POLICY PERSPECTIVE

Vulnerable species and ecosystems are falling through the cracks of environmental impact assessments

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Abstract
Proponents of development projects (e.g., new roads, mines, dams) are frequently required to assess and manage their impacts on threatened biodiversity. Here, we propose that the environmental legislation and standards that mandate such assessments are failing those threatened species and ecological communities listed as vulnerable. Using a case study of Australia’s key environmental legislation, we highlight that vulnerable ecological communities receive no statutory protection, while vulnerable species are held to a less stringent standard in the impact assessment process compared with those that are endangered or critically endangered. In the 19 years since Australia’s Environment Protection and Biodiversity Conservation Act 1999 was enacted, four times as many vulnerable species have declined in their threat status than have improved. Beyond Australia, we demonstrate the global relevance of this issue, as it applies to internationally recognized best practice impact assessment guidelines. These cases provide a cautionary tale: without greater attention and stricter assessment criteria in the impact assessment process, the vulnerable species of today risk becoming the endangered species of tomorrow, with all the attendant costs and missed opportunities for recovery that this implies.

KEYWORDS
Australia, EIA, Environment Protection and Biodiversity Conservation Act, EPBC, infrastructure development, performance standards, red list, threatened ecological communities, threatened ecosystems, threatened species

1 | AUSTRALIA’S ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

Species and ecological communities that are at risk of extinction—those listed as vulnerable, endangered, or critically endangered—are a major focus of assessment protocols for proposed developments such as new roads or mines. This safeguard reduces the adverse outcomes of development projects, by informing conditions of development approval that often seek to prevent projects from contributing further to the declines of species/communities that are threatened with extinction. Typically, such assessments are formalized in instruments such as an environmental impact assessment, which are guided by government policies or corporate/financier standards that dictate their scope and requirements.
Here, we examine the extent to which species and ecosystems identified to be “vulnerable” to extinction are considered in impact assessments, with a focus on the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act); the key federal legislation in Australia that mandates project assessment and approval. The EPBC Act provides the framework for the determination of whether a proposed project will have a “significant impact” on any “matters of national environmental significance” (MNES), the assessment pathway that is required to determine whether a project can proceed, and how identified impacts should be managed (Figure 1).

Under the EPBC Act, “threatened ecological communities” can be listed as vulnerable, endangered, or critically endangered. Yet, only threatened ecological communities that are endangered or critically endangered are considered to be MNES under Part 3 of the EPBC Act. In other words, impacts from new development to vulnerable threatened ecological communities need not be referred to the Commonwealth Government for assessment, given that these are not considered to be of national environmental significance. This amounts to impacts on a biological entity that is threatened with extinction not being considered or assessed. In a statutory review of the EPBC Act undertaken in 2009, an explicit recommendation was that vulnerable threatened ecological communities be included as an MNES, thus triggering assessment requirements (Commonwealth of Australia, 2009). This recommendation has not been implemented.

For threatened species, Significant Impact Guidelines (hereafter, “the guidelines”) are available to assist proponents and assessors make a determination of whether an action is likely to have a significant impact, based on an assessment against various criteria (Department of the Environment (Australia), 2013). Under these guidelines, adverse impacts on a “population” of an endangered or critically endangered species (n = 970) represent a significant impact (Department of the Environment (Australia), 2013, p. 9). A population is defined in the guidelines as “the occurrence of the species in a particular area” (Department of the Environment (Australia), 2013, p. 9). This implies that if the species occurs at or near the site of the proposed development, a significant impact is likely, and assessment under the act must occur. However, the criteria are subtly different for vulnerable species (n = 792). For an impact to be considered significant (and thus trigger
FIGURE 2  The potential occurrence of vulnerable species across terrestrial Australia. This map presents the overlap of where 768 vulnerable species (or their habitat) are likely to or may occur, based upon species distribution maps (1 km² resolution) produced by the Australian Department of the Environment and Energy (2019). In some parts of eastern Australia, up to 51 vulnerable species have the potential to co-occur at a 1 km² resolution. Grey shading represents parts of Australia where no vulnerable species are predicted to occur.

