Consideration Wheels

Decision support for AdaptLog using scalable hierarchies of information

A product from Climate Systems National Environmental Science Program (NESP) project 2.7
Climate-effective management for threatened species and protected places.

Thinking about adaptation?

Overarching decision-making principles that recognise the role of rightsholders and knowledge holders, true engagement of people affected by decisions made and creating opportunities for benefits and collaborations.

When establishing objectives, you may consider what you are trying to achieve ecologically and mechanistically.

Ready to start?

The Adaptation Catalogue for Conservation (AdaptLog)

Example user tasks

<1 hour	Browsing, finding new ideas, understanding how many options there might be to consider.	1 **THE PROBLEM** (entry point) – Target, Threat, Intervention Category.
Few hours	Sorting through carefully to tailor the outputs to needs.	2 **THE EXPLORATION** (looking through search results) – scanning search results, exploring relevant returns in more detail, export full record pages for further reading.
Few days	Comparing between types of interventions, thinking about implementation, prioritising actions.	3 **THE CONSIDERATIONS** (wheels) – relative importance of context-specific considerations, unique for each Intervention category. → Consideration wheels
Few weeks	Deeply considering implementation and what might be involved.	4 **THE POINTS TO PONDER** – additional considerations that vary based on species/ location/threat/judgement etc and can't be summarised. → Points to ponder

Consideration Wheels

The Adaptation Catalogue for Conservation (AdaptLog) is an information resource describing conservation interventions for species and ecological communities – interventions that explicitly consider climate change. We have developed this resource to help people access and assess a wide range of intervention options for managing species, ecological communities and protected places under climate change. The information in AdaptLog has been extracted from publicly available records and information. The diagram above shows a tiered search process using AdaptLog features and supporting materials.

Why are additional considerations needed?

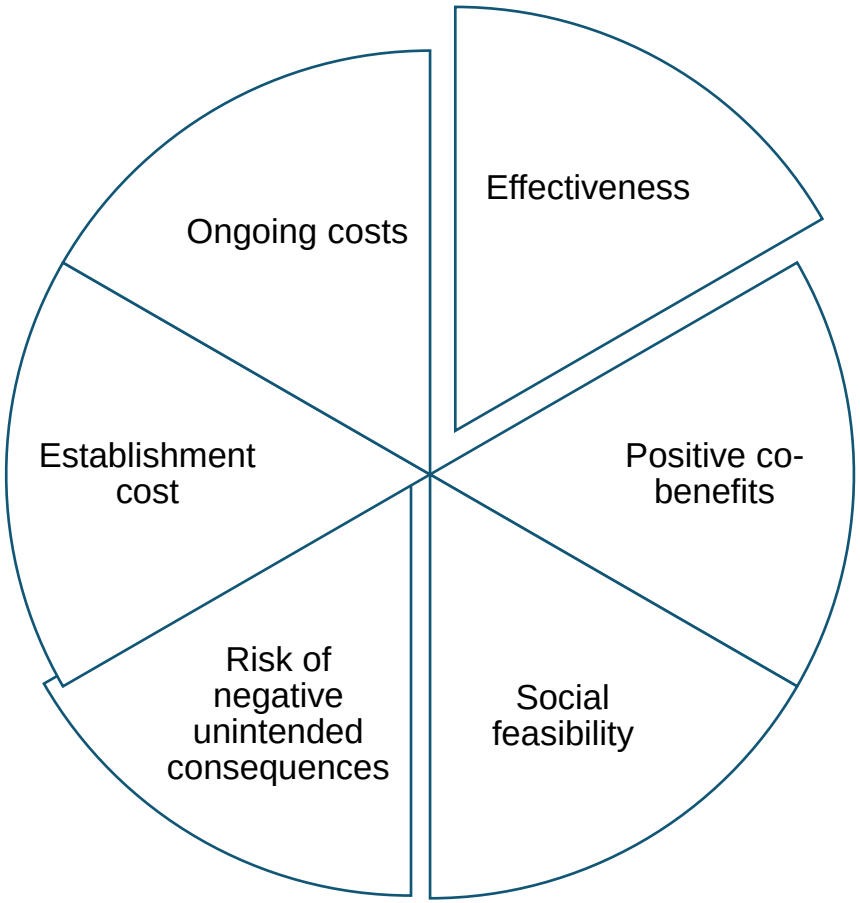
We have classified a range of attributes for hundreds of interventions; however, many attributes were difficult to classify or unknown at the scale of the individual intervention. Our intent for the AdaptLog resource is to capture the breadth and richness of actions that have occurred in this emerging field of practice - not to present a small number of detail-rich case studies. In our classification of these interventions within AdaptLog, we balance granularity and usefulness, i.e. we want to avoid overclassifying for bespoke and incomparable attributes as this would result in an unmanageable number of categories. We also avoided under-classifying by having too few categories (i.e. limiting to two categories such as high/low) which does not add value. Instead, we provide scalable hierarchies of information based on the classification granularity that was most logical. Additional considerations may be needed when choosing an intervention. These are the Consideration Wheels. These six considerations (Figure 1 below) have been identified via engagement with experts and practitioners in Australia as important aspects underpinning informed and successful implementation of adaptation. Often the considerations are difficult to quantify at the scale of the individual intervention. In many cases the information (for example costs) has not been collected, is difficult to estimate, or is not available (Adams, 2024; Iacona et al., 2018).

