Natural Resources Management Plan 2015–2025

Have Your Say

for their future...

Discussion paper No 3: Biodiversity Conservation

This discussion paper is part of a series covering all of the 'Big Issues' raised by the community during meetings and workshops about the new Kangaroo Island NRM Plan. It provides a summary of the current state of knowledge about the issue, suggests courses of action and identifies who might work together with us in addressing it.

We now invite your comments, suggestions, criticisms and ideas.

Biodiversity and ecosystems

Biodiversity refers to all organisms on land, in the sea and other water ecosystems. An ecosystem is a dynamic complex of communities of plants, animals, and microorganisms and their non-living environment, interacting as a functional unit. The size of an ecosystem can vary and includes physical and chemical components such as soils, water, and nutrients that support the organisms living within them. Healthy ecosystems are self-sustaining, not requiring any outside interventions to continue to exist.

Ecosystems tend to be very complex with multiple interactions between all of the component parts (structure). Each organism occupies a particular position (niche) and does a particular job (function) or possibly a number of jobs. At its simplest level for example, an insect feeds on a leaf, a mouse eats the insect, an owl eats the mouse, the owl dies and bacteria decompose the owl, nutrients are returned to the soil and a new plant grows. In reality though, things are much more complicated with many more links in the chain and a number of different species that carry out each function in different ways. Furthermore, different ecosystem processes operate over different space and time scales.

Natural Resources
Kangaroo Island

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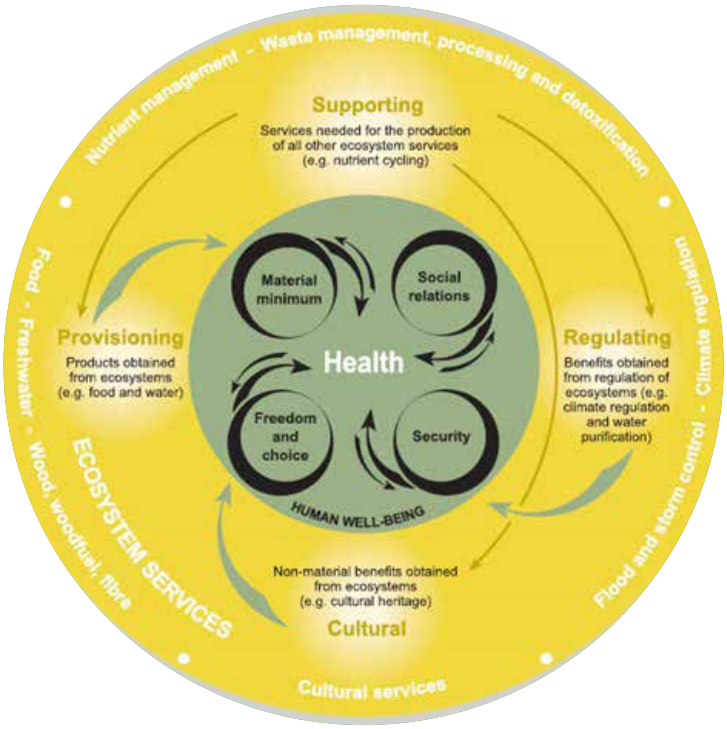
Why worry?

Humans have become an integral part of virtually all ecosystems, so our activities can have important effects on ecosystem structure and the way they function. If the number of species is reduced, there are fewer left to do the different 'jobs' and the system may become more easily tipped out of balance (less resistant) or less able to recover from disturbances and return to the original state (less resilient). In extreme cases a threshold may be crossed that causes the ecosystem to collapse entirely and not return to its former state. Changes in physical and chemical cycles and processes also impact ecosystems, e.g. soil and water salinisation, pollution of waterways and oceans.

