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The emergence of H5N1 Avian Influenza and the potential impact on Hays Inlet in Southeast Queensland: A Case Study.

Introduction

High Pathogenicity Avian Influenza (H5N1) reached mainland Australia in June 2026, ending the continent's long-standing isolation from the global panzootic. The lethal clade 2.3.4.4b has since been confirmed in wild seabirds in Southeast Queensland, including Moreton Island and the Sunshine Coast. Its proximity to Brisbane and circulation in wild birds create an imminent biosecurity threat to interconnected waterways and vulnerable ecosystems such as Hays Inlet.

Hays Inlet, off Bramble Bay near Southeast Queensland's Redcliffe Peninsula, is a significant estuarine wetland of mangroves, saltmarshes and tidal flats fed by Saltwater Creek. Protected as a declared Fish Habitat Area and recognised Ramsar wetland within Moreton Bay Marine Park, it is closed to commercial fishing to preserve important marine breeding grounds. The inlet also supports migratory shorebirds, native kangaroos, flying foxes and abundant marine life.

Since spring 2015, Birders of the South Pine River and REF Environmental volunteers have conducted quarterly surveys at Silcock Street Park, Clontarf. Its eucalypt, casuarina and melaleuca woodland, saltmarsh, mangrove and intertidal habitats support diverse birdlife. Across 43 surveys over 11 years, they recorded **153 bird species**, demonstrating the biodiversity, productivity and ecological importance of Hays Inlet.

In August 2026 the Department of Climate Change, Energy, the Environment and Water released a report summarising the risk factors of H5N1 flu for over 3000 species of birds and mammals. The data collected from the long-term bird survey provides a case study aligning these risk scores with the natural population.

H5N1 National Risks Paper (DCCEEW)

Australia's many endemic animals make the impacts of H5 bird flu difficult to predict. Clearly, all birds and mammals face some risk. A risk analysis developed with BirdLife Australia and Charles Darwin University assesses impacts on native species and identifies sites where at-risk species are concentrated. This instrument provides risk scores for over 3000 species of native birds and mammals. The risk analysis was framed as follows:

- **Susceptibility Score.** The likelihood of infection with H5 bird flu and local-level impacts to a species (extreme, very high, high, moderate, low). The susceptibility score considers habitat, diet, group size, dispersal distance, population connectivity (for mammals), reproductive rate and mating behaviour, endemism, and precedence (impacts to similar species overseas).
- **Conservation Status**. National listing under the Environment Protection and Biodiversity Conservation Act 1999 (Vulnerable, Endangered, Critically Endangered, Not listed (Blank)). Note that 'Vulnerability' also considered if a species is range restricted and/or has a small population size. Range size and population information have not been provided in this summary table.
- **National Risk**. The national H5 bird flu risk score for a species (extreme, very high, high, moderate, low). This is defined as the estimated relative risk of species level impacts from H5 bird flu. The national risk score is derived from the susceptibility score and vulnerability score of a species.

Case Study Methods

Using the scores provided in the DCCEEW table, all observed birds on the Hays Inlet Bird Database were created as a list summarising the risk scores for each observed species. This allowed us the opportunity to get an idea of the risks to the observed birds in Hays Inlet. A recent Bioblitz at Hays Inlet was conducted in June 2026 and observed mammals were included in a separate table.

Results Bird Survey

152 species were analysed (Note, the introduced bird, the Common Myna wasn't included in the DCCEEW tables). Of these species 2 were listed as critically endangered, 2 species endangered and 5 as vulnerable. The Susceptibility score indicated 28 species were very high, 24 high, 55 moderate and 45 low. The results are summarised in the chart below:

