Pest animal risk assessment

Indian myna

Acridotheres tristis

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Front cover: Indian myna.(*Acridotheres tristis*).

Introduction

Name and taxonomy

Species:	*Acridotheres tristis* Syn. *Acridotheres tristas*
Common names:	Common myna, Indian myna, mynah, talking myna
Family:	Sturnidae
Related species:	*Acridotheres javanicus* (Javan myna)
Similar species:	*Manorina melanocephala* (noisy miner)—a slightly larger, Australian native honeyeater.

Description

Indian mynas are 23–26 cm long, weigh 82–143 g and have a wing-span of 120–142 mm. Males are slightly larger and heavier than females. Their body is brown, with a glossy black head, neck and upper breast. In Australia, Indian mynas are often confused with the native noisy miner (*Manorina melanocephala*). However, Indian mynas have distinctive white patches on their wings that are clearly visible in flight. Indian mynas have bright yellow bills, eye skin, legs and feet, and the iris of the adult bird is a reddish brown. Juveniles are duller in colour and have brownish heads.

Biology

Life history

Incubation period:	13–14 days
Number of eggs:	4–6 (average 4). Greenish blue colour
Breeding interval:	Depending on the location, may breed 1–3 times per year
Fledging:	20–32 days (average 25 days)
Sexual maturity:	9–12 months
Sexual activity:	Unknown
Life span:	Average of 4 years in the wild, possibly over 12 years

Indian mynas are monogamous and pairs use the same territory each year. During courtship, males display to females.

Nests are cup-shaped and built out of dry grass, twigs, leaves, feathers and assorted rubbish. Indian mynas build their nests in protected hollows, either in naturally occurring tree hollows, artificial nesting boxes or in crevices and gaps in buildings, such as under the eaves of houses and in any gaps in walls and ceilings. In Israel, nest sites have been found in palm trees, woodpecker holes, traffic lights, electricity utility poles, and crevices in buildings (Holzapfel et al. 2006).

Both parent mynas help incubate their eggs, with the female incubating the eggs overnight. Nestlings are fed for the first ten days exclusively on invertebrates, primarily insects. Males and females both feed the young, and may continue to feed and protect the young up to three weeks after fledging. When juvenile Indian mynas are independent, they form small flocks and may form breeding pairs from nine months of age. The breeding season in Australia extends from August to March (Animal Diversity Web, 2007; Australian Museum Online, 2003; ISSG, 2006; NSW DPI, undated; Pell & Tidemann, 1997b).

Social organisation

Indian mynas are social birds, forming loose flocks of five or six birds while they forage during the day. In the evening, all mynas within a one kilometer radius (except nesting females and juveniles) gather in a communal roost, which can number thousands of birds. Up to 5000 birds have been recorded in a single roost. However, in Australia, there are usually 40–80 birds per roost. Roosts are usually selected where there is dense foliage and shelter, often in large trees, but also in buildings and under bridges. Large roosts are messy and very noisy, especially at dusk, when the birds chatter loudly.

Indian mynas maintain territories and defend them aggressively. Each territory tends to cover a nesting site and a nearby feeding area. Territories can range in size from 117 m² to 2.0 ha (Pell & Tidemann, 1997b).

Diet and feeding behaviour

Indian mynas are generalist, opportunistic omnivores, feeding on a wide variety of food, including invertebrates, bird eggs, small reptiles, food scraps, pet food, fledging birds, cultivated seedlings, and the ripening fruit and seeds of plants such as figs, papaya, dates, apple, pear, tomato, and cereal crops such as maize, wheat and rice. Their diet is highly flexible, enabling them to take advantage of seasonal, or otherwise temporary, food sources. For example, at some coastal locations Indian mynas gather at low tide to feed on worms, molluscs, crustaceans and other seafood that has been stranded.

Indian mynas usually scavenge on the ground (for example, around rubbish dumps, pastures, farmlands, roads), but will also feed in flowering or fruiting trees and bushes. They usually forage in pairs or small family groups on the ground, or in larger groups in trees and shrubs. Most feeding occurs close to roosting or nesting sites, usually within 100 m of the roost (Australian Museum Online, 2003; ISSG, 2006; NSW DPI, undated).

