

PESTSMART

Indicative 10 Project National Resource Material

Canada Goose

(Branta canadensis)

Win Kirkpatrick and Michelle T. Christy
2017

Department of Primary Industries and Regional
Development

3 Baron-Hay Court,
South Perth, WA 6151

An Invasive Animals CRC Project



Contents

Figures	iii
Summary	1
Key Messages	1
Classification	1
Common names	1
Biology and Ecology.....	2
Identification	2
Behaviour and Traits.....	2
Food and Foraging.....	3
Reproduction and Lifecycle	3
Habitat	3
Global Range	3
Potential for Introduction	5
Potential for Eradication	5
Impacts.....	6
Economic.....	6
Environmental	6
Social	6
Legislation	7
Image Library	8
Copyright Licence Restrictions of Use	8
Image Library - Canada goose (<i>Branta canadensis</i>).....	15
References	20

Figures

Figure 1. Canada goose (<i>Branta canadensis</i>). Photo Fyn Kynd (CC BY 2.0).....	1
Figure 2. Canada goose (<i>Branta canadensis</i>). Photo Shawn Nystrand (CC BY-SA 2.0)	2
Figure 3. Flock of Canada goose (<i>Branta canadensis</i>). Photo: Robb Hannawacker (CC0 1.0) ...	3
Figure 4. Map showing general range of Canada goose (<i>Branta canadensis</i>).	4



Summary

Species on VPC List 2007?	Yes
Species on the live import list (EPBC Act 1999)?	No
Risk of establishment:	Extreme (Bomford 2008)
Pathway:	Unintentional

Key Messages

Range - Total migration distance travelled - 4020 km, distance between stopovers - 400 km (Giles et al. 2013). Can fly at speeds >50 km for extended periods (Mowbray 2002), e.g. 2800 km at 58km/h for 48 h (Gill 1996).

Introduction pathway - Escape of birds kept in aviculture; natural movement from NZ.

Impacts - On agriculture production, the environment, society and community

Identification Issues - Different in appearance to Australian native water fowl species such as Magpie Goose and Cape Barren Goose, so shouldn't be an issue to identify birds in the field.

Eradication measures - Control programs at airports, urban parklands and on farms have included habitat modification, scaring with sound, lights or movement, chemical repellents, hunting and reproductive control. Compensation payments have also been made to farmers in the United States and the Netherlands for damage of crops by the Canada goose.

Classification

Branta canadensis (Linnaeus, 1758)

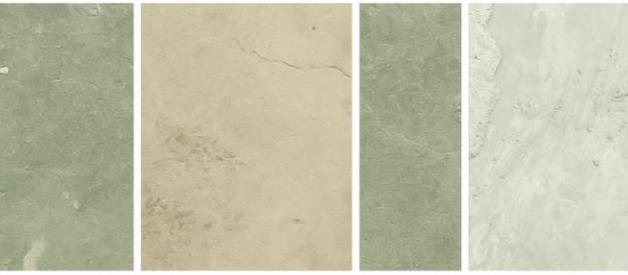
Class:	Aves
Order:	Anseriformes
Family:	Anatidae
Genus:	Branta
Species:	<i>canadensis</i>



Common names

Canada Goose

Figure 1. Canada goose (*Branta canadensis*).
Photo Fyn Kynd (CC BY 2.0)



Biology and Ecology

Identification

The form of Canada goose found in Australia and New Zealand is a moderate to large bird 0.5 to 1 m in length (body and tail), with a wingspan of 1.2 to 1.8 m, and weighing 3 to 6 kg. It is brown and white with a conspicuous white patch on the cheeks and chin and a long black neck and head. The bill, tail, legs and feet are also black. Male, female and immature birds are similar although immature plumage is more greyish and the white face-patches are often tinted brown.



Figure 2. Canada goose (*Branta canadensis*). Photo Shawn Nystrand (CC BY-SA 2.0)

Behaviour and Traits

The Canada goose swims with its neck held upright. It flies in groups in striking V-formation with neck outstretched and often with loud honking. It is easily identified from below by its black neck, white face-patch, pale belly and dark underwings. It also has a white V-shaped mark on the rump, visible from above and when the bird is taking off.

Within its natural range, the majority of Canada goose populations migrate to warmer areas before the onset of winter. Some introduced populations also migrate, such as those in the United Kingdom and Scandinavia. In late summer adults become flightless for about a month during the post-breeding moult.

In the wild, a Canada goose can live for up to 30 years.