While general (qualitative) characteristics of an “important population” are documented in the guidelines, specific guidance on what should be considered important (e.g., thresholds of minimum number or density of individuals) is available for only a small minority of species. Species- or assemblage-specific referral (assessment) guidelines have only been produced for 21 out of 792 vulnerable species in total (including for one out of 590 vulnerable flora species). Other sources of information are available, including species recovery plans and/or “conservation advice” documents. However, an explicit definition of what constitutes an “important population” is provided in recovery plans for only 76 vulnerable species (<10% of all vulnerable species, noting that...
recovery plans have been produced for less than one-third of these species). Further, conservation advice documents (a summary of information relevant to the conservation of a listed species, prepared by the Commonwealth) contain information on an “important population” for only 25 species, reflecting only 3% of all vulnerable species, despite conservation advice documents having been produced for 653 species. This deficiency of explicit guidance places substantial limitations on making determinations about a criterion, that, by design, requires some frame of reference against which to make an informed judgment (“important” compared to what?).

The vagueness of the “important population” criterion has potentially adverse ramifications for other significant impact criteria that apply to vulnerable species. For example, if a site is not judged to support an “important population,” then it might be concluded that a project at that site is not likely to “adversely affect habitat critical to the survival of a species” nor “modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species is likely to decline” (Department of the Environment (Australia), 2013, p. 10). The “important population” trigger is disproportionally important when it comes to determining and assessing whether an impact on a vulnerable species is significant, and therefore, the extent (if any) to which vulnerable species are considered in the assessment and approvals process.

Our focus on the risks posed by the “important population” trigger can be distilled to a single question: considering the risks associated with incremental cumulative impacts and imperfect data, are not all individuals of a species that has been identified to be threatened with extinction important? If there is scope for impacts to occur in spite of the occurrence or likely occurrence of a vulnerable species (or their habitat) because the population at a site is not judged important, then the conservation status of these species is not likely to improve. This may particularly affect species that occur over large ranges—in effect, small losses may be diluted by the broad extent over which the species occurs, where these losses are, in isolation, not deemed to affect an important population. This contributes to the wider malaise of death by a thousand cuts, whereby numerous small losses accumulate with severe ultimate effects (Dales, 2011).

**FIGURE 3** Four times as many species have been moved from vulnerable (V) to a more severe threat status (endangered (E) \( n = 30 \) or critically endangered (CE) \( n = 11 \)) than have been down-listed to vulnerable \( (n = 11) \) since the EPBC Act came into force in 2000 (as of March 2019). The relative number of species that have been up-listed or down-listed is represented by line thickness and arrow head size.
Since the EPBC Act came into force in 2000, 41 species have been up-listed from vulnerable to endangered or critically endangered, while 10 species have been down-listed to vulnerable from endangered or critically endangered (with one down-listed from extinct to vulnerable; Figure 3). Of the 116 species down-listed from the category vulnerable (i.e., now no longer listed as threatened), only 10 could be attributed to genuine improvements in status linked to conservation actions, while the remainder were due to a combination of new information, taxonomic changes, or removal of legacy listings from the legislation that the EPBC Act superseded. The number of species listed as vulnerable increased by 17%, from 679 in July 2000 when the EPBC Act commenced, to 792 (March 2019). In comparison, the number of endangered species increased by 37% for the same time period (from 519 to 711). In summary, both relating to the number of listed species, and the relative rate of up-listing to down-listing among threat categories, more species are worse off today in terms of their conservation status than when the EPBC Act was introduced (Cresswell & Murphy, 2017; Walsh, Watson, Bottrill, Joseph, & Possingham, 2012; Woinarski, Garnett, Legge, & Lindenmayer, 2017).