Preferred habitat

Indian mynahs prefer warm to hot climates, being abundant in many tropical, subtropical and warm temperate areas in Australia and overseas. They are generally absent from areas where the average minimum temperature of the coldest month is less than –0.4°C. This is probably due to the effect of cold temperatures on hatching success, since invertebrates (nestling food) are not readily available at very low temperatures (Martin, 1996). One exception is in New Zealand, where Indian mynas established a small population near a piggery shed. The heat and food from the piggery allowed them to survive in a region that would otherwise have been too cold.

In Australia, Indian mynas prefer open habitats where the original native tree cover has been cleared or otherwise fragmented by human activity. Prime habitat includes open parks and gardens associated with towns and cities as well as any cleared agricultural areas, especially open grasslands, cultivated paddocks, cane fields and plantations. As tree cover increases, Indian mynas tend to become less abundant and are absent from dense forests and closed rainforest. The degree to which Indian mynas can invade and persist in eucalypt forest and woodland seems to depend on tree cover and may vary from one region to the next. For example, in (disturbed) open eucalypt woodland near Brisbane, the authors observed a single Indian myna being attacked and driven away by up to 20 native noisy miners, grey butcherbirds and magpies. Such behaviour from aggressive, locally native birds might explain why Indian mynas are absent from some areas of eucalypt woodland. In other parts of Australia, however—such as near Canberra—Indian mynas can invade and persist in eucalypt woodland. For example, Pell & Tidemann (1997b) found that the while Indian mynas were generally more abundant in 'edge habitats' of urban nature reserves, compared with the interior of woodland habitats, they still managed to utilise a range of forest habitat types during the breeding season.

In their native range, Indian mynas evolved in open woodland habitats (Pell & Tidemann, 1997b).

Outside their native range, Indian mynas have naturalised in a variety of habitat types, but generally in open areas, where natural tree cover has been damaged or removed. In Hawaii, Indian mynas can be found at elevations from sea level to 2300 m (Englund & Preston, 2000). On the Comoro Islands (between Africa and Madagascar), Indian mynas exist in open environments, such as degraded forests and tree plantations, and only occasionally enter more intact forests. The presence of Indian mynas on these islands is considered a good indicator of habitat degradation (Sontag & Louette, 2007). In the Middle East, Indian mynas prefer areas undergoing major land use change, such as large irrigated grass lawns interspersed with trees and artificial structures such as street and traffic lights. They are currently spreading in Middle Eastern countries that can afford large-scale landscaping, where water is used to create artificial tropical and subtropical habitats in areas that are otherwise arid or semi-arid (Holzapfel et al. 2006).

Predators and diseases

In the Middle East and parts of Asia, the eggs and chicks of Indian mynas are occasionally taken by Indian house crows, cats and Javan mongooses. In some of the Pacific Islands, humans are known to eat these birds (Animal Diversity Web, 2007).

While raptors prey on Indian mynas in some countries, a dietary study of peregrine falcons (*Falco peregrinus*) and Australian Hobbies (*Falco longipennis*) in Australia found that Indian mynas were not part of the raptors' diet, despite being optimal prey size (Olsen et al. 2008).

Indian mynas are susceptible to haemosiderosis and haemochromatosis ('iron overload') (Mete et al. 2001).

Indian mynas can carry diseases that may not affect them directly. For example, in Australia, they carry avian malaria (*Plasmodium* and *Haemoproteus* spp.) that originally came from Indian founding stock (Ishtiaq et al. 2006). In Hawaii, the introduction of avian malaria by Indian mynas has had a significant impact on native birds, perhaps contributing to the extinction of some species. Indian mynas maintain the disease at a high level, but do not seem to be affected by it (Caughley & Sinclair, 1994).

Distribution and abundance overseas

Indian mynas are native to a large area of the Middle East, India and Asia, including Afghanistan, Bangladesh, Bhutan, Cambodia, China, Egypt, India, Islamic Republic of Iran, Kazakhstan, Lao People's Democratic Republic, Lebanon, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Tajikistan, Thailand, Turkmenistan, Uzbekistan and Vietnam.

They have become naturalised in Australia, Brunei, Darussalam, Comoros, Cook Islands, Fiji, French Polynesia, Hong Kong, Indonesia, Israel, Kiribati, Kuwait, Madagascar, Maldives, Mauritius, Mayotte, New Caledonia, New Zealand, Oman, Qatar, Reunion, Saint Helena, Samoa, Seychelles, Singapore, Solomon Islands, South Africa, Spain, Tonga, Turkey, United States, Vanuatu, Wallis and Futuna.

