

# **Waikato Regional Pest Management Plan 2014-2024**

## Appendix 4: Tests for good neighbour rules

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# 1 Introduction to good neighbour rules

The Biosecurity Act 1993 (BSA) was amended in late 2012, which altered the position of the Crown with regard to their responsibilities in relation to regional pest management plans (RPMP). Section 5 of the BSA now requires the Crown, and other land occupiers, to comply with “good neighbour rules” within regional pest management plans. Good neighbour rules are designed to address the external effects of pests spilling over from land onto adjacent properties. The larger intent of good neighbour rules is to help ensure that RPMPs are effective at controlling pests across broad landscapes, without being compromised by uncontrolled areas on Crown land.

Good neighbour rules must be consistent with conditions included in a national policy direction document being developed by central government. At the adoption of this RPMP, the national policy direction is only a proposal. Nevertheless, the RPMP attempted to comply with the proposed national policy direction conditions. The RPMP will be reviewed for compliance with the national policy direction after it is finalised by central government.

Section 10 of the proposed national policy direction includes a number of requirements associated with good neighbour rules. This appendix to the RPMP addresses those requirements for each pest that includes a good neighbour rule. The rules themselves are found in sections 5 and 6 of the RPMP.

The proposed national policy direction states that good neighbour rules should focus on managing an externality (that is, a cost caused by the spread of pests) imposed by one property on to a neighbouring property. However, in practice, the good neighbour rules must be set at a broad regional scale without the knowledge of specific property-by-property situations. In taking this approach, council acknowledges that in some instances other methods such as MOUs or site specific strategies may be more appropriate ways to achieve the desired outcome than enforcement of good neighbour rules.

In contrast to setting good neighbour rules, their implementation requires individual evaluation of specific site-by-site issues. This aligns with the proposed national policy direction requirement that the regional council consider “whether the costs of compliance with the rule are reasonable relative to the costs that such an occupier would incur, from the pest spreading, in the absence of a rule.” This analysis of costs and benefits between the Crown and an adjoining landowner can be done meaningfully only once the details of a specific situation are known.

Waikato Regional Council intends to take a pragmatic approach to the implementation of good neighbour rules. Our intent is to ensure that a strict interpretation of good neighbour principles does not result in unintended negative consequences or nonsensical situations. For example, in a remote location access to a Department of Conservation site for pest control might be very difficult or non-existent. This would be considered in an evaluation of what action was “reasonable” to expect in this situation.

The implementation of good neighbour rules will adhere to the process described in section 4.2.3 of the RPMP. Waikato Regional Council also may use the existing exemption provisions in the Biosecurity Act to address ongoing issues in a particular situation. For all RPMP rules, the exemption process can offer pragmatic solutions to land occupiers faced with difficult pest management choices.

Finally, Waikato Regional Council notes that both Crown and private land occupiers have a responsibility to adhere to RPMP rules designed to limit the spread of pests. The Crown may notify the council when its land is being impacted by pests spreading from nearby private land.

Waikato Regional Council believes that formalising the requirement for the Crown to be a “good neighbour” is an improvement. However, Waikato Regional Council has always worked well with the Crown agencies in our region. For example, we undertake a number of joint operations with the Department of Conservation that deliver more than if either agency worked alone. We want this close, collaborative relationship to continue.

## **Definition of the Crown**

For the purposes of good neighbour rules, “Crown” has the meaning given to it in the Public Finance Act 1989:

- a. means the Sovereign in right of New Zealand; and*
- b. includes all Ministers of the Crown and all departments;*

*but*

- c. does not include:*
  - i. an Office of Parliament; or*
  - ii. a Crown entity; or*
  - iii. a State enterprise named in Schedule 1 of the State-Owned Enterprises Act 1986.*

## 2 Good neighbour rules for pest plants in the Waikato region

The Waikato Regional Council good neighbour rules take a “buffer” approach for most pest plants, taking into account the weediest parts of the boundary, how plants spread and focusing on managing costs caused to neighbours by the spread of pests.

With the Crown now required to comply with good neighbour rules, it is important to consider where on the Crown estate these would most likely come into play. For example, pest plants in the heart of a large forest park are unlikely to have a significant negative effect on neighbouring properties that may be many kilometres away. In contrast, areas where pest plants can proliferate (areas of disturbance, low and open vegetation, retired or abandoned farmland, secondary forest and shrubland) are often associated with property and vegetation boundaries.

The edges and margins are the key area of risk where weed spread comes from. In forest areas, most documentation suggests this area is around 50 – 100 metres<sup>1</sup>. This margin is an area of extreme conditions (light, wind, heat and cold), and is well suited to exotic weedy species that are able to thrive there.

It is true that the dispersal mechanisms of some plants can extend for many kilometres. Wind born seed has been found 30 kilometres away from the parent plant (e.g. moth plant, pampas). Birds and animals are also able to carry seed many kilometres from the original seed source. However, margins and edges are the main area of concern. Therefore a good neighbour rule to deal with the high risk areas is a reasonable option.

Pest plants have been grouped according to their main dispersal method and good neighbour rules have been developed accordingly. These groups are:

- bird
- wind
- water
- vegetative
- machine/physical.

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<sup>1</sup> Norton DA. Edge effects in a lowland temperate New Zealand rainforest. 2002. Department of Conservation DOC Science Internal Series 27.

## 2.1 Summary of good neighbour rules – pest plants

Species	Dispersal Category	Good neighbour rule summary (see section 5 of the RPMP for full text)	Page number
Asparagus: bushy ( <i>Asparagus aethiopicus</i> ), and ferny asparagus ( <i>A. setaceus</i> ) (excluding 'Foxtail' cultivar)	Bird	100 metres or less from the boundary (only at high value sites)	10
Australian sedge ( <i>Carex longebrachiata</i> )	Wind and ballistic	20 metres or less from the boundary	14
Banana passionfruit ( <i>Passiflora tripartita</i> and <i>P. mixta</i> )	Bird	100 metres or less from the boundary	10
Boneseed ( <i>Chrysanthemoides monilifera</i> ssp. <i>monilifera</i> )	Bird	100 metres or less from the boundary	10
Broom ( <i>Cytisus scoparius</i> )	Wind and ballistic	20 metres or less from the boundary	14
California bulrush ( <i>Schoenoplectus californicus</i> )	Water	Infestation that is identified as the source of the impact (only at high value sites)	18
Chocolate vine ( <i>Akebia quinata</i> )	Bird	100 metres or less from the boundary	10
Climbing asparagus ( <i>Asparagus scandens</i> )	Bird	100 metres or less from the boundary	10
Contorta pine ( <i>Pinus contorta</i> )	Wind and ballistic	100 metres or less from the boundary	14
Darwin's barberry ( <i>Berberis darwinii</i> )	Bird	100 metres or less from the boundary	10
Giant gunnera ( <i>Gunnera tinctoria</i> and <i>G. manicata</i> )	Water	Infestation that is identified as the source of the impact.	18
Gorse ( <i>Ulex europaeus</i> )	Wind and ballistic	20 metres or less from the boundary	14
Japanese cherry ( <i>Prunus serrulata</i> ) and rum Cherry ( <i>P. serotina</i> )	Bird	100 metres or less from the boundary (only at high value sites)	10
Japanese walnut ( <i>Juglans ailantifolia</i> )	Water	Infestation that is identified as the source of the impact (only at high value sites)	
Mexican water lily ( <i>Nymphaea mexicana</i> )	Water	Infestation that is identified as the source of the impact (only at high value sites)	17
Mignonette vine ( <i>Anredera cordifolia</i> )	Vegetative	20 metres or less from the boundary	21

