Framework for reporting on the condition of the Limestone Coast

DEWNR Technical report 2015/05

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Summary

This document outlines a framework to report on the condition of the Limestone Coast in the South East (SE) NRM region. The framework was developed to assist Natural Resources SE staff to measure and track the condition of coastal resources, pressures on them, and the effectiveness of investments to manage them. The framework for a report card and the indicators in the report card were developed during a workshop in November 2014. The workshop was attended by SE regional staff and technical experts.

The workshop was used to develop a conceptual model to show links between the natural resources of the Limestone Coast, their social and economic values, and the pressures on the resources. Native vegetation is an important and valued resource in the coastal environment because it provides habitat for native animals, places for recreation, gives the coastal landscape its identity and is culturally important for Aboriginal people. To further understanding of the condition of the vegetation, three communities, which are conservation priorities, were included on the conceptual model. The model was then used to inform the selection of indicators for monitoring and reporting.

A report card template was designed in the workshop. The template will guide the collection of information over the duration of the Limestone Coast Watchers program and ensure that the information is collected in a format that enables it to be used for concise and clear reporting.

The report card will use information from existing or on-going monitoring programs to summarise the condition of coastal resources, including the three vegetation communities. This report card will both educate readers on the condition of the coastal environment, as well as indicate where efforts could be focused to improve the condition of coastal resources.

1 Report card development process

1.1 Information Review

The information reviewed at the beginning of this project included:

- Conceptual models of ecosystems in the SE NRM region (C. Auricht report)
- Information on coastal vegetation communities that are conservation priorities from the Coastal Action Plan for the Limestone Coast and other reports (Caton et al. 2011)
- Vegetation and habitat requirements of orange bellied parrots on the Limestone Coast (Caton et al. 2011, Ehmke et al. 2009)

Workshop participants were asked to bring data that were relevant to either coastal vegetation, shorebirds, intertidal reefs and related natural resources on the Limestone Coast.

1.2 Workshop

The workshop aimed to increase interest in the Limestone Coast and to develop a common understanding about its condition. The workshop process allowed the collection and synthesis of information from diverse stakeholder groups and justified how resources and indicators of their condition were chosen.

The workshop was attended by technical experts, and Natural Resources SE staff. The goals of the workshop were to determine and agree on:

1. Three coastal vegetation communities that would be monitored between 2015 and 2017.
2. Indicators of condition for the vegetation communities.
3. Methods, site selections and timing of monitoring for the vegetation communities.
4. Other indicators of condition of other priority coastal resources including shorebirds, intertidal reef, beach, rocky headland, seagrass beds, orange bellied parrots and orchids (where information was or will be available).
5. Additional indicators of the condition of other priority resources for which information is not available. These indicators would inform monitoring priorities in the future.
6. A framework for the report card, including the components and format.

The workshop was held on 4th November 2014 in Mount Gambier, 11 Helen Street, between 10:40 and 4pm. The participants were as follows: Bryan Haywood, Cath Bell, Katrin Springer, Peter Riseley, Ann Aldersey, Melissa Herpich, Kiran Liversage, Glenn Jackway, Ross Anderson, Brenton Hastie, Barry Schriever, Darren Herpich, Raelene Mibus, Tania Rajic. The workshop was facilitated by Annelise Wiebkin and followed the process of Wiebkin (2014).

Step 1. Developing a conceptual model

A conceptual model provides a way to visualise the natural resources in an ecosystem, how they link together and processes that can change their condition. Conceptual models can be used to convey a broadly accessible message about how ecosystems function and what needs to be managed and monitored.

The workshop participants decided that the spatial boundaries of the Limestone Coast should match the boundaries outlined in the Coastal Action Plan (between the border of Victoria/South Australia and to north of the Granites) plus the area extending to Salt Creek (to align with the coastal subregion). The seaward boundary included the low water mark, and seagrass meadows.

Workshop participants reviewed, combined and modified several models that had been developed by Imgraben et al. (2014). The model that was developed by the workshop participants aimed to represent the features of the Limestone Coast as they are in 2014 (Appendix 1). The main ecosystems that were depicted included: intertidal reef, beach and dunes, seagrass, estuaries, rocky headlands and three coastal vegetation communities.

Step 2. Coastal vegetation communities' condition

Two vegetation communities were selected for condition monitoring by Natural Resources SE staff prior to the workshop. A third community was selected in the workshop using the criteria in Table 1. The three selected communities were:

1) Saltmarshes (selected prior to workshop) (specific community description and mapping layer to be decided)
2) Coastal grassland and sedgelands (selected prior to workshop) (specific community description and mapping layer to be decided)
3) Dryland teatree (*Melaleuca lanceolata*, selected in workshop) (specific community description and mapping layer to be decided)

Dryland teatree was selected from a list of the 6 vegetation communities that were nominated by workshop participants (Table 1). Dryland teatree met 5 of the 7 criteria below. The primary dunes also met 5 of the criteria, and workshop participants indicated that this habitat may be included in the report card if data (satellite images or aerial photographs) are available in when the report card is compiled.

Table 1. The vegetation communities that were considered for inclusion in the Limestone Coast Condition Check report card (to be compiled in 2017), and the criteria that were used to prioritise them.

Criteria	Dryland teatree	Primary dunes (coastal scrub/heath *L. parviflorus*)	Drooping sheoaks	Coastal mallee /coastal heath	Silky teatree with cutting grass	Seagrass
Resources available for monitoring methods	√ (2 days onground survey)	√ (may use remote sensing/aerial photography)	√ (2 days onground survey)	√ (2 days onground survey)	√ (2 days onground survey)	No (requires $40K for at-sea survey)
Extent known	Needs mapping revision prior to monitoring (only 800ha left)	√ (dune profile data from Coastal Protection Board)	√	√	√	√
Condition data available					Fauna and flora presence data only (M Bachmann 2012)	
Habitat for threatened species	√ (OBP habitat)	√ (shorebirds)			√ (OBP roosting habitat)	
Management actions planned or occurring for this community	√ (Dryland teatree regional Action Plan)	√ (erosion management and education)	√ (revegetation and burning occurring)			
Threats well understood	√ (highly threatened by fragmentation)	√ (threatened by weeds and erosion)				√ (threatened by nutrients from runoff, sediment and disturbance/erosion)
Community interest		√				√

The three vegetation communities that were selected for monitoring are highlighted as valuable ecological systems in the Coastal Action Plan for the Limestone Coast (Caton et al. 2011). Saltmarshes are valued because they are important habitats for the orange bellied parrot, which is threatened and iconic to people in the region (Ehmke and Tzaros 2009). Dryland teatree is

considered endangered within the region and its extent has been reduced to less than 2% of its original distribution, most of which is on private land (Sweeney and Fowler, 2013). Coastal grasslands and sedgelends support rare and threatened plant associations and bird species (Caton et al. 2011).

The workshop participants aimed to measure the condition of one vegetation community each year, for the three years between 2015 and 2017. Workshop participants decided to measure saltmarshes in 2015, grasslands and sedgelands in 2016 and dryland teatree in 2017. DEWNR's extent map for dryland teatree requires revision before sites are selected or monitored.

