

# Habitat assessment and biodiversity background searches

## Habitat assessment criteria

An evaluation of the likelihood and extent of impact to threatened and/or protected flora/fauna recorded within or with the potential to occur within a ten kilometre radius around the proposal site. Records are from a search of the OEH Wildlife Atlas, NSW DPI Fisheries PrimeFacts and the EPBC Act Protected Matters Search Tool. Ecology information has been obtained from the Threatened Species Profiles on the NSW OEH website and NSW DPI (fisheries) website and through available scientific literature. Terrestrial species have also been considered but due to the nature of the proposed work and location only those with the potential to use the wharf structure as habitat have been included and assessed (i.e. microbats). Only one bird species has been considered at the request of North Sydney Council (*Eudyptula minor* Little Penguin).

## Presence of Habitat

**Present:** Potential or known foraging, roosting, nesting, refuge, movement corridor (including movement of genetic material) or other habitat is present within the proposal site.

**Absent:** No potential foraging, roosting, nesting or other habitat is present within the proposal site.

## Likelihood of Occurrence

**None:** Species does not occur at the proposal site.

**Unlikely:** Species is unlikely to occur at the proposal site.

**Vagrant:** Species could occur on occasion as a vagrant or passing over/across the proposal site

**Possible:** Species could occur and utilise resources in the proposal site.

**Present:** Species was recorded during the field investigations

## Likelihood of Impact

**High:** Species present at site and activities could impact species if no safeguards are in place

**Moderate:** Species not observed during surveys but has potential to occur at site and be impacted by activity if no safeguards are in place

**Low:** Species unlikely to occur at site and/or nature of activities unlikely to impact species should it occur.

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
<b>Threatened Ecological Community</b>								
<b>Posidonia australis seagrass meadows of the Manning-Hawkesbury ecoregion</b>		Endangered		Posidonia australis is a sub-tidal meadow-forming seagrass species.		Absent	None, species not present	Low
<b>Invertebrates</b>								
<b><i>Dendronephthya australis</i></b>  <b>Cauliflower Soft Coral</b>		Endangered		<p>The genus <i>Dendronephthya</i> forms colonies which are branched or bushy and usually have a rough or prickly feel from the sclerites. They are usually around 20cm tall (but can grow up to 2 metres high). <i>Dendronephthya</i> species are common at depths below 20 metres in fast currents and can also grow in muddy estuaries and deep oceanic waters.</p> <p>The Cauliflower Soft Coral has been recently (2018) found occurring in Sydney Harbour, Botany Bay and Jervis Bay. The soft coral habitat is known to be an important habitat for a range of diverse marine species. In particular, it has been found to be a preferred habitat for <i>Hippocampus whitei</i> (White's Seahorse), an endangered species in NSW, with mature animals found commonly in this habitat.</p> <p>The species appears to be confined to protected estuarine environments in NSW where it occurs in depths of 1 to 18m.</p>		Present	Moderate	Moderate
<b>Fish</b>								
<b><i>Epinephelus daemeli</i></b>		Vulnerable	Vulnerable	Adult Black Cod's are usually found in caves, gutters, and beneath bommies in rocky reefs.		Present	Moderate	Low

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
<b>Black Cod</b>				They are territorial and often occupy a particular cave for life. Small juveniles are often found in coastal rock pools and larger juveniles around rocky shores in estuaries. Black Cod are opportunistic carnivores, eating mainly other fish and crustaceans. They can change from one colour pattern to another in a few seconds. They are usually black in estuaries and banded around clear water reefs. Black Cod are usually slow growing. Smaller fish are mostly females, but they generally change sex to become males at around 100-110 cm in length.				
<b><i>Prototroctes maraena</i></b> <b>Australian Grayling</b>		Vulnerable		Australian Grayling occur in freshwater streams and rivers, especially clear gravelly streams with a moderate flow, as well as estuarine areas. They occur in fast-moving shoals and are a shy fish, fleeing when disturbed. They reach sexual maturity at 1–2 years of age when approximately 150 mm in length. Spawning takes place during late summer or autumn. Females can lay up to 82 000 small (approx. 1 mm) eggs, probably in the middle reaches of rivers, where they presumably settle among the gravel of the streambed. Once hatched, the larvae swim towards the water surface where they are swept downstream to the sea. The larvae and young juveniles have a marine stage before returning to freshwater rivers during spring when they are about 6 months old. The rest of their life cycle is spent in freshwater. Australian grayling are opportunistic omnivores, with a mixed diet of aquatic algae and insects.		Absent	Low	Low
<b><i>Anampses elegans</i></b> <b>Elegant wrasse</b>			Protected	Elegant wrasse are a widespread but uncommon species found on coral reef and rocky reef habitats at depths from 2 to 35 m. The distribution of elegant wrasse extends from southern Queensland to Montague Island on the NSW south coast, particularly around inshore islands.		Absent	Low	Low

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
				Elegant wrasse are a subtropical, warm-temperate species that are active during the day. Elegant wrasse can be found in different habitats depending on life cycle stage. Juveniles are found among seaweed in coastal bays and harbours. Juveniles travel in small schools feeding in short bouts. Large juveniles are found in small aggregations on coastal rocky reefs. They are carnivorous, feeding on small crustaceans and molluscs by scraping the surface of small seaweeds with their forward-projecting comb-like teeth.				
<b><i>Paraplesiops bleekeri</i></b>  Bleekers devil fish			Protected	Eastern blue devil fish, <i>Paraplesiops bleekeri</i> , also known as Bleakers blue devil fish, are a shy, secretive fish found in caves, crevices and under ledges on inshore reefs and estuaries. Eastern blue devil fish are distributed from southern Queensland to Montague Island on the NSW south coast. Eastern blue devil fish are a benthic, inshore reef inhabitant. They occur in shallow waters in estuaries as well as in deep waters offshore ranging from 3 to 30 metres. Juveniles of the species are very rarely seen. The few juvenile individuals that have been observed were found in the back of narrow crevices. Eastern blue devil fish are solitary creatures that usually live alone in caves, crevices or under ledges during the day. They are most active at night. Little is known about their diet but they are known to feed on brittle stars.		Absent	Low	Low
<b><i>Syngnathiforms</i></b> (seahorses, sea dragons, pipefish)			Protected	Off the NSW coast syngnathiforms are found in a variety of habitats ranging from deep reefs to coastal algae, weed or seagrass habitats, or around man made structures such as jetties or mesh nets. Weedy seadragons can be observed along reefs with kelp or along the edge of sand areas feeding on very small shrimp-like mysids		Present	High	High