Moth plant ( <i>Araujia hortorum</i> ), also known as <i>A. Sericifera</i>	Wind and ballistic	100 metres or less from the boundary.	14
Nodding thistle ( <i>Carduus nutans</i> ) and plumeless thistle ( <i>Carduus acanthoides</i> )	Wind and ballistic	50 metres or less from the boundary	14
Pampas ( <i>Cortaderia jubata</i> , <i>C. selloana</i> , and cultivars)	Wind and ballistic	100 metres or less from the boundary	14
Privet ( <i>Ligustrum species</i> )	Bird	As per plan rule 5.45.2 and 5.45.3.	10
Purple nutsedge ( <i>Cyperus rotundus</i> )	Machinery	No person shall move, or allow to be moved, cultivating/harvesting machinery, any organism, risk goods or other goods into or out of a restricted place, as determined under section 130 of the Act, that may be contaminated with purple nutsedge, without the permission of an authorised person.	24
Ragwort ( <i>Senecio jacobaea</i> and <i>Jacobaea vulgaris</i> )	Wind and ballistic	50 metres or less from the boundary	14
Royal fern ( <i>Osmunda regalis</i> )	Wind and ballistic	100 metres or less from the boundary (only at high value sites)	14
Saltwater paspalum ( <i>Paspalum vaginatum</i> )	Vegetative	Infestation that is identified as the source of the impact (only at high value sites)	21
Strawberry dogwood, also known as Himalayan dogwood ( <i>Cornus capitata</i> )	Bird	100 metres or less from the boundary (only at high value sites)	10
Tutsan ( <i>Hypericum androsaemum</i> )	Bird	100 metres or less from the boundary	10
Velvet leaf ( <i>Abutilon theophrasti</i> )	Machinery	No person shall move, or allow to be moved, any velvet leaf propagules from a contaminated property. No person shall move, or allow to be moved, cultivating/harvesting machinery, any organism, risk goods or other goods into or out of a property that may be contaminated with velvet leaf, without the permission of an authorised person.	24

Wild ginger ( <i>Hedychium gardnerianum</i> , <i>H. flavescens</i> )	Bird, Vegetative	100 metres or less from the boundary	10
Wild kiwifruit	Bird	100 metres or less from the boundary (only at high value sites)	10
Wilding conifers	Wind and ballistic	100 metres or less from the boundary (only at high value sites)	14
Willow: grey ( <i>Salix cinerea</i> ) and crack ( <i>Salix fragilis</i> )	Wind, water and vegetative	Infestation that is identified as the source of the impact (only at high value sites)	14 & 18
Woolly nightshade ( <i>Solanum mauritianum</i> )	Bird	100 metres or less from the boundary	10
Yellow flag iris ( <i>Iris pseudacorus</i> )	Water	Infestation that is identified as the source of the impact (only at high value sites)	18

## 2.2 Tests for good neighbour rules

### 2.2.1 Bird dispersed

There are two aspects to consider when determining the distance of a good neighbour rule for bird spread plants. These are the distance a bird has travelled after feeding, and seed retention time.

The blackbird was used as a guide when developing the good neighbour rule for bird spread plants. Blackbirds are very common in New Zealand<sup>2,3</sup> and have fruit as a part of their diet<sup>4</sup>.

Blackbirds swallow fruit up to at least 13mm diameter and meal size ranges from about 13 to 14 fruits, depending on size<sup>5,6</sup>. They also eat parts of larger fleshy fruits and may swallow the seeds intact.<sup>3</sup>

Blackbirds, in common with most passerines, are likely to move most seed less than 100 metres.<sup>7,8</sup> Individual seed dispersal distances by birds may be much greater, occasionally reaching 300 metres<sup>9</sup> or even 800 metres.

Swallowed fruits take approximately 30 minutes to be defecated.<sup>10,11</sup> Longer seed retention times generally result in greater dispersal distances<sup>12,13</sup> but decreased seed viability<sup>14,15</sup>.

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<sup>2</sup> Bull PC, Gaze PD, Robertson CJR 1985. The atlas of bird distribution in New Zealand. The Ornithological Society of New Zealand Inc., Wellington. 296 pp.

<sup>3</sup> Innes J, Kelly D, Overton JM, Gillies C 2010. Predation and other factors currently limiting New Zealand forest birds. *New Zealand Journal of Ecology* 34(1): 86–114.

<sup>4</sup> Williams PA, Karl BJ 1996. Fleshy fruits of indigenous and adventive plants in the diet of birds in forest remnants, Nelson, New Zealand. *New Zealand Journal of Ecology* 20(2): 127-145.

<sup>5</sup> Snow B, Snow D 1988. Birds and berries. Calton, Poyser, U.K. 268 pp.

<sup>6</sup> Paulsen TR, Hogstedt G 2002. Passage through birds' guts increases germination rate and seedling growth in *Sorbus occuparia*. *Functional Ecology* 16(5): 608-610.

<sup>7</sup> Debussche M, Escarré, J, Lepart J, 1982. Ornithochory and plant succession in Mediterranean abandoned orchards. *Vegetation* 48(3): 255-266.

<sup>8</sup> Théry M 1989. Consommation des fruits et dissémination des graines par le Merle noir (*Turdus merula*) en zone-périurbaine sous climat tempéré. *Acta Oecologia Applicata* 10(3): 271-285.

<sup>9</sup> Debussche M, Iseemann M 1994. Bird-dispersed seed rain and seedling establishment in patchy Mediterranean vegetation. *Oikos* 69: 414-426.

<sup>10</sup> Sorensen AE 1984. Nutrition, energy and passage time: experiments with fruit preferences in European blackbirds (*Turdus merula*). *Journal of Animal Ecology* 53: 545-557.

<sup>11</sup> Barnea A, Yom-Tov Y, Friedman J 1991. Does ingestion by birds affect seed germination? *Functional Ecology* 5: 394-402.

<sup>12</sup> Murray KG, Russell S, Picone CM, Winnett-Murray K, Sherwood W, Kuhlmann ML 1994. Fruit laxatives and seed passage rates in frugivores: consequences for plant reproductive success. *Ecology* 75: 989–994.

<sup>13</sup> Holbrook KM, Smith TB 2000. Seed dispersal and movement patterns in two species of *Ceratogymna* hornbills in a West African tropical lowland forest. *Oecologia* 125: 249–257.

<sup>14</sup> Murphy SR, Reid N, Yan ZG, Venables WN 1993. Differential passage time of mistletoe fruits through the gut of honeyeaters and flowerpeckers: effects on seedling establishment. *Oecologia* 93: 171–176.

<sup>15</sup> Charalambidou I, Santamaria L, Langevoord O 2003. Effect of ingestion by five avian dispersers on the retention time, retrieval and germination of *Ruppia maritima* seeds. *Functional Ecology* 17: 747–753.

## Good neighbour rule tests: bird dispersed pests

Pest	
<ul style="list-style-type: none"> <li>• Asparagus: bushy (<i>Asparagus aethiopicus</i>) and ferny asparagus (<i>A. Setaceus</i>) excluding foxtail cultivar</li> <li>• Banana passionfruit (<i>Passiflora tripartita</i> and <i>P. mixta</i>)</li> <li>• Boneseed (<i>Chrysanthemoides monilifera ssp. monilifera</i>)</li> <li>• Chocolate vine (<i>Akebia quinata</i>)</li> <li>• Climbing asparagus (<i>Asparagus scandens</i>)</li> <li>• Darwin's barberry (<i>Berberis darwinii</i>)</li> <li>• Japanese cherry (<i>Prunus serrulata</i>) and rum cherry (<i>P. serotina</i>)</li> <li>• Privet (<i>Ligustrum</i> spp.)</li> <li>• Strawberry dogwood, also known as Himalayan dogwood (<i>Cornus capitata</i>)</li> <li>• Tutsan (<i>Hypericum androsaemum</i>)</li> <li>• Wild ginger (<i>Hedychium gardnerianum</i>, <i>Hedychium flavescens</i>)</li> <li>• Wild kiwifruit (<i>Actinidia</i> spp.)</li> <li>• Woolly nightshade (<i>Solanum mauritianum</i>)</li> </ul>	
Tests*	Comments/considerations
<p>(a) In the absence of the rule, the pest would:</p> <p>(i) spread to land that is adjacent or nearby within the life of the plan; and</p> <p>(ii) cause more than minor costs to an occupier of that land (being costs resulting from a material effect on the way that occupier manages that land, or a material effect on that occupier's activities on that land).</p>	<p>These pests are predominantly dispersed by birds for up to several kilometres. For this reason rapid invasion into neighbouring land is certain and can cause serious damage to the local ecosystems and economy.</p> <p>These species are often hard to manage and threaten residential areas, production land and environmental areas. Once widely established control is difficult and the plant will continue to spread rapidly.</p> <p>For some landowners there will be a considerable cost associated with these pests.</p>
<p>(b) In determining whether the pest would spread as described in sub clause (a) the regional council must consider the proximity and characteristics of the adjacent or nearby land and the biological characteristics and behaviour of the particular pest (the greater the distance between properties, the more difficult to satisfy the test in sub clause (a)).</p>	<p>These species are proven to spread rapidly by bird dispersal. Most seed is dropped within 100 metres of the seed source, but may be spread as far as several kilometres.</p> <p>At least 100 metre clearance rules would be required to minimise bird spread of the seed.</p> <p>Privet is managed for its potential health impacts and so a 50 metre buffer is appropriate.</p>