Step 3. Monitoring methods for native vegetation

The three vegetation communities will be measured for condition, extent and connectivity. Extent measures will be based on DEWNR's native vegetation layer and connectivity will be measured following the methods of Parkes, Newell and Cheal (2003). Both indices can be estimated using GIS tools and mapping layers constructed by DEWNR (Heard 2003). A connectivity index will determine the extent to which remaining patches of vegetation are spatially connected to surrounding native vegetation (Appendix 4). An index of vegetation extent will also determine the percentage of vegetation that remains since the pre-European period. This will only be possible in areas where pre-European vegetation maps are available.

The resources allocated to monitoring the condition of each vegetation community will be 4 teams of people (2 per team) for 2 days. Each team is likely to consist of one person from the SE Limestone Coast team and one volunteer or another Natural Resources SE staff.

Workshop participants developed vegetation monitoring methods that were suitable for people with low to moderate botanical knowledge (unable to identify every coastal plant), but who are familiar with most coastal weed species.

Workshop participants agreed that the condition of saltmarshes should be surveyed using the methods of Emke and Tzaros (2009) (Victorian orange bellied parrot habitat monitoring model). The methods are based on the abundance and structure of a subset of plant species that are readily recognisable. The participants decided that to include the 12-18 sites that were assessed by Ehmke and Tzaros (2009), with additional sites to be selected randomly across the Limestone Coast saltmarshes.

Workshop participants agreed that the condition of coastal grassland and sedgelands, and dryland teatree communities would be surveyed using by adapting the Bushland Condition Monitoring (BCM) method, which was developed by the Nature Conservation Society of SA. The BCM methods that workshop participants adapted are summarised in Table 2, and detailed in Appendix 2. The preferred timing of vegetation surveys is listed in Table 2.

Workshop participants selected additional indicators, which were highlighted as priorities for management in the conceptual model (Appendix 1, Table 2). One of the additional indicators for the grassland and sedgeland community was bird diversity, which will be surveyed by volunteers at each vegetation site. Workshop participants indicated that these surveys would not need to be undertaken at the same time as the vegetation surveys. Bird survey methods were not discussed in the workshop, but it was noted that standard bird sampling methods would be used (e.g. single 20-minute visits to 2-hectare sites; Possingham et al. 2004). A summary of the condition indicators is below (Table 2).

Table 2. The vegetation condition indicators that will be surveyed for each of the three vegetation communities, and the preferred timing of vegetation surveys.

Vegetation condition indicator	Saltmarshes (sample according to Ehmke and Tzaros 2009)	Coastal grassland and sedgelands (sample in Nov-Jan)	Dryland teatree (sample in spring)
Total native species diversity	√	√	√
Ground cover		√	√
Plant-life structure		√	√
Regeneration		√	√
Weed abundance and threat	√	√	√
Abundance of boxthorn and tall fescue*		√	

>5% of woody cover *L. parviflorus* and *A. longifolia* and *Olearia (*for grassland*)**		√	√
Nativeness (relative abundance of native plants to weeds)		√	√
Roosting sites for orange bellied parrots	√		
Abundance of moss/lichens*			√
ORVs/Motorbikes*	√ (possibly)	√ (possibly)	
Inter-tussock space*		√	
Bird Diversity (reported separately, measured by volunteers)*		√	

*Denotes extra indicators that are specifically relevant to a vegetation community (not part of the BCM method).

The vegetation surveys methods were developed to ensure that sufficient sites could be surveyed in 2 days, and that sufficient data (4 sites per day) would be collected to detect changes in vegetation condition in the future. Power analyses of vegetation monitoring data, which were collected using similar methods, indicate that about 100 grassland/sedgeland sites are required to detect a 10 per cent change between surveys, and 20 sites are required to detect a 20 per cent change between surveys (Wiebkin 2013). About 60 samphire/forblands sites are required to detect a 10 per cent change between surveys, and 30 sites are required to detect a 20 per cent change. Analyses of various heath and shrubland communities indicated that between 40 and 100 sites are required to detect a 10 per cent change and between 10 and 30 sites are required to detect a 20 per cent change.

These analyses suggest that a minimum of 30 sites should be surveyed for each vegetation community in the Limestone Coast project, which will enable the detection of a 20 per cent change in the condition of vegetation in most communities (smaller changes will be detected in some communities).

Workshop participants agreed that the vegetation monitoring sites would be randomly selected across the distribution of each community in the Limestone Coast (including parks and private land). Randomly selecting sites ensures that the vegetation condition surveys will not be biased toward vegetation in either the best or worst conditions and that the information is representative of the entire Limestone Coast. The sites will be selected using the following rules:

- sites will be in patches that are greater than 6000 square metres (or smaller if patch sizes are typically smaller)
- sites will be further than 100 from the edge of areas of native vegetation (e.g. where vegetation meets paddock) to minimise edge effects such as encroachment of weeds from paddocks
- sites will be further than 110 metres from roads (centrelines), to minimise edge effects such as road-side weeds, and run-off from roads
- sites will be less than 210 metres from roads, to minimise the time it takes to get to each site
- sites will be greater than 1000 metres apart (within the same vegetation community) to ensure that sites are independent (Appendix 3).

These rules can be built into a GIS model, which can then be used to randomly select the sites for monitoring. About 50 sites should be randomly selected using the GIS model, which is more than needs to be surveyed. Additional sites will allow flexibility if sites are not accessible (e.g. remoteness of sites, impassable tracks, weather conditions, or access not granted from private landowners), or where the vegetation at a site is not consistent with DEWNR mapping data.

It is recommended that broad scale (region wide) surveys of vegetation condition be conducted every 5 years in order to detect changes in the condition of vegetation. Connectivity and extent could be resurveyed each 10 years. Where targeted on-ground actions are being implemented (e.g. weed control, revegetation, fencing, herbivore control, fire management) for a particular vegetation community, more frequent monitoring may be required. In cases such as these it is recommended that on-ground actions and subsequent monitoring be designed and undertaken in a way that enables the effectiveness of management actions to be evaluated. Appropriate data should be collected relating to the type of management undertaken,

the location of management practices and the amount of effort employed (hours/amount of weed spraying etc.). This approach will allow comparisons of vegetation condition at sites where management has and has not been carried out, allow a cost-benefit assessment of the effectiveness of management activities and inform adaptive management of vegetation.

Step 4. Indicators of the condition of other coastal resources

Workshop participants used the conceptual model to guide the selection of indicators of the condition of other natural resources on the Limestone Coast (Table 3). The habitats that were highly valued for inclusion into the report card were rocky headlands and beach (that support shorebirds and vegetation communities of conservation value), as well as intertidal reef and seagrass (that support commercial and recreational fishing species, general recreation, stabilise sand and provide habitats for species of conservation value). Shorebirds, orange bellied parrots and orchids were also selected for their iconic value to people within the region and conservation significance. Indicators of condition were chosen for each of these along with indicators that reflect key threats to each system or species (where threats were known and information was available).

Workshop participants suggested that all indicators should be scored out of 100, which could then be converted to grades ("A,B,C" or "good", "poor) if required. Workshop participants indicated that scoring would be dependent on the data that are available (Table 3).

Table 3. The natural resources that were prioritised for reporting, the indicators of condition, baselines against which indicator data could be scored, the people responsible for preparing the information for the report card, and additional indicators of pressures and condition for future monitoring projects. One graph will be produced for each of these indicators (for each natural resource) showing the indicator score against time (if temporal information is available).

