

# **CANADA GEESE – A NEW INCURSION INTO AUSTRALIA**



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## 1 Executive summary

1. In late December 2007, there was an incursion of 4 Canada geese into coastal southern NSW, probably from New Zealand. By the end of January the birds had disappeared, but it is not known whether they were removed or have relocated.
2. Historical data indicate that the risk of establishment by such a small number of birds is low. However, further incursions are likely and other birds may already be present. They could inhabit the extensive wilderness areas of the NSW National Parks for some time without being observed. The current population of over 35,000 in New Zealand originated from only 50 birds.
3. Canada geese have established significant introduced nuisance populations in New Zealand, the UK and mainland Europe, and have also increased to become a problem species in their native US. They have the capacity for explosive increases in numbers and effective dispersal into new, previously uncolonised areas. They also adapt well to man-made habitats.
4. Problems caused by Canada geese include:
  - *Airstrikes.* Canada geese are a major problem species at airports and have caused deaths and considerable damage to aircraft.
  - *Public health.* Canada geese foul pastures and private lawns, golf courses, public parks, parking lots, beaches, waterways and sewage treatment ponds. They carry avian influenza, *Campylobacter*, *Listeria*, *Escherichia coli* and *Salmonella*.
  - *Agriculture.* Canada geese compete significantly with stock for pasture. This is particularly relevant when feed is limited, as during a drought. Damage to crops appears to be less important in the US and New Zealand.
  - *Environment.* Canada geese compete with native species for wetland habitat. This is especially significant when wetlands are already under threat. They are also implicated in the spread of noxious weeds. Canada geese hybridise readily with other geese, though it is not known whether they would do so with the Cape Barren Goose.
5. A range of management options are in use in other countries, including recreational and professional shooting, culling of moulting birds, egg destruction, baiting and planting of sacrificial crops. Integrated management is in place in several areas including Heathrow Airport. The cost of management compared with prevention cannot however be overemphasised.

6. **Recommendation:**

**The immediate eradication of Canada geese should be an agreed predetermined response to their incursion into any part of Australia. The risk of establishment is real, and this would result in damage and nuisance to airports, public health, agriculture and the natural and urban environments.**

**The cost of both this damage and management efforts to control it would be significant and could be major.**

## 2 Background

### 2.1 The incursion

On 26 December 2007, four Canada geese were first recorded in the Milton/Ulladulla area of the Shoalhaven in NSW. Reports were received that they were commuting between a wetland at Burrill Lake and local farmland where they were grazing. The birds are thought to be of wild origin as they were unbanded, free-flying and wary. There are 11 or 12 subspecies of Canada geese<sup>1</sup> and the plumage features and large size of the birds recorded are consistent with their having originated from the most likely source, New Zealand. The birds have not been seen since the 4<sup>th</sup> week of January, 2008; it is not known whether they have moved on and are still in Australia, or whether they have been killed. Canada geese have only been recorded once before in NSW. In October 2002 a single bird was observed at the mouth of the Shoalhaven River<sup>2</sup>, very close to the present incursion site. This bird was also thought to be a vagrant from New Zealand.

Canada geese have been introduced into Australia in the past. Some birds were liberated in south-western Australia between 1912 and 1920, and also on a subsequent occasion, but none survived. There was an unsuccessful release at Sale, Victoria in the 1920s and small numbers were observed in 1935. Two vagrant birds were recorded at Grimes Lagoon, Tunbridge, Tasmania in 1927 and were assumed to have originated from the Victorian release area. One bird, believed to have flown from New Zealand, was recorded on Lord Howe Island in 1977<sup>3</sup>.

In most parts of Australia, including NSW, current regulations do not address immediate action in the event of such an incursion. Policy in Western Australia is further developed than in most other States and Territories, and any Canada geese found there would be immediately removed.