Figure 3. Flock of Canada goose (*Branta canadensis*). Photo: Robb Hannawacker (CC0 1.0)

Food and Foraging

The Canada goose eats a wide variety of vegetation, grazing on roots, grasses, stems, leaves, fruits, aquatic plants and sedges as well as agricultural crops and pasture. It sometimes feeds by dabbling (dipping its head under water) and in urban environments in the United Kingdom it readily takes food handouts and this could occur elsewhere.

Reproduction and Lifecycle

The geese mate for life and begin breeding at two to three years of age. The nest is a large mass of vegetation lined with down, usually built on the ground near water but occasionally they may be located off the ground. Four to seven white eggs are laid. The Canada goose can be aggressive towards people and pets if disturbed when breeding.

Habitat

The Canada goose is found in a large range of habitats, both open and wooded areas as well as coastal areas and semi-desert. Urban and agricultural lands are also used as well as parklands, golf courses and areas of extensive lawn. All types of wetlands are utilised from ornamental lakes to mudflats and estuaries.

Global Range

Native to North America (Canada and the United States of America, including Alaska, the Aleutian Islands and Hawaii), the Bahamas and Greenland. In winter, some populations migrate south to warmer areas (some as far as Mexico), and to other countries including



Bermuda, Japan and Russia (Kamchatka Peninsula). In the US where it has established in previous non-breeding areas the goose is non-migratory.

Introduced populations occur in Iceland, Austria, Belgium, Denmark, Estonia, Finland, Germany, Italy, Latvia, Lithuania, Netherlands, Norway, Poland, Sweden, the United Kingdom and western Russia. These introductions are a result of deliberate and accidental release of kept geese.

In addition to natural populations occasionally migrating from North America, some introduced populations in Europe also migrate and captive birds escape or are released. These factors result in the occasional presence of the species in other countries including Bulgaria, Czech Republic, France, Liechtenstein, Luxembourg, Portugal, Slovakia, Slovenia, Spain, the Ukraine and in Beijing, China.

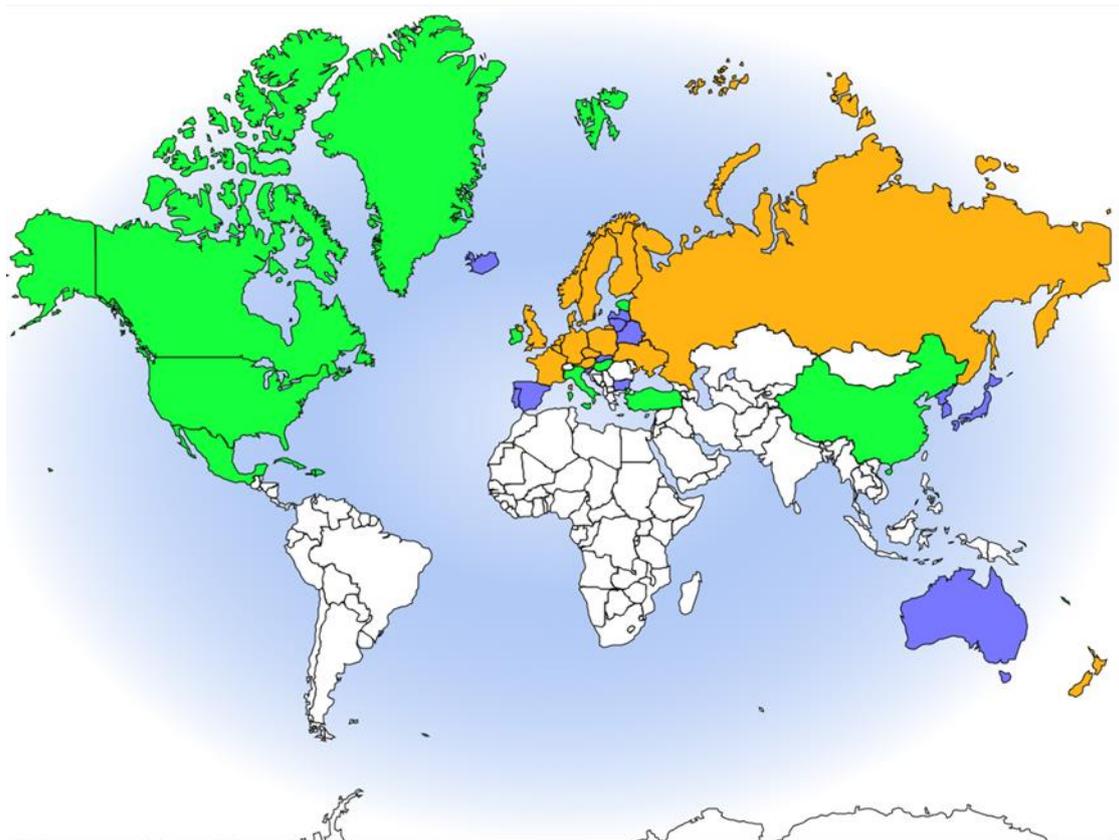


Figure 4. Map showing general range of Canada goose (*Branta canadensis*). Colours indicate range: green = native or nesting, orange = introduced, yellow = reintroduced, purple = rare/occasional vagrant. Image taken from Oiseaux.net. July 2017.