Natural Resource	Selected indicators for report card	Baseline against which indicator will be scored	Person responsible for preparing information for report card	Additional indicators for future monitoring projects
Saltmarshes	1. Condition, 2. Connectivity, 3. Remaining extent	Model "best-possible" 100% connected 100% extent coverage	R. Mibus (coordinate) D. Herpich, R. Mibus D. Herpich, R. Mibus	
Coastal grassland and sedgeland	1. Condition, 2. Bird diversity, 3. Connectivity, 4. Remaining extent	Model "best-possible" Model "best-possible" 100% connected 100% extent coverage	R. Mibus (coordinate) R. Mibus (coordinate) D. Herpich, R. Mibus D. Herpich, R. Mibus	
Dryland teatree	1. Condition, 2. Connectivity, 3. Remaining extent	Model "best-possible" 100% connected 100% extent coverage	R. Mibus (coordinate) D. Herpich, R. Mibus D. Herpich, R. Mibus	
Intertidal reef	1. Reefwatch data (need to discuss with SARDI to determine what measures are used to create an index of condition)	Model "best-possible"	To be determined	Off road vehicles Nutrients
Rocky headlands				Off road vehicles Shorebirds Vegetation removal Erosion from storm surge Condition of vegetation

Natural Resource	Selected indicators for report card	Baseline against which indicator will be scored	Person responsible for preparing information for report card	Additional indicators for future monitoring projects
Beach	1. Marine debris (weight/km of beach) – SARDI study 2. Change in beach profile of primary dunes (may use CPB data)	0 kg debris Loss of sand/reduction in profile height or width	To be determined To be determined	Off road vehicles (possibly look at Honours Student (N. Petch) data, or number of fake nests run over, or a survey of number Off road vehicles seen per hour) (see Mbuteti 2013 Beach wrack (length of beach) Amount of beach wrack harvested Density of invertebrates in beach wrack Abundance of weeds Extent of seawheat grass
Seagrass	1. Loss of seagrass extent	To be determined (e.g. Extent from pre 1970s)	To be determined	
Shorebirds (beach and inland lakes)	1. Abundance, # locations, # fledglings of hooded plovers (resident) and other species* 2. Abundance of waterfowl (select species) 3. Percentage of sites at which fox and cat baits are taken (as an indicator of the percentage of sites where of foxes and cats are present)	To be determined To be determined Zero baits taken assumes no foxes/cats	R. Anderson, B. Schriever R. Anderson, B. Schriever B. Schriever	
Orange-bellied parrots	1. Abundance	To be determined	To be determined	
Orchids	1. Abundance	To be determined	To be determined	
Social values	1. Volunteer effort (hours and numbers of people) in conservation programs and education programs	Not required.	To be determined	CPUE for local commercial fisheries Visitation rates (tourism)

*Note shorebirds include the following species: pied oyster catchers, hooded plovers, ruddy turnstones, red-necked stints and sanderlings.

Step 5. Designing the report card

The workshop participants discussed how the condition information should be reported, and agreed that a report card format would be most appropriate. The participants decided that the audience of the report card would to be the community and SE Natural Resources staff. The participants did not agree on whether they wanted one large report card or several smaller ones using the format of the NRM Reporting Framework. The workshop participants indicated that the format would be a printable brochure or several single A4 page cards. If a larger report card is deemed most appropriate, the report would have a section on each of the priority resources (Table 3).

The workshop participants drafted the layout of report cards for intertidal reefs and coastal vegetation (example in Appendix 5). They included the following components:

- The importance of the natural resource (e.g. vegetation or reefs), including economic benefits, health benefits and ecosystem services.
- The reasons for reporting on the three selected vegetation communities; they are representative of communities that are currently being managed.
- Historical context; what reefs were like and what species were once there; what vegetation was like before human pressures; and when it was cleared.
- A map of reef extent and vegetation extent, with main towns and reef watch sites. Include a pre-European vegetation extent map.
- A section on threats (e.g. reef threats are nutrients, illegal food/bait collection, climate change/sea level rise, invasive species)
- A section on the indicators that were used and a brief description of the methods, timeframes (years of reporting) and how they were used to determine the scores.
- Trends of condition, remaining extent (for vegetation) and threats (e.g. for reefs, include graph of brown algae, sedimentation and the number of people in nearby towns).
- The overall score for reefs or vegetation, and what the score means.
- A section on the management actions being undertaken, recommendations, and how individuals can help, and future work.
- Photos of healthy reef or vegetation
- Links to detailed technical reports.

1.3 Following the workshop

Step 6. Sourcing and preparing information

The Natural Resources SE staff will collect, process and graph the information listed in Table 3. A single graph will be prepared for each indicator. The preference is to report trend information. The information, together with text and graphics relating to the components listed in Step 5 will be prepared in a report card template by Natural Resources SE staff (example in Appendix 5).

2 References

Aravind N.A, Shaanker R.U, Ganeshaiah K.N (2004). Croak, croak, croak: are there more frogs to be discovered in the Western Ghats? Current Science. 86, 1471–1472.

Bebber, D.P, Marriott, F.H.C., Gaston, K.J., Harris, S.A. and Scotland, R.W. (2007). Predicting unknown species numbers using discovery curves. Proceedings of the Royal Society B, 274, 1651-1658.

Caton, B., Quinn, J., Detmar, S., Fotheringham, D., Rubbo, N., Royal, M., Sandercock, R. and Laurence, S. (2011), Limestone Coast and Coorong Coastal Action Plan and Conservation Priority Study, South East NRM Board and Department of Environment and Natural Resources, Adelaide.

Croft, S.J. Pedler, J.A., and Milne, T.I. (2005). Bushland Condition Monitoring Manual. Volume 1. Field Guide to Bushland Monitoring. Nature Conservation Society of South Australia. Adelaide, South Australia.

Ehmke, G., Herrod, A., Green R. and Tzaros, C. (2009), Habitat Protection and Restoration Plan for the Orange-bellied Parrot *Neophema chrysogaster* in the South East of South Australia, Birds Australia, Melbourne.

Heard, L.M.B. (2003). Vegetation, in *A Biological Survey of the South East, South Australia. 1991 and 1997*. (Eds. Foulkes, J.N. and Heard, L.M.B.), pp. 65-154, Department for Environment and Heritage, South Australia.

Imgraben, S., Auricht, C.M, Baskerville, L. and Walker, K (2014) Development of conceptual models for major social and ecological systems in the South East NRM region. Report prepared for SE NRM Board by Auricht Projects, South Australia.

Kluth, C and Bruelheide, H. (2004). Using standardized sampling designs from population ecology to assess biodiversity patterns of therophyte vegetation across scales. Journal of Biogeography, 31, 363–377.

Mahoney, P.G. and Saison, C. (2012). Bushland Condition Monitoring in Eyre Peninsula NRM Region. Towards a regional Baseline of Vegetation Condition. Nature Conservation Society of South Australia. pp113.

McLeay, L.J., Wiebkin, A.S., Page, B., Neagle, N. and Sharafi, S.M., (2013), Monitoring of Native Vegetation Condition and Extent in the South East Natural Resources Management Region. Report to the South East Natural Resources Management Board

Medellin R.A and Soberon J (1999). Prediction of mammal diversity on four land masses. Conservation Biology 13, 143–49.

Milne, T. and Croft, T. (2012). Bushland Condition Monitoring Manual. Benchmark communities of the South East. Nature Conservation Society of South Australia. 90p.

Moreno, C.E. and Halffter, G. (2000). Assessing the completeness of bat biodiversity inventories using species accumulation curves. Journal of Applied Ecology, 37, 149-158.