<p>(c) The land that is adjacent or nearby, as described in sub clause (a), must be clear from the pest or, if the pest is present on that land, the occupier of that land must be taking measures to manage the pest or its impacts.</p>	<p>The RPMP rules apply to all land occupiers and these pests must be managed. If an occupier is not complying with the RPMP rule, the adjoining landowner/occupier may make a complaint to council and council will follow-up the non-compliance.</p>
<p>(d) The rule must not set a requirement on an occupier that is greater than that required to manage the spread of the pest.</p>	<p>The 100 metre distance gives the neighbouring landowner a reasonable level of protection against most of the bird spread seed. For large properties this is a far more realistic option than a requirement to manage cross boundary impacts across the entire property. However, control over the adjacent 100 metre strip might prove to be less cost effective than controlling the whole property in some situations.</p>
<p>(e) In determining the rules to be set to manage the costs to an occupier of land that is adjacent or nearby, of the pest spreading, consider:</p> <p>(i) the biological characteristics and behaviour of the particular pest; and</p> <p>(ii) whether the costs of compliance with the rule are reasonable relative to the costs that such an occupier would incur, from the pest spreading, in the absence of a rule.</p>	<p>(i) Bird dispersal puts all adjacent land at risk, potentially up to a kilometre from the parent plant.</p> <p>(ii) The costs associated with these pests can be significant. A 100 metre distance will effectively address seed spread and compliance costs are considered to be reasonable.</p>

## Main references

- Williams PA 2006. The role of blackbirds (*Turdus merula*) in weed invasion in New Zealand. *New Zealand Journal of Ecology* 30(2): 285-291.
- Wotton D, Clout M, Kelly D 2008. Seed retention times in the New Zealand pigeon (*Hemiphaga novaeseelandiae novaeseelandiae*). *New Zealand Journal of Ecology* 32(1): 1-6.

## 2.2.2 Wind and ballistically dispersed pests

To create rules for wind and ballistic dispersed seed that will address the cross boundary impacts can be very difficult as there are many variables to consider.

An important detail for a wind-dispersed seed is that it is very light. It must be able to be carried easily on wind or else it will drop straight to the ground. Some plants have light dust-like propagules e.g. royal fern, while a number of the plants within the RPMP are wind dispersed by woolly tufts or pappus e.g. ragwort, thistles, moth plant. Depending on the size of the seed and strength of the wind will determine how far the seed will travel. Nodding thistle seed has a larger seed than ragwort therefore will travel a shorter distance.

Other plants have wings on their seed e.g. conifers. This allows their seed to travel long distances downwind. Australian sedge has a heavy seed without “wings” to help dispersal so it doesn’t fall far from the parent plant, however under strong wind conditions it can move longer distances.

Gorse and broom disperse their seed ballistically meaning that they shoot their seed a few meters away from the parent plant and it generally germinates where it lies or is picked up by animals or water.

### **Australian sedge (*Carex longebrachiata*)**

The seed of Australian sedge is relatively heavy and the utricle is not endowed with special mechanisms to assist dispersal. Most of the seed shed falls within 12 inches from the edge of the canopy.<sup>16</sup>

### **Broom (*Cytisus scoparius*)**

Dispersal of seeds is mainly from explosion of pods but seeds may also be dispersed in mud stuck to animals or vehicles.<sup>17</sup>

### **Gorse (*Ulex europaeus*)**

The only method of spread is by seeds which are relatively large and not equipped for wind dispersal. The heat of the sun bursts the pods ejects seeds with considerable force, for a distance of up to 5 metres according to New Zealand studies.<sup>18</sup>

### **Grey willow (*Salix cinerea*)**

Seed is easily carried by wind for more than 1 km, and some travels up to 50 or even 100 km. Transport of seed or live branches by streams also serves to spread willows, but is less effective, and only downstream.<sup>19</sup>

### **Moth plant**

Seeds travel far and wide (normally up to 100 metres) on parachutes of fine silky tufts with some also being spread on animals, and peoples’ clothing.<sup>20</sup>

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<sup>16</sup> Molloy BJP, Rumball PJ, Cumberland GLB. Distribution and ecology of Australian sedge. *Proceedings of the NZ Grassland Association*. 112-127. [http://www.grassland.org.nz/publications/nzgrassland\\_publication\\_1711.pdf](http://www.grassland.org.nz/publications/nzgrassland_publication_1711.pdf)

<sup>17</sup> PestWeb [http://www.pestweb.co.nz/view\\_species.php?sp=Cytisus+scoparius&tab=B](http://www.pestweb.co.nz/view_species.php?sp=Cytisus+scoparius&tab=B)

<sup>18</sup> Parsons WT, Cuthbertson EG 1992. Noxious Weeds of Australia.

<sup>19</sup> Cremer KW 2003. Introduced willows can become invasive pests in Australia. *Biodiversity* 4(4): 17-24.

<sup>20</sup> Auckland Regional Council 1999. Moth plant factsheet.

## **Nodding thistle**

Nodding thistle seeds are not carried far by the wind, usually no further than 20 metres.<sup>21</sup>

## **Pampas**

The seed bearing florets of the female plant are hairy and readily dispersed by wind, often being carried for up to 25km. In contrast, the almost hairless florets from bisexual plants tend to fall close to the parent plant.<sup>19</sup>

## **Ragwort**

Most seed fell within 36 metres of the parent plant.<sup>22</sup>

## **Royal fern**

Royal fern spores are wind dispersed, therefore can be carried long distances.

## **Wilding conifers and contorta pine**

The majority of spread is fringe spread and is encountered within a few hundred metres downwind of the source. However, it is not uncommon to find wildings some kilometres downwind of the parent trees. This long distance spread usually originates from "take-off" sites - ridges or hilltops or from sites on or near slopes exposed to the prevailing winds, and often results in the establishment of lone outlier trees, which if left alone will eventually parent a new pocket of wildings. For unknown reasons, the appearance of wildings is often several years after the first seed is produced.<sup>23</sup>

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<sup>21</sup> Korte CJ, Eyles GO, Bennie SK, Taylor MJ 1998. A guide to Nodding and Variegated Thistle Control. Hawkes Bay Regional Council.

<sup>22</sup> Wardle DA 1987. The ecology of ragwort (*Senecio jacobaea* L.) - a review. New Zealand Journal of Ecology 10: 67-76.

<sup>23</sup> Tussock Grassland Management Information System.