Potential for Introduction

Scientific risk assessments, endorsed nationally by Invasive Plants and Animals Committee (IPAC), determined that *Branta canadensis* pose an extreme threat (the highest of four categories) to Australia with an extreme risk of establishment (Kirkpatrick 20013). Climate matching was estimated to be 6.7 % (Bomford 2008).

Despite this evaluation no wild populations have yet established in Australia although it has been found at large (Clayton et al. 2006; Long 1981). It was unsuccessfully introduced to Western Australia in 1913 and Victoria in the 1920s, and two geese reported in Tasmania in 1927 were believed to have originated from the released Victorian birds. In the 1970s, one bird was recorded on Lord Howe Island, and since 2002 four small incursions have been recorded on the east coast of mainland Australia.

It is kept as an exotic waterfowl species in Australia and captive birds have occasionally been found at large.

In the early 1900s the goose was successfully introduced to New Zealand and is now a widespread pest there. Wild geese from New Zealand have flown unaided to coastal New South Wales on at least two occasions. The most recent was in 2008 when four birds were removed from wetlands 120 km south of Sydney.

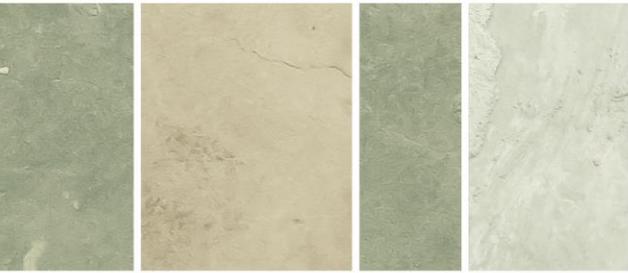
- **Vagrant from New Zealand:** likely
- **Hitchhiker passenger on ships:** unlikely
- **Escaped sailor's pet:** unlikely

Potential for Eradication

Population growth of introduced populations is most rapid in urban areas when mortality levels are low due to no lethal control work (Global Invasive Species Database 2017). Restrictions on hunting and provision of artificial water and food resources facilitate rapid population growth.

Canada goose incursions can be controlled using a variety of different methods depending on their life stage. For example, adults are often shot, fledglings removed from the nest, eggs coated with mineral oil to prevent hatching, interference to daily activity by fencing foraging and landing sites, and deterrence of geese at facilities like airports (Allan et al. 1995; Heinrich and Craven 1992; ISSG 2017; Smith et al. 2000; Ward et al. 1999). However, none of these techniques, even when applied together, has demonstrated to be effective in eradicating invasive geese populations, although they do facilitate the reduction in population size. Although control techniques have not been ineffective at removing established populations, they have been effective in Australia where the species is not yet established but arrives as a rare vagrant.

The most effective control method is likely to be lethal control by shooting. Australia is somewhat accepting of lethal control of invasive species (Johnston and Marks 1997; Saunders et al. 2010; Sharp 2012a, b; Tracey et al. 2007). However, shooting native waterfowl in Australia is still controversial. This objection may impact successful eradication in the event of an incursion.



On a positive note, none of the native species of waterfowl in Australia are similar to Canada geese and therefore identification of the species should be relatively quick. Given it is easily identifiable the species should be easy to detect even at low densities.

Impacts

Economic

- Economic and social impact: Canada geese flocks have been implied in significant crop losses in almost every place in their exotic range (Allan et al. 1995; Conover 1988; Heinrich and Craven 1992; ISSG 2017; Smith et al. 2000). It is a moderate pest of agriculture, damaging crops such as broccoli, cabbage, cereals, corn, lucerne, pea, rye, soybean and turnip. The goose competes with livestock by feeding on pasture and fouling it with droppings, and may pose a risk of
- transmit diseases to livestock.
- In flocks, the Canada goose prefers to graze in open grassy areas, such as airports, posing a serious bird-strike risk to aircraft.
- The presence of flocks on or around airports pose a threat to air safety from collisions with aircrafts flying, taking off and landing, putting the lives of passenger at risk and causing significant damage to property (Blackwell and Bernhardt 2004; Marra et al. 2009).