Parkes, D., Newell, G and Cheal, D (2003). Assessing the quality of native vegetation: The 'habitat hectares' approach. *Ecological Management and Restoration* 4 Supplement, s29-s38.

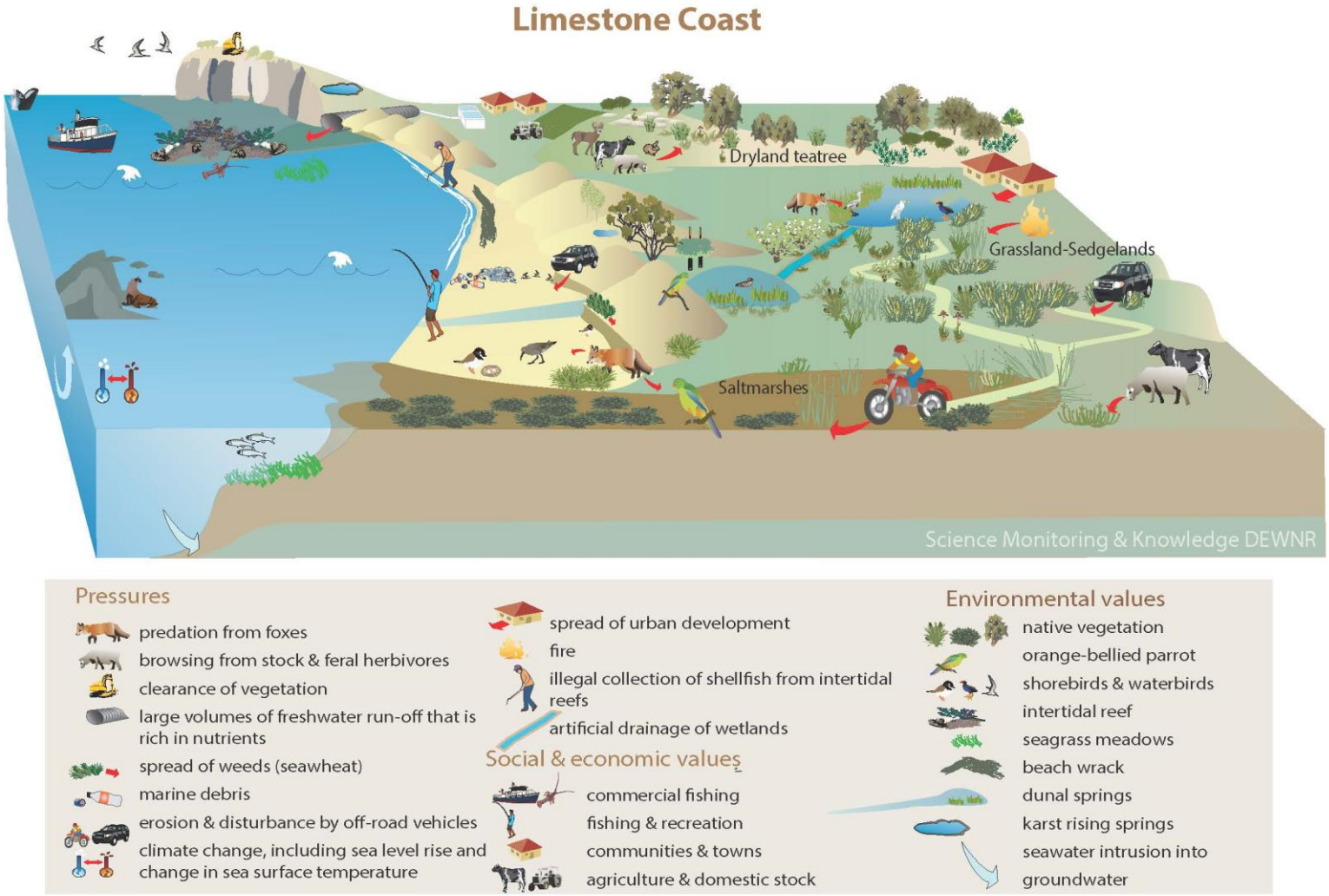
Soberon J.M, Llorente J.B (1993). The use of species accumulation functions for the prediction of species richness. Conservation Biology, 7, 480–488.

Sweeney, O. and Fowler, T (2013) Action plan for Dryland Tea-tree (*Melaleuca lanceolata*) and Drooping Sheoak (Allocasurina verticillata) Alkaline Low Woodlands in the South East of South Australia. Report for SE NRM Region.

Wiebkin, A. (2014). Developing conceptual models – a guide for facilitating workshops. DEWNR Technical Note 2014/04. Government of South Australia, through Department of Water, Land and Biodiversity Conservation, Adelaide.

Wiebkin, A. (2013). Monitoring Native Vegetation on Eyre Peninsula for the Wentworth Group's Regional Environmental Accounting Trial 2012. Report to the Eyre Peninsula Natural Resources Management Board. Department of Environment, Water and Natural Resources.

Appendix 1. Conceptual model



Appendix 2: Field monitoring protocols for dryland treatree and grassland-sedgelands

The following rapid vegetation condition survey protocols are based on the Bush Condition Monitoring (BCM) method (NCSSA) but there are some differences. The BCM method uses a 30m x 30m quadrat and the rapid vegetation condition survey uses line transects. The use of line transects reduce the amount of time and cost associated with sampling a survey site, thereby enabling mores sites to be surveyed and providing data relating to the condition of priority vegetation communities over larger areas.

Vegetation surveys are traditionally conducted by botanical experts because plant identification is required to determine community composition. However, the need for taxonomic identification of plants to species level is determined by the aims of a particular study. The BCM method and the method used in the rapid vegetation condition survey records scores relating to the number of plant species present but does not require detailed species identification. Incorporating plant identification into vegetation surveys requires voucher specimens to be collected, and may add significant cost to surveys undertaken across large spatial scales. It is worth noting that the potential influence of inaccurate species identification on overall vegetation scores at a survey site is minimal. For example, in a survey using the same methods (McLeay et al. 2013), the mean number of species recorded was 19 for four vegetation communities. If one species was not identified at one site in any vegetation community, a reduction of 0.05% in the overall site condition score would occur. Management actions for natural resources such as native vegetation are triggered by the detection of large-scale changes in condition and would not be impacted by this small margin of error. Future monitoring of vegetation condition in the SE region should continue to weigh up the costs and benefits of the different methods that are available in relation to management goals (McLeay et al 2013).

To obtain a reference benchmark value for each indicator of vegetation condition, the rapid vegetation condition survey either uses the maximum possible categorical value for each indicator or uses a modelling procedure to estimate reference benchmark values (e.g. for counts of species diversity). Benchmark values are commonly estimated in vegetation monitoring studies by surveying a number of sites that are considered to be 'best-on-offer' (Mahoney and Saison 2012). For the rapid vegetation condition survey, the reference benchmark values can be estimated by modelling the data that will be collected during the survey. This approach has been used in studies of frogs (Aravind *et al.* 2004), bats (Moreno and Halffter 2000), mammals (Medellin and Soberon 1999) and plants (Soberon and Llorente 1993, Kluth and Bruelheide 2004, Bebber *et al.* 2007). This modelling technique has advantages over other methods used to estimate benchmark values because it does not require additional fieldwork, is not biased towards sites that are subjectively chosen as 'best on offer' and is particularly useful when the variation between sites is large (Bebber *et al.* 2007).