Overarching decision-making process and principles – where Consideration Wheels fit in.

AdaptLog may be useful in adaptation planning for a species or protected place, or for brainstorming conservation options for a recovery plan for a climate-sensitive and threatened species. It is important that we place this tool in context of the whole process of adaptation or conservation decision-making. AdaptLog and the Consideration Wheels are useful resources during the “identify” step of the adaptation process, where options for intervention are being developed and prioritised. Before this step, considerable work defining the context and decision-making space would have occurred already. This process would ideally have included and engaged people affected by these decisions. This includes the local community, rightsholders, people that could be benefactors of these decisions, and any groups of people that could be affected. The options in AdaptLog are not recommendations, and considerable work is needed before the decision to intervene including the involvement of all relevant stakeholders who are affected by any decisions made, as well as talking to experts and locals to understand the local context.

Design and delivery

The Considerations Wheels accompany the online, searchable AdaptLog to provide decision support and guide thinking around the various aspects associated with intervening in the face of climate change. In the AdaptLog interface, Consideration Wheels can be accessed following a search and on reading the full information record about an individual intervention. Consideration Wheel graphics and accompanying text will summarise the relative importance of six considerations for each Intervention Category (n=18). We suggest that Consideration Wheels be used to guide discussions and decision making while planning adaptation, and we provide further resources for each of the six considerations to assist (can be downloaded from the About page of AdaptLog). Table 2 below provides details on the methods that were used to inform scoring for each consideration and Intervention Category. Table 3 suggests some relative scorings for each of the Considerations and Intervention Categories, intended to initiate a thinking process and demonstrate how some of the considerations could play out in the decision-making process.



Effectiveness (evidence & scale of effect)	
	>90%
	>50 – 90%
	<50%
	Unknown (or too hard to estimate)
Positive co-benefits	
	Definitely some
	Maybe some
	None
	Unknown (or too hard to estimate)
Social feasibility	
	High feasibility
	Moderate feasibility
	Low feasibility
	Unknown (or too hard to estimate)
Risk of negative unintended consequences	
	<1%
	>1 – 10%
	>10%
	Unknown (or too hard to estimate)
Establishment cost	
	<$10 000/ha
	>$10 000 - <$100 000/ha
	>$100 000/ha
	Unknown (or too hard to estimate)
Total ongoing cost (20-year deployment)	
	<$10 000/ha
	>$10 000 - <$500 000/ha
	>$500 000/ha
	Unknown (or too hard to estimate)

Figure 1. Consideration wheel template and legend used to display relative importance of each consideration for each Intervention Category.

Table 1. Components of each consideration and associated scoring definitions and method notes.