Environmental

- Competes with indigenous waterfowl for food and nesting sites.
- Can spread parasites and diseases to other species including stock
- In large flocks, the Canada goose fouls ponds and lakes with its droppings. The resulting increased algal growth reduces water oxygen levels which harms some aquatic animals.

Social

- Canada geese damage gardens, landscaping, pathways, golf courses, lawns and other grassed areas. The damage is caused by the goose grazing, fouling areas with droppings and by erosion from trampling.
- Accumulation of droppings can cause pathways and grassed areas to become slippery, making them unpleasant for people to use and increasing the risk of falls.
- Accumulations of their droppings pollute water sources used for human consumption and parklands (Castelli and Sleggs 2000; Smith et al. 2000). The droppings are a source of harmful bacteria that can pose a significant health threat to humans.
- Can transmit pathogens in their droppings to humans and waterways (Alderisio and DeLuca 1999; Bönner et al. 2004; Hussong et al. 1979). One of those pathogens is the influenza A virus that can be transmitted from geese to poultry (Bönner et al. 2004; Harris et al. 2010).



Legislation

The high risk and potential pest status of the Canada goose is recognised throughout Australia, as indicated in Table 2.

Table 2: Current status of the Canada goose under jurisdictional legislation

Jurisdiction	Legislation	Status
Australia	Biosecurity Act 2015	included
Australia	List of specimens taken to be suitable for live import	not listed
Western Australia	Biosecurity and Agriculture Management Act 2007	prohibited
South Australia	Natural Resources Management Act 2004	prohibited
New South Wales	Non-Indigenous Animals Regulation	No legal status
Queensland	Land Protection (Pest and Stock Route Management) Act 2002	Class 1 declared animal
Victoria	Catchment and Land Protection Act 1994	prohibited

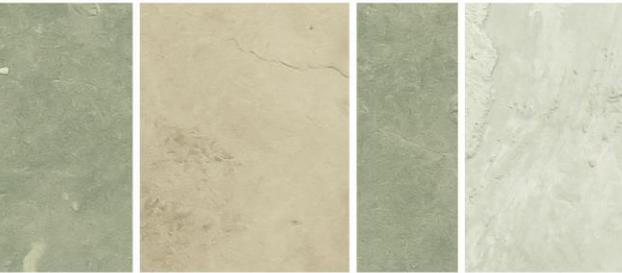


Image Library

This section contains a library of images and copyright licences that can be used in a range of related printed and electronic extension materials.

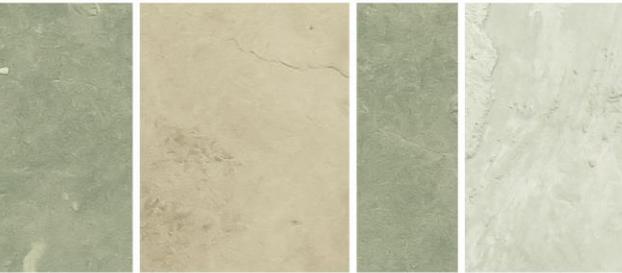
Copyright Licence Restrictions of Use

Table X is a list of copyright codes and their terms of use that relate to the images in the catalogue. The terms list what you can do and how you can use each image.

Type	Terms of Use
No copyright	No copyright restrictions known and no permissions required
Attribution - 2.0 Generic (CC BY 2.0) https://creativecommons.org/licenses/by/2.0/legalcode	<p>You are free to:</p> <ul style="list-style-type: none"> • Share – copy and redistribute the material in any medium or format for any purpose, even commercially. • Adapt – remix, transform, and build upon the material for any purpose, even commercially. • The licensor cannot revoke these freedoms as long as you follow the license terms. <p>Under the following terms:</p> <ul style="list-style-type: none"> • Attribution – You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. • No additional restrictions – You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.
Attribution - No Derivs 2.0	<p>You are free to:</p> <ul style="list-style-type: none"> • Share – copy and redistribute the material in any medium or format for any purpose, even