### 2.2 The Canada goose

The Canada goose (*Branta canadensis*; with 11 subspecies) is a large, striking brown and white bird with a black head and neck and a conspicuous white facial patch. In New Zealand, where the population is largely derived from subspecies *maxima*, it is 55-100 cm in length, weighs 3-6 kg, and can live for 27 years, though high juvenile mortality results in an average life expectancy of 2.8 years<sup>4</sup>. It lives and breeds readily in temperate climates, though in its native North America the migratory populations travel to the Arctic and sub-Arctic in summer to breed. The Canada goose inhabits grasslands, terrestrial wetlands and estuarine waters, and grazes close to water in grassland, pasture and crops. In New Zealand it tends to breed in high country from September-January, but will also nest at coastal lagoons<sup>5</sup>. The bird tolerates human and other disturbances, and current urban and suburban landscaping

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<sup>1</sup> Handbook of Australian, New Zealand and Antarctic Birds, Volume 1, pp 1189-94.

<sup>2</sup> <http://bioacoustics.cse.unsw.edu.au/archives/html/birding-aus/2002-10/msg00020.html>

<sup>3</sup> Handbook of Australian, New Zealand and Antarctic Birds, Volume 1, pp 1189-94.

<sup>4</sup> Spurr EB and Coleman JD. Review of Canada goose population trends, damage and control in New Zealand. Landcare Research Science Series No 30, 2005.

<sup>5</sup> Handbook of Australian, New Zealand and Antarctic Birds, Volume 1, pp 1189-94.

techniques provide suitable habitat for the Canada goose. Many Canada goose populations are migratory, but even in their native habitat residential populations are increasing where the birds discover environments that provide all their needs. In countries to which they have been introduced, this behaviour is emphasised by the lack of traditional migratory routes. However, the ability of the Canada goose to undertake long migratory journeys assists its ability to disperse into new habitats when the carrying capacity of its existing range has been reached.

### 2.2.1 An invasive species

Canada geese are native to North America and Mexico, and are now present in sufficient numbers to constitute pest populations in significant parts of their natural distribution. They have also established large nuisance populations in the UK, mainland Europe and New Zealand. The New Zealand experience is particularly relevant to Australia.

*New Zealand.* Canada geese were introduced to New Zealand for recreational hunting, and remain a game bird there. Introductions of 3 birds in 1876 and 15 in 1879 failed, but from 1905 to 1920 there were several introductions of 3-50 birds that resulted in their widespread release, and one introduction of 50 birds is considered the basis of the present population. By 1930 they had disappeared from North Island but were well established in the Otago and Canterbury areas of South Island. They were reintroduced to North Island in 1970. Winter aerial counts gave an estimated population of at least 5,000 in North Island and 32,000 in South Island in 1987<sup>6</sup>. The birds have continued to expand their population since then, largely as a result of expanding their range. The population along the survey lines in South Island appears to be relatively static at about 35,000 birds, but elsewhere in South Island and in North Island the number of Canada geese continues to increase. In New Zealand Canada geese inhabit farmland almost exclusively, preferring improved pasture, breeding on high-country farmland and congregating in flocks of as many as 2,000 birds around inland and coastal waterways during the non-breeding season<sup>7</sup>.

*UK.* Canada geese were first introduced into Britain in 1665 as part of the waterfowl collection of King Charles II. However, numbers remained low until the 1950s when they started to increase significantly as the result of a relocation scheme implemented by the Wildfowlers' Association and Wildfowl Trust<sup>8</sup>. In 1991 63,581 Canada geese were recorded in the UK<sup>9</sup>. This had risen to 88,866 by 2000, a mean annual increase of 9.3%<sup>10</sup>, and to over 96,000 by 2005<sup>11</sup>. Most of this increase has been in areas with previously low goose densities. In the UK the nuisance value of Canada geese is now sufficient for them to feature in the services offered by private pest control companies<sup>12</sup>.

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<sup>6</sup> Handbook of Australian, New Zealand and Antarctic Birds, Volume 1, pp 1189-94.

<sup>7</sup> Spurr EB and Coleman JD. Review of Canada goose population trends, damage and control in New Zealand. Landcare Research Science Series No 30, 2005.

<sup>8</sup> Baxter A and Witter I. (2005) Adopting an integrated, flexible approach to reducing the birdstrike risk from Canada geese. Bird Strike Committee Proceedings, Vancouver, Canada.