Considerations 1 & 4 are defined by probability (%). Consideration 2 & 3 are defined by qualitative assessment. Considerations 5 & 6 are defined by interval in approximate cost by area ($/ha). This resource can be used to display considerations able to be summarised at the scale of each Intervention Category to provide a quick visual comparison and starting point for deeper exploration prior to implementation. **All considerations are scored to be relative comparisons between the 18 Intervention Categories**, i.e. provision of food is estimated as a lower cost compared to hydrological engineering works.

Consideration and its components	Guidance for scoring including caveats and any method note	Score
(1) Effectiveness	This consideration has two components of information that relate to the effectiveness of the intervention. The first component relates to the amount of evidence available that an intervention has been successfully implemented in the past. Please note that reporting of outcomes is limited for most interventions in AdaptLog (Mason et al., 2021) and we recommend Conservation Evidence as a resource for exploring evidence from the scientific literature for the accumulated effectiveness of general conservation actions. Our hope is that AdaptLog is the start of more evidence-informed practice in this space. 1. Evidence of effectiveness component We did not attempt to score the likelihood of effectiveness or estimated effect size as these measures are very context-specific and defined by the individual project objectives. Instead, we focus on the likelihood of effectiveness of the intervention itself based on existing evidence from the AdaptLog database. • LOW if less than 20 entries found in AdaptLog or approach is known to have mixed success • MEDIUM if between 20-50 entries found in AdaptLog • HIGH if more than 50 entries found in AdaptLog *A note on confidence* As climate adaptation interventions are a relatively new practice in conservation, many of these approaches aren't robustly tested or evaluated,	HIGH >90% MEDIUM >50–90% LOW <50% UNKNOWN (or too hard to estimate)

even less are tested across a wide range of systems, species and locations. When we score these interventions based on the available evidence, it is important to consider that the number of failures increases the more these interventions are trialled, as they won't work for all systems and locations. The number of times something has been trialled increases our confidence in the ratings in the wheel but doesn't necessarily increase the success rate. For example, an intervention has been done once successfully would have a 100% success rate, however we have very low confidence in this rating. Conversely, an intervention that has been trialled 20 times, with five failures only has a 75% success rate, but we have much greater confidence in its effectiveness.

The second component is that assuming the intervention is successful, what is the likely scale of impact.

2. Likely scale of impact component

This differs from our co-benefits consideration as it is looking at the benefits provided by the ecological outcomes of a successful deployment of an intervention. Whereas the co-benefits consideration is concerned with the co-benefits of the actual undertaking of the intervention, regardless of outcome. Here, we score the likely scale of impact of an Intervention Category across a spectrum from a local, single species impact, up to impacting ecological functions and processes:

- HIGH if ecological functions or interactions impacted
- MEDIUM if multiple species impacted
- LOW if only individuals or single species impacted

We average these two components into a final effectiveness rating of percentage likelihood (probability) of relative effectiveness between the different Intervention Categories.

	This consideration excludes the external factors required for species or ecosystem recovery that could threaten the overall success of conservation efforts. These enabling factors for recovery can include things like policy, legislation or systematic barriers, limited species or system knowledge, other threats, or lack of collaboration in the space. We acknowledge that despite the action/on-ground management (Intervention Category) being implemented successfully, the outcome may not be successful due to these external factors having a greater impact on overall success and recovery. In the VKR framework, this exclusion relates to the Rules component (Gorddard et al., 2016). Please see our **Points to Ponder** fact sheet on more explanation of this consideration.	
(2) Positive co-benefits (designed, accidental or unintended)	This consideration comprises of two components of information that relate to the positive co-benefits of the intervention. The first component only includes co-benefits to people received from implementing and maintaining the intervention itself. 1. <u>Community involvement component</u> Positive co-benefits for the community can be realised in many/most of the Intervention Categories depending on how it is done (i.e. does not necessarily depend on what is done). And so, we chose to only flag co-benefits from social and community levels if members of the public could be involved in its deployment. If the intervention can be theoretically implemented by members of the community (e.g. provision of food or water, restoration) then it receives "a point" for social or community co-benefits. This is compared to intervention categories that can't be easily implemented by members of the community, e.g. fire management or genetic rescue. Indigenous management practices have a high rating for co-benefits as they are a holistic approach that involves people. The second component includes co-benefits to people if the intervention is successful i.e. those co-benefits provided by the beneficiary species or ecological community e.g. tourism or ecosystem engineer services. 2. <u>Wider environment component</u>	**HIGH** Definitely some (both community involvement and wider environment likely) **MEDIUM** Maybe some (either community involvement or wider environment likely) **LOW** None (neither community involvement or wider environment likely)