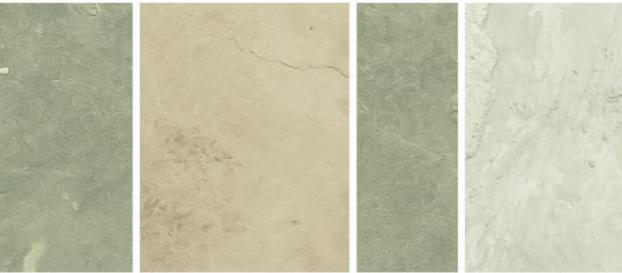
Type	Terms of Use
Generic (CC BY-ND 2.0) https://creativecommons.org/licenses/by-nd/2.0/legalcode	commercially. <ul style="list-style-type: none">The licensor cannot revoke these freedoms as long as you follow the license terms. Under the following terms: <ul style="list-style-type: none">Attribution – You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.No Derivatives – If you remix, transform, or build upon the material, you may not distribute the modified material.No additional restrictions – You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.
Attribution - Non Commercial 2.0 Generic (CC BY-NC 2.0) https://creativecommons.org/licenses/by-nc/2.0/legalcode	You are free to: <ul style="list-style-type: none">Share – copy and redistribute the material in any medium or formatAdapt – remix, transform, and build upon the materialThe licensor cannot revoke these freedoms as long as you follow the license terms. Under the following terms: <ul style="list-style-type: none">Attribution – You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.Non Commercial – You may not use the material for commercial purposes.No additional restrictions – You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.
Attribution - Non Commercial - No Derivs 2.0 Generic (CC BY-NC-ND 2.0)	You are free to: <ul style="list-style-type: none">Share – copy and redistribute the material in any medium or formatThe licensor cannot revoke these freedoms as long as you follow the license terms.



Type	Terms of Use
https://creativecommons.org/licenses/by-nc-nd/2.0/legalcode	<p>Under the following terms:</p> <ul style="list-style-type: none"> • Attribution – You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. • Non Commercial – You may not use the material for commercial purposes. • No Derivatives – If you remix, transform, or build upon the material, you may not distribute the modified material. • No additional restrictions – You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.
<p>Attribution - Share Alike 1.0 (CC BY-SA 1.0)</p> https://creativecommons.org/licenses/by-sa/1.0/legalcode	<p>You are free to:</p> <ul style="list-style-type: none"> • Share – copy and redistribute the material in any medium or format for any purpose, even commercially. • Adapt – remix, transform, and build upon the material for any purpose, even commercially. • The licensor cannot revoke these freedoms as long as you follow the license terms. <p>Under the following terms:</p> <ul style="list-style-type: none"> • Attribution – You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. • ShareAlike – If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. • No additional restrictions – You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.
<p>Attribution - Share Alike 2.0 Generic (CC BY-SA 2.0)</p>	<p>You are free to:</p> <ul style="list-style-type: none"> • Share – copy and redistribute the material in any medium or format for any purpose, even commercially.



Type	Terms of Use
https://creativecommons.org/licenses/by-sa/2.0/legalcode	<ul style="list-style-type: none"> • Adapt – remix, transform, and build upon the material for any purpose, even commercially. • The licensor cannot revoke these freedoms as long as you follow the license terms. <p>Under the following terms:</p> <ul style="list-style-type: none"> • Attribution – You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. • Share Alike – If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. • No additional restrictions – You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.
Attribution - Share Alike 2.5 Generic (CC BY-SA 2.5) https://creativecommons.org/licenses/by-sa/2.5/legalcode	<p>You are free to:</p> <ul style="list-style-type: none"> • Share – copy and redistribute the material in any medium or format for any purpose, even commercially. • Adapt – remix, transform, and build upon the material for any purpose, even commercially. • The licensor cannot revoke these freedoms as long as you follow the license terms. <p>Under the following terms:</p> <ul style="list-style-type: none"> • Attribution – You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. • Share Alike – If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. • No additional restrictions – You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.
Attribution - Share Alike	<p>You are free to:</p> <ul style="list-style-type: none"> • Share – copy and redistribute the material in any medium or format for any purpose, even



Type	Terms of Use
<p>3.0 Unported (CC BY-SA 3.0)</p> <p>https://creativecommons.org/licenses/by-sa/3.0/legalcode</p>	<p>commercially.</p> <ul style="list-style-type: none"> • Adapt – remix, transform, and build upon the material for any purpose, even commercially. • The licensor cannot revoke these freedoms as long as you follow the license terms. <p>Under the following terms:</p> <ul style="list-style-type: none"> • Attribution – You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. • Share Alike – If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. • No additional restrictions – You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.
<p>Attribution - Share Alike 4.0 International (CC BY-SA 4.0)</p> <p>https://creativecommons.org/licenses/by-sa/4.0/legalcode</p>	<p>You are free to:</p> <ul style="list-style-type: none"> • Share – copy and redistribute the material in any medium or format for any purpose, even commercially. • Adapt – remix, transform, and build upon the material for any purpose, even commercially. • The licensor cannot revoke these freedoms as long as you follow the license terms. <p>Under the following terms:</p> <ul style="list-style-type: none"> • Attribution – You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. • Share Alike – If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. • No additional restrictions – You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.



