



Biodiversity and Conservation Science

Guideline for assessing risks to the conservation of biodiversity associated with threatened species and threatened ecological communities



Species and Communities Program
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Department of **Biodiversity,
Conservation and Attractions**

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1 OBJECTIVE

This guideline outlines methods for assessing risks to the conservation of threatened species and threatened ecological communities in a consistent and transparent manner, and in accordance with corporate objectives for risk management.

2 SCOPE

This guideline applies to the provision of formal advice on activities that have potential to impact threatened species and threatened ecological communities (TECs). The methods outlined herein, may also be used to assess risks to the conservation of priority species, priority ecological communities and other native wildlife, as necessary.

The guideline is applicable to the provision of Department of Biodiversity, Conservation and Attractions (department) advice on matters including but not limited to:

- applications to take or disturb threatened species under section 40 of the Biodiversity Conservation Act 2016 (BC Act);
- applications to modify occurrences of TECs under section 45 of the BC Act;
- formal department advice related to risks to the conservation of biodiversity associated with threatened species and threatened ecological community; and
- assessing risks from department activities to threatened and priority species, TECs, priority ecological communities (PECs) and other native wildlife, as necessary.

3 CONTEXT

Native species are listed as threatened under the BC Act when they have been assessed as facing a high risk of extinction in the wild in the medium-term future (in the category of vulnerable), a very high risk of extinction in the wild in the near future (in the category of endangered), or an extremely high risk of extinction in the wild in the immediate future (in the category of critically endangered). Similarly, threatened ecological communities may be listed as vulnerable, endangered or critically endangered when they face a high, very high or extremely high risk of collapse over the same timeframes, respectively. Due to the elevated risks of causing species extinction or ecological collapse, actions that take or disturb listed threatened species or cause modification of the occurrence of TECs require Ministerial authorisation under section 40 (species) or section 45 (TECs) of the BC Act. Authorisations may be sought independently or in association with other regulatory processes, typically including, wildlife licence applications under the Biodiversity Conservation Regulations 2018, planning schemes and scheme 2 amendments, development proposals and clearing permit applications under the Environmental Protection Act 1986, land use planning under the Planning and Development Act 2005 and related State Planning Policies, and referrals of Matters of National Environmental Significance under the Environment Protection and Biodiversity Conservation Act 1999.

The department routinely provides advice to decision-makers during assessment of proposed activities through these processes.

This Guideline should be considered in conjunction with:

- Corporate Policy Statement No. 35: Conserving Threatened Species and Ecological Communities;
- Corporate Policy Statement No. 56: Risk Management.

4 LEGISLATION

The BC Act provides the statutory basis for listing threatened species, TECs, critical habitat and key threatening processes. Under section 40 (1), the Minister or the Minister's delegate may by instrument, authorise a person (including a public authority) to take or disturb a threatened species, and under section 45 (1), the Minister may, by instrument, authorise a person (including a public authority) to modify an occurrence of a TEC. The Minister may impose conditions on an authorisation to take or disturb a threatened species [section 41 (2)], or to modify the occurrence of a TEC [section 46 (2)], so as to mitigate or offset the impact that an authorised activity is likely to have on the total known population of a threatened species in the State or the total known occurrences of a TEC in the State, and on relevant habitat.

5 DEFINITIONS / GLOSSARY / ACRONYMS

Terminology in this Guideline follows the definitions of the BC Act, the International Union for the Conservation of Nature (IUCN) Red List and Red List of Ecosystems guidelines and the International Organization for Standardization (ISO) risk management guidelines 31000:2018.

Area of occupancy: a scaled metric that represents the area of suitable habitat currently occupied by the species or ecological community that can be referred to at the level of local occurrence, regional, subpopulation, population or community.

Biodiversity: means the variability among living organisms and the ecosystems of which those organisms are a part, including (a) diversity within and between native species; (b) diversity of ecosystems; (c) diversity of other biodiversity components.

Biodiversity components: includes native species, habitats, ecological communities, genes, ecosystems and ecological processes.

Collapsed (in relation to ecological communities): there is no reasonable doubt that the last occurrence of the ecological community has collapsed; or the ecological community has been so extensively modified throughout its range that no occurrence of it is likely to recover its species composition or structure; or its species composition and structure.

Consequence: the realistic maximum potential impact of an event on the objective(s). Consequence can be certain or uncertain and can have positive or negative, direct or indirect effects on objectives.

Conserve: includes maintain and restore.

