

EPBC Act Listed Threatened and Migratory Fauna Species Review

Lots 4 and 5 Ludlow Road

Limestone Extraction

Myalup, WA

(EPBC 2019/8388)

August 2019

Prepared by:

Greg Harewood

Zoologist

PO Box 755

BUNBURY WA 6231

M: 0402 141 197

E: gharewood@iinet.net.au

Attach is a summary review of the EPBC Act Listed threatened and migratory species that DoTEE consider as being present or as having the potential to be present within the proposed action area and surrounds.

Shorebirds

The DotEE identified the following shorebird species of concern:

- Bar-tailed Godwit (*Limosa lapponica baueri*) — vulnerable, migratory;
- Curlew Sandpiper (*Calidris ferruginea*) — critically endangered, migratory;
- Great Knot (*Calidris tenuirostris*) — critically endangered, migratory;
- Greater Sand Plover (*Charadrius leschenaultia*) — vulnerable, migratory;
- Lesser Sand Plover (*Charadrius mongolus*) — endangered, migratory;
- Eastern Curlew (*Numenius madagascariensis*) — critically endangered, migratory;
- Red-necked Stint (*Calidris ruficollis*) – migratory.

The proposed action area contains no habitat suitable for any of the listed threatened/migratory shorebird species to utilise and none would ever occur under normal circumstances. The proposed action area mainly contains a low woodland of limestone marlock (*Eucalyptus decipiens*) over scattered shrubs and bare limestone with some areas of scattered tuart (*E. gomphocephala*), peppermint (*Agonis flexuosa*) and jarrah (*E. marginata*) over pasture grasses (Harewood 2018). As indicated this habitat is totally unsuitable for the shorebirds in question and therefore none are considered as likely to occur.

The proposed action area occurs within about 300 metres of Lake Preston. Lake Preston is the largest of 10 wetlands collectively referred to as Yalgorup Lakes which are all contained within the Yalgorup National Park. The lakes are all shallow (< 3 m deep) and have no defined inlet or outlet channels. Lake Preston is a long, narrow, largely hypersaline water body approximately 30 km long and 0.5–1.5 km wide, running parallel to the coastline. An artificial causeway separates the northern section of Lake Preston from the remainder of the waterbody (Hale and Butcher 2007).

Lake Preston forms part of the Peel-Yalgorup System, a recognised Ramsar Site. The site as a whole is documented as regularly supporting over 20,000 water birds and at least 1% of individuals of some species these being: Red necked Avocet *Recurvirostra novaehollandiae*, Red necked Stint *Calidris ruficollis*, Red-capped Plover *Charadrius ruficapillus*, Banded Stilt *Cladorhynchus leucocephalus*, Caspian Tern *Sterna caspia* and Fairy Tern *Sterna nereis* (Ramsar information Sheet - Peel – Yalgorup System, Western Australia).

The Yalgorup lakes are important habitat for a number of waterbird species and are considered a summer sanctuary for waterfowl (CALM 1995). Lake Clifton and Lake Preston, in particular, supported large numbers of waterbirds in the period up to Ramsar listing (Hale and Butcher 2007).

More than 15 000 red-necked stint *C. ruficollis* were observed at Lake Preston in December 1999 (which is more than 3% of the population of this species – Rose and Scott 1997; Russell 2000). The very large numbers of stint and other waders at this time may have been due in part to very high water levels at Lake McLarty and Harvey Estuary restricting the availability of suitable habitat (Russell 2000).

Habitat suitable for shorebirds present within 1km of the proposed action area is limited in extent being represented by a 2.7km section of the eastern shoreline and a 300m section of the western shoreline of Lake Preston. The narrow band of shallow water and open shoreline along these sections represents the habitat most likely to be utilised for both roosting and feeding by shorebirds though the value of this section of the Lake relative to other areas is not documented.

An extract of NatureMap records for the seven species of shorebirds is provided in the review below. The only shorebird species shown as being recorded within 1 km of the proposed action area is the red-necked stint and overall, with the exception of the red-necked stint the number of records of each species recorded in the Yalgorup Lakes area as a whole appears to be relatively low. It should however be noted that some sections of Lake Preston are difficult to access and therefore surveys in these areas may be limited in number and frequency when compare to more accessible locations. It should also be noted that not all fauna observations are reported to the DBCA for inclusion in NatureMap and therefore other records of some species may exist (in private individual databases for example) but could not be readily obtained.

Carnaby's Black Cockatoo

A black cockatoo habitat assessment was carried out over the proposed action area in 2018 (Harewood 2018).

This habitat assessment identified a total of 76 trees with a DBH of ≥ 50 cms within the proposed action area. Sixty two of the trees were not observed to contain hollows of any size. Half (31) of these trees were limestone marlock (*Eucalyptus decipiens*) which is not documented as developing hollows that are then used by black cockatoos for breeding. Twelve trees (all tuarts) contained one or more possible hollows considered by the Author not to be suitable for black cockatoos to use for nesting purposes.

Two tuart trees appeared to contain hollows with larger entrances (greater than ~10cm) that appeared big enough to possibly allow the entry of a black cockatoo into a suitably sized and orientated branch/trunk. Both these hollows showed signs (chew marks) of use though it was unclear if the chew marks were caused by black cockatoos or galahs. These trees were subsequently excluded from the proposed action area to ensure they are not impacted on.

Following is a list of the main flora species recorded within the proposed action area during the fauna assessment that are known to be used as a direct food source (i.e. seeds or flowers) by one or more species of black cockatoo:

- Tuart (*Eucalyptus gomphocephala*) - seeds,
- Jarrah (*Eucalyptus marginata*) - seeds;
- Peppermint (*Agonis flexuosa*) – bark, grubs; and
- Candlestick Banksia (*Banksia attenuata*) - seeds.

Tuarts and peppermint are only foraged upon rarely and the number of jarrah and banksia trees present is very small and would amount to far less than 1 ha in total. It has therefore been concluded that the proposed action area does not contain quality black cockatoo foraging habitat.

No existing roosting trees (trees used at night by black cockatoos to rest) were positively identified during the survey.

There are numerous records of Carnaby's black cockatoo in the NatureMap data base (see Figure 7) including several documented roosts sites. None of the records are located within 1km of the proposed action site though the total lack of recorded observations is likely a consequence of the area being difficult to access. Carnaby's black cockatoo are however considered as unlikely to be specifically attracted to the proposed action area given the large areas of similar or better quality habitat present in surrounding areas.

Shorebirds

Bar-tailed Godwit (*Limosa lapponica baueri*)

EPBC Act Status: Vulnerable, Migratory.

Abundance (East Asian-Australasian Flyway): 133,000 (*L. l. baueri* only – year 2007 - 2009 - Wetlands International 2019), 325,000 (all subspecies - Hansen *et al.* 2016).

Australian Distribution: The bar-tailed godwit is a non-breeding migrant to Australia and has been recorded in the coastal areas of all Australian states though they are generally more numerous in northern Australia. In Western Australia it is widespread around the coast, from Eyre to Derby, with a few scattered records elsewhere in the Kimberley Division. (Marchant & Higgins 1993).

West Australian sites of international importance and highest recorded number of birds are (Bamford *et al.* 2008):

- Eighty Mile Beach, Western Australia (110 290)
- Roebuck Bay, Western Australia (65 000).