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
				and other small crustaceans. There are 19 pipefish species known to inhabit NSW waters such as the Tiger pipefish <i>Filicampus tigris</i> that can be found in seagrass beds or sheltered reefs to depths of 15 metres. Pipehorses are found on soft bottoms near reefs or rubble in shallow to very deep waters, or amongst seagrasses. Often the ends of jetties are rich with seahorses due to water circulation patterns that sometimes present rich patches of zooplankton on which they feed. Seahorses in particular are able to wrap their tails around structures and feed on passing organisms. Ghostpipefish species are found in NSW in habitats ranging from muddy open bottoms to reefs with rich invertebrate life, usually in sheltered coastal or estuary waters. Seamoths are found lying flat or crawling on sandy or muddy bottoms.				
<i>Hippocampus whitei</i>  White's Seahorse		Endangered	Endangered	<p>White's Seahorse is known to occur in estuaries from St Georges Basin, NSW to Hervey Bay, QLD. The only locations where high abundances occurred were Sydney Harbour and Port Stephens, with the most found at any of the other locations being eight individuals in Port Hacking. Port Stephens and Sydney Harbour are the only locations where large populations (more than 10 individuals) have been found to occur.</p> <p>White's Seahorse is known to occur at depths between 1-15 metres and is found utilising a wide range of habitat types (both natural and artificial). Within Sydney Harbour, seahorses are generally found on artificial habitats such as the protective swimming net enclosures and also on jetty pylons. Their use of artificial habitats in the harbour appears to be most common in areas where natural habitat (such as seagrass, sponges and soft corals) has been lost.</p>		Present	High	High

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
<i>Epinephelus coioides</i>  Estuary cod			Protected	Estuary cod are commonly found in the lower reaches of estuaries and protected silty reef habitats. They occur on coral reefs in turbid areas as well as in brackish environments. Adult estuary cod are usually found at the bases of small drop-offs associated with large caves or shipwrecks. Specimens have been recorded at depths up to 100 m. Juvenile estuary cod are common in shallow waters of estuaries over sand, seagrass, mud and gravel and among mangroves, and they have also been reported from freshwaters. The majority of tropical Australian estuary cod populations consist almost entirely of preproductive females. Estuary cod can be solitary or form small groups and usually exist within a small home range of approximately 80 m. Estuary cod feed upon a variety of animals including fish, shrimp, cuttlefish and crab. They are capable of living to at least 17 years.		Absent	Low	Low
<i>Girella cyanea</i>  Blue Drummer			Protected	Blue Drummer are ocean dwellers and do not generally enter rivers or estuaries. They can be found in  coastal and offshore rocky reef areas in NSW from depths of 5–30 m. Juveniles live in tidal pools, and adults form schools over reef areas. Bluefish are not common in NSW coastal waters but are occasionally found within the Solitary Islands Marine Park and have been reported off Port Stephens. NSW DPI research suggests that fish around 52 cm (fork length) are approximately 39 years old. This suggests that the species is long lived and therefore may be vulnerable to overexploitation.  The diet of bluefish is known to consist of crustaceans, smaller fishes, molluscs and other		Absent	None	None

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				marine organisms, including calcareous seaweeds, brittlestars, cunjevoi and marine worms				
<b><i>Epinephelus lanceolatus</i></b>  <b>Giant Queensland groper</b>			Protected	Giant Queensland goppers occupy a variety of habitats depending on their stage of growth. Estuaries, coral reef and associated habitats are all important to their survival. Giant Queensland goppers are commonly seen in caves on coral reefs and around wrecks. Along outer reefs they have been found in large lagoons and on reef slopes to depths of at least 50 m. Both adults and juveniles are also found in estuaries.		Absent	Low	Low
<b><i>Odontaspis ferox</i></b>  <b>Herbsts nurse shark</b>			Protected	Herbsts nurse sharks usually live in relatively deep water on insular and continental shelves and upper slopes, and around seamounts. They have been caught off NSW in depths up to 850 m, and there are also records of the species from open waters of the Indian Ocean.  Around oceanic islands such as CocosKeeling and the Kermadecs, individuals are occasionally seen by divers in depths less than 30 m at sites adjacent to deepwater dropoffs. The Herbsts nurse shark is a large shark growing to about 4.5 m in length and over 700 kg in weight.		Absent	Low	Low
<b><i>Rhincodon typus</i></b>  <b>Whale Shark</b>		Vulnerable, migratory		The whale shark feeds on minute organisms including krill, crab larvae, jellyfish etc. Whale sharks have a broad distribution in tropical and warm temperate seas, usually between latitudes 30°N and 35°S. They are known to inhabit both deep and shallow coastal waters and the lagoons of coral atolls and reefs. This species is widely distributed in Australian waters. Although most common at NMP (and to a lesser extent at Christmas Island and in the Coral Sea), sightings have been confirmed further south than Kalbarri (on the mid-west coast of WA) and Eden (on the		Absent	Low	Low

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
				NSW south coast). Whale sharks have also been recorded from Commonwealth waters between Australia and Indonesia. This species is thought to prefer surface sea-water temperatures between 21 - 25°C. Sightings at NMP, however, are most common in water temperatures around 27°C. The sharks (regularly) appear at locations where seasonal food 'pulses' are known to occur. The predictable annual whale shark aggregation at NMP is closely linked with an increase in productivity of the region. This is associated with a mass coral spawn which occurs around March/April each year. Whale sharks are regarded as highly migratory - although these 'migration patterns' are poorly understood.				
<i>Sphyrna lewini</i>  Scalloped Hammerhead Shark			Endangered	Adult Scalloped Hammerheads inhabit deep waters adjacent to continental shelves, in water depths ranging from the surface to at least 275 in depth, while juveniles are found close to shore nursery habitats. Adult females occupy deeper water and move into shallower waters to mate and give birth. Juveniles often occur in large migratory schools while adults may be seen alone, in pairs or in small schools. Scalloped Hammerheads are pelagic foragers. Their diet mainly comprises of fish, crustaceans and cephalopods (squid, octopus and cuttlefish). Juveniles generally feed on fish and nocturnally active crustaceans.		Absent	Low	Low
<i>Carcharias taurus</i> (east coast population)  Grey Nurse Shark (east		Critically endangered	Critically endangered	The Grey Nurse Shark is a coastal species found on the continental shelf from the surf zone down to at least 190 m. The shark is a slow, strong-swimming species that is often seen hovering motionless near the bottom in or near deep sandy bottomed gutters or in rocky caves around inshore rocky reefs and islands at depths between 15 and 25 metres. These sites may play an important role in pupping and/or mating activities as grey		Present, occurs in gutters or in rocky caves around inshore rocky	Moderate	Low



Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
coast population)				nurse sharks often form aggregations at these sites. Occasionally, they are also found throughout the water column.		reefs and islands.		
<b><i>Carcharodon carcharias</i></b>  Great White Shark		Vulnerable, migratory	Vulnerable	The Great White Shark is widely distributed, and located throughout temperate and sub-tropical regions in the northern and southern hemispheres. In Australia, its range extends primarily from Moreton Bay in southern Queensland, with at least one record as far north as Mackay, around the southern coastline and to North West Cape in Western Australia. Great White Sharks are large, rare, warm-blooded apex marine predators. It is estimated that they mature at 12-18 years for females and 8-10 years for males. Maximum length is 6.4 metres, though specimens of up to 7 metres may exist. Great White Sharks reproduce only one every two to three years and produce between two and ten pups per litter.		Absent	Low	Low
<b><i>Sphyrna mokarran</i></b>  Great Hammerhead Shark			Vulnerable	The Great Hammerhead is a coastal-pelagic and semi-oceanic species, occurring along coastlines, continental shelves and adjacent drop-offs to about 80 m depth.  In NSW waters Great hammerheads are most likely to occur north of Sydney and mainly during the warmer months.  The species is typically nomadic in its movements compared to other hammerheads, and migrates to cooler waters in the summer months. The diet of the Great Hammerhead Shark consists of fish, other sharks, rays, crustaceans, and cephalopods (squid, octopus and cuttlefish). The presence of many demersal species in stomach contents suggests Great Hammerheads are bottom feeders.		Absent	Low	Low