<http://www.tussocks.net.nz/Forestry/Management/spreadofwildingtrees.html>

## Good neighbour rule tests: wind and ballistic dispersed pests

Pest	
<ul style="list-style-type: none"> <li>• Australian sedge (<i>Carex longebrachiata</i>)</li> <li>• Broom (<i>Cytisus scoparius</i>)</li> <li>• Contorta pine (<i>Pinus contorta</i>)</li> <li>• Gorse (<i>Ulex europaeus</i>)</li> <li>• Grey willow (<i>Salix cinerea</i>)</li> <li>• Moth plant (<i>Araujia hortorum</i>), also known as <i>A. Sericifera</i></li> <li>• Nodding thistle (<i>Carduus nutans</i>) and plumeless thistle (<i>Carduus acanthoides</i>)</li> <li>• Pampas (<i>Cortaderia jubata</i> and <i>C. selloana</i>, and cultivars)</li> <li>• Ragwort (<i>Senecio jacobaea</i> and <i>Jacobaea vulgaris</i>)</li> <li>• Royal fern (<i>Osmunda regalis</i>)</li> <li>• Wilding conifers</li> </ul>	
Tests*	Comments/considerations
<p>(a) In the absence of the rule, the pest would:</p> <p>(i) spread to land that is adjacent or nearby within the life of the plan; and</p> <p>(ii) cause more than minor costs to an occupier of that land (being costs resulting from a material effect on the way that occupier manages that land, or a material effect on that occupier's activities on that land).</p>	<p>These pests are dispersed by the wind or seeds may be ejected from the plant. Depending on the type and size of the seed the dispersal distance could be as low as a few metres or as high as tens of kilometres. For this reason rapid invasion into neighbouring land is possible and can cause serious damage to the local ecosystems and economy.</p> <p>These species are hard to manage and threaten residential areas, production land and environmental areas. Once widely established control is difficult and the pest will continue to spread rapidly. For some landowners there will be a considerable associated cost.</p>
<p>(b) In determining whether the pest would spread as described in sub clause (a) the regional council must consider the proximity and characteristics of the adjacent or nearby land and the biological characteristics and behaviour of the particular pest (the greater the distance between properties, the more difficult to satisfy the test in sub clause (a)).</p>	<p>These species spread by the wind or ballistically. Most seed is dropped within 100 metres of the seed source, but may be spread much further, or considerably less in the case of ballistically spread pests.</p>

<p>(c) The land that is adjacent or nearby, as described in sub clause (a), must be clear from the pest or, if the pest is present on that land, the occupier of that land must be taking measures to manage the pest or its impacts.</p>	<p>The RPMP rules apply to all land occupiers and these pests must be managed. If an occupier is not complying with the RPMP rule, the adjoining landowner/occupier may make a complaint to council and council will follow-up the non-compliance.</p>
<p>(d) The rule must not set a requirement on an occupier that is greater than that required to manage the spread of the pest.</p>	<p>The buffer distances in these rules give the neighbouring landowner a level of protection against most wind spread seed and ballistic spread. For large properties this is a far more realistic option than a requirement to manage the entire property.</p>
<p>(e) In determining the rules to be set to manage the costs to an occupier of land that is adjacent or nearby, of the pest spreading, consider:</p> <ul style="list-style-type: none"> <li>(i) the biological characteristics and behaviour of the particular pest; and</li> <li>(ii) whether the costs of compliance with the rule are reasonable relative to the costs that such an occupier would incur, from the pest spreading, in the absence of a rule.</li> </ul>	<p>(i) Wind dispersal puts all adjacent land at risk, potentially up to many kilometres from the parent plant. Ballistic spread is much less. This is reflected in the rules.</p> <p>(ii) The costs imposed by these pests can be significant. Compliance costs are considered to be reasonable in comparison.</p>

### 2.2.3 Water dispersed

Many aquatic and some terrestrial plant species use seed dispersal through water. To create rules for water dispersed propagules can be very difficult as there are many variables to consider; seed weight, water disturbance, plants rafting capability. Some plants can also use a combination of bird and water dispersal.

Seeds can travel for extremely long distances, depending on the specific mode of water dispersal e.g. sea spurge floating to New Zealand from Australia.

The seeds of yellow flag iris can also be dispersed by water both inland streams and rivers and also if they grow near oceans, the seeds can be transported by ocean currents over long distances with seed being found along the west coast of the Waikato which is believed to have come from plants in the Waikato River.

As well as dispersal by seed some plants use fragmentation to disperse. Reed sweet grass uses both seed and creeping rhizomes fragments to spread.

#### **California bulrush (*Schoenoplectus californicus*)**

Seed is bird and water dispersed. Vegetative spread happens through detachment and deliberate plantings.<sup>24</sup>

#### **Giant gunnera (*Gunnera tinctoria* and *G. manicata*)**

Seed spread by birds and water, rhizomes by deliberate plantings, soil movement.<sup>25</sup>

#### **Mexican water lily (*Nymphaea mexicana*)**

Mexican water lily is recognisable by its large floating spotted leaves with yellow flowers. It is spread by rhizomes, tubers, seeds and by deliberate planting.<sup>26</sup>

Spreads vegetatively from stolons, and will spread into water 2 m deep.<sup>27</sup>

Existing colonies increase in size as creeping rhizomes spread beyond their periphery. Other spread is by seed moved in flowing water, or in mud on animal hooves and fur, and on footwear, machinery or other vehicles<sup>28</sup>.

#### **Crack willow (*S. fragilis*)**

Crack willow is a deciduous tree that grows to 25 m. This tree has spreading rather than hanging branches with rough and fissured bark. Root suckers and rootlets are bright-red when in or near water. Shoots and leaves are silky when young but become hairless as they mature. Leaves are narrow lance-shaped with tiny serrations. Undersides of leaves are pale, and the upper surface is shiny, green and often covered with bright-red galls. Narrow downward-curving catkins (40-75 mm long) appear from September to October. As there are only male plants in New Zealand, no fruit is formed unless hybridised with other species such as golden willow. Spread is by stem fragments carried by water movement which readily produce new plants<sup>29</sup>

<sup>24</sup> New Zealand Plant Conservation Network 2013. *Schoenoplectus californicus*. [http://www.nzpcn.org.nz/flora\\_details.aspx?ID=2690](http://www.nzpcn.org.nz/flora_details.aspx?ID=2690)

<sup>25</sup> New Zealand Plant Conservation Network 2013. *Gunnera tinctoria*. [http://www.nzpcn.org.nz/flora\\_details.aspx?ID=4015](http://www.nzpcn.org.nz/flora_details.aspx?ID=4015)

<sup>26</sup> Waikato Regional Pest Management Strategy 2008 - 2013

<sup>27</sup> <http://www.weeds.org.au/cgi-bin/weedident.cgi?tpl=plant.tpl&state=&s=&ibra=all&card=W16>

<sup>28</sup> Parsons WT, Cuthbertson EG 1992. Noxious Weeds of Australia.

<sup>29</sup> <http://www.biosecurity.govt.nz/pests/crack-willow>

### **Japanese walnut (*Juglans ailantifolia*)**

Fruit hanging in clusters 2.5-4 cm long, and “heartshaped” walnuts. An escape from cultivation around settlements, but spreading along some roadsides, stream and river banks in the North Island.<sup>30</sup>

Methods of seed dispersal is mainly by water, occasionally dumped nuts. Possibly by pigs or possums.<sup>31</sup>

### **Yellow flag iris (*Iris pseudacorus*)**

Seeds and rhizome fragments are spread by water and contaminated machinery. It is a ‘garden escape’ plant that has spread from gardens and deliberate plantings into the environment.<sup>32</sup>

Seeds and rhizome fragments spread by water and contaminated machinery.<sup>33</sup>

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<sup>30</sup> Ian Popay, Paul Champion, Trevor James. 2010. Common Weeds of New Zealand 3<sup>rd</sup> Edition.

