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Marine and Coastal Component



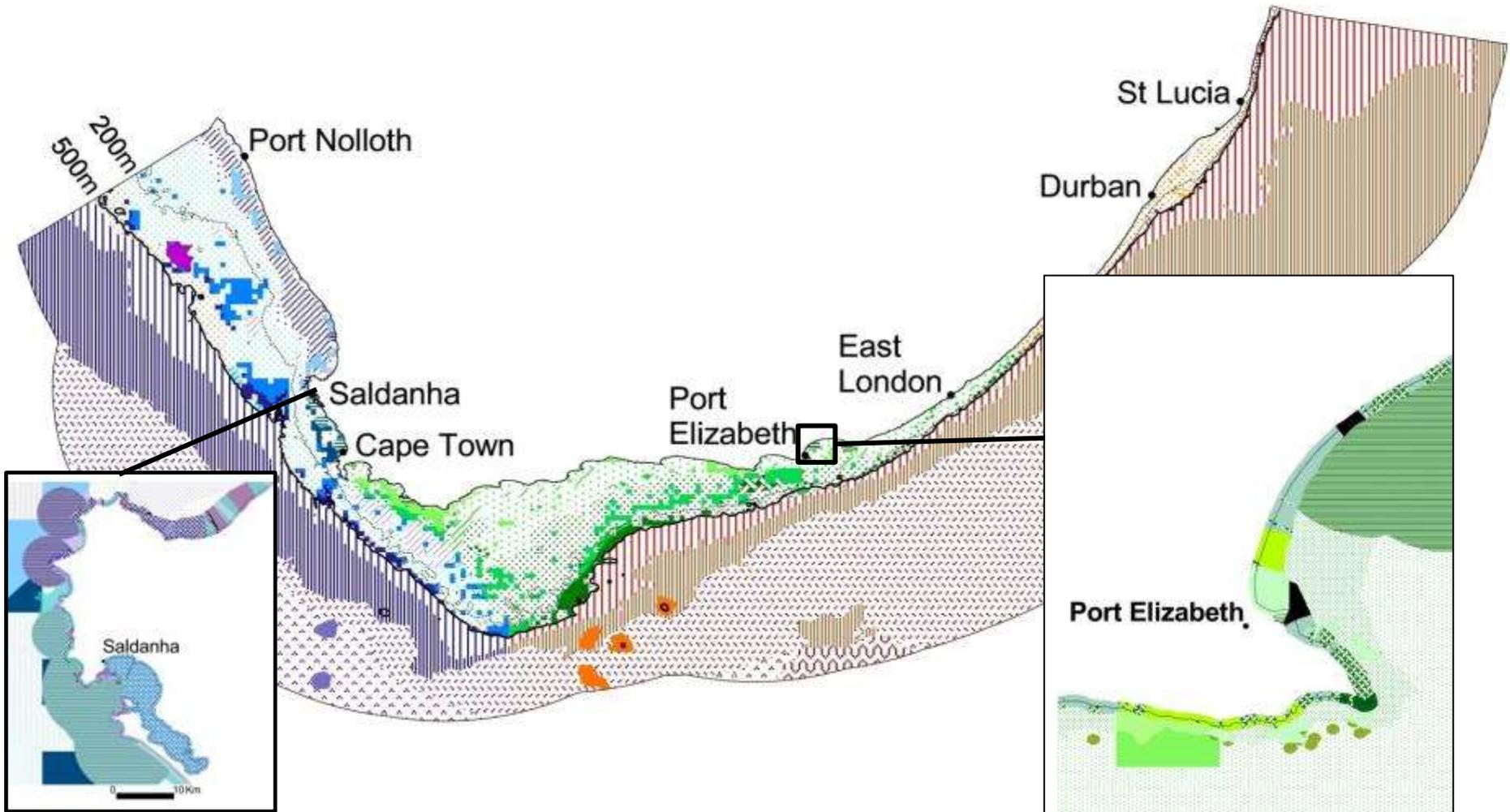
# Assessing ecosystem condition in South Africa's marine environment

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# Coastal & offshore habitats

Coastal – 37 coast types, 17 inshore, 3 islands, 1 lagoon (58)

