



A Guide to the Common
Marine Fishes of
Barrow Island



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Front cover: Stripey Snapper (*Lutjanus carponotatus*). Photo - Katherine Ross

Chevron's Policy on Working in Sensitive Areas

Protecting the safety and health of people and the environment is a Chevron core value. Therefore, we:

- Strive to design our facilities and conduct our operations to avoid adverse impacts to human health and to operate in an environmentally sound, reliable and efficient manner.
- Conduct our operations responsibly in all areas, including environments with sensitive biological characteristics.

Chevron strives to avoid or reduce significant risks and impacts our projects and operations may pose to sensitive species, habitats and ecosystems. This means we:

- Integrate biodiversity into our business decision-making and management through our Operational Excellence (OE) management system.
- Drive and assess our performance relating to biodiversity through key OE expectations, such as Environmental Stewardship, and processes, including Health, Environment and Safety (HES). Due Diligence for Property Transfers; Environmental, Social and Health Impact Assessment; and Risk Management.
- Understand that humans and the natural environment are interdependent and interact with each other in various ways. In managing our impacts we consider those interrelationships and the functions ecosystems perform in supporting sustainable economic development.

Chevron recognises our activities could affect particularly sensitive or valuable biodiversity inside or outside of legally-designated protected areas. Therefore, we:

- Decide whether and how to operate in a protected or sensitive area, based on consideration of the specific circumstances of the area and operation involved.
- Operate in such areas only with government legal authorisation, and where we are confident we can comply with all regulatory requirements and use operating practices appropriately protective of the area.
- Use our OE processes to avoid or minimise potential risks of our operations to sensitive biological resources and seek ways to make positive contributions to biodiversity conservation in the area.

Chevron undertakes activities to raise internal and external awareness of the importance of conserving biodiversity and how the company is addressing it. This includes:

- Communicating about our biodiversity-related activities to employees and outside audiences, such as through our Corporate Responsibility report.
- Engaging with government, local communities and others to understand and work to address significant biodiversity issues in areas where we operate.
- Participating in industry associations and other forums to share and promote best practices for biodiversity conservation.
- Seeking to understand and, where appropriate, participate in development of external policy-making activities that affect our operations, such as those adopted under the UN Convention on Biological Diversity and national, regional and local biodiversity policies and plans.
- Working with a variety of external organisations to make positive contributions to biodiversity conservation in areas where we operate and globally.

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Barrow Island is the home of the Chevron-operated Gorgon Project - one of the world's largest natural gas projects and the largest single resource project in Australia's history. The Gorgon Project will develop the Greater Gorgon Area gas fields, located between 65 and 130 kilometres off the west coast of Barrow Island.

The Gorgon Project is a joint venture between the Australian subsidiaries of Chevron (approximately 47 percent), ExxonMobil (25 percent), Shell (25 percent), Osaka Gas (1.25 percent), Tokyo Gas (1 percent) and Chubu Electric Power (0.417 percent).

Introduction

About Barrow Island

Barrow Island has been a Class A Nature Reserve since 1910 and is an internationally important conservation estate. Located approximately 60 kilometres off the north-west coast of Western Australia (WA), it is the state's second largest island. Approximately 25 km long by 10 km wide, Barrow Island totals approximately 23,400 hectares above the high-tide mark. The reserve's total area is much greater, however, as it also extends to the low water mark of the intertidal zone.

Barrow Island provides important habitat for flora and fauna, both on the land and below the sea. Above water, Barrow Island's isolation provides a refuge for terrestrial species that are now vulnerable or



Barrow Island. Photo - Chevron



The Materials Offloading Facility and LNG Jetty in construction on the east coast of Barrow Island. Photo - Chevron

threatened on the mainland due to introduced pests. Below the water, the island's marine environment consists of a mosaic of habitat types that support a diversity of marine life.

While Barrow Island is important from an environmental perspective, it is also home to Australia's largest onshore operating oilfield and the location of the Gorgon Project, one of the world's largest natural gas processing facilities. Chevron, operator of both the oilfield and the Gorgon Project, is proud of its environmental reputation and performance on Barrow Island. Environmental management of the island is widely recognised as a benchmark for the successful coexistence of industry and biodiversity.