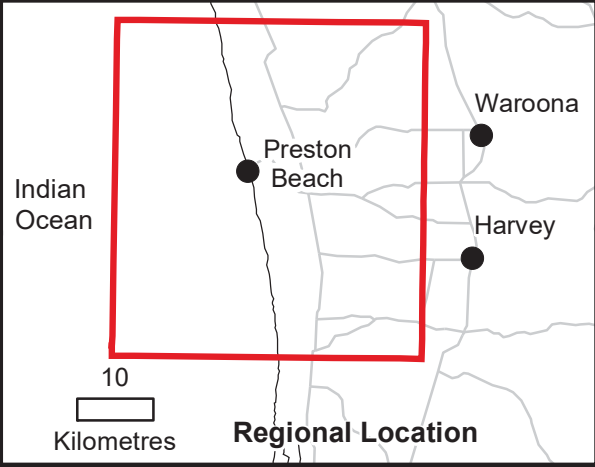
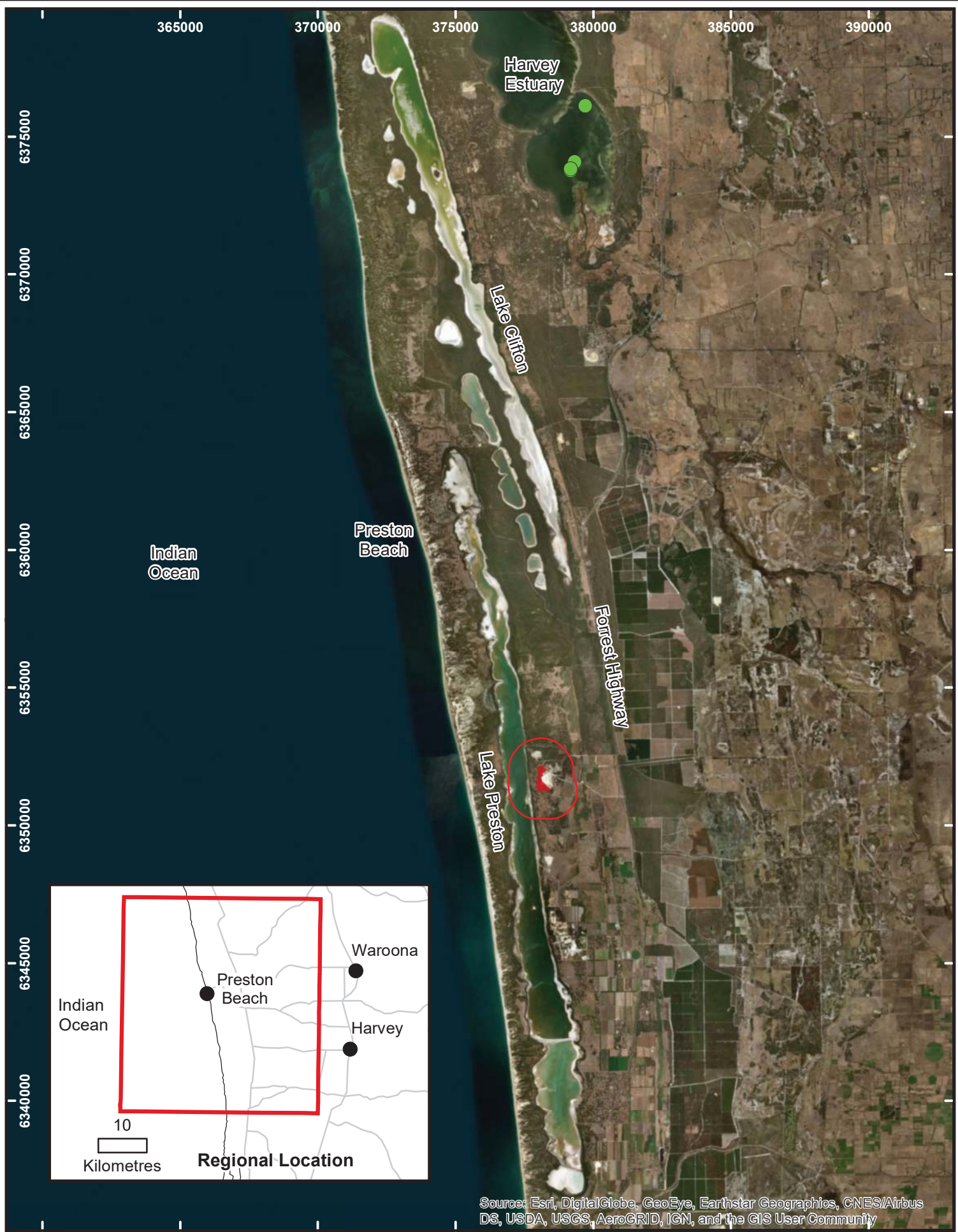
The bar-tailed godwit is listed as a species “present” within Yalgorup National Park (Hale and Butcher 2007) but no records appear in the NatureMap database (NatureMap 2019). There are however a number of records from the Harvey Estuary to the north east (Figure 1 – note: these are cumulative records, some from the same location and from several years i.e. the number of dots shown on the map does not reflect the number of recorded individuals at each location).

Ecology: Breeding take place each year in Scandinavia, northern Asia and Alaska in the northern hemisphere summer after which they migrate to Australia arriving each year around August. The birds start the return migration northwards generally from early February to mid-April (Marchant & Higgins 1993) however many Bar-tailed Godwits remain in the non-breeding range all year (Alcorn 1988).

The bar-tailed godwit is mainly carnivorous with a diet consisting of worms, molluscs, crustaceans, insects and some plant material. It has also been recorded eating fruits, fish and

tadpoles. While it is in breeding grounds it eats mainly ground dwelling insects (Marchant & Higgins 1993).

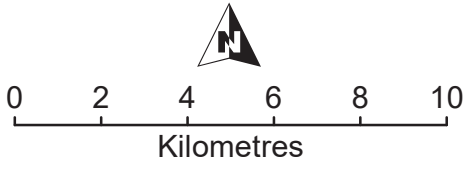
Habitat: The bar-tailed godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh. It has been sighted in coastal sewage farms and saltworks, salt lakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. In Australia it is rarely found on inland wetlands or in areas of short grass, such as farmland, paddocks and airstrips (Marchant & Higgins 1993).



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Subject Site
- 1km Buffer
- Bar-Tailed Godwit Record



Fauna Assessment
 Drawn: G Harewood
 Date: July 2019
 Scale: 1:175,000

**Lot 4 & 5 Ludlow Road
 Myalup**

**Bar-tailed Godwit
 (*Limosa lapponica baueri*)
 Records (NatureMap 2019)**

Curlew Sandpiper (*Calidris ferruginea*)

EPBC Act Status: Critically Endangered, Migratory.

Abundance (East Asian-Australasian Flyway): 90,000 (Hansen *et al.* 2016).

