Appendices

Appendix 1
Climate change vulnerability assessment process

A vulnerability assessment was completed for natural assets in the West Gippsland region as part of a project completed for a number of Catchment Management Authorities in Victoria by Spatial Vision and Natural Decisions.[6] The assessment was completed for multiple natural asset classes and included the use of available data on the characteristics, values and condition of the assets. The assets considered in the assessment were consistent with those used in the RCS development process and included: native vegetation, rivers and streams, wetlands, estuaries, coasts and soil. The assessment included climate change projection scenarios based on selected exposure surfaces available from research and development activities.

The approach used to assess potential impacts and vulnerability required consideration of the sensitivity and adaptive capacity of the relevant asset. The assessment incorporated multiple projection scenarios (based on different global emissions scenarios) over multiple time frames and considered the potential climate change impact and vulnerability using the assessment framework described below.
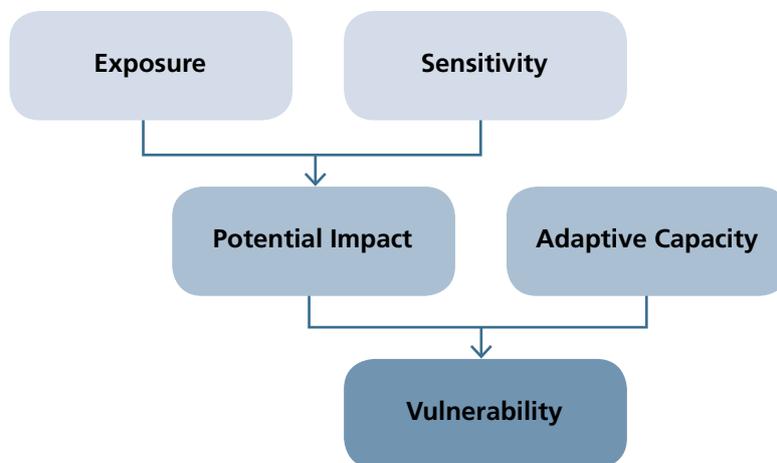

Figure 15: Climate change impact and vulnerability assessment framework

The process involved identifying the sensitivity of an asset type to two different climate exposures (or climatic stressors under a particular climate scenario) and using this information to determine the potential impact. The adaptive capacity of the asset was then used to determine its vulnerability.

While the climate stressors vary based on the climate scenario chosen in terms of the climate model used and particular timeframe, the sensitivity relationship or profile for an asset type is applicable for any anticipated climate scenario and timeframe under consideration.

The general steps undertaken for each natural asset type in application of the vulnerability assessment process were as follows:

1. Identify two key **Climate Stressors/Exposures** (and potential changes).

2. Identify **Asset Classes** relevant to Stressors.

3. Assign likely **Sensitivity** to Climate Stressors (likely response to change).

4. Calculate **Potential Impact** for each Climate Stressor (Exposure) for the change anticipated for a given climate scenario and time frame.

5. Calculate the worst **Potential Impact** for each combination of Climate Stressors (Exposure) for a given climate scenario and time frame.

6. Develop a likely **Adaptive Capacity** measure (based on current condition) for NRM asset.

7. Calculate **Vulnerability** based on potential impact and intrinsic adaptive capacity based on current state for a given climate scenario and time frame.

8. Assets with a **vulnerability score of equal to or greater than 30** were deemed to be the most vulnerable to climate change impacts.

Parameters used in the vulnerability assessment to determine the exposure, sensitivity and adaptive capacity of each asset class are presented below.

Table 13: Summary of Climate Stressors (Exposures), Climate Stressor Sensitivity considerations and Adaptive Capacity inputs

Asset Type	Climate Stressor	Sensitivity	Adaptive Capacity
Native Vegetation	Total Rainfall Nov to April – daily Max Temp	EVC sub-groups	Site condition Landscape connectivity
Wetlands	Mar to Nov – Rainfall Nov to April – daily Max Temp	Wetland type (FW meadows, marshes etc.) Water Source (river, groundwater) Alpine/non-alpine Within 2100 SLR and storm surge extent	% native veg presence within 100m Quality of native veg within 100m Land use within 100m Presence of drain, levee or cropping
Coastal wetlands	Mar to Nov – Rainfall Sea Level Rise & Storm Surge	Wetland type (Freshwater meadows, marshes etc.) Wetlands Regime – Supratidal Water Source (river, groundwater) Within 2100 SLR and storm surge extent	%native veg presence within 100m Dominant native veg quality within 100m Dominant land use within 100m Presence of drain, levee or cropping
Estuaries	Mar to Nov – Rainfall Sea Level Rise & Storm Surge	Open – Permanent & Intermittent Regulated catchment or not Mouth type – bay / coast	%native veg within catchment Quality of native veg within catchment Population & population density within catchment