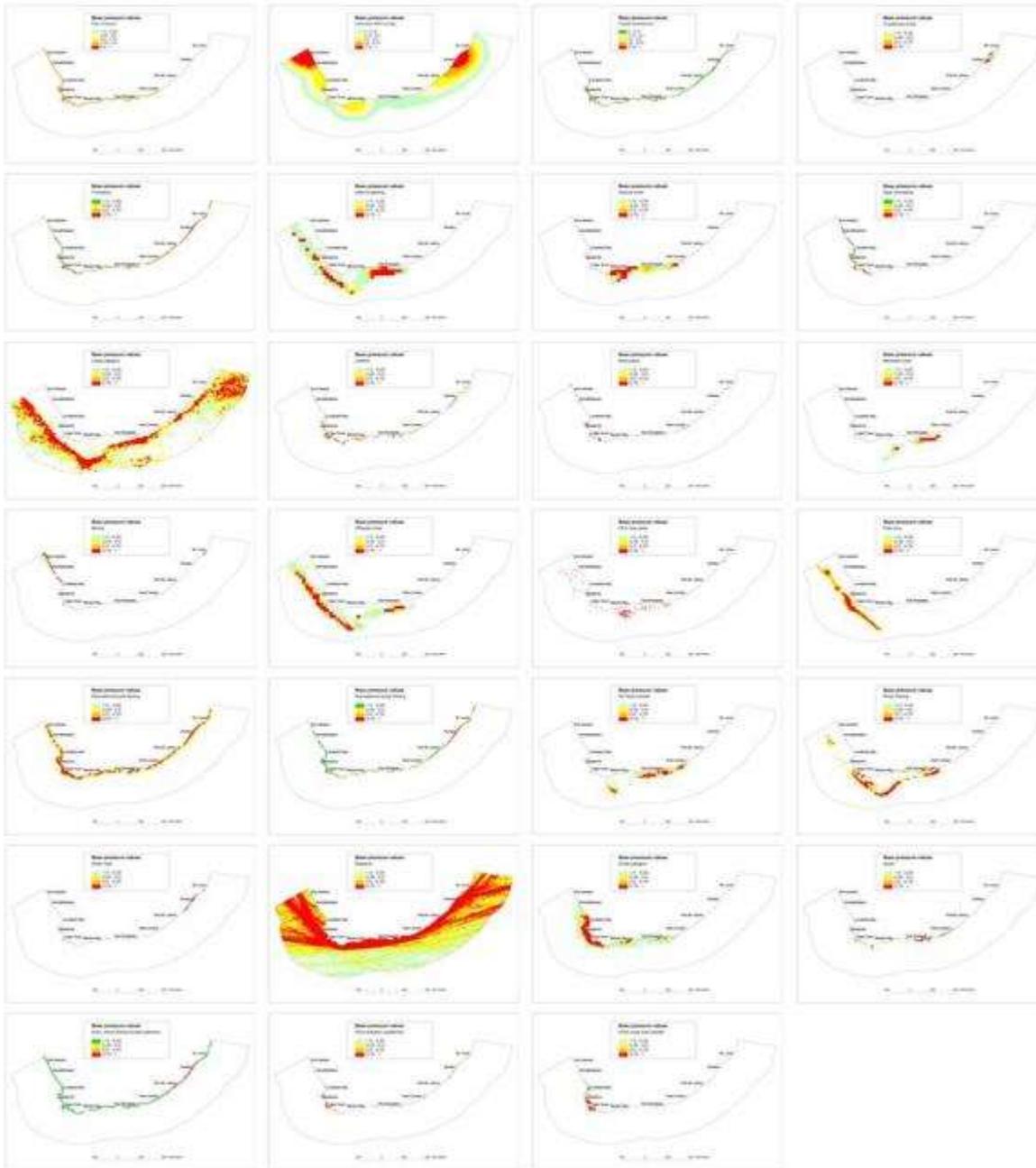
Offshore benthic – 23 rocky, 39 unconsolidated shelf, shelf edge & deepsea (62)



# Pressure mapping

27 GIS layers

- Alien Invasives
- Catchment MAR change
- Coastal development
- Commercial fishing (15 sectors)
- Disturbance
- Diamond & other mining
- Oil & Gas wells
- Recreational fishing (2)
- Shark nets
- Shipping
- Subsistence fishing
- Waste water discharge



# Condition

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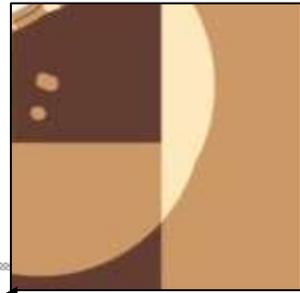
- Assumption— condition is related to the number and intensity of pressures and ecosystem impacts & recovery potential
- Pressure - habitat matrix
- Cumulative impact scores for sites (Halpern *et al.* 2008)
- Condition index for sites (5 min grid)

<b>Pressures</b>	Few pressures, low intensity	Range of pressures, moderate intensity	Many pressures, high intensities
<b>Condition</b>	Good	Fair	Poor
<b>Expected biodiversity impact</b>	Pattern and process intact	Some ecosystem degradation	Loss of biodiversity pattern and disruption of ecological processes.