Type	Terms of Use
No Copyright - CC0 1.0 Universal (CC0 1.0) - Public Domain Dedication https://creativecommons.org/publicdomain/zero/1.0/legalcode	<p>No Copyright</p> <ul style="list-style-type: none"> • This license is acceptable for Free Cultural Works. • The person who associated a work with this deed has dedicated the work to the public domain by waiving all of his or her rights to the work worldwide under copyright law, including all related and neighbouring rights, to the extent allowed by law. • You can copy, modify, distribute and perform the work, even for commercial purposes, all without asking permission. <p>Other Information</p> <ul style="list-style-type: none"> • In no way are the patent or trademark rights of any person affected by CC0, nor are the rights that other persons may have in the work or in how the work is used, such as publicity or privacy rights. • Unless expressly stated otherwise, the person who associated a work with this deed makes no warranties about the work, and disclaims liability for all uses of the work, to the fullest extent permitted by applicable law. • When using or citing the work, you should not imply endorsement by the author or the affirmer.
Public Domain - US: Public Domain - Out of copyright worldwide	<ul style="list-style-type: none"> • This media file is in the public domain in the United States. This applies to U.S. works where the copyright has expired, often because its first publication occurred prior to January 1, 1923. • This image might not be in the public domain outside of the United States; this especially applies in the countries and areas that do not apply the rule of the shorter term for US works, such as Canada, Mainland China (not Hong Kong or Macao), Germany, Mexico, and Switzerland. The creator and year of publication are essential information and must be provided. See Wikipedia: Public domain and Wikipedia: Copyrights for more details.
Public Domain - work prepared by an officer or employee of the US Government - USGS	<p>Acknowledging or Crediting USGS as Information Source</p> <ul style="list-style-type: none"> • Most U.S. Geological Survey (USGS) information resides in the public domain and may be used without restriction. When using information proper credit is given. Note that some non USGS photographs, images or graphics require permission from the copyright holder under the copyright law.

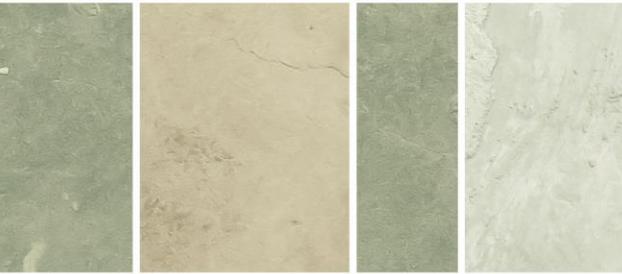


Type	Terms of Use
https://www2.usgs.gov/visual-credit_usgs.html#copyright	
Public Domain - work prepared by an officer or employee of the US Government https://en.wikipedia.org/wiki/Copyright_status_of_work_by_the_U.S._government	<ul style="list-style-type: none"> • A work of the US government is "a work prepared by an officer or employee" of the federal government "as part of that person's official duties." • In general, under section 105 of the Copyright Act, such works are not entitled to domestic copyright protection under U.S. law and are therefore in the public domain. • This act only applies to U.S. domestic copyright as that is the extent of U.S. federal law. The U.S. government asserts that it can still hold the copyright to those works in other countries.
GNU General Public License, Version 2 https://www.gnu.org/licenses/old-licenses/gpl-2.0.html	This work is free software <ul style="list-style-type: none"> • You can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation. • This work is distributed in the hope that it will be useful, but without any warranty; without even the implied warranty of merchantability or fitness for a particular purpose.



Image Library - Canada goose (*Branta canadensis*)

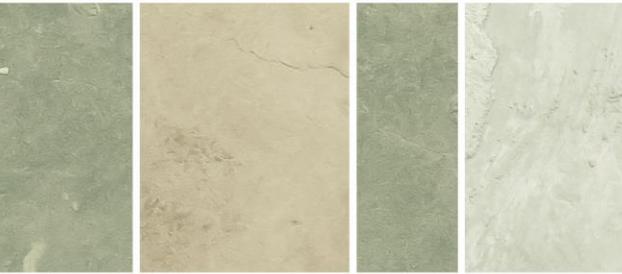
No	Photograph	Photo Credit	Image Size (Pixels)	Copyright Licence	Licence Link	File Name
1		J. Maughn	4032 x 3024	Attribution - Non Derivs 2.0 Generic (CC BY-ND 2.0)	https://creativecommons.org/licenses/by-nc/2.0/legalcode	1 Canada goose J. Maughn.jpg
2		J. Maughn	3047 x 1949	Attribution-Non Derivs 2.0 Generic (CC BY-ND 2.0)	https://creativecommons.org/licenses/by-nc/2.0/legalcode	2 Canada goose J. Maughn.jpg
3		Fyn Kynd	4545 x 2728	Attribution 2.0 Generic (CC BY 2.0)	https://creativecommons.org/licenses/by/2.0/legalcode	3 Canada goose Fyn Kynd Photography.jpg