<sup>9</sup> Canada Goose Conservation Society; [www.canadagoose.org.uk](http://www.canadagoose.org.uk).

<sup>10</sup> [www.bto.org/birdtrends2007](http://www.bto.org/birdtrends2007)

<sup>11</sup> Canada geese - a guide to legal control measures in the UK. British Association for Shooting and Conservation.

<sup>12</sup> eg. Premier Pest Control, Burton-upon-Trent

*Mainland Europe*

Canada geese have both been introduced to and have reached mainland Europe naturally. They have established populations in the Netherlands, Belgium and Scandinavia.

*North America.* Over-hunting and loss of habitat contributed to a major decline in the numbers of this native bird in North America in the late 1800s and early 1900s. In recent years, however, it has undergone population explosions in several areas. The North American non-migratory Canada goose population increased 3.6-fold from 1 million birds in 1990 to 3.6 million in 2003<sup>13</sup>. In Michigan, for example, the population has increased from about 7,000 in 1970 to more than 300,000 today<sup>14</sup>. Resident populations in the Atlantic Flyway (migratory route) have increased by 1% per annum since 1996 and reached over 1 million in spring of 2005. In the Mississippi Flyway resident birds have increased by about 5% per annum over the same period and in 1995 numbered about 1.6 million<sup>15</sup>. New Jersey alone supports more than 1 million resident birds, and in 2006 the USDA APHIS Wildlife Services listed 'Protecting property and public health and safety from damage associated with Canada geese' as its top assistance activity in New Jersey; each year it specifically assists more than 400 residents to manage problems presented by these birds<sup>16</sup>.

## 3 Impact

### 3.1 Transport

Bird strikes to aircraft present a significant problem. Between 1988 and 2004, over 195 people have been killed worldwide as a result of wildlife strikes to aircraft. Bird and other wildlife strikes cause over US\$600 million per annum in damage to US civil and military aviation. In 2003 over 4,300 bird strikes were reported by the US Air Force and over 5,900 bird strikes for US civil aircraft, even though it is estimated that 80% of bird strikes to civil aircraft are unreported<sup>17</sup>. About 15% of bird strikes result in aircraft damage. The UK Civil Aviation Administration estimates that UK registered aircraft of over 5,700 kilos strike a bird about once every thousand flights.

Canada geese are one of the birds most frequently involved in airstrikes. The birds are large and fly in flocks in V-shaped formation. In 1995 a US Air Force aircraft struck a flock of Canada geese on takeoff at Elmendorf AFB, Alaska. The plane crashed, killing all 24 crew members and destroying the US\$184 million aircraft<sup>18</sup>. In June the same year, Canada geese struck an Air France Concorde that was landing at JFK Airport in New York, destroying two of its engines at a cost of US\$6 million<sup>19</sup>. High and increasing numbers of the birds near Christchurch International Airport

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<sup>13</sup> Bird strike hazards. Navy Flying Club Safety Brief, September 14, 2004

<sup>14</sup> [www.michigan.gov](http://www.michigan.gov)

<sup>15</sup> Resident Canada Geese: Final Environmental Impact Statement. US Fish and Wildlife Service.

<sup>16</sup> USDA APHIS Wildlife Services – New Jersey. Report, 2006.

<sup>17</sup> Bird strike hazards. Navy Flying Club Safety Brief, September 14, 2004

<sup>18</sup> [www.af.mil/news/airman/1297/bash.htm](http://www.af.mil/news/airman/1297/bash.htm)

<sup>19</sup> Smith AE, Craven SR and Curtis PD. (1999) Managing Canada geese in urban environments. A technical guide, Jack Berryman Institute Publication 16.

(New Zealand) resulted in a near miss in 2004<sup>20</sup>. In the ten years 1995-2004, there were 11 airstrikes caused by Canada Geese at London's Heathrow Airport<sup>21</sup>.