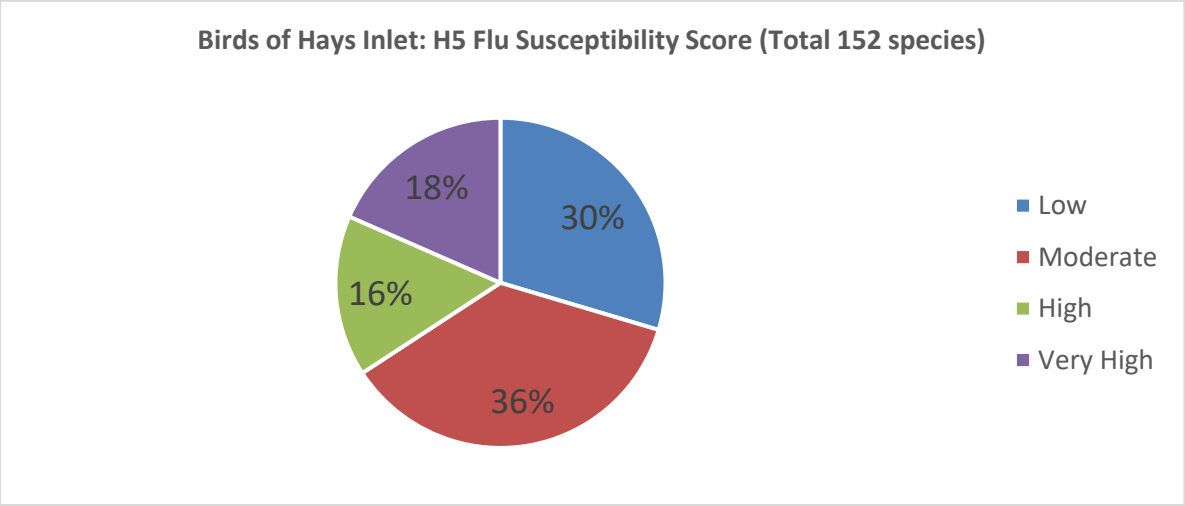


Chart One: Summary of the Susceptibility Scores for the birds of Hays Inlet (Refer to Appendix 3 for further details).

The National Risk score indicated that 2 species were rated as very high, 37 species as high, 55 species as moderate and 90 species as presenting a low risk. It should be noted that this is a national view, and the potential impact on the local bird populations could be significantly higher. The results are summarised in the chart below:

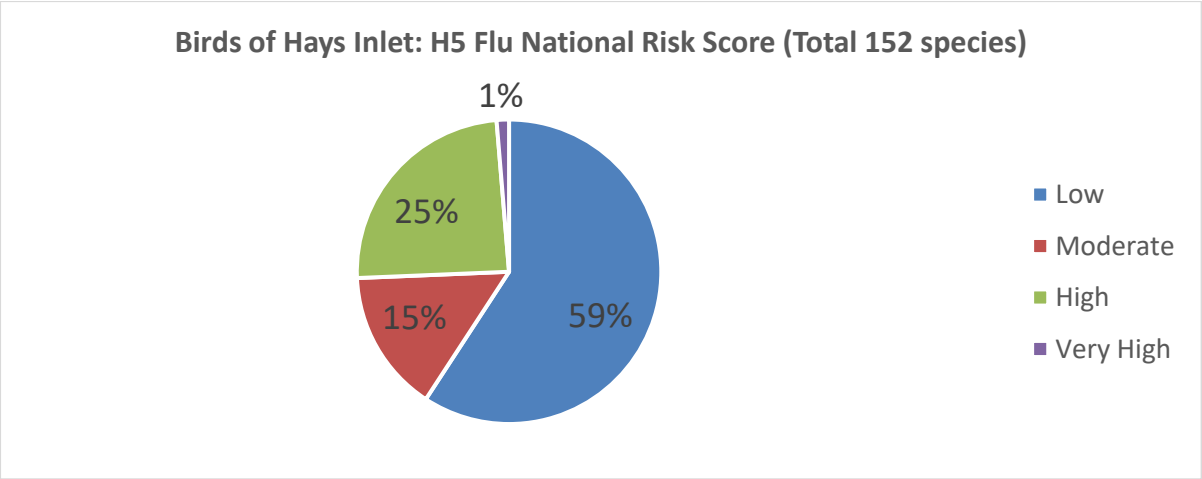


Chart Two: Summary of the National Risk Scores for the birds of Hays Inlet (Refer to Appendix 3 for further details).