	We assign an additional "point" for wider environmental outcomes that then are expected to benefit the community (e.g. tourism for increased bird watching or iconic species), improved agricultural outputs or job opportunities (ongoing management, work and training opportunities, water quality and quantity management), community wellbeing through fire protection (human life and infrastructure), community participation and social interaction (indication of wellbeing). We sum these two components into a positive co-benefits rating, qualitative scored and relative between the different Intervention Categories.	UNKNOWN (or too hard to estimate)
(3) Social feasibility (not including pre-establishment costs such as legal and planning)	This consideration is scored as a relative qualitative metric, comparing relative social feasibility between the different Intervention Categories in AdaptLog. It is important here to note that community attitudes are not fixed throughout time or space, and our guided scoring as part of this exercise is a snapshot in time for our experience of attitudes in 2024 in Australian conservation. At different time points and in different communities, this scoring would be very different and would need to be completed for the unique context and sociopolitical landscape. We could assign some of our scorings as whether the Intervention Category was generally considered as *interfering with what is "natural"* (Low feasibility) or generally considered as supporting natural processes and *giving a "helping hand"* (Medium feasibility). We also considered the following components of social feasibility: • Support from community, leadership/governance team, managers/approvers • Social acceptability • Taboo/controversy/polarising rating • Does it challenge social norms? • Willingness/support from all potential stakeholders e.g. NGO donors/scientific community	HIGH High feasibility MEDIUM Moderate feasibility LOW Low feasibility UNKNOWN (or too hard to estimate)

	• Willingness of partners to co-develop • Alignment with community values/needs We chose to use qualitative scoring for this consideration rather than a quantitative measure such as the percentage of the population likely to support an Intervention Category. Often, social feasibility does not scale with percentage of the population that supports the intervention, as one vocal and unsupportive person could mean the project has low social feasibility. It is also worth noting that if the species or the place has an iconic status, this could either work to gain support or in fact generate more pushback. Interventions for species and places in populated areas could theoretically have greater pushback if they are controversial (or the 'not in my backyard' ethos applies), however could have more support and funding if the community supports the initiative. Table 3 below describes some thoughts on why we think some Intervention Categories may have different social feasibility to each other. Please also consult the **Points to Ponder** documentation which discusses other aspects of feasibility.	
(4) Risk of negative unintended consequences	In the risk consideration, we make a relative estimation between the 18 different Intervention Categories based on current practices with references where available. We consider the following sources of risk: • Physical: Compounding threats, climate interaction • Biology of target species: Genetics, disease • Biology of non-target species: Biosecurity, predator/prey dynamics, pest species • Human interactions: roadkill, human health, human-wildlife conflict This risk scoring has two components being likelihood and consequence. In Table 2 below we categorise each Intervention Category as high or low in terms	LOW <1% MEDIUM >1 – 10% HIGH >10% UNKNOWN (or too hard to estimate)

<table>
<tr>
<td></td>
<td>of its likelihood and consequence and use the matrix below to score the overall risk of negative unintended consequences.

<table>
<tr><td></td><td>Low likelihood</td><td>High likelihood</td></tr>
<tr><td>Low consequence</td><td>LOW <1%</td><td>MEDIUM >1 – 10%</td></tr>
<tr><td>High consequence</td><td>MEDIUM >1 – 10%</td><td>HIGH >10%</td></tr>
</table>
</td>
<td></td>
</tr>
<tr>
<td>(5) Establishment Cost</td>
<td>For the following considerations, scores were assigned using cost information from Yong et al. (2023), Table 3 as a guide:
• Fire management
• Hydrological regime manipulation
• Terrestrial and riparian restoration or renovation
• Interspecific species management
• Disease management