Where categorical data are recorded for an indicator, the 'reference benchmark' should be the maximum possible categorical value for that indicator. Where categorical data are not recorded for an indicator (e.g. counts of species diversity), Gompertz curves can be fitted to the data collected at all sites for each vegetation community. The asymptote value estimated from the Gompertz curve represents the maximum attainable value for each indicator based on the data collected. This value is defined as the reference benchmark or best condition of each indicator.

If modelling benchmarks is not possible, benchmarks for BCM are available for the following communities in the SE NRM region: coastal dune grasslands and low open shrublands, coastal dune shrublands, coastal and sub-coastal low woodlands with open grassy understorey, coastal mallee and closed mallee with a very open understorey on sandy soils, coastal, sub-coastal and inland mallee with mid-dense shrub and sedge understorey on calcareous dunes (Milne and Croft 2012).

Data for each indicator are then scaled against each reference benchmark, giving a value between 0 and 100 for each indicator at each site. These values are weighted for each indicator and then summed to provide an overall condition score for each site. Site scores are then averaged to give an overall condition score for each vegetation community. Weightings assigned for each indicator were based on methods of BCM used by staff at the NCSSA.

The field protocol and data sheets for the vegetation condition surveys are below. They include the following activities:

1. Mark out 3 transects of 30 metres in length (these can be surveyed sequentially so that only one measuring tape is required).
2. Site description and photo (note that photos are optional and are not required for the survey of vegetation condition, they are for reference or newsletter photos etc.). If photos are taken, they should be filed by the Natural Resources SE staff.
3. For each transect, record ground cover type and plant structural form intersecting (above or below) each meter mark of the measuring tape, the abundance rating for the most dominant 5 weed species within 1 metre of each transect.
4. The total number of native plant species intersecting the three transects.
5. The number of age classes (seedlings, juveniles, mature trees) of the over storey trees and shrubs. Only do this for the dryland teatree community.

Two look-up sheets are also included below. These are the plant life forms referred to in the datasheet. A list of potential weed species for the dryland teatree community is also included below.

Details on how to enter and process the data that will be provided by Science Monitoring and Knowledge as electronic files (spreadsheets and word documents). Weed scores incorporate a threat rating for each species, which will also be provided. Katrin Springer (Natural Resources SE) may provide advice about field logistics and systems for recording contact with landowners.

Rapid Vegetation Condition Survey Method

If the site does not look like DRYLAND TEATREE (DTT) or COASTAL GRASSLANDS/SEDGELANDS (CGS), DO NOT continue with this survey. If either of these communities are present within 1km of where you are, move to the nearest patch to start survey.

SITE DESCRIPTION

Site ID (e.g. 03-DTT): ☐☐ Observer: _____ Date: _____

Location of start of Transect 1: Zone (e.g. 53) ____ Easting _ _ _ _ _ _ Northing _ _ _ _ _ _ _

GPS Datum (circle which used) WGS84 GDA94

1. Vegetation Community Description

Briefly describe the vegetation community in terms of the **dominant species (can be >1) in the overstorey and the understorey**. If you do not know the species name, use a descriptive name instead (e.g. stringybark, sheoak, grass tree, mangrove, needle-leaf bush etc).

Overstorey	
Understorey	

Site Photo

Take a photo of the vegetation from the start of Transect 1 (looking in the direction of Transect 1). Write the name of the project (SE Coastal Veg Mon), site name (e.g. 03-DTT) and the date on the site board with a whiteboard marker and place it clearly in the photo. E.g.:-

SE Coastal Veg Mon

03-DTT

2. Landform Description

Tick appropriate descriptors below that describe the landscape where the site is located.

Landform Pattern			
	Ridge-top		Coastal dune
	Steep hill slope (>20º)		Coastal swale
	Hill slope (<20º)		Coastal cliff
	Valley bottom		Swamp
	Plain (slope <5º)		Estuarine
	Consolidated dune		Floodplain
	Inland sand dune		Creekline
	Inland swale		Other -

Dominant Substrate	
	Mainly sandy texture (water penetrates rapidly)
	Mainly clay texture (high moisture holding
	Mainly loam texture
	Calcrete
	Rocky
	Inundated by water for substantial parts of year

TRANSECTS

Wherever possible transects should be >100m from the track, road, or edge of the vegetation patch. Mark out a straight 30m transect, and complete the data collection for Transect 1. Ensure you walk 50 paces (in a straight line, in any direction) before marking out the next transect (example transect design below). Repeat until you have completed 3 transects. Ensure transects do not cross with one another and they lie within the same vegetation type. If a site has been recently burnt, still collect data.

TRANSECT 1

3. Structural Diversity A: Ground Cover

This component focuses on the extent and type of ground cover present that is acting to prevent soil erosion. For each metre increment along the 30m transect tape (e.g. at 1m, 2m, 3m, etc) tick the type of **ground cover** that best describes what is **underlying** the transect tape at that point. **You must only tick one ground cover** at each metre-point intercept. You can record **Ground Cover** and **Native Plant** Forms at the same time

Transect 1	**metre mark on the transect tape (point of intercept)**																												
Ground Cover	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Bare ground																														
Leaf Litter (leaves, bark, twigs, branches)																														
Exposed Rock																														
Microphytic crust (moss, liverworts, lichen																														
Plants (only if you **can't** see under them)																														

4. Structural Diversity B: Native Plant Life Forms

At each metre increment tick the plant life form(s) **for NATIVE species only** that intercept above or below the tape. **You may tick more than one life form** at each metre intercept. See look up table for plant life forms. If there is no plant form at a particular metre intercept, leave the column blank. **Weeds** are to be dealt with separately. Place a tick in the appropriate box on the bottom line of the table below **if a weed is present** (as any life form) at any metre intercept.

Transect 1	**metre mark on the transect tape (point of intercept)**																												
Life Form (refer	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
tall tree >15m																														
medium tree 5-15m																														
small tree <5m																														
tall mallee >5m																														
small mallee <5m																														
tall shrub >2m																														
medium shrub 0.5-2m																														
small shrub <0.5m																														
herb																														
mat plant (excl. microphytic crust)																														
tall grass >0.5m																														
low grass <0.5m																														
tall tussock (sedge, rush, iron grass) >0.5m																														
low tussock (as above)																														
vine or climber																														
mistletoe																														
fern																														
********Weed **********																														

TRANSECT 2

Structural Diversity A: Ground Cover

Transect 2	metre mark on the transect tape (point of intercept)																												
Ground Cover	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Bare ground																														
Leaf Litter (leaves, bark, twigs, branches)																														
Exposed Rock																														
Microphytic crust (moss, liverworts, lichen																														
Plants (only if you **can't** see under them)																														

Structural Diversity B: Native Plant Life Forms

Transect 1	metre mark on the transect tape (point of intercept)																												
Life Form (refer	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
tall tree >15m																														
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tall mallee >5m																														
small mallee <5m																														
tall shrub >2m																														
medium shrub 0.5-2m																														
small shrub <0.5m																														
herb																														
mat plant (excl. microphytic crust)																														
tall grass >0.5m																														
low grass <0.5m																														
tall tussock (sedge, rush, iron grass) >0.5m																														
low tussock (as above)																														
vine or climber																														
mistletoe																														
fern																														
********Weed **********																														

TRANSECT 3

Structural Diversity A: Ground Cover

Transect 2	metre mark on the transect tape (point of intercept)																												
Ground Cover	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Bare ground																														
Leaf Litter (leaves, bark, twigs, branches)																														
Exposed Rock																														
Microphytic crust (moss, liverworts, lichen																														
Plants (only if you **can't** see under them)																														