Lying within the Pilbara Offshore Marine Bioregion, Barrow Island is located on the Rowley Shelf, a large, shallow, submarine limestone



Sea turtles along the west coast of Barrow Island. Photo - Chevron

shelf extending up to 80 km from the west Pilbara coast. The state waters around Barrow Island are part of the Montebello/ Barrow Island Marine Conservation Reserves (with the exception of the Barrow Island Port Area on the east coast). In the waters directly surrounding Barrow Island there are two categories of marine reserve: the Barrow Island Marine Management Area, which includes a conservation area to protect benthic fauna and seabirds at Bandicoot Bay to the south and the Barrow Island Marine Park, a Sanctuary Zone on the west coast to protect a significant fringing reef and turtle breeding area.¹

The waters around Barrow Island support a diverse array of tropical and subtropical marine fauna. Two major currents, the Leeuwin Current and the Indonesian Through-flow Current, have a strong influence on species distribution, recruitment and biological productivity in these waters.¹

A variety of oceanographic and physical conditions occur in the



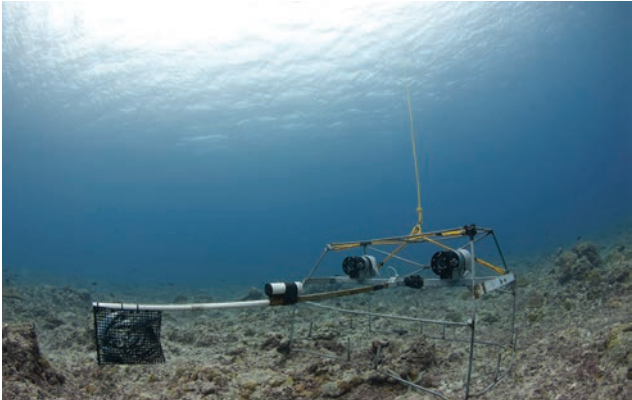
Coral gardens off the Pilbara coast. Photo - Alexia Jankowski

region, supporting an array of marine benthic habitats including seagrass, coral reef, macroalgal meadows, invertebrate filter feeding communities and soft sediments.^{1,2} These in turn support a diversity of marine fauna, with a number of reefs and coral communities recognised as regionally significant.²

At least 196 species of hard corals, 380 fish, 316 molluscs, five types of seagrass and 99 species of macroalgae have been recorded in the Barrow Island region.^{3,1} Four species of marine turtle nest on Barrow Island, with the Flatback Turtle and Green Turtle the most common.²

Comprehensive marine baseline studies and monitoring programs have been conducted off the coast of Barrow Island since 2008. These aim to describe marine ecosystems in the region and help Chevron understand and interpret change in this complex marine environment.

As part of these studies, fish populations surrounding Barrow



A Stereo-BRUVS. Photo - Steve Lindfield

Island were surveyed repeatedly through time using baited remote underwater stereo-video systems (Stereo-BRUVS) developed by ES Harvey and MR Shortis.⁴ A bait-filled bag is suspended in front of two synchronised, high definition cameras to attract nearby fish and capture them on stereo video. This technique gathers information on species richness, fish abundance and fish length in a non-destructive, cost-effective manner. Many reef fish species are habitat dependent and therefore sensitive to activities that may cause changes to specific habitats within the marine environment. For this reason, fish can indicate changes in ecosystem health and are an important component of Chevron's marine monitoring programs.

