


KEY THREATENING PROCESS NOMINATION

(a) Nominator:

Nominator: ACT Scientific Committee

Signature/Date:



A. J. G.
7/3/18

(b) Name of the nominated item:

Category of nomination: Key Threatening Process

Name of process: Unnatural/Inappropriate fragmentation of habitats

(c) Description:

The proposal identifies as a threatening process *any unnatural fragmentation of habitat that disrupts biological processes/biological organisation and significantly increases the likelihood of extinction of flora and fauna beyond that due to natural processes.*

As a threatening process, non-natural fragmentation applies, at different scales, to flora, fauna and ecological communities; terrestrial and aquatic species and habitats; suburban and rural areas; and reserves. It implies a loss of ecological connectivity.

The research and management literature on this subject is very extensive. General texts providing an Australian perspective include Burgman and Lindenmayer (1998), New (2000), Lindenmayer and Fischer (2006) and Lintermans (2013) and Fraser et al. (2014). Research overviews of the subject can be found in MacLeod (2002), Fahrig (2003), Ries et al. (2004), Tschardtke, et al. (2012), Amos et al. (2014) and elsewhere, and the references included therein.

Key Concepts:

- Habitat fragmentation is an umbrella term describing the complete process by which habitat loss or artificial barriers result in the division of large, continuous habitats into a greater number of smaller patches of lower total area, isolated from each other by a matrix of dissimilar habitats and is not just the pattern of spatial arrangement of remaining habitat (Didham 2010). Lindenmayer and Fischer (2006) and others argue that there can be dangers in such a sweeping terms because they obscure the identification of multiple underlying processes. They suggest that the way forward is to focus on the component causes of fragmentation.
- Habitat loss and habitat fragmentation are not independent drivers of ecological change – habitat loss acts via the change in habitat arrangement, not independently of it (Didham 2010).

Impacts of non-natural habitat fragmentation

The process of non-natural habitat fragmentation includes:

- Reduction in the total area of the habitat
- Decrease of the interior/edge ratio, with concomitant increase in edge effects
- Isolation of one habitat fragment from other areas of the habitat
- Breaking up of one patch of habitat into several smaller patches
- Decrease in the average size of each patch of habitat
- Differential removal of particular subhabitats.

These processes may lead to a general reduction in the resilience of the system through the consequences of isolation, reduction in population size and the increasing effects of external influences. For example:

- Loss of individuals from the fragments, and in extreme cases species
- Reduced chances of recolonisation
- Loss of genetic diversity through genetic drift and panmictic limitation
- Increased mortality due to climate modification, e.g. temperature or

wind regimes

- Increased predation, e.g. from introduced animals
- Increased competition e.g. from weeds and 'overabundant' native species
- Reduced possibilities for dispersal (e.g. of young of the year)
- Reduced possibilities for movement (e.g. for movements between feeding, breeding and refuge areas)
- Reduced possibilities for reproduction
- Reduced possibilities for feeding/foraging
- Reduced resilience to extreme climatic events
- Increased exposure to pathogens and diseases
- Increased likelihood of an extinction debt (time-delayed loss)
- Edge effects.

Component causes of unnatural fragmentation

Unnatural fragmentation can be the direct or indirect consequence of, often interactive, impacts from anthropogenic factors such as:

- Inappropriate fire regimes
- Overgrazing (by feral animals, livestock or 'overabundant' native species)
- Undergrazing (through loss or exclusion of natural grazers)
- Weed, pest animal and pathogen invasion
- Urban development
- Establishing inappropriate vegetation
- Clearing
- Inappropriate application of pesticides and herbicides
- Unnatural disturbance or compacting of soil
- Changes to water flows/hydrology
- Lowered water quality (e.g. effluent discharge poses a chemical barrier discouraging movement through affected areas)
- Climate change
- Monoculture development such as plantations

- Physical barriers to movement, e.g. vegetation removal, super highways, weirs, poorly placed urban parks
- Removal of ground cover, including rocks, logs and leaf litter
- Smothering of aquatic habitat through sedimentation, sand slugs

In the ACT, one or more of these processes and actions have been identified as causing reduction and fragmentation of woodlands (ACT (2004), grasslands (ACT 2005) and riparian zones and aquatic habitats (2007). Habitat loss and fragmentation are considered to be threats to all of the species and communities currently listed in the ACT (Tables 1–3) under the *Nature Conservation ACT 2014*.

