



Environmental Factor Guideline

Terrestrial Fauna

The objective of the factor *Terrestrial Fauna* is:

To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.

Purpose

The purpose of this guideline is to outline how the factor *Terrestrial Fauna* is considered by the Environmental Protection Authority (EPA) in the environmental impact assessment (EIA) process.

Specifically, the guideline:

- describes the factor *Terrestrial Fauna* and explains the associated objective
- describes EIA considerations for this factor
- discusses the environmental values of terrestrial fauna, and their significance
- describes issues commonly encountered by the EPA during EIA of this factor
- identifies activities that can impact on terrestrial fauna
- provides a summary of the type of information that may be required by the EPA to undertake EIA related to this factor.

What are terrestrial fauna?

For the purposes of EIA, terrestrial fauna are defined as animals living on land or using land (including aquatic systems) for all or part of their lives. Terrestrial fauna includes vertebrate (birds, mammals including bats, reptiles, amphibians, and freshwater fish) and invertebrate (arachnids, crustaceans, insects, molluscs and worms) groups.

Guidance for EIA concerning fauna that use subterranean environments for their entire lives is provided in the *Environmental Factor Guideline – Subterranean Fauna*.

Fauna habitat is defined as the natural environment of an animal or assemblage of animals, including biotic and abiotic elements, that provides a suitable place for them to live (e.g. breed, forage, roost or seek refuge). The scale at which fauna habitat is defined will depend on the ecological requirements of the species considered.

How this factor links with other environmental factors

The EPA recognises that there are inherent links between the factor *Terrestrial Fauna* and other environmental factors, and that individual factors should not be considered in isolation. For example, impacts or changes to the factors *Flora and Vegetation*, *Landforms* and *Inland Waters Environmental Quality* can impact the factor *Terrestrial Fauna*. Some species of terrestrial fauna may also use marine habitats and may be considered under the factor *Marine Fauna*.

The environmental objective for Terrestrial Fauna

The EPA's objective for the factor *Terrestrial Fauna* is: "To protect terrestrial fauna so that biological diversity and ecological integrity are maintained".

In the context of this objective:

Ecological integrity is the composition, structure, function and processes of ecosystems, and the natural range of variation of these elements.

Considerations for environmental impact assessment

Considerations for EIA for the factor *Terrestrial Fauna* include, but are not necessarily limited to:

- application of the mitigation hierarchy to avoid or minimise impacts to terrestrial fauna, where possible
- the terrestrial fauna affected by the proposal
- the potential impacts and the activities that will cause them, including direct and indirect impacts
- the implications of cumulative impacts
- whether surveys and analyses have been undertaken to a standard consistent with EPA technical guidance
- the scale at which impacts to terrestrial fauna are considered
- the significance of the terrestrial fauna and the risk to those fauna
- the current state of knowledge of the affected species/assemblages and the level of confidence underpinning the predicted residual impacts
- whether proposed management approaches are technically and practically feasible.

Environmental and other values supported by terrestrial fauna, and their significance

Since European settlement, 23 terrestrial fauna species are known to have become extinct in Western Australia and an additional 230 species are listed as threatened or endangered. Some species now only persist in isolated pockets of habitat and offshore islands, requiring on-ground monitoring and management to ensure their survival. In particular, mammal species have experienced dramatic declines in species distributions and abundance due to human-induced impacts, with 29 per cent of mammal species in Western Australia listed at the Federal or State Level, including eight species listed as extinct.

Due to the large size of the state and variety of landforms, Western Australia has a highly diverse and unique terrestrial fauna. Vertebrates are the best documented group with over 1,500 species of birds, mammals, reptiles and frogs described in Western Australia, and new species are being described every year. The number of invertebrate species in Western Australia is currently unknown but is estimated to be in the hundreds of thousands, with many yet to be described.

Some faunal groups have high levels of endemism, in particular freshwater fish, reptiles, amphibians, and some invertebrate groups that exhibit high degrees of short range endemism. A high proportion (27 per cent) of endemic vertebrate species are also listed as being of conservation concern.

Terrestrial fauna are essential in maintaining the integrity and function of our ecosystems. Many invertebrates, birds and mammals act as pollinators for plants, and help disperse plant seeds and the fruit and spores of fungi. Fauna species can also be used as indicators of environmental health. Many terrestrial fauna are iconic or are of cultural importance to Aboriginal people as spiritual significance or for sources of traditional food.