Today, Indian mynas have a vast range, with an estimated global extent of 1 000 000–10 000 000 km² (BirdLife International, 2004; ISSG 2006).

In some countries, including the United States, Hawaii and Australia, Indian mynas are kept as pets, due to their intelligence and ability to mimic human speech (Blue Mountains Bird Watching, undated).

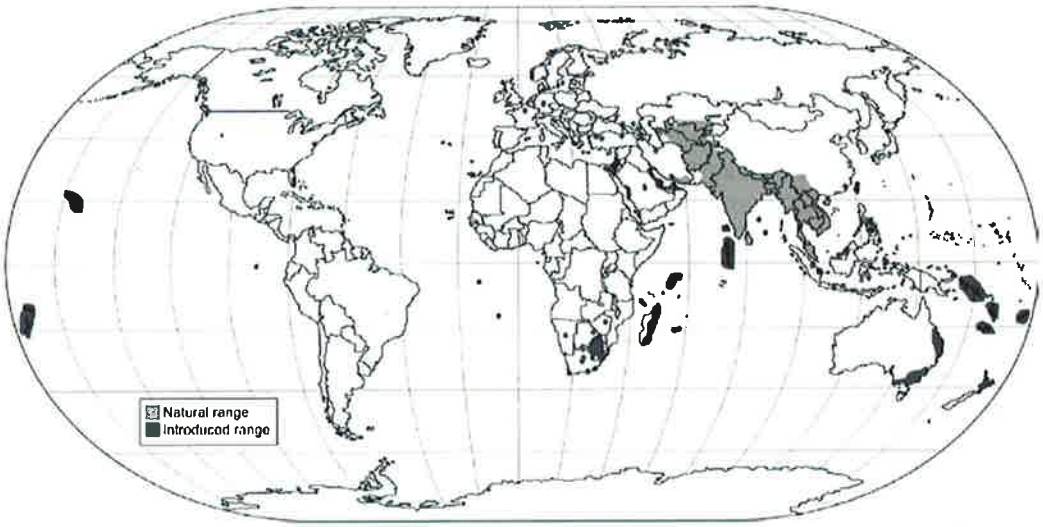

Figure 1. Worldwide distribution of *Acridotheres tristis*. (Source: Peacock et al. 2007).

Distribution and abundance in Australia

Indian mynas are distributed throughout eastern Australia from western Victoria in the south, to Cairns in the north (Figure 2). They are most abundant in suburban and agricultural regions of south-eastern Queensland and in northern areas near Cairns and Townsville. In Cairns there are up to 1000 birds per square kilometre (Australian Rainforest Foundation, 2007). They have also been recently spotted in Perth, Adelaide and Tasmania (Australian Museum Online, 2003; Department of Agriculture and Food Western Australia, 2008; Stoddart & Handke, 2008).

There were several releases of Indian mynas in Australia between 1862 and 1872. It is not known why they were originally introduced. The first release was in Melbourne where 42 birds were released in 1863. In 1883, some of these mynas were taken to sugarcane-growing areas in northern Queensland, in the belief that they would help control insect pests on cane, particularly locusts and cane beetles. By the 1950s and 1960s, Indian mynas were well established in many eastern metropolitan areas, and continued to spread throughout many regions (Long, 1981).

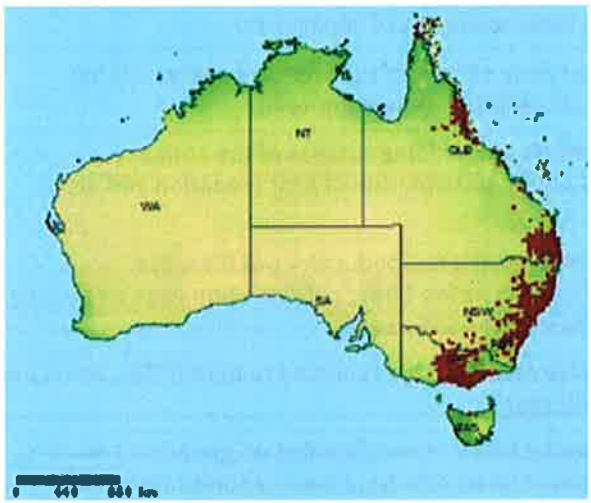

Figure 2. Distribution map of *Acridotheres tristis* in Australia. (Source: Birdata, 2007).

Species conservation status

IUCN Red List—*Acridotheres tristis* was listed as a Species of Least Concern in 2004.