Structural Diversity B: Native Plant Life Forms

Transect 1	metre mark on the transect tape (point of intercept)																												
Life Form (refer	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
tall tree >15m																														
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tall mallee >5m																														
small mallee <5m																														
tall shrub >2m																														
medium shrub 0.5-2m																														
small shrub <0.5m																														
herb																														
mat plant (excl. microphytic crust)																														
tall grass >0.5m																														
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tall tussock (sedge, rush, iron grass) >0.5m																														
low tussock (as above)																														
vine or climber																														
mistletoe																														
fern																														
********Weed **********																														

ALL TRANSECTS

5. Species Diversity

Record all NATIVE species found to be intersecting (above or below) the transect tape and place a tick in the appropriate column to indicate whether they are native, or unknown (if weed or native). If you do not know the species name, use a descriptive name instead (e.g. spiky grass). It is not the names of the plants that is important in this exercise, but rather the number of different species present. Do not count the species if it DOES NOT intersect the tape. This provides an INDICATOR of RELATIVE species diversity, not ACTUAL species diversity of the whole community in the area. **Make this a cumulative list for all three transects. Sum the native perennial species and sum the annual species below.**

Species name or descriptive name **(Voucher specimens are not required to calculate the condition score)**	**Native (tick)**	**Unknown if weed or native**
Total perennials		
Total annuals		

If the following species are recorded on the diversity table, please tick if the species has canopy cover that is greater than 5%

Woody species	**Tick if more than 5% cover on transect**
L. parviflorus (in dryland teatree community)	
A. longifolia (in dryland teatree community)	
Olearia (in grassland community)	

6. Weeds

List (in any order) the 5 most common weed species (or <5 if fewer species are present) found within 0.5m either side of the transect tape (i.e. in a belt transect 1m wide). To determine the boundaries of the 1m wide belt transect, hold the 1m pole across your body as you walk along the transect tape. If you cannot identify the weeds, name them ***Weed 1***, ***Weed 2*** etc. with a brief description.

Record an estimate of the abundance of each weed based on the following criteria:-

Abundance Criteria	Abundance Rating
Not many, 1-3 individuals and total belt transect area < 5%	**1**
Plentiful, but of small cover (<5%)	**2**
Any number of individuals covering 5-25% of the belt transect area	**3**
Any number of individuals covering 26-50% of the belt transect area	**4**
Any number of individuals covering 51-75% of the belt transect area	**5**
Covering more than 75% of the belt transect area	**6**

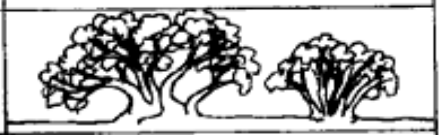
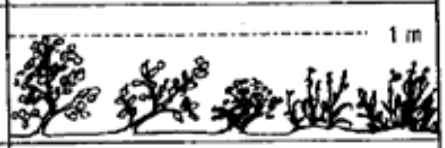
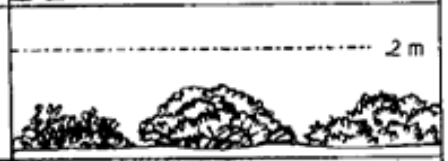
Weed Species Name (or description)	Abundance Rating (1,2,3,4,5 or 6)		
	Transect 1	Transect 2	Transect 3
Example: Bridal creeper	*4*	*1*	-
1			
2			
3			
4			
5			

5. Regeneration of Natives - Do this ONLY for Transect 1, and ONLY if trees or shrubs are present.

Look at the area that is approximately 15 m either side of the transect tape (no need to measure it out). **Record <u>all</u> NATIVE species in the overstorey**, irrespective of whether these are trees or shrubs, and **tick <u>all</u> age classes** that are present for each species. If you don't know the species, use a description.

Species Name (or description)	Seedlings <10cm	Seedlings 10cm – 1m	Juveniles (not yet flowered)	Juveniles (may have flowered but not full size)	Mature Plants
Example: E. oleosa or Eucalyptus spp2	-	-	-	√	√

LOOK UP TABLE for Plant Life Forms (as per Croft *et al.* 2005)

Life Form/Height Class		Notes	Illustration
Trees	Tall Tree > 15 m	Trees are generally erect woody plants with the canopy held well above the ground. Often single-stemmed, but if multi-stemmed, with fewer than 5 trunks that result from branching of a single trunk.	
	Medium Tree 5 – 15 m		
	Small Tree < 5 m		
Mallees	Tall Mallee > 5 m	Multi-stemmed trees, the individual trunks arising from a swelling or 'lignotuber' at the base of the stem or below soil level that bears dormant buds.	
	Small Mallee < 5 m		
Shrubs	Tall Shrub > 2 m	Multi-stemmed woody plants with stems and branches arising from a rootstock or very short common trunk. *Xanthorrhoea* species are generally included in shrubs.	
	Medium Shrub 0.5 – 2 m		
	Small Shrub < 0.5 m		
Herbs	Herbs	Soft or slightly woody plants, annual or sometimes perennial, usually with soft, broad leaves (excluding grasses). Lilies & Orchids are included in this category.	
Mat Plants	Mat Plants & Groundcovers < .2 m	Ground-hugging shrubs forming a mat. Prostrate herbaceous or woody plants, with major stems growing along the ground. Usually perennial, may be succulent. Rarely exceed .2 m tall.	
Grasses	Tall Grass > 0.5 m	Perennial or annuals, generally erect or spreading. Usually with individual shoots arising from a single root system. Seed heads are included in height.	
	Low Grass < 0.5 m		
Tussocks	Tall Tussock > 0.5 m	Herbaceous, usually perennial, tufted plants, often with stiff blades, includes sedges and rushes, e.g. Black-anther Flax-lily, Iron-grasses, Rapier-grass, *Juncus* spp., *Isolepsis* spp., *Gahnia* spp.	
	Low Tussock < 0.5 m		
Vines	Vines, Twiners, Climbers & Scramblers	Climbing, twining, winding or scrambling plants usually with a woody stem. e.g. *Cassytha* spp, *Billardiera* spp.	
Mistletoe	Mistletoe	Aerial shrubs, parasitic (takes water & mineral nutrients from host) by attaching and growing on branches of trees & shrubs.	
Ferns	Fern	Plants with fronds, underground rhizome and reproduced by spores, e.g., Bracken, Rock Fern, Coral Fern, *Blechnum* spp.	

LOOK-UP WEED SHEET for DRYLAND TEATREE

Invasive weeds species that may occur in Alkaline Low Woodland communites. Sweeney and Fowler (2013). Sources include DSE (2010); Moxham and Turner (2009); DSE (2004).