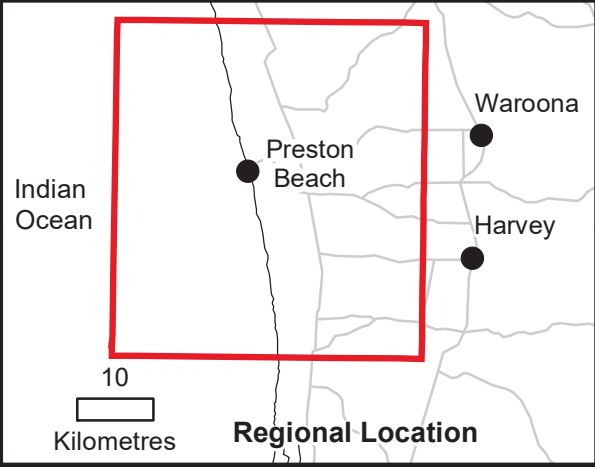
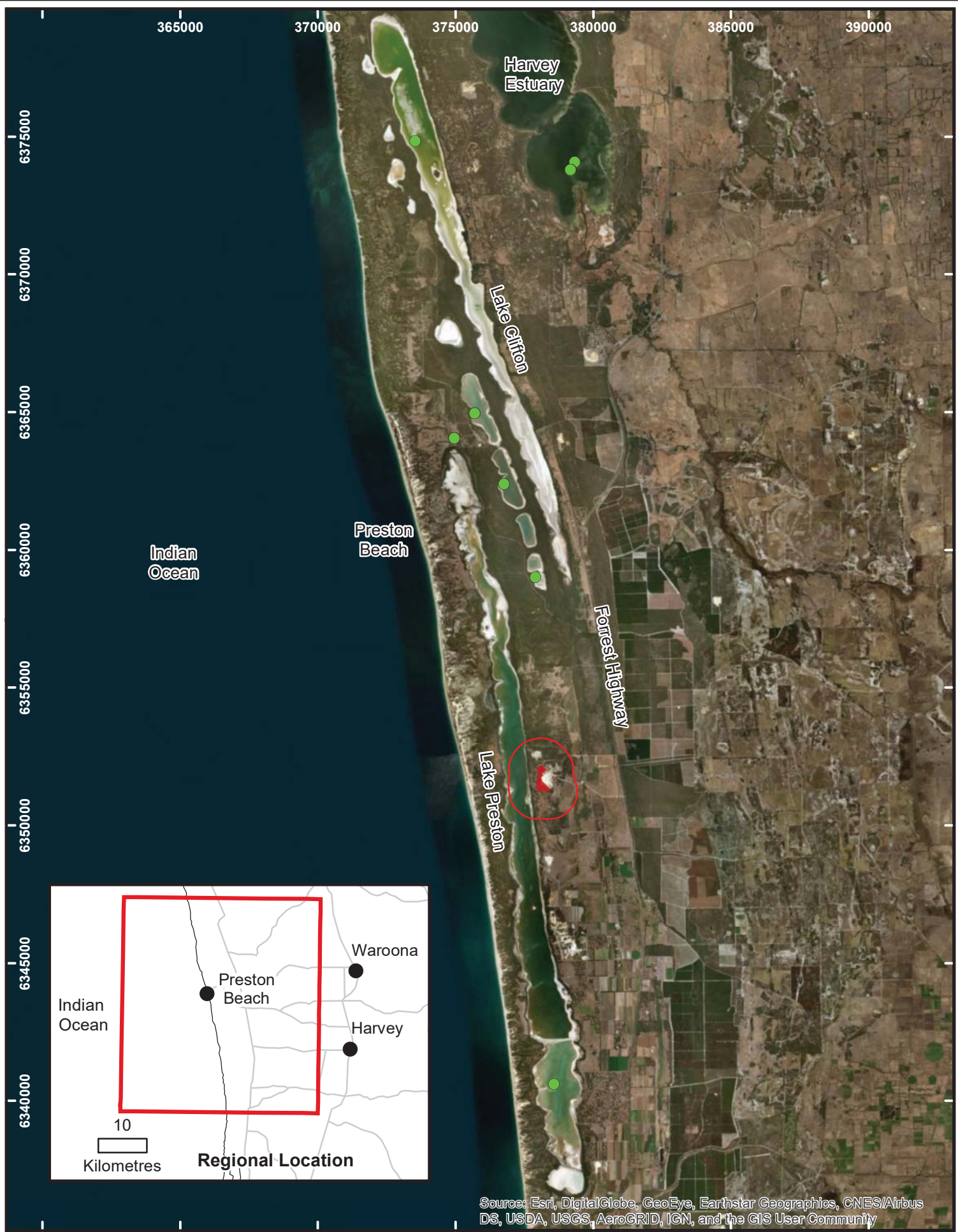
Australian Distribution: In Australia, curlew sandpipers occur around the coasts and are also quite widespread inland, though in smaller numbers. Records occur in all states during the non-breeding period, and also during the breeding season when many non-breeding one year old birds remain in Australia rather than migrating north. In Western Australia, they are widespread around coastal and subcoastal plains from Cape Arid to south-west Kimberley Division, but are more sparsely distributed between Carnarvon and Dampier Archipelago. They occur in large numbers, in thousands to tens of thousands, at Port Hedland Saltworks, 80 Mile Beach, Roebuck Bay and Lake Macleod. They are rarely recorded in the north-west Kimberley, around Wyndham and Lake Argyle (Higgins & Davies 1996).

The curlew sandpiper is listed as a species “present” within Yalgorup National Park (Hale and Butcher 2007) and there are numerous records of it being observed in this area in the NatureMap database (NatureMap 2019) (Figure 2 – note: these are cumulative records, some from the same location and from several years i.e. the number of dots shown on the map does not reflect the number of recorded individuals at each location). The species does not however appear to have been recorded near the proposed action area.

Ecology: Breeds in north-eastern Siberia and Alaska where nesting occurs during June and July (Hayman *et al.* 1986). Males depart breeding grounds during early July, followed by females in July and early August, then juveniles in August (Higgins & Davies 1996). After a stopover in northern Australia migration continues on a direct route to south-east Australia, the first birds arriving in late August, but the majority not until September. They return north in March (Higgins & Davies 1996).

This species forages mainly on invertebrates, including worms, molluscs, crustaceans, and insects, as well as seeds. Outside Australia, they also forage on shrimp, crabs and small fish (Dann 1999b).

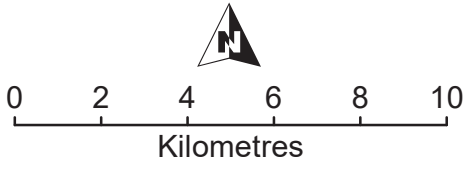
Habitat: Curlew sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Occasionally they are recorded around floodwaters (Higgins & Davies 1996).



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Subject Site
- 1km Buffer
- Great Knot Record



Drawn: G Harewood
Date: July 2019
Scale: 1:175,000

**Lot 4 & 5 Ludlow Road
Myalup**

**Great Knot
(*Calidris tenuirostris*)
Records (NatureMap 2019)**

Great Knot (*Calidris tenuirostris*)

EPBC Act Status: Critically Endangered, Migratory.

Abundance (East Asian-Australasian Flyway): 425,000 (Hansen *et al.* 2016).

Australian Distribution: The great knot has been recorded around the entirety of the Australian coast, with a few scattered records inland. The greatest numbers are found in northern Australia; where the species is common on the coasts of the Pilbara and Kimberley, from the Dampier Archipelago to the Northern Territory border, and in the Northern Territory from Darwin and Melville Island, through Arnhem Land to the south-east Gulf of Carpentaria. The species is much less common in south-west Australia, South Australia, Victoria and Tasmania (Higgins & Davies 1996).

West Australian sites of international importance and the highest recorded number of birds are (Bamford *et al.* 2008):

