

The importance of artificial roosts for migratory shorebirds



National Environmental Science Programme



Shorebirds roosting at East Arm Wharf, Darwin, NT. Photo: Michael Lawrence-Taylor

Australia's migratory shorebirds

Australia has 37 species of migratory shorebirds. They breed in boreal and arctic areas of Russia, Mongolia, northern China and Alaska before migrating 12,000-14,000km to spend their non-breeding season in Australia during our summer.

Australia's shorebirds are part of a migration route called the East Asian-Australasian Flyway. Millions of shorebirds journey through this flyway annually. Many make their first southward migration to Australia when only a few months old.

A recent analysis of data spanning 1973-2014 showed population decreases in 12 migratory shorebirds species in Australia. Since 2015 eight species or subspecies have been listed or have had their conservation status uplisted under the *Environmental Protection and Biodiversity Conservation Act 1999*.

A muddy life driven by tides

Shorebirds are adapted to foraging for invertebrates below or on top of muddy substrates along the shorelines of oceans, lakes, rivers and wetlands. The daily movements of many species are largely governed by tidal cycles: at low tide foraging for invertebrates on exposed intertidal mudflats, at high tide moving to supratidal roosting areas primarily to rest and digest.

Disturbance taking a toll

Globally, migratory shorebirds are in serious decline and face multiple threats throughout their life cycle. One of the most significant threats to shorebirds in Australia, where many shorebird species spend the non-breeding season, is disturbance - especially at high tide roosts. A common cause of disturbance is people and their dogs on beaches for recreation.

Disturbance causes shorebirds to expend extra energy keeping watch and fleeing by walking or flying. The effect of disturbance is often underappreciated, but can be significant given the huge distances the birds fly during migration. A study from Lee Point near Darwin, Northern Territory concluded that the increased energy associated with 10 alarm flights per day could have negative consequences to the point of reducing survival or reproductive success.

The distance at which a shorebird initiates a flight because of the approach of a perceived predator differs between species. Some birds such as the Far Eastern Curlew, which had a mean flight initiation distance of over 125 m recorded in Victoria, are particularly intolerant. Disturbance can cause birds to abandon roosts for the tide cycle or even altogether.

Lack of roosts safe from disturbance may even constrain the number of shorebirds that can be supported in a given region.



A global trend

Shorebird declines are being experienced globally, nowhere more so than in the East Asian-Australasian Flyway (EAAF). Species experiencing the most rapid declines are the ones most reliant on a migration route through the Yellow and Bohai Sea region of the EAAF, which encompasses parts of the coastlines of China, The Democratic Peoples' Republic of Korea and the Republic of Korea.

A key threat to shorebirds in this region is the loss or degradation of intertidal mudflats. There has been more than a 50% decline in tidal mudflats in the Yellow Sea region, and remaining mudflats are affected by widespread pollution, algal blooms and declines of invertebrate and vertebrate fauna.

Loss of habitat in this region can make birds more sensitive to impacts in other regions.

Far Eastern Curlew

The Far Eastern Curlew *Numenius madagascariensis* has experienced one of the most acute declines of any Australian shorebird species. It has experienced a 5.8 % annual rate of decline; if this trend persists, the global population will fall to 10 % of its 1993 abundance by 2035. It is listed as Endangered on the IUCN Red List and Critically Endangered under Australia's EPBC Act.

It is endemic to the East Asian-Australasian Flyway and is heavily impacted by mudflat loss in the Yellow Sea region. Around three quarters of the population is thought to spend the non-breeding season in Australia, where it is also impacted by disturbance.



Roosting bar-tailed godwits. Photo: Micha Jackson

A study in Moreton Bay, Queensland showed that recreational use of foreshores, particularly by dogs, resulted in a consistent negative effect on the occupancy and abundance of shorebirds within a protected area. Luckily, however, it also showed that strategic zoning can be used effectively to accommodate both migratory shorebirds and recreational use.

The importance of artificial roosts

Safe roosts free from disturbance are of great importance to shorebirds. Though they should not be considered a replacement for natural habitat, a number of studies have shown that supratidal artificial habitats can provide attractive high tide roosts for migratory shorebirds, particularly when they are shielded from disturbance. They can also provide foraging opportunities for some species.

Artificial roosting habitats can include those that have been created 'accidentally' or those constructed or reconstructed deliberately to provide or maintain resources for shorebirds. In Australia they are generally associated with commercial salt works, ports, wastewater treatment and in some cases specifically constructed roosts.

Examples of artificial roosting habitat in Australia:

- Artificial ponds at a former commercial salt operation in the Gulf St. Vincent area, South Australia, consistently recorded over 15,000 shorebirds during counts over the last several decades.
- Supratidal ponds associated with the Western Treatment Plant, Victoria, consistently hold internationally significant numbers (more than 1% of the global population) of many shorebird species. The ponds are used throughout the tidal cycle for roosting and foraging by different species.
- Settling ponds at East Arm Wharf, associated with the Darwin Port, Northern Territory, support consistently large numbers of roosting Far Eastern Curlews whose abundance at the site has steadily increased in recent years despite the species-wide decline.

A common characteristic of the sites above is their relative inaccessibility to the public. Management of these habitats can provide opportunities to help shorebirds maintain a positive energy balance during the non-breeding season, particularly when putting on weight before migration.

Far Eastern Curlews are among the species that use artificial habitats, though only a few locations in Australia have recorded counts of over 100 birds.



Eastern Curlew. Photo: Micha Jackson

Safe roosts free from disturbance are of great importance to shorebirds.

Further Information

More information and references can be found in the report "Literature review: Importance of Artificial roosts for migratory shorebirds, TSR Hub, 2017"

For more information on Research Project 5.1.1: Strategic planning for the Eastern Curlew, see the TSR Hub website.

What makes good roosting habitat?

Proximity to foraging grounds and avoidance of disturbance and predation risk are some of the most important factors affecting roost choice by shorebirds. In general, shorebirds will prefer to roost close to their foraging grounds, but will invest a significant amount of energy to travel to alternate 'safer' roosts if nearby roosts are regularly disturbed or vulnerable to predation. This can also result in different roosting behaviour at night time. Other factors that can be important are microclimate and landscape features of the roost.

Variability in shorebird behaviour strongly indicates that managers wanting to improve roosting conditions for shorebirds of a given species in a given locality require a detailed local knowledge of available foraging and roosting habitat as well as the seasonal behaviour of target species for management. Similarly, design or implementation of artificial roosts requires careful consideration of regional and site-specific details and extensive consultation with relevant experts such as ecologists and engineers.



Roosting Whimbrel. Photo: Micha Jackson