Threat to human health and safety

There have been reports of Indian mynas attacking people, swooping in a similar manner to magpies (Answers.com, 2008). These attacks can cause serious injury, with one man receiving a lacerated left eye after being struck (Young, 2000). Large roosts inside buildings can spread disease (such as salmonellosis, Newcastle disease and Avian influenza) to people and can cause dermatitis and asthma because of the mites they carry (Brisbane City Council, undated; Thomas, 2004). The materials used to build nests can also be a fire hazard (Canberra Indian Myna Action Group Inc., undated).

History as a pest

Indian mynas are listed among 100 of the world's worst invaders by IUCN/SCC Invasive Species Specialist Group (ISSG, 2006).

Indian mynas are regarded as pests in many countries, on every continent except South America and Antarctica. They rank as one of the most abundant birds on a number of islands in the Indian, Atlantic, and Pacific oceans.

Over their naturalised range, Indian mynas are considered to pose a threat to natural biodiversity, by competing with native animals for food and nesting resources. In addition, they cause some crop damage and have various impacts on the public, due mainly to their noisy roosts and habit of nesting in gaps in walls and eaves (Peacock et al. 2007).

In south-east Asia, Indian mynas started to spread in the early 1900s. This may have been assisted by an expansion in agriculture and its associated habitat fragmentation, and/or deliberate release of birds. Indian mynas are now a common bird around towns and villages. However, they are generally not considered a problem in these regions and are often referred to 'farmer's friends' due to their habit of eating insect pests (Long, 1981; Tidemann, 2007).

In Singapore, Indian myna numbers have increased rapidly. The large communal roosts are a major nuisance due to the noise, pollution from droppings, the presence of fungal growth in faeces that may cause respiratory problems in people and damage to trees and buildings from the weight of roosts (Yap et al. 2002).

From the mid-1700s and throughout the 1800s, there were many deliberate introductions of Indian mynas to islands in the Indian, Atlantic and Pacific oceans, usually to control insect pests such as locusts, wasps (Tahiti), and army worms (Hawaii). Indian mynas are now a serious problem in many of these places. Some examples of impacts are:

- in the Seychelles, Indian mynas have adverse effects on the breeding success of the endangered magpie robin (*Copsychus sechellarum*) (Komdeur, 1996)
- in Tahiti, Indian mynas have adverse effects on breeding success of the critically endangered Tahiti flycatcher (*Pomarea nigra*), possibly due to nest predation and also territorial aggression (Blanvillain et al. 2003)
- in Fiji, Indian mynas compete with native seabirds for food, carry owl flies, lice, threadworms and roundworms that may affect native birds, predate upon eggs and young of terns (Sterna spp.) and noddies (Anous spp.) (ISSG, 2006)
- in Hawaii, Indian mynas disperse invasive plants such as *Lantana camara* (ISSG, 2006) and carry avian malaria (Caughley & Sinclair, 1994)
- in New Zealand, Indian mynas cause production losses by feeding on grains and stock foods. In some regions, grain crop losses of up to 80% have been reported (Northland Regional Council, undated)

- in Florida, Indian mynas attack indigenous purple martins (*Progne subis*) (Florida Fish and Wildlife Conservation Commission, undated)
- in Israel, Indian mynas have shown aggressive behaviour towards Syrian woodpeckers (*Dendrocopos syriacus*) (Holzapfel et al. 2006).

Potential distribution and impact in Queensland

Climatically, Indian mynas are well adapted to most of Queensland (Figure 3). As such, they have the potential to expand their range and become more abundant in a variety of open habitats, including parks, gardens, suburbs/towns, agricultural areas and certain types of eucalypt woodland. They have a clear preference for areas that have been heavily disturbed by human activities and are not expected to invade rainforests, or other dense forest types. Ongoing clearing of tree cover for agriculture and urban development will undoubtedly create ideal habitat for Indian mynas.

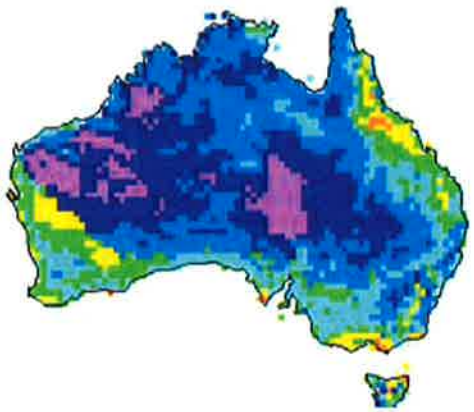

Figure 3. Potential distribution of Indian mynas (*Acridotheres tristis*) in Australia, as predicted by 'PC CLIMATE' (climate-matching computer software). (Orange indicates areas where climate is most suitable, decreasing to yellow, green, light blue, dark blue, purple, with grey as the least suitable areas).