No	Photograph	Photo Credit	Image Size (Pixels)	Copyright Licence	Licence Link	File Name
4		Shawn Nystrand	3872 x 2592	Attribution - Share Alike 2.0 Generic (CC BY-SA 2.0)	https://creativecommons.org/licenses/by-sa/2.0/legalcode	4 Canada goose Shawn Nystrand.jpg
5		Robert Elsmore	3837 x 1938	No Copyright - CC0 1.0 Universal (CC0 1.0) - Public Domain Dedication	https://creativecommons.org/publicdomain/zero/1.0/legalcode	5 Canada goose Robert Elsmore.jpg
6		Jim Gray	2327 x 1548	No Copyright - CC0 1.0 Universal (CC0 1.0) - Public Domain Dedication	https://creativecommons.org/publicdomain/zero/1.0/legalcode	6 Canada goose Jim Gray.jpg



No	Photograph	Photo Credit	Image Size (Pixels)	Copyright Licence	Licence Link	File Name
7		Robb Hannawacker	3072 x 2304	No Copyright - CC0 1.0 Universal (CC0 1.0) - Public Domain Dedication	https://creativecommons.org/publicdomain/zero/1.0/legalcode	7 Canada goose Robb Hannawacker.jpg
8		Domingo Mora	6000 x 4000	No Copyright - CC0 1.0 Universal (CC0 1.0) - Public Domain Dedication	https://creativecommons.org/publicdomain/zero/1.0/legalcode	8 Canada goose Domingo Mora.jpg
9		D Coetzee	4288 x 2848	No Copyright - CC0 1.0 Universal (CC0 1.0) - Public Domain Dedication	https://creativecommons.org/publicdomain/zero/1.0/legalcode	10 Canada goose D Coetzee.jpg



No	Photograph	Photo Credit	Image Size (Pixels)	Copyright Licence	Licence Link	File Name
10		D Coetzee	4288 x 2848	No Copyright - CC0 1.0 Universal (CC0 1.0) - Public Domain Dedication	https://creativecommons.org/publicdomain/zero/1.0/legalcode	10 Canada goose D Coetzee.jpg
11		D Coetzee	4103 x 2613	No Copyright - CC0 1.0 Universal (CC0 1.0) - Public Domain Dedication	https://creativecommons.org/publicdomain/zero/1.0/legalcode	11 Canada goose D Coetzee.jpg
12		Robb Hannawacker	4023 x 2483	No Copyright - CC0 1.0 Universal (CC0 1.0) - Public Domain Dedication	https://creativecommons.org/publicdomain/zero/1.0/legalcode	12 Canada goose Robb Hannawacker.jpg



No	Photograph	Photo Credit	Image Size (Pixels)	Copyright Licence	Licence Link	File Name
13		Andrew 3457	631 x 292	Attribution 2.0 Generic (CC BY 2.0)	https://creativecommons.org/licenses/by/2.0/legalcode	13 Canada goose Andrew 3457.jpg
14		Jon Pinder	5669 x 3780	Attribution - Non Commercial - No Derivs 2.0 Generic (CC BY-NC-ND 2.0)	https://creativecommons.org/licenses/by-nc-nd/2.0/legalcode	14 Canada goose Jon Pinder.jpg