Table 13: Summary of Climate Stressors (Exposures), Climate Stressor Sensitivity considerations and Adaptive Capacity inputs *continued*

Asset Type	Climate Stressor	Sensitivity	Adaptive Capacity
Rivers and Streams	Mar to Nov – Rainfall Nov to April – daily Max Temp	Regulated or not Perennial / permanent Terrain category – plains, intermediate, upper	% native veg presence within 100m Quality of native veg within 100m ISC – hydrology & streamside zone rating
Soils and Land	Total Rainfall Nov to April – daily Max Temp	Land system based soils Susceptibility to wind erosion Susceptibility to water erosion & terrain type	Native vegetation cover/ground cover Site condition & landscape context Land degradation (salinity, erosion)

The results from the vulnerability assessment using the RCP 4.5 scenario indicated that there may only be moderate levels of impact on natural assets in the West Gippsland region until the 2090 time period. Whereas the RCP 8.5 emission scenario (where emissions continue to rise throughout the 21st century) indicated moderate to high levels of impact on natural assets from 2070 onward. Taking into account the results of the impact and vulnerability assessment, it was decided that the RCP 8.5 emission scenario for the 2070 time period would be used to inform this Strategy. This scenario has been chosen because it provides a longer planning horizon than the Regional Catchment Strategy (55 years compared with 20 years), and has been judged to provide a plausible picture of possible moderate to high level impacts, under specific changes in climate factors, particularly changes in temperature and rainfall.

It is important to note that the results for the RCP 8.5 emission scenario for the 2030, 2050 and 2090 timeframes were used to help assess how robust and feasible each of the adaptation and mitigation options may possibly be over time.

Appendix 2
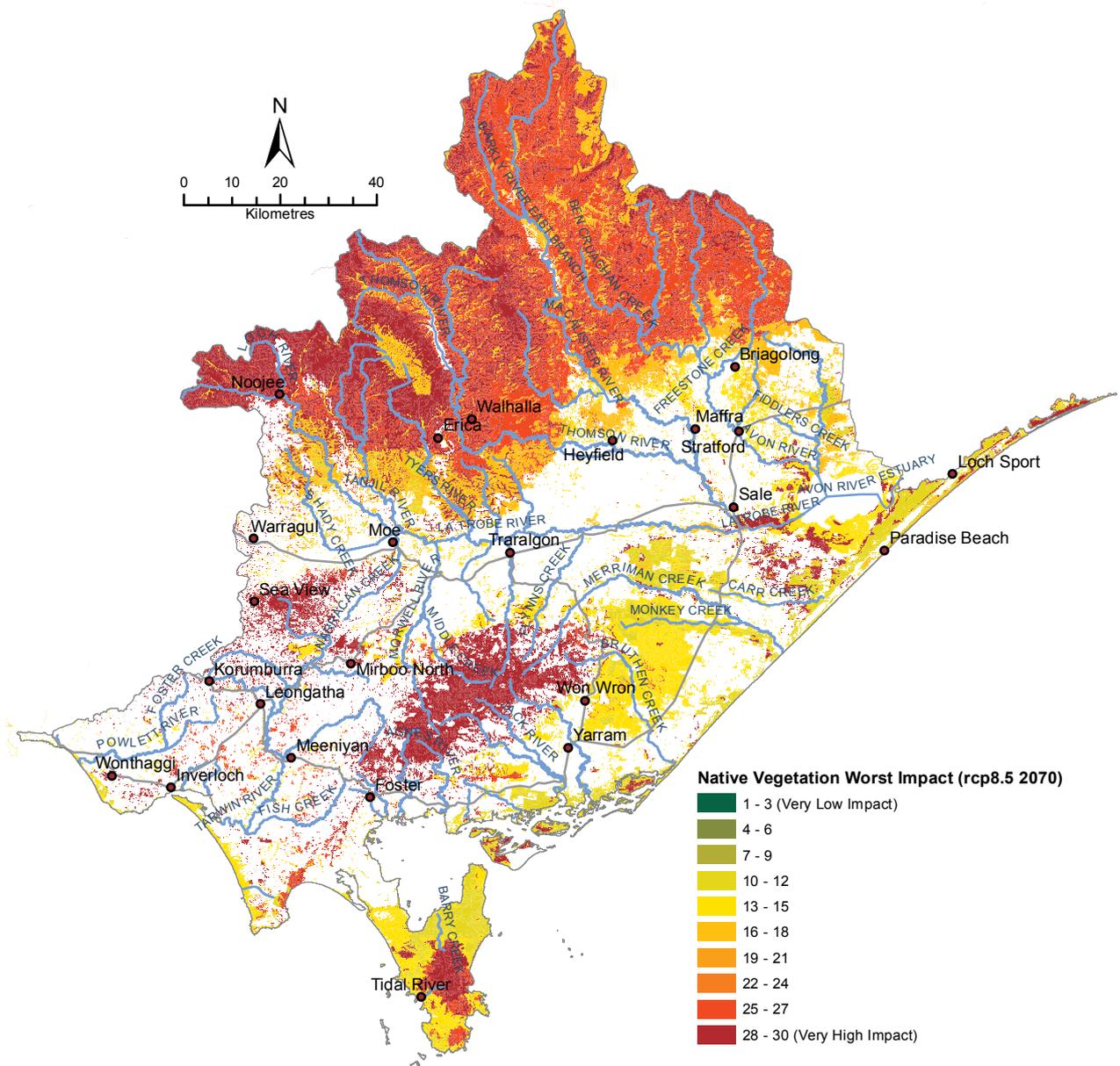# Climate change vulnerability assessment maps