The remaining were scored through expert consensus with references where available and appropriate. We considered the following components of establishment costs:
• Capital investment
• (site) Preparation costs
• Labour cost for construction or implementation
• Community preparation/engagement
• Legal (and planning) approval process
• Ethics
• Internal safety processes</td>
<td>LOW <$10 000/ha

MEDIUM >$10 000 - <$100 000/ha

HIGH >$100 000/ha

UNKNOWN (or too hard to estimate)</td>
</tr>
</table>

(6) On-going costs (post establishment for 20 years)	This score represents the total cost for continuous implementation of the intervention for 20 years (i.e. excluding establishment and overhead costs). We chose a 20-years rather than the lifespan of a project which would have required the identification of temporary measures versus long-term implementation, which is a project-specific feature of an intervention. For the following considerations, scores were assigned using cost information from Yong et al. (2023), Table 3 as a guide: • Fire management • Hydrological regime manipulation • Terrestrial and riparian restoration or renovation • Interspecific species management • Disease management The remaining were scored through expert consensus with references where available and appropriate. We considered the following components of on-going costs: • Labour cost • Maintenance required (materials) • Other ongoing costs (i.e. fixed costs) • Monitoring costs When thinking about the consideration of on-going costs, it is helpful to think about the distribution of the effort function over time. Below is a useful visualisation that compares possible functions for annual effort/cost on the y-axis and time on the x-axis. Several different relationships between ongoing cost (or effort as a proxy for cost) could be high at the start of the intervention implementation and slowly decrease over time (panel a). The ongoing costs could vary over time (in a regular manner) with peaks and throughs occurring at a certain time interval for example due to seasonal activities (panel b). The ongoing costs could simply be continuously high due to regular human effort needed for deployment (c) or could require replacement within the 20-year time frame, where there appears a peak midway during the time period (d) or could	LOW <$10 000/ha MEDIUM >$10 000- <$500 000/ha HIGH >$500 000/ha UNKNOWN (or too hard to estimate)

involve a small amount of ongoing costs after a high initial investment (e). An intervention could have increasing annual costs over its lifetime (f), perhaps due to an expensive maintenance schedule.

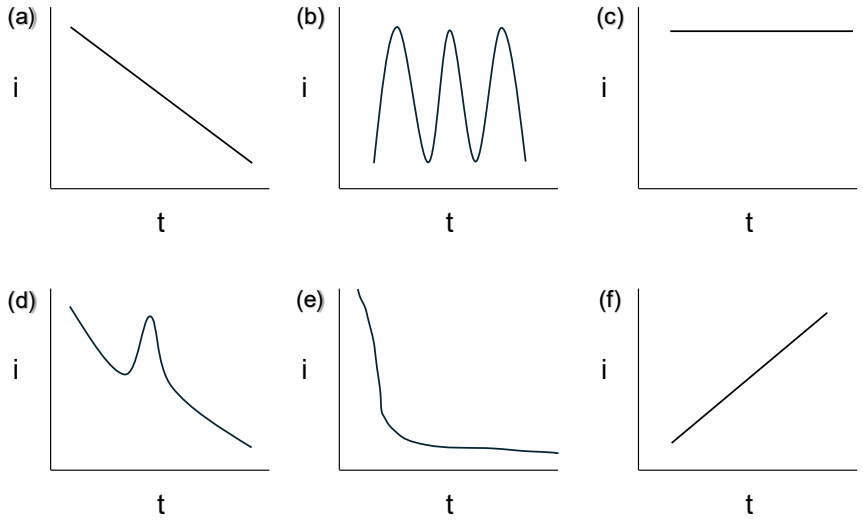


Table 2. Relative scoring guidance and justification for Consideration Wheels specific to each Intervention Category.

Note: This scoring is for guidance only and completing this exercise with your own context and knowledge is needed before making decisions or taking action.