<sup>31</sup> Horizons Regional Council. <http://www.horizons.govt.nz/assets/publications/managing-our-environment/publications-pest-plants-and-animals/Japanese-Walnut.pdf>

<sup>32</sup> Weedbusters. [http://weedbusters.co.nz/weed\\_info/detail.asp?WeedID=13](http://weedbusters.co.nz/weed_info/detail.asp?WeedID=13)

<sup>33</sup> New Zealand Plant Conservation Network 2013. *Iris pseudacorus*. [http://www.nzpcn.org.nz/flora\\_details.aspx?ID=3315](http://www.nzpcn.org.nz/flora_details.aspx?ID=3315)

## Good neighbour rule tests: water dispersed pests

Pest	
<ul style="list-style-type: none"> <li>• California bulrush (<i>Schoenoplectus californicus</i>)</li> <li>• Giant gunnera (<i>Gunnera tinctoria</i> and <i>G. manicata</i>)</li> <li>• Japanese walnut (<i>Juglans ailantifolia</i>)</li> <li>• Willow: grey (<i>Salix cinerea</i>) and crack (<i>Salix fragilis</i>)</li> <li>• Mexican water lily (<i>Nymphaea mexicana</i>)</li> <li>• Yellow flag iris (<i>Iris pseudacorus</i>)</li> </ul>	
Tests*	Comments/considerations
<p>(a) In the absence of the rule, the pest would:</p> <p>(i) spread to land that is adjacent or nearby within the life of the plan; and</p> <p>(ii) cause more than minor costs to an occupier of that land (being costs resulting from a material effect on the way that occupier manages that land, or a material effect on that occupier's activities on that land).</p>	<p>These pests are predominantly dispersed by the water currents. Depending on the type and size of the seed, the dispersal distance could be as low as a few metres or as high as hundreds of kilometres downstream and at sea. However, invasion into neighbouring land likely in most cases and can cause serious damage to the local ecosystems and economy.</p> <p>The environment that these species survive in (e.g. in water and/or riparian margin) makes them difficult and costly to manage. They threaten residential areas, production land and environmental areas. Once widely established control is difficult and the plant will continue to spread rapidly.</p> <p>For some landowners there will be a considerable cost to them (e.g. yellow flag iris).</p>
<p>(b) In determining whether the pest would spread as described in sub clause (a) the regional council must consider the proximity and characteristics of the adjacent or nearby land and the biological characteristics and behaviour of the particular pest (the greater the distance between properties, the more difficult to satisfy the test in sub clause (a)).</p>	<p>These species are proven to spread rapidly by the water. Most seed has the ability to travel long distances depending on where the plant is growing, i.e. within a wetland/pond or on the riparian margin. It also depends on the type and size of the seed, rhizome and fragmentation (e.g. yellow flag seed vs. crack willow fragments).</p> <p>Because of the variables, identifying the source of the impact on a property must be done on a case by case basis before the good neighbour rule can be applied.</p>

<p>(c) The land that is adjacent or nearby, as described in sub clause (a), must be clear from the pest or, if the pest is present on that land, the occupier of that land must be taking measures to manage the pest or its impacts.</p>	<p>The RPMP rules apply to all land occupiers and these pests must be managed accordingly. If an occupier is not complying with the RPMP rule, the adjoining landowner/occupier may make a complaint to council and council will follow-up the non-compliance.</p>
<p>(d) The rule must not set a requirement on an occupier that is greater than that required to manage the spread of the pest.</p>	<p>These species are proven to spread rapidly by the water. Most seed has the ability to travel long distances depending on where the plant is growing, i.e. within a wetland/pond or on the riparian margin. It also depends on the type and size of the seed, rhizome and fragmentation (e.g. yellow flag seed vs. crack willow fragments).</p> <p>Because of the variables, identifying the source of the impact on a property must be done on a case by case basis before the good neighbour rule can be applied.</p>
<p>(e) In determining the rules to be set to manage the costs to an occupier of land that is adjacent or nearby, of the pest spreading, consider:</p> <ul style="list-style-type: none"> <li>(i) the biological characteristics and behaviour of the particular pest; and</li> <li>(ii) whether the costs of compliance with the rule are reasonable relative to the costs that such an occupier would incur, from the pest spreading, in the absence of a rule.</li> </ul>	<p>(i) Water dispersal puts all adjacent land at risk. However, identifying the source of the impact on a property must be done on a case by case basis before the good neighbour rule can be applied.</p> <p>(ii) The costs associated with these pests can be significant. The reasonableness of compliance costs must be evaluated case-by-case before the good neighbour rules are applied.</p>

## 2.2.4 Vegetative dispersal

Vegetative dispersal requires that segments of the parent plant, usually a piece of stem containing the node or a rhizome fragment, will form roots. In most cases the fragment requires an additional dispersal method to spread; this could be as simple as gravity (Mignonette vine) or water (saltwater paspalum) or use the help of animals (i.e. on fur or caught in their feet).

### **Mignonette vine (*Anredera cordifolia*)**

This species often spreads through its own vegetative growth, but can easily be transported by human activities. If fragments end up in waterways, they are easily transported to new locations in this manner.<sup>34</sup>

No seed is produced in New Zealand, with all spread by dumped or waterborne (fresh or sea water) tubers and rhizomes. Even tiny fragments of tubers can re-sprout.<sup>35 36</sup>

### **Saltwater paspalum (*Paspalum vaginatum*)**

Its dispersal mechanisms are not well understood as it is unclear whether it sets viable seed. It seems most likely to be vegetative spread either deliberately, or by animals or other natural means.<sup>37</sup>

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<sup>34</sup> Global Invasive Species Database 2013. *Anredera cordifolia* (vine, climber).  
<http://www.issg.org/database/species/ecology.asp?si=776&fr=1&sts=sss&lang=EN>

<sup>35</sup> Department of Conservation 2000. Weed manager: a guide to the identification, impacts and management of conservation weeds of New Zealand. Department of Conservation, Wellington.

<sup>36</sup> Weedbusters. [http://www.weedbusters.co.nz/weed\\_info/detail.asp?WeedID=71](http://www.weedbusters.co.nz/weed_info/detail.asp?WeedID=71)

<sup>37</sup> Graeme M, Kendal H 2001. Saltwater Paspalum (*Paspalum vaginatum*) – a Weed Review. Prepared for Waikato Regional Council, New Zealand.

## Good neighbour rule tests: vegetative dispersed pests

Vegetative dispersed plants	
<ul style="list-style-type: none"> <li>• Mignonette vine (<i>Anredera cordifolia</i>)</li> <li>• Saltwater paspalum (<i>Paspalum vaginatum</i>)</li> </ul>	
Tests*	Comments/considerations
<p>(a) In the absence of the rule, the pest would:</p> <p>(i) spread to land that is adjacent or nearby within the life of the plan; and</p> <p>(ii) cause more than minor costs to an occupier of that land (being costs resulting from a material effect on the way that occupier manages that land, or a material effect on that occupier's activities on that land).</p>	<p>These pests are predominantly dispersed by fragments from the rhizome, leaf or stem. In some cases spread can be slow, as fragments only move a short distance from the plant. Physical movement of the plant is a key way in which these plants spread, i.e. water, dumping and machinery, in these situations plant propagules can potentially move long distances. Once established these plants can be very difficult to destroy and often require repeated control applications.</p> <p>These plants can cause serious damage to the local ecosystems and economy.</p> <p>These species are hard to manage and threaten residential areas, production land and environmental areas. Once widely established control is difficult and the plant will continue to spread. For some landowners there will be a considerable associated cost.</p>

<p>(b) In determining whether the pest would spread as described in sub clause (a) the regional council must consider the proximity and characteristics of the adjacent or nearby land and the biological characteristics and behaviour of the particular pest (the greater the distance between properties, the more difficult to satisfy the test in sub clause (a)).</p>	<p>These species are proven to spread by fragmentation. Most fragments are dropped within 10-20 metres of the parent plant but can be carried some distance under the right conditions (i.e. gravity, water, animal) and therefore could be spread many kilometres.</p> <p>A site specific evaluation is needed to consider the proximity and characteristics of the adjacent or nearby land.</p>
<p>(c) The land that is adjacent or nearby, as described in sub clause (a), must be clear from the pest or, if the pest is present on that land, the occupier of that land must be taking measures to manage the pest or its impacts.</p>	<p>The RPMP rules apply to all land occupiers and these pests must be managed accordingly. If an occupier is not complying with the RPMP rule, the adjoining landowner/occupier may make a complaint to council and council will follow-up the non-compliance.</p>
<p>(d) The rule must not set a requirement on an occupier that is greater than that required to manage the spread of the pest.</p>	<p>For Mignonette vine the 20 metre distance is adequate and a far more realistic option than a requirement to manage cross boundary impacts across the entire property.</p> <p>For saltwater paspalum, identifying the source of the impact on a property must be done on a case by case basis before the good neighbour rule can be applied.</p>
<p>(e) In determining the rules to be set to manage the costs to an occupier of land that is adjacent or nearby, of the pest spreading, consider:</p> <p>(i) the biological characteristics and behaviour of the particular pest; and</p> <p>(ii) whether the costs of compliance with the rule are reasonable relative to the costs that such an occupier would incur, from the pest spreading, in the absence of a rule.</p>	<p>(i) Vegetative dispersal can put adjacent at risk; however spread may be slow. Site specific evaluations are also needed.</p> <p>(ii) The costs associated with these pests can be significant. The reasonableness of compliance costs must be evaluated case-by-case before the good neighbour rules are applied.</p>

## 2.2.5 Pests dispersed by physical means or machinery

The role of machinery and equipment contaminated with plants spreading and infesting previously clear areas is under-appreciated. This dispersal mechanism is caused through human movement of 'risk goods' and can be both intentional and unintentional, although the latter is more likely.