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
<b><i>Lamna nasus</i></b>  <b>Porbeagle, Mackerel Shark</b>		Migratory		In Australia, the species occurs in waters from southern Queensland to south-west Australia (Last & Stevens 2009). Animals typically occur in oceanic waters off the continental shelf, although they occasionally enter coastal waters (Francis et al. 2002).		Absent	None	Low
<b><i>Thunnus maccoyii</i></b>  <b>Southern Bluefin Tuna</b>			Endangered	Southern Bluefin Tuna are long lived (up to 40 years), slow growing, late maturing (8 – 12 years) and highly migratory.  Southern Bluefin Tuna spawn at only one location in the tropical waters between Java and north-west Australia. Spawning occurs during September and March. The frequency of spawning events is currently unknown. Females have low fecundity releasing up to 15 million eggs during a spawning period with few survivors. The eggs hatch after 2-3 days. Larvae and small juveniles are carried southwards along the West Australian coastline. Juveniles remain nearer to the coast for the first three years of life before moving out to sea. Southern Bluefin Tuna are carnivorous feeding mainly on fish, squid, krill and salps. In offshore waters, they also eat small crustaceans and larger fish.		Absent	Low	Low
<b><i>Manta alfredi</i></b>  <b>Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray</b>		Migratory		<i>M. alfredi</i> is commonly sighted inshore, around coral reefs and rocky reefs in coastal areas. Long-term sighting records suggest that this species is mostly resident to tropical and subtropical waters.		Absent	None	Low

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
<b><i>Manta birostris</i></b>  Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray		Migratory		The Manta Ray lives in tropical, marine waters worldwide, but is also found occasionally in temperate seas. In Australia it is recorded from south-western Western Australia, around the tropical north of the country and south to the southern coast of New South Wales.		Absent	Low	Low
<b>Marine Mammals</b>								
<b><i>Physeter macrocephalus</i></b>  Sperm Whale	Vulnerable	Endangered, migratory		Wide, but patchy distribution from the tropics to the edge of the polar pack-ice in both hemispheres. Concentrations of Sperm Whales tend to occur where the seabed rises steeply from a greater depth, beyond the continental shelf. It is likely they feed on squid, octopus and fish. They are able to dive to depths of 2500m and have been recorded eating Giant Squid up to 10m in length.		Absent	Low	Low
<b><i>Eubalaena australis</i></b>  Southern Right Whale		Endangered, migratory		Temperate and subpolar waters of the Southern Hemisphere. Migrate between summer feeding grounds in Antarctica and winter breeding grounds around the coasts of southern Australia, New Zealand, South Africa and South America. They feed in the open ocean in summer. They move inshore in winter for calving and mating. Calving females and females with young usually remain very close to the coast, particularly in the 5-10 m watermark. They feed on krill and copepods by filtering water through their baleen (plates of keratin that hang inside their upper-jaw). It appears Southern Right Whales may not feed at all in Australian waters.		Absent	Low.	Low

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
<b><i>Megaptera novaeangliae</i></b> <b>Humpback Whale</b>	Vulnerable	Vulnerable, migratory		Species occurs in oceanic and coastal waters worldwide. The population of Australia's east coast migrates from summer cold-water feeding grounds in Subantarctic waters to warm-water winter breeding grounds in the central Great Barrier Reef. They are regularly observed in NSW waters in June and July, on northward migration and October and November, on southward migration.		Absent	Low	Low
<b><i>Balaenoptera musculus</i></b> <b>Blue Whale</b>		Endangered, migratory		Oceanic within Southern Hemisphere between 20 degrees to 70 degrees South including NSW waters. Breeds in warm water at low latitudes, preferring open seas rather than coastal waters. Often feeds during spring and summer on krill close to the ice edge.		Absent	None	Low
<b><i>Balaena glacialis australis</i></b> <b>Southern Right Whale</b>	Vulnerable	Endangered*, migratory		Temperate and subpolar waters of the Southern Hemisphere, with a circumpolar distribution between about 200 S and 550 S with some records further south to 630 S. Migrate between summer feeding grounds in Antarctica and winter breeding grounds around the coasts of southern Australia, New Zealand, South Africa and South America. They feed in the open ocean in summer. They move inshore in winter for calving and mating. Calving females and females with young usually remain very close to the coast, particularly in the 5-10 m watermark. They feed on krill and copepods by filtering water through their baleen (plates of keratin that hang inside their upper-jaw). It appears Southern Right Whales may not feed at all in Australian waters.		Absent	None	Low
<b><i>Balaenoptera edeni</i></b>		Migratory		There may be 2 distinct groups in some areas one occurring offshore and partially migratory and the other living inshore and resident all year-round. The two forms differ slightly in their reproductive		Absent	Low	Low

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<b>Bryde's Whale</b>				behaviour and the offshore animals are usually larger, have more scaring and have longer and broader baleen than the inshore variety. There may also be a 'dwarf' form around the Solomon Islands. The Bryde's whale prefers water temperatures above 20°C (68°F) so it is most common in coastal areas of tropical and subtropical waters of all seas. Some tropical populations are possibly sedentary with most migrating short distances with no known long-distance migrations to higher latitudes. They often feed on schooling fish, and unlike the surface swimming sei whales, they are deep divers. They often approach ships, seemingly out of curiosity.				
<b><i>Caperea marginata</i></b>  <b>Pygmy Right Whale</b>		Migratory		Pygmy Right Whales have primarily been recorded in areas associated with upwellings and with high zooplankton abundance, particularly copepods and small euphausiids which constitute their main prey. It is inconspicuous at sea and only surfaces for a few seconds at a time. It has not been observed breaching or lobtailing but it will throw its snout out of the water. Distribution appears limited by the surface water temperature as they are almost always found in 5° to 20°C temperature water. This excludes the whales presence south of the Antarctic Convergence and the cold waters of the Antarctic. Population numbers are unknown as it is easily confused with the Minke whale but Pygmy Right whales may be more common than the limited sightings suggest. Pygmy Right Whales have been seen in sheltered shallow bays, but it appears that these are predominantly juveniles and sub-adults.		Absent	Low	Low
<b><i>Lagenorhynchus obscurus</i></b>		Migratory		Dusky dolphin tend to like deep offshore water, hunting in pods which can sometimes number less than 20, but often more than 100. They can be found in the southern hemisphere in temperate		Absent	Low	Low

