The Gippsland Lakes supports a wide range of different vegetation types, which are described under the theme “habitats”. Four indicators of condition have been selected:

- **Seagrass** – three species of seagrass occur in Lakes Victoria and King: *Zostera nigricaulis* in deeper areas, and *Zostera mulleri* in shallower, often intertidal, areas where the seagrass may be exposed at low tide, and *Ruppia spiralis*.

- **Coastal saltmarsh** – EPBC listed vulnerable community that occurs across many of the fringing wetlands as well as across the hypersaline Lake Reeve. Coastal saltmarsh includes a wide variety of plants differing greatly in their taxonomic, structure and life histories. In general, though, they occur in consistently saline environments and are generally dominated by low succulent chenopods (e.g. *Sarcocornia* spp.).

- **Freshwater wetland vegetation** – in Sale Common and MacLeod Morass. Includes a variety of emergent reeds, and sedges such as Common Reed (*Phragmites australis*), *Baumea* spp., *Bolboschoenus* spp., *Carex* spp., *Cyperus* spp., *Juncus* spp., *Schoenoplectus* spp.

- **Variably saline wetland vegetation** – which includes woody communities such as Swamp Paperbarks (*Melaleuca ericifolia*) as well as a variety of emergent salt tolerant rushes and sedges.

The vegetation of the Gippsland Lakes plays a critical role in the lakes’ ecology including:

- primary production, via photosynthesis, supplying energy to the system and food for a range of fauna
- provision of the habitat used by animals for shelter
- contributions to nutrient cycles via take-up and release nutrients such as nitrogen and phosphorus
- stabilisation of shorelines, protecting them from erosion
- contributions to biodiversity and other intrinsic values (Batavia and Nelson 2017).

The vegetation of the Gippsland Lakes also provides social and economic values. Some types of plants, for example, seagrass, are especially valued for anglers for their contribution to productive and sustainable fisheries. Other types, for example, the fringing vegetation of freshwater and variably saline wetlands, are valued by birdwatchers for the waterbirds they support. Although perhaps not as widely recognised is the value that fringing vegetation including paperbark swamps, reed beds and coastal Banksia woodlands have in preventing shoreline degradation and in maintaining the aesthetics of the Gippsland Lakes.

### Variably saline wetlands

**Indicators and thresholds**

The Limits of Acceptable Change (LAC) and Resource Condition Targets (RCT) for the Ramsar site have been used to derive thresholds for variably saline wetland vegetation extent.

**LAC** = A habitat mosaic will be maintained at Dowd Morass that comprises open water, common reed and swamp paperbark, with no habitat comprising more than 70 percent of the total wetland area for more than five successive years (Hale unpublished).

**RCT** = Maintain the extent, diversity and condition of variably saline vegetation communities.

Condition thresholds for variably saline wetland vegetation extent are as follows:

- **Good** = meets RCT
- **Fair** = between RCT and LAC
- **Poor** = exceeding LAC

Vegetation composition and structure was used to assess the condition of variably saline wetland vegetation extent, specifically in terms of conformity with EVC benchmarks. The Index of Wetland Condition biotic sub-index is used to assess vegetation across several themes: structure, community composition, and weeds. This is used to derive a condition score out of 20 for each vegetation community. Condition is reported on a five point scale,
which has been translated into the three categories for the Gippsland Lakes Environment Report as follows:

- **Good** = biota score 16 - 20
- **Fair** = biota score 13 - 10
- **Poor** = biota score 0 – 9

**Locations**

Wetlands of the Gippsland Lakes that experience variably saline regimes include Dowd Morass, The Heart Morass, Lake Coleman and Clydebank Morass. Data on vegetation composition, however, is limited to two of these wetlands: Heart Morass and Dowd Morass.