Fishes of the Barrow Island region

The Montebello/Barrow region supports a rich diversity of fish fauna. The composition and diversity is strongly influenced by seasonal processes, tidal regimes, turbidity and the diversity of available habitats in these waters.⁵



Coral monitoring transects off Barrow Island. Photo - Chevron

Most species exhibit wide distributions throughout the Indo-West Pacific region,⁶ with local species composition closely resembling that of the Dampier Archipelago.⁷ Due to the southward flow of the Leeuwin Current, the Dampier Archipelago, along with other outer reef systems, are thought to provide an important source of recruits for reefs down-current in the Montebello/Barrow Islands region.⁶ Similarly, the Montebello/Barrow Islands region may act as an important source of recruits for locations further south.⁶

There are up to 37 species of fishes in the Barrow Island area that are protected under State and Commonwealth legislation including the *Western Australian Fish Resources Management Act 1994* (FRM Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Protected species include, but are not limited to, the Potato Cod (*Epinephelus tukula*), all species of sawfish (*pristids*), the Double-headed Maori Wrasse (*Cheilinus undulatus*) and all seahorses, pipefish and seadragons (syngnathids and solenostomids).^{1,8}



Chromis sp. sheltering in coral. Photo – Alexia Jankowski

In addition, numerous commercial and recreationally important fish species such as Spangled Emperor (*Lethrinus nebulosus*) and Bar-cheeked Coral Trout (*Plectropomus maculatus*) occur around Barrow Island.³

A total of 967 Stereo-BRUVS have been deployed off Barrow Island as part of Baseline and Post-Development Monitoring Programs, recording over 76,000 individual fish from 380 different species. The results reveal fish species associate strongly with individual habitat types. Coral habitats supported the most diverse fish community, comprising, among others, many species of damselfish (Pomacentridae), parrotfish (Scaridae), snappers (Lutjanidae), and groupers (Serranidae).³

Macroalgal habitats were considered important nursery areas for a diverse range of fish species, such as emperor (Lethrinidae) threadfin bream (Nemipteridae), tuskfish (Labridae) and trevally (Carangidae). Sand and sessile invertebrate habitats were dominated by a similar



School of Golden Trevally (*Gnathanodon speciosus*). Photo - Stereo-BRUVS footage

diversity of species such as emperor (Lethrinidae) and threadfin bream (Nemipteridae), but also included goatfish (Mullidae), small leatherjackets (Monacanthidae) and toadfish (Tetraodontidae).³

After dredging and dredge spoil disposal activities associated with the construction of the Materials Offloading Facility and LNG Jetty ceased off the east coast of Barrow in 2011, Post-Development Surveys were undertaken annually to investigate the state of the marine environment surrounding the island. The most recent monitoring program was completed in 2014 and this booklet describes some of the fish species most commonly observed during the Stereo-BRUVS surveys (observed most frequently on camera drops). Common sharks and rays in the waters surrounding Barrow Island are also included.



Lemon Damselfish (*Pomacentrus moluccensis*). Photo - Peter Michael

This marine fishes booklet is part of a series of nature books developed by Chevron Australia to create understanding of the diverse and interesting wildlife that exists on Barrow Island and in the surrounding marine environment.

Understanding this book

The following symbols have been created to provide quick information about the species or group of fish.



A species or group of fish targeted by commercial and/or recreational fisheries.



A poisonous species or group of fish: exercise caution when consuming.



A venomous species or group of fish.

The abbreviation spp. and sp. refers to multiple species and a single species respectively within a genus.

The conservation status, or vulnerability of a species, has been provided for species targeted by recreational fisheries, as well as internationally vulnerable or threatened species.

Family: Scombridae

Mackerel



Description

Mackerel were viewed on 59% of Stereo-BRUVS deployed and were the most common fish surveyed. A large, predatory and transient fish family representing two genera (*Scomberomorus* spp. and *Grammatorcynus* sp.) and five species: Spanish Mackerel (*S. commerson*), School Mackerel (*S. queenslandicus*), Spotted Mackerel (*S. munroi*), Grey Mackerel (*S. semifasciatus*) and Shark Mackerel (*G. bicarinatus*). Mackerel are strong swimmers that grow on average to between 100 and 200 cm.⁹ During the surveys the largest mackerel recorded was 148 cm.

Distribution

Mackerel species have a relatively wide distribution. Of those species that occur around Barrow Island, one occurs in Australian waters only (Shark Mackerel), several occur in northern Australia and southern New Guinea waters (Grey Mackerel, School Mackerel and Spotted Mackerel) and one occurs throughout the broader Indo-West Pacific region (Spanish Mackerel).⁹

Preferred Habitat

Mackerel are pelagic¹⁰, living near the surface or middle depths of the ocean. During the Post-Development Surveys, they were one of the top ten most commonly observed fish across all marine habitats around Barrow Island.