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Dusky Dolphin				and sub-Antarctic waters. Kiakoura in New Zealand is the place best known for these marine mammals, as they are there in numbers all year. In Australia these dolphin have been seen in places such as southern NSW, the eastern edge of Bass Strait, Wilson's Promontory and Cape Shank, Kangaroo Island, and Tasmania, but nowhere with any consistency.				
<i>Orcinus orca</i>  Killer Whale, Orca		Migratory		The pelagic killer whale is found in oceanic and shelf waters. While the species is found in both warm and cold waters, it may be more common in cold, deep water. Off Australia, they are often seen along the continental slope and on the shelf, and near seal colonies. Macquarie Island is a key locality for the species in the Australian region as it is regularly sighted there. Killer whales are a top-level carnivore and often hunt in packs. Their diet differs seasonally and regionally. The specific diet of Australian killer whales is not known but there are reports of attacks on dolphins, young humpbacks, blue whales, sperm whales, dugongs and Australian sea lions. They are also known to herd bottlenose dolphins and common dolphins.		Absent	None	Low
<i>Sousa chinensis</i>  Indo-Pacific Humpback Dolphin				In Australia, Indo-Pacific Humpback Dolphins are known to occur along the northern coastline, extending to Exmouth Gulf on the west coast (25° S), and the Queensland/NSW border region on the east coast (34° S) (Corkeron et al. 1997). Off the east Australian coast, their distribution appears to be continuous. The extent of occurrence is calculated in coastal waters 5.5 km (3 nm) seawards throughout the known distribution. Indo-Pacific Humpback Dolphins inhabit shallow coastal, estuarine, and occasionally riverine habitats, in tropical and subtropical regions. The species usually occurs		Present	Moderate	Low

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				close to the coast, generally in depths of less than 20 m.				
<b><i>Arctocephalus pusillus doriferus</i></b>  <b>Australian Fur Seal</b>	Vulnerable			The Australian Fur seal has a relatively restricted distribution around the islands of Bass Strait, parts of Tasmania and southern Victoria. They can be seen hauling out (coming ashore) on islands off South Australia and areas of southern New South Wales such as Montague Island with the occasional animal appearing as far north as the mid north coast of New South Wales. Their preferred habitat especially for breeding is rocky islands, which include boulder or pebble beaches and gradually sloping rocky ledges. These seals feed on a variety of bony fish species plus squid and octopus. Australian Fur Seals come ashore each year and form breeding colonies. Females spend most of the gestation period at sea, coming ashore just before the birth of a single pup between October and December.	5 (Bionet)	Absent	Low	Low
<b><i>Arctocephalus forsteri</i></b>  <b>New Zealand fur-seal</b>	Vulnerable			Occurs in Australia and New Zealand. Reports of non-breeding animals along southern NSW coast particularly on Montague Island, but also at other isolated locations to north of Sydney. Prefers rocky parts of islands with jumbled terrain and boulders. Feeds principally on cephalopods, fish also seabirds and occasionally penguins.	2 (Bionet)	Absent	Low. Two New Zealand Fur Seals were recorded near the Opera House in 2016.	Low
<b><i>Dugong dugong</i></b>  <b>Dugong</b>		Endangered		Extends south from warmer coastal and island waters of the Indo-West Pacific to northern NSW, where its known from incidental records only. Major concentrations of Dugongs occur in wide shallow protected bays, wide shallow mangrove channels and in the lee of large inshore islands. Will also occupy deeper waters if their sea grass food is available. Shallow waters such as tidal		Absent	None	Low

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				sandbanks and estuaries have been reported as sites for calving.				
<b>Birds</b>								
<i>Calidris canutus</i>  Red Knot		Endangered, migratory		Breeding in the Arctic Circle between August and April, it visits Australian shores in large numbers and frequents coastal sand flats and the margins of estuaries and rivers. It feeds in close-packed flocks that move in unison.		Absent	Low	Low
<i>Calidris tenuirostris</i>  Great Knot	Vulnerable	Critically Endangered		Occurs within sheltered, coastal habitats containing large, intertidal mudflats or sandflats, including inlets, bays, harbours, estuaries and lagoons. Often recorded on sandy beaches with mudflats nearby, sandy spits and islets and sometimes on exposed reefs or rock platforms. Migrates to Australia from late August to early September, although juveniles may not arrive until October-November. Most birds return north in March and April, however some individuals may stay over winter in Australia. Forages for food by methodically thrusting its bill deep into the mud to search for invertebrates, such as bivalve molluscs, gastropods, polychaete worms and crustaceans.		Absent	Low	Low
<i>Charadrius leschenaultia</i>  Greater Sand Plover		Vulnerable		The greater sand plover breeds in the northern hemisphere and undertakes annual migrations to and from southern feeding grounds for the austral summer. The greater sand plover distribution in Australia during the non-breeding season is widespread, although the most are found in northern Australia.  The greater sand plover has an extremely large global range with the extent of occurrence estimated to be 3,460,000 km <sup>2</sup> (BirdLife		Absent	Low	Low



Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
				International 2015). Greater sand plovers usually feed from the surface of wet sand or mud on open intertidal flats of sheltered embayments, lagoons or estuaries.				
<b><i>Charadrius mongolus</i></b> <b>Lesser Sand Plover</b>	Vulnerable	Endangered		Almost entirely coastal in NSW, favouring the beaches of sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats; occasionally occurs on sandy beaches, coral reefs and rock platforms. Highly gregarious, frequently seen in flocks exceeding 100 individuals; also often seen foraging and roosting with other wader species. Roosts during high tide on sandy beaches, spits and rocky shores; forage individually or in scattered flocks on wet ground at low tide, usually away from the water's edge. Diet includes insects, crustaceans, molluscs and marine worms. Prey is usually detected visually with the birds making short, quick runs, with abrupt stops to lunge at the ground or look for prey.		Absent	Low	Low
<b><i>Dasyornis brachypterus</i></b> <b>Eastern Bristlebird</b>	Endangered	Endangered		The distribution of the Eastern Bristlebird has contracted to three disjunct areas of south-eastern Australia: southern Queensland/northern NSW, the Illawarra Region and in the vicinity of the NSW/Victorian border. The estimated population size is less than 2000 individuals occupying a total area of about 120 sq km. There are now only four populations in the southern Queensland/northern NSW area with a total of 35 birds, compared to 15 years ago when 14 populations and 154 birds were recorded. This population once extended as far south as at least Dorrigo and has recently been identified as a separate ultrataxon ( <i>monoides</i> ) but further research is being undertaken to determine		Absent	Low	Low

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
				<p>the validity of this. The remaining populations are the nominate ultrataxon (<i>brachypterus</i>) and once extended at least to what is now the Sydney urban area. The Illawarra population comprises an estimated 1600 birds, mainly from Barren Grounds Nature Reserve, Budderoo National Park and the Jervis Bay area. The southern population in Nadgee Nature Reserve and Howe's Flat is around 200 birds. Further surveys are required in parts of Ben Boyd National Park and Sydney Catchment Authority lands to determine whether further populations of the Eastern Bristlebird occur in these areas. Habitat is characterised by dense, low vegetation including heath and open woodland with a heathy understorey; in northern NSW occurs in open forest with tussocky grass understorey; all of these vegetation types are fire prone. Age of habitat since fires (fire-age) is of paramount importance to this species; Illawarra and southern populations reach maximum densities in habitat that has not been burnt for at least 15 years; however, in the northern NSW population a lack of fire in grassy forest may be detrimental as grassy tussock nesting habitat becomes unsuitable after long periods without fire; northern NSW birds are usually found in habitats burnt five to 10 years previously. Shy and cryptic and rarely flies, although can be seen scampering over the ground; when approached, may move to a lookout perch 1 m or more above the ground, then retreat into dense vegetation. Feeds on a variety of insects, particularly ants. Nests are elliptical domes constructed on or near the ground amongst dense vegetation. Two eggs are laid during August to February; producing more than</p>				