Native vegetation

Native Vegetation Worst Impact (rcp8.5 2070)
- 1 - 3 (Very Low Impact)
- 4 - 6
- 7 - 9
- 10 - 12
- 13 - 15
- 16 - 18
- 19 - 21
- 22 - 24
- 25 - 27
- 28 - 30 (Very High Impact)

Figure 16: Vulnerability assessment results: native vegetation worst impact (RCP 8.5 2070)

Native vegetation

Native Vegetation Adaptive Capacity
- 1 - Very Low
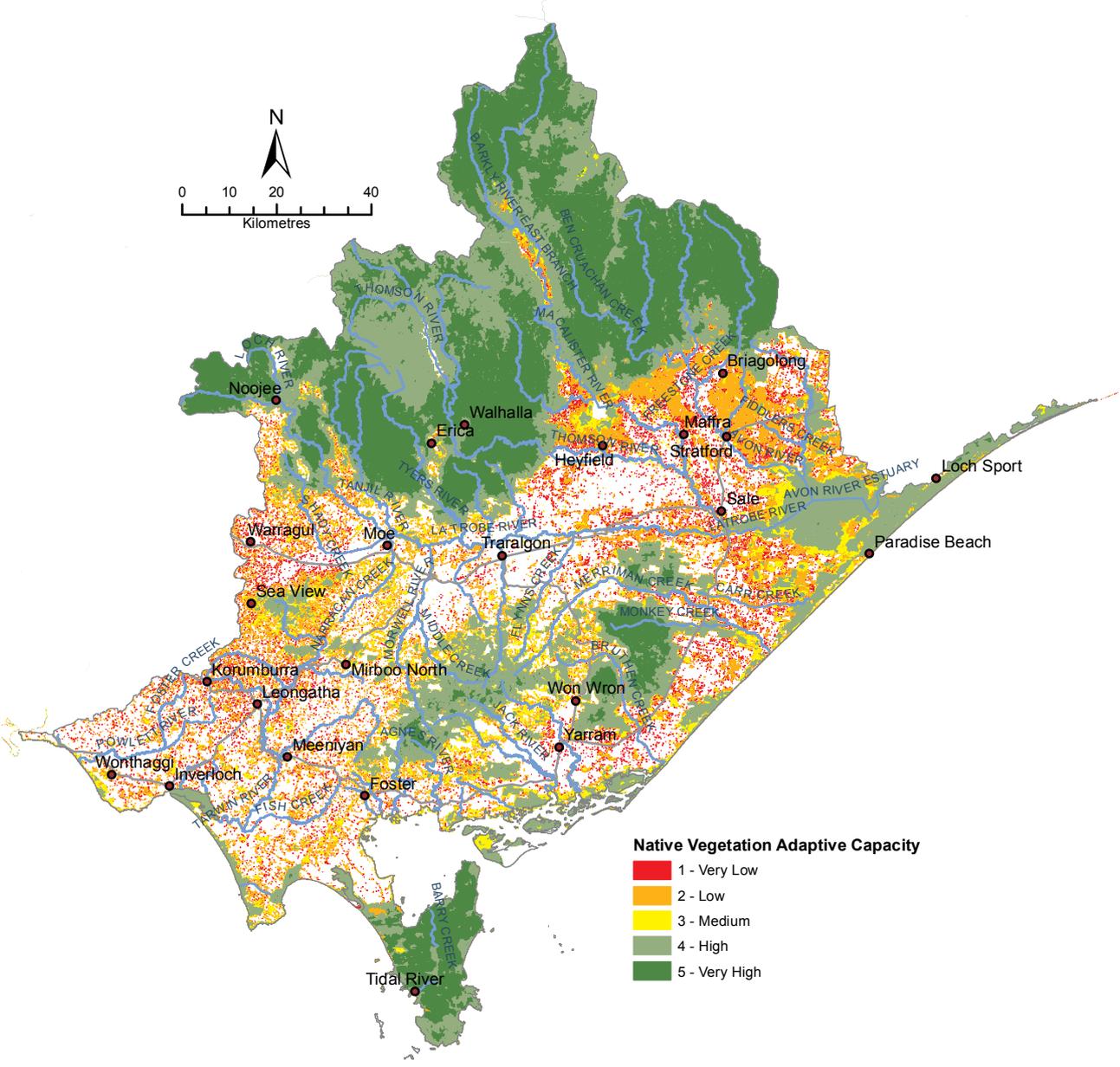- 2 - Low
- 3 - Medium
- 4 - High
- 5 - Very High