Behaviour and Ecology

Many species undertake annual migrations over hundreds of kilometres.⁹

Conservation Status

Moderate vulnerability.¹⁰

Mackerel are an important commercial species and are also highly prized by recreational fishers. The minimum recreational catch size limits for mackerel in Western Australia vary depending on the species. Please check with the Western Australian Department of Fisheries for the minimum length and bag limits that apply for each species.



Mackerel species
Photo - Dave Gull

Family: Labridae

Moon Wrasse

(*Thalassoma lunare*)



Description

Labridae were one of the most commonly observed families in Barrow Island waters using the Stereo-BRUVS method. One species of wrasse, the Moon Wrasse (*Thalassoma lunare*) were observed at around 23% of camera deployments and are distinguished by their dark green body, bright magenta markings on the pectoral fins and head and vertical magenta stripes on the body.^{9,11} Dramatic colour changes can occur in many wrasse species as they mature from juveniles to adults.⁹

Distribution

Wrasse inhabit tropical coral reefs and warm temperate seas worldwide.⁹ The Moon Wrasse is one of the most widespread reef fish in the southern hemisphere.¹²

Preferred Habitat

Moon Wrasse can be found in habitats such as coral reefs, rocky reefs and lagoons.¹³ During the surveys, this species was most commonly observed in coral habitat.

Behaviour and Ecology

Moon Wrasse may be solitary or live in groups.¹⁴ The majority of their diet consists of small invertebrates living on the sea floor and fish eggs.¹⁵

Wrasse (Labridae) are the second largest family of reef fishes in the world, with an estimated 500 species globally. They range in length from six centimeters (e.g Whitebanded Sharpnose Wrasse *Wetmorella albobasciata*)¹⁶ to more than two metres (Humphead Maori-Wrasse) and live in a range of habitats and depths.⁹



Moon Wrasse (*Thalassoma lunare*), lower right
Photo - Peter Michael

Family: Labridae

Tuskfish

(*Choerodon* spp.)



Description

A number of tuskfish species were observed in Barrow Island waters including the Blue Tuskfish (*Choerodon cyanodus*), Blackspot Tuskfish (*Choerodon schoenleinii*) and Bluespotted Tuskfish (*Choerodon cauteroma*). These species range in maximum size from around 36 cm (Bluespotted Tuskfish) to 80 cm (Blackspot Tuskfish).⁹

Distribution

The Blue Tuskfish is only found in northern Australia and the Bluespotted Tuskfish is only found in the north west of Western Australia.⁹ The Blackspot Tuskfish is found throughout the Indo-West Pacific region.¹¹

Preferred Habitat

Tuskfish are demersal¹⁰, living on or near the ocean floor and inhabiting reefs or flat bottoms (Blue Tuskfish), or sandy areas adjacent to reefs (Blackspot and Bluespotted Tuskfish).¹⁶ The Blue Tuskfish was the most commonly observed fish species within coral habitats, observed in the majority of all camera deployments in coral habitat. Other tuskfish species were also commonly observed in both coral and macroalgal habitats.

Behaviour and Ecology

Tuskfish feed on hard-shelled prey such as molluscs, crustaceans and sea urchins.¹¹ Tuskfish have been observed using tools such as rocks to crush or crack open bivalves before consuming them.¹⁷

Conservation Status

Long-lived and slow growing resulting in a high vulnerability to overfishing.¹⁰

There is a minimum recreational catch size and bag limit in Western Australia for tuskfish. Please check with the Western Australian Department of Fisheries for the minimum length and bag limits that apply for each species.



Blackspot Tuskfish (*Choerodon schoenleinii*)
Photo - Peter Michael

Family: Carangidae

Trevallies



A number of Trevally species were observed frequenting Barrow Island waters including the Gold-Spotted Trevally (*Carangoides fulvoguttatus*), Golden Trevally (*Gnathanodon speciosus*) and Bludger Trevally (*Carangoides gymnostethus*).