It is estimated that millions of species are yet to be discovered and that only a fraction of life on earth has been properly documented. However, extinctions are now occurring at rates hundreds of times faster than they usually would. The recent Living Planet Report[1] released by the World Wild Fund for Nature estimates that 52% of the Earth's biodiversity has been lost since 1970 due to factors such as over-exploitation, habitat loss and climate change! Australia is certainly not exempt from this global collapse of biodiversity[2] and species that have already gone extinct on KI include the Kangaroo Island dwarf emu and the brush-tailed phascogale. The loss of biodiversity means a reduction in the benefits (or services) that ecosystems can offer to human wellbeing. The Millenium Ecosystem Assessment[3] classified these into four main categories:



Provisioning services refers to the products we are able to harvest or utilise from nature such as fish, meat, fruit and vegetables, water, timber, fibre and medicines

Regulating services are the jobs that nature does for us that we don't have to pay for, such as water purification and flood prevention by wetlands, disease regulation by scavengers and decomposers, air filtering by vegetation and climate regulation

Supporting services are those necessary for the production of all other ecosystem services including the formation of soil, the cycling of nutrients and pollination of flowers

Cultural services are the aesthetic, inspirational, recreational, spiritual, religious and other non-material benefits delivered to us by ecosystems.

Figure 1. The contribution that ecosystem services make to human wellbeing

All of these ecosystem services work together to support human health and wellbeing by providing for our physical, mental and spiritual needs. In one of the first efforts to gauge the benefits of nature to humans, the global value of ecosystem services was estimated at $US 33 trillion/year[4] in 1977. To put this into perspective, global gross national product was then only around $US 18 trillion per year. A recently updated estimate of the same ecosystem services came in at $US 125–145 trillion/year[5] in 2011. The loss of ecosystem services from 1997 to 2011 due to human activities was estimated to be up to $US 20.2 trillion/year. In damaging ecosystems and reducing biodiversity, humanity is undoing its own wellbeing and long term interests. Many people feel that nature has a right to exist, of and for itself, and not simply for the benefit of humans. The ecosystem services approach does not aim to undermine this, simply to make it clear to people how critical a healthy environment is for human wellbeing and survival and to improve decision making about land use and management.

[1]http://wwf.panda.org/about_our_earth/all_publications/living_planet_report/

[2]Gillam, S and Urban, R. (2014) *Regional Species Conservation Assessment Project, Phase 1 Report: Regional Species Status Assessments, Kangaroo Island NRM Region*. Department of Environment, Water and Natural Resources, South Australia.

[3]www.millenniumassessment.org

[4]Costanza, R, dArge, R, de Groot, R, Farber, S, Grasso, M, Hannon, B, Limburg, K, Naeem, S, O'Neill, RV, Paruelo, J, Raskin, RG, Sutton, P and van den Belt, M. 1997. *The value of the world's ecosystem services and natural capital*. Nature 387, 253–260.

[5]Costanza, R, de Groot, R, Sutton, P, van der Ploeg, S, Anderson, SJ, Kubiszewski, I, Farber, S and Turner, RK. 2014. *Changes in the global value of ecosystem services. Global Environmental Change 26*, 152-158. http://www.sciencedirect.com/science/article/pii/S0959378014000685

Figure 2 below graphically represents the level of protection that might be afforded to biodiversity under a number of different scenarios that take the above ecosystem services into greater or lesser consideration.