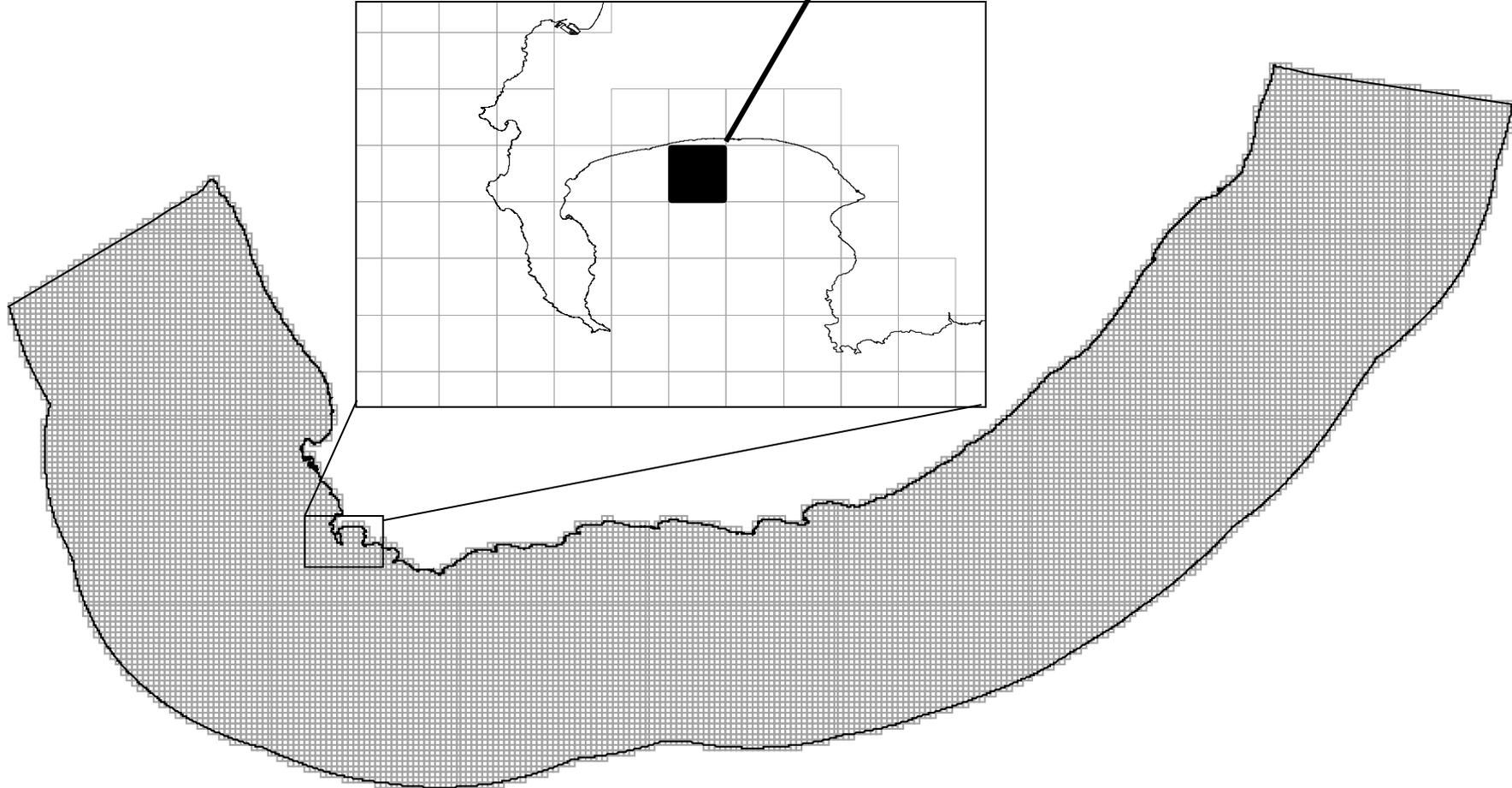
# Assessment Units

**Count:** **15,534**

**Mean size:** **72 km<sup>2</sup>**



7 habitats in different condition



## Cumulative impact scores

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The framework for calculating cumulative impact scores ( $I_c$ ) generally follows Halpern *et al.* (2008, 2009).  $I_{cj}$  was separately calculated for each habitat found within a 5' grid square, as a grid square could include a variety of ecosystems that may not all be subject to the same pressures (e.g. fishing for west coast rock lobster may impact the hard ground habitat within the unit of assessment but not the unconsolidated sediment) and could potentially respond differently to specific pressure types (i.e. a particular habitat may be impacted more heavily or take longer to recover from any one pressure). The cumulative impact for a habitat at a site was calculated as:

$$I_{cj} = \sum_{i=1}^n \beta_i \times W_{ij}$$

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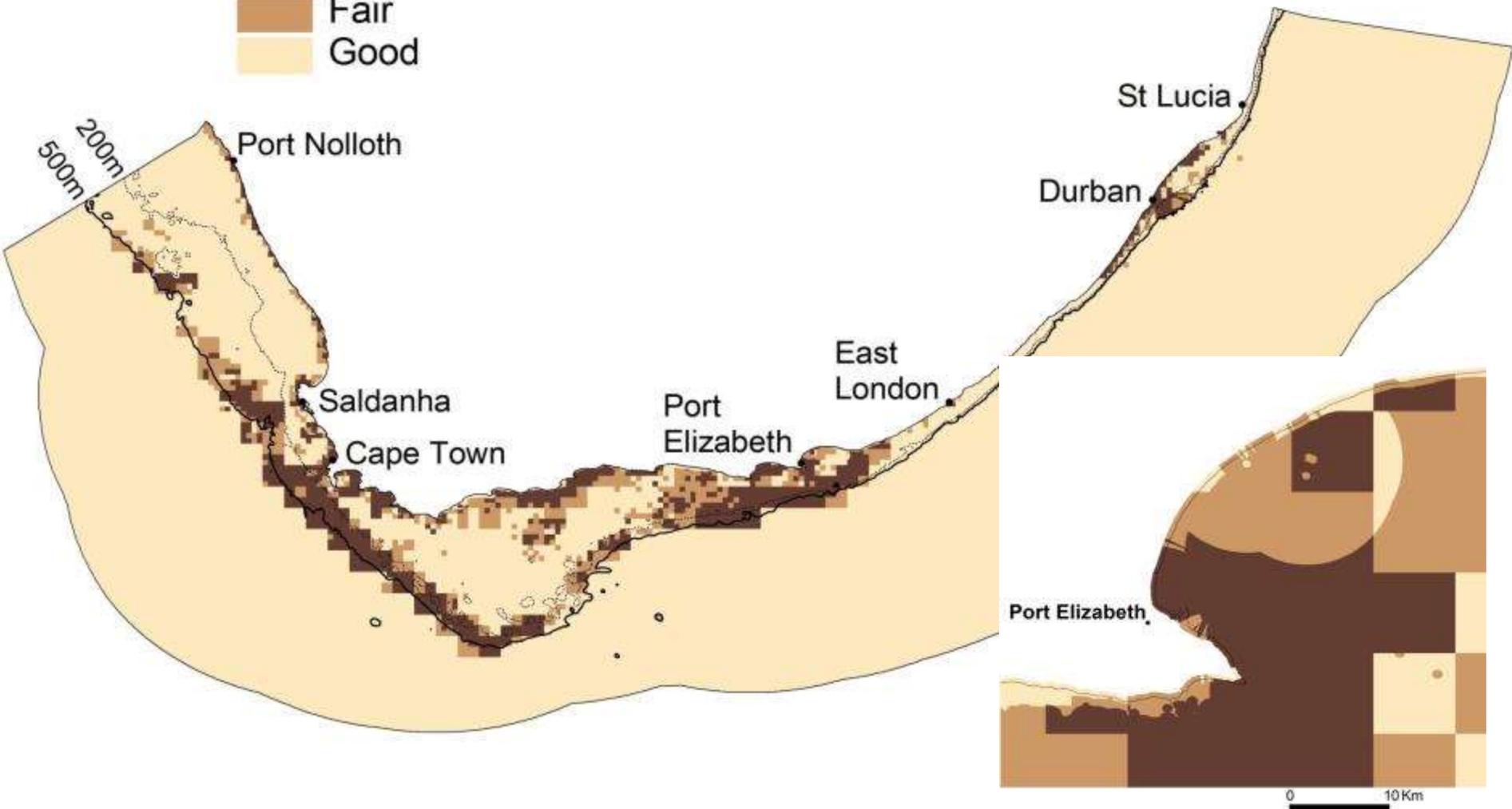
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Where  $\beta_i$  is the normalized pressure value (scaled between 0 and 1) of intensity of an anthropogenic driver at location  $i$ , and  $W_{ij}$  the impact weight for anthropogenic driver  $i$  and ecosystem  $j$ .

Impact weight = average of functional impact & recovery potential

Histograms were drawn of the cumulative impact scores, and these were subdivided on the basis of natural breaks in the distributions. The subdivisions values were also guided by spatial comparisons of values in highly impacted areas (e.g. heavily fished areas near major commercial and industrial centres) compared to habitats with few anthropogenic drivers of ecosystem change, as well as by cross referencing to cumulative impact scores in global studies (Halpern et al. 2008)

# Coastal & offshore benthic condition





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The impact weights  $W_{ij}$  were estimated using a group consensus process (6 experts) supplemented by additional consultation with individual experts and reference to available literature (see Table 2 and Table 4 for Ecosystem and Pressures references collectively including over 600 citations). This expert-driven process relied on expertise from more than 30 marine and coastal biodiversity and fisheries specialists in the South African marine field.