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
				one clutch a year is rare, and recruitment into the population is low.				
<i>Limosa lapponica baueri</i>  Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit		Vulnerable, migratory		It is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. Less frequently it occurs in salt lakes and brackish wetlands, sandy ocean beaches and rock platforms. It often occurs around beds of seagrass, and sometimes in nearby saltmarsh or the outer margins of mangrove areas. It forages at low to mid tide in shallow water or along the water's edge on sandy substrates on intertidal flats, banks and beaches or on soft mud substrates. Its diet consists of worms, molluscs, crustaceans, insects and some plant material.  In NSW its high tide roost areas on sandy beaches, sandbars, spits and near-coastal saltmarsh are frequently shared with other shorebirds. It is rarely found on inland wetlands or in areas of short grass such as farmland, paddocks and airstrips. In large part, the observed decline in Bar-tailed Godwit (Western Alaskan) numbers across Australia stems from ongoing loss of intertidal mudflat habitat at key migration staging sites in the Yellow Sea.	3 (Bionet)	Absent	Low	Low
<i>Limosa lapponica menzbieri</i>  Northern Siberian Bar-tailed Godwit, Bar-tailed		Critically Endangered		The bar-tailed godwit (northern Siberian) usually forages near the edge of water or in shallow water, mainly in tidal estuaries and harbours. They prefer exposed sandy or soft mud substrates on intertidal flats, banks and beaches. The bar-tailed godwit (northern Siberian) usually roosts on sandy beaches, sandbars, spits and also in near-		Absent	Low	Low

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
<b>Godwit (menzbieri)</b>				coastal saltmarsh. In some conditions, shorebirds may choose roost sites where a damp substrate lowers the local temperature. During periods of cyclonic activity, shorebirds moved to sheltered areas to avoid high winds and heavy rain.				
<b><i>Diomedea antipodensis</i>  Antipodean Albatross</b>		Vulnerable		The species ranges across the southern Pacific Ocean, east to the coast of Chile and west to eastern Australia. The majority of birds breed on Antipodes Island, with a small number of pairs breeding on Campbell Island. The Antipodean Albatross breeds biennially in colonies on ridges, slopes and plateaus of isolated subantarctic islands, usually in vegetation such as grass tussocks. Egg laying begins in January (Antipodes Island) and February (Campbell Island), and chicks usually fledge the following year in January and March. This species regularly occurs in small numbers off the NSW south coast from Green Cape to Newcastle during winter where they feed on cuttlefish. Although representing a small proportion on its total foraging area, potential forage in NSW waters is nonetheless considered significant for the species. Forage for the Antipodean Albatross is extremely patchy, both spatially and temporally, and individuals traverse great distances in search of food. This species feeds pelagically on squid, fish and crustaceans.		Present, part of foraging range	Low	Low
<b><i>Diomedea antipodensis gibsoni</i></b>		Vulnerable		Essentially endemic to the Auckland Islands of New Zealand. The non-breeding range is poorly known however the species probably disperses across the southern Pacific. The species is regularly encountered on trans-Tasman shipping routes and at seas off Sydney, and regularly occurs off the NSW coast usually between Green		Present, part of foraging range	Low	Low

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
<b>Gibson's Albatross</b>				Cape and Newcastle. This species is known only to breed on the Adams, Disappointment and Auckland Islands in the subantarctic Auckland Island group. This species regularly occurs off the NSW coast from Green Cape to Newcastle. Although representing a small proportion on its total foraging area, potential forage in NSW waters during the winter is nonetheless considered significant for the species. Forage for Gibson's Albatross is extremely patchy, both spatially and temporally, and individuals traverse great distances in search of food. This species feeds pelagically on squid, fish and crustaceans.				
<i>Diomedea epomophora</i>  <b>Southern Royal Albatross</b>		Vulnerable		Albatrosses and giant petrels breed at only six localities under Australian jurisdiction. These are: Macquarie Island (including Bishop and Clerk Islets), Albatross Island, Pedra Branca, the Mewstone, Heard and McDonald Islands and the Australian Antarctic Territory (Giganteus Island, Hawker Island and the Frazier Islands).  These remote islands constitute the only suitable breeding habitat under Australian jurisdiction and should be regarded as habitat that is critical to the survival of albatrosses and giant petrels in Australian waters. Albatross and giant petrel species exhibit a broad range of diets and foraging behaviours, and hence their at-sea distributions are diverse. Combined with their ability to cover vast oceanic distances, all waters within Australian jurisdiction can be considered foraging habitat, however the most critical foraging habitat is considered to be those waters south of 25 degrees where most species spend the majority of their foraging time.		Present, part of foraging range	Low	Low

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
<i>Diomedea sanfordi</i>  Northern Royal Albatross		Endangered		The Northern Royal Albatross primarily forages in inshore and offshore waters over the continental shelf to the shelf edge. It feeds mainly on cephalopods and fish, but also salps, crustacea and carrion.		Present, part of foraging range	Low	Low
<i>Fregata grallaria grallaria</i>  White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian)	Vulnerable	Vulnerable		Marine, in Australia breeds only on offshore islands in the Lord Howe Island group. Nest consists of a chamber usually located amongst large rocks. Vagrant birds occur in coastal NSW waters, particularly after storm events.		Present, part of foraging range	Low	Low
<i>Macronectes giganteus</i>  Southern Giant-Petrel, Southern Giant Petrel		Endangered		<p>Albatrosses and giant petrels breed at only six localities under Australian jurisdiction. These are:</p> <p>Macquarie Island (including Bishop and Clerk Islets), Albatross Island, Pedra Branca, the Mewstone, Heard and McDonald Islands and the Australian Antarctic Territory (Giganteus Island, Hawker Island and the Frazier Islands).</p> <p>These remote islands constitute the only suitable breeding habitat under Australian jurisdiction and should be regarded as habitat that is critical to the survival of albatrosses and giant petrels in Australian waters. Albatross and giant petrel species exhibit a broad range of diets and foraging behaviours, and hence their at-sea distributions are diverse. Combined with their ability to cover vast oceanic distances, all waters within Australian jurisdiction can be considered foraging habitat, however the most critical foraging habitat is considered to be those waters south of 25</p>		Present, part of foraging range	Low	Low

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
				degrees where most species spend the majority of their foraging time.				
<b><i>Macronectes halli</i></b>  <b>Northern Giant Petrel</b>	Vulnerable	Vulnerable		<p>Breeding in Australian territory is limited to Macquarie Island and occurs during spring and summer.</p> <p>Adults usually remain near the breeding colonies throughout the year (though some do travel widely) while immature birds make long and poorly known circumpolar and trans-oceanic movements. Hence most birds recorded in NSW coastal waters are immature birds. Northern Giant-Petrels seldom breed in colonies but rather as dispersed pairs, often amidst tussocks in dense vegetation and areas of broken terrain. A single chick is raised and although breeding occurs annually, approximately 30% of the potential breeding population do not nest. There are marked differences in diet between the sexes. Females obtain most of their prey live from the sea, while males also scavenge from the carcasses of penguins and seals on land. At sea, both sexes are aggressive opportunists, feeding on fish, cephalopods, birds and crustaceans, including euphausiids or krill, and regularly scavenge on fishing vessels.</p>		Present, part of foraging range	Low	Low
<b><i>Pterodroma leucoptera leucoptera</i></b>  <b>Gould's Petrel, Australian Gould's Petrel</b>	Vulnerable	Endangered		<p>The first arrival of Gould's petrel on cabbage tree Island occurs from mid to late September. Principal nesting habitat is located within two gullies which are characterised by steeply, sloping rock scree with a canopy of Cabbage Tree Palms. They nest predominantly in natural rock crevices among the rock scree and also in hollow fallen palm trunks, under mats of fallen palm fronds and in cavities among the buttresses of fig trees. They breed colonially and the nests are clumped and often less than 1 m apart. Egg laying takes place</p>		Possible, forage range not know	Low	Low