Disturb (in relation to fauna): to chase, drive, follow, harass, herd or hunt fauna by any means; to apply an identifier to fauna by any means; to engage in an activity that has the effect, whether directly or indirectly, of altering the natural behaviour of fauna to its detriment or cause or permit any of these things to be done.

Disturb (in relation to flora): to engage in an activity that has the effect, whether directly or indirectly, of altering the long-term persistence of the flora in its habitat, or cause, or permit, any of these activities to be engaged in.

Modify (in relation to an occurrence of a TEC): to take action that results in the modification of a TEC to such an extent that an occurrence of the TEC is unlikely to recover its species composition or structure or is unlikely to recover its species composition and structure, or the occurrence is destroyed.

Extent of occurrence: the area contained within the shortest continuous inferred boundary that can be drawn to encompass all the known, inferred or projected sites of an ecological community, population, subpopulation or occurrence, excluding cases of vagrancy.

Likelihood: chance of an effect on the objective. In this context, likelihood generally refers to the chance of the assessed consequence occurring.

Occurrence: record of the presence of a species or ecological community.

Occurrence location: the geographic co-ordinates of an occurrence. **Population:** the total number of individuals of the species.

Risk: the effect of uncertainty on objectives, which is usually expressed in terms of risk sources, potential events, their consequences and their likelihood.

Subpopulation: geographically or otherwise distinct group in the population, with which there is little demographic or genetic exchange with other subpopulations.

Take (in relation to fauna): to kill, injure, harvest or capture fauna by any means or to cause or permit any of these things to be done.

Take (in relation to flora): to gather, pluck, cut, pull up, destroy, dig up, remove, harvest or damage flora by any means or to cause or permit any of these things to be done.

6 PROCEDURES

Before risks can be assessed, it is necessary to define the department's objective in relation to the conservation of threatened biodiversity (6.1). The ISO risk management standard (ISO 31000:2018) then defines the 4 steps of risk assessment as: risk identification (6.2), risk analysis (6.3), risk evaluation (6.4) and risk treatment (6.5).

6.1 Risk assessment objective

For the purposes of this Guideline, and consistent with object 1(a) of the BC Act to conserve and protect biodiversity, assessed risk is that of not achieving the department's objective for the conservation of threatened species and ecological community biodiversity, which is:

to conserve the biodiversity associated with threatened species and threatened ecological communities throughout Western Australia.

- Conservation of biodiversity associated with threatened species refers to maintenance or restoration of the following biological and ecological attributes, and the processes that maintain them:
- Extent of occurrence or area of occupancy of the population;
- Absolute or relative abundance (including rate and trajectory of change, as appropriate) of the population;
- Reproductive or regeneration potential of the population;
- Genetic or functional connectivity (frequency and quantity of dispersal) between subpopulations or other population components;
- Genetic diversity (evolutionary potential) of the population; and
- Other species attributes.

Conservation of biodiversity associated with ecological communities refers to maintenance or restoration of the following attributes, and the processes that maintain them:

- extent of occurrence and area of occupancy of the ecological community;
- level, rate or trajectory of change in an abiotic variable towards collapse of the ecological community;
- level/rate of disruption of a biotic variable towards collapse of the ecological community; genetic/functional connectivity of biota within the same or other ecological communities of the ecological community;
- diversity of key functional biota that are the basis of the description of the structure and composition of the ecological community; and
- other ecological community attributes.

6.2 Risk identification

Effective risk assessment requires the explicit identification of all sources of direct and indirect risks to the objective.

Direct risk sources are those that only occur due to the event taking place. Examples of direct risk sources include intentional take or disturbance of a species or modification of an ecological community; additional accidental take, disturbance or modification; habitat damage; changes to hydrological regimes or ecosystem functions; introduction of weeds, disease or predators as a result of the activity.

Indirect (external) risk sources are not caused by the proposed activity but may alter the nature or severity of direct risks. Indirect risks can include those caused by other authorised or unauthorised activities, as well as activities and processes that are beyond immediate control, such as long-term environmental change.¹

Each direct and indirect risk source should be independently analysed for each species or ecological community to which the assessment applies. Additionally, as the impacts of individual risks can escalate through cascading and compounding effects, the cumulative impacts of all risk sources should be assessed for each species and ecological community.