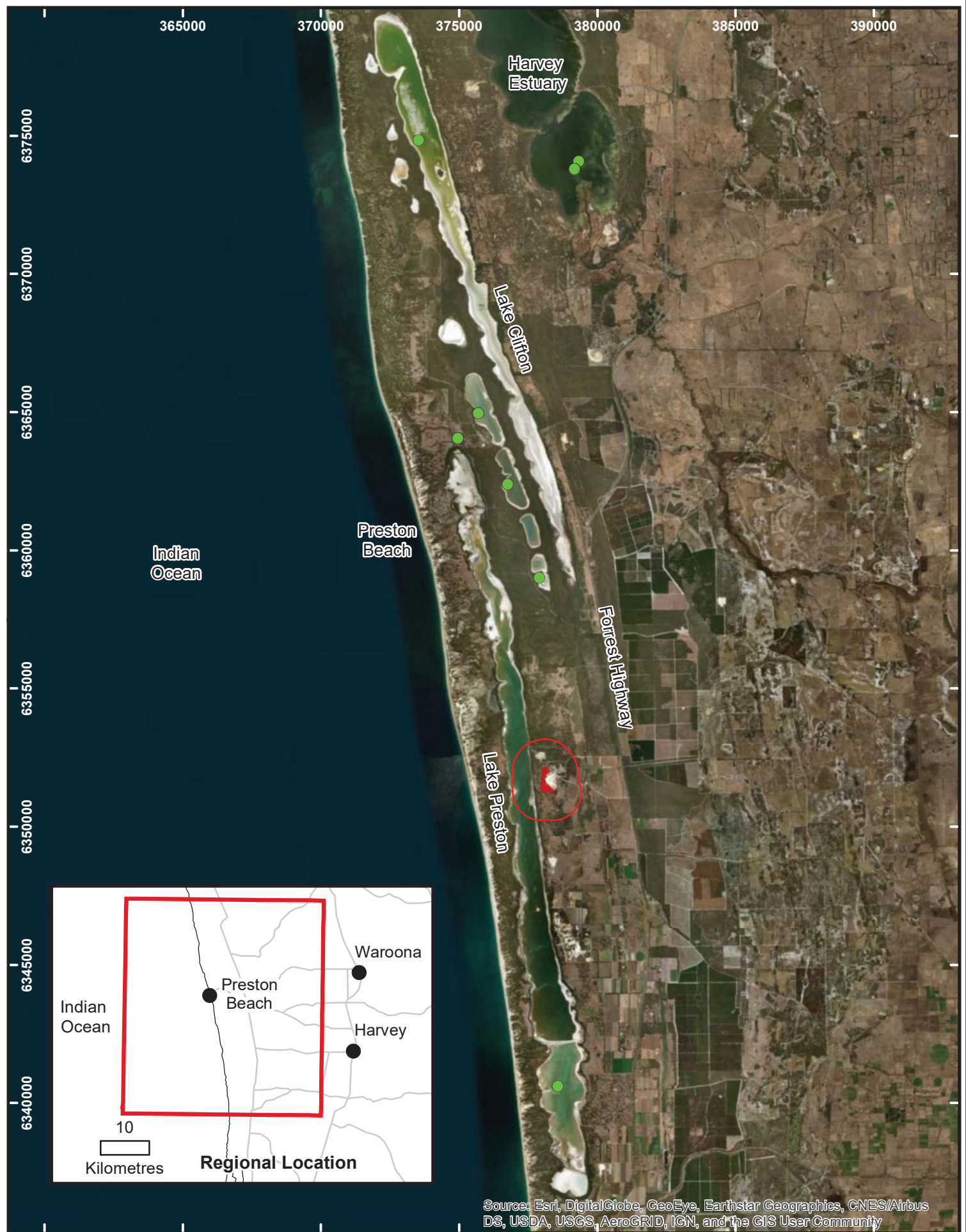
- Eighty Mile Beach, Western Australia (169 044)
- Roebuck Bay, Western Australia (22 600).

The great knot is listed as a species “present” within Yalgorup National Park (Hale and Butcher 2007) and there are several records of it being observed in this area in the NatureMap database (NatureMap 2019) (Figure 3 – note: these are cumulative records, some from the same location and from several years i.e. the number of dots shown on the map does not reflect the number of recorded individuals at each location). The species does not however appear to have been recorded near the proposed action area.

Ecology: The great knot breeds in north-east Siberia but the breeding distribution is poorly known. During the non-breeding season, most of the Great Knot population occurs in Australia. Post-breeding migration starts in late June and seems to occur in three waves up to early September. In Australia, large numbers arrive in the north-west in late August-early September (Lane 1987), though juveniles and many males may not arrive till October-November (Barter 1986).

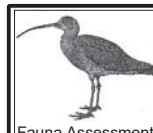
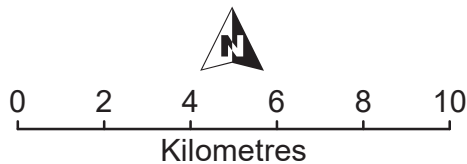
The great knot feeds on invertebrates by pecking at or just below the surface of moist mud or sand. They feed on bivalves, gastropods, crustaceans and other invertebrates (Higgins and Davies 1996).

Habitat: In Australasia, the species typically prefers sheltered coastal habitats, with large intertidal mudflats or sandflats. This includes inlets, bays, harbours, estuaries and lagoons. They are occasionally found on exposed reefs or rock platforms, shorelines with mangrove vegetation, ponds in saltworks, at swamps near the coast, salt lakes and non-tidal lagoons. The Great Knot rarely occurs on inland lakes and swamps (Higgins & Davies 1996).



Legend

- Subject Site
- 1km Buffer
- Great Knot Record



Drawn: G Harewood
Date: July 2019
Scale: 1:175,000

Projection/Coordinate System: UTM/MGA Zone 50

**Lot 4 & 5 Ludlow Road
Myalup**

**Great Knot
(*Calidris tenuirostris*)
Records (NatureMap 2019)**

Figure: 2

Greater Sand Plover (*Charadrius leschenaultia*)

EPBC Act Status: Vulnerable, Migratory.

Abundance (East Asian-Australasian Flyway): 200,000-300,000 (Hansen *et al.* 2016).

Australian Distribution: In Australia, the greater sand plover occurs in coastal areas in all states, though the greatest numbers occur in northern Australia, especially the north-west (Marchant & Higgins 1993; Minton *et al.* 2006). In northern Australia, the species is especially widespread between North West Cape and Roebuck Bay in Western Australia (Barrett *et al.* 2003; Blakers *et al.* 1984; Lane 1987; Storr 1980, 1987); there are sparsely scattered records from the largely inaccessible area between Roebuck Bay and Darwin. It also occasionally occurs along the coast of southern Western Australia (Barrett *et al.* 2003; Blakers *et al.* 1984; Emison *et al.* 1987; Jaensch *et al.* 1988; Lane 1987; Storr 1987).

Internationally important sites in Western Australia and maximum counts include (Bamford *et al.* 2008):