To develop this model, all climatic points across the species' introduced and native range with an altitude of less than 2000 m were used (source information: Peacock et al. 2007).

Where there is favourable habitat, Indian mynas can be expected to have the following range of impacts:

- reduce breeding success of certain native parrot species. Indian mynas compete aggressively for nesting hollows and can evict native parrots from nest boxes or tree hollows and even kill eggs and chicks. A pair of mynas can build nests in multiple nesting hollows without using every nest. Such behaviour probably deters other species and maintains a large breeding territory (Pell & Tidemann, 1997a)
- compete for tree hollows with other native wildlife such as possums and gliders. Indian mynas can kill small mammals and remove sugar gliders from tree hollows (NSW DPI, undated; Perry, 2008)
- act as a potential reservoir for diseases of native birds such as avian malaria (Caughley & Sinclair, 1994)
- damage fruit, vegetable, and cereal crops
- spread certain weeds such as *Lantana camara* (DPI NSW, undated) and fireweed (*Senecio madagascariensis*) (Cunich, 2006)
- generate noise complaints in suburban areas, wherever there are large communal roosts
- cause dermatitis, allergies, and asthma in people by nesting in the roofs of houses (Brisbane City Council, 2007). Nests built in roofs of houses are also a possible fire risk (Canberra Indian Myna Action Group Inc., undated).

Some native species that may be adversely affected by Indian mynas include, but are not limited to, the species listed on the following page.

Threatened bird species

Barking owl (*Ninox connivens*)

Brown treecreeper (*Climacteris picumnus*)

Coxen's double-eyed fig parrot (*Cyclopsitta diophthalma coxeni*)

Flesh-footed shearwater (*Puffinus carneipes*)

Glossy black cockatoo (*Calyptorhynchus lathami*)

Hooded plover (*Thinornis rubricollis*)

Little tern (*Sterna albifrons*)

Masked owl (*Tyto novaehollandiae*)

Powerful owl (*Ninox strenua*)

Regent parrot (*Polytelis anthopeplus*)

Sooty owl (*Tyto tenebricosa*)

Sooty tern (*Sterna fuscata*)

Superb parrot (*Polytelis swainsonii*)

Turquoise parrot (*Neophema pulchella*)

White tern (*Gygis alba*)

Threatened mammal species

Beccari's freetail bat (*Mormopterus beccarii*)

Brush-tailed phascogale (*Phascogale tapoatafa*)

Eastern false pipistrelle (*Falsistrellus tasmaniensis*)

Eastern long-eared bat (*Nyctophilus bifax*)

Eastern pygmy-possum (*Cercartetus nanus*)

Greater broad-nosed bat (*Scoteanax rueppellii*)

Hoary wattled bat (*Chalinolobus nigrogriseus*)

Large-footed myotis (*Myotis adversus*)

Squirrel glider (*Petaurus norfolcensis*)

Yellow-bellied glider (*Petaurus australis*)

Yellow-bellied sheathtail bat (*Saccolaimus flaviventris*)

Non-threatened species

Common brushtail possum (*Trichosurus vulpecula*)

Crimson rosella (*Platycercus elegans*)

Dollarbird (*Eurystomus orientalis*)

Eastern rosella (*Platycercus eximius*)

Laughing kookaburra (*Dacelo novaeguineae*)

Red-rumped parrot (*Psephotus haematonotus*)

Sugar glider (*Petaurus breviceps*)

White-striped freetail-bat (*Tadarida australis*)

(Department of Environment and Heritage, 2005; NSW DPI, undated; NSW Government, undated; Pell & Tidemann, 1997a; Wetlandcare Australia, undated).

Legal status of Indian mynas in Australia and Queensland

In Western Australia, the *Agriculture and Related Resources Protection Act 1976* prohibits entry and keeping of Indian mynas, and also lists the species as a target for eradication (Department of Agriculture and Food, Western Australia, 2006).

Indian mynas are restricted in Tasmania under the *Nature Conservation Act 2002*.

