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Effectiveness of farm management actions for enhancing NZ biodiversity: Specialist judgement assessment

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Executive Summary

As part of the second step in a proof-of-concept for co-designing a biodiversity assessment tool for New Zealand farms, the New Zealand Sustainability Dashboard research team invited a panel of specialists to assess the effectiveness of farm management actions on target biodiversity groups. The management actions and biodiversity groups assessed were those prioritised by a panel of stakeholder-advisors for inclusion in the prototype biodiversity tool (the first step in this proof-of-concept).

We used a structured assessment process based on that used by Conservation Evidence, whereby multiple rounds of anonymous individual scoring of management actions were used to achieve a consensus among the assessment panel of the final classification of an action as more or less likely to be beneficial in enhancing biodiversity of a target group. The assessors were asked to score the expected benefits and harms of each management action to each biodiversity group, and their certainty in these benefits and harms scores, based on their working knowledge and experience of New Zealand ecology and research – thus, this was termed a Specialist Judgement assessment. A total of 10 New Zealand-based assessors from a variety of research institutions with expertise in biodiversity and production landscapes participated in the assessment of 43 management actions on 11 biodiversity groups.

Of the 473 management action—biodiversity group combinations assessed, 177 were expected to provide some benefit, while 268 were not expected to benefit the target biodiversity group. Over 75% (33) of the management actions were expected to benefit overall biodiversity in the production landscape, with 6 – 31 actions expected to benefit particular ecological species groups. Most actions expected to benefit native plants and birds occur in large non-production areas of the farm, while most actions expected to benefit genetic diversity of farm products occur in the farm's production areas. A single management action might be expected to benefit one to nine biodiversity groups, with approximately half of the management actions assessed expected to benefit five or more of the target biodiversity groups.

Several considerations for future assessments have emerged from this assessment process, including planning the logistics and refining the actions to enable the assessment panel to provide thorough and consistent input. Incorporating the assessment's information source and proposed end-use, as well as stakeholder and specialist expertise on criteria for a "beneficial" outcome, into the final assessment results might clarify communication and better link the panel's knowledge with potential uses of the assessment.

The results from this Specialist Judgement assessment have highlighted a number of priorities for future research. Several management actions expected to have limited biodiversity benefits in New Zealand have strong evidence for their effectiveness at enhancing multiple species groups overseas. Additionally, 23 management action—biodiversity group combinations were categorized as having unknown effectiveness and variability in assessor scores of benefits and harms was high across the board. More work investigating the potential benefits of management actions, particularly within production areas, to biodiversity of native flora and fauna of New Zealand would be especially valuable to fill these knowledge gaps and support consistent recommendations for which management actions farmers and growers should undertake to enhance biodiversity on their land.

Table of Contents

1 Introduction

As part of the proof-of-concept for co-designing a biodiversity assessment tool for New Zealand farms (Box 1), the New Zealand Sustainability Dashboard (NZSD) research team invited a panel of specialists to assess the effectiveness of farm management actions on target biodiversity groups (Step B1 in Box 1). The management actions and biodiversity groups assessed were those prioritised by a panel of stakeholder-advisors for inclusion in the prototype biodiversity tool (Step A4 in Box 1).

We used a structured expert assessment process based on that used by Conservation Evidence[1], an initiative based at the University of Cambridge, to quantify the effectiveness of a suite of farm management actions in enhancing overall biodiversity in the production landscape and biodiversity of 10 ecological groups. The actions and biodiversity groups used in this assessment were prioritised for inclusion in the prototype biodiversity tool by a panel of stakeholder-advisors because they are commonly implemented or recommended on farms and apply to a wide range of agricultural sectors (Step A4 in Box 1). Thus, these practices do not represent all possible practices for enhancing farmland biodiversity, nor was there any *a priori* assumption of their effectiveness. The outcome of this assessment will be used to inform the scoring system of the prototype biodiversity tool, as well as highlighting areas in which policy and management recommendations might benefit most from further research.

This assessment drew on the working knowledge and experience in NZ ecology and research of a panel of scientific experts (hereafter, "Specialist Judgement" assessment). The expert panel comprised scientists from universities, Crown Research Institutes, government agencies and environmental consultancies with expertise in impacts of agricultural practices on NZ biodiversity and specialty in at least one of the prioritised biodiversity groups for inclusion in the prototype tool. The assessment involved multiple rounds of anonymous individual scoring of farm management actions for their expected effects on biodiversity to achieve a consensus of the final classification of an action as more or less likely to be beneficial in enhancing biodiversity of a particular group.

Similar to the process of scoping components to include in the tool (Step A1 in Box 1), the benefits of this assessment approach include limiting the potential for bias and providing transparency in the tool's development. Using a panel of experts in a formal process of evaluating the effectiveness of farm management actions can minimise the risk of favouring particular management actions that are traditionally recommended or conventionally used but have limited guarantee of success, as well as clarifying how to deal with conflicting evidence for effectiveness of a management action. Our approach involving an expert panel and the consensus process thus reduces individual bias toward particular management actions and provides a documented framework for the subsequent determination of the tool's scoring (i.e. which actions are scored as more or less effective at enhancing a particular biodiversity group). Here we describe the methods and results of the Specialist Judgement assessment of prioritised farm management actions and biodiversity groups.

Box 1: Co-designing a biodiversity assessment tool for NZ farms

The *New Zealand Sustainability Dashboard* (NZSD) project is developing a simple, online prototype tool for New Zealand (NZ) farmers to self-assess the management actions they have taken to enhance biodiversity. It also delivers a proof-of-concept of a co-design process for evidence-based tools for NZ farmers and other stakeholders to assess and report their sustainability performance.[2]

Working with a diverse range of NZ stakeholders and researchers, we are capitalising on overseas' research investments to collectively adapt an existing online calculator (the Cool Farm Biodiversity Tool[3] [CFT], developed for north-western European farms) to reflect NZ priorities, farming practices and sectors. This co-design process aims to build trust in the tool and ensure it is widely used. Using the CFT as a standard can provide direct benefits to multiple NZ stakeholders, such as aiding market access and environmental reporting by communicating environmental benefits of farm practices in an industry standard way.

The development of the biodiversity assessment tool consists of three work streams (see diagram below):[4]

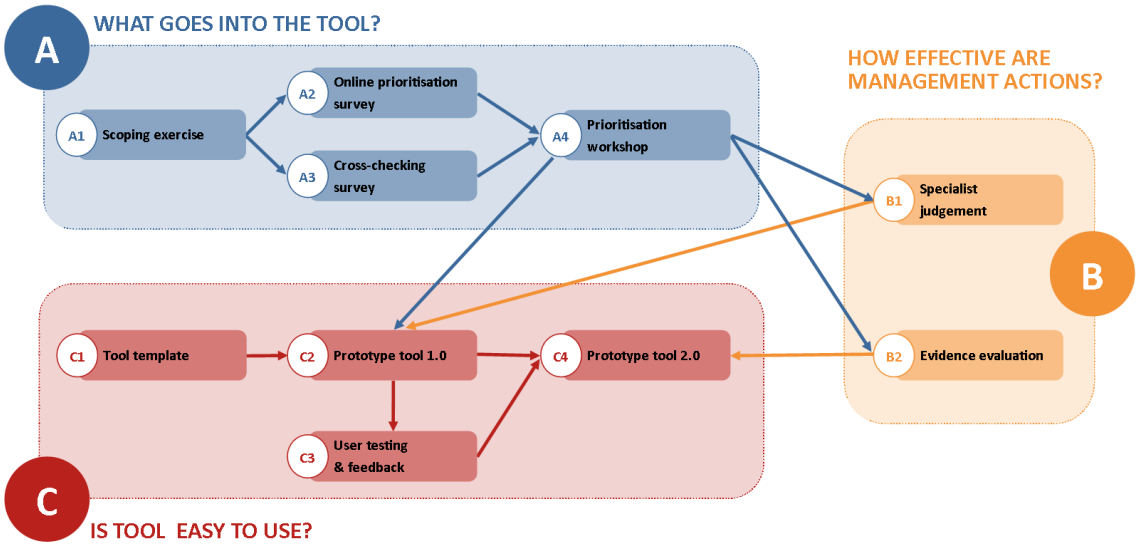
A. *What goes into the tool?* – Tailoring the biodiversity groups and management actions to tell the unique story of NZ's biodiversity. This step, which is complete, involved scoping the possible components (A1) to include in the tool[5] and prioritising components of the prototype tool (A2–A4) with stakeholders.[6]

B. *How effective are management actions?* – Quantifying the expected benefits of a subset of relevant NZ farm management actions for each of the priority biodiversity groups; it involves two substeps:

   B1. A *Specialist Judgement* assessment of the prioritised actions and biodiversity groups, which is complete.

   B2. An *Evidence Evaluation* assessment to determine effectiveness of management actions based on an evaluation of scientific evidence; the focus of this report.

C. *Is the tool easy to use?* – Developing and testing an online prototype tool for biodiversity assessments on NZ farms.



2 Methods

We combined the approaches of the Gaia Biodiversity Yardstick[7], an online farm biodiversity questionnaire developed by experts at CLM and the University of Leiden, and the Cool Farm Biodiversity Tool[8] in this first part of the assessment of effectiveness of farm management actions in enhancing prioritised biodiversity groups for the prototype tool. We assembled a panel of 10 NZ-based experts from a variety of institutions (three universities, two Crown Research Institutes, a government agency and an environmental consultancy) with expertise in impacts of agricultural practices on NZ biodiversity and specialty in at least one of the prioritised biodiversity groups for inclusion in the prototype tool (Table 1 lists the eight assessors who participated in the complete assessment process). At least two of the panel members had expertise in each undomesticated taxonomic group (i.e. plants, birds, terrestrial invertebrates, soil biota and aquatic fauna).

Table 1: Expert panel*

Assessor	Affiliation
Dr. Nigel Bell	AgResearch
Assoc. Professor Bruce Burns	University of Auckland
Dr. Kelvin Lloyd	Wildland Consultants
Mr. Bruce McKinlay	Department of Conservation
Dr. Maria Minor	Massey University
Dr. Colin O'Donnell	Department of Conservation
Dr. Jacqui Todd	Plant & Food Research
Professor Jason Tylianakis	University of Canterbury

*Note that membership on the assessment panel does not indicate endorsement of the results or the biodiversity tool.

The assessment was aimed at the 35 farm management actions and 10 ecological biodiversity groups prioritised by stakeholder-advisors for inclusion in the prototype tool.[6] As recommended by the stakeholder-advisor panel, several of these actions were revised prior to being assessed for effectiveness. We also revised the scope of many of the actions occurring in natural habitats so that each action was paired with a specific habitat type (i.e. grassland/shrubland, wetland or forest), thus enabling a clearer assessment of which biodiversity groups would likely be affected by a particular action. The assessment was thus conducted on a final list of 43 management actions (Table 2) and 11 target biodiversity groups, including the 10 prioritised ecological groups (Table 3) and "overall biodiversity", or all taxa potentially occurring in the production landscape. This revision remains consistent with the stakeholder-advisor priority of having ≥50% of the actions pertaining to small non-production areas and production areas on the farm[6] (13 actions in Production areas, 12 in Small non-production areas and 18 in Large non-production areas).

Table 2: Farm management actions for assessment

Mgmt area	Index	Action label	Action description
Production areas	1	More than one crop	Grow more than one type or variety of crop
	2	More than one livestock	Raise more than one species or breed of livestock
	3	Species mixtures in paddocks	Grow a mixture of species (mixed grasses or grasses and legumes/field flowers) in a paddock
	4	Use biocontrol	Use biological control methods to manage agricultural pests
	5	Natural biocontrol promotion	Provide semi-natural habitats near crops so beneficial insects can help with pest control, such as beetle banks
	6	Practice cultural controls	Practice cultural controls, such as mechanical/physical control of weeds and crop disease prevention (such as selecting resistant crop varieties, planning rotations, avoid leaving crop residues in which diseases or pests could develop) to manage agricultural pests
	7	Limited pesticide use	Use pesticides (including herbicides) only when and where they are needed as determined through monitoring of pests or crop damage
	8	Selective pesticide use	Use only selective pesticides targeted to the specific pest or weed, and which are compatible with biological control
	9	Avoid bare ground	Minimise bare ground, such as by planting cover crops in arable fields, maintaining ground cover in orchards and vineyards, or maintaining vegetation cover in paddocks
	10	Tillage methods	Use shallow tillage or no tillage as the main method of cultivation
	11	Minimal root stock disturbance	Minimise soil compaction and pugging by carefully managing machinery and livestock
	12	Soil organic matter	Maintain or increase soil organic matter, such as by leaving straw or crop residues, growing green manure crops, or adding compost or organic mulches
	13	Careful fertiliser use	Add the right amounts and types of fertilisers (including organic inputs), and only in response to a demand for nutrients (such as that indicated by plant or soil testing, or assessment of paddock requirements) and at appropriate timings and frequency to minimise leaching and runoff
Small non-production areas	14	Uncultivated areas	Field or paddock margins or corners are left out of production, with naturally occurring plants
	15	Flowers in uncultivated areas	Non-productive areas such as paddock boundaries are planted with flowering plants and trees to provide nectar, fruit or other food for wildlife such as pollinators and birds
	16	Shelterbelts present	Shelterbelts present on farm
	17	Trees on production land	Solitary or well-spaced trees are present on or adjacent to production land
	18	Small forest on farm	Small patches of native bush (<2 ha) or plantations of non-native trees present on farm
	19	Shelterbelts managed	Manage shelterbelts to promote biodiversity, such as avoiding spraying or pruning at low frequency