6.3 Risk analysis

Risks should be analysed through a consequence-likelihood matrix approach, in which consequence and likelihood are defined by the qualitative scales described below. This approach enables systematic and efficient assessment of information to evaluate and compare risks across disparate and complex activities and scenarios, even when the resolution of available information is variable and limited. When considering the consequence and likelihood of an event, it is necessary to clearly specify how the following factors are considered.

Confidence and uncertainty. Data available for assessing biodiversity conservation risks can be imperfect and variable. Nonetheless, failure to assess risk because of data limitations, can result in the risk remaining untreated, unmonitored or otherwise unmanaged. In keeping with section 4 (b) of the BC Act, “lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation”, assessors must exercise their best judgement to interpret imperfect data objectively.

¹ Note that this is the ISO definition associated with risk and differs from the term “indirect impact” used in environmental impact assessment to refer to an off-site or delayed consequence.

To deal with quantitative uncertainty, appropriate confidence bounds should be considered, instead of mean, median or modal values. When assessing qualitative data, assessors should consult all available information sources (including expert opinions) to determine plausible ranges of values for the risk component being assessed. In all cases, assessors must thoroughly document any assumptions, interpolations, inferences or exclusions made, any limitations of data or analysis methods and any relevant alternative views.

Conservation benefits of protection on lands managed by the department. The extent to which a population or ecological community occurs in conservation reserve or other lands managed by the department may have a positive effect on either the magnitude of a risk source's consequence or the likelihood of the objective being affected. Thus, depending on the specific circumstances, this can be incorporated as a moderating effect on either consequence or likelihood with appropriate and documented justification. Care must be taken to avoid 'double counting' this beneficial factor in both consequence and likelihood.

Listing category and reasons. The BC Act listing category and corresponding criteria should be considered to ensure that underlying extinction or collapse risks are not exacerbated by the assessed event. As listing categories denote an escalating risk of extinction or collapse, tolerance of risks should decline with increasing threatened category.

Precautionary principle. Where it is judged that a component of risk could meet the criteria for more than one classification, the highest level of risk should be selected. Assessors will use their best judgement to ensure that analyses of risks are objective and reasonable and that worst-case scenarios are used sparingly and only with robust justification. Spatial or population scale of analysis. Risks can be analysed for individual organisms, occurrences, regional assemblages, sub-populations or any other subcomponent of a population or ecological community. The scale of analysis must be explicitly described, and analysed risks must be expressed in terms of risk to the objective, which is risk to the entire population or ecological community.

Timeframe. Although assessed events may occur over limited periods, their long-term effects on the biodiversity conservation objective should be considered. The timeframe over which risk is being assessed must be explicitly stated.

6.3.1 Consequence

The consequence component of risk is the outcome of an event that affects the objective(s). Consequence can be certain or uncertain; have positive or negative, direct or indirect effects; be expressed qualitatively or quantitatively and can escalate through cascading and cumulative effects. For the purpose of this guideline, consequence is the aggregate effect of impacts to the individual conservation attributes on the biodiversity conservation objective. Consequence should be treated as the realistic maximum potential impact of the proposed activity to the conservation attributes of the species or ecological community.

Using all available information, the following characteristics of the proposed activity should be considered when assessing consequence:

- the timing, duration and frequency of the event;
- the magnitude and nature of the event's impacts;
- the susceptibility of the affected species or community to the particular event; and
- the geographic overlap of the activity with the assessed species or community.

Consequence should be categorised according to the definitions in Table 1.

Table 1. Consequence definitions and scores

Consequence	Score	Definition
Negligible	1	Minimal impact to any conservation attribute with no measurable effect on the objective
Minor	2	Measurable but minor impact to some conservation attributes with minimal overall effect on the objective
Moderate	3	Maximum acceptable level of impact to any conservation attribute that will still achieve the objective
Major	4	Above acceptable level of impact to any conservation attribute that will lead to a negative but reversible effect on the objective
Severe	5	Above acceptable level of impact to one or more conservation attribute(s) that will lead to a negative and irreversible effect on the objective

6.3.2 Likelihood

Likelihood is the chance of an effect on the objective. The ISO standard allows for likelihood scores to be defined; measured; determined objectively, subjectively, qualitatively or quantitatively or described in general terms or mathematically (such as probability or rate). In application of this Guideline, likelihood refers to the chance of the previously determined consequence occurring or being exceeded, according to the qualitative definitions in Table 2.