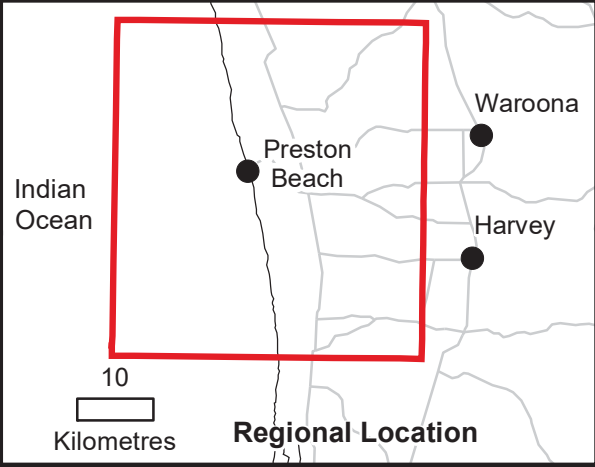
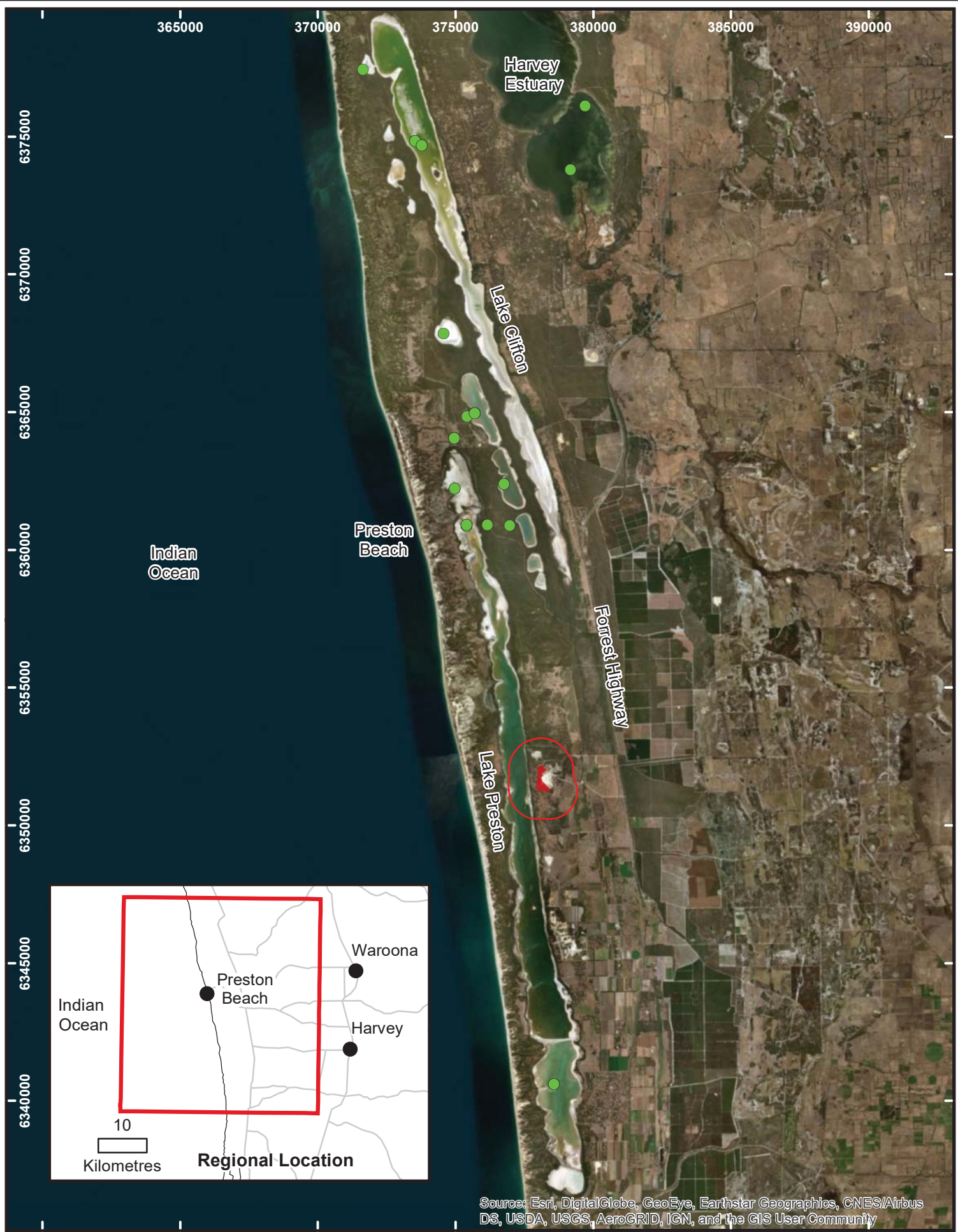
- Eighty Mile Beach, Western Australia (64 584)
- Roebuck Bay, Western Australia (26 900)
- Ashmore Reef, Western Australia (1 196)

The greater sand plover is listed as a species “present” within Yalgorup National Park (Hale and Butcher 2007) and there are numerous records of it being observed in this area in the NatureMap database (NatureMap 2019) (Figure 4 – note: these are cumulative records, some from the same location and from several years i.e. the number of dots shown on the map does not reflect the number of recorded individuals at each location). The species does not however appear to have been recorded near the proposed action area.

Ecology: The greater sand plover is a migratory species, breeding in the Northern Hemisphere and flying south for the boreal winter (Lane 1987; Marchant & Higgins 1993). The Greater Sand Plover is one of the first migratory waders to return to north-western Australia, usually arriving in late July (Minton *et al.* 2005). In the East Asian-Australasian Flyway, Greater Sand Plovers have been recorded moving through Indonesia between February and June (White & Bruce 1986). The species begins to vacate southern coasts by March, with most Plovers having left the north-west by mid to late April (Lane 1987; Marchant & Higgins 1993).

During the non-breeding season, greater sand plovers mostly eat molluscs, worms, crustaceans (especially small crabs and sometimes shrimps) and insects (including adults and larvae of termites, beetles, weevils, earwigs and ants) (Barker & Vestjens 1989). They are said to have been recorded eating lizards and plant material (Marchant & Higgins 1993).

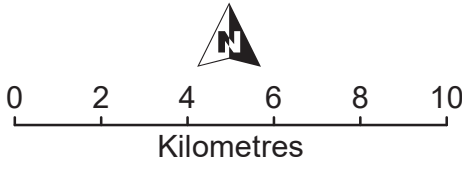
Habitat: In the non-breeding grounds in Australasia, the species is almost entirely coastal, inhabiting littoral and estuarine habitats. They mainly occur on sheltered sandy, shelly or muddy beaches with large intertidal mudflats or sandbanks, as well as sandy estuarine lagoons (Bamford 1988; Blakers *et al.* 1984; Lane 1987), and inshore reefs, rock platforms, small rocky islands or sand cays on coral reefs (Abbott 1982). They are occasionally recorded on near-coastal saltworks and salt lakes, including marginal saltmarsh, and on brackish swamps. They seldom occur at shallow freshwater wetlands (Storr 1977).



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Subject Site
- 1km Buffer
- Greater Sand Plover Record



Fauna Assessment
 Drawn: G Harewood
 Date: July 2019
 Scale: 1:175,000

**Lot 4 & 5 Ludlow Road
 Myalup**

**Greater Sand Plover
 (*Charadrius leschenaultia*)
 Records (NatureMap 2019)**

Lesser Sand Plover (*Charadrius mongolus*)

EPBC Act Status: Endangered, Migratory.

Abundance (East Asian-Australasian Flyway): 180,000-275,000 (Hansen *et al.* 2016).

Australian Distribution: Within Australia, the lesser sand-plover is widespread in coastal regions and has been recorded in all states. It mainly occurs in northern and eastern Australia, in south-eastern parts of the Gulf of Carpentaria, western Cape York Peninsula and islands in Torres Strait, and along the entire east coast, though it occasionally also occurs inland. It is most numerous in Queensland and NSW (Blakers *et al.* 1984; Marchant & Higgins 1993; Minton *et al.* 2006).

Internationally important sites in Western Australia and maximum counts include (Bamford *et al.* 2008):

- Eighty Mile Beach, Western Australia (1 575)
- Roebuck Bay, Western Australia (1 057)
- Broome, Western Australia (745)
- Port Hedland Saltworks (668)

The lesser sand plover is listed as a species “present” within Yalgorup National Park (Hale and Butcher 2007) but no records from this area appear in the NatureMap database (NatureMap 2019). There are however a number of records from Lake McClarty and Peel inlet further north.

Ecology: The lesser sand plover is a migratory species, breeding in the Northern Hemisphere and flying south for the boreal winter. The species is present at non-breeding grounds in Australasia mostly between September and April or May, with greatest numbers in northern Australia (Lane 1987; Marchant & Higgins 1993).

During the non-breeding season lesser sand plovers eat invertebrates, such as molluscs (especially bivalves), worms, crustaceans (especially crabs) and insects (Lane 1987).

Habitat: In non-breeding grounds in Australia, this species usually occurs in coastal littoral and estuarine environments. It inhabits large intertidal sandflats or mudflats in sheltered bays, harbours and estuaries, and occasionally sandy ocean beaches, coral reefs, wave-cut rock platforms and rocky outcrops. It also sometime occurs in short saltmarsh or among mangroves. The species also inhabits saltworks and near-coastal saltpans, brackish swamps and sandy or silt islands in river beds. The species is seldom recorded away from the coast, at margins of lakes, soaks and swamps associated with artesian bores (Marchant & Higgins 1993).

Eastern Curlew (*Numenius madagascariensis*)

EPBC Act Status: Critically Endangered, Migratory.

Abundance (East Asian-Australasian Flyway): 35,000 (Hansen *et al.* 2016).