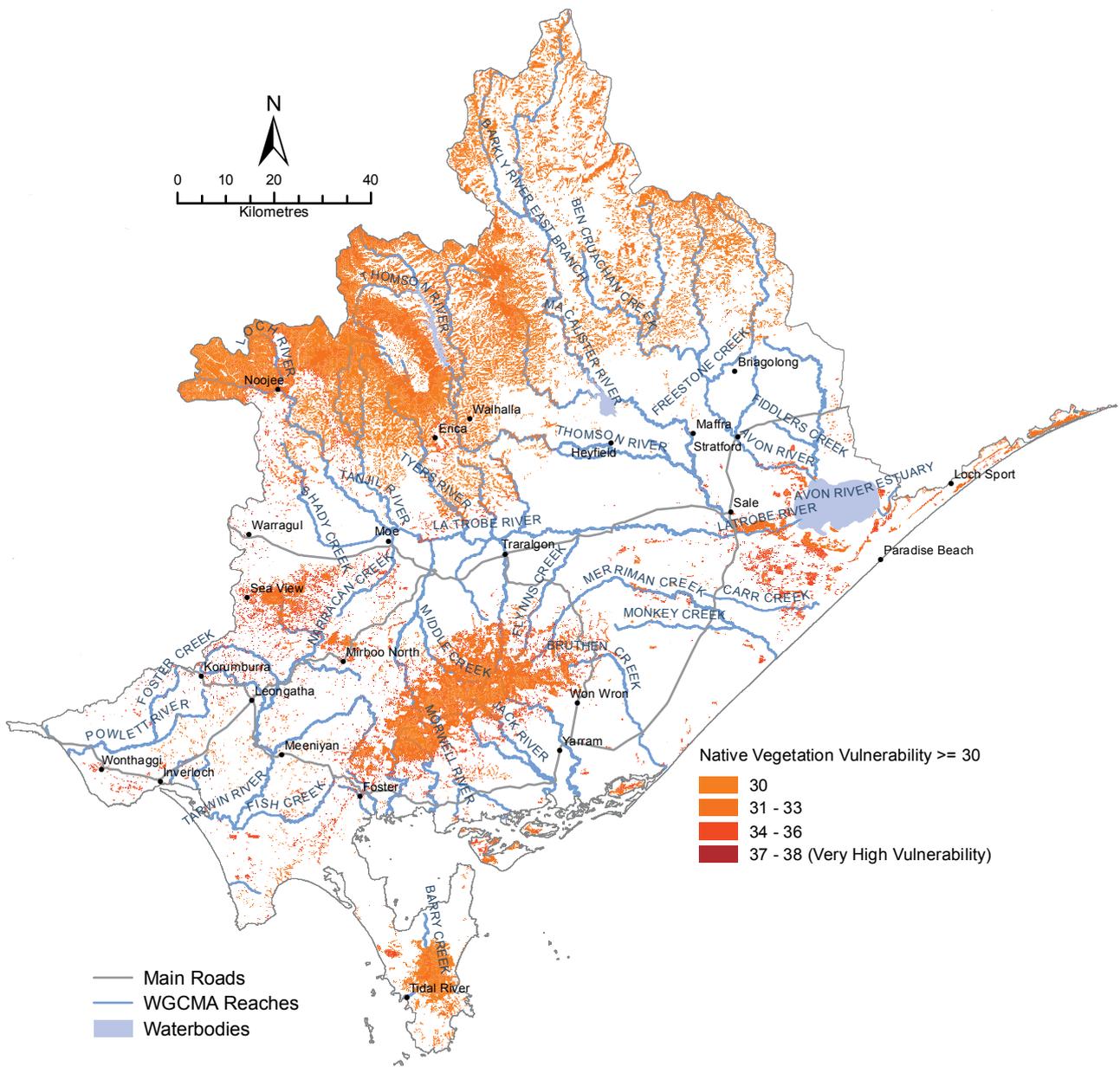**Figure 17: Vulnerability assessment results: native vegetation adaptive capacity**

Figure 18: Location of native vegetation with a very high potential vulnerability in West Gippsland (RCP 8.5 2070)