Intervention Category	Scoring with caveats &/ method note					
	Effectiveness HIGH = good MEDIUM LOW = bad UNKNOWN *Score averages two ratings, 1) **evidence** rating and 2) **scale of potential impact** rating. If the two ratings conflict, round down. Or settle at Medium if a one High and one Low.*	Positive co-benefits HIGH = good MEDIUM LOW = bad UNKNOWN *Score adds presence of two possible benefits, 1) if **opportunities for community participation** exist and 2) if **wider environment benefits** are possible from outcome.*	Social feasibility HIGH = good MEDIUM LOW = bad UNKNOWN	Risk of negative unintended consequences LOW=good MEDIUM HIGH=bad UNKNOWN	Establishment cost LOW=good MEDIUM HIGH=bad UNKNOWN	Ongoing cost LOW=good MEDIUM HIGH=bad UNKNOWN
Provision of food or water	LOW LOW evidence rating as mixed outcomes have been documented LOW scale of potential impact as only	MEDIUM Opportunities for community participation and private land involvement	LOW Interfering with what is “natural” This is currently a controversial management action in Australia, as some	HIGH Likelihood=high Consequence=high Negative unintended consequences have been documented for this	LOW Relative to other Intervention Categories this type of action has been assigned the lowest establishment cost score	HIGH Although this category is often a temporary measure, for this comparative rating we are estimating costs for continuous

	individuals or single species impacted		government agencies do not allow this practice.	Intervention Category, for example supplementary feeding could support feral animals instead, or disease risk due to increased animal interactions around water stations		deployment for 20 years. Due to the continuously maintenance and human resources required we suggest a high rating
Fire management	MEDIUM MEDIUM evidence rating as 20-50 cases in AdaptLog HIGH scale of potential impact as ecological functions or interactions impacted	MEDIUM Wider environment benefit possible e.g. reduced risk to homes and livelihoods, landscape/multi-species benefit	MEDIUM Fire management is a widely accepted practice in Australia, although there is debate on best practice due to continually evolving ecological understanding	MEDIUM Likelihood=low Consequence=high	LOW Establishment and Ongoing costs: Table 3 (Yong et al., 2023)	MEDIUM Establishment and Ongoing costs: Table 3 (Yong et al., 2023)
Hydrological regime manipulation	HIGH HIGH evidence rating as >50 cases in AdaptLog HIGH scale of potential impact as ecological functions or interactions impacted	MEDIUM Wider environment benefit possible e.g. water quality and quantity management benefits agricultural production and community wellbeing in regional areas	LOW Water body intervention can result in vast changes in the landscape, as well as significant up and down-stream impacts, with many different stakeholders affected	MEDIUM Likelihood=low Consequence=high Hydrological systems can be modelled with varying confidence Intervention on the scale of ecological systems and	MEDIUM Establishment and Ongoing costs: Table 3 (Yong et al., 2023)	MEDIUM Establishment and Ongoing costs: Table 3 (Yong et al., 2023)

				interactions is of large consequence		
Habitat manipulation	MEDIUM HIGH evidence rating as >50 cases in AdaptLog LOW scale of potential impact as only individuals or single species impacted	MEDIUM Opportunities for community participation and private land involvement	LOW Interfering with what is “natural”	HIGH Likelihood=high Consequence=high	LOW Using a relative comparison between Intervention Categories this type of action has been assigned the lowest establishment cost score	HIGH Although this category is often a temporary measure, for this comparative rating we are estimating costs for continuous deployment for 20 years. Due to the continuously maintenance and human resources required we suggest a high rating
Terrestrial and riparian restoration or renovation	HIGH HIGH evidence rating as >50 cases in AdaptLog HIGH scale of potential impact as ecological functions or interactions impacted	HIGH Opportunities for community participation and private land involvement Wider environment benefit possible e.g. improves amenity and cultural values, can improve agricultural production (e.g. pollinators)	MEDIUM This Intervention Category incurs an opportunity cost of land use change (i.e. conversion to restored natural habitat) which may not align with all stakeholders views and desires for the landscape	LOW Likelihood=low Consequence=low	HIGH Establishment and Ongoing costs: Table 3 (Yong et al., 2023)	MEDIUM Establishment and Ongoing costs: Table 3 (Yong et al., 2023)