	20	Woody species mixtures - shelterbelts	Maintain a mixture of species in shelterbelts or small forest, including native woody plants
	21	Water bodies present	Waterways (including rivers, streams, or ponds) present on farm
	22	Natural hydrology	Promote a natural hydrological regime in waterways on farm, such as allowing flooding or maintaining sufficient water levels for wildlife
	23	Wildlife waterway passage	Have culverts or bridges over streams that allow fish passage in waterways on farm
	24	Waterway buffer zones	Provide woody or grassy buffers between production areas and waterways, including fencing that excludes livestock from the buffer strip
	25	Waterway barriers	Use barriers to prevent pollutants from entering waterways, such as sediment traps or constructed wetlands
Large non-production areas	26	Natural grassland	Large patch (>2 ha) of natural tussock grassland or shrubland present on farm
	27	Formal protection - grassland	Large patches of natural tussock grassland or shrubland are formally protected, such as in a QEII covenant
	28	Livestock exclusion - grassland	Large patches of natural tussock grassland or shrubland fenced to exclude livestock
	29	Control weeds - grassland	Control weedy non-native plants in large patches of natural tussock grassland or shrubland, such as by spraying, grazing, or mechanical methods
	30	Natural wetland	Large (>1 ha) naturally-occurring wetland present on farm
	31	Formal protection - wetland	Large natural wetlands are formally protected, such as in a QEII covenant
	32	Livestock exclusion - wetland	Large natural wetlands are fenced to exclude livestock
	33	Control weeds - wetland	Control weedy non-native plants in large natural wetlands, such as by spraying, grazing, or mechanical methods
	34	Natural forest	Large patch (>2 ha) of native forest or dense bush present on farm
	35	Formal protection - forest	Large patches of native forest or dense bush are formally protected, such as in a QEII covenant
	36	Livestock exclusion - forest	Large patches of native forest or dense bush fenced to exclude livestock
	37	Control weeds - forest	Control weedy non-native plants in large patches of native forest or dense bush, such as by spraying, grazing, or mechanical methods
	38	Forest edge management	Manage edges of large bush patches to benefit wildlife, such as providing a transitional or shrubby buffer zone between production areas and taller forest
	39	Woody species mixtures - forest	Maintain a mixture of native woody species in large patches of native forest or dense bush
	40	Control possums	Control possums on farm, especially in natural habitats
	41	Control mammal predators	Control stoats, rats, hedgehogs, or other predators on farm, especially in natural habitats
	42	Control introduced herbivores	Control deer, goats, pigs, or other animals that alter habitat on farm, especially in natural habitats
	43	Reduce introduced competitors	Control mice or other animals that compete with wildlife for food and nest sites on farm, especially in natural habitats

Table 3: Ecological biodiversity groups prioritised for inclusion in the prototype biodiversity tool development

Ecological group	Description	Example taxa*
 Native bush plants	Native trees, shrubs, and herbs of shaded areas, including shelterbelts	Species commonly found in beech, podocarp, or broad-leaved forests and dense shrubland or scrub (e.g. manuka); also native woody species planted in shelterbelts
 Native wetland and aquatic plants	Native herbs, flowers, and shrubs of permanently or semi-permanently wet areas and of freshwater (pools, streams)	Sedges, rushes, reeds, divaricating shrubs, and other native plant species commonly found in wetland habitats
 Native grassland plants	Grasses, flowers, and shrubs native to New Zealand tussock grasslands and open shrublands	Tussocks, herbs, wildflowers, shrubs (e.g. matagouri, *Olearia* spp), harakeke (flax) and other native plant species commonly found in open habitats
 Native forest birds	Native birds that require woody plants (such as forest, dense scrub, or shelterbelts) for breeding and feeding	Fantail, tui, kereru, bellbird, silvereye, tomtit, rifleman, NZ robin, kaka, kakariki
 Wetland birds	Birds that mainly use wetlands for breeding and feeding, including riparian areas	Herons, scaup, wrybill, pukeko, bittern, rails, fernbird
 Native birds of open habitats	Native birds that mostly use open areas (grasslands or open shrublands) for breeding and feeding	Falcon, harrier hawk, weka, oystercatcher, paradise shelduck, spur-winged plover, gulls
 Soil life	Animals, bacteria and fungi that live within the soil, and are mainly found below ground	Earthworms, springtails, mites, fungi, microbes
 Beneficial insects	Invertebrates that help agriculture by providing services like pollination or pest control	Bees & other pollinators, spiders, parasitic wasps & other biocontrol agents, ground beetles, millipedes, landhoppers, slaters
 Native aquatic animals	Animals native to New Zealand that need water for breeding, shelter, or feeding	Galaxid fishes (whitebait), eels, koura (crayfish), frogs, benthic invertebrates, surface invertebrates
 Livestock, crop and variety	Genetic diversity of livestock and crops, diversity of forage and green manure crops grown	Livestock & crop species, cover crops/forage species such as legumes, brassicas & grasses

*The list of example taxa for each ecological group is not meant to be comprehensive. We recognise that some taxa use multiple habitats; the broad overall habitat preference or requirements of a species should determine its group, but any particular species is not necessarily precluded from belonging to multiple groups.

We used a method of assessment based on the Delphi technique and used in developing the online Conservation Evidence database[1], whereby multiple rounds of anonymous individual scoring of management actions are used to achieve a consensus of the final classification of an action as more or less likely to be effective in enhancing biodiversity. The assessment consisted of three rounds of assessor surveys:

1. **Initial scoring.** Assessors scored each management action (from 0 to 100) for overall biodiversity and each ecological group (i.e. *n* = 473 cases) to answer the three questions 1) How *beneficial* is the practice for the target biodiversity group?, 2) How *harmful* is the practice for the target biodiversity group? and 3) How *certain* are you about your answers to questions 1 and 2?
2. **Agreement with categorization.** Categories of expected effectiveness using criteria established by Conservation Evidence (Table 4) were assigned to each management action–biodiversity group combination (hereafter, "case") based on median scores from the first survey round. We used the median rather than the mean to avoid the potential for a skewed mean due to extreme values. Assessors indicated whether they agreed with the category to which each case was assigned.
3. **Final scoring.** Assessors were asked to rescore cases for which there was substantial disagreement with the assigned effectiveness category in the second survey round. The scoring process was identical to round 1; final effectiveness categories were assigned to these cases according to the new median scores as in round 2.

As this was a "Specialist Judgement" assessment, we asked assessors to draw on their own working knowledge and experience in NZ ecology and research, including their expertise in factors that support or limit species populations, knowledge of the published primary and grey literature and experience of research and management efforts conducted in NZ. When scoring "benefits" and "harms" of practices on a target biodiversity group, assessors were asked to consider each case independently of other practices or covariates and to consider benefits and harms as independent effects (e.g. where a practice benefits certain species within a target biodiversity group but may harm others). "Benefits" could include increased abundance of individuals, enhanced range and diversity of species or occurrence of target species; "harms" include negative side-effects to the target biodiversity group. When scoring "certainty" of the benefits and harms of practices on a target biodiversity group, assessors were asked to consider the knowledge sources informing their decision for the scores (e.g. anecdotal evidence vs. studies done on the target biodiversity group, conflicting observations vs. general agreement), the representativeness of the current state of knowledge (e.g. expectations across a range of farming systems and NZ regions) and their familiarity with the target biodiversity group. In each survey round, assessors were invited to provide comments giving reasons for their decisions in scoring or agreement/disagreement with assigned effectiveness categories. These comments were provided to all assessors in subsequent survey rounds to help inform their responses.

Table 4: Categorization of farm management actions based on median values of benefits, harms and certainty scores from assessment (i.e. on a combination of the size of benefits and harms and the confidence of assessors in these effects)

Categories	Benefits score	Harms score	Certainty score
Beneficial	≥ 60	< 20	≥ 60
Likely to be beneficial	≥ 60	< 20	40 – 60
OR	40 – 60	< 20	≥ 40
Trade-offs between benefits & harms	≥ 40	≥ 20	≥ 40
Unknown effectiveness	Any score	Any score	< 40
Unlikely to be beneficial	< 40	< 20	40 – 60
Likely to be ineffective or harmful	< 40	Any score	≥ 60
OR	< 40	≥ 20	≥ 40

In survey round 1, 7 – 10 assessors scored each case. In survey round 2, 5 – 8 assessors indicated whether they agreed with the effectiveness category to which each case was assigned. There was substantial disagreement with the effectiveness category for 55 cases. “Substantial disagreement” was defined as ≥30% of the responding assessors disagreeing with the assigned category. Thus, a third survey round was conducted for these cases (indicated in Table 6 in the Appendix) and effectiveness categories assigned based on the new median scores.

3 Summary of the assessment results

The complete results of the Specialist Judgement assessment of each farm management action's effect on each target biodiversity group is available in Table 6 of the Appendix (Section 7). Of the 473 cases (i.e. management actions × biodiversity groups) assessed, 177 were categorized as "Beneficial" or "Likely to be beneficial" and 268 as "Unlikely to be beneficial" or "Likely to be ineffective or harmful" (Table 5). This suggests that many of the farm management actions prioritised for inclusion in the biodiversity tool may only benefit certain biodiversity groups, or that there is currently limited scientific knowledge to support an expectation of benefits from certain actions to particular biodiversity groups in NZ.

3.1 Effectiveness of actions across management areas and biodiversity groups

Each of the farm management actions in the assessment fits within one of the three farm management areas included in the prototype tool: "Production areas" (i.e. in the crops, vineyard, orchards or grassland), "Small non-production areas" (e.g. marginal non-production areas, field/paddock margins, woody areas, farm buildings and water courses or bodies) and "Large non-production areas" of mainly natural habitat (Table 2). Each target biodiversity group assessed was expected to benefit from multiple management actions, though these actions were often focused within a particular management area on the farm (Table 5). Most actions expected to benefit native plants and birds occur in Large non-production areas, while most actions expected to benefit genetic diversity of farm products ("Livestock, crop & variety") occur in Production areas. Actions across all management areas were expected to benefit soil life and beneficial insects. Most actions expected to benefit native aquatic animals occur in Small non-production areas, which is the management area that includes actions associated with waterways. Given that research overseas has found many examples of enhanced plant and bird diversity resulting from some of these actions in Production areas[9], more research may be needed to determine if the native flora and fauna of NZ show similar trends.

Of the 43 management actions assessed, 33 were expected to benefit "Overall biodiversity" (i.e. all species occurring in the production landscape; Table 5). The number of actions expected to benefit each ecological biodiversity group ranged from six for native grassland plants to 31 for soil life. This suggests that farmers may have fewer choices of actions to implement if they want to enhance certain biodiversity groups compared to others. These results may also help inform priorities for future tool developments – for example, if stakeholders want to include a broad range of recommended actions expected to enhance biodiversity of each of the prioritised groups, then the next step could be to add actions targeted at native grassland and wetland plants, wetland birds and native birds of open habitats.

Table 5: Summary of effectiveness of farm management actions in enhancing target biodiversity groups across farm management areas

Biodiversity group	Management area	Number of farm management actions per effectiveness category					
		Beneficial	Likely to be beneficial	Trade-offs between benefits and harms	Unknown effectiveness	Unlikely to be beneficial	Likely to be ineffective or harmful
Overall biodiversity	Production areas	1	5	1	3	3	0
	Small non-production areas	3	7	0	0	1	1
	Large non-production areas	14	3	0	1	0	0
Native bush plants	Production areas	0	0	0	0	10	3
	Small non-production areas	0	2	0	0	3	7
	Large non-production areas	8	1	0	0	5	4
Native wetland and aquatic plants	Production areas	0	1	0	1	9	2
	Small non-production areas	1	3	0	0	4	4
	Large non-production areas	4	1	0	0	12	1
Native grassland plants	Production areas	0	0	0	0	10	3
	Small non-production areas	0	1	0	0	6	5
	Large non-production areas	4	1	0	1	12	0
Native forest birds	Production areas	0	0	0	1	9	3
	Small non-production areas	0	3	0	0	5	4
	Large non-production areas	7	3	0	0	6	2

Wetland birds	Production areas	0	0	0	1	11	1
	Small non-production areas	2	2	0	0	6	2
	Large non-production areas	4	2	0	0	10	2
Native birds of open habitats	Production areas	0	1	0	1	8	3
	Small non-production areas	0	3	0	1	6	2
	Large non-production areas	0	6	0	5	7	0
Soil life	Production areas	3	5	2	2	0	1
	Small non-production areas	1	6	0	0	5	0
	Large non-production areas	7	9	0	0	2	0
Beneficial insects	Production areas	3	4	1	1	3	1
	Small non-production areas	2	6	0	0	4	0
	Large non-production areas	6	9	1	0	1	1
Native aquatic animals	Production areas	0	2	0	3	6	2
	Small non-production areas	5	0	0	0	4	3
	Large non-production areas	3	0	0	2	11	2
Livestock, crop and variety	Production areas	3	6	0	0	4	0
	Small non-production areas	0	4	0	0	7	1
	Large non-production areas	0	0	0	0	17	1
	Total	81	96	5	23	207	61

3.2 How many biodiversity groups benefit?

The number of biodiversity groups expected to benefit from each management action ranged from one to nine of the 11 target biodiversity groups assessed (where benefit is considered as an Effectiveness Category of “Beneficial” or “Likely to be beneficial”; Figure 1). Approximately half of the management actions assessed are expected to benefit five or more of the target biodiversity groups, suggesting that, on average, there is good alignment of the prioritised management actions for inclusion in the prototype tool with the biodiversity groups of greatest interest to stakeholders.

