Supplementary Material

# Supplementary Figures and Tables

## Supplementary Tables

**Supplementary Table 1:** Summary of data-sources and the threats they represent for seagrass habitat in Australia

|  |  |
| --- | --- |
| **Threats to seagrass based on Grech et al (2012)** | **Spatially explicit threats analysed in this paper** |
| **Current risk** |  |
| Urban/industrial runoff | Industrial pollution |
| Agricultural runoff | Acute sediment & nutrient loads (inc. urban /agricultural runoff) |
|  | Chronic sediment and nutrient loads (inc. urban /agricultural runoff) |
|  | Resuspension |
| Urban/port infrastructure development | Port infrastructure & dredging |
| Dredging | As above |
| Shipping accidents (eg oil spills) | Shipping accidents |
|  | Oil & gas production accidents |
| Trawling | No data identified |
| Aquaculture | No data identified |
| Boat damage (commercial) | No data identified |
| Fishing (other than trawling) | No data identified |
| Invasive/introduced specie | No data identified |
| Desalination plants | No data identified |
| Seagrass harvesting | No data identified |
| **Future risk** |  |
| Changes in sea surface temperature | Increase in temperature |
| Increase in severity of tropical cyclones | Increases in rainfall |
| Sea level rise | Increase in sea-level |
| Changes in air temperature | Not included |
| Elevated CO2 and ocean acidification | No data identified |
|  |  |

**Supplementary Table 2:** Assignment of acute and chronic risk based on catchment modification and hydrological characteristics.

|  |  |  |  |
| --- | --- | --- | --- |
| **Acute sediment and nutrient risk** | | | |
| **Catchment modification** | **Pulse metric**  **<25th percentile**  (<494.5) | **Pulse metric**  **25th – 75th percentile**  (494.5 - 644) | **Pulse metric**  **>75th percentile**  (>644) |
| Pristine / largely unmodified | 1 | 1 | 2 |
| Modified | 1 | 2 | 3 |
| Highly modified | 1 | 3 | 4 |
| **Chronic sediment and nutrient risk** | | | |
| **Catchment modification** | **Hydrologic metric**  **<25th percentile**  (<0.85) | **Hydrologic metric**  **25th – 75th percentile**  (0.85–1.16) | **Hydrologic metric**  **>75th percentile**  (>1.16) |
| Pristine / largely unmodified | 2 | 1 | 1 |
| Modified | 3 | 2 | 1 |
| Highly modified | 4 | 3 | 2 |

**Supplementary Table 3:** Regions assessed by experts in the validation approach.

|  |  |
| --- | --- |
| **State** | **Region assessed in each state** |
| Western | Geographe Bay |
| Australia | Perth Coastal Waters |
|  | Shark Bay |
| South | Spencer Gulf (SW near Lincoln) |
| Australia | Gulf of St Vincent |
|  | Victor Harbor |
| Victoria | Port of Hastings |
|  | Port of Phillip Bay |
|  | Corner Inlet |
| Tasmania | Ralph’s Bay (near Hobart) |
|  | George’s Bay (Near St Helens) |
|  | Robbins/Kangaroo Island |
| New South | Botany Bay |
| Wales | Jervis Bay |
|  | Port Stephens |
| Queensland | Moreton Bay |
|  | Hervey Bay |
|  | Townsville |
| Northern | Gulf of Carpentaria (western side near Groote Eylandt) |
| Territory | Darwin Harbour |
|  | Arhem Land |
|  |  |



**Supplementary Figure 1.** Diagram showing how the spatial extent of influence of “x” - indicating estuary point location, is determined based on the risk value (low-blue, moderate-green, high-red) and annual flow (small, medium, large) for both acute and chronic sediment and nutrient threat layers.

Table

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**Supplementary Figure 2.** Datasheet used to collect qualitative and quantitative validation information on threats and risk projection.



**Supplementary Figure 3.** Top- Summary of the confidence experts have in the risk assignment to each threat layer and for the cumulative risk assessment for current and future threats. Bottom-The difference between expert opinion of the threat and the actual model value. A negative value indicates that the expert underestimated the model prediction whereas a positive value means the expert opinion was higher than the model.

Map

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**Supplementary Figure 4.** Likelihood of risk from exposure to acute sediment and nutrient delivery at a national scale in Australia.

**Map

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**Supplementary Figure 5.** Likelihood of risk from exposure to chronic sediment and nutrient delivery at a national scale in Australia.

Map

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**Supplementary Figure 6.** Likelihood of risk from exposure from sediment resuspension at a national scale in Australia.

Map

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**Supplementary Figure 7.** Likelihood of risk from exposure to pressures from ports and dredging at a national scale in Australia.

Map

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**Supplementary Figure 8.** Likelihood of risk from exposure to industrial pollution at a national scale in Australia.

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**Supplementary Figure 9.** Likelihood of risk from shipping accidents at a national scale in Australia.

Map

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**Supplementary Figure 10.** Likelihood of risk from exposure to oil and gas production wells at a national scale in Australia.

Map

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**Supplementary Figure 11.** Likelihood of risk from exposure to increased temperature based on 2070 predictions at a national scale in Australia.

Map

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**Supplementary Figure 12.** Likelihood of risk from exposure to increased rainfall based on 2070 predictions at a national scale in Australia.

Map

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**Supplementary Figure 13.** Likelihood of risk from exposure to increased sea level based on 2070 predictions at a national scale in Australia.