Coastal and marine restoration or renovation	MEDIUM MEDIUM evidence rating as 20-50 cases in AdaptLog HIGH scale of potential impact as ecological functions or interactions impacted	HIGH Opportunities for community participation and private land involvement Wider environment benefit possible e.g. fisheries, tourism	MEDIUM This Intervention Category incurs an opportunity cost of land use change (i.e. conversion to restored natural habitat) which may not align with all stakeholders views and desires for the landscape	LOW Likelihood=low Consequence=low	HIGH Assume similar to terrestrial Establishment and Ongoing costs: Table 3 (Yong et al., 2023)	MEDIUM Assume similar to terrestrial Establishment and Ongoing costs: Table 3 (Yong et al., 2023)
Soil management	MEDIUM LOW evidence rating as <20 cases in AdaptLog HIGH scale of potential impact as ecological functions or interactions impacted	HIGH Opportunities for community participation and private land involvement Wider environment benefit possible e.g. Agricultural production and resilience	UNKNOWN	LOW Likelihood=low Consequence=low	UNKNOWN	UNKNOWN
Conservation introductions outside of historic range	LOW LOW evidence rating as <20 cases in AdaptLog LOW scale of potential impact as only	LOW	LOW Interfering with what is “natural”	HIGH Likelihood=high Consequence=high	UNKNOWN	LOW Assume no ongoing costs post translocation (i.e. population successful established)

	individuals or single species impacted					therefore using the relative comparison this category is assigned the lowest cost score
Reinforcement and reintroduction within historic range	LOW MEDIUM evidence rating as 20-50 cases in AdaptLog LOW scale of potential impact as only individuals or single species impacted	MEDIUM Wider environment benefit possible e.g. tourism benefits for iconic or culturally significant species	MEDIUM “Helping hand”	MEDIUM Likelihood=high Consequence=low	UNKNOWN	LOW Assume no ongoing costs post translocation (i.e. population successful established) therefore using the relative comparison this category is assigned the lowest cost score
Ex situ conservation	LOW LOW evidence rating as mixed outcomes have been documented, and very species dependent LOW scale of potential impact as only individuals or single species impacted	MEDIUM Wider environment benefit possible e.g. through zoo programs and botanic gardens can increase connection and awareness	LOW Interfering with what is “natural”	UNKNOWN VARIABLE as large difference in risk between plants and animals. Typically, high risk for animals and less so for plants	UNKNOWN VARIABLE as large difference in this activity between plants and animals. Typically, very expensive for animals, plants very cheap (e.g. seedbank)	UNKNOWN VARIABLE as large difference in this activity between plants and animals. Typically, very expensive for animals, plants very cheap (e.g. seedbank)
In situ reproductive or survival manipulation	LOW LOW evidence rating as <20 cases in AdaptLog	LOW	MEDIUM “Helping hand”	HIGH Likelihood=high Consequence=high	UNKNOWN VARIABLE dependent on activity	UNKNOWN VARIABLE dependent on activity

	LOW scale of potential impact as only individuals or single species impacted					
Genetic rescue or management	LOW LOW evidence rating as <20 cases in AdaptLog LOW scale of potential impact as only individuals or single species impacted	LOW	LOW Interfering with what is “natural”	MEDIUM Likelihood=low Consequence=high	UNKNOWN VARIABLE depends on genetic information available and type of action i.e. mixing or lab work	LOW Assume no ongoing costs post genetic intervention (i.e. population genetic diversity has been restored)
Interspecific species management	MEDIUM MEDIUM evidence rating as 10-50 cases in AdaptLog MEDIUM scale of potential impact as multiple species impacted	UNKNOWN VARIABLE e.g. could engage community in weeding but not in feral animal culling	MEDIUM Well-established in Australia but lethal methods are not universally supported	MEDIUM Likelihood=low Consequence=high	UNKNOWN Highly variable dependent on species Establishment and Ongoing costs: Table 3 (Yong et al., 2023)	UNKNOWN Highly variable dependent on species Establishment and Ongoing costs: Table 3 (Yong et al., 2023)
Disease management	LOW LOW evidence rating as <20 cases in AdaptLog LOW scale of potential impact as only individuals or single species impacted	LOW	HIGH Very well accepted because it happens to humans?	MEDIUM Likelihood=low Consequence=high	UNKNOWN Highly variable dependent on disease Establishment and Ongoing costs: Table 3 (Yong et al., 2023)	UNKNOWN Highly variable dependent on disease Establishment and Ongoing costs: Table 3 (Yong et al., 2023)