The assessment protocol under the EPBC Act appears to be doing little to stop actions (e.g., new development projects) from occurring where vulnerable species have the potential to occur. For example, since 2000, more than half (53%) of the 5,527 assessed referrals submitted to the Commonwealth Government for consideration were deemed to require no further assessment before proceeding (Commonwealth of Australia, 2018). Considering only terrestrial actions, all 2,689 of these overlapped spatially with locations in which at least one vulnerable species (or its habitat) is likely to, or may occur, as mapped by the Commonwealth Government (as of March 2019). We acknowledge several caveats linked to this finding: (a) the species (single or multiple) may not have been listed as vulnerable and thus not applicable to the assessment at the time at which the referral was submitted; (b) the project site did not contain habitat for the species, despite the mapped likely/potential occurrence of vulnerable species; or (c) the specific activities associated with the proposed action did not entail adverse impacts on fauna and flora in general, or on certain (MNES) species in particular given the nature of the project and/or mitigation measures proposed in the referral. Nonetheless, a substantial amount of proposed development is passing through the first and, therefore, only filter for the consideration of impacts to nationally listed vulnerable species (referral under the EPBC Act), without triggering further detailed scrutiny (e.g., full environmental impact assessment). Actions that trigger the EPBC Act may not always be applicable to, nor the main drivers of, the decline of vulnerable species. However, it is quite likely that for certain species, inherent limitations of the assessment framework are a contributing factor to their worsening threat status (Ward et al., 2019; see Box 1).

**Box 1**

The woodlands and savannas of eastern Australia have undergone extensive transformation in recent decades (Evans, 2016; Reside et al., 2017). Two taxa endemic to this region, king blue-grass (*Dichanthium queenslandicum*) and black-throated finch (southern) (*Poephila cincta cincta*; below), have been up-listed from vulnerable to endangered in the time that the EPBC Act has been in force (2013 and 2005, respectively). For both species, the loss of habitat from agricultural expansion and development such as mining or urbanization is the key threat, and the reason for their up-listing (Commonwealth of Australia, 2005, 2013). The status of both these species is in part a legacy of historic native vegetation removal and land use change (Commonwealth of Australia, 2013; Mula Laguna et al., 2019). However, while listed as vulnerable, the comprehensive regulatory framework for the assessment of impacts to these MNES failed to arrest ongoing declines, driven by continued habitat loss. In the case of the black-throated finch (southern), there were 177 projects referred under the EPBC Act that intersected potential black-throated finch (southern) habitat while this bird was listed as vulnerable (2000–2004; Reside et al., 2019). Of these, only 43 (24%) were designated as “controlled actions”; therefore, 76% of projects were not required to undergo rigorous assessment nor provide any measures for any threatened species, beyond what may have been outlined in the referral document.
3 | VULNERABLE SPECIES, ONGOING DEVELOPMENT, AND GLOBAL CONSERVATION

The reduced attention given to vulnerable species is not an uniquely Australian problem. For example, the International Finance Corporation’s Performance Standard 6 (IFC PS6; IFC, 2012) represents international best practice for biodiversity management as this applies to assessing the impacts of proposed development projects. Its definition of “critical habitat”—the highest level of assessment unit with the most rigorous scrutiny and mitigation requirements—is based on several criteria, although a major trigger is the occurrence of habitat for endangered and/or critically endangered species. The critical habitat trigger only applies to vulnerable species if it can be demonstrated that the impact “would result in the change of the International Union for Conservation of Nature (IUCN) Red List status to endangered or critically endangered” (IFC, 2019, p. 21). This may potentially be applicable where a very large impact was to occur, or the affected vulnerable species had an extremely localized range. However, in many more cases, it is probable that vulnerable species will not trigger assessment and these species will escape dedicated scrutiny. Notwithstanding that vulnerable species may be accounted for and benefit from actions like offsetting, where these are implemented to manage impacts to critical habitat or “natural habitat” under PS6, the Standard affords limited explicit attention (e.g., requirements for dedicated surveys, targeted mitigation, and management) specifically focused on vulnerable flora and fauna. This risks the ongoing attrition of vulnerable species and their habitats.

