# S4 Table. Modeling framework predictor variables description and processing methods.

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| --- | --- | --- | --- | --- | --- |
| **Type** | **Code** | **Metric** | **Source** | **Description** | **Analytical tool** |
| Terrestrial drivers | H2O | Freshwater | Groundwater models | Proxy for salinity (.yr-1) | GIS-based models |
| N | Dissolved nitrogen | Groundwater models | Proxy for land-based source dissolved nitrogen (.yr-1) | GIS-based models |
| P | Dissolved phosphorus | Groundwater models | Proxy for land-based source dissolved phosphorus (.yr-1) | GIS-based models |
| Marine driver (Wave) | wav | Wave power | SWAN wave modela | Wave power (kW.m-1) | [1] |
| Marine drivers (Geography) | Depth | Depth | Bathymetryb | Average depth (m) | ArcGIS Spatial Analyst tools [2] |
| dist2shore | Distance to shore | Coastlinec | Distance to nearest land (m) | ArcGIS Spatial Analyst Euclidean Distance tool [2] |
| Marine drivers (Habitat topography) | bpi | Bathymetric position index (60m, 240m) | Bathymetryb | Mean values indicate a location’s position relative to the surrounding area; values can be positive (ridges), negative (valleys), or zero (flat or constant slope)  | Benthic Terrain Modeler tool [3] |
| slp | Slope (60m, 240m) | Bathymetryb | Maximum rate of change from a cell to its neighbors | ArcGIS Slope tool [2]ArcGIS Focal Statistics tool [2] |
| Marine drivers (Habitat exposure) | asp\_sd | Surface aspect(standard deviation) | Bathymetryb | Slope direction (degrees) | ArcGIS Aspect tool [2] |
| asp\_sin | Sine aspect  | Bathymetryb | Sine of slope direction (derived from transforming the mean aspect into “eastness”) (degrees) | ArcGIS Spatial Analyst tools (sine function) [2] |
| asp\_cos | Cosine aspect | Bathymetryb | Cosine of slope direction (derived from transforming the mean aspect into “northness”) (degrees) | ArcGIS Spatial Analyst tools (cosine function) [2] |
| Marine drivers (Habitat complexity) | curv\_pro | Profile curvature (mean) | Bathymetryb | Curvature values can be + (concave), - (convex), or 0 (flat). A proxy for spur and groove effects on water flow. | DEM Surface Tools Curvature tool [4] |
| curv\_plan | Planar curvature (mean) | Bathymetryb | Curvature values can be – (concave) to + (convex), or 0 (flat) (mean). A proxy for spur and groove effects on water flow. | DEM Surface Tools Curvature tool [4] |
| rug | Rugosity | Bathymetryb | Value range from 1 (flat) to infinity. | DEM Surface Tools Curvature tool [4] |
| Benthic community | CCA | Crustose coralline algae | Coral reef model | Spatially-explicit predicted % cover | Coral reef model predictions  |
| COR | Coral cover | Coral reef model | Spatially-explicit predicted % cover | Coral reef model predictions |
| MAC | Macroalgae | Coral reef model | Spatially-explicit predicted % cover | Coral reef model predictions |
| TUR | Turf algae | Coral reef model | Spatially-explicit predicted % cover | Coral reef model predictions |

This table provides a description of all the predictor variables modeled in the coral reef models. Each metric is classified by type (terrestrial drivers or marine drivers) and assigned a code for modeling. The table below indicates the data source and analytical tool used to generate each metric at 60 m resolution. Refer to Stamoulis & Delevaux et al. [5] for more details on processing methods.

a SWAN hindcast wave model at 500 m native resolution [1]

b Bathymetry synthesis at 5 m native resolution [6]

c Coastline [7]

**References**

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