References

- Alderisio K, DeLuca N. 1999. Seasonal enumeration of fecal coliform bacteria from the feces of ring-billed gulls (*larus delawarensis*) and canada geese (*branta canadensis*). Applied and Environmental Microbiology 65:5628-5630.
- Allan JR, Kirby JS, Feare CJ. 1995. The biology of canada geese *branta canadensis* in relation to the management of feral populations. Wildlife Biology 1:129-143.
- Blackwell BF, Bernhardt GE. 2004. Efficacy of aircraft landing lights in stimulating avoidance behavior in birds. Journal of Wildlife Management 68:725-732.
- Bomford M. 2008. Risk assessment models for establishment of exotic vertebrates in australia and new zealand: Invasive Animals Cooperative Research Centre Canberra, ACT.
- Bönner BM, Lutz W, Jäger S, Redmann T, Reinhardt B, Reichel U, Krajewski V, Weiss R, Wissing J, Knickmeier W. 2004. Do canada geese (*branta canadensis* linnaeus, 1758) carry infectious agents for birds and man? European Journal of Wildlife Research 50:78-84.
- Castelli PM, Sleggs SE. 2000. Efficacy of border collies to control nuisance canada geese. Wildlife Society Bulletin 28:385-392.
- Clayton M, Wombey JC, Mason IJ, Chesser RT, Wells A. 2006. Csiro list of australian vertebrates: A reference with conservation status: CSIRO Publishing. Collingwood, VIC. 161 pp.
- Conover MR. 1988. Effect of grazing by canada geese on the winter growth of rye. The Journal of Wildlife Management 52:76-80.
- Giles MM, Jodice PG, Baldwin RF, Stanton JD, Epstein M. 2013. Spring migratory pathways and migration chronology of canada geese (*branta canadensis* interior) wintering at the santee national wildlife refuge, south carolina. Canadian Field-Naturalist 127:17-25.
- Gill RE, C. A. Babcock, C. M. Handel, Jr. Butler, W. R. and D. G. Raveling. 1996. Migration, fidelity, and use of autumn staging grounds in alaska by cackling canada geese *branta canadensis minima*. Wildfowl 47:42-61.
- Global Invasive Species Database. 2017. Species profile: Branta canadensis.
- Harris MT, Brown JD, Goekjian VH, Luttrell MP, Poulson RL, Wilcox BR, Swayne DE, Stallknecht DE. 2010. Canada geese and the epidemiology of avian influenza viruses. Journal of wildlife diseases 46:981-987.
- Heinrich JW, Craven SR. 1992. The economic impact of canada geese at the horicon marsh, wisconsin. Wildlife Society Bulletin (1973-2006) 20:364-371.
- Hussong D, Damare J, Limpert RJ, Sladen W, Weiner R, Colwell R. 1979. Microbial impact of canada geese (*branta canadensis*) and whistling swans (*cygnus columbianus columbianus*) on aquatic ecosystems. Applied and Environmental Microbiology 37:14-20.
- ISSG, (Invasive Species Specialist Group) 2017. Global invasive species database. International Union for Conservation of Nature (IUCN). <http://www.iucngisd.org/gisd/>.



- Johnston MJ, Marks CA. 1997. Attitudinal survey on vertebrate pest management in victoria: Agriculture Victoria, Department of Natural Resources and Environment. Melbourne, VIC. 36 pp.
- Kirkpatrick WE. 20013. Risk assessment for canada goose (*branta canadensis*)
- Long JL. 1981. Introduced birds of the world: The worldwide history, distribution and influence of birds introduced to new environments: Universe Books New York, New York, USA
- Marra PP, Dove CJ, Dolbeer R, Dahlan NF, Heacker M, Whatton JF, Diggs NE, France C, Henkes GA. 2009. Migratory canada geese cause crash of us airways flight 1549. *Frontiers in Ecology and the Environment* 7:297-301.
- Mowbray TB, Craig R. Ely, James S. Sedinger and Robert E. Trost. 2002. Canada goose (*branta canadensis*). In: Rodewald PG, editor. *The Birds of North America*. Ithaca: Cornell Lab of Ornithology.
- Saunders G, Cooke B, McColl K, Shine R, Peacock T. 2010. Modern approaches for the biological control of vertebrate pests: An australian perspective. *Biological Control* 52:288-295.
- Sharp T. 2012a. Bir001: Shooting of pest birds. *Invasive Animals CRC*. Canberra, ACT. 6 pp.
- Sharp T. 2012b. Bir002: Trapping of pest birds. *Invasive Animals CRC*. Canberra, ACT. 8 pp.
- Smith AE, Craven SR, Curtis PD. 2000. Managing canada geese in urban environments: Jack Berryman Institute Publication 16 and Cornell Cooperative Extension. Ithaca, NY. 32 pp.
- Tracey J, Bomford M, Hart Q, Saunders G, Sinclair R. 2007. Managing bird damage to fruit and other horticultural crops: Bureau of Rural Sciences. Canberra, ACT. 278 pp.
- Ward DH, Stehn RA, Erickson WP, Derksen DV. 1999. Response of fall-staging brant and canada geese to aircraft overflights in southwestern alaska. *The Journal of Wildlife Management* 63:373-381.