The action expected to benefit the greatest number of biodiversity groups is “Control introduced herbivores” (#42); other actions expected to benefit more than five biodiversity groups are “Small forest on farm” (#18), “Waterway buffer zones” (#24), “Natural wetland” (#30), “Formal protection – wetland” (#31), “Livestock exclusion – wetland” (#32) and “Control mammal predators” (#41; see Table 2 for complete action descriptions). Actions expected to benefit a single biodiversity group are “More than one livestock” (#2), “Practice cultural controls” (#6), “Limited pesticide use” (#7), “Selective pesticide use” (#8), “Tillage methods” (#10) and “Trees on production land” (#17).

These results indicate that farmers with resources to implement only some of the management actions listed here may need to consider trade-offs in which biodiversity groups they most want to enhance, particularly if they have limited scope to implement actions in Small and Large non-production areas given their landscape context (e.g. no waterways or natural habitats currently located on or near their property). Future research into actions expected to benefit few biodiversity groups would be particularly useful to confirm the results from this Specialist Judgement assessment or improve the state of knowledge about the potential for broader benefits of these actions to biodiversity.

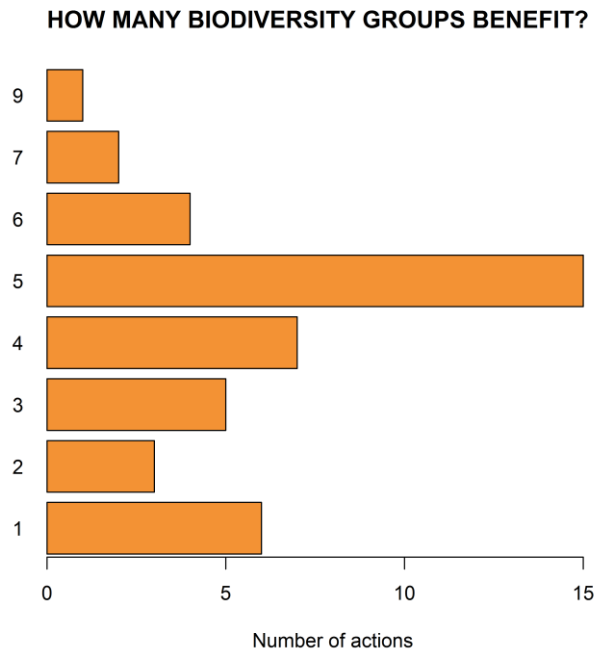


Figure 1: Individual actions benefit 1 – 9 biodiversity groups

3.3 Actions with unknown effectiveness

Across the entire assessment, 23 cases were categorized as “Unknown effectiveness” (Table 5), suggesting that the effects of these management actions on these particular biodiversity groups should be of high priority in future research. Some common themes emerged from this subset of cases. The effectiveness of several actions was categorized as unknown for overall biodiversity, native birds of open habitats and native aquatic animals, and the effects of certain actions on several biodiversity groups were categorized as unknown. For example, the effects of “Limited pesticide use” (#7; see Table 2 for complete action description) were categorized as unknown for overall biodiversity and all three bird biodiversity groups. The effects of other agricultural pest management approaches (#6 and #8), tillage methods (#10) and weed control in natural habitats (#29, #33 and #37) were categorized as unknown for several biodiversity groups. The effects of management of native bush habitats (#35 – 39) on flora and fauna of open habitats were also often categorized as unknown.

3.4 Variation in assessor scores

Variation in scores of benefits, harms and certainty was generally high – 429 of the 473 cases assessed had a range of 70 for at least one of the three scores (where the scoring scale was 0 – 100; see Table 6 in the Appendix). Benefits scores varied greatly (range ≥70) in 215 cases

and harms scores in 77 cases (21 of these cases had high variation in both benefits and harms scores). Variation in assessor certainty over their scores may in part be due to our request of assessors to evaluate all cases rather than solely those management actions and biodiversity groups where they have particular expertise. Overall, there is some evidence that assessors with greater certainty tended to give higher benefits ($r = 0.33$, $df = 3594$, $p < 0.0001$) and harms ($r = 0.05$, $df = 3546$, $p = 0.003$) scores. Further evaluation is needed to determine if benefits/harms scoring varied with certainty in scores on a case-by-case basis, particularly for the cases rescored in the third round of the assessment in which assessors were able to take the panel's scores and comments from previous rounds into consideration.

High variation in expected benefits and harms of management actions to target biodiversity groups might also suggest the potential for variation in outcomes of undertaking these actions due to variation in context (e.g. industry sector, NZ region, landscape). Cases with particularly high variation in expected benefits/harms may thus be priorities for future research to determine both the average outcome and the context-dependency of any biodiversity benefits.

4 Considerations for future assessments

This Specialist Judgement assessment process was adapted from the process used by Conservation Evidence to assess the effectiveness of management interventions on conservation outcomes via an evaluation of synopses of available evidence from the literature. The assessment was conducted on farm management actions prioritised for inclusion in the prototype biodiversity tool, which in several cases differ in scope from interventions considered appropriate for Conservation Evidence (e.g. actions that do not represent an active intervention that can be tested in a randomised, replicated experiment, such as presence of natural habitats). This background structure and motivation for the assessment have led to several learnings that can inform future assessments to support environmental decision-making and suggest avenues for further research. Comments from the assessment panel were particularly helpful to informing these reflections and are included as footnotes below.

4.1 Logistics of the assessment process

The need for a complete assessment for the prototype tool's content within the timeline of this research programme led to a substantial amount of work asked of assessors (ca. 7 – 12 hrs volunteered) in a short timeframe (6 weeks total). This was a much faster turnaround on a longer list of cases to be assessed than is typically conducted in an assessment by the Conservation Evidence research team. Furthermore, the short timeline and smaller pool of experts from which to draw (New Zealand researchers vs. a global pool) led to assessors being asked to evaluate effects on biodiversity groups outside their areas of expertise. Thus, future assessments should certainly consider a shorter length of assessment and more accurate estimation of the time required to complete the assessment when inviting assessors to participate. Future assessments might also consider a narrower focus for each assessor (e.g., only biodiversity groups within their specialty) and wider pacing of tasks with greater flexibility in deadlines for completion to accommodate busy times of year for each assessor.

4.2 Refining actions

Certain farm management actions included in this assessment were highlighted by assessors as needing further revision. The language of some actions was noted as requiring further revision to relate to the NZ context, which may be addressed in part by incorporating feedback from end-users testing the prototype tool.

Some actions require refinement to more accurately assess their effects on particular biodiversity groups. The specificity of actions assessed was quite variable, with some being very focused and others rather vague or at a more general scale. For example, the effect of controlling weeds in natural habitats (#29, #33 and #37; see Table 2 for complete action

descriptions) is currently difficult to assess because it includes all potential control methods.[a] Herbicide use in particular, especially in or near wetlands, can have greater potential for harm to various biodiversity groups than other methods of weed control. A similar difficulty arises when assessing any other management actions that include more than one management technique or for which the effect could vary depending on the agricultural context (e.g. farm sector and crop or livestock type) or landscape context (e.g. presence of waterways influences the effect of natural habitat management on aquatic flora and fauna).[b]

4.3 Categorization of effectiveness

The effectiveness of each farm management action in enhancing biodiversity of the target group was placed into one of six categories based on score thresholds used by Conservation Evidence (Table 4), which have been adapted from the *Clinical Evidence Handbook*.[10] The intention of the categories is to distinguish the potential net benefits of a management action ("beneficial" vs. "not beneficial/ineffective") from the certainty of assessors in the outcome ("likely" vs. "unlikely"). The category thresholds of 20, 40 and 60 were established in previous expert assessments conducted by Conservation Evidence researchers and were used in the Specialist Judgement assessment to provide continuity with the Conservation Evidence approach and the CFT Biodiversity module.

Three themes emerged from assessor feedback on the assignment of effectiveness categories:

Scoring approach vs. direct assignment of categories: Unlike the approach used to develop the Gaia Biodiversity Yardstick, where a panel of experts directly assigned categories of benefit to each management action to use in scoring the online tool, we applied the Conservation Evidence assessment approach of scoring three aspects of each case. We selected this approach because our aim for the assessment was twofold – (1) to acquire specialist input that would inform the scoring within a farm biodiversity assessment tool and (2) to gather general knowledge about the potential benefits of and knowledge gaps in farm management effects on biodiversity in NZ's production landscape. This scoring approach allows researchers, policymakers and managers to distinguish, for example, whether an expectation of low effectiveness is due to low benefits, high harm or high uncertainty. Management actions that are predicted to have high benefits but also have high uncertainty of whether those benefits will be realised could thus be prioritised for further research or recognised as being appropriate only in a specific context.

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[a] *"Mixing mechanical chemical and grazing methods of weed control is not easy to interpret."*

[b] *"I had some trouble with questions where the benefit/harm would differ depending on the agricultural/crop context, and where more than one management technique was listed because each could have a different outcome…"*

"I have continued to put low benefit and harm scores for questions about aquatic animals in forest, grassland and scrub areas on farms. While there can certainly be aquatic habitats in forest matrices, given there are other questions specifically about waterways I have interpreted this question as forests grassland and scrub not generally containing aquatic animals. I give 5 % benefit scores to acknowledge there may be the occasional aquatic species in these habitats."

Though the scoring approach used here has provided valuable insight into, e.g., the high variation among specialists in perspectives on farm management effects on biodiversity, the assessors highlighted potential drawbacks to using this approach on its own for certain end-uses, such as biodiversity tool scoring. For example, if the tool included negative scores for an action that were harmful to a particular biodiversity group, farmers and growers might be dissuaded from using the tool or hesitant to consider implementing an action that was beneficial to other biodiversity groups. A hybrid approach might thus be useful to consider in future assessments where effectiveness categories assigned from scoring are blended with specialist-recommended categories (as several assessors indicated in their comments on the assessment scoresheets[c]), possibly in a workshop that brings all specialists together after the three scoring rounds have been completed.

Category definitions: The category "Likely to be ineffective or harmful" currently captures management actions where there is high certainty of low benefit or medium certainty of low benefit and medium-to-high harm. Distinguishing lack of benefit from likelihood of harm would be valuable in future assessments, as well as remove a particular point of contention for the assessment panel when determining their agreement or disagreement with the assigned effectiveness categories.[d]

Score threshold for "beneficial" actions: The appropriate score threshold to indicate whether a management action is beneficial might depend on both the information source used to obtain scores (e.g., evaluation of evidence from the literature vs. specialist judgement) and the proposed end-use of the effectiveness categories (e.g., scoring an assessment tool, making policy recommendations or highlighting research priorities). For example, as one assessor indicated, "If 30% of bird species would benefit from an action, I'd give that a benefit score of 30. To me, this is a big benefit…"[e] Thus, scoring thresholds could be revised in future assessments, either based on the scoring distribution, discussion with the assessment panel or discussion with relevant stakeholders when the assessment output is slated for a specific use (e.g. environmental reporting, sustainability assessment).

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[c] *"I would give more weight to the categories the experts give in the comments, in cases when calculated scores result in a category perceived as incorrect"*

[d] *"I have a problem with the last category, which lumps ineffectiveness with harm. Many activities are ineffective but pose no harm to the biodiversity group in question."*

"I am not sure if the two categories 'Likely to be ineffective or harmful' and 'Unlikely to be beneficial' are really any different"

[e] *"Personally I didn't like the conservationevidence.com categorisations, and I think from the comments of others that this was a source of contention for other evaluators. If 30% of bird species would benefit from an action, I'd give that a benefit score of 30. To me, this is a big benefit, but according to the rating system, at best it could be uncertain, but at worst it could be 'ineffective or harmful'... I think that's the reason so many people are recommending other categories or saying they can't see why something is harmful - it's because the end categories don't seem to match what people have in mind for their numeric scores. In particular, it's possible to have zero harm score and still be categorized as ineffective or harmful, which sounds like a dangerous message to give to landowners."*

4.4 Limitations of categorized data

In addition to the effectiveness categories themselves, there are certain limitations and the potential for introducing artefacts of binning when converting continuous data to categories. For example, the number of categories imposed and the criteria for categorisation can affect the outcome of aggregating scores from categorical data (such as when scoring an assessment tool that draws on categorical information) in ways that are still poorly understood and deserve further investigation. Future work using this assessment structure to inform scoring of sustainability assessment tools should consider possible approaches that draw directly from the median scores, possibly via algorithms or regression models. Another consideration for future work could be how to incorporate the variation in assessment scores into environmental decision-making, sustainability assessment and prioritising research streams.