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
				over a six week period commencing in early November. Forage range not known				
<b><i>Pterodroma neglecta neglecta</i></b>  <b>Kermadec Petrel (western)</b>	Vulnerable	Vulnerable		Breeds on islands across the South Pacific. In Australia it breeds on Ball's Pyramid and Phillip Island (near Norfolk Island).  Nests in a crevice amongst rocks.  Diet is squid and crustaceans.  Vagrant birds occur in coastal NSW waters, particularly after storm events.		Possible, forage range not known	Low	Low
<b><i>Thalassarche bulleri</i></b>  <b>Buller's Albatross, Pacific Albatross</b>		Vulnerable		Buller's Albatross are marine and pelagic, inhabiting subtropical and subantarctic waters of the southern Pacific Ocean (Marchant & Higgins 1990). Specific habitat requirements are poorly known, but they have been observed in association with fishing boats close inshore and over waters 180–360 m deep in New Zealand (Robertson & Jenkins 1981; Secker 1969). This species does not appear to be as strongly associated with fishing boats as other albatrosses (Marchant & Higgins 1990). In Australia, Buller's Albatross are seen over inshore, offshore and pelagic waters. They appear to congregate over currents where water temperature exceeds 16 °C (Blaber 1986). Breeding habitat of Buller's Albatross occurs on subtropical and subantarctic islands and rock stacks in the New Zealand region. Nests are made in a range of inland habitats including: bare substrate or fern and tussock covered cliffs, slopes or ridges open grassy meadows, summit plateaus under Olearia forest		Present, part of foraging range	Low	Low



Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
<b>Thalassarche bulleri platei</b>  <b>Northern Buller's Albatross, Pacific Albatross</b>		Vulnerable		<p>The Pacific Albatross is a marine, pelagic species. It occurs in subtropical and subantarctic waters of the South Pacific Ocean. Habitat preferences are poorly known. In New Zealand, the species has been observed in association with fishing boats close inshore and over waters of 180–360 m depth although it is not so strongly associated with fishing grounds as are other albatrosses. In Australia, the species occurs over inshore, offshore and pelagic waters and off the coast of south-east Tasmania. The Pacific Albatross prefers waters of the East Australia Current where sea surface-temperatures are greater than 16.5 °C. The birds fly in low or medium airspace using updraft off sea swell for lift. The species takes food from the surface with shallow dives to depth of 1 m observed. The birds breed on subtropical and subantarctic islands and rock stacks in the New Zealand region, on sparsely vegetated slopes, cliff tops and ledges on rocky islands or stacks.</p>		Present, part of foraging range	Low	Low
<b>Thalassarche cauta cauta</b>  <b>Shy Albatross, Tasmanian Shy Albatross</b>		Vulnerable		<p>This pelagic or ocean-going species inhabits subantarctic and subtropical marine waters, spending the majority of its time at sea. While at sea, it soars on strong winds and when calm, individuals may rest on the ocean, in groups during the breeding season or as individuals at other times. Occasionally the species occurs in continental shelf waters, in bays and harbours.</p> <p>The species feeds on fish, crustaceans, offal and squid and may forage in mixed-species flocks. Food may be caught by seizing prey from the water's surface while swimming, by landing on top of prey, diving for prey beneath the water and by scavenging behind fishing vessels.</p>		Present, possibly part of foraging range	Low	Low

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
<i>Thalassarche cauta steadi</i>  White-capped Albatross		Vulnerable		The White-capped Albatross is a marine species and occurs in subantarctic and subtropical waters. It reaches tropical areas associated with the cool Humboldt Current off South America. It is unknown what sea-surface temperatures this subspecies prefers; however, in the southern Indian Ocean it has been observed in waters of 6.4–13.5 °C. The White-capped Albatross has been noted in shelf-waters around breeding islands and over adjacent rises. During the non-breeding season, birds have been observed over continental shelves around continents. The species occurs both inshore and offshore and enters harbours and bays. The species is scarce in pelagic waters. Birds gather to scavenge at commercial fishing grounds. Birds nest on slopes vegetated with tussock and succulents on Auckland Island.		Present, part of foraging range	Low	Low
<i>Thalassarche eremita</i>  Chatham Albatross		Endangered		The Chatham Albatross is a marine species. It occurs in subantarctic and subtropical waters reaching the tropics in the cool Humboldt Current off South America. It has been noted in shelf-waters around breeding islands, over continental shelves during the non-breeding season, and occurs inshore and offshore. It enters harbours and bays and is scarce in pelagic waters.		Present, part of foraging range	Low	Low
<i>Thalassarche impavida</i>  Campbell Albatross, Campbell Black-browed Albatross		Vulnerable		The Campbell Albatross is a marine sea bird inhabiting sub-Antarctic and subtropical waters from pelagic to shelf-break water habitats. In the Antarctic, it occurs through the belt of icebergs to the edge of the consolidated pack-ice. The Campbell Albatross does not penetrate the ice-packs, perhaps because ice inhibits soaring by dampening sea swells. They tolerate sea surface-temperatures from 0–24 ° but are mainly found in the sub-Antarctic. In December, the subspecies		Absent	Low	Low

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
				southern limit in the Ross Sea is at the 1.0 °C isotherm and in January at the 0.0 °C isotherm.				
<b><i>Thalassarche melanophris</i></b> <b>Black-browed Albatross</b>	Vulnerable	Vulnerable		<p>Inhabits antarctic, subantarctic, subtropical marine and coastal waters over upwellings and boundaries of currents.</p> <p>Can tolerate water temperatures between 0°C and 24°C.</p> <p>Spends most of its time at sea, breeding on small isolated islands.</p> <p>When at sea, individuals soar on strong winds and rest on the ocean, when calm, often in groups.</p> <p>This species feeds on fish, crustaceans, offal and squid and often forages in flocks with other seabirds.</p> <p>Individuals seize prey from the surface while swimming or landing, sometimes submerging their head and body to capture prey underwater, and they scavenge in large flocks behind fishing vessels.</p>		Absent	Low	Low
<b><i>Thalassarche salvini</i></b> <b>Salvin's Albatross</b>		Vulnerable		<p>Salvin's Albatross is a marine species occurring in subantarctic and subtropical waters, reaching the tropics in the cool Humboldt Current, off South America. The sea-surface temperature preferences of Salvin's Albatross are poorly known. In the southern Indian Ocean the species has been observed over waters of 6.4–13.5 °C. Birds have been noted in shelf-waters around breeding islands and over adjacent rises. During the non-breeding season, the species occurs over continental shelves around continents. It occurs both inshore and offshore and enters harbours and bays. Salvin's Albatross is scarce in pelagic</p>		Present, part of foraging range	Low	Low