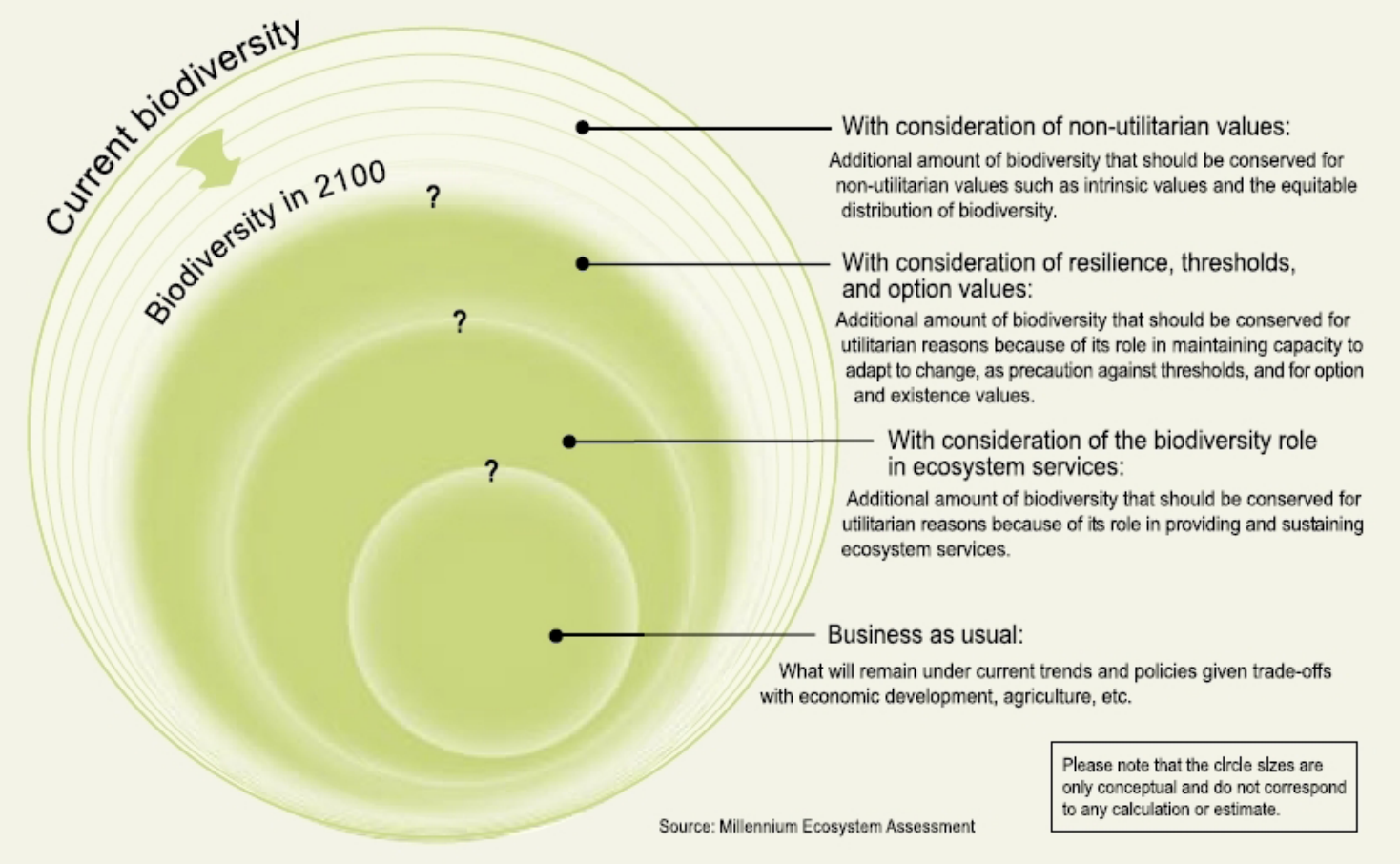


Figure 2. Theoretical global biodiversity conservation scenarios were described based simply on consideration of under-exploited utilitarian values and non-utilitarian values producing changes to current biodiversity trade-offs (MEA, 2005). In a KI context, the outer circle represents total KI biodiversity and inner circles represent the level of biodiversity preserved under various value frameworks; question marks represent uncertainties over boundaries (and hence relative sizes of inner circles). This suggests that understanding and capturing the full benefits provided by biodiversity will lead to improved conservation outcomes.

Biodiversity on Kangaroo Island

KI retains the largest tract of uncleared native vegetation in the agricultural parts of South Australia and has not suffered from the introduction of either foxes or rabbits as on the mainland[2]. Consequently, it still contains a highly diverse range of plant and animal species and communities. Nevertheless, since European settlement, about 52% of the native vegetation on KI has been cleared, largely for agriculture, with around 48% remaining. Some vegetation communities are very well conserved, e.g. the limestone south and west coast, whilst others are very poorly conserved, e.g. the eastern plains. Some are intact, whilst some are fragmented and degraded.

KI also has the largest number of endemic (not found anywhere else) plants of any region in South Australia with 45 species unique to the island. Another 11 plants are found on KI that are only found in very few places on the nearby mainland[6]. There are also a number of endemic mammal, bird, insect, and fungus species, whilst other species are distinctive island forms or sub-species.