4.5 Other considerations

Breadth of taxa within biodiversity groups: Assessment of particular biodiversity groups becomes more challenging as the breadth of taxa within the group increases. In the case of the current assessment, this is particularly true for overall biodiversity[f], which includes all introduced as well as native taxa found in the NZ production landscape. Overall biodiversity was assessed as a separate group rather than averaging across the scores of the 10 ecological biodiversity groups because much of this production landscape biodiversity is not captured by the focused ecological groups.

Baseline of comparison: Unlike the Conservation Evidence approach when evaluating evidence from the literature, we did not provide any supporting information about the farm management actions to the assessment panel (i.e., no definition or synopsis). Thus, the baseline for comparison of the effect of the management actions on biodiversity was implied and, in many cases, could be unclear. For example, management actions for agricultural pest management approaches (#4, #6 – 8; see Table 2 for complete action description) could be compared to conventional practices or no-spray practices. The baseline of comparison can be particularly important when management actions have nonlinear effects (e.g. the effects of no tillage vs. reduced tillage vs. conventional tillage can vary for different biodiversity groups or other outcomes depending on which pairwise comparison is made[11]).

[f] *"I find 'overall biodiversity' difficult to assess, as this would involve integrating across the different trade-offs. I'm not sure that taking an average of scores would be valid either."*

5 Next steps

The results from this Specialist Judgement assessment will be used to inform the scoring of the prototype biodiversity tool (Step C2 in Box 1). The effectiveness categories to which each farm management action was assigned for each biodiversity group will be translated into a score of expected benefit for that biodiversity group and incorporated into the code for the prototype tool.[12] The online prototype tool[13] can then be tested with end-users (Step C3 in Box 1) and their feedback used to improve its communication and ease of use (Step C4 in Box 1).

The lessons learnt from the Specialist Judgement assessment will be used to inform future assessments and research programmes. Future assessments include an evaluation of available scientific evidence for the effectiveness of a subset of the prioritised farm management actions (Step B2 in Box 1), which will also be incorporated into the scoring of the prototype biodiversity tool. Future research programmes could expand the use of the assessment process to support decision-making and policy development over a wide range of environmental challenges, as well as address the research questions highlighted in Sections 3 and 3.2.

This work and the future research directions that it suggests have potential for great value to a variety of end-users, such as central and local government, land managers in government agencies, non-governmental organisations, industry bodies, farmers and growers, researchers, funding bodies and community groups. As one assessor indicated, “Having something visual and responsive like this [biodiversity tool] would, I think, be useful for farmers to enable them to see what impact they could have on biodiversity by changes or enhancements to current practice. Certainly, we talk to a number of farmers, and indeed processors, who are interested in being able to quantify, to some extent, the impact of any changes they make or encourage on-farm which are perceived to be enhancing biodiversity.”

6 References

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7 Appendix: Score summaries and assigned effectiveness categories

Table 6: Final score summaries and assigned categories of effectiveness of farm management actions in enhancing target biodiversity groups

Index	Action description	Biodiversity group	Assessment panel scores (median and range)			Effectiveness Category
			Benefits	Harms	Certainty	
1	Grow more than one type or variety of crop	Overall biodiversity	40 (10 - 100)	20 (0 - 95)	65 (20 - 95)	Trade-offs between benefits and harms
		Native bush plants	0 (0 - 20)	5 (0 - 60)	47.5 (30 - 60)	Unlikely to be beneficial*
		Native wetland and aquatic plants	0 (0 - 20)	7.5 (0 - 60)	47.5 (30 - 60)	Unlikely to be beneficial*
		Native grassland plants	0 (0 - 20)	7.5 (0 - 60)	47.5 (30 - 60)	Unlikely to be beneficial*
		Native forest birds	0 (0 - 20)	0 (0 - 60)	45 (30 - 90)	Unlikely to be beneficial*
		Wetland birds	0 (0 - 20)	10 (0 - 60)	45 (30 - 60)	Unlikely to be beneficial*
		Native birds of open habitats	20 (5 - 50)	5 (0 - 60)	60 (20 - 75)	Likely to be ineffective or harmful*
		Soil life	50 (10 - 90)	25 (0 - 70)	40 (30 - 90)	Trade-offs between benefits and harms
		Beneficial insects	55 (5 - 90)	6 (0 - 60)	60 (50 - 90)	Likely to be beneficial
		Native aquatic animals	0 (0 - 40)	20 (0 - 100)	30 (10 - 100)	Unknown effectiveness
		Livestock, crop and variety	75 (10 - 100)	10 (0 - 40)	70 (10 - 100)	Beneficial
2	Raise more than one species or breed of livestock	Overall biodiversity	20 (10 - 30)	10 (0 - 95)	50 (10 - 95)	Unlikely to be beneficial
		Native bush plants	0 (0 - 20)	10 (0 - 100)	50 (10 - 95)	Unlikely to be beneficial
		Native wetland and aquatic plants	0 (0 - 20)	10 (0 - 95)	30 (10 - 95)	Unknown effectiveness
		Native grassland plants	0 (0 - 20)	10 (0 - 90)	60 (10 - 95)	Likely to be ineffective or harmful
		Native forest birds	0 (0 - 20)	0 (0 - 100)	55 (5 - 100)	Unlikely to be beneficial
		Wetland birds	0 (0 - 20)	0 (0 - 35)	50 (30 - 75)	Unlikely to be beneficial*
		Native birds of open habitats	20 (0 - 40)	10 (0 - 95)	40 (10 - 90)	Unlikely to be beneficial
		Soil life	20 (0 - 50)	15 (0 - 50)	37.5 (20 -	Unknown

					90)	effectiveness*
		Beneficial insects	10 (0 - 50)	15 (0 - 60)	55 (20 - 90)	Unlikely to be beneficial
		Native aquatic animals	5 (0 - 40)	40 (0 - 95)	50 (10 - 95)	Likely to be ineffective or harmful
		Livestock, crop and variety	80 (10 - 100)	10 (0 - 90)	72.5 (10 - 100)	Beneficial
3	Grow a mixture of species (mixed grasses or grasses and legumes/field flowers) in a paddock	Overall biodiversity	40 (20 - 90)	10 (0 - 90)	70 (10 - 90)	Likely to be beneficial
		Native bush plants	0 (0 - 10)	0 (0 - 100)	60 (20 - 95)	Likely to be ineffective or harmful
		Native wetland and aquatic plants	0 (0 - 10)	10 (0 - 95)	60 (20 - 95)	Likely to be ineffective or harmful
		Native grassland plants	20 (0 - 60)	20 (0 - 90)	70 (20 - 85)	Likely to be ineffective or harmful
		Native forest birds	5 (0 - 10)	0 (0 - 100)	62.5 (10 - 100)	Likely to be ineffective or harmful
		Wetland birds	10 (0 - 50)	10 (0 - 90)	50 (10 - 95)	Unlikely to be beneficial
		Native birds of open habitats	50 (10 - 70)	10 (0 - 80)	50 (30 - 90)	Likely to be beneficial*
		Soil life	67.5 (30 - 90)	17.5 (0 - 60)	45 (30 - 90)	Likely to be beneficial
		Beneficial insects	65 (20 - 90)	15 (0 - 60)	70 (30 - 90)	Beneficial
		Native aquatic animals	10 (0 - 50)	10 (0 - 95)	50 (10 - 95)	Unlikely to be beneficial
		Livestock, crop and variety	80 (20 - 100)	0 (0 - 80)	72.5 (10 - 100)	Beneficial*
4	Use biological control methods to manage agricultural pests	Overall biodiversity	55 (20 - 100)	10 (0 - 30)	50 (20 - 90)	Likely to be beneficial
		Native bush plants	0 (0 - 70)	0 (0 - 10)	70 (0 - 95)	Likely to be ineffective or harmful
		Native wetland and aquatic plants	0 (0 - 80)	0 (0 - 10)	70 (0 - 95)	Likely to be ineffective or harmful
		Native grassland plants	10 (0 - 80)	0 (0 - 10)	60 (0 - 90)	Likely to be ineffective or harmful
		Native forest birds	0 (0 - 80)	0 (0 - 10)	55 (0 - 95)	Unlikely to be beneficial
		Wetland birds	5 (0 - 80)	0 (0 - 10)	55 (0 - 95)	Unlikely to be beneficial

		Native birds of open habitats	20 (0 - 80)	0 (0 - 10)	60 (20 - 90)	Likely to be ineffective or harmful
		Soil life	50 (10 - 80)	7.5 (0 - 30)	45 (20 - 90)	Likely to be beneficial
		Beneficial insects	70 (0 - 100)	10 (0 - 30)	62.5 (30 - 90)	Beneficial
		Native aquatic animals	10 (0 - 90)	0 (0 - 10)	70 (10 - 100)	Likely to be ineffective or harmful
		Livestock, crop and variety	55 (0 - 90)	5 (0 - 20)	50 (5 - 90)	Likely to be beneficial
5	Provide semi-natural habitats near crops so beneficial insects can help with pest control, such as beetle banks	Overall biodiversity	65 (30 - 100)	10 (0 - 10)	67.5 (20 - 100)	Beneficial
		Native bush plants	20 (0 - 100)	0 (0 - 10)	40 (10 - 95)	Unlikely to be beneficial
		Native wetland and aquatic plants	10 (0 - 50)	0 (0 - 10)	50 (10 - 95)	Unlikely to be beneficial
		Native grassland plants	20 (10 - 100)	0 (0 - 20)	40 (10 - 95)	Unlikely to be beneficial
		Native forest birds	25 (0 - 100)	2.5 (0 - 30)	50 (10 - 95)	Unlikely to be beneficial
		Wetland birds	10 (0 - 75)	2.5 (0 - 10)	50 (10 - 95)	Unlikely to be beneficial
		Native birds of open habitats	30 (10 - 100)	10 (0 - 10)	50 (20 - 100)	Unlikely to be beneficial
		Soil life	60 (30 - 100)	5 (0 - 30)	50 (30 - 100)	Likely to be beneficial
		Beneficial insects	80 (30 - 100)	7.5 (0 - 30)	70 (20 - 100)	Beneficial
		Native aquatic animals	20 (0 - 75)	0 (0 - 20)	45 (10 - 100)	Unlikely to be beneficial
		Livestock, crop and variety	20 (0 - 80)	2.5 (0 - 20)	45 (10 - 80)	Unlikely to be beneficial
6	Practice cultural controls, such as mechanical/physical control of weeds and crop disease prevention (such as selecting resistant crop varieties, planning rotations, avoid leaving crop residues in which diseases or pests could develop) to manage agricultural pests	Overall biodiversity	25 (0 - 60)	10 (0 - 50)	50 (10 - 90)	Unlikely to be beneficial
		Native bush plants	0 (0 - 10)	0 (0 - 20)	40 (0 - 95)	Unlikely to be beneficial
		Native wetland and aquatic plants	0 (0 - 30)	0 (0 - 20)	40 (0 - 95)	Unlikely to be beneficial
		Native grassland plants	0 (0 - 20)	0 (0 - 20)	40 (0 - 95)	Unlikely to be beneficial
		Native forest birds	0 (0 - 20)	5 (0 - 20)	45 (0 - 95)	Unlikely to be beneficial
		Wetland birds	5 (0 - 50)	10 (0 - 20)	40 (0 - 95)	Unlikely to be beneficial
		Native birds of open habitats	20 (0 - 30)	15 (0 - 30)	40 (10 - 90)	Unlikely to be beneficial
		Soil life	30 (0 - 50)	20 (5 - 80)	35 (10 -	Unknown

					90)	effectiveness
		Beneficial insects	40 (0 - 70)	15 (0 - 70)	50 (10 - 90)	Likely to be beneficial
		Native aquatic animals	5 (0 - 50)	10 (0 - 20)	30 (10 - 95)	Unknown effectiveness
		Livestock, crop and variety	20 (0 - 90)	5 (0 - 50)	50 (5 - 70)	Unlikely to be beneficial
7	Use pesticides (including herbicides) only when and where they are needed as determined through monitoring of pests or crop damage	Overall biodiversity	20 (10 - 70)	10 (0 - 50)	30 (10 - 75)	Unknown effectiveness
		Native bush plants	10 (0 - 30)	10 (0 - 20)	40 (0 - 95)	Unlikely to be beneficial
		Native wetland and aquatic plants	10 (0 - 50)	10 (0 - 50)	40 (0 - 95)	Unlikely to be beneficial
		Native grassland plants	20 (0 - 50)	10 (0 - 50)	50 (0 - 70)	Unlikely to be beneficial
		Native forest birds	5 (0 - 40)	10 (0 - 40)	35 (0 - 95)	Unknown effectiveness
		Wetland birds	10 (0 - 40)	10 (0 - 40)	35 (0 - 95)	Unknown effectiveness
		Native birds of open habitats	27.5 (0 - 75)	10 (0 - 60)	35 (10 - 90)	Unknown effectiveness
		Soil life	40 (0 - 75)	20 (2 - 50)	45 (10 - 75)	Trade-offs between benefits and harms
		Beneficial insects	42.5 (0 - 85)	22.5 (0 - 60)	50 (30 - 75)	Trade-offs between benefits and harms
		Native aquatic animals	5 (0 - 85)	10 (0 - 50)	50 (3 - 95)	Unlikely to be beneficial
		Livestock, crop and variety	50 (0 - 90)	0 (0 - 10)	50 (2 - 80)	Likely to be beneficial
8	Use only selective pesticides targeted to the specific pest or weed, and which are compatible with biological control	Overall biodiversity	20 (0 - 90)	10 (0 - 90)	30 (10 - 90)	Unknown effectiveness
		Native bush plants	0 (0 - 20)	10 (0 - 10)	50 (0 - 95)	Unlikely to be beneficial
		Native wetland and aquatic plants	5 (0 - 60)	10 (0 - 10)	50 (0 - 95)	Unlikely to be beneficial
		Native grassland plants	10 (0 - 80)	10 (0 - 20)	50 (0 - 80)	Unlikely to be beneficial
		Native forest birds	0 (0 - 40)	10 (0 - 20)	45 (0 - 95)	Unlikely to be beneficial
		Wetland birds	0 (0 - 70)	10 (0 - 30)	45 (0 - 95)	Unlikely to be beneficial
		Native birds of open habitats	22.5 (0 - 90)	10 (0 - 50)	50 (10 - 90)	Unlikely to be beneficial
		Soil life	20 (0 - 70)	30 (2 - 80)	50 (20 - 90)	Likely to be ineffective or harmful*
		Beneficial insects	20 (0 - 90)	20 (0 - 80)	50 (10 - 90)	Likely to be ineffective or harmful*