Scientific name	Common name	Weed of National Signicance or Declared Weed
Aira sp	Hair grasses	
Asparagus asparagoides	Bridal Creeper (incl. western cape)	WONS
Arctotheca calendula	Cape Weed	
Asphodelus fistulosus	Oinion Weed	
Avena barbata	Wild Oat	
Bromus spp	Brome	
Chryanthemoides monilifera monilifera	Boneseed	WONS
Desmazeria rigida	Rigid Festcue	
Dipogon lignosus	Dolichos pea	
Echium plantagineum	Salvation Jane	Declared
Ehrharta calycina	Perennial Veldt Grass	
Ehrharta erecta var. erecta	Panic Veldtgrass	
Hordeum spp	Barley Grass	
Hypochaeris radicata	Rough Cat's Ear	
Lagurus ovata	Hare's tail	
Lycium ferocissimum	African Boxthorn	WONS
Marrubium vulgare	Horehound	Declared
Oenothera sticta	Evening Primrose	
Polygala myrtifolia	Milkwort	
Rhamnus alaternus	Buckthorn	
Sonchus oleracues	Common Sow-thistle	
Vulpia spp	Silver Grasses	

Appendix 3: Field site selection and protocols

The random selection of sites ensures that monitoring is not biased toward vegetation in either the best or worst conditions. Field monitoring sites can be randomly selected from within mapped polygons for each vegetation community using ArcGIS. Several rules should be applied to ensure that monitoring sites encompass large patches of vegetation, are independent and easily accessed. Monitoring sites can be chosen on the basis of whether they:

1. Exist within patches >6000m^2 (or select a smaller area if most extant patches are <6000m^2)
2. Are >110m from road centrelines and <210m from road centrelines;
3. Are >100m from the edge of areas of native vegetation (e.g. where vegetation meets paddock);
4. Are at least 1000m apart if sampling the same vegetation community.

The number of sites that are selected should exceed the number of sites that will be monitored. If possible, 50 sites should be selected within each vegetation community. An excess of sites allows for some flexibility in situations where sites are not accessible (due to remoteness of sites, impassable tracks, weather conditions or lack of access approval from private landowners), or where vegetation community types at chosen sites are inconsistent with mapping data. The 50 randomly selected sites should be labelled sequentially from 1 to 50. Access and directions to each site should be checked and sought (i.e. approval from owners of private land) prior to the survey. Land tenure information may be outdated or contact numbers may be missing in the land tenure database. Local telephone directories, Property Assist and local councils can provide some up-to-date land owner's contact details. If any sites are not accessible, then they should be discarded and access to the next site on the list should be sought until access is confirmed for 30 sites.

Information that should be attached to the location of each site should also include:

- Unique identification number
- Land owner surname
- Land owner name
- Land owner address
- Landholder's contact detail
- Section number
- Hundred name
- Vegetation community

The locations of these sites should be uploaded into field GPS, and maps of the selected sites (together with cadastral or Forestry SA maps) should also be prepared and provided to field teams.

GIS assistance will be provided by Jan Rowland (Knowledge Management Unit, Science Monitoring Knowledge Branch). Please contact Jan on Jan.Rowland@sa.gov.au or 8222 9224.

Appendix 4. Vegetation Connectivity Protocol (modified from Habitat Hectares)

Native vegetation connectivity indices can be based on variables from the Habitat Hectares - Landscape Context survey method (Parkes et al. 2003), which is used to estimate patch connectivity of native vegetation in Victoria. Science, Monitoring and Knowledge (DEWNR) can support the following analyses.

The variables for this method can be collected using ArcGIS and all mapped polygons (patches) for which each vegetation community is known in the Limestone Coast. Each polygon represents a continuous patch of vegetation of one community.

ArcGIS can be used to calculate the following variables for each mapped polygon of each vegetation community in the Limestone Coast:

- area of each polygon (ha)
- whether the polygon is mostly (more than 50%) in a park, or on private land.
- the area that is covered by any community of native vegetation within a 100m radius of the central point of each polygon
- the area that is covered by any community of native vegetation within a 1 km radius of the central point of each polygon
- the area that is covered by any community of native vegetation within a 5 km radius of the central point of each polygon
- the shortest distance from the central point of each polygon to any vegetation patch (of any community) that is 50 ha or more in size.

The 6 variables above can be used to develop the three indicators of the Landscape Context method: Patch size, Neighbourhood and Distance to Core area. Scores are assigned to these three indicators (see details below), which are then summed as a measure of landscape connectivity (out of 25). These measures are then scaled to a score between 0 and 100.

The Habitat Hectares – Landscape Context uses the following criteria and scores:

1) Patch Size Score (maximum score of 10)

Area	Score
< 2ha	1
≥ 2 ha but <5 ha	2
≥ 5 but <10 ha	4
≥ 10 ha but <20 ha	6
≥ 20 ha but significantly disturbed	8
≥ 20 ha and not significantly disturbed	10

Note: The Habitat Hectares method states that "effectively all private land remnants in the rural landscape are classified as significantly disturbed". For the analyses of Limestone Coast vegetation, significantly disturbed refers to land that is not in a public park (protected).

2) Neighbourhood Score (maximum score of 10)

- the proportion of land area that is covered by any native vegetation within a 100m radius of the central point of each vegetation patch (weighted by 0.3)
- the proportion of land area that is covered by any native vegetation within a 1 km radius of the central point of each vegetation patch (weighted by 0.4)
- the proportion of land area that is covered by any native vegetation within a 1 km radius of the central point of each vegetation patch (weighted by 0.3)

The neighbourhood score is determined by summing the three weighted proportions, reducing the sum by a value of 2 if the patch is significantly disturbed and then rounding it to the nearest whole number.

3) Distance to Core Area score (maximum score of 5)

Distance to the nearest patch >50 ha in size	Score
> 5 km	0
1 – 5 km	2
<1 km	4
Contiguous	5

If the vegetation patch is significantly disturbed, then a value of 1 is subtracted from the distance to core area score.

Appendix 5: Report card templates

On the next two pages is a template of a two-page report card for one of the natural resources (native vegetation communities). Additional pages could be included for reef, beach, rocky headlands, seagrass meadows, shorebirds and orchids. The first page summarises all the information from all the selected natural resources that will be reported within the report card. It provides an overall assessment of the whole coast. It includes a conceptual model to provide context on how the resources fit together and the threats impacting them. The second page allows for details about each natural resource that was monitored (ie native vegetation), such as historical context, the specific indicators that were chosen, maps, management considerations and a condition score for each natural resource. Note the graphed data on these pages is not real. Map and graphics are place-holders only.

On the following page, there is a one-page report card that was developed for the NRM Reporting Framework to report on targets in the State NRM Plan. This card reports on the condition of native vegetation in the South East. This template is also available for reporting on the health of the Limestone Coast. The template has similar components to those discussed in the workshop: an introduction with context, history and indicators, a section on trend, a section on the current condition and what is being done to improve it. There are sections that highlight the trend (getting better, getting worse, stable or unknown) and the current condition (good, fair, poor). There is also a photo, a map and space for a second graphic such as a graph.