According to the recent Regional Species Conservation Assessment[2], 21% of all KI species are considered threatened. Another 24% of species are classed as 'Rare' and 'Near Threatened' and 9.5% of species are believed to be declining, with birds being disproportionately represented amongst KI's threatened fauna (42 species). Many 'threatened species hotspots' (areas with a high concentration of threatened species) are within existing protected areas, but there are some hotspots with little to no protection.

[6]Kangaroo Island Natural Resources Management Board. 2009. *Kangaroo Island Natural Resources Management Plan. Volume 1: State of the Region 2009*. Kangaroo Island Natural Resources Management Board, South Australia.

Road reserves on KI are especially important for biodiversity conservation as they contain a significant amount of remnant vegetation, particularly towards the eastern end of the island where little of the original vegetation cover is left. Some roadsides provide critical habitat for a number of state and nationally threatened plant species[7] and provide important shelter, resources and corridors for fauna. Roadside 'sites of significance' include Willsons Road, Barretts Road, Hundred Line Road, Three Chain Road and Hog Bay Road.

We need to identify and effectively manage the threats to these species in both protected and unprotected areas. However, biodiversity conservation isn't just about individual species. Adequate habitat extent and connectivity are critical considerations in species persistence, e.g. for gene flow. Adequacy will vary from species to species and in the agricultural landscape needs to be integrated with production systems.

Threats to Biodiversity on KI

The consultation process with stakeholders identified a range of impacts and threats to terrestrial, aquatic and marine biodiversity and ecosystems on KI (not listed in order of importance, not all originating locally, and with responsibility for dealing with these issues vested in a number of different agencies operating at different levels):

- climate change
- fragmented native vegetation leaving relatively isolated blocks or strips in some areas
- rising soil salinity, acidification and erosion
- changing fire regimes
- over-grazing/browsing by stock and over-abundant native species
- physical damage caused by stock in native vegetation (e.g. trampling, debarking), particularly in riparian zones
- impact of herbicides and pesticides on off-target species
- introduced pests and weeds, including feral cats
- inattention to or lack of awareness about necessary biosecurity measures
- clearing of roadside vegetation
- road kill (especially of declining species such as goannas)
- cars and unrestrained dogs on beaches
- inappropriate, poorly located development
- poorly managed mining and quarrying activities
- lack of appropriate public infrastructure (e.g. toilets, walking paths, access tracks) in sensitive areas
- storm water runoff polluting rivers, lakes, wetlands, estuaries and coastal waters
- sewage spills and septic tank overflow into the sea around residential areas
- over-harvesting of marine resources
- runoff of agricultural chemicals into native vegetation, rivers, lakes, wetlands and the sea

[7]Taylor DA. 2008. *Recovery plan for nationally threatened plant species on Kangaroo Island South Australia*. Department of Environment, Water and Natural Resources, Government of South Australia, South Australia.

- offshore prospecting and drilling for fossil fuels
- marine litter (particularly plastics and discarded fishing gear and nets)
- inadequate processes and resources to deal with environmental emergencies such as toxic / hazardous spills
- lack of funding for research and management of biodiversity
- short term political cycles and decision making not based on considerations relating to environmental sustainability and hence long term social and economic sustainability
- decreasing environmental volunteering
- growing lack of human connection to and direct experience of nature
- lack of understanding of the contribution that biodiversity makes to human wellbeing.



Some of the above threats are already being actively addressed by NR KI and other parties, some require attention or renewed focus, and some are difficult to address or influence at a regional level. What is certain is that the community and all key industries on KI depend on healthy, functioning natural resources. The primary attraction for tourists is abundant wildlife and access to nature in a clean environment. Agriculture depends on healthy soil, availability of good quality water and the benefits of native vegetation such as shelter belts and pest suppression. Fishers depend on healthy seagrass meadows and reefs, clean and productive oceans. People who have moved to the island and/or purchased property here have generally done so because of the clean and natural setting it affords.

Climate Change

The ecological impacts of climate change are unavoidable and will be widespread. As climatic conditions change, the ability of species to persist in their current locations will also change. If able to, species may migrate along temperature, rainfall or topographic gradients to remain in climatically suitable conditions. For example, a 3ºC increase[8] in temperature in SA will typically correspond to a southwards shift of 300–400 km or an upward shift in elevation of 500 m. Some species currently found on KI may be unable to survive here in the longer term, given the lack of altitudinal gradient and limited space for shifting in most directions due to being an island.