		Native aquatic animals	3 (0 - 80)	10 (0 - 50)	40 (3 - 95)	Unlikely to be beneficial
		Livestock, crop and variety	40 (0 - 90)	5 (0 - 10)	50 (2 - 80)	Likely to be beneficial
9	Minimise bare ground, such as by planting cover crops in arable fields, maintaining ground cover in orchards and vineyards, or maintaining vegetation cover in paddocks	Overall biodiversity	45 (20 - 100)	10 (0 - 90)	70 (10 - 100)	Likely to be beneficial
		Native bush plants	0 (0 - 10)	0 (0 - 100)	50 (20 - 95)	Unlikely to be beneficial
		Native wetland and aquatic plants	10 (0 - 40)	0 (0 - 95)	50 (10 - 95)	Unlikely to be beneficial
		Native grassland plants	10 (0 - 30)	5 (0 - 80)	50 (10 - 80)	Unlikely to be beneficial
		Native forest birds	0 (0 - 10)	0 (0 - 100)	55 (10 - 100)	Unlikely to be beneficial
		Wetland birds	10 (0 - 50)	0 (0 - 90)	55 (10 - 95)	Unlikely to be beneficial
		Native birds of open habitats	35 (10 - 60)	5 (0 - 80)	45 (10 - 90)	Unlikely to be beneficial
		Soil life	50 (30 - 100)	0 (0 - 60)	65 (30 - 90)	Likely to be beneficial
		Beneficial insects	55 (20 - 100)	5 (0 - 60)	50 (20 - 90)	Likely to be beneficial
		Native aquatic animals	50 (0 - 100)	0 (0 - 95)	55 (10 - 100)	Likely to be beneficial
		Livestock, crop and variety	50 (10 - 100)	0 (0 - 50)	70 (5 - 100)	Likely to be beneficial
10	Use shallow tillage or no tillage as the main method of cultivation	Overall biodiversity	30 (10 - 100)	0 (0 - 90)	30 (5 - 90)	Unknown effectiveness
		Native bush plants	0 (0 - 10)	0 (0 - 100)	50 (5 - 95)	Unlikely to be beneficial
		Native wetland and aquatic plants	5 (0 - 40)	0 (0 - 95)	50 (5 - 95)	Unlikely to be beneficial
		Native grassland plants	10 (0 - 30)	0 (0 - 80)	50 (5 - 80)	Unlikely to be beneficial
		Native forest birds	0 (0 - 10)	0 (0 - 10)	50 (40 - 100)	Unlikely to be beneficial*
		Wetland birds	10 (0 - 50)	0 (0 - 90)	50 (5 - 95)	Unlikely to be beneficial
		Native birds of open habitats	25 (10 - 60)	15 (0 - 80)	40 (5 - 90)	Unlikely to be beneficial
		Soil life	60 (50 - 100)	0 (0 - 50)	70 (30 - 90)	Beneficial*
		Beneficial insects	25 (10 - 80)	15 (0 - 60)	35 (10 - 90)	Unknown effectiveness
		Native aquatic animals	30 (0 - 100)	0 (0 - 95)	30 (5 - 100)	Unknown effectiveness
		Livestock, crop and variety	30 (0 - 90)	5 (0 - 50)	40 (5 - 75)	Unlikely to be beneficial

11	Minimise soil compaction and pugging by carefully managing machinery and livestock	Overall biodiversity	45 (15 - 100)	0 (0 - 90)	45 (5 - 90)	Likely to be beneficial
		Native bush plants	0 (0 - 10)	0 (0 - 100)	50 (5 - 95)	Unlikely to be beneficial
		Native wetland and aquatic plants	10 (0 - 30)	0 (0 - 95)	50 (5 - 95)	Unlikely to be beneficial
		Native grassland plants	10 (0 - 20)	0 (0 - 80)	50 (5 - 95)	Unlikely to be beneficial
		Native forest birds	0 (0 - 10)	0 (0 - 10)	65 (40 - 100)	Likely to be ineffective or harmful*
		Wetland birds	10 (0 - 20)	0 (0 - 20)	55 (40 - 70)	Unlikely to be beneficial*
		Native birds of open habitats	20 (5 - 65)	0 (0 - 80)	55 (5 - 95)	Unlikely to be beneficial
		Soil life	60 (30 - 100)	0 (0 - 60)	70 (20 - 100)	Beneficial
		Beneficial insects	30 (10 - 80)	0 (0 - 60)	50 (10 - 95)	Unlikely to be beneficial
		Native aquatic animals	20 (0 - 80)	0 (0 - 95)	45 (5 - 95)	Unlikely to be beneficial
		Livestock, crop and variety	45 (5 - 90)	0 (0 - 50)	50 (5 - 95)	Likely to be beneficial
12	Maintain or increase soil organic matter, such as by leaving straw or crop residues, growing green manure crops, or adding compost or organic mulches	Overall biodiversity	40 (20 - 100)	0 (0 - 90)	55 (10 - 90)	Likely to be beneficial
		Native bush plants	0 (0 - 0)	0 (0 - 0)	80 (40 - 95)	Likely to be ineffective or harmful*
		Native wetland and aquatic plants	5 (0 - 20)	0 (0 - 95)	50 (10 - 95)	Unlikely to be beneficial
		Native grassland plants	10 (0 - 20)	0 (0 - 80)	50 (20 - 95)	Unlikely to be beneficial
		Native forest birds	0 (0 - 10)	0 (0 - 10)	70 (40 - 100)	Likely to be ineffective or harmful*
		Wetland birds	10 (0 - 20)	0 (0 - 10)	60 (40 - 95)	Likely to be ineffective or harmful*
		Native birds of open habitats	35 (30 - 60)	0 (0 - 80)	45 (20 - 95)	Unlikely to be beneficial
		Soil life	65 (30 - 100)	0 (0 - 60)	70 (20 - 100)	Beneficial
		Beneficial insects	45 (30 - 100)	0 (0 - 60)	50 (10 - 90)	Likely to be beneficial
		Native aquatic animals	20 (5 - 50)	0 (0 - 10)	47.5 (20 - 95)	Unlikely to be beneficial*
		Livestock, crop and variety	50 (15 - 90)	0 (0 - 20)	50 (5 - 90)	Likely to be beneficial
13	Add the right	Overall biodiversity	35 (10 -	0 (0 - 30)	55 (40 -	Unlikely to be

	amounts and types of fertilisers (including organic inputs), and only in response to a demand for nutrients (such as that indicated by plant or soil testing, or assessment of paddock requirements) and at appropriate timings and frequency to minimise leaching and runoff		70)		90)	beneficial*
		Native bush plants	0 (0 - 20)	0 (0 - 0)	50 (40 - 95)	Unlikely to be beneficial*
		Native wetland and aquatic plants	50 (0 - 50)	0 (0 - 0)	60 (40 - 95)	Likely to be beneficial*
		Native grassland plants	20 (0 - 30)	0 (0 - 80)	50 (10 - 95)	Unlikely to be beneficial
		Native forest birds	0 (0 - 20)	0 (0 - 100)	55 (5 - 100)	Unlikely to be beneficial
		Wetland birds	10 (0 - 50)	0 (0 - 90)	55 (5 - 95)	Unlikely to be beneficial
		Native birds of open habitats	15 (0 - 60)	0 (0 - 80)	60 (5 - 95)	Likely to be ineffective or harmful
		Soil life	40 (30 - 50)	0 (0 - 20)	55 (40 - 95)	Likely to be beneficial*
		Beneficial insects	20 (0 - 60)	5 (0 - 60)	40 (10 - 80)	Unlikely to be beneficial
		Native aquatic animals	50 (0 - 80)	0 (0 - 95)	72.5 (20 - 95)	Likely to be beneficial
		Livestock, crop and variety	20 (0 - 90)	0 (0 - 50)	50 (5 - 80)	Unlikely to be beneficial
14	Field or paddock margins or corners are left out of production, with naturally occurring plants	Overall biodiversity	45 (30 - 100)	10 (0 - 30)	50 (30 - 100)	Likely to be beneficial
		Native bush plants	15 (0 - 50)	0 (0 - 20)	50 (20 - 95)	Unlikely to be beneficial
		Native wetland and aquatic plants	20 (0 - 20)	0 (0 - 20)	40 (20 - 95)	Unlikely to be beneficial
		Native grassland plants	30 (20 - 50)	0 (0 - 70)	45 (20 - 95)	Unlikely to be beneficial
		Native forest birds	10 (0 - 20)	0 (0 - 10)	60 (10 - 95)	Likely to be ineffective or harmful
		Wetland birds	10 (0 - 50)	0 (0 - 10)	50 (10 - 95)	Unlikely to be beneficial
		Native birds of open habitats	50 (40 - 70)	0 (0 - 20)	60 (40 - 90)	Likely to be beneficial*
		Soil life	55 (20 - 100)	2.5 (0 - 10)	55 (30 - 100)	Likely to be beneficial
		Beneficial insects	50 (25 - 100)	1 (0 - 20)	60 (30 - 95)	Likely to be beneficial
		Native aquatic animals	12.5 (0 - 100)	0 (0 - 10)	40 (10 - 100)	Unlikely to be beneficial
		Livestock, crop and variety	12.5 (0 - 50)	0 (0 - 30)	45 (10 - 95)	Unlikely to be beneficial
15	Non-productive areas such as paddock boundaries are	Overall biodiversity	60 (30 - 100)	10 (0 - 20)	60 (20 - 100)	Beneficial
		Native bush plants	20 (0 - 30)	0 (0 - 40)	70 (10 - 95)	Likely to be ineffective or

	planted with flowering plants and trees to provide nectar, fruit or other food for wildlife such as pollinators and birds					harmful
		Native wetland and aquatic plants	0 (0 - 20)	0 (0 - 10)	50 (10 - 95)	Unlikely to be beneficial
		Native grassland plants	10 (0 - 20)	0 (0 - 30)	50 (10 - 95)	Unlikely to be beneficial
		Native forest birds	20 (0 - 100)	5 (0 - 30)	55 (10 - 95)	Unlikely to be beneficial
		Wetland birds	10 (0 - 50)	5 (0 - 20)	50 (10 - 95)	Unlikely to be beneficial
		Native birds of open habitats	40 (10 - 100)	5 (0 - 40)	62.5 (20 - 100)	Likely to be beneficial
		Soil life	65 (30 - 100)	2.5 (0 - 30)	55 (30 - 100)	Likely to be beneficial
		Beneficial insects	80 (50 - 100)	1 (0 - 10)	75 (50 - 100)	Beneficial
		Native aquatic animals	10 (0 - 20)	0 (0 - 10)	50 (10 - 95)	Unlikely to be beneficial
		Livestock, crop and variety	40 (0 - 50)	0 (0 - 50)	40 (10 - 80)	Likely to be beneficial
16	Shelterbelts present on farm	Overall biodiversity	30 (5 - 100)	5 (0 - 30)	50 (30 - 100)	Unlikely to be beneficial
		Native bush plants	10 (0 - 30)	2 (0 - 10)	60 (10 - 95)	Likely to be ineffective or harmful
		Native wetland and aquatic plants	0 (0 - 20)	0 (0 - 10)	50 (10 - 95)	Unlikely to be beneficial
		Native grassland plants	0 (0 - 20)	0 (0 - 20)	50 (10 - 70)	Unlikely to be beneficial
		Native forest birds	10 (0 - 100)	2.5 (0 - 20)	50 (10 - 95)	Unlikely to be beneficial
		Wetland birds	0 (0 - 10)	0 (0 - 10)	50 (10 - 95)	Unlikely to be beneficial
		Native birds of open habitats	25 (0 - 100)	7.5 (0 - 40)	50 (10 - 100)	Unlikely to be beneficial
		Soil life	50 (10 - 100)	0 (0 - 50)	40 (10 - 100)	Likely to be beneficial
		Beneficial insects	50 (5 - 100)	0 (0 - 20)	65 (10 - 100)	Likely to be beneficial
		Native aquatic animals	10 (0 - 50)	0 (0 - 10)	50 (10 - 95)	Unlikely to be beneficial
		Livestock, crop and variety	50 (10 - 100)	2.5 (0 - 50)	55 (10 - 95)	Likely to be beneficial
17	Solitary or well-spaced trees are present on or adjacent to production land	Overall biodiversity	35 (10 - 100)	0 (0 - 30)	65 (20 - 100)	Likely to be ineffective or harmful*
		Native bush plants	20 (5 - 90)	0 (0 - 0)	90 (10 - 95)	Likely to be ineffective or harmful*