The "Keep it Clean"<sup>38</sup> document highlights and states these risks. Machinery and vehicle movements are not the only culprit responsible for much of the ongoing spread of pests in New Zealand's productive and environmental landscapes. Other significant pathways such as movements of stock, stock feed, and rock aggregates are also important<sup>39</sup>.

However, machinery movements pose a persistent high risk in pest spread, with at least 80 pest species known to be typically moved by machinery<sup>40</sup>.

There needs to be more vigilance by all machinery operators and people who move animal feed material from property-to-property. For the most part the rural sector has a strong sense of environmental stewardship; however, for all land managers there is room for improvement in taking responsibility for potential effects when moving machinery and animal feed around the countryside.

### Purple nutsedge/nutgrass (*Cyperus rotundus*)

In most cases nutgrass produces little, if any, viable seed; when seed is produced it usually germinates poorly under field conditions.

Dispersal occurs when tubers are dragged by cultivation equipment and to a lesser degree with the movement of mud, soil (particularly with potted plants), gravel and flood waters. Without disturbance, normal rhizome and tuber growth extends the boundary of a patch by more than a meter a year.<sup>41</sup>

### Velvet leaf (*Abutilon theophrasti*)

Seeds are spread by farm machinery when harvesting grain (e.g., maize), through livestock, and as a contaminant of grain.<sup>42</sup>

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<sup>38</sup> National Pest Control Agencies (2013). KEEP IT CLEAN, Machinery hygiene guidelines and logbook to prevent the spread of pests and weeds.

<sup>39</sup> MAF Biosecurity New Zealand (2010) Slowing pest spread. Domestic Pathways of Human Mediated Pest Spread. MAF Biosecurity New Zealand Technical Paper No: 2010/22

<sup>40</sup> MAF Biosecurity New Zealand (2012) Pilot risk analysis for the domestic machinery pathway. Report prepared by Sandy Toy for the Ministry of Agriculture and Forestry under contract.

<sup>41</sup> Parsons WT, Cuthbertson, EG 1992. Noxious Weeds of Australia. Page 59.

<sup>42</sup> PestWeb. [http://www.pestweb.co.nz/view\\_species.php?sp=Abutilon+theophrasti&tab=B](http://www.pestweb.co.nz/view_species.php?sp=Abutilon+theophrasti&tab=B)

## Good neighbour rule tests: physical machinery dispersed pests

Pest	
<ul style="list-style-type: none"> <li>• Purple nutsedge/nutgrass (<i>Cyperus rotundus</i>)</li> <li>• Velvet leaf (<i>Abutilon theophrasti</i>)</li> </ul>	
Tests*	Comments/considerations
<p>(a) In the absence of the rule, the pest would:</p> <p>(i) spread to land that is adjacent or nearby within the life of the plan; and</p> <p>(ii) cause more than minor costs to an occupier of that land (being costs resulting from a material effect on the way that occupier manages that land, or a material effect on that occupier's activities on that land).</p>	<p>These pests are predominantly spread by poor machinery hygiene and soil movement.</p> <p>In most cases natural spread can be slow as the plant propagules only move a short distance for the parent plant. However once picked up by an agricultural machine there is no limit to where these plants can spread.</p> <p>Once established these plants can be very difficult to destroy/manage and often require repeated control applications. For this reason these plants can cause very serious damage to the economy and agricultural industry.</p> <p>These species are hard to manage and threaten production land. Once established on a property control is difficult, and the plant will continue to spread via normal agricultural practices. For some landowners there will be a considerable associated cost.</p>

<p>(b) In determining whether the pest would spread as described in sub clause (a) the regional council must consider the proximity and characteristics of the adjacent or nearby land and the biological characteristics and behaviour of the particular pest (the greater the distance between properties, the more difficult to satisfy the test in sub clause (a)).</p>	<p>These species are proven to spread by agricultural machinery. Machines can move very quickly from property to property, therefore potentially spreading plant propagules.</p> <p>Because the main way these plants are spread is by human activities, a distance rule is ineffective for managing the risks of machinery spread species.</p> <p>For velvet leaf, the occupier of land shall not move, or allow to be moved, any plant propagules listed from a contaminated property.</p> <p>For purple nutsedge, the occupier of land shall not move or allow to be moved, cultivating/harvesting machinery, any organism, risk goods or other goods into or out of a property, that may be contaminated with plants listed, without the permission of an authorised person.</p>
<p>(c) The land that is adjacent or nearby, as described in sub clause (a), must be clear from the pest or, if the pest is present on that land, the occupier of that land must be taking measures to manage the pest or its impacts.</p>	<p>The RPMP rules apply to all land occupiers and these pests must be managed accordingly. If an occupier is not complying with the RPMP rule, the adjoining landowner/occupier may make a complaint to council and council will follow-up the non-compliance.</p>
<p>(d) The rule must not set a requirement on an occupier that is greater than that required to manage the spread of the pest.</p>	<p>As the main dispersal method is predominantly the human movement of plant propagules, having a set distance rule is ineffective for managing the risks of machinery spread species. Machinery will move between adjacent properties (i.e. hay/silage) to minimise costs. Therefore the good neighbour rule for plants predominantly dispersed by machinery is about controlling movement, not about buffers.</p>

<p>(e) In determining the rules to be set to manage the costs to an occupier of land that is adjacent or nearby, of the pest spreading, consider:</p> <p>(i) the biological characteristics and behaviour of the particular pest; and</p>	<p>(i) Machinery dispersed plants puts all adjacent land at risk; however site specific evaluations are also needed.</p>
<p>(ii) whether the costs of compliance with the rule are reasonable relative to the costs that such an occupier would incur, from the pest spreading, in the absence of a rule.</p>	<p>(ii) The costs caused by these pests can be significant. The costs associated with compliance with this rule are generally considered to be reasonable; however costs must be evaluated case-by-case before the good neighbour rules are applied.</p>

## 3 Good neighbour rules for animal pests in the Waikato region

### 3.1 Feral goats (*Capra hircus*)

Directions on good neighbour rules	
Tests*	Comments/considerations
<p>(a) In the absence of the rule, the pest would:</p> <p>(i) spread to land that is adjacent or nearby within the life of the plan; and</p> <p>(ii) would cause more than minor costs to an occupier of that land (being costs resulting from a material effect on the way that occupier manages that land, or a material effect on that occupier's activities on that land).</p>	<p>Feral goats will readily move between properties to exploit food sources. Feral goats may move several kilometres within short periods of time if pressured.</p> <p>Where feral goat control is occurring on adjacent land; uncontrolled populations will cause:</p> <ul style="list-style-type: none"> <li>• biodiversity impacts from goat browse on vegetation</li> <li>• instability of erosion slips through goat browse on stabilising vegetation, contributing to further erosion and sedimentation of waterways</li> <li>• impacts of production through feeding on farm pasture.</li> </ul>
<p>(b) In determining whether the pest would spread as described in sub clause (a) the regional council must consider the proximity and characteristics of the adjacent or nearby land and the biological characteristics and behaviour of the particular pest (the greater the distance between properties, the more difficult to satisfy the test in sub clause (a)).</p>	<p>Goats will move between bush and pasture lands in search of preferred food sources. Goats have been known to move several kilometres in short periods of time.</p>
<p>(c) The land that is adjacent or nearby, as described in sub clause (a), must be clear from the pest or, if the pest is present on that land, the occupier of that land must be taking measures to manage the pest or its impacts.</p>	<p>In the event that the neighbour is not required to actively manage feral goats under the regional pest plan rule or site-led agreements and are not undertaking site specific biodiversity protection programmes, the good neighbour rules do not apply.</p>