In the Northern Territory, Indian mynas are listed as 'Prohibited entrants' under the *Territory Parks and Wildlife Conservation Act 2007* (Northern Territory of Australia, 2007).

In Queensland, Indian mynas are not listed as a 'declared pest' under the *Land Protection (Pest and Stock Route Management) Act 2002*; nor are they listed as 'Prohibited Wildlife' under the Nature Conservation (Wildlife) Regulation, 2006.

Numerical risk assessment

Using a numerical risk assessment system developed by Bomford (2006), Indian mynas in Queensland were assessed as an 'extreme' threat species (See Appendix 1).

References

Animal Diversity Web (2007). *Acridotheres tristis*—common myna. http://animaldiversity.ummz.umich.edu/site/accounts/information/Acridotheres_tristis.html

Answers.com (2008). *Common Myna*. www.answers.com/topic/common-myna

Australian Museum Online (2003). *Common Myna*. www.amonline.net.au/factSheets/common_myna.htm

Australian Rainforest Foundation (2007). *Researching the Effectiveness of Myna Bird (acridotheres tristis) Roost Trapping as a Control Method*. www.arf.net.au/newsandmedia/reports/Myna_Report_ARF_2007.pdf

Birdata (2007). *Atlas Distribution Maps—Common Myna*. www.birdata.com.au/maps.vm#

BirdLife International (2004). *Acridotheres tristis*. www.iucnredlist.org/search/details.php/51915/all

Blanvillain, C, Salducci, JM, Tutururai & G, Maeura, M (2003). '*Impact of introduced birds on the recovery of the Tahiti Flycatcher (Pomarea nigra)*, a critically endangered forest bird of Tahiti', Biological Conservation, 109: 197–205.

Blue Mountains Bird Watching (undated). *Common Myna*. www.bluemountains.net/birds/bird.asp?bird_id=208

Bomford, M (2006). *Risk assessment for the establishment of exotic vertebrates in Australia: recalibration and refinement of models*. Australian Government, Bureau of Rural Sciences.

Brisbane City Council (2007). *Brisbane Invasive Species Management Plan*. www.brisbane.qld.gov.au/bccwr/environment/documents/invasive_species_mgmt_plan_b.pdf

Brisbane City Council (undated). *Common Myna*. www.brisbane.qld.gov.au/BCC:BASE::pc=PC_2287

Canberra Indian Myna Action Group Inc. (undated). *An Obnoxious Invader that's a Threat to our Wildlife*. www.indianmynaaction.org.au/

Caughley, G & Sinclair, ARE (1994). *Wildlife Ecology and Management*. Blackwell Publishing.

Cunich, G (2006). *Australia's Unnoticed Environmental Disaster*. www.indianmynaeradication.com/Reports/Environmental%20Disaster%20Report.pdf

Department of Agriculture and Food, Western Australia (2006). *Agriculture and Related Resources Protection Act 1976*. http://svapp1.estation.com.au/swcc/reports/PESTS_200610_DECLAREDANIMALS%5B1%5D.pdf

Department of Agriculture and Food, Western Australia (2008). *Animal Pest Alert—Common Myna*. www.agric.wa.gov.au/content/pw/vp/bird/CommonMyna_NHT.pdf

Department of Environment and Heritage (2005). *Superb Parrot—Polytelis swainsonii*. www.environment.gov.au/biodiversity/threatened/publications/tsd05superb-parrot.html

Englund, RA & Preston, DJ (2000). *Avian Species Assessment for the Kuhio Highway, Manoa Stream Ford Crossing Project.* http://hbs.bishopmuseum.org/pdf/hbs2000-005.pdf

Florida Fish and Wildlife Conservation Commission (undated). *Common Myna.* http://myfwc.com/nonnatives/exotics/SpeciesNumberResults.asp?SPPNO=95

Griffin, AS (2008). 'Social learning in Indian mynahs, *Acridotheres tristis*: the role of distress calls', *Animal Behaviour*, 75: 79–89.

Holzapfel, C, Levin, N, Hatzofe O & Kark, S (2006). 'Colonisation of the Middle East by the invasive Common Myna *Acridotheres tristis L.*, with special reference to Israel', *Sandgrouse*, 28(1): 44–51.

Ishtiaq, F, Beadell, JS, Baker, AJ, Rahmani, AR, Jhala, YV & Fleischer, RC (2006). 'Prevalence and evolutionary relationships of haematozoan parasites in native versus introduced populations of common myna *Acridotheres tristis*', Proceedings of the Royal Society B, 273: 587–594.