### 3.2 Public health

Canada geese foul pastures and private lawns, golf courses, public parks, parking lots, beaches, waterways and sewage treatment ponds. The problem is significant because of the size both of the individual birds and of the population. In addition to the nuisance value of this problem it has the potential to transmit disease to humans as well as other animals. Canada geese are known to be carriers of avian influenza, *Campylobacter*, *Listeria*, *Escherichia coli* and *Salmonella*<sup>22</sup>. During the warmer months of the year, 94% of Canada geese sampled from various US locations were found to carry *Escherichia coli*<sup>23</sup>. In some areas they are believed to be the source of increased faecal coliform counts on beaches, which have led to beach closures<sup>24</sup>.

### 3.3 Agriculture

Damage to pasture and crops brings Canada geese into conflict with farmers. The birds feed both night and day, and their preferred food varies with the agricultural landscape. In Wisconsin, in the mid-West US, corn (maize) is their preferred food, though they also consume winter wheat, alfalfa and buckwheat. Losses are not as high as might be expected as the birds prefer the increased visibility afforded by harvested fields and fallen grain contributes much of their consumption<sup>25</sup>. In New Zealand Canada geese have been recorded taking clovers, lucerne, brassicas, peas, turnips, oats and barley as well as grasses. Canada geese compete directly with livestock for pasture and crops, and the daily intake of a single bird has been estimated at 0.3-0.4 kg dry matter<sup>26</sup>. In a lakeside site in inland Canterbury, New Zealand, densities of grazing geese have recently been measured at 3.7/ha in spring to 20.2/ha in autumn. They were responsible for a reduction in monthly dry matter production of 1.3 kg/ha in spring and 7.1 kg/ha in autumn<sup>27</sup>. New Zealand 1986 estimates of the financial damage attributable to Canada Geese included a weighted average annual loss per goose of about \$7 (range \$2-14)<sup>28</sup>, based on surveys of farmers. In today's terms, accounting only for inflation, the average annual loss per goose is >\$15. A separate analysis yielded a similar figure, and estimated that 4 geese consumed one stock unit of feed<sup>29</sup>.

<sup>20</sup> Spurr EB and Coleman JD. Review of Canada goose population trends, damage and control in New Zealand. Landcare Research Science Series No 30, 2005.

<sup>21</sup> Baxter A and Witter I. (2005) Adopting an integrated, flexible approach to reducing the birdstrike risk from Canada geese. Bird Strike Committee Proceedings, Vancouver, Canada.

<sup>22</sup> Spurr EB and Coleman JD. Review of Canada goose population trends, damage and control in New Zealand. Landcare Research Science Series No 30, 2005.

<sup>23</sup> Clark L. (2004) Avian diseases: carriage of bacterial pathogens by Canada geese and blackbirds. USDA APHIS Wildlife Management report.

<sup>24</sup> <http://www.dcnr.state.pa.us/news/resource/res2007/07-0117-geesehunting.aspx>

<sup>25</sup> Craven SR and Heinrich J. (1996) Canada geese crop damage. Wisconsin County Extension Publications.

<sup>26</sup> Handbook of Australian, New Zealand and Antarctic Birds, Volume 1, pp 1189-94.

<sup>27</sup> Spurr EB and Coleman JD. Review of Canada goose population trends, damage and control in New Zealand. Landcare Research Science Series No 30, 2005.

<sup>28</sup> Leathers KL and Costello EJ. (1986). The economics of Canada goose management in New Zealand: a preliminary analysis. Report to New Zealand Wildlife Service.

<sup>29</sup> White EG. (1986). Canada Geese in New Zealand. Information Paper No 4, Centre for Resource Management, Lincoln.



### 3.4 Environment

The Canada goose poses several threats to the natural environment.

#### 3.4.1 Competition for wetland habitat

Canada geese compete with other birds for wetland resources, a habitat that is currently under significant threat in many parts of Australia. They also carry parasites that can infect native waterfowl<sup>30</sup>.

#### 3.4.2 Distribution of noxious weeds

In the US it is recognised that Canada geese are effective distributors of noxious weeds<sup>31</sup>.