<p>(d) The rule must not set a requirement on an occupier that is greater than that required to manage the spread of the pest.</p>	<p>An appropriate treatment area will be determined by an authorised person where goats will be required to be controlled to a standard of one feral goat encounter per hunter day. This standard is no greater than the requirement for adjacent land, which is that all feral goats shall be destroyed.</p> <p>Should the fencing option be selected the occupier negatively impacted by the situation shall be not subjected to a greater requirement than the exacerbating occupier, as it is the exacerbating occupiers choice as to whether or not to retain feral goats on the land in question.</p>
<p>(e) In determining the rules to be set to manage the costs to an occupier of land that is adjacent or nearby, of the pest spreading, consider:</p> <p>(i) the biological characteristics and behaviour of the particular pest; and</p> <p>(ii) whether the costs of compliance with the rule are reasonable relative to the costs that such an occupier would incur, from the pest spreading, in the absence of a rule.</p>	<p>When determining the buffer area to be treated by hunting the length of time between control periods must also be considered – it can be inferred that the longer the timeframe between control operations, the greater the size of the buffer is required to reduce impacts on adjacent land.</p> <p>Containing feral goats behind an appropriate fence or hunting the feral goats will reduce spread to neighbouring properties at a reasonable cost. Without fencing or hunting by the exacerbating occupier all of the costs to mitigate the impact will fall on the affected landowner.</p>

## References

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- Parkes J, 1990. Eradication of feral goats on islands and habitat islands. *Journal of the Royal Society of New Zealand* 20(3): 297-304.
- Rudge MR 1990. Feral goat. In: King CM ed. *The Handbook of New Zealand mammals*. 2nd ed. Auckland, Oxford University Press. 406-423.

## 3.2 Magpie (*Gymnorhina species*)

Directions on good neighbour rules	
Tests*	Comments/considerations
(a) In the absence of the rule, the pest would: (i) spread to land that is adjacent or nearby within the life of the plan; and  (ii) would cause more than minor costs to an occupier of that land (being costs resulting from a material effect on the way that occupier manages that land, or a material effect on that occupier's activities on that land).	Magpies may present a public threat annually over the breeding period. People who are particularly impacted are cyclists, school children, and recreational users. The magpie nest may occur on land adjacent to where the complaint arises.  Should magpie populations on land adjacent to where the complaint has arisen not be controlled the threat will not be mitigated. In this case, the cost would likely be in terms of personal injury.
(b) In determining whether the pest would spread as described in sub clause (a) the regional council must consider the proximity and characteristics of the adjacent or nearby land and the biological characteristics and behaviour of the particular pest (the greater the distance between properties, the more difficult to satisfy the test in sub clause (a)).	Magpies typically only present this threatening behaviour in areas close to where they are breeding.
(c) The land that is adjacent or nearby, as described in sub clause (a), must be clear from the pest or, if the pest is present on that land, the occupier of that land must be taking measures to manage the pest or its impacts.	In the event that the neighbour is not required to actively manage magpies under the regional pest plan rule or site-led agreements the good neighbour rules do not apply.
(d) The rule must not set a requirement on an occupier that is greater than that required to manage the spread of the pest.	Destroying the bird and or the nest is considered to be the only effective way to deal with these issues.
(e) In determining the rules to be set to manage the costs to an occupier of land that is adjacent or nearby, of the pest spreading, consider: (i) the biological characteristics and behaviour of the particular pest; and (ii) whether the costs of compliance with the rule are reasonable relative to the costs that such an occupier would incur, from the pest spreading, in the absence of a rule.	The threat behaviour is only likely to occur during a short period of time between September and November annually.  The costs of control are likely to be reasonable given the potential for serious injury of cyclists and attacks on children and recreational users.

## Reference

- Morgan D, Waas JR, Innes J 2005. Magpie interactions with other birds in New Zealand: results from a literature review and public survey. *Notornis* 52(2): 61-74.

### 3.3 Possum (*Trichosurus vulpecula*)

Directions on good neighbour rules	
Tests*	Comments/considerations
<p>In the absence of the rule, the pest would:</p> <p>(i) spread to land that is adjacent or nearby within the life of the plan; and</p> <p>(ii) would cause more than minor costs to an occupier of that land (being costs resulting from a material effect on the way that occupier manages that land, or a material effect on that occupier's activities on that land).</p>	<p>Possums primarily disperse through juvenile dispersal but home range movement in response to habitat and food needs also occurs.</p> <p>Where possum control is occurring on adjacent land:</p> <ul style="list-style-type: none"> <li>• Significant costs are possible through pasture browse, cropping damage, and Tb infection within stock.</li> <li>• Biodiversity impacts will also occur to vegetation and invertebrates through possum browse and predation.</li> <li>• Significant costs are possible through reinvasion onto PPCAs where council service providers are contracted to achieve RTC levels – untreated lands will impact the contractors' ability to achieve the required RTC.</li> </ul>
<p>(b) In determining whether the pest would spread as described in sub clause (a) the regional council must consider the proximity and characteristics of the adjacent or nearby land and the biological characteristics and behaviour of the particular pest (the greater the distance between properties, the more difficult to satisfy the test in sub clause (a)).</p>	<p>At specific times of the year juvenile possums migrate to new territories. How far they move is dependent on various environmental factors – but the migration distance can be large.</p> <p>These migrations can create significant adverse effects on adjacent properties where site specific biodiversity protection programmes or PPCA are occurring.</p>
<p>(c) The land that is adjacent or nearby, as described in sub clause (a), must be clear from the pest or, if the pest is present on that land, the occupier of that land must be taking measures to manage the pest or its impacts.</p>	<p>In the event that the neighbour is not required to actively manage possums under the regional rest plan rule or are not undertaking site specific biodiversity protection programmes, the good neighbour rules do not apply.</p>

<p>(d) The rule must not set a requirement on an occupier that is greater than that required to manage the spread of the pest.</p>	<p>The rule will not require management of possum habitat areas 500m beyond the property boundary of the area where the complaint has originated from.</p> <p>Council recognises that the proposed 500m buffer distance is a matter of professional judgement. Possums, like most animals, do not follow a strict set of behavioural rules. Nevertheless, Waikato Regional Council believes this is a reasonable figure. With a narrower buffer, the externality impact would likely be reduced only for a short period of time. The wider the buffer the longer the externality impact will be mitigated as reinvasion time will be extended</p> <p>The occupier is expected to control possums to the same standard as being achieved on the adjacent land typically an RTC of 3 or 5% depending on the method of control.</p>
<p>(e) In determining the rules to be set to manage the costs to an occupier of land that is adjacent or nearby, of the pest spreading, consider:</p> <p>(i) the biological characteristics and behaviour of the particular pest; and</p> <p>(ii) whether the costs of compliance with the rule are reasonable relative to the costs that such an occupier would incur, from the pest spreading, in the absence of a rule.</p>	<p>Home range movement is unlikely to be beyond 500m in normal circumstances for 95% of possums, but in many cases possums have been recorded moving much greater distances in short periods of time.</p> <p>When determining the buffer area the length of time between control periods has also been considered – it can be inferred that the longer timeframe between control operations the greater the size of the buffer is required to reduce impacts on adjacent land.</p> <p>Regular and timely control of possums to a 3 or 5% RTC (dependent on the area and the method) will reduce spread to neighbouring properties at a reasonable cost.</p>

\* Before a rule can be identified as a good neighbour rule in a regional pest management plan, the regional council must be satisfied of the matters in sub clause (a), (c), and (d) and must comply with the requirements in sub-clause (b) and (e).

## References

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- King, CM (ed.) 1998. The handbook of New Zealand Mammals. Auckland, Oxford University Press.