According to CSIRO[9], our ability to manage biodiversity as the climate changes depends upon the magnitude of the changes as well as our capacity to predict the associated ecological impacts. Future NRM plans may need to focus on supporting biodiversity through these changes (if for no other reason than to ensure ecosystems continue to function and deliver various life supporting services). For example, a high emissions climate change scenario suggests that across most of Australia, only about half of present day vascular plants may have the potential to persist in their current locations by 2050, although changes on KI are not expected to be as dramatic.

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[8]Ford, B, Cook, B and Rogers, D. 2013. *Climate change impacts and adaptation in the Southern and Southwestern Flatlands cluster: review of existing knowledge.* Report No CENRM133, Centre of Excellence in Natural Resource Management, University of Western Australia, Albany.

[9]Williams, KJ, Prober, SM, Harwood, TD, Doerr, VAJ, Jeanneret, T, Manion, G and Ferrier, S. 2014. *Implications of climate change for biodiversity: a community-level modelling approach.* CSIRO Land and Water Flagship, Canberra. ISBN 978-1-4863-0479-0 http://adaptnrm.csiro.au/biodiversity-impacts/

Climate change will impact biological groups (mammals, amphibians, reptiles, birds, vascular plants, etc.) differently, and will not be uniform across a region. Some ecological communities that currently exist in Australia may completely disappear while novel ecological communities[10] may be created.

The ability of Australia's biodiversity to survive climate change will depend upon the amount, location and condition of suitable habitat. Refugia are defined as habitats that biota retreat to, persist in and potentially expand from under changing environmental conditions, and these need to be planned for and appropriately managed and protected. Large areas of Australia's (and KI's) more intensively settled regions have already been modified and/or degraded, reducing the options for many species to move to more climatically suitable areas. Other stresses such as pollution, weeds or over-harvesting are also likely to compound the impacts of climate change on ecosystems, thereby reducing their resilience and adaptive capacity.

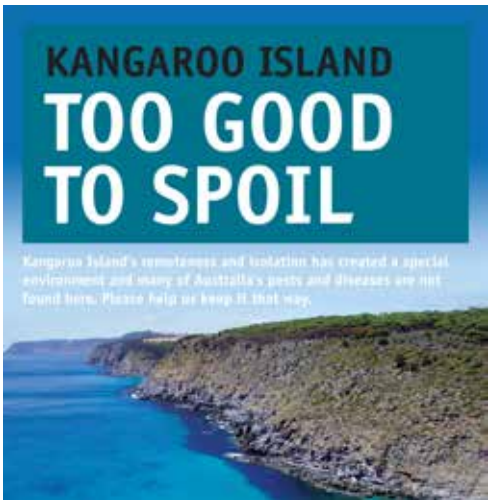
The National Climate Change Adaptation Research Facility (NCARFF) Policy Guidance Brief No 8: Adapting Ecosystems to Climate Change[11] suggests that humans can help to build resilient ecosystems in the face of climate change in a number of ways:

- Identifying, protecting and planning for places where species might find a refuge as the environment changes around them.
- Making sure that habitats and landscapes stay connected by natural corridors and plan for habitat retreat.
- Making sure that good biosecurity measures are in place.
- Reducing existing threats (such as feral species, diseases and tree clearing) and pressures (such as excess sediments, nutrients and pesticides entering waterways).
- Monitoring changes so that appropriate action can be taken.

Nevertheless, stronger additional measures may be required[11]:

- Collating and analysing all of the information on the actual and predicted impacts of climate change will improve our understanding of how it works and enable us to make better decisions about how to respond to it.
- Enforcing laws and regulations more strongly and making sure that current management recommendations are carried out (such as species recovery plans) will improve ecosystem resilience.
- Because there is quite a lot of uncertainty about the details of how the climate will change locally and how species and ecosystems will respond, we need to keep our future management options open by doing things like increasing protected areas, minimising clearing, restoring ecosystems.

When planning and carrying out actions to help ecosystems adapt to climate change, we are likely to encounter many challenges and barriers, such as a lack of knowledge about the precise environmental and physical requirements of species or ecological communities. This means that we won't be able to accurately predict what might colonise or successfully grow in an area under climate change and hence our management responses will be uncertain[11].