#### 3.4.3 Hybridisation

Canada geese readily hybridise with other goose species, including those from the same genus such as barnacle geese (*Branta leucopsis*) and other genera including greylag geese (*Anser anser*)<sup>32</sup> in Europe and greater white-fronted geese (*Anser albifrons*)<sup>33</sup> and blue geese<sup>34</sup> in North America. Some of these are fertile. It is not known whether the bird would hybridise with Australia's only native goose also classified in the sub-family *Anserinase*, the Cape Barren goose (*Cereopsis novaehollandiae*), but if so there is the potential risk of significant genetic dilution such as has occurred by hybridisation between the native Pacific black duck and introduced mallard.

### 3.5 Urban nuisance

Canada geese adapt well to man-made habitats, and in addition to the specific impacts discussed above, they are widely accepted to be a general nuisance simply by their presence in urban areas.

## 4 Management

### 4.1 Management options

#### 4.1.1 Shooting

In New Zealand recreational hunting is the primary method of Canada goose control. About 14,000 birds are killed per annum by licensed shooters, but this is insufficient to prevent significant damage<sup>35</sup>. Shooting from helicopters is also used, but it is

<sup>30</sup> Spurr EB and Coleman JD. Review of Canada goose population trends, damage and control in New Zealand. Landcare Research Science Series No 30, 2005.

<sup>31</sup> Clark L. (2004) Avian diseases: carriage of bacterial pathogens by Canada geese and blackbirds. USDA APHIS Wildlife Management report.

<sup>32</sup> <http://users.utu.fi/hlehto/photo/hybrid/aalbxbcn1.shtml>

<sup>33</sup> [listserv.arizona.edu/cgi-bin/wa?A2=ind0512a&L=birdwg01&P=3864-16k](http://listserv.arizona.edu/cgi-bin/wa?A2=ind0512a&L=birdwg01&P=3864-16k)

<sup>34</sup> Prevett JP and MacInnes CD. (1973) Observations of wild hybrids between Canada and blue geese. The Condor 75, 124-125.

<sup>35</sup> Spurr EB and Coleman JD. Review of Canada goose population trends, damage and control in New Zealand. Landcare Research Science Series No 30, 2005.

necessary to minimise learning avoidance behaviour by the geese for this to be effective. In the US, expanded hunting methods and opportunities are being put in place to assist in managing major increases in populations<sup>36</sup>.

#### **4.1.2 Moult culls**

Annual culls of moulting birds remove about 7,000 Canada geese per annum from South Island, New Zealand. The birds are rounded up, stunned and beheaded. Although this method is considered humane it is unacceptable to some sectors of the public<sup>37</sup>.

#### **4.1.3 Egg destruction and other forms of reproductive control**

Destruction of Canada goose eggs by egg pricking has been undertaken in New Zealand since about 1976. Destruction of all eggs in a nest was unsuccessful as a means of population control because the birds nest elsewhere after nesting fails, and although they originally nested colonially they now tend to do so in isolation and on inaccessible sites. To minimise this behaviour one or two eggs per nest are now left to develop. However, egg destruction suffers from the difficulty and cost of locating sufficient nests to have an impact on the population. Moreover, simulation modelling indicates that lethal control of adult birds is 4 times more effective at reducing their population than egg destruction<sup>38</sup>.

Elsewhere, egg-oiling is widely used for this purpose but suffers from the same constraints as egg pricking. Egg substitution has also been used on a small scale.

Both nicarbazin and azocosterol are potential avian reproductive inhibitors, and both are being investigated for this purpose in the US. OvoControl™ G, which contains nicarbazin, is registered by the US EPA for the reduction of egg hatchability in Canada geese<sup>39</sup>. However, the need for regular dosing - Ovocontrol G must be fed daily through the egg-laying season to be effective - together with delayed action and issues of target specificity represent major challenges in the effort to develop a practicable means of applying this approach.

#### **4.1.4 Baiting**

Baiting with alphachloralose on barley is an approved method of goose control in New Zealand. Consumption of an adequate dose can be a problem as birds have been observed leaving the site when they see others succumbing to the sedative effects of the active ingredient. Moreover, there are significant non-target issues with this approach.