### 3.4 Rabbit (*Oryctolagus cuniculus*)

Directions on good neighbour rules	
Tests*	Comments/considerations
<p>(a) In the absence of the rule, the pest would:</p> <p>(i) spread to land that is adjacent or nearby within the life of the plan; and</p> <p>(ii) would cause more than minor costs to an occupier of that land (being costs resulting from a material effect on the way that occupier manages that land, or a material effect on that occupier's activities on that land).</p>	<p>High rabbit populations on one property will exacerbate the impacts on neighbouring properties.</p> <p>Uncontrolled rabbit populations will impact neighbouring properties by:</p> <ul style="list-style-type: none"> <li>• consuming pasture, and competing with stock</li> <li>• contributing to greater breeding potential</li> <li>• digging burrows and damaging paddocks to the extent where they may pose a hazard to stock and farm machinery.</li> <li>• impacting on site aesthetics with large amounts of excrement on the ground, and disturbed lawns and gardens</li> <li>• consuming vegetation used for aesthetic plantings or sedimentation control.</li> </ul>
<p>(b) In determining whether the pest would spread as described in sub clause (a) the regional council must consider the proximity and characteristics of the adjacent or nearby land and the biological characteristics and behaviour of the particular pest (the greater the distance between properties, the more difficult to satisfy the test in sub clause (a)).</p>	<p>Rabbits will move from property to property with ease in search of food, mates and suitable burrow sites.</p>
<p>(c) The land that is adjacent or nearby, as described in sub clause (a), must be clear from the pest or, if the pest is present on that land, the occupier of that land must be taking measures to manage the pest or its impacts.</p>	<p>In the event that the neighbour is not required to actively manage rabbits under the regional pest plan rule or site-led agreements, the good neighbour rules do not apply.</p>
<p>(d) The rule must not set a requirement on an occupier that is greater than that required to manage the spread of the pest.</p>	<p>Level 4 on the McLean scale is an appropriate management requirement.</p>

<p>(e) In determining the rules to be set to manage the costs to an occupier of land that is adjacent or nearby, of the pest spreading, consider:</p> <p>(i) the biological characteristics and behaviour of the particular pest; and</p>	<p>If left uncontrolled rabbit populations rapidly grown to the point where they will impact neighbouring properties.</p>
<p>(ii) whether the costs of compliance with the rule are reasonable relative to the costs that such an occupier would incur, from the pest spreading, in the absence of a rule.</p>	<p>Rabbit control is a standard requirement in rural areas because of the large costs they can impose on landowners. Regular rabbit control is more economic than infrequent operations, and is a normal behaviour of properties in rabbit prone areas. The cost of compliance is considered to be reasonable.</p>

## References

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### 3.5 Rats: ship rat (*Rattus rattus*) and Norway rat (*Rattus norvegicus*)

Directions on good neighbour rules	
Tests*	Comments/considerations
<p>(a) In the absence of the rule, the pest would:</p> <p>(i) spread to land that is adjacent or nearby within the life of the plan; and</p> <p>(ii) would cause more than minor costs to an occupier of that land (being costs resulting from a material effect on the way that occupier manages that land, or a material effect on that occupier's activities on that land).</p>	<p>Rat populations will move from uncontrolled areas to controlled areas in response to a search for food, mates, and or extension of home range.</p> <p>Uncontrolled rat populations will impact neighbouring properties by:</p> <ul style="list-style-type: none"> <li>negatively impacting on biodiversity through browsing and predation</li> <li>impacting on council service providers' ability to attain agreed control performance standards.</li> </ul>
<p>(b) In determining whether the pest would spread as described in sub clause (a) the regional council must consider the proximity and characteristics of the adjacent or nearby land and the biological characteristics and behaviour of the particular pest (the greater the distance between properties, the more difficult to satisfy the test in sub clause (a)).</p>	<p>Home ranges and natural dispersal rates vary from site to site.</p> <p>Rats have been documented dispersing 500m in forest fragment habitats and in a short period of time.</p> <p>The average dispersal distance in non-beech North Island forest habitats has been documented at 300m.</p>
<p>(c) The land that is adjacent or nearby, as described in sub clause (a), must be clear from the pest or, if the pest is present on that land, the occupier of that land must be taking measures to manage the pest or its impacts.</p>	<p>In the event that the neighbour is not required to actively manage rats under the regional pest plan rule, Project Halo or site-led agreements, the good neighbour rules do not apply.</p>
<p>(d) The rule must not set a requirement on an occupier that is greater than that required to manage the spread of the pest.</p>	<p>Control over no more than 200 metres is considered appropriate to manage the pest.</p>

<p>(e) In determining the rules to be set to manage the costs to an occupier of land that is adjacent or nearby, of the pest spreading, consider:</p> <p>(i) the biological characteristics and behaviour of the particular pest; and</p>	<p>Uncontrolled rat populations occupy different home ranges. They will disperse into unoccupied territories at different rates depending on the dynamics of the environment and the rat population, but they will quickly invade controlled areas.</p>
<p>(ii) whether the costs of compliance with the rule are reasonable relative to the costs that such an occupier would incur, from the pest spreading, in the absence of a rule.</p>	<p>Having untreated land nearby will quickly remove any benefit of rat control on adjacent land. The cost of complying with the rule is considered to be reasonable given the extreme impacts that rats can have on native biodiversity.</p>

## References

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- King CM, Innes JG, Gleeson D, Fitzgerald N, Winstanley T, O'Brien B, Bridgeman L, Cox N 2011. Reinvasion by ship rats (*Rattus rattus*) of forest fragments after eradication. *Biological Invasions*, 13(10): 2391-2408.
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## 3.6 Wasp species

Directions on good neighbour rules	
Tests*	Comments/considerations
<p>(a) In the absence of the rule, the pest would:</p> <ul style="list-style-type: none"> <li>(i) spread to land that is adjacent or nearby within the life of the plan; and</li> <li>(ii) cause more than minor costs to an occupier of that land (being costs resulting from a material effect on the way that occupier manages that land, or a material effect on that occupier's activities on that land).</li> </ul>	<p>Uncontrolled wasp populations may cause environmental and public health impacts to occur on neighbouring land as the wasp will move across property boundaries.</p> <p>Uncontrolled wasp populations may cause more than minor costs and impact on activities being carried out on adjacent land due to the public health impacts.</p> <p>Uncontrolled wasp populations may impact negatively on biodiversity by exploiting food resources and consuming beneficial insects.</p>
<p>(b) In determining whether the pest would spread as described in sub clause (a) the regional council must consider the proximity and characteristics of the adjacent or nearby land and the biological characteristics and behaviour of the particular pest (the greater the distance between properties, the more difficult to satisfy the test in sub clause (a)).</p>	<p>Wasps may travel large distances when foraging for food. One information source indicates they may travel 1500m from the nest. Unprovoked wasp attacks are rare, however they will aggressively defend the nest if disturbed and the closer the proximity to the nest the more wasps you will encounter.</p>
<p>(c) The land that is adjacent or nearby, as described in sub clause (a), must be clear from the pest or, if the pest is present on that land, the occupier of that land must be taking measures to manage the pest or its impacts.</p>	<p>In the event that the neighbour is not required to actively manage wasps under the regional pest plan rule or site-led agreements, the good neighbour rule will not apply.</p>
<p>(d) The rule must not set a requirement on an occupier that is greater than that required to manage the spread of the pest.</p>	<p>Destroying wasp nests within 50 metres is considered an appropriate management response.</p>

<p>(e) In determining the rules to be set to manage the costs to an occupier of land that is adjacent or nearby, of the pest spreading, consider:</p> <p>(i) the biological characteristics and behaviour of the particular pest; and</p>	<p>Wasps will aggressively defend their nest if disturbed and more wasps will be encountered the closer to the nest you are.</p>
<p>(ii) whether the costs of compliance with the rule are reasonable relative to the costs that such an occupier would incur, from the pest spreading, in the absence of a rule.</p>	<p>The costs are considered reasonable especially when considering a public health impact. Reducing the population levels of wasps within 50m of a property boundary will reduce the likelihood of public health being impacted.</p>

## References

- Landcare Research 2013. Social Wasps in New Zealand. <http://www.landcareresearch.co.nz/science/plants-animals-fungi/animals/invertebrates/invasive-invertebrates/wasps>
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