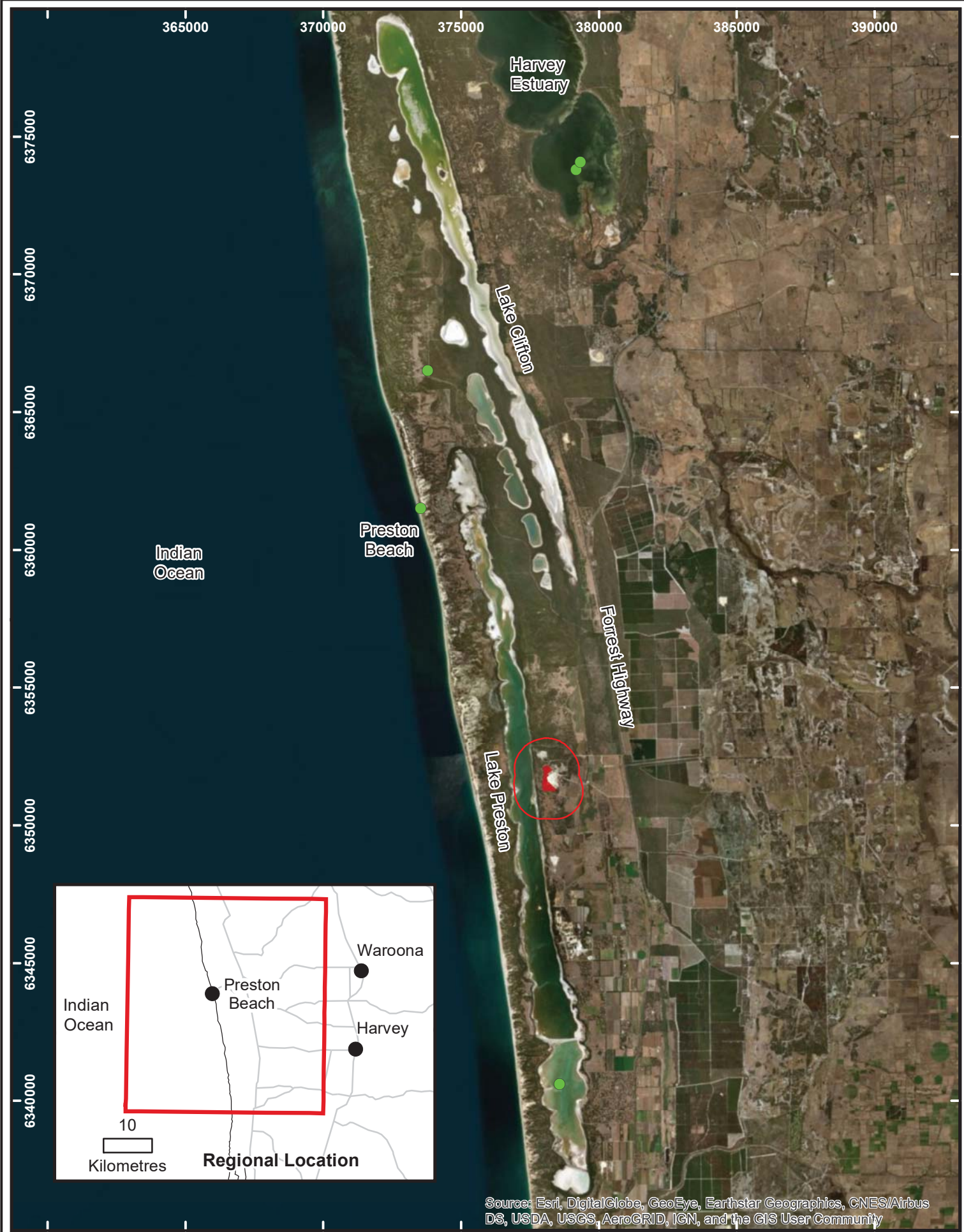
Australian Distribution: Within Australia, the eastern curlew has a primarily coastal distribution. The species is found in all states, particularly the north, east, and south-east regions including Tasmania. Eastern curlews are rarely recorded inland. They have a continuous distribution from Barrow Island and Dampier Archipelago, Western Australia, through the Kimberley and along the Northern Territory, Queensland, and NSW coasts and the islands of Torres Strait. In southern Western Australia, eastern curlews are recorded from Eyre, and there are scattered records from Stokes Inlet to Peel Inlet. The species is a scarce visitor to Houtman Abrolhos and the adjacent mainland, and is also recorded around Shark Bay (Marchant & Higgins, 1993).

The eastern curlew is listed as a species “present” within Yalgorup National Park (Hale and Butcher 2007) and there are several records of it being observed in this area in the NatureMap database (NatureMap 2019) (Figure 5 – note: these are cumulative records, some from the same location and from several years i.e. the number of dots shown on the map does not reflect the number of recorded individuals at each location). The species does not however appear to have been recorded near the proposed action area.

Ecology: The eastern curlew is migratory and after breeding, they move south for the Northern Hemisphere winter. The birds arrive in north-west and eastern Australia as early as July (Lane 1987). In Australia, most eastern curlews leave between late February and March-April (Marchant & Higgins 1993).

The eastern curlew is carnivorous during the non-breeding season, mainly eating crustaceans (including crabs, shrimps and prawns), small molluscs, as well as some insects (Marchant & Higgins 1993).

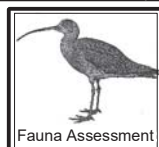
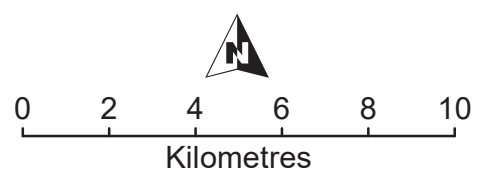
Habitat: During the non-breeding season in Australia, the eastern curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. The birds are often recorded among saltmarsh and on mudflats fringed by mangroves, and sometimes within the mangroves. The birds are also found in coastal saltworks and sewage farms (Marchant & Higgins, 1993).



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Subject Site
- 1km Buffer
- Eastern Curlew Record



Fauna Assessment
 Drawn: G Harewood
 Date: July 2019
 Scale: 1:175,000

**Lot 4 & 5 Ludlow Road
 Myalup**

**Eastern Curlew
 (*Numenius madagascariensis*)
 Records (NatureMap 2019)**

Red-necked Stint (*Calidris ruficolis*)

EPBC Act Status: Migratory.

Abundance (East Asian-Australasian Flyway): 475,000 (Hansen *et al.* 2016).

Australian Distribution: In the non-breeding season the red-necked stint occurs along most of the Australian coastline. It has also been found inland in all states when conditions are suitable.

Western Australian sites of international importance and maximum or average counts (Watkins 1993) in Australia include:

- Eighty Mile Beach, Western Australia (60 000)
- Port Hedland Saltworks, Western Australia (23 000)
- Roebuck Bay, Western Australia (19 800)
- Wilson Inlet, Western Australia (15 252)
- Alfred Cove Nature Reserve, Western Australia (10 000)
- Lake Macleod, Western Australia (8 312)
- Peel Inlet, Western Australia (8 063)

