

How to assess the impact of an invasive alien species

Ongoing incursions are forcing decision-makers to triage the management of invasive species. Narrowing the scope of the problem by prioritising those species of greatest concern should guide the investment of limited resources for management. The International Union for the Conservation of Nature (IUCN) has adopted an assessment tool for allocating species to categories of impact from massive and major to minimal concern – called **EICAT (ENVIRONMENTAL IMPACT CLASSIFICATION FOR ALIEN TAXA)**. EICAT can be used to rank priority species, and also to identify the ways in which invasive species are having an environmental impact (so called- mechanisms of impact).

This information sheet provides recommendations for reducing potential uncertainties that may arise when performing environmental impact assessments, such as EICAT, and to increase the value of their findings.

Recommendations for strengthening Impact Assessments for alien species

1. **Provide, communicate and make accessible any and all uncertainty associated with the assessment result.** Removing all uncertainty from an impact assessment will never be possible. Therefore, it is important to ensure this uncertainty is understood, and can be addressed as knowledge accumulates. For EICAT, in addition to assignment of confidence, information on the total number of impact studies and the variability in results across them can be provided. There is more confidence in an assessment result supported by many independent studies with similar findings, then a species with few impact studies and/or high variability in impact severity.
2. **Separate and record experience-based expert judgement from literature-based evidence.** Expert judgement is not part of the EICAT process. However, experienced species experts and invasion biologists have much to offer semi-quantitative impact assessment processes, especially when other evidence is not available or incomplete. Being as objective as possible will provide an assessment that is more reflective of the available evidence and more readily comparable across assessors and for the purpose of ranking and updating. A distinct opportunity to layer expert judgement alongside this can add value to the process.
3. **Evidence is not always clear or readily classified.** When the evidence doesn't readily fit into a formal impact mechanism category, provide a short, accurate description of the impact and the information source. This is important for two reasons: (1) if a similar mechanism repeatedly emerges across species or contexts, then this could potentially expand the variety of mechanisms worth recognising in impact assessments, (2) it gives other assessors the chance to review this decision.
4. **What is being impacted, can be more important than where the impact is happening.** This is a good rule to follow to prevent evidence from being prematurely dismissed as not relevant. When assessing the environmental impacts of alien species, evidence could come from other settings, such as urban or agroecosystems. For example, although agricultural impacts are not included in environmental impact assessments, alien species can negatively impact native species in crop environments, impact wild relatives of the crop, or interfere in species interactions important to the natural environment beyond the agroecosystem.

5. **Use a decision tree in the assessment process to help clarify and capture the reasoning behind the decision.** Decision trees can help to streamline the assessment process and make it more repeatable. Importantly, they can also help clarify when a species is assigned an impact category in the presence or absence of evidence for a more, or less, severe impact. In other words, it can help separate instances of evidence of absence from absence of evidence, on the basis of both of which it is possible to arrive at the same conclusion but via different routes.
6. **Rigorously document the evidence accrual process.** Environmental impact assessments are based on a wide variety of information sources. For example, evidence may come from academic publications or from government technical reports. As such, the outcome of an impact assessment can be dictated by the evidence accrual process. To

minimise the chance of missing relevant pieces of impact evidence, or to help others identify why one may have missed relevant evidence, it is important to rigorously document the evidence accrual process, ideally using systematic review processes. Good software exists for managing such processes. This would include, but is not limited to, the literature databases used, the timespan of the search, or the words or terms used in the search. It is also important to include known synonyms when search strings include scientific names. This accounts for differential use of scientific names in the literature and by different governing bodies, and for historical name changes.

For a more thorough description of the uncertainty involved in environmental impact assessments see:

Clarke DA, Palmer DJ, McGrannachan, C, Burgess TI, Chown SL, Clarke RH, Kumschick S, Lach L, Liebhold AM, Roy HE, Saunders ME, Yeates DK, Zalucki MP & McGeoch MA. 2021. Options for reducing uncertainty in impact classification for alien species. *Ecosphere* 12:e03461. DOI: 10.1002/ecs2.3461

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