Gold-Spotted Trevally

(*Carangoides fulvoguttatus*)

Description

Oval-shaped trevally with gold or brassy spots along the upper sides and back with the spots usually forming four to five rough bands.¹⁸ Also known as the Yellow-Spotted Trevally.¹⁸ Grows to 130 cm⁹ and 18 kg.¹⁹

Distribution

Coastal waters throughout the Indo-West Pacific region.⁹

Preferred Habitat

Trevally are pelagic¹⁸, living near the surface or middle depths of the ocean. During the surveys, Gold-Spotted Trevally were commonly observed in seagrass and coral habitats as well as in sandy areas inhabited by invertebrates such as sea whips, sponges and soft corals.

Behaviour and Ecology

Adults are observed both singly as well as in large schools.^{16, 20, 14} Diet includes small invertebrates and fish.²¹

Conservation status

Moderate vulnerability¹⁰



Gold-Spotted Trevally (*Carangoides fulvoguttatus*)
Photo - Peter Michael

Family: Carangidae

Golden Trevally

(Gnathanodon speciosus)



Description

Distinguished by a golden belly or underside and large fleshy lips⁹, this species reaches a maximum length of 120 cm²² and 15 kg⁹.

Distribution

Coastal and offshore waters throughout the Indo-East Pacific region.⁹

Preferred Habitat

As with other trevally species, Golden Trevally are pelagic, living near the surface or middle depths of the ocean and usually near reefs.⁹ A total of 2095 individual Golden Trevally were recorded during the surveys. They were the most abundant species observed in seagrass habitats and were also seen in large numbers frequenting sand and coral habitats.

Behaviour and Ecology

Golden Trevally feed on small fish and can also often be observed foraging head-down for crustaceans and invertebrates in the sand.^{16, 14}

Conservation Status

Moderate vulnerability.¹⁰

Many trevally species form schools and display piloting behaviour, closely following sharks and large fish to gain protection from potential predators.^{16, 14}



Golden Trevally (*Gnathanodon speciosus*)
Photo - Stereo-BRUVS footage

Family: Nemipteridae

Threadfin Bream

(*Pentapodus* spp.)

Description

Four species of bream in the genera *Pentapodus* have been recorded in the waters off Barrow Island: the Japanese Whiptail (*Pentapodus nagasakiensis*), Northwest Threadfin Bream (*Pentapodus porosus*), Purple Threadfin Bream (*Pentapodus emeryii*) and the Western Butterfish (*Pentapodus vitta*). Adult Purple Threadfin Bream (pictured) are distinguished by long filaments at the tip of each tail (caudal) lobe.⁹ Species range in maximum size from 20 cm (*P. nagasakiensis*)¹⁶ to 35 cm (*P. emeryii*).¹⁴

Distribution

The Western Butterfish has a limited distribution and has only been recorded in Western Australian waters. Northwest Threadfin Bream range from northwestern Australia to southern New Guinea, Purple Threadfin Bream extend from northwestern Australia to Indonesia and the Philippines and the Japanese Whiptail range from northwestern Australia to southern Japan in the South China Sea.^{9,23}

Preferred Habitat

Can be found along coastal reefs around sand/weed areas and rocky rubble bottoms.⁹ During the surveys, the Northwest Threadfin Bream was the most abundant fish species observed in sandy areas and in habitats with high densities of invertebrates such as sea whips, sponges and soft corals. The Western Butterfish was most commonly observed in sand habitats while the Japanese Whiptail and Purple Threadfin Bream were observed almost entirely in macroalgal habitats.

Behaviour and Ecology

Western Butterfish are generally observed in schools⁹, while the Japanese Whiptail, Northwest Threadfin Bream and Purple Threadfin Bream live both solitary and in groups.¹⁴ These four species are carnivorous, feeding on small fish, crustaceans and worms.²³

Northwest Threadfin Bream were the third most abundant fish species recorded during Stereo-BRUVS surveys, with 5171 individual fish recorded.



Purple Threadfin Bream (*Pentapodus emeryii*)
Photo - Peter Michael

Family: Lethrinidae

Emperor

(*Lethrinus* spp