Waterfowl inhabiting Hays Inlet including Black Swans (L) Pelicans and Chestnut Teals (C) and Royal Spoonbills (R) are very susceptible to H5N1

Susceptibility

This analysis indicates that 18% Hays Inlet bird species are very susceptible to the H5N1 flu. In particular there are two categories of birds at risk:

- Waterfowl, Herons and Egrets, Spoonbills, Cormorants, Terns and Gulls as well as large resident birds including the Australian Pelican, Black-winged Stilts, various Duck species and Black Swans.
- Birds of Prey including raptors such as the White-bellied Sea Eagle, Brahminy Kite, Whispering Kite and the Swamp Harrier.

Birds of prey around Hays Inlet are highly susceptible to H5N1 because their behaviour includes opportunistic feeding on carrion. Whistling Kite (L) Swamp Harrier (C) White-bellied Sea Eagle (R)

National Risk

In terms of National Risk, the Little Tern and the Plumed Egret have both been assessed as very high. Other high risk birds using the national risk score include:

- Migratory Shorebirds including the critically endangered Far Eastern Curlew and the Sandpiper Curlew along with endangered Black-tailed Godwit and the Common Greenshank as well as vulnerable species including the Great Knot, the Red Knot, The Lesser-Sand Piper, the Sharp-tailed Sandpiper and Latham's Snipe.
- In addition to the highly susceptible species listed above, Dotterels, the Willy Wagtail and both species of Ibis (Straw-necked and Australian White) are also categorised as high in terms of the National Risk score.

The National Risk score for some migratory waders is very high due to their conservation status. Endangered Black-tailed Godwit (L) the critically endangered Sandpiper Curlew (C) and the critically endangered Eastern Curlew (R) are all visitors to Hays Inlet.

For the complete list of birds observed in Hays Inlet and their risk scores please refer to Appendix One. For abundance and species diversity in the quarterly surveys see Appendix Two.

Results Mammal Survey

A recent bioblitz listed the following mammals present in Hays Inlet (Note this included a night spotting survey for arboreal mammals). During daylight hours a number of Eastern Grey Kangaroos can be observed feeding on the marine couch. There are also a number of koalas associated with the fringe forest areas of Eucalypt, Melaleuca and Casuarina. There is little known about microbats within Hays Inlet, although they are probably present due to the extent of saltmarsh, mangroves and casuarina. The table is presented below summarising the H5N1 risk scores.

Hays Inlet Mammal Species	Susceptibility Score	Conservation Status	National Risk Score
Sugar Glider	Moderate		Moderate
Squirrel Glider	Low		Low
Eastern Grey Kangaroo	Low		Low
Little Red Flying Fox	Moderate		Moderate
Koala	Low	Endangered	Low
Swamp Wallaby	Low		Low
Brushtail Possum	Low		Low

Table One: H5N1 Risk Scores for mammals identified in Hays Inlet

Mammals observed in the Hays Inlet catchment, including the endangered koala, generally have low susceptibility to H5N1. The susceptibility and national risk for the Little Red Flying Fox is higher and may well be related to their communal roosting. However, there is little known about the bats (and microbats) in Hays Inlet and this may well be worth investigating further.

There are a number of mammals associated with the fringing forests and saltmarsh pastures associated with Hays Inlet. However, their susceptibility is generally considered low. Eastern Grey Kangaroo (L)the endangered Koala (C) and the Brushtail Possum (R)

Discussion

Rationale and application of risk scores to managing Hays Inlet

This brief analysis is an example in applying the risk factors outlined by the DCCEWW to identified bird species located in a local area. Hays Inlet is part of a large coastal system associated with Moreton Bay, making it more susceptible to the virus. The 11 years of observational data can also provide some insights into the potential impacts on the ecology and wildlife of Hays Inlet.

In applying these risk factors to Hays Inlet, it's important to consider the variables used by DCCEEW to categorise risks, especially around susceptibility and vulnerability.

The risks around susceptibility are calculated on a number of factors including connection to aquatic habitats (the virus can be transferred through contaminated water) behaviour (aggregations and reproductive), diet, mobility and in the case of mammals, connectivity (DCCEEW, 2026). In particular endemism is also a factor as species that are only found in Australia are likely to have less resistance to the virus as they aren't found anywhere else in the world.