[10]Morse, NB, Pellissier, PA, Cianciola, EN, Brereton, RL, Sullivan, MM, Shonka, NK, Wheeler, TB and McDowell WH. 2014. *Novel ecosystems in the Anthropocene: a revision of the novel ecosystem concept for pragmatic applications*. Ecology and Society 19(2): 12.

[11]https://www.terranova.org.au/repository/nccarf/nccarf-policy-guidance-brief-8-adapting-ecosystems-to-climate-change

It is therefore crucial that we effectively monitor the status of individual organisms, species and ecosystems to detect shifts, identify thresholds, modify management strategies and build the evidence base for long-term decision-making. The results of monitoring must also be used to adjust management and policy settings. Even if we are able to identify the best means to protect ecosystems, we may be unable to carry them out, for instance because of limited resources or socio-economic reasons.

Strategies and priorities

It is important to note that this is the region's plan and all stakeholders are therefore partners in implementation, responsible in different ways and to varying degrees for actioning the below.

» Undertake a comprehensive and integrated biodiversity conservation planning process that reflects the Open Standards for the Practice of Conservation (e.g. Conservation Action Planning) in order to prioritise threats, issues and management actions, and build a common understanding and acceptance of these among stakeholders:

- obtain information and improve understanding regarding the ecological processes that are responsible for the predicted declines of species and ecosystems (e.g. loss of particular habitats, weed invasion, introduced predators) and the ecological conservation requirements of species and ecosystems that are thought to be declining
- identify a priority list of species/ecosystems most in need of conservation management and that have the greatest chance of recovery. Criteria for the assessment include:
  - probability of extinction (determined by regional status ratings and trend, including projected impacts of climate change) or degradation
  - consequences of extinction or degradation (ecological values, economic values evolutionary values, social values, uniqueness)
  - potential for successful recovery (knowledge of threatening processes, capacity to affect recovery, need for ongoing management)
- once a priority list of species/ecosystems is established, identify common threats and actions so that resources can be allocated to deliver the greatest conservation benefit
- assess landscapes so that goals, targets and activities can be developed to meet their conservation requirements.

» Maintain and enhance the appropriate connectivity of habitats and landscapes, as determined by the planning process above or other evidence that is available.

» Protect and buffer (where possible and appropriate) intact habitat and identify key areas for restoration/ rehabilitation.

» Understand likely impacts of climate change on species and landscapes and develop plans to respond to them effectively, for example, through managed habitat retreat.

» Identify, plan for and protect places where species might find refuge from the impacts of climate change.

- Reduce the stress on natural systems (e.g. over-grazing, chemical contamination/pollution) to increase their adaptive capacity and resilience.
- Identify and prioritise ways to minimise, mitigate and manage existing threats and pressures.
- Adopt a proactive approach to development planning in order to identify, minimise and mitigate possible impacts on key species and ecosystems at risk.
- Facilitate local appreciation of the extensive economic and social benefits provided by biodiversity assets, using an ecosystem services approach where possible and appropriate to qualify and quantify these.
- Ensure alignment between the KI brand and natural resource management, working to ensure the maintenance of a healthy, functioning natural resource base to support all economic activities on the island and to provide a 'clean and green' marketing edge.
- Implement an adaptive management approach that includes effective monitoring, evaluation and refinement of management objectives and activities as understanding improves.

Partners

- Research Agencies
- Kangaroo Island Council
- Industry
- Primary Industries and Regions SA
- Residents and landholders

What are your thoughts?

1. Have all the key issues relating to this big issue been adequately captured and understood?
2. Are there any gaps or misinterpretations?
3. What is the overall trend in relation to this issue – are matters improving or deteriorating, how fast and why?
4. In order to address this challenge, will the 'business as usual' approach work, or is adaptation (substantial change) or transformation (complete rethink of how we do business and how we tackle this issue) needed?
5. Do you agree with the strategies and priorities listed and/or do any need adding?
6. Who are the partners that need to collaborate to address this challenge?

Images: Brushtail-phascogale, E Mainka; little penguin, B Page; bulldozers clearing, T Carter.

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