#### **4.1.5 Sacrificial crops and habitat manipulation**

In the UK and mainland Europe sacrificial crops of grass or white clover are being used to limit losses of at-risk cereals from grazing by Canada geese. This is cost-

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<sup>36</sup> Resident Canada Geese: Final Environmental Impact Statement. US Fish and Wildlife Service.

<sup>37</sup> Spurr EB and Coleman JD. Review of Canada goose population trends, damage and control in New Zealand. Landcare Research Science Series No 30, 2005.

<sup>38</sup> *ibid*

<sup>39</sup> [www.innolyticsllc.com](http://www.innolyticsllc.com)

effective in the EU under a policy that sets aside 10% of land for non-productive use, but may not be so in Australia. Diversionary feeding, a similar approach to attract dispersed geese, is practised in the US, but in New Zealand this concept is regarded as too expensive and unlikely to succeed<sup>40</sup>.

In the US Canada goose populations at some urban sites are being managed by sowing grasses of low palatability, with the aim of establishing permanent avoidance of previously favoured feeding grounds.

#### **4.1.6 Chemical repellents**

Anthraquinone and methyl anthranilate are both registered in the US for Canada goose control and have been shown to be highly effective at deterring them from grazing on grass. However, they do not mitigate other problems associated with the presence of large numbers of these birds, including fouling and bird strikes.

#### **4.1.7 Dispersal devices**

These are not a useful method of population control as they simply shift the flocks of birds to another site. However, they can offer short-term protection to specific sites. In the UK the use of plastic tapes and streamers is thought to have potential for protecting cereals planted alongside lakes and rivers from Canada geese, and this approach has been used successfully to disperse feeding geese from favoured sites in the US. Its usefulness depends on the potential damage to be caused elsewhere by the dispersed birds. Moreover, the approach is only practicable over small areas of about 2-3 ha, and is expensive.

Border collie dogs have been used successfully on a small scale in the urban environment to scare away Canada geese, including in the Dow Jones corporate complex in New Jersey and on golf courses in North America.

Dispersal using scaring devices generating noise or simulating predators is not useful for more than very short periods, as the birds become habituated to the device. However, the use of laser beams is showing some promise.

#### **4.1.8 Integrated management**

Integrated management of populations of Canada geese involving several of the above approaches is applied in the US by the USDA APHIS Wildlife Services to reduce Canada goose damage to rare habitats such as restored wetlands and native wild rice ecosystems<sup>41</sup>. At Heathrow Airport in the UK, an integrated management strategy specifically tailored to the need to reduce airstrike risk from Canada geese has been implemented with a resulting 70% reduction in transits of the runways and approaches<sup>42</sup>.

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<sup>40</sup> Spurr EB and Coleman JD. Review of Canada goose population trends, damage and control in New Zealand. Landcare Research Science Series No 30, 2005.

<sup>41</sup> USDA APHIS Wildlife Services – New Jersey. Report, 2006.

<sup>42</sup> Baxter A and Witter I. (2005) Adopting an integrated, flexible approach to reducing the birdstrike risk from Canada geese. Bird Strike Committee Proceedings, Vancouver, Canada.

## **4.2 *Opposition to management options***

In much of their natural and introduced range, Canada geese are highly prized game birds. Indeed, the majority of introductions have been for the purpose of hunting. Hunting organisations may oppose eradication.

Canada geese are striking and beautiful birds, and there can be significant public opposition to their culling. This was the case in urban areas of Christchurch, New Zealand, despite the fouling problems caused by the birds in this area<sup>43</sup>. A novel species inevitably also arouses great interest in the bird watching community, but Birds Australia has indicated support for eradication of Canada goose incursions (see below).

## **5 Recommendation**

**The immediate eradication of Canada geese should be an agreed predetermined response to their incursion into any part of Australia. The risk of establishment is real, and this would result in damage and nuisance to airports, public health, agriculture and the natural and urban environments.**

**The cost of both this damage and management efforts to control it would be significant and could be major.**

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<sup>43</sup> Spurr EB and Coleman JD. Review of Canada goose population trends, damage and control in New Zealand. Landcare Research Science Series No 30, 2005.