Vulnerability is based on the conservation status of each species (EPBC act) realising smaller populations could lead to an extinction effect. Importantly their range and population size can have an impact on small geographically isolated populations as opposed to a widely distributed species.

Application or interpreting impact on Hays Inlet

Over the past 11 years there has been over 14,000 observations during the quarterly surveys and apart from the risk scores for each individual species the abundance and behaviour of birds can also be linked to the risk (as indicated in the rationale for developing risk scores). For example, the Far Eastern Curlew is a visitor to Moreton Bay and although susceptible to infection along its international migratory routes, it is generally not a common bird and tends to be less gregarious than other species such as the Godwits and Whimbrels who tend to feed in flocks.

Surveys show that bird numbers increase at certain times of year, particularly among migratory waders. Hays Inlet's intertidal flats provide rich feeding grounds for waders preparing to return

to the Northern Hemisphere. Hundreds have been observed feeding close together, including Red-necked Stints, Pacific Golden Plovers, Bar-tailed Godwits, Curlew Sandpipers and Sharp-tailed Sandpipers. Such concentrations are likely to increase the risk of cross-infection. Large gatherings of resident birds may pose a similar risk. During cooler months, large flocks of Pied Stilts gather on the flats, while more than 1,000 Little Black Cormorants may feed *en masse* on baitfish schools and roost together.

At least a 1000 Little Black Cormorants roosting on a Sandbar in Moreton Bay. These aggregations often occur in winter and are likely to increase the chance of infection.

Hays Inlet is not a known roosting site for migratory waders. However, large communal roosts at the Port of Brisbane, Toorbul and Bribie Island may be significant infection points for many bird species, regardless of where they feed.

Evidence from overseas outbreaks suggests that some bird species associated with Hays Inlet and Moreton Bay could experience mass mortality. Vaccinating wild bird populations is unlikely to be practical; however, visitors to the inlet can take steps to reduce impacts and limit the spread of H5N1.

Avoid, Record and Report

Hays Inlet attracts birdwatchers, fishers, boaters, local residents and other visitors. A public education campaign promoting the Australian Government's Avoid, Record and Report protocol could help raise awareness and reduce the risk of H5N1 transmission. The recommended process is outlined below (birdflu@gov.au):

- **Avoid.** Do not touch dead animals and keep pets away from them.
- **Record.** Take a photo or video, note the date, time and location, and record any relevant observations.
- **Report.** Call the 24-hour Emergency Animal Disease Hotline on **1800 675 888**.

Precautions for consultants, contractors, researchers and citizen scientists

Hays Inlet is an important conservation area supporting environmental rehabilitation, including weed control and revegetation, community bushcare, and flora and fauna monitoring by researchers and volunteers. Like many saltmarsh areas, it associated with infrastructure including utilities. Unitywater operates a water treatment plant with a pipeline extending into the inlet that requires periodic maintenance. A reconstruction project is due to begin to replace the pipeline after it was severely damaged during a cyclone.

These activities create potential pathways for H5N1 transmission, so the Avoid, Record and Report protocol should be supported by site-specific biosecurity measures. Workers and

volunteers may need to adjust their usual practices by avoiding bird habitat where possible and disinfecting footwear before entering and after leaving wetland areas. Although the local Bushcare group generally works along the landward edge of Hays Inlet rather than within the main wetlands, its members should still be informed about the Avoid, Record and Report protocol.

In terms of bird surveys, it maybe worthwhile modifying the observation protocols from a census to include a “biosecurity” monitoring program. Volunteers could look for signs of infection such as birds with twisted necks, lack of coordination, tremors or clusters of carcasses. Again, it’s important that these volunteers avoid contact and disinfect their footwear before entering and leaving the area.

Summary

Hays Inlet provides a valuable local case study for assessing H5N1 risk. Eleven years of quarterly surveys, comprising more than 14,000 observations and 153 recorded bird species, establish a strong baseline for understanding seasonal abundance, flocking behaviour and the presence of susceptible or threatened species. The greatest potential impacts are on waterbirds, migratory shorebirds and raptors, particularly where birds congregate to feed or roost and may be exposed through contaminated water, close contact or carrion.