**Results**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Status and trends</th>
<th>Summary</th>
<th>Data quality:</th>
<th>Data custodian: DELWP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variably saline wetland vegetation extent</td>
<td>Unknown</td>
<td>Poor</td>
<td>Fair</td>
<td>Good</td>
</tr>
<tr>
<td>Variably saline wetland vegetation condition</td>
<td>Poor</td>
<td>Fair</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Status**

Recent mapping of vegetation at Dowd Morass indicates: 35% open water; 29% emergent vegetation; 19% woody vegetation (Frood et al. 2015). While the LAC is met and we can determine that the extent of vegetation at Dowd Morass is better than “poor” more quantitative data is required to establish a measurable threshold for “good” extent.

Quantitative data on vegetation composition and structure were available only for two variably saline wetlands around the lower Latrobe River: Heart Morass and Dowd Morass (Frood et al. 2015).

Heart Morass is spatially very complex, and Frood et al. (2015) reported over 60 spatially discrete vegetation patches. The EVC scores of these patches ranged from highs of 19 for a patch of Wet Sedgy Herbland (EVC A116) and 18 for a patch of Tall Marsh (EVC 821), to a low of 6 for a patch of Floodplain Riparian Woodland (EVC 56). The calculation of an IWC score requires integration not only of different measures in different EVCs, but also considers the extent of each vegetation community in a wetland. The total score for Heart Morass, from all vegetation communities assessed was 16, indicating good condition.

Dowd Morass received scores for various EVC components in different mapping units ranging from 19 for a patch of coastal saltmarsh aggregate (EVC 9) to a low of 8 for a patch of Brackish Wetland (EVC 565). The overall score was 16, indicating vegetation was in Good condition. This ranking, however, must be set against the large number of earlier research reports on Dowd Morass, which indicate that the Swamp Paperbark component of this
wetland is in poor condition, stressed by high salinity and prolonged flooding (e.g. Raulings et al. 2010, 2011; Salter et al. 2007, 2010a, b).

Figure 1: A variably saline wetland, Dowd Morass. Photograph by Paul I. Boon

Trend

There is no information available to allow trends in the composition or structure, or the total area, of the variably saline wetlands of the Gippsland Lakes to be determined. Boon et al. (2008) indicated that there had been a steady loss of Common Reed (*Phragmites australis*) and encroachment into former reed-vegetated areas of Dowd Morass by Swamp Paperbark (*Melaleuca ericifolia*) since the 1950s, but whether similar patterns have taken place in other variably saline wetlands is unknown.

Influencing factors and threats

The variably saline wetlands of the Gippsland Lakes provide one of the iconic features of the Gippsland landscape. Almost all have been modified in one way or another since European colonisation of the region, mainly for agriculture (e.g. Heart Morass and large parts of Clydebank and Dowd Morasses) and in some cases for discharge of waste waters (e.g. Lake Coleman). In some cases, they appear to have deepened as a result of landuse change, and this influences their salinity and hydrological regimes.

As with all coastal wetlands, changes to salinity or hydrological regimes will have very great impacts on the variably saline wetlands of the Gippsland Lakes. The dominant woody plant in these wetlands is the Swamp Paperbark *Melaleuca ericifolia*, and whilst it is tolerant of waterlogging it cannot withstand permanent inundation. Similarly, while it is tolerant of slightly saline conditions, it cannot withstand highly saline conditions. Climate change, responsible for both increases in eustatic sea levels and in storm surges, will likely have major impacts on the variably saline wetlands. In some places a co-dominant plant species is Common Reed *Phragmites australis*, and there is good evidence that for over the past 40-50 years it has become less extensive in the variably saline wetlands (Bird 1961b; Boon et al. 2008; Boon et al. 2016).
The vegetation of the variably saline wetlands is expected to vary strongly with long-term changes in climate, for example prolonged dry or wet periods. These long-term climatic patterns will influence what types of vegetation that grows best under prevailing conditions: dry periods might see the contraction of paperbarks and the expansion of salt-tolerant plant species; wetter periods might see the rapid expansion of species better suited to wet and fresher conditions. Episodic intrusions of saline water are also likely to decrease vegetation condition, possibly for periods of as long as a decade after the event (Raulings et al. 2010).

References