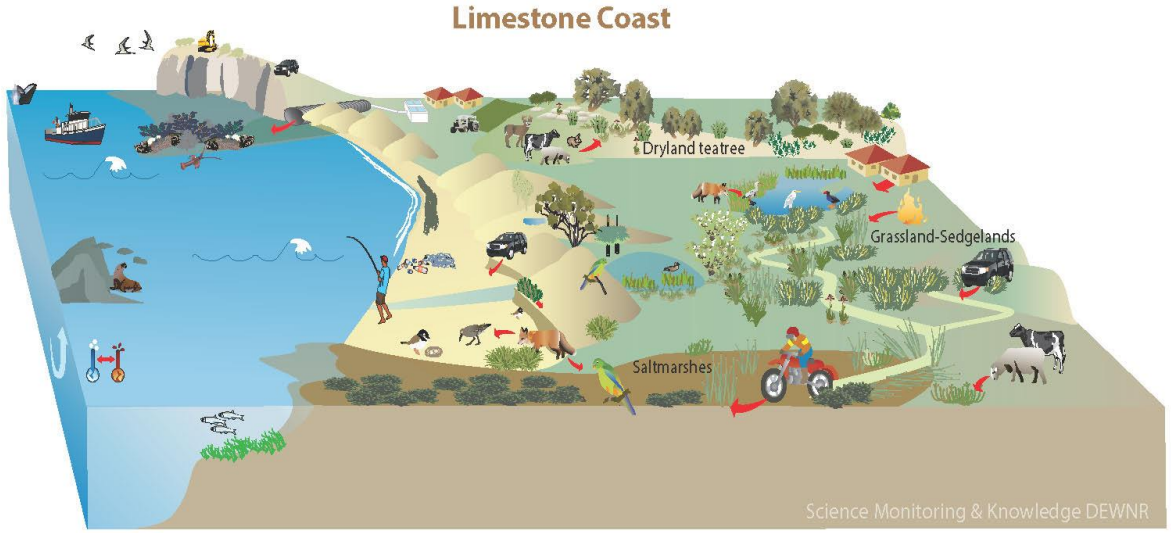
Both of these examples allow the information to be summarised concisely for an effective and simple message about each natural resource. They allow the graphics to communicate the key messages.

Limestone Coast health check

B+ health score

photo of coast

Text (200 words) why limestone coast is important to manage and monitor. List the key habitats and species that will be reported in this report card, how they are linked, as well as the economic benefits, health benefits and ecosystem services of the overall coast.



Pressures

- predation from foxes
- browsing from stock & feral herbivores
- clearance of vegetation
- run-off that is rich in nutrients
- spread of weeds (seawheat)
- marine debris
- erosion & disturbance by off-road vehicles
- change in sea surface temperature
- fire
- spread of urban development

Social & economic values

- commercial fishing
- fishing & recreation
- communities & towns
- agriculture & domestic stock

Environmental values

- native vegetation
- orange-bellied parrot
- shorebirds & waterbirds
- intertidal reef
- seagrass meadows

Introduce concept of indicators and how to use/read this report card (i.e. there is a page for each key natural resource)

How the overall health score was calculated (if you plan to combine all scores from all resources in this report card), and what it means. Is there a trend? Put score in context of historical activities, such as clearance of vegetation, pressures from urban development and human recreation.

General management options for the Limestone Coast to improve health in the future. State the frequency of these reports.

Map of coast

Native vegetation of Limestone Coast

Saltmarshes	Dryland teatree	Grassland/sedgeland
B+ health score	C health score	D health score
photo of healthy veg	photo of healthy veg	photo of healthy veg

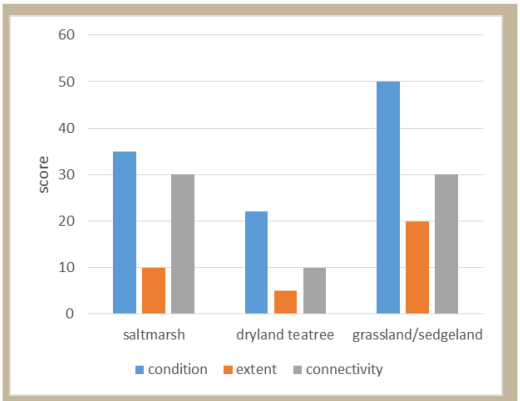
Text (150 words) why communities are important, economic benefits, health benefits and eco-system services, and reasons why we are reporting on condition (they are representative of communities that are being managed)

Historical context: original extent, what veg was like before human pressures and when it was cleared.

Map of veg communities

INDICATORS: what was used to determine scores, brief methods and trend period (if applicable):

Condition
Connectivity
Extent



Summarise condition, remaining extent, connectivity and put in context

Threats to these communities and how they are/will be managed, recommendations and how individuals can help, future work.

Links to detailed technical reports

Template used to report on the condition of vegetation in the SE for the State NRM Plan

South East NRM Region

Terrestrial

2014 Regional Snapshot

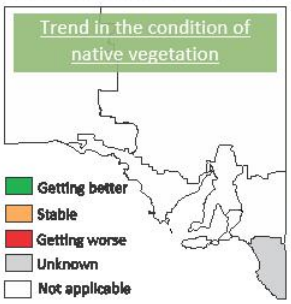
Is the condition of our native vegetation improving?

South Australia's native vegetation - from small ground covers and native grasses to large trees and water plants - is fundamental to the health of our environment and the prosperity of our primary industries.

Native vegetation protects our land and water from erosion and dry-land salinity, while improving our agricultural productivity and storing carbon. It provides habitat for our native animals, places for recreation, gives our landscape its identity and is culturally important for Aboriginal people.

Human development has affected our native vegetation. It has reduced its extent (coverage), and increased its connectivity (fragmentation). Our remaining native vegetation is under pressure from further fragmentation, inappropriate grazing and fire regimes, weeds, pests, plant diseases and firewood collection. Increasing water extraction, altered water flows, increasing soil salinity, rising groundwater, pollution and climate change are also threats. Several native vegetation communities in the state are now listed as threatened.

This report summarises the condition of our native vegetation, and should be read alongside reports on vegetation extent and connectivity, and protection.



State target

Increase extent and improve condition of native vegetation

Trend	Unknown	This is the first time this information has been collated. Trends will be available in the future.

We monitor the condition of native vegetation to ensure that our management activities are effective. Management includes controlling vegetation clearance, pests, weeds and grazing, and improving land-use practices.

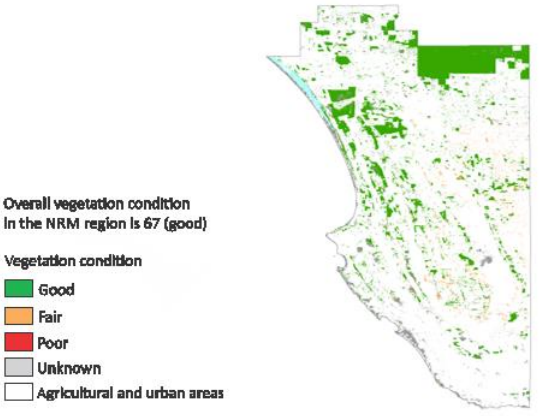
Declines in the condition of our native vegetation since European settlement have largely been a result of agricultural and urban developments. Recent trends in the condition of our native vegetation are not known at regional or state scales (see map above), but its protection in 1991 and ongoing management aim to improve its condition and extent.

Where we are at (2014)	Good	Our agricultural and urban developments have degraded much of our native vegetation.

Native vegetation clearance has been most intense around areas of extensive urban and agricultural development. Monitoring of the remaining vegetation patches in the South East NRM region indicates that on average it is in good condition (see map on right). This score reflects sites that were chosen for their environmental importance. Future surveys will be more representative of regional condition.

A study in 2011 by the Australian Government Department of Agriculture highlighted that just 4 per cent of the region remains largely unchanged since European settlement.

The Department of Environment, Water and Natural Resources is assessing ways to standardise assessments of native vegetation condition for regional and statewide reporting.



Reliability of information	★★☆☆☆	Fair

Further information: Technical information for this report, DEWNR native vegetation, Nature Conservation Society of South Australia

This report is a work in progress. As resource monitoring improves, so too will our ability to describe trends in condition.

Government of South Australia

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Department of Environment,
Water and Natural Resources