Overseas experience indicates that some species could suffer mass mortality. Mammal risk is generally lower, although communal roosting may increase exposure for flying foxes, and limited knowledge of local bats and microbats warrants further investigation.

Priority actions include public promotion of the Avoid, Record and Report protocol; rapid reporting of sick or dead wildlife; keeping people and pets away from carcasses; adapting surveys to monitor signs of disease; and requiring workers, researchers and volunteers to avoid bird habitat where practicable and disinfect footwear and equipment before entering and after leaving wetland areas. Continued monitoring and coordination across the wider Moreton Bay system will be important for early detection and reducing transmission.

Appendix One: H5N1 Risk score for Birds in Hays Inlet

Hays Inlet Bird Species	Susceptibility Score	Conservation Status	National Risk Score
Baza Pacific	High		Moderate
Bee eater Rainbow	Moderate		Low
Bronze-cuckoo Horsfield's	Low		Low
Bronze-cuckoo Shining	Low		Low
Bronzewing (Common)	Low		Low
Brush Turkey Australian	High		Moderate
Butcherbird Grey	Moderate		Low
Butcherbird Pied	Moderate		Low
Cicadabird	Moderate		Low
Cisticola Golden-headed	High		Moderate
Cockatoo Sulphur Crested	Low		Low
Corella Little	Moderate		Low
Cormorant Great	Very High		High
Cormorant Little Black	Very High		High
Cormorant Little Pied	Very High		High
Cormorant Pied	Very High		High
Coucal Pheasant	Moderate		Low

Hays Inlet Bird Species	Susceptibility Score	Conservation Status	National Risk Score
Crow Torresian	High		Moderate
Cuckoo Brush	Low		Low
Cuckoo Channel-billed	Low		Low
Cuckoo Fan-tailed	Low		Low
Cuckoo-shrike Black Faced	Moderate		Low
Curlew Far Eastern	Moderate	Critically endangered	High
Currawong Pied	High		Moderate
Darter	High		Moderate
Dollarbird	Moderate		Low
Dotterel Black-fronted	Very High		High
Dotterel Red-kneed	Very High		High
Dove Bar-shouldered	Low		Low
Dove Peaceful	Low		Low
Dove Spotted	Moderate		Low
Drongo spangled	Moderate		Low
Duck Hardhead	Very High		High
Duck Pacific Black	High		Moderate
Duck Maned	High		Moderate

Hays Inlet Bird Species	Susceptibility Score	Conservation Status	National Risk Score
Egret Little	Very High		High
Egret Cattle	Very High		High
Egret Great	Very High		High
Egret Plumed	Very High		Very High
Fairywren Variegated	Low		Low
Fairywren Red-backed	Low		Low
Fairywren Superb	Low		Low
Fantail Grey	Moderate		Low
Fantail Rufous	Moderate		Low
Figbird Australian	Moderate		Low
Finch Double -barred	Low		Low
Finch Red-browed (Firetail)	Low		Low
Flycatcher Leaden	Moderate		Low
Friarbird Little	Low		Low
Friarbird Noisy	Low		Low
Fruit-dove Rose-crowned	Low		Low
Galah	Low		Low
Gerygone Mangrove	Low		Low

Hays Inlet Bird Species	Susceptibility Score	Conservation Status	National Risk Score
Gerygone White-Throated	Low		Low
Godwit Bar-tailed	Moderate		High
Godwit Black-tailed	Moderate	Endangered	High
Goshawk Brown	High		Moderate
Grass-bird Tawny	High		Moderate
Greenshank Common	Moderate	Endangered	High
Gull Silver	Very High		High
Harrier Swamp	High		Moderate
Heron Little	High		High
Heron White-faced	Very High		High
Heron White-necked (Pacific)	High		Moderate
Honeyeater Blue-faced	Low		Low
Honeyeater Brown	Low		Low
Honeyeater Lewins	Low		Low
Honeyeater Mangrove	Low		Low
Honeyeater Scarlet	Low		Low
Honeyeater Striped	Low		Low
Honeyeater White-throated	Low		Low