Response to extreme event	MEDIUM MEDIUM evidence rating as 10-50 cases in AdaptLog VARIABLE scale of impact depending on application	UNKNOWN VARIABLE dependent on activity	UNKNOWN	UNKNOWN	HIGH In comparison the *Preparation for extreme events*, costs for response activities are likely to be higher in general	HIGH In comparison the *Preparation for extreme events*, costs for response activities are likely to be higher in general
Preparation for extreme events	MEDIUM MEDIUM evidence rating as 10-50 cases in AdaptLog VARIABLE scale of impact depending on application	UNKNOWN VARIABLE dependent on activity	UNKNOWN	UNKNOWN	LOW In comparison the *Response to extreme event*, costs for preparation activities are expected to be lower in general	LOW In comparison the *Response to extreme event*, costs for preparation activities are expected to be lower in general
Indigenous management practices	MEDIUM LOW evidence rating as <20 cases in AdaptLog HIGH scale of potential impact as ecological functions or interactions impacted	HIGH Wider environment benefit possible e.g. connection to Country and culture increased, high human wellbeing benefit Opportunities for community participation and private land involvement	UNKNOWN	LOW Likelihood=low Consequence=low	UNKNOWN	MEDIUM Staffing, acquisition of land
Landscape planning and management	MEDIUM	HIGH	MEDIUM	LOW Likelihood=low	UNKNOWN	MEDIUM

	MEDIUM evidence rating as 10-50 cases in AdaptLog HIGH scale of potential impact = ecological functions or interactions impacted	Wider environment benefit possible e.g. holistic approach with many co-benefits to broader environment Opportunities for community participation and private land involvement	This Intervention Category incurs an opportunity cost of land use change which may not align with all stakeholders views and desires for the landscape	Consequence=low		Staffing, acquisition of land

Bibliography

Adams, V. M. (2024). Costs in conservation: Common costly mistakes and how to avoid them. *PLOS Biology*, *22*(6), e3002676. https://doi.org/10.1371/JOURNAL.PBIO.3002676

Gorddard, R., Colloff, M. J., Wise, R. M., Ware, D., & Dunlop, M. (2016). Values, rules and knowledge: Adaptation as change in the decision context. *Environmental Science & Policy*, *57*, 60–69. https://doi.org/10.1016/J.ENVSCI.2015.12.004

Iacona, G. D., Sutherland, W. J., Mappin, B., Adams, V. M., Armsworth, P. R., Coleshaw, T., Cook, C., Craigie, I., Dicks, L. V., Fitzsimons, J. A., McGowan, J., Plumptre, A. J., Polak, T., Pullin, A. S., Ringma, J., Rushworth, I., Santangeli, A., Stewart, A., Tulloch, A., … Possingham, H. P. (2018). Standardized reporting of the costs of management interventions for biodiversity conservation. *Conservation Biology*, *32*(5), 979–988. https://doi.org/10.1111/COBI.13195

Mason, C., Hobday, A. J., Alderman, R., & Lea, M. A. (2021). Climate adaptation interventions for iconic fauna. *Conservation Science and Practice*, *3*(7), e434. https://doi.org/10.1111/CSP2.434

Yong, C., Ward, M., Watson, J. E. M., Reside, A. E., van Leeuwen, S., Legge, S., Geary, W. L., Lintermans, M., Kennard, M. J., Stuart, S., & Carwardine, J. (2023). The costs of managing key threats to Australia's biodiversity. *Journal of Applied Ecology*, *60*(5), 898–910. https://doi.org/10.1111/1365-2664.1437

Please cite decision support documentation for AdaptLog as: Mason, Claire; Hartog, Jason; Boulter, Sarah; Hobday, Alistair; Melbourne-Thomas, Jess; Styger, Jenny; & van Putten, Ingrid (2024): Decision support documentation for AdaptLog. CSIRO. Service Collection. http://hdl.handle.net/102.100.100/659364?index=1

This project is supported with funding from the Australian Government under the National Environmental Science Program.