ISSG (2006). *Acridotheres tristis (bird).* www.issg.org/database/species/ecology.asp?fr=1&si=108

Komdeur, J (1996). 'Breeding of the Seychelles Magpie Robin Copsychus sechellarum and implications for its conservation', *Ibis*, 138: 485–498.

Long, JL (1981). *Introduced Birds of the World.* A. H. & A.W. Reed Pty Ltd.

Martin, WK (1996). 'The Current and Potential Distribution of the Common Myna *Acridotheres tristis* in Australia', Emu, 96: 166–173.

Mete, A, Dorrestein, GM, Marx, JJM, Lemmens, AG & Beyen, AC (2001). 'A comparative study of iron retention in mynahs, doves and rats', *Avian Pathology*, 30: 479–486.

New South Wales Government (undated). *Threatened and pest animals of Greater Southern Sydney.* www.environment.nsw.gov.au/resources/threatenedspecies/07227tpagssch7pt1.pdf

Northern Territory of Australia (2007). *Territory Parks and Wildlife Conservation Act.* www.austlii.edu.au/au/legis/nt/consol_act/tpawca451.txt/cgibin/download.cgi/download/au/legis/nt/consol_act/tpawca451.rtf

Northland Regional Council (undated). *Pest Management Strategy for Magpie and Myna.* www.nrc.govt.nz/upload/2724/Magpie%20and%20Myna.pdf

NSW DPI (undated). *Common myna (Acridotheres tristis).* www.dpi.nsw.gov.au/__data/assets/pdf_file/0007/237238/common-myna.pdf

Olsen, J, Fuentes, E, Bird, DM, Rose, AB & Judge, D (2008). 'Dietary Shifts Based Upon Prey Availability in Peregrine Falcons and Australian Hobbies Breeding Near Canberra, Australia', *Journal of Raptor Research*, 42(2): 125–137.

Peacock, DS, van Rensburg, BJ & Robertson, MP (2007). 'The distribution and spread of the invasive alien common myna, *Acridotheres tristis L.* (Aves: Sturnidae), in southern Africa', *South African Journal of Science*, 103: 465–473.

Pell, AS & Tidemann, CR (1997a). 'The Impact of Two Exotic Hollow-nesting Birds on Two Native Parrots in Savannah and Woodland in Eastern Australia', *Biological Conservation*, 79:145–153.

Pell, AS & Tidemann, CR (1997b) 'The Ecology of the Common Myna in Urban Nature Reserves in the Australian Capital Territory', *Emu*, 97: 141–149.

Perry, A (2008) *Native bird threat a myna matter.* http://hawkesbury.yourguide.com.au/news/local/news/news-features/native-bird-threat-a-myna-matter/526921.aspx

Sontag Jr, WA & Louette, M (2007) 'The potential of particular starlings (Sturnidae) as indicators of habitat change', *Journal of Ornithology*, 148 (Suppl 2): S261–S267.

Stoddart, P & Handke, B (2008) *Tackling Indian Mynas—the cane toad on wings.* http://majura.org/wp-content/uploads/2008/05/report-tackling-indian-myna-the-cane-toad-on-wings.doc

Sunshine Coast Regional Council (2006) *Maroochy Pest Management Plan 2006–2010.* www.maroochy.qld.gov.au/environment/documents/pest_management_plan.pdf

Tasmania Legislation (2008) *Nature Conservation Act 2002.* www.thelaw.tas.gov.au/tocview/index.w3p;cond=;doc_id=63%2B%2B2002%2BAT@EN%2B20080906000000;histon=;prompt=;rec=-1;term=

Tidemann, C (2007) *Common Indian Myna.* http://fennerschool-associated.anu.edu.au/myna/identification.html

Thomas, A (2004) *Scribbly Gum—Myna Fightback.* www.abc.net.au/science/articles/2004/04/08/2044900.htm?site=science/scribblygum

Townsville City Council (2004) *Townsville Local Government Area Pest Management Plan 2004–2008.* http://previous.townsville.qld.gov.au/wwwdocs/health/TPL_Pest%20Management%20Plan/11%20Pest%20Animals%20for%20Prevention,%20Eradication%20&%20Containment.pdf

Wetlandcare Australia (undated) *Indian Myna Control Project.* www.wetlandcare.com.au/docs/info_bulletins_projects/Indian_Myna_info_bulletin_3106.pdf

Wikipedia (2008) *Common Myna.* http://en.wikipedia.org/wiki/Common_Myna

Yap, CAM, Sodhi, NS & Brook, BW (2002) 'Roost Characteristics of Invasive Mynas in Singapore', *The Journal of Wildlife Management*, 66(4): 1118–1127.