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
				waters. Salvin's Albatross nest's on level or gently sloping ledges, summits, slopes and caves of rocky islets and stacks, usually in broken terrain with little soil and vegetation.				
<b><i>Rostratula australis</i></b> <b>Australian Painted Snipe</b>	Endangered	Endangered		<p>Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.</p> <p>Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. The nest consists of a scrape in the ground, lined with grasses and leaves.</p> <p>Breeding is often in response to local conditions; generally occurs from September to December. Incubation and care of young is carried out by the male only.</p> <p>Forages nocturnally on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter.</p>		Absent	Low	Low
<b><i>Sternula nereis nereis</i></b> <b>Australian Fairy Tern</b>		Vulnerable, migratory		The Fairy Tern (Australian) nests on sheltered sandy beaches, spits and banks above the high tide line and below vegetation. The subspecies has been found in embayments of a variety of habitats including offshore, estuarine or lacustrine (lake) islands, wetlands and mainland coastline (Higgins & Davies 1996; Lindsey 1986a). The bird roosts on beaches at night (Higgins & Davies 1996). The subspecies may migrate within southern Western Australia and Tasmania, where are seen less frequently during the winter months. The bird is more sedentary in the north of Western Australia, South Australia and Victoria (Hill et al. 1988).		Absent	Low	Low

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
<b>Curlew Sandpiper</b> <i>Calidris ferruginea</i>	Endangered	Critically Endangered		<p>It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland. It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. It roosts on shingle, shell or sand beaches; spits or islets on the coast or in wetlands; or sometimes in salt marsh, among beach-cast seaweed, or on rocky shores. Curlew Sandpipers are omnivorous, feeding on worms, molluscs, crustaceans, insects and some seeds.</p>	8 (Bionet)	Absent	Low	Low
<b>Little Penguin in the Manly Point Area (being the area on and near the shoreline from Cannae Point generally northward to the point near the intersection of Stuart Street and Oyama Cove Avenue, and extending 100 metres offshore from that shoreline)</b>				<p>The Little Penguins spend the first 2-3 years of their life at sea and eventually return to breed between July and March. Penguins tend to make their nests in rock crevices, in sand or soft soil and nesting material is from leaves, twigs and bark or whatever is available, even plastic packaging or paper bags. Generally they will have several paths to their nests so that they can approach them in safety. The male is responsible for the nest building and the female must decide whether the nest is good enough for her to lay her eggs. The male can sometimes be seen gathering material for the nest. The current population at Manly is reasonably stable and if the conditions are good. the parents tend to have two clutches of chicks per breeding season, initially in August/September and another in November/December.</p> <p>Penguins leave the nest about an hour before sunrise and return about an hour after sunset. Whilst penguins are mainly solitary feeders, they sometimes group and feed together. Their main diet is small shoaling fish, squid and cuttlefish. An</p>		Breeding habitat absent but potential foraging habitat	Moderate	Low

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
				adult can travel 20 km per day when foraging, and have been known to dive as deep as 60 m. During the breeding season they do not venture far for foraging.				
<i>Diomedea exulans</i>  Wandering Albatross	Endangered	Endangered		<p>Wandering albatross spend the majority of their time in flight, soaring over the southern oceans.</p> <p>They breed on a number of islands just north of the Antarctic Circle: South Georgia Island (belonging to the UK), Prince Edward and Marion Islands (South Africa), Crozet and Kerguelen Islands (French Southern Territories) and Macquarie Island (Australia).</p> <p>Breeding takes place on exposed ridges and hillocks, amongst open and patchy vegetation. Wandering albatross pairs mate for life; these long-lived birds do not reach sexual maturity until 9-11 years of age. Wandering Albatross breed biennially in small, loose colonies among grass tussocks, using a large mud nest. A single egg is laid; both parents incubate the egg (that hatches after two months) and feed the growing chick, which remains on the nest for around 9 months. They feed in pelagic, offshore and inshore waters, often at night, taking fish and cephalopods such as squid, crustaceans and carrion, and will often follow ships feeding on the refuse they trail.</p>	1 (Bionet)	Absent	Low	Low
<i>Erythrotriorchis radiatus</i>  Red Goshawk	Critically Endangered	Vulnerable		Red Goshawks inhabit open woodland and forest, preferring a mosaic of vegetation types, a large population of birds as a source of food, and permanent water, and are often found in riparian habitats along or near watercourses or wetlands. In NSW, preferred habitats include mixed	1 (Bionet)	Absent, however site may comprise part of large range	Low	Low

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
				<p>subtropical rainforest, Melaleuca swamp forest and riparian Eucalyptus forest of coastal rivers.</p> <p>Adults appear to occupy territories throughout the year and breeding territories are traditionally used from year to year. Adults have large home-ranges, estimated in the Northern Territory to be as great as about 120 km<sup>2</sup> for females and 200 km<sup>2</sup> for males.</p> <p>Red Goshawks mainly eat medium to large birds, including species as large as Australian Brush-turkeys, Kookaburras, Tawny Frogmouths, Sulphur-crested Cockatoos and Rainbow Lorikeets, but they also take mammals, reptiles and insects. Red Goshawks usually hunt from concealed or, less often, exposed perches, but also fly close above or through forest or woodland searching for prey. They often hunt from perches early in the morning and late in the day and tend to hunt more on the wing at other times of the day.</p> <p>The breeding behaviour of Red Goshawks is not well known. Breeding is likely to be in spring and summer in southern Queensland and NSW. The birds lay clutches of 1-2 eggs between July and September, in a stick nest in a tall tree (&gt;20 m tall) within 1 km of a watercourse or wetland. Young fledge around November and December. In winter in eastern Australia, the birds appear to move from nesting sites in the ranges to coastal plains, where they are associated with permanent wetlands.</p>				
<b>White-bellied Sea-Eagle</b>	Vulnerable			<p>Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea.</p> <p>Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons,</p>	54 (Bionet)	Absent	Low	Low

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
<b><i>Haliaeetus leucogaster</i></b>				<p>estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh.</p> <p>Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass.</p> <p>Feed mainly on fish and freshwater turtles, but also waterbirds, reptiles, mammals and carrion.</p>				
<b><i>Hieraaetus morphnoides</i></b>  Little Eagle	Vulnerable			<p>The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW.</p> <p>The Little Eagle occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used.</p> <p>It nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. It lays two or three eggs during spring, and young fledge in early summer.</p> <p>The Little Eagle preys on birds, reptiles and mammals, occasionally adding large insects and carrion.</p>	1 (Bionet)	Absent	Low	Low
<b>Square-tailed Kite</b>	Vulnerable			<p>Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid north-western NSW, has been observed in</p>	1 (Bionet, observed)	Absent	Low	Low



Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
<b><i>Lophoictinia isura</i></b>				<p>stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland.</p> <p>Is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage.</p>	using site)			
<b>Little Tern</b>  <b><i>Sternula albifrons</i></b>	Endangered			<p>Almost exclusively coastal, preferring sheltered environments; however may occur several km from the sea in harbours, inlets and rivers (with occasional offshore islands or coral cay records).</p> <p>Nests in small, scattered colonies in low dunes or on sandy beaches just above high tide mark near estuary mouths or adjacent to coastal lakes and islands.</p> <p>Often seen feeding in flocks, foraging for small fish, crustaceans, insects, worms and molluscs by plunging in the shallow water of channels and estuaries, and in the surf on beaches, or skipping over the water surface with a swallow-like flight.</p>	1 (Bionet)	Absent	Low	Low
<b><i>Epthianura albifrons</i></b>  <b>White-fronted Chat (Sydney Metropolitan Catchment Management Area)</b>	Endangered Population			<p>Regularly observed in the saltmarsh of Newington Nature Reserve (with occasional sightings from other parts of Sydney Olympic Park and in grassland on the northern bank of the Parramatta River). Current estimates suggest this population consists of 8 individuals.</p> <p>Regularly observed in the saltmarsh and on the sandy shoreline of a small island of Towra Point Nature Reserve. This population is estimated to comprise 19-50 individuals.</p> <p>The Newington and Towra Point populations are thought to be disjunct from each other (and from the nearest populations outside Sydney</p>		Absent	Low	Low

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
				Metropolitan CMA). Gregarious species, usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground. Have been observed breeding from late July through to early March, with 'open-cup' nests built in low vegetation. Nests in the Sydney region have also been seen in low isolated mangroves. Nests are usually built about 23 centimetres above the ground (but have been found up to 2.5 metres above the ground).				
<b><i>Haematopus longirostris</i></b>  <b>Pied Oystercatcher</b>	Endangered			Favours intertidal flats of inlets and bays, open beaches and sandbanks. Forages on exposed sand, mud and rock at low tide, for molluscs, worms, crabs and small fish. The chisel-like bill is used to pry open or break into shells of oysters and other shellfish.  Nests mostly on coastal or estuarine beaches although occasionally they use saltmarsh or grassy areas. Nests are shallow scrapes in sand above the high tide mark, often amongst seaweed, shells and small stones.	1 (Bionet)	Absent	Low	Low
<b>Marine Reptiles</b>								
<b><i>Chelonia mydas</i></b>  <b>Green turtle</b>	Vulnerable	Vulnerable, migratory		Widely distributed in tropical and sub-tropical seas. Usually found in tropical waters around Australia but also occurs in coastal waters of NSW, where it is generally seen on the north or central coast, with occasional records from the south coast. Ocean-dwelling species spending most of its life at sea. Carnivorous when young but as adults they feed only on marine plant material. Eggs laid in holes dug in beaches		Present, species occasionally sighted in Sydney Harbour	Moderate	Low

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
				throughout their range. Scattered nesting records along the NSW coast.				
<b>Loggerhead turtle</b>  <i>Caretta caretta</i>	Endangered	Endangered, migratory		Loggerhead Turtles are found in tropical and temperate waters off the Australian coast. In NSW they are seen as far south as Jervis Bay and have been recorded nesting on the NSW north coast and feeding around Sydney. Loggerhead Turtles are ocean-dwellers, foraging in deeper water for fish, jellyfish and bottom-dwelling animals. The female comes ashore to lay her eggs in a hole dug on the beach in tropical regions during the warmer months.		Present, species occasionally sighted in Sydney Harbour	Low	Low
<b>Hawksbill turtle</b>  <i>Eretmochelys imbricata</i>		Vulnerable, migratory		Hawksbill turtles typically occur in tidal and sub-tidal coral and rocky reef habitats throughout tropical waters, extending into warm temperate areas as far south as northern New South Wales. In Australia the main feeding area extends along the east coast, including the Great Barrier Reef. Other feeding areas include Torres Strait and the archipelagos of the Northern Territory and Western Australia, possibly as far south as Shark Bay or beyond. Hawksbill turtles also feed at Christmas Island and the Cocos (Keeling) Islands.		Absent, occurs in northern NSW only.	Low	Low
<b><i>Dermochelys coriacea</i></b>  <b>Leatherback Turtle</b>	Endangered	Endangered, migratory		The Leatherback Turtle is a pelagic feeder, found in tropical, subtropical and temperate waters throughout the world.  No major nesting has been recorded in Australia, although scattered isolated nesting (one to three nests per annum) occurs in southern Queensland and the Northern Territory. Some nesting has occurred in northern NSW near Ballina. However,		Present, species occasionally sighted in Sydney Harbour	Low	Low

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
				no nesting has occurred in Queensland or NSW since 1996.				
<b>Terrestrial Mammals</b>								
<b><i>Chalinolobus dwyeri</i></b>  <b>Large-eared Pied Bat</b>	Vulnerable	Vulnerable		Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin ( <i>Petrochelidon ariel</i> ), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years. Found in well-timbered areas containing gullies. This species probably forages for small, flying insects below the forest canopy. Likely to hibernate through the coolest months.	1 (Bionet)	Absent	Low	Low
<b><i>Miniopterus australis</i></b>  <b>Little Bentwing-bat</b>	Vulnerable	Not listed		Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas.  Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats.  They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters.  In NSW the largest maternity colony is in close association with a large maternity colony of Eastern Bentwing-bats ( <i>Miniopterus schreibersii</i> ) and appears to depend on the large colony to	9 (Bionet)	Present - Overwinter habitat adjacent to study site	Known	Low – Work occurring outside of seasonal occupation period

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
				<p>provide the high temperatures needed to rear its young.</p> <p>Maternity colonies form in spring and birthing occurs in early summer. Males and juveniles disperse in summer.</p> <p>Only five nursery sites /maternity colonies are known in Australia.</p>				
<p><b><i>Miniopterus schreibersii oceanensis</i></b></p> <p><b>Eastern Bentwing-bat</b></p>	Vulnerable			<p>Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures.</p> <p>Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young.</p> <p>At other times of the year, populations disperse within about 300 kilometre range of maternity caves.</p> <p>Cold caves are used for hibernation in southern Australia.</p> <p>Hunt in forested areas, catching moths and other flying insects above the tree tops.</p>	90 (Bionet)	Present - Overwinter habitat adjacent to study site	Known	Low – Work occurring outside of seasonal occupation period
<p><b><i>Mormopterus norfolkensis</i></b></p> <p><b>Eastern Freetail-bat</b></p>	Vulnerable			<p>Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range.</p> <p>Roost mainly in tree hollows but will also roost under bark or in man-made structures.</p> <p>Usually solitary but also recorded roosting communally, probably insectivorous.</p>	10 (Bionet)	Absent	Low	Low
<p><b><i>Myotis macropus</i></b></p>	Vulnerable			<p>Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage.</p>	48 (Bionet)	Potential	Moderate	Low

Common Name (Scientific Name)	BC Act	EPBC Act	FM Act	Ecology	Number of records	Presence of Habitat	Likelihood of occurrence	Likelihood of Impact
<b>Southern Myotis</b>				<p>Known to roost under wharf within</p> <p>Forage over streams and pools catching insects and small fish by raking their feet across the water surface.</p> <p>In NSW females have one young each year usually in November or December.</p>				
<p><b><i>Pteropus poliocephalus</i></b></p> <p><b>Grey-headed Flying-fox</b></p>	Vulnerable	Vulnerable		<p>Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.</p> <p>Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.</p> <p>Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young.</p> <p>Annual mating commences in January and conception occurs in April or May; a single young is born in October or November.</p> <p>Site fidelity to camps is high; some camps have been used for over a century.</p> <p>Can travel up to 50 km from the camp to forage; commuting distances are more often &lt;20 km.</p> <p>Feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines.</p> <p>Also forage in cultivated gardens and fruit crops</p>	1115 (Bionet)	Absent	Low	Low