Hays Inlet Bird Species	Susceptibility Score	Conservation Status	National Risk Score
Honeyeater Yellow-faced	Low		Low
Ibis Australian White	Very High		High
Ibis Straw-necked	Very High		High
Kingfisher Azure	Moderate		Low
Kingfisher Forest	Moderate		Low
Kingfisher Sacred	Moderate		Low
Kingfisher Torresian	Moderate		Low
Kite Black-shouldered	High		Moderate
Kite Brahminy	High		Moderate
Kite Whistling	High		Moderate
Knot Great	Moderate	Vulnerable	Moderate
Knot Red	Moderate	Vulnerable	High
Koel Pacific	Low		Low
Kookaburra Laughing	Moderate		Low
Lapwing Masked	Low		Low
Lorikeet Little	Low		Low
Lorikeet Rainbow	Moderate		Low
Lorikeet Scaly-breasted	Moderate		Low

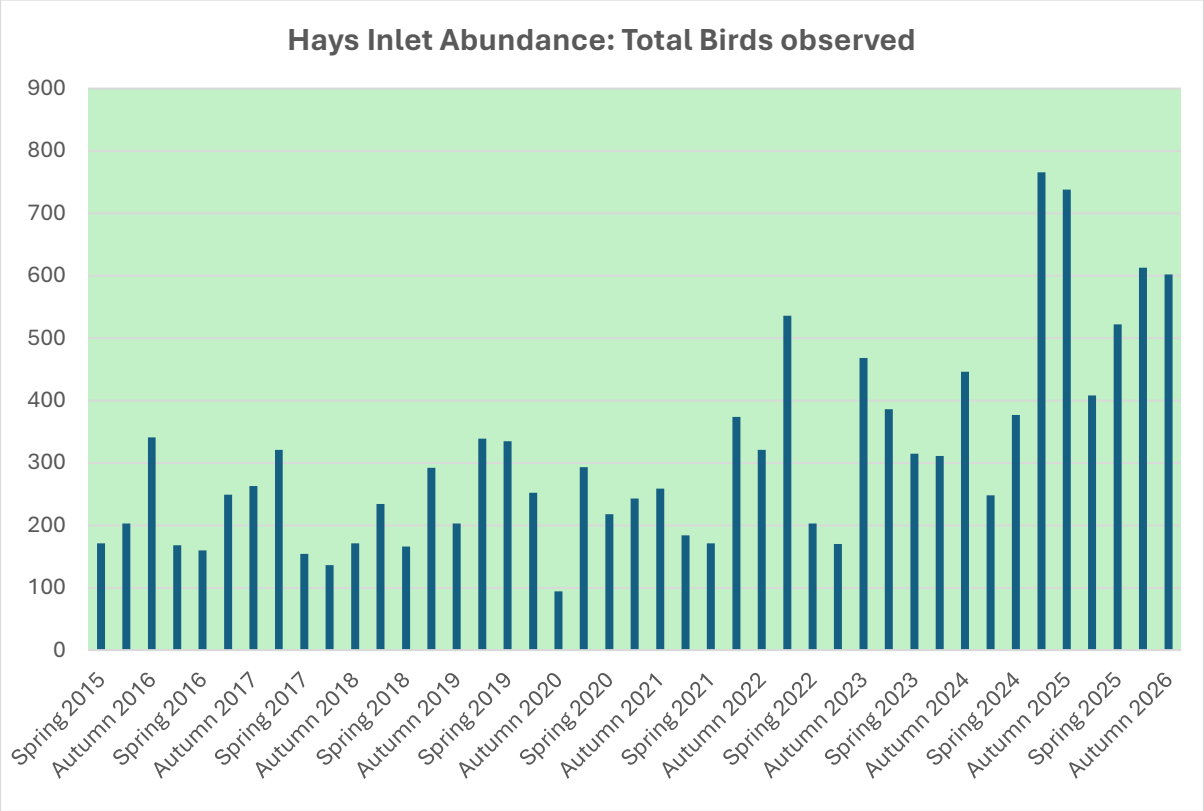
Hays Inlet Bird Species	Susceptibility Score	Conservation Status	National Risk Score
Magpie Australian	Moderate		Low
Magpie Lark	Moderate		Low
Mannikin Chestnut breasted	Moderate		Low
Martin Fairy	Low		Low
Martin Tree	Low		Low
Miner Noisy	Moderate		Low
Mistletoe bird	Low		Low
Monarch Black-faced	Moderate		Low
Monarch Spectacled	Moderate		Low
Moorhen Dusky	Very High		High
Night-Heron Nankeen	High		High
Oriole Olive-backed	Moderate		Low
Osprey	Moderate		Low
Oystercatcher Pied	Moderate		Low
Pardalote Spotted	Low		Low
Pardalote Striated	Low		Low
Parrot King	Low		Low
Pelican	Very High		High