It should be noted that likelihood scores increase with increasing certainty that the full extent of the consequence will occur. This can be somewhat counterintuitive, as in other situations, greater certainty in an outcome equates to lower risk. It should therefore be remembered that increasing the likelihood score in a consequence-likelihood matrix, increases the overall risk score due to increasing certainty that the negative impact will be realised. Likelihood should not be mistaken for the chance of a potential event (e.g., the proposed activity) or a particular risk source, actually occurring.

Table 2. Likelihood definitions and scores

Likelihood	Score	Definition
Remote	1	Reasonable confidence (e.g. prior evidence) that the consequence level will not fully occur or be exceeded within the timeframe but not impossible (indicative probability <5%)
Unlikely	2	Reasonable confidence that the consequence level is not expected to fully occur or be exceeded within the timeframe (indicative probability of 5–19%)
Possible	3	Reasonable confidence that the consequence level will only fully occur or be exceeded in some circumstances within the timeframe (indicative probability: 20–49%)
Likely	4	Reasonable confidence of a greater probability than not of the consequence level fully occurring or being exceeded within the timeframe (indicative probability: 50–79%)
Probable	5	The consequence level is expected to fully occur or be exceeded in the timeframe (indicative probability: 80-100%)

In circumstances where there is low confidence in accurate consequence prediction, for example where data are uncertain, it should be assumed that there is a greater chance of the consequence occurring. In these cases, the assessor should consider whether a higher likelihood score is warranted.

6.4 Risk evaluation

The overall risk of an event is calculated as the product of the assessed consequence and likelihood scores. Risk can be calculated prior to any treatment (6.5) being applied ('intrinsic' risk) or after treatment has been applied ('residual' risk). The risk scores described in Table 3, correspond to predetermined definitions of risk, given below.

Table 3. Consequence-likelihood risk analysis matrix. Numbers in coloured cells indicate overall risk values and are the product of consequence and likelihood scores; cell shading represents overall risk levels: blue = insignificant risk, green = low risk, yellow = moderate risk, orange = high risk and red = very high risk.

Consequence	Likelihood				
	Remote (1)	Unlikely (2)	Possible (3)	Likely (4)	Probable (5)
Negligible (1)	1	2	3	4	5
Minor (2)	2	4	6	8	10
Moderate (3)	3	6	9	12	15
Major (4)	4	8	12	16	20
Severe (5)	5	10	15	20	25

Risk levels have been defined to reflect the department's tolerance of risk to the conservation of threatened species and threatened ecological communities as follows:

Insignificant risk – requires no mitigation with minimal monitoring and reporting to verify that realised risk does not exceed the assessed level and the objective is being achieved.

Low risk – generally does not require mitigation with more detailed or higher frequency monitoring and reporting to verify that realised risk does not exceed the assessed level and the objective is being achieved.

Moderate risk - detailed and high frequency monitoring and reporting of the assessed activity to verify that realised risk does not exceed the assessed level and may require additional targeted mitigation actions or offsets to ensure that the objective is being achieved.

High risk – requires targeted mitigation actions and may require offsets to reduce intrinsic risk to at least a moderate level and detailed and high frequency monitoring and reporting to verify that realised risk does not exceed the assessed residual risk level.

Very high risk – requires substantial targeted mitigation actions and may require offsets to reduce intrinsic risk to at least a moderate level and detailed and high frequency monitoring and reporting to verify that realised risk does not exceed the assessed residual risk level. May meet the requirements for referral to the Minister for consideration for Parliament's approval under section 42 of the BC Act.

6.5 Risk treatment

The efficacy of different risk mitigation options ('treatments') can be examined and demonstrated by re-analysing each risk source, assuming the treatment option(s) is in place. Treatments may be designed and modified to reduce either the consequence or likelihood components of risk or both to achieve an acceptable overall risk level.

Selection of appropriate risk treatment options is entirely context-specific but treatment usually takes the form of avoidance/prevention, reduction/minimisation, sharing or transfer. Once potentially suitable treatment options have been identified, the event or risk source(s) can be

re-assessed assuming those treatment actions are in place, to determine whether the residual risk has been reduced to an acceptable level. Formal evaluation of residual risk is beneficial in ensuring that the treatment is sufficient to moderate risks to an acceptable level. This is also an essential step in justifying the need for conservation actions, e.g. imposition of conditions on BC Act section 40 and section 45 authorisations.

After consideration of available treatment options, where residual risk(s) to conservation of threatened biodiversity remains unacceptable, this should be unambiguously reported so that it can be recognised in broader ecologically sustainable development decision making processes [BC Act section 4 (a)].