Young, A (2000) 'Corneal laceration with total but isolated aniridia caused by a pecking injury', *Journal of Cataract and Refractive Surgery*, 26(9): 1419–1421.

Appendix 1

Using the Bomford (2006) system, Indian mynas in Queensland were considered an *extreme* threat species.

Species:		Acridotheres tristis (Indian myna)
Date of assessment:		16 September 2008
Literature search type and date:		See references
Factor	Score	
A1. Risk to people from individual escapees (0–2)	1	Indian mynas are territorial and will swoop and attack people, and may cause injuries that require medical attention.
A2. Risk to public safety from individual captive animals (0–2)	0	Apart from someone entering an enclosure or otherwise being in reach of a captive animal, there is nil or low risk to public safety.
Stage A. Risk posed by captive or released individuals = Sum of A1 to 2. (0–4)	1	Moderately dangerous
B1. Climate match (1–6)	4	High climate match in Australia. CMS = 1224.
B2. Exotic population established overseas (0–4)	4	Exotic populations are established on islands larger than 50 000 square kilometres and also on continents.
B3. Taxonomic class (0–1)	0	Bird.
B4. Migratory (0–1)	1	Non-migratory in its native range.
B5. Diet (0–1)	1	Generalist diet of invertebrates, bird eggs, small reptiles, food scraps, pet food, fledging sparrows, cultivated seedlings, and the ripening fruit and seeds of plants such as figs, papaya, dates, apple, pear, tomato, and cereal crops.
B6. Habitat (0–1)	1	Indian mynas live in human-disturbed habitats.
B7. Overseas range size (0–2)	1	Overseas range size of 1–10 million square kilometres.
B. Probability escaped or released individuals will establish a free-living population = Sum of B 1 to 7. (1–16)	12	Serious establishment risk
C1. Taxonomic group (0–4)	2	Bird in taxa that is particularly prone to causing agricultural damage.
C2. Overseas range size including current and past 1000 years, natural and introduced range (0–2)	1	1–10 million square kilometres.
C3. Diet and feeding (0–3)	0	Not a mammal.

C4. Competition with native fauna for tree hollows (0–2)	2	Can nest or shelter in tree hollows.
C5. Overseas environmental pest status (0–3)	3	Major environmental pest throughout established range.
C6. Climate match to areas with susceptible native species or communities (0–5)	5	The species has more than 20 grid squares within the highest two climate match classes, and has more than 100 grid squares within the four highest climate match classes, that overlap the distribution of any susceptible native species or communities.
C7. Overseas primary production pest status (0–3)	3	Major pest of primary production in Australia and New Zealand.
C8. Climate match to susceptible primary production (0–5)	5	Score = 290 see Table 1.
C9. Spread disease (1–2)	2	All birds and mammals (likely or unknown effect on native species and on livestock and other domestic animals).
C10. Harm to property (0–3)	3	Annual value of property damage estimated at least $50 million.
C11. Harm to people (0–5)	3	Social nuisance—annoyance moderate or severe and few people at risk (see A1).
C. Probability an exotic species would become a pest (for birds, mammals, reptiles and amphibians) = Sum of C 1 to 11. (1–37)	29	Extreme pest risk
A. Risk to public safety posed by captive or released individuals		
A = 0 = not dangerous; A = 1 = moderately dangerous; A ≥ 2 = highly dangerous	1	Moderately dangerous
B. Risk of establishing a wild population		
For birds and mammals: B < 6 = low establishment risk; B = 7–11 = moderate establishment risk; B = 12–13 = serious establishment risk; B > 14 = extreme establishment risk	12	Serious establishment risk
For reptiles and amphibians: B < 3 = low establishment risk; B = 3–4 = moderate establishment risk; B = 5–6 = high establishment risk; B > 6 = extreme establishment risk		
C. Risk of becoming a pest following establishmen		
C < 9 = low pest risk; C = 9–14 = moderate pest risk; C = 15–19 = serious pest risk; C > 19 = extreme pest risk	29	Extreme pest risk
VPC threat category		Extreme

PR09-4413