Hays Inlet Bird Species	Susceptibility Score	Conservation Status	National Risk Score
Pigeon Crested	Low		Low
Pigeon Rock	Moderate		Low
Pigeon White-headed	Low		Low
Plover Lesser-Sand	High	Vulnerable	High
Plover Pacific Golden	High		Moderate
Plover Red-capped	High		High
Rail Buff-banded	Moderate		Low
Reed-Warbler Australian	High		Moderate
Robin Eastern Yellow	Moderate		Low
Rosella Pale-headed	Low		Low
Sandpiper Curlew	Moderate	Critically endangered	High
Sandpiper Marsh	Moderate		Low
Sandpiper Sharptailed	Moderate	Vulnerable	Moderate
Scrub Wren White-browed	Low		Low
Sea-eagle white-bellied	High		Moderate
Shrikethrush Grey	Moderate		Low
Shrikethrush Rufous (little)	Moderate		Low
Sparrowhawk Collared	High		Moderate

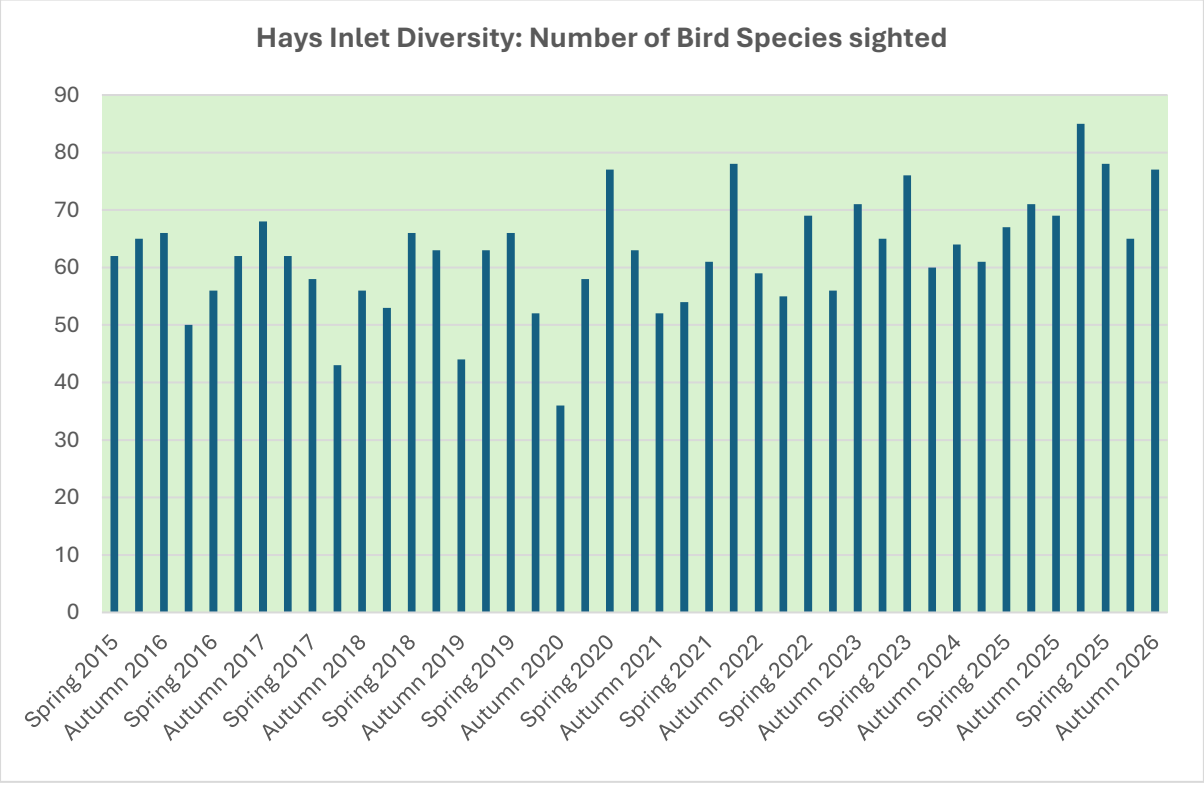
Hays Inlet Bird Species	Susceptibility Score	Conservation Status	National Risk Score
Silvereye	Moderate		Low
Snipe Latham's	Moderate	Vulnerable	Moderate
Spoonbill Royal	Very High		High
Stilt Pied	Very High		High
Stint Red-necked	Moderate		Low
Stork Black-necked	Very High		High
Swallow Welcome	Low		Low
Swamp Hen Australian	Very High		High
Swan Black	Very High		High
Swift / Needletail White throat	Moderate		Low
Swift Pacific	Moderate		Low
Teal Chestnut	High		Moderate
Teal Grey	Very High		High
Tern Caspian	Very High		High
Tern Australian	Very High		High
Tern Gull-billed	Very High		High
Tern Greater Crested	Very High		High
Tern Little	Very High		Very High