		Native wetland and aquatic plants	0 (0 - 10)	0 (0 - 10)	70 (10 - 95)	Likely to be ineffective or harmful
		Native grassland plants	0 (0 - 5)	0 (0 - 10)	70 (10 - 95)	Likely to be ineffective or harmful
		Native forest birds	15 (0 - 30)	0 (0 - 10)	67.5 (40 - 95)	Likely to be ineffective or harmful*
		Wetland birds	0 (0 - 10)	0 (0 - 10)	60 (10 - 95)	Likely to be ineffective or harmful*
		Native birds of open habitats	15 (0 - 90)	0 (0 - 10)	55 (40 - 90)	Unlikely to be beneficial*
		Soil life	15 (5 - 100)	0 (0 - 10)	45 (10 - 100)	Unlikely to be beneficial
		Beneficial insects	15 (10 - 40)	0 (0 - 10)	55 (10 - 100)	Unlikely to be beneficial
		Native aquatic animals	0 (0 - 10)	0 (0 - 10)	67.5 (10 - 95)	Likely to be ineffective or harmful*
		Livestock, crop and variety	50 (0 - 100)	0 (0 - 50)	55 (10 - 95)	Likely to be beneficial
18	Small patches of native bush (<2 ha) or plantations of non-native trees present on farm	Overall biodiversity	70 (40 - 100)	5 (0 - 15)	70 (30 - 100)	Beneficial
		Native bush plants	50 (40 - 100)	5 (0 - 50)	80 (40 - 95)	Likely to be beneficial
		Native wetland and aquatic plants	5 (0 - 20)	0 (0 - 20)	50 (10 - 95)	Unlikely to be beneficial
		Native grassland plants	5 (0 - 20)	10 (0 - 75)	50 (10 - 95)	Unlikely to be beneficial
		Native forest birds	50 (20 - 100)	5 (0 - 30)	60 (50 - 95)	Likely to be beneficial*
		Wetland birds	5 (0 - 20)	5 (0 - 20)	50 (10 - 95)	Unlikely to be beneficial
		Native birds of open habitats	50.5 (10 - 100)	5 (0 - 20)	72.5 (50 - 90)	Likely to be beneficial*
		Soil life	67.5 (30 - 100)	2.5 (0 - 10)	70 (30 - 100)	Beneficial
		Beneficial insects	62.5 (50 - 100)	2.5 (0 - 40)	60 (40 - 100)	Beneficial
		Native aquatic animals	7.5 (0 - 20)	0 (0 - 10)	57.5 (20 - 95)	Unlikely to be beneficial*
		Livestock, crop and variety	40 (0 - 100)	2.5 (0 - 50)	50 (10 - 95)	Likely to be beneficial
19	Manage shelterbelts to promote biodiversity, such	Overall biodiversity	50 (10 - 100)	5 (0 - 20)	60 (30 - 100)	Likely to be beneficial
		Native bush plants	30 (10 - 100)	0 (0 - 0)	90 (30 - 95)	Likely to be ineffective or

	as avoiding spraying or pruning at low frequency					harmful*
		Native wetland and aquatic plants	0 (0 - 20)	0 (0 - 5)	60 (20 - 95)	Likely to be ineffective or harmful
		Native grassland plants	10 (0 - 20)	0 (0 - 5)	60 (20 - 95)	Likely to be ineffective or harmful
		Native forest birds	40.5 (10 - 100)	2.5 (0 - 10)	80 (40 - 95)	Likely to be beneficial*
		Wetland birds	0 (0 - 30)	0 (0 - 10)	50 (10 - 95)	Unlikely to be beneficial
		Native birds of open habitats	35.5 (10 - 100)	2.5 (0 - 30)	70 (40 - 95)	Likely to be ineffective or harmful*
		Soil life	55 (15 - 100)	0 (0 - 50)	40 (10 - 100)	Likely to be beneficial
		Beneficial insects	55 (10 - 100)	2.5 (0 - 50)	65 (10 - 100)	Likely to be beneficial
		Native aquatic animals	0 (0 - 20)	0 (0 - 10)	70 (10 - 100)	Likely to be ineffective or harmful
		Livestock, crop and variety	30 (10 - 80)	0 (0 - 0)	50 (40 - 60)	Unlikely to be beneficial*
20	Maintain a mixture of species in shelterbelts or small forest, including native woody plants	Overall biodiversity	60 (15 - 100)	5 (0 - 20)	60 (30 - 100)	Beneficial
		Native bush plants	50 (15 - 100)	2 (0 - 10)	60 (30 - 95)	Likely to be beneficial
		Native wetland and aquatic plants	0 (0 - 20)	0 (0 - 10)	60 (10 - 95)	Likely to be ineffective or harmful
		Native grassland plants	10 (0 - 20)	0 (0 - 10)	60 (10 - 95)	Likely to be ineffective or harmful
		Native forest birds	40.5 (10 - 75)	2.5 (0 - 10)	62.5 (40 - 95)	Likely to be beneficial*
		Wetland birds	0 (0 - 20)	0 (0 - 10)	55 (10 - 95)	Unlikely to be beneficial
		Native birds of open habitats	25 (0 - 100)	0 (0 - 10)	55 (20 - 100)	Unlikely to be beneficial
		Soil life	50 (15 - 100)	0 (0 - 50)	55 (15 - 100)	Likely to be beneficial
		Beneficial insects	50 (20 - 100)	0 (0 - 20)	65 (50 - 100)	Likely to be beneficial
		Native aquatic animals	10 (0 - 50)	0 (0 - 10)	60 (10 - 95)	Likely to be ineffective or harmful
		Livestock, crop and variety	22.5 (0 - 80)	2.5 (0 - 40)	50 (10 - 80)	Unlikely to be beneficial
21	Waterways	Overall biodiversity	55 (15 -	0 (0 - 20)	75 (20 -	Likely to be

	(including rivers, streams, or ponds) present on farm		100)		100)	beneficial
		Native bush plants	5 (0 - 20)	0 (0 - 5)	80 (20 - 95)	Likely to be ineffective or harmful
		Native wetland and aquatic plants	40 (10 - 100)	0 (0 - 40)	80 (20 - 95)	Likely to be beneficial
		Native grassland plants	10 (0 - 20)	0 (0 - 20)	70 (10 - 95)	Likely to be ineffective or harmful
		Native forest birds	7.5 (0 - 20)	0 (0 - 10)	70 (20 - 95)	Likely to be ineffective or harmful
		Wetland birds	72.5 (10 - 100)	0 (0 - 30)	72.5 (20 - 95)	Beneficial
		Native birds of open habitats	30 (0 - 80)	0 (0 - 20)	55 (20 - 90)	Unlikely to be beneficial
		Soil life	15 (0 - 50)	0 (0 - 10)	55 (20 - 95)	Unlikely to be beneficial
		Beneficial insects	22.5 (0 - 50)	0 (0 - 30)	55 (30 - 75)	Unlikely to be beneficial*
		Native aquatic animals	77.5 (20 - 100)	0 (0 - 50)	85 (20 - 100)	Beneficial
		Livestock, crop and variety	2.5 (0 - 100)	0 (0 - 90)	50 (20 - 95)	Unlikely to be beneficial
22	Promote a natural hydrological regime in waterways on farm, such as allowing flooding or maintaining sufficient water levels for wildlife	Overall biodiversity	50 (20 - 100)	10 (0 - 20)	60 (20 - 100)	Likely to be beneficial
		Native bush plants	5 (0 - 20)	0 (0 - 10)	40 (10 - 95)	Unlikely to be beneficial
		Native wetland and aquatic plants	50 (40 - 80)	0 (0 - 20)	60 (10 - 95)	Likely to be beneficial
		Native grassland plants	10 (0 - 10)	0 (0 - 30)	40 (10 - 95)	Unlikely to be beneficial
		Native forest birds	7.5 (0 - 10)	0 (0 - 10)	50 (10 - 95)	Unlikely to be beneficial
		Wetland birds	80 (15 - 100)	0 (0 - 30)	72.5 (20 - 95)	Beneficial
		Native birds of open habitats	25 (0 - 80)	0 (0 - 20)	45 (20 - 95)	Unlikely to be beneficial
		Soil life	35 (0 - 50)	10 (0 - 50)	40 (10 - 95)	Unlikely to be beneficial
		Beneficial insects	20 (0 - 50)	10 (0 - 70)	45 (20 - 75)	Unlikely to be beneficial
		Native aquatic animals	80 (20 - 100)	0 (0 - 20)	72.5 (20 - 100)	Beneficial
		Livestock, crop and variety	2.5 (0 - 50)	7.5 (0 - 50)	55 (10 - 80)	Unlikely to be beneficial
23	Have culverts or bridges over	Overall biodiversity	40 (10 - 80)	0 (0 - 10)	60 (20 - 100)	Likely to be beneficial

	streams that allow fish passage in waterways on farm	Native bush plants	0 (0 - 5)	0 (0 - 5)	80 (20 - 100)	Likely to be ineffective or harmful
		Native wetland and aquatic plants	10 (0 - 60)	0 (0 - 5)	70 (20 - 100)	Likely to be ineffective or harmful
		Native grassland plants	0 (0 - 5)	0 (0 - 5)	80 (20 - 100)	Likely to be ineffective or harmful
		Native forest birds	0 (0 - 10)	0 (0 - 10)	77.5 (20 - 100)	Likely to be ineffective or harmful
		Wetland birds	20 (0 - 80)	0 (0 - 10)	65 (20 - 95)	Likely to be ineffective or harmful
		Native birds of open habitats	2.5 (0 - 60)	0 (0 - 10)	65 (20 - 100)	Likely to be ineffective or harmful
		Soil life	2.5 (0 - 30)	0 (0 - 10)	55 (20 - 100)	Unlikely to be beneficial
		Beneficial insects	2.5 (0 - 50)	0 (0 - 50)	50 (10 - 100)	Unlikely to be beneficial
		Native aquatic animals	65 (10 - 100)	7.5 (0 - 100)	72.5 (10 - 100)	Beneficial
		Livestock, crop and variety	0 (0 - 50)	0 (0 - 50)	50 (10 - 100)	Unlikely to be beneficial
24	Provide woody or grassy buffers between production areas and waterways, including fencing that excludes livestock from the buffer strip	Overall biodiversity	55 (30 - 100)	10 (0 - 30)	70 (20 - 100)	Likely to be beneficial
		Native bush plants	5 (0 - 40)	0 (0 - 20)	60 (20 - 95)	Likely to be ineffective or harmful
		Native wetland and aquatic plants	40 (15 - 80)	0 (0 - 20)	50 (20 - 95)	Likely to be beneficial
		Native grassland plants	41 (0 - 50)	0 (0 - 20)	40 (25 - 95)	Likely to be beneficial*
		Native forest birds	7.5 (0 - 40)	0 (0 - 10)	55 (20 - 95)	Unlikely to be beneficial
		Wetland birds	40 (0 - 100)	0 (0 - 20)	50 (20 - 95)	Likely to be beneficial
		Native birds of open habitats	35 (0 - 70)	5 (0 - 20)	35 (20 - 95)	Unknown effectiveness
		Soil life	55 (0 - 100)	0 (0 - 20)	60 (20 - 90)	Likely to be beneficial
		Beneficial insects	50 (0 - 100)	7.5 (0 - 30)	60 (20 - 80)	Likely to be beneficial
		Native aquatic animals	85 (30 - 100)	0 (0 - 20)	85 (20 - 100)	Beneficial
		Livestock, crop and variety	0 (0 - 50)	0 (0 - 50)	60 (10 - 95)	Likely to be ineffective or harmful