Terrestrial fauna may be significant for a range of reasons, including:

- being identified as a threatened or priority species
- species with restricted distribution
- degree of historical impact from threatening processes
- providing an important function required to maintain the ecological integrity of a significant ecosystem.

Impacts to significant fauna should be investigated and reported if identified in the survey area.

Fauna habitats may be significant if they provide habitat important to the life history of a significant species, i.e. breeding, feeding and roosting or aggregation areas, or where they are unique or isolated habitats, for example wetlands, in the landscape or region.

Issues

The following issues are matters that are commonly encountered by the EPA due to the nature of proposals that are referred to it. Background on these issues is provided here to help proponents and the community engage with EIA. This issues section will be updated from time to time to reflect new issues as they arise in referrals and EIA.

Habitat loss, degradation and fragmentation

Species are less resilient to external pressures when the habitats they rely on are reduced or fragmented. Habitat loss and fragmentation affects the health and survival of individual populations as well as entire species. In parts of Western Australia, such as the Avon-Wheatbelt and Swan Coastal Plain, large scale clearing and loss of wetland habitat has occurred. In addition to habitat loss, these highly fragmented landscapes affect the ability of species to disperse. This may be a consideration in EIA where implementation of a proposal or scheme amendment would significantly impact a fauna species.

Fire regimes

Increased fires interrupt the natural ecological processes that Western Australia's fauna have adapted to. Fire opens up habitats and recurring fires prevent understorey from re-establishing, allowing weedy species to dominate. Increased fire frequency also impacts fauna that require habitat with long unburnt areas of vegetation, such as spinifex grasslands in arid areas and dense leaf litter in forest areas.

Invasive species

Invasive species include introduced fauna, weeds and diseases. Introduced fauna are often highly adaptable and thrive in disturbed or modified habitats. They may compete with local species for food and habitat resources. Increased competition and predation from exotic animals can result in changes to the species assemblage, often resulting in the loss of native species. Weeds and diseases have the potential to adversely alter fauna habitat. This issue might be particularly relevant for EIA of proposals such as landfills that have the potential, if not well managed, to increase feral animal numbers.

Changing climate

A changing climate may impact terrestrial fauna through changes in temperature and rainfall patterns, which will influence the distribution and diversity of species. The scale, rate and nature of projected change, and the interactions between a changing climate and other threatening processes will determine to what extent they are impacted.

For the purposes of EIA, the EPA is concerned with proposal specific impacts that, when considered in combination with climate change, are likely to exacerbate impacts to terrestrial fauna.

Short range endemism

Some invertebrate fauna groups are known to have species with small distributions that do not move outside their specific habitat due to poor dispersal ability and, as a consequence, they are vulnerable to impacts.

State of knowledge

The terrestrial vertebrate fauna of Western Australia is relatively well known. There are some regional exceptions, including the desert regions and the Kimberley where little survey has been undertaken. The taxonomy, distribution and habitat requirements of the majority of vertebrate species is well understood.

In comparison, the level of knowledge of invertebrate groups is often poor. There are still many gaps regarding taxonomy, habitat requirements, distribution and natural history. New species are regularly discovered during EIA surveys and provide a challenge when assessing impacts.

Impacts

Impacts to terrestrial fauna can be direct or indirect, and may be permanent or temporary.

Direct impacts include the removal, fragmentation or modification of habitat, and mortality or displacement of individuals or populations. The main threat is the clearing of land and vegetation for residential or commercial development, infrastructure (i.e. roads and pipelines), agriculture and farming, and mining (including waste rock and water storage). These actions cause direct impact by reducing the diversity and abundance of species in an area.

Habitat removal, fragmentation or modification can also result in indirect impacts including:

- the introduction or promotion of weeds, introduced fauna or pests and disease
- reduced or prevention of access to feeding or roosting habitats
- disruption of the dispersal of individuals required to colonise new areas inhibiting maintenance of genetic diversity between populations
- disruption of pollinators and seed dispersal vectors.

Other indirect impacts include increased light or noise, dust, fire, vehicle strike, attraction of predators or competitors, and pollution or modification of water quality and water regimes (i.e. through drainage, dam construction, and groundwater drawdown).

Impacts may result in changes to fauna or fauna habitat beyond the immediate development envelope.

Information required for EIA

Technical guidance for survey standards and information required for assessment are available on the EPA's website.

Environmental Protection Authority 2016, *Environmental Factor Guideline: Terrestrial Fauna*, EPA, Western Australia.

This document is available in alternative formats upon request.

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