Hays Inlet Bird Species	Susceptibility Score	Conservation Status	National Risk Score
Thornbill Brown	Low		Low
Treecreeper White throated	Low		Low
Triller Varied	Moderate		Low
Wattlebird Little	Low		Low
Wood-swallow white-breasted	Moderate		Low
Whimbrel	Moderate		Low
Whistler Golden	Moderate		Low
Whistler Rufous	Moderate		Low
Willie Wagtail	Moderate		High

Appendix Two: Results of Bird Surveys conducted at Hays Inlet



Quarterly bird counts vary seasonally, particularly when large flocks of waders are present.



Quarterly bird species counts vary seasonally across surveys.

Appendix Three: Bird Case Studies

Little Tern in the foreground (L) and Plumed Egret (R) are deemed very high in susceptibility and national risk to H5N1.

Birds from Hays Inlet with Very High Susceptibility to H5N1

Great Cormorant	Silver Gull	Black-necked Stork
Little Black Cormorant	White-faced Heron	Australian Swamphen
Little Pied Cormorant	Australian White Ibis	Black Swan
Pied Cormorant	Straw-necked Ibis	Grey Teal
Black-fronted Dotterel	Dusky Moorhen	Caspian Tern
Red-kneed Dotterel	Pelican	Australian Tern
Hardhead Duck	Royal Spoonbill	Gull-billed Tern
Little Egret	Pied Stilt	Greater Crested Tern
Cattle Egret		
Great Egret		

Birds from Hays Inlet with elevated Conservation Status

Bird species	Conservation Status
Far Eastern Curlew	Critically endangered
Curlew Sandpiper	Critically endangered
Black-tailed Godwit	Endangered
Common Greenshank	Endangered
Red Knot	Vulnerable
Lesser-Sand Plover	Vulnerable
Great Knot	Vulnerable
Latham's Snipe	Vulnerable
Sharp-tailed Sandpiper	Vulnerable

Birds from Hays Inlet with a Very High National Risk

Bird species	Susceptibility Score	National Risk
Plumed Egret	Very High	Very High
Little Tern	Very High	Very High

References and Attributions

DCCEEW (2026) National Risks for H5N1 for Native Birds and Mammals national-risk-scores-h5-bird-flu-native-birds-mammals.pdf downloaded 21 August 2026

DCCEEW (2026) Understanding the risk to native species - DCCEEW downloaded 28 August 2026.