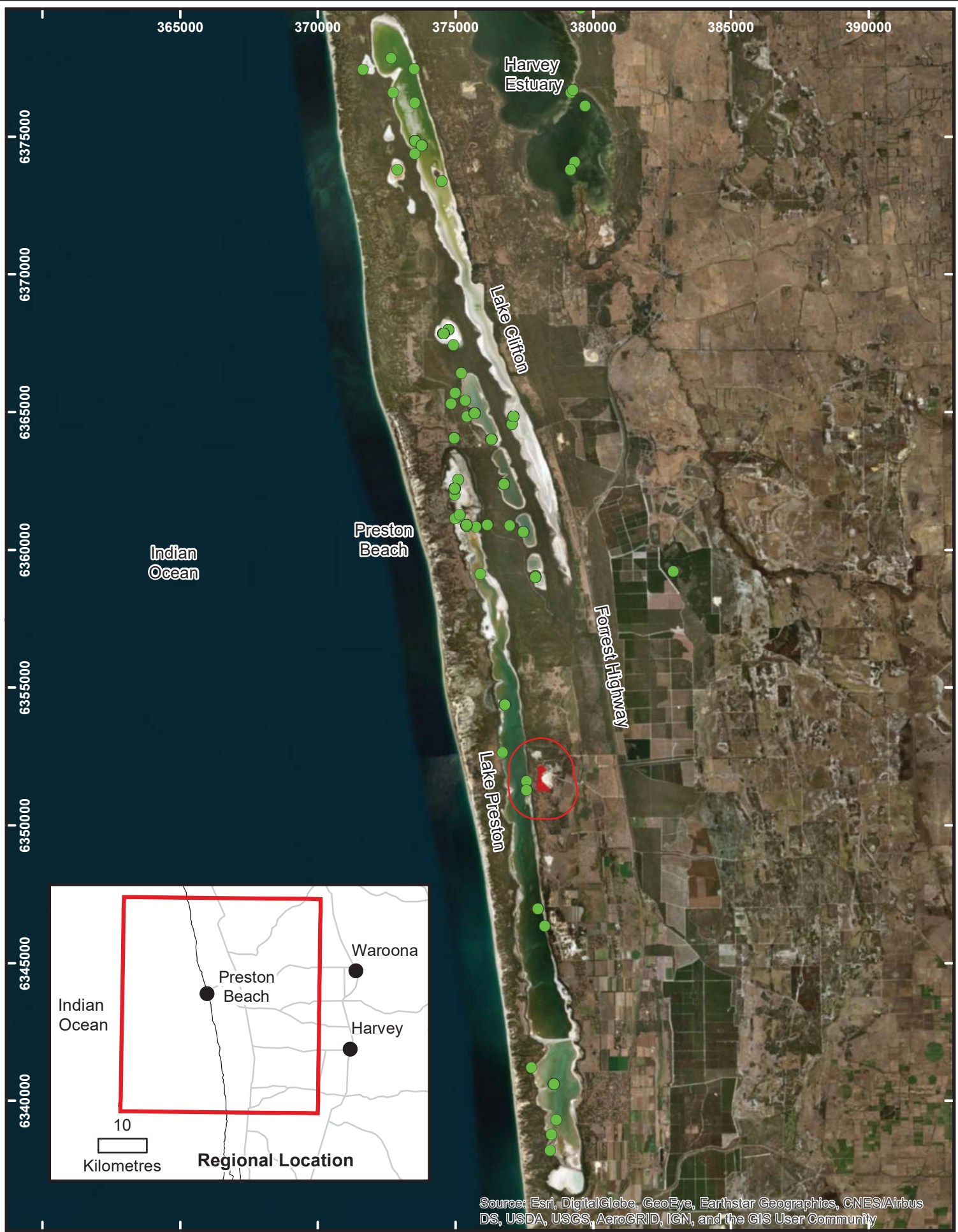
The red-necked stint is listed as a species “present” within Yalgorup National Park (Hale and Butcher 2007) and there are numerous records of it being observed in this area in the NatureMap database (NatureMap 2019) (Figure 6 – note: these are cumulative records, some from the same location and from several years i.e. the number of dots shown on the map does not reflect the number of recorded individuals at each location). The species appears to have been recorded near the proposed action area on several occasions in the past.

Historically up to 15,000 red-necked stints have been recorded within the Yalgorup Lakes during a single count which at the time represented 3% of the estimated total population (Hale and Butcher 2007).

Ecology: The Red-necked Stint is migratory and breeds in Siberia and west Alaska and then moves to non-breeding areas in south-east Asia and Australasia. The Red-necked Stint arrives in Australia from August (and possibly July), with most from early September. The Red-necked Stint leaves Australia from late February or March through to April. A few, however, may remain until May (Higgins & Davies 1996).

The Red-necked Stint is omnivorous. In Australia it is known to forage on intertidal and near-coastal wetlands. It jabs and probes with its bill into the soft mud for small invertebrates. It also gleans from plants in saltmarsh and water. The Red-necked Stint also forages on plant seeds and on a range of marine worms, molluscs, snails and slugs, shrimps, spiders, beetles, flies and ants. The Red-necked Stint also eats grit (Higgins & Davies 1996).

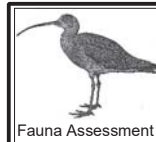
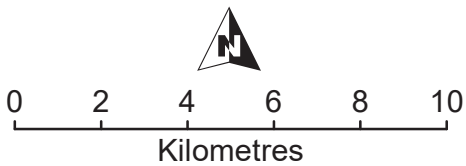
Habitat: In Australasia, the Red-necked Stint is mostly found in coastal areas, including in sheltered inlets, bays, lagoons and estuaries with intertidal mudflats, often near spits, islets and banks and, sometimes, on protected sandy or coralline shores. Occasionally they have been recorded on exposed or ocean beaches, and sometimes on stony or rocky shores, reefs or shoals. They also occur in saltworks and sewage farms; saltmarsh; ephemeral or permanent shallow wetlands near the coast or inland, including lagoons, lakes, swamps,



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Subject Site
- 1km Buffer
- Red-necked Stint Record



Fauna Assessment
 Drawn: G Harewood
 Date: July 2019
 Scale: 1:175,000

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 Myalup**

**Red-necked Stint
 (*Calidris ruficolis*)
 Records (NatureMap 2019)**

riverbanks, waterholes, bore drains, dams, soaks and pools in saltflats. They sometimes use flooded paddocks or damp grasslands. They have occasionally been recorded on dry gibber plains, with little or no perennial vegetation (Higgins & Davies 1996).

Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*)

EPBC Act Status: Endangered.

Abundance: 40,000 (DPAW 2013).

Australian Distribution: Carnaby's Cockatoo is endemic to the south-west of Western Australia, north to the lower Murchison River and east to Nabawa, Wilroy, Waddi Forest, Nugadong, Manmanning, Durokoppin, Noogar (Moorine Rock), Lake Cronin, Ravensthorpe Range, head of Oldfield River, 20 km ESE of Coondingup and Cape Arid; also casual on Rottnest Island (Johnstone and Storr 1998).

Ecology: Carnaby's cockatoos nest in the hollows of live or dead eucalypts, primarily the smooth-barked Salmon Gum and Wandoo (Saunders 1979b, 1982), though breeding has been reported in other wheatbelt tree species and some tree species on the Coastal Plain and jarrah forest (Saunders 1979b, 1982; Storr 1991; Johnstone and Storr 1998; Johnstone et al. 2011) (see Groom 2010a for tree species used for breeding by Carnaby's cockatoo). Carnaby's cockatoos have been recorded nesting in trees on private property, road and railway reserves, conservation estate and other crown land. There are significant breeding areas located outside the conservation estate, particularly along rail and road reserves and on agricultural land (Saunders 1982; Saunders and Ingram 1998). Success in breeding is dependent on the quality and proximity of feeding habitat within 12 km of nesting sites (Saunders 1977, 1986; Saunders and Ingram 1987). Along with the trees that provide nest hollows, the protection, management and increase of this feeding habitat that supports the breeding of Carnaby's cockatoo is a critical requirement for the conservation of the species.

During the non-breeding season (January to July) the majority of the birds migrate to the higher rainfall coastal regions of their range in the midwest coast, Swan Coastal Plain and south coast (Saunders 1980, 1990; Berry 2008; Saunders *et al.* 2011b; Johnstone *et al.* 2011), though some non-breeding birds remain in non-breeding areas all year round. These areas have better natural water sources over the summer period and historically had extensive areas of proteaceous woodlands and shrublands to provide feed for young birds, and good resources for adult birds to stock up for the following breeding season (DPAW 2013).

