054.26 |
| M 12 | 13 |  | 963.13 |  | 2239.41 |  | **3018.19** |
| M 13 | 13 |  | 953.63 |  | 2235.48 |  | 3044.49 |
| M 14 | 15 |  | 962.25 |  | 2246.95 |  | 3036.84 |
| M 15 | 17 |  | **951.27** |  | 2237.52 |  | 3021.12 |

**Supplementary Table 8.** Comparison of dispersion parameters and Akaike information criterion (AIC) values of the full model (M15) on fish length of three species (*H. dactylopterus*, *L. eques* and *M. moro*) for the three different study sites.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study site** |  | **RB** |  |  | **HB** |  |  | **BM** |  |
| **Fish species** |  | Dispersion | AIC |  | Dispersion | AIC |  | Dispersion | AIC |
| *H. dactylopterus* |  | 1.29 | 597.38 |  | - | - |  | 1.77 | 277.44 |
| *L. eques* |  | 2.91 | 677.8 |  | 2 | 2893.5 |  | 1.38 | 3129.42 |
| *M. moro* |  | - | - |  | 1.87 | 165.9 |  | 4.04 | 579.16 |

**Supplementary Table 9.** Akaike information criterion (AIC) values and explained deviance (%D) of all Poisson GLM models on fish length of the three species (*H. dactylopterus*, *L. eques* and *M. moro*). The lowest AIC and the highest %D indicate models with the highest variation explained and are highlighted in bold.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Fish species** |  | ***H. dactylopterus*** | | | | | | |  | | ***L. eques*** | | | | | | | | | | | | | | | |  | | ***M. moro*** | | | | | | | | | |
| **Study site** |  | **RB** |  |  | **BMP** | | | |  | | **RB** | |  | |  | | **HB** | | | |  | | **BMP** | | | |  | | **HB** | |  | |  | | **BMP** | |  | |
| **Model** |  | **AIC** | **% D** |  | **AIC** | **% D** | |  | | **AIC** | | **% D** | |  | | **AIC** | | **% D** | |  | | **AIC** | | **% D** | |  | | **AIC** | | **% D** | |  | | **AIC** | | **% D** | |
| M 1 |  | 594.39 | 0 |  | **266.11** | | 0 | |  | | 681.84 | | 0 | |  | | 2917.7 | | 0 | |  | | 3137 | | 0 | |  | | **159.38** | | 0 | |  | | 617.58 | | 0 | |
| M 2 |  | 594.19 | 1.78 |  | 268.09 | | 0.02 | |  | | 681.58 | | 0.92 | |  | | 2918.6 | | 0.13 | |  | | 3121.5 | | 2.56 | |  | | 159.81 | | 4.42 | |  | | 618.19 | | 0.51 | |
| M 3 |  | 595.52 | 0.7 |  | 267.4 | | 1.16 | |  | | 683.62 | | 0.09 | |  | | 2909.4 | | 1.18 | |  | | 3137.8 | | 0.17 | |  | | 161.38 | | 0.006 | |  | | 580.62 | | 14.39 | |
| M 4 |  | 594.28 | 1.71 |  | 267.85 | | 0.43 | |  | | 683.57 | | 0.11 | |  | | 2900.9 | | 2.15 | |  | | 3139 | | 0 | |  | | 161.13 | | 0.7 | |  | | 613.74 | | 2.16 | |
| M 5 |  | 595.01 | 2.73 |  | 269.01 | | 1.8 | |  | | 683.54 | | 0.94 | |  | | 2911.3 | | 1.19 | |  | | **3123.4** | | 2.57 | |  | | 161.8 | | 4.45 | |  | | 580.07 | | 15.33 | |
| M 6 |  | 595.4 | 2.42 |  | 269.83 | | 0.46 | |  | | 683.39 | | 1 | |  | | 2902.9 | | 2.16 | |  | | 3123.4 | | 2.57 | |  | | 161.16 | | 6.24 | |  | | 614.7 | | 2.53 | |
| M 7 |  | 595.96 | 3.58 |  | 270.47 | | 2.69 | |  | | 685.38 | | 1.01 | |  | | 2899.2 | | 2.81 | |  | | 3125.3 | | 2.58 | |  | | 162.97 | | 6.77 | |  | | 581.92 | | 15.38 | |
| M 8 |  | 596.52 | 3.13 |  | 270.36 | | 2.87 | |  | | 682.27 | | 2.28 | |  | | 2909.5 | | 1.63 | |  | | 3124.1 | | 2.77 | |  | | 160.69 | | 13.19 | |  | | **574.72** | | 18.05 | |
| M 9 |  | 596.89 | 2.83 |  | 270.92 | | 1.95 | |  | | **676.79** | | 4.52 | |  | | 2909.8 | | 1.59 | |  | | 3125 | | 2.63 | |  | | 162.21 | | 8.93 | |  | | 577.48 | | 17.03 | |
| M 10 |  | 597.11 | 4.27 |  | 272.35 | | 2.89 | |  | | 678.64 | | 4.58 | |  | | 2910.4 | | 1.75 | |  | | 3126.1 | | 2.77 | |  | | 162.52 | | 13.68 | |  | | 576.65 | | 18.06 | |
| M 11 |  | **594.05** | 6.75 |  | 272.82 | | 2.11 | |  | | 684.51 | | 2.18 | |  | | 2897.1 | | 3.29 | |  | | 3125 | | 2.93 | |  | | 165.04 | | 6.59 | |  | | 583.16 | | 15.67 | |
| M 12 |  | 597.43 | 5.63 |  | 273.88 | | 3.67 | |  | | 679.53 | | 5.03 | |  | | 2900.2 | | 3.16 | |  | | 3127.9 | | 2.79 | |  | | 162.2 | | 20.19 | |  | | 578.65 | | 18.07 | |
| M 13 |  | 595.71 | 7.02 |  | 274.03 | | 3.41 | |  | | 686.46 | | 2.2 | |  | | **2891.8** | | 4.12 | |  | | 3126.7 | | 2.96 | |  | | 166.38 | | 8.45 | |  | | 584.78 | | 15.81 | |
| M 14 |  | 596.79 | 7.77 |  | 276.51 | | 2.62 | |  | | 675.85 | | 7.35 | |  | | 2894.3 | | 4.06 | |  | | 3127.5 | | 3.14 | |  | | 163.94 | | 20.93 | |  | | 586.94 | | 15.75 | |
| M 15 |  | 597.38 | **8.91** |  | 277.44 | | **4.37** | |  | | 677.8 | | **7.37** | |  | | 2893.5 | | **4.39** | |  | | 3129.4 | | **3.15** | |  | | 165.9 | | **21.03** | |  | | 579 | | **19.36** | |