Vulnerable species (for example, as listed under the IUCN Red List of Threatened Species) are central to addressing biodiversity declines (the “biological annihilation” described by Ceballos, Ehrlich, & Dirzo, 2017). In a study of genuine threat status category changes between 1996 and 2008 for 5,487 mammals, the vulnerable category had the highest number of species that had experienced a deterioration in status, with vulnerable species representing 9% of all assessed mammals (and almost half of all threatened mammals (Hoffmann et al., 2011)). Indeed, over 12,000 plant and animal species are listed as vulnerable under the IUCN Red List of Threatened Species (IUCN, 2019). Given the imperative for ongoing development, not least to improve human well-being and meet internationally agreed commitments such as the Sustainable Development Goals (SDGs), ongoing adverse impacts to these species and their habitats are inevitable. With a surge in infrastructure development expected in coming years (Laurance, 2018), there is a need to manage, minimize, and counterbalance losses such that the achievement of existing biodiversity targets, including those relating to preventing extinctions as enshrined in the SDGs and the Convention on Biological Diversity are not compromised (Bull et al., 2019; Maron, Simmonds, & Watson, 2018). Adequately addressing impacts to vulnerable species—animals and plants recognized as being at a high risk of extinction in the wild—must be a key focal point of these efforts.

Furthermore, as the world meets to agree upon an ambitious post-2020 framework for the conservation of biodiversity (Dinerstein et al., 2019), where the goal is to “bend the curve” (Mace et al., 2018)—halt and reverse the decline of species—vulnerable species are in a pivotal position. These are the threatened species that, in theory at least, should be most recoverable due to their higher populations and/or reduced exposure to threats. In practice, intervening before species are close to extinction is likely to be more cost effective, and lead to better long-term outcomes such as fewer extinctions (Le Breton et al., 2019; Martin et al., 2012; Wilson, Joseph, Moore, & Possingham, 2011). Vulnerable species may be less at risk of imminent loss, but without stronger protections, including in the impact assessment process, the trajectory of these species is unlikely to reverse.

4 | RECOMMENDATIONS FOR THE ASSESSMENT OF IMPACTS TO VULNERABLE SPECIES AND COMMUNITIES

Vulnerable species and communities are falling through the cracks when it comes to the assessment of the impacts of proposed new developments. This is because they are either completely overlooked (threatened ecological communities in Australia), or are subject to a narrower trigger to warrant assessment (“important population” in Australia; demonstrable threat status category change as per IFC PS6). In light of this, we propose three recommendations that are equally relevant to the current statutory (decadal) review of Australia’s EPBC Act, or any other law, policy or standard that mandates the assessment of a project’s potential impacts to biodiversity:

1. **Vulnerable species and communities should be afforded the same consideration to those that are endangered or critically endangered in terms of how they are assessed in regulatory frameworks.** This would entail increasing the extent to which vulnerable species and communities are considered in the assessment process, not reducing (the currently higher) requirements for endangered and critically endangered species/communities (e.g., in the EPBC Act, IFC PS6). A single assessment standard should apply regardless of threat status.

2. **The assessment of impacts to threatened species should be strengthened to be less subjective, and underpinned by robust, and wherever possible, quantitative criteria (e.g., thresholds, as per the case in PS6 for determining what...**
constitutes “Critical Habitat”), to reduce reliance on relative judgments that are often based on limited information.

3. Any policies or guidelines that assist with application of environmental laws (e.g., the EPBC Act Significant Impact Guidelines) should be consistent with the aims of the legislation. In Australia, a lower standard for the assessment of vulnerable species and ecological communities, and the potential for these to receive less scrutiny (or in the case of communities, no current assessment), does not accord with the EPBC Act’s aim of protecting Australia’s environment (nor the nation’s international obligations under the Convention on Biological Diversity).

We conclude that all species/ecosystems that have been deemed, by a rigorous and standardized framework (e.g., IUCN, 2019), to be at elevated risk of extinction, be considered equally in impact assessment. Policies and standards for assessing impacts should reflect this, especially given that the current situation is not helping to arrest ongoing declines. Why wait until species and communities are at the brink before we act? Without more focus and action in environmental impact assessment and regulation, vulnerable species, and communities will likely continue their slide toward endangerment.

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