Habitat:

Breeding Habitat: Any patch of woodland or forest that contains live or dead trees of salmon gum, wandoo, tuart, jarrah, flooded gum, york gum, karri or marri, with presence of suitable nest hollow (Commonwealth of Australia 2017). On the Swan Coastal Plain most nests are in tuart (Johnstone & Kirkby 2010).

Foraging Habitat: Native shrubland, kwongan heathland and woodland dominated by proteaceous plant species such as *Banksia* spp. (including *Dryandra* spp.), *Hakea* spp. and *Grevillea* spp. Forages in pine plantations (*Pinus* spp.), Eucalypt woodland and forest that contains foraging species. Also individual trees and small stands of these species

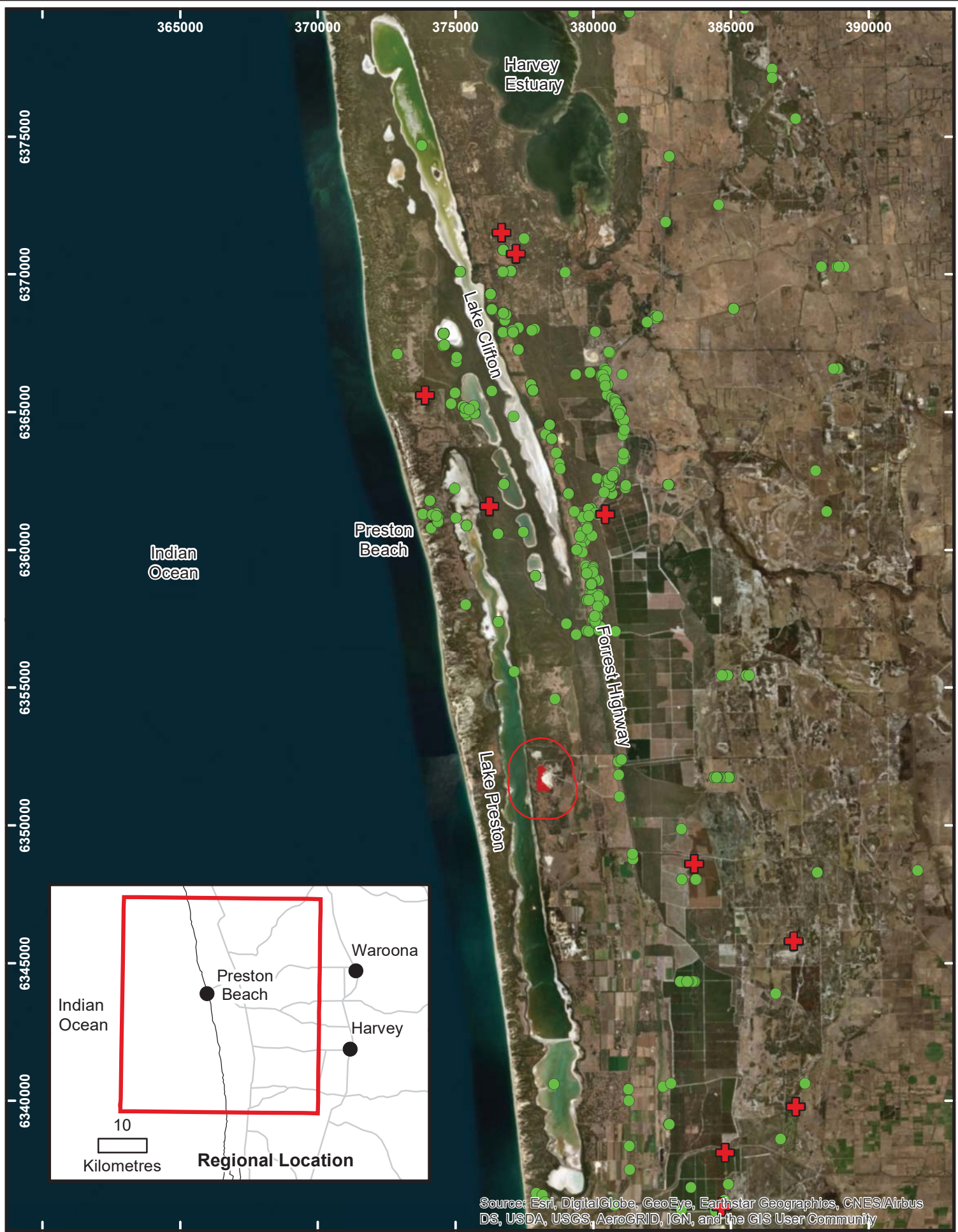
Roosting Habitat: Generally in or near riparian environments or natural and artificial permanent water sources. Flat-topped yate, salmon gum, wandoo, marri, karri, blackbutt, tuart, introduced eucalypts (for example blue gum) and introduced pines (Commonwealth of Australia 2017).

The Swan Coastal Plain is used by black cockatoos primarily for foraging resources, with some small patches of breeding habitat. The area is dominated by *banksia* spp and tuart woodlands on sandy soils, as well as marri, with jarrah occurring in the east. A key focus for this region is the ongoing viability of foraging resources for black cockatoos, particularly Carnaby's Cockatoo.

Breeding occurs mainly from early July to mid-December in the semiarid and subhumid interior from the Three Springs district south to the Stirling Range, west to Cockleshell Gully, Cataby, Regans Ford, Gingin, near mouth of Moore River, Yanchep, Serpentine, Mandurah, Lake Clifton, Bunbury, Nannup and Tone River and east to Manmanning, Kellerberrin, Woolundra, Lake Cronin, Hatters Hill and near Ravensthorpe (Johnstone & Kirkby 2010).

There has been an apparent shift in its breeding range further west and south since the middle of last century with a more rapid increase in the past 10–30 years into the Jarrah-Marri forests of the Darling Scarp and the Tuart forests of the Swan Coastal Plain. There are now numerous breeding records for the northern Darling Scarp, including Bindoon, Bullsbrook, Mundaring, Lower Darkin River, near Canning Dam, near Wungong Dam, Serpentine and near Collie, and on the Swan Coastal Plain at Gingin, Boonanarring, Mooliabeenee, near mouth of Moore River, Yanchep, Baldivis, near Mandurah, Lake Clifton and near Bunbury.

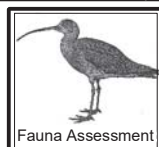
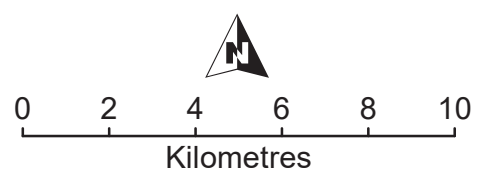
Apart from recent roost surveys and counts (see Peck *et al.* 2018) very little of the Swan Coastal Plain and adjacent Darling Scarp has been surveyed for feeding, breeding and roosting sites. The only studies carried out so far with detailed information on foraging and breeding are in the Gnangara Sustainability study area, the East Wanneroo area, near Bindoon, the corridor of the Forrest Highway, Wungong Dam Catchment, the Serpentine area and parts of the Whicher Range and in the Bunbury-Busselton road verges. In most cases these too have also only been short term studies of only a few months making it difficult to determine the importance of certain habitats and sites (Johnstone & Kirkby 2010).



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Subject Site
- 1km Buffer
- Carnaby's Black Cockatoo Record
- Black Cockatoo Roost Site



Fauna Assessment
 Drawn: G Harewood
 Date: July 2019
 Scale: 1:175,000
 Projection/Coordinate System: UTM/MGA Zone 50

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 Myalup**

**Carnaby's Black Cockatoo
 (*Calyptorhynchus latirostris*)
 Records (NatureMap 2019)**

Figure: 7

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