25	Use barriers to prevent pollutants from entering waterways, such as sediment traps or constructed wetlands	Overall biodiversity	50 (10 - 100)	5 (0 - 30)	70 (20 - 100)	Likely to be beneficial
		Native bush plants	0 (0 - 10)	0 (0 - 10)	40 (10 - 95)	Unlikely to be beneficial
		Native wetland and aquatic plants	60 (15 - 100)	0 (0 - 10)	70 (10 - 95)	Beneficial
		Native grassland plants	0 (0 - 30)	0 (0 - 10)	40 (10 - 95)	Unlikely to be beneficial
		Native forest birds	2.5 (0 - 10)	0 (0 - 10)	55 (10 - 95)	Unlikely to be beneficial
		Wetland birds	40 (0 - 100)	0 (0 - 20)	55 (10 - 95)	Likely to be beneficial
		Native birds of open habitats	12.5 (0 - 70)	2.5 (0 - 10)	50 (10 - 95)	Unlikely to be beneficial
		Soil life	10 (0 - 50)	0 (0 - 20)	50 (20 - 95)	Unlikely to be beneficial
		Beneficial insects	45 (0 - 50)	0 (0 - 10)	60 (10 - 75)	Likely to be beneficial*
		Native aquatic animals	75 (30 - 100)	0 (0 - 10)	80 (20 - 100)	Beneficial
		Livestock, crop and variety	2.5 (0 - 50)	0 (0 - 50)	50 (10 - 95)	Unlikely to be beneficial
26	Large patch (>2 ha) of natural tussock grassland or shrubland present on farm	Overall biodiversity	50 (30 - 100)	5 (0 - 20)	70 (30 - 100)	Likely to be beneficial
		Native bush plants	30 (0 - 100)	0 (0 - 10)	60 (30 - 95)	Likely to be ineffective or harmful
		Native wetland and aquatic plants	0 (0 - 20)	0 (0 - 10)	50 (30 - 95)	Unlikely to be beneficial
		Native grassland plants	80 (40 - 100)	0 (0 - 40)	70 (30 - 100)	Beneficial
		Native forest birds	10 (0 - 20)	2.5 (0 - 10)	50 (20 - 95)	Unlikely to be beneficial
		Wetland birds	5 (0 - 10)	2.5 (0 - 10)	50 (10 - 95)	Unlikely to be beneficial
		Native birds of open habitats	40 (0 - 100)	2.5 (0 - 30)	50 (20 - 95)	Likely to be beneficial
		Soil life	70 (30 - 100)	0 (0 - 10)	67.5 (20 - 100)	Beneficial
		Beneficial insects	60 (20 - 100)	2.5 (0 - 10)	60 (20 - 100)	Beneficial
		Native aquatic animals	7.5 (0 - 30)	0 (0 - 10)	42.5 (20 - 95)	Unlikely to be beneficial*
		Livestock, crop and variety	0 (0 - 70)	0 (0 - 50)	50 (10 - 95)	Unlikely to be beneficial
27	Large patches of natural tussock grassland or shrubland are	Overall biodiversity	60 (0 - 100)	0 (0 - 40)	60 (0 - 100)	Beneficial
		Native bush plants	30 (0 - 100)	0 (0 - 10)	60 (0 - 95)	Likely to be ineffective or

	formally protected, such as in a QEII covenant					harmful
		Native wetland and aquatic plants	0 (0 - 20)	0 (0 - 10)	40 (0 - 95)	Unlikely to be beneficial
		Native grassland plants	60 (0 - 100)	0 (0 - 10)	70 (0 - 100)	Beneficial
		Native forest birds	15 (0 - 30)	0 (0 - 10)	50 (0 - 95)	Unlikely to be beneficial
		Wetland birds	5 (0 - 30)	0 (0 - 10)	50 (0 - 95)	Unlikely to be beneficial
		Native birds of open habitats	45 (0 - 100)	0 (0 - 20)	50 (0 - 95)	Likely to be beneficial
		Soil life	60 (0 - 100)	0 (0 - 10)	60 (0 - 100)	Beneficial
		Beneficial insects	55 (0 - 100)	0 (0 - 20)	57.5 (0 - 100)	Likely to be beneficial
		Native aquatic animals	20 (0 - 40)	0 (0 - 20)	40 (15 - 95)	Unlikely to be beneficial*
		Livestock, crop and variety	0 (0 - 50)	0 (0 - 50)	45 (0 - 95)	Unlikely to be beneficial
28	Large patches of natural tussock grassland or shrubland fenced to exclude livestock	Overall biodiversity	70 (30 - 100)	5 (0 - 10)	75 (30 - 100)	Beneficial
		Native bush plants	30 (0 - 100)	0 (0 - 10)	70 (30 - 95)	Likely to be ineffective or harmful
		Native wetland and aquatic plants	0 (0 - 20)	0 (0 - 10)	40 (10 - 95)	Unlikely to be beneficial
		Native grassland plants	60 (40 - 100)	0 (0 - 20)	70 (30 - 100)	Beneficial
		Native forest birds	15 (0 - 40)	2.5 (0 - 10)	67.5 (20 - 95)	Likely to be ineffective or harmful
		Wetland birds	5 (0 - 10)	2.5 (0 - 10)	50 (10 - 95)	Unlikely to be beneficial
		Native birds of open habitats	45 (25 - 80)	2.5 (0 - 30)	60 (20 - 95)	Likely to be beneficial
		Soil life	75 (30 - 100)	0 (0 - 20)	67.5 (20 - 100)	Beneficial
		Beneficial insects	55 (35 - 100)	2.5 (0 - 20)	77.5 (20 - 100)	Likely to be beneficial
		Native aquatic animals	20 (0 - 50)	0 (0 - 20)	55 (15 - 95)	Unlikely to be beneficial*
		Livestock, crop and variety	2.5 (0 - 50)	0 (0 - 50)	55 (10 - 95)	Unlikely to be beneficial
29	Control weedy non-native plants in large patches of natural tussock grassland or shrubland, such as	Overall biodiversity	40 (0 - 75)	15 (0 - 30)	50 (15 - 75)	Likely to be beneficial*
		Native bush plants	10 (0 - 40)	0 (0 - 80)	40 (20 - 95)	Unlikely to be beneficial
		Native wetland and aquatic plants	0 (0 - 10)	0 (0 - 80)	40 (10 - 95)	Unlikely to be beneficial

	by spraying, grazing, or mechanical methods	Native grassland plants	60 (10 - 100)	0 (0 - 80)	60 (20 - 95)	Beneficial
		Native forest birds	7.5 (0 - 20)	2.5 (0 - 60)	72.5 (20 - 95)	Likely to be ineffective or harmful
		Wetland birds	2.5 (0 - 10)	2.5 (0 - 50)	50 (10 - 95)	Unlikely to be beneficial
		Native birds of open habitats	35 (10 - 100)	7.5 (0 - 60)	55 (20 - 95)	Unlikely to be beneficial
		Soil life	50 (10 - 80)	17.5 (0 - 50)	45 (20 - 90)	Likely to be beneficial
		Beneficial insects	50 (10 - 60)	20 (0 - 80)	45 (20 - 90)	Trade-offs between benefits and harms
		Native aquatic animals	0 (0 - 10)	0 (0 - 30)	30 (0 - 95)	Unknown effectiveness
		Livestock, crop and variety	5 (0 - 50)	0 (0 - 50)	50 (10 - 95)	Unlikely to be beneficial
30	Large (>1 ha) naturally-occurring wetland present on farm	Overall biodiversity	60 (40 - 100)	0 (0 - 15)	65 (30 - 100)	Beneficial
		Native bush plants	20 (0 - 40)	0 (0 - 10)	40 (20 - 95)	Unlikely to be beneficial
		Native wetland and aquatic plants	70 (20 - 100)	0 (0 - 20)	75 (10 - 100)	Beneficial
		Native grassland plants	10 (5 - 50)	0 (0 - 20)	40 (10 - 95)	Unlikely to be beneficial
		Native forest birds	10 (0 - 50)	0 (0 - 10)	50 (10 - 95)	Unlikely to be beneficial
		Wetland birds	80 (30 - 100)	0 (0 - 10)	70 (10 - 100)	Beneficial
		Native birds of open habitats	17.5 (5 - 80)	5 (0 - 20)	50 (10 - 90)	Unlikely to be beneficial
		Soil life	40 (0 - 70)	0 (0 - 10)	67.5 (30 - 95)	Likely to be beneficial
		Beneficial insects	45 (5 - 70)	2.5 (0 - 10)	50 (30 - 80)	Likely to be beneficial
		Native aquatic animals	70 (20 - 100)	0 (0 - 10)	77.5 (10 - 100)	Beneficial
		Livestock, crop and variety	0 (0 - 50)	0 (0 - 50)	50 (10 - 95)	Unlikely to be beneficial
31	Large natural wetlands are formally protected, such as in a QEII covenant	Overall biodiversity	72.5 (0 - 100)	0 (0 - 10)	60 (0 - 75)	Beneficial
		Native bush plants	20 (0 - 40)	0 (0 - 10)	40 (0 - 95)	Unlikely to be beneficial
		Native wetland and aquatic plants	75 (0 - 100)	0 (0 - 5)	75 (0 - 100)	Beneficial
		Native grassland plants	10 (0 - 50)	0 (0 - 20)	40 (0 - 95)	Unlikely to be beneficial
		Native forest birds	10 (0 - 50)	0 (0 - 10)	50 (0 - 95)	Unlikely to be beneficial

		Wetland birds	70 (0 - 100)	0 (0 - 20)	70 (0 - 100)	Beneficial
		Native birds of open habitats	17.5 (0 - 80)	0 (0 - 20)	50 (0 - 90)	Unlikely to be beneficial
		Soil life	42.5 (0 - 70)	0 (0 - 10)	55 (0 - 95)	Likely to be beneficial
		Beneficial insects	45 (0 - 70)	0 (0 - 10)	50 (0 - 80)	Likely to be beneficial
		Native aquatic animals	60 (0 - 100)	0 (0 - 30)	65 (0 - 100)	Beneficial
		Livestock, crop and variety	0 (0 - 50)	0 (0 - 50)	50 (0 - 95)	Unlikely to be beneficial
32	Large natural wetlands are fenced to exclude livestock	Overall biodiversity	75 (50 - 100)	0 (0 - 15)	65 (30 - 90)	Beneficial
		Native bush plants	20 (0 - 40)	0 (0 - 10)	40 (20 - 95)	Unlikely to be beneficial
		Native wetland and aquatic plants	87.5 (50 - 100)	0 (0 - 20)	75 (10 - 100)	Beneficial
		Native grassland plants	10 (5 - 30)	0 (0 - 20)	40 (10 - 95)	Unlikely to be beneficial
		Native forest birds	10 (0 - 50)	0 (0 - 10)	50 (10 - 95)	Unlikely to be beneficial
		Wetland birds	90 (60 - 100)	0 (0 - 10)	70 (10 - 100)	Beneficial
		Native birds of open habitats	17.5 (5 - 80)	5 (0 - 20)	40 (10 - 90)	Unlikely to be beneficial
		Soil life	40 (0 - 70)	0 (0 - 10)	67.5 (30 - 95)	Likely to be beneficial
		Beneficial insects	45 (5 - 70)	2.5 (0 - 10)	60 (30 - 80)	Likely to be beneficial
		Native aquatic animals	70 (25 - 100)	0 (0 - 10)	77.5 (10 - 100)	Beneficial
		Livestock, crop and variety	0 (0 - 50)	0 (0 - 50)	50 (10 - 95)	Unlikely to be beneficial
33	Control weedy non-native plants in large natural wetlands, such as by spraying, grazing, or mechanical methods	Overall biodiversity	50 (20 - 65)	20 (0 - 80)	30 (10 - 70)	Unknown effectiveness
		Native bush plants	10 (0 - 50)	5 (0 - 20)	40 (10 - 95)	Unlikely to be beneficial
		Native wetland and aquatic plants	55 (0 - 75)	5 (0 - 60)	70 (0 - 95)	Likely to be beneficial
		Native grassland plants	10 (0 - 50)	10 (0 - 50)	40 (10 - 95)	Unlikely to be beneficial
		Native forest birds	10 (0 - 10)	2.5 (0 - 10)	55 (10 - 95)	Unlikely to be beneficial
		Wetland birds	45 (10 - 60)	7.5 (0 - 70)	45 (10 - 95)	Likely to be beneficial
		Native birds of open habitats	12.5 (0 - 40)	15 (0 - 60)	35 (10 - 90)	Unknown effectiveness

		Soil life	10 (0 - 50)	2.5 (0 - 50)	55 (30 - 95)	Unlikely to be beneficial
		Beneficial insects	15 (0 - 50)	7.5 (0 - 70)	55 (20 - 95)	Unlikely to be beneficial
		Native aquatic animals	25 (0 - 60)	20 (0 - 80)	50 (10 - 95)	Likely to be ineffective or harmful
		Livestock, crop and variety	0 (0 - 50)	0 (0 - 50)	50 (10 - 95)	Unlikely to be beneficial
34	Large patch (>2 ha) of native forest or dense bush present on farm	Overall biodiversity	65 (50 - 100)	5 (0 - 20)	70 (40 - 100)	Beneficial
		Native bush plants	90 (40 - 100)	0 (0 - 30)	95 (60 - 100)	Beneficial
		Native wetland and aquatic plants	10 (0 - 20)	0 (0 - 10)	40 (10 - 95)	Unlikely to be beneficial
		Native grassland plants	10 (0 - 20)	0 (0 - 20)	50 (20 - 95)	Unlikely to be beneficial
		Native forest birds	60 (30 - 100)	2.5 (0 - 30)	65 (50 - 95)	Beneficial
		Wetland birds	10 (0 - 10)	2.5 (0 - 10)	60 (10 - 95)	Likely to be ineffective or harmful
		Native birds of open habitats	20 (5 - 40)	5 (0 - 30)	55 (10 - 95)	Unlikely to be beneficial
		Soil life	75 (20 - 100)	0 (0 - 30)	72.5 (40 - 100)	Beneficial
		Beneficial insects	65 (30 - 100)	0 (0 - 30)	72.5 (40 - 100)	Beneficial
		Native aquatic animals	10 (0 - 41)	0 (0 - 10)	50 (30 - 95)	Unlikely to be beneficial*
		Livestock, crop and variety	7.5 (0 - 40)	0 (0 - 80)	50 (10 - 95)	Unlikely to be beneficial
35	Large patches of native forest or dense bush are formally protected, such as in a QEII covenant	Overall biodiversity	70 (0 - 100)	0 (0 - 20)	70 (0 - 100)	Beneficial
		Native bush plants	70 (0 - 100)	0 (0 - 5)	80 (0 - 100)	Beneficial
		Native wetland and aquatic plants	10 (0 - 40)	0 (0 - 5)	40 (0 - 95)	Unlikely to be beneficial
		Native grassland plants	5 (0 - 40)	0 (0 - 20)	30 (0 - 95)	Unknown effectiveness
		Native forest birds	62.5 (0 - 100)	0 (0 - 30)	65 (0 - 95)	Beneficial
		Wetland birds	10 (0 - 30)	0 (0 - 10)	50 (0 - 95)	Unlikely to be beneficial
		Native birds of open habitats	15 (0 - 60)	0 (0 - 30)	45 (0 - 95)	Unlikely to be beneficial
		Soil life	60 (0 - 100)	0 (0 - 30)	60 (0 - 100)	Beneficial
		Beneficial insects	62.5 (0 -	0 (0 - 30)	65 (0 -	Beneficial