Table 1a. DECLARED ENDANGERED SPECIES

SPECIES SCIENTIFIC NAME	SPECIES COMMON NAME
<i>Tympanocryptis pinguicolla</i>	Grassland Earless Dragon
<i>Synemon plana</i>	Golden Sun Moth
<i>Prasophyllum petilum</i>	Tarengo Leek Orchid
<i>Gentiana baeuerlenii</i>	a subalpine herb
<i>Swainsona recta</i>	Small Purple Pea
<i>Rutidosis leptorrhynchoides</i>	Button Wrinklewort
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby
<i>Macquaria australasica</i>	Macquarie Perch
<i>Maccullochella macquariensis</i>	Trout Cod
<i>Anthochaera phrygia</i>	Regent Honeyeater
<i>Pseudomys fumeus</i>	Smoky Mouse
<i>Muehlenbeckia tuggeranong</i>	Tuggeranong Lignum
<i>Lepidium ginninderrense</i>	Ginninderra Peppergrass
<i>Bidyanus bidyanus</i>	Silver Perch
<i>Pseudophryne pengilleyi</i>	Northern Corroboree Frog
<i>Arachnorchis actensis</i>	Canberra Spider Orchid
<i>Corunastylis ectopa</i>	Brindabella Midge Orchid
<i>Bossiaea grayi</i>	Murrumbidgee Bossiaea

Table 1b. DECLARED VULNERABLE SPECIES

SPECIES SCIENTIFIC NAME	SPECIES COMMON NAME
<i>Delma impar</i>	Striped Legless Lizard
<i>Gadopsis bispinosus</i>	Two-spined Blackfish
<i>Euastacus armatus</i>	Murray River Crayfish
<i>Melanodryas cucullata</i>	Hooded Robin
<i>Lathamus discolor</i>	Swift Parrot
<i>Perunga ochracea</i>	Perunga Grasshopper
<i>Polytelis swainsonii</i>	Superb Parrot
<i>Climacteris picumnus</i>	Brown Treecreeper
<i>Grantiella picta</i>	Painted Honeyeater
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll
<i>Daphoenositta chrysoptera</i>	Varied Sittella
<i>Lalage sueurii</i>	White-winged Triller
<i>Hieraaetus morphnoides</i>	Little Eagle
<i>Aprasia parapulchella</i>	Pink-tailed Worm Lizard
<i>Calyptorhynchus lathamii</i>	Glossy Black-cockatoo
<i>Petroica multicolor</i>	Scarlet Robin

Table 1c. DECLARED ENDANGERED ECOLOGICAL COMMUNITIES

NAME OF COMMUNITY	DESCRIPTION
Natural Temperate Grassland	A naturally occurring grassland of the temperate zone, dominated by native perennial tussock grasses, with associated native herbs and native fauna.
Yellow Box/Red Gum Grassy Woodland	A naturally occurring woodland of the temperate zone, in which Yellow Box co-occurs with Blakely's Red Gum. It includes the species rich understorey of native tussock grasses, herbs and scattered shrubs, together with a large number of native animal species.

Habitat loss and fragmentation are mentioned as key threats to a great many species listed in various Australian jurisdictions as threatened.

In 2012, Victoria listed 'Habitat fragmentation as a threatening process for fauna in Victoria'; and the 'Prevention of passage of aquatic biota as the result

of the presence of instream structures' as a potentially threatening process under the Victorian [*Flora and Fauna Guarantee Act, 1988*](#).

In 2001, New South Wales found 'Loss of biodiversity as a result of loss and/or degradation of habitat following clearing and fragmentation of native vegetation' and listed '[Clearing of Native Vegetation](#)' as a Key Threatening Process under the *Threatened Species Conservation Act, 1995* (now the *Biodiversity Conservation Act, 2016*). NSW also lists the '[Installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams](#)' as a Key Threatening Process under the *Fisheries Management Act, 1994*.

Under the Commonwealth *Environment Protection and Biodiversity Act, 1999*, the following related Key Threatening Processes are listed—'Land Clearance', 'Competition and land degradation by rabbits' and 'Competition and land degradation by goats'—all of which can lead to fragmentation.

(d) Distribution:

Non-natural fragmentation occurs throughout the ACT Bioregion and is particularly evident in the grasslands (ACT Government 2005), low altitude woodlands (ACT Government 2004) and aquatic/riverine zones (ACT Government 2007).

(e) Criterion satisfied, and the reason:

Habitat fragmentation is cited as a contributing factor to the listing of all species and communities currently listed in the ACT. Non-natural fragmentation of habitat satisfies Criterion 4.1 of the old ACT *Nature Conservation Act 1980*, namely:

'Threatening process is clearly shown to be a significant cause for declaration of any species as vulnerable* or endangered* or any ecological community as endangered in the ACT region.'*

It also meets the requirements of the definition of a threatening process under Section 73 of the new *Nature Conservation Act 2014*:

‘A threatening process is defined as a key threatening process if it threatens or may threaten the survival, abundance or evolutionary development of a native species or ecological community.’

(f) References

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