			100)		100)	
		Native aquatic animals	7.5 (0 - 40)	0 (0 - 30)	45 (10 - 95)	Unlikely to be beneficial*
		Livestock, crop and variety	7.5 (0 - 50)	0 (0 - 80)	50 (0 - 95)	Unlikely to be beneficial
36	Large patches of native forest or dense bush fenced to exclude livestock	Overall biodiversity	80 (60 - 100)	0 (0 - 10)	80 (40 - 100)	Beneficial
		Native bush plants	100 (50 - 100)	0 (0 - 10)	95 (60 - 100)	Beneficial
		Native wetland and aquatic plants	10 (0 - 40)	0 (0 - 10)	40 (10 - 95)	Unlikely to be beneficial
		Native grassland plants	5 (0 - 70)	0 (0 - 20)	50 (20 - 95)	Unlikely to be beneficial
		Native forest birds	72.5 (50 - 100)	0 (0 - 20)	80 (50 - 95)	Beneficial
		Wetland birds	10 (0 - 20)	0 (0 - 10)	52.5 (10 - 95)	Unlikely to be beneficial
		Native birds of open habitats	15 (0 - 40)	0 (0 - 20)	35 (10 - 95)	Unknown effectiveness
		Soil life	80 (20 - 100)	0 (0 - 20)	77.5 (40 - 100)	Beneficial
		Beneficial insects	70 (30 - 100)	0 (0 - 20)	77.5 (30 - 100)	Beneficial
		Native aquatic animals	22.5 (5 - 75)	0 (0 - 30)	55 (30 - 95)	Unlikely to be beneficial*
		Livestock, crop and variety	2.5 (0 - 40)	0 (0 - 40)	50 (10 - 95)	Unlikely to be beneficial
37	Control weedy non-native plants in large patches of native forest or dense bush, such as by spraying, grazing, or mechanical methods	Overall biodiversity	67 (30 - 90)	10 (0 - 70)	50 (30 - 80)	Likely to be beneficial
		Native bush plants	60 (50 - 100)	5 (0 - 60)	70 (60 - 100)	Beneficial
		Native wetland and aquatic plants	0 (0 - 20)	0 (0 - 50)	40 (10 - 95)	Unlikely to be beneficial
		Native grassland plants	5 (0 - 10)	0 (0 - 70)	50 (20 - 95)	Unlikely to be beneficial
		Native forest birds	45 (20 - 70)	2.5 (0 - 70)	65 (20 - 95)	Likely to be beneficial
		Wetland birds	5 (0 - 10)	2.5 (0 - 30)	55 (20 - 95)	Unlikely to be beneficial
		Native birds of open habitats	7.5 (0 - 30)	15 (0 - 70)	35 (20 - 90)	Unknown effectiveness
		Soil life	42.5 (0 - 70)	7.5 (0 - 70)	65 (30 - 90)	Likely to be beneficial
		Beneficial insects	35 (20 - 60)	15 (0 - 80)	67.5 (40 - 90)	Likely to be ineffective or harmful
		Native aquatic animals	5 (0 - 50)	0 (0 - 50)	60 (10 - 100)	Likely to be ineffective or harmful

		Livestock, crop and variety	0 (0 - 10)	0 (0 - 30)	55 (10 - 95)	Unlikely to be beneficial
38	Manage edges of large bush patches to benefit wildlife, such as providing a transitional or shrubby buffer zone between production areas and taller forest	Overall biodiversity	70 (40 - 100)	5 (0 - 40)	60 (20 - 80)	Beneficial
		Native bush plants	60 (10 - 100)	0 (0 - 10)	80 (50 - 100)	Beneficial
		Native wetland and aquatic plants	0 (0 - 20)	0 (0 - 5)	50 (10 - 95)	Unlikely to be beneficial
		Native grassland plants	10 (0 - 30)	0 (0 - 20)	50 (20 - 95)	Unlikely to be beneficial
		Native forest birds	65 (10 - 100)	0 (0 - 30)	65 (20 - 95)	Beneficial
		Wetland birds	5 (0 - 10)	0 (0 - 10)	55 (10 - 95)	Unlikely to be beneficial
		Native birds of open habitats	15 (0 - 50)	5 (0 - 30)	35 (20 - 95)	Unknown effectiveness
		Soil life	50 (0 - 100)	0 (0 - 30)	72.5 (40 - 100)	Likely to be beneficial
		Beneficial insects	55 (20 - 100)	0 (0 - 30)	72.5 (40 - 100)	Likely to be beneficial
		Native aquatic animals	7.5 (0 - 30)	0 (0 - 30)	50 (10 - 95)	Unlikely to be beneficial*
		Livestock, crop and variety	0 (0 - 10)	0 (0 - 80)	50 (10 - 95)	Unlikely to be beneficial
39	Maintain a mixture of native woody species in large patches of native forest or dense bush	Overall biodiversity	70 (50 - 100)	5 (0 - 50)	70 (10 - 90)	Beneficial
		Native bush plants	100 (40 - 100)	0 (0 - 20)	90 (60 - 100)	Beneficial
		Native wetland and aquatic plants	10 (0 - 20)	0 (0 - 10)	40 (10 - 95)	Unlikely to be beneficial
		Native grassland plants	10 (0 - 30)	0 (0 - 20)	50 (20 - 95)	Unlikely to be beneficial
		Native forest birds	77.5 (50 - 100)	0 (0 - 40)	75 (10 - 95)	Beneficial
		Wetland birds	5 (0 - 10)	0 (0 - 10)	55 (20 - 95)	Unlikely to be beneficial
		Native birds of open habitats	10 (0 - 50)	0 (0 - 30)	35 (10 - 95)	Unknown effectiveness
		Soil life	60 (30 - 100)	0 (0 - 50)	67.5 (10 - 100)	Beneficial
		Beneficial insects	60 (50 - 100)	0 (0 - 60)	75 (10 - 100)	Beneficial
		Native aquatic animals	5 (0 - 60)	0 (0 - 30)	50 (10 - 95)	Unlikely to be beneficial*
		Livestock, crop and variety	2.5 (0 - 50)	0 (0 - 50)	50 (10 - 95)	Unlikely to be beneficial
40	Control possums on farm, especially	Overall biodiversity	70 (30 - 100)	5 (0 - 20)	80 (30 - 90)	Beneficial

	in natural habitats	Native bush plants	100 (40 - 100)	0 (0 - 10)	90 (30 - 100)	Beneficial
		Native wetland and aquatic plants	20 (0 - 60)	0 (0 - 10)	80 (10 - 95)	Likely to be ineffective or harmful*
		Native grassland plants	35 (5 - 50)	2.5 (0 - 10)	40 (20 - 80)	Unlikely to be beneficial*
		Native forest birds	85 (10 - 100)	0 (0 - 30)	85 (30 - 95)	Beneficial
		Wetland birds	27.5 (0 - 100)	0 (0 - 30)	62.5 (20 - 95)	Likely to be ineffective or harmful
		Native birds of open habitats	45 (0 - 100)	0 (0 - 20)	57.5 (20 - 95)	Likely to be beneficial
		Soil life	25 (0 - 100)	0 (0 - 10)	57.5 (20 - 100)	Unlikely to be beneficial
		Beneficial insects	45 (5 - 90)	0 (0 - 20)	67.5 (20 - 100)	Likely to be beneficial
		Native aquatic animals	10 (0 - 50)	0 (0 - 10)	30 (0 - 95)	Unknown effectiveness
		Livestock, crop and variety	30 (0 - 80)	0 (0 - 10)	50 (20 - 95)	Unlikely to be beneficial
41	Control stoats, rats, hedgehogs, or other predators on farm, especially in natural habitats	Overall biodiversity	80 (30 - 100)	5 (0 - 25)	75 (20 - 90)	Beneficial
		Native bush plants	20 (0 - 100)	0 (0 - 20)	80 (10 - 100)	Likely to be ineffective or harmful
		Native wetland and aquatic plants	0 (0 - 70)	0 (0 - 20)	50 (10 - 95)	Unlikely to be beneficial
		Native grassland plants	20 (0 - 80)	0 (0 - 20)	50 (10 - 95)	Unlikely to be beneficial
		Native forest birds	70 (30 - 100)	2.5 (0 - 25)	80 (20 - 95)	Beneficial
		Wetland birds	70 (0 - 100)	2.5 (0 - 25)	80 (20 - 95)	Beneficial
		Native birds of open habitats	55 (40 - 100)	2.5 (0 - 25)	80 (20 - 95)	Likely to be beneficial
		Soil life	40 (0 - 100)	0 (0 - 20)	50 (20 - 100)	Likely to be beneficial
		Beneficial insects	60 (5 - 100)	0 (0 - 20)	72.5 (20 - 100)	Beneficial
		Native aquatic animals	10 (0 - 90)	0 (0 - 20)	40 (0 - 95)	Unlikely to be beneficial
		Livestock, crop and variety	2.5 (0 - 100)	0 (0 - 30)	50 (10 - 95)	Unlikely to be beneficial
42	Control deer, goats, pigs, or other animals that alter habitat on	Overall biodiversity	80 (30 - 100)	5 (0 - 15)	70 (30 - 90)	Beneficial
		Native bush plants	80 (40 - 100)	0 (0 - 5)	90 (30 - 100)	Beneficial

	farm, especially in natural habitats	Native wetland and aquatic plants	60 (0 - 80)	0 (0 - 0)	70 (30 - 95)	Beneficial*
		Native grassland plants	40 (0 - 100)	0 (0 - 5)	50 (30 - 95)	Likely to be beneficial
		Native forest birds	55 (10 - 100)	0 (0 - 20)	67.5 (30 - 95)	Likely to be beneficial
		Wetland birds	50 (0 - 100)	0 (0 - 20)	55 (20 - 95)	Likely to be beneficial
		Native birds of open habitats	40 (0 - 100)	0 (0 - 20)	40 (20 - 90)	Likely to be beneficial
		Soil life	45 (0 - 100)	2.5 (0 - 20)	50 (20 - 100)	Likely to be beneficial
		Beneficial insects	55 (5 - 90)	0 (0 - 20)	65 (20 - 100)	Likely to be beneficial
		Native aquatic animals	10 (0 - 90)	0 (0 - 20)	50 (0 - 95)	Unlikely to be beneficial
		Livestock, crop and variety	30 (0 - 70)	0 (0 - 20)	60 (30 - 95)	Likely to be ineffective or harmful
43	Control mice or other animals that compete with wildlife for food and nest sites on farm, especially in natural habitats	Overall biodiversity	70 (5 - 100)	5 (0 - 30)	70 (10 - 90)	Beneficial
		Native bush plants	50 (0 - 100)	0 (0 - 10)	70 (10 - 95)	Likely to be beneficial
		Native wetland and aquatic plants	10 (0 - 100)	0 (0 - 10)	40 (10 - 95)	Unlikely to be beneficial
		Native grassland plants	30 (0 - 80)	0 (0 - 10)	50 (10 - 95)	Unlikely to be beneficial
		Native forest birds	45 (5 - 100)	0 (0 - 20)	65 (10 - 95)	Likely to be beneficial
		Wetland birds	25 (0 - 100)	0 (0 - 20)	40 (10 - 95)	Unlikely to be beneficial
		Native birds of open habitats	30 (5 - 100)	0 (0 - 20)	40 (10 - 95)	Unlikely to be beneficial
		Soil life	40 (30 - 100)	0 (0 - 30)	50 (10 - 100)	Likely to be beneficial*
		Beneficial insects	55 (5 - 100)	0 (0 - 40)	67.5 (10 - 100)	Likely to be beneficial
		Native aquatic animals	0 (0 - 90)	0 (0 - 20)	50 (0 - 95)	Unlikely to be beneficial
		Livestock, crop and variety	20 (0 - 80)	0 (0 - 50)	40 (10 - 95)	Unlikely to be beneficial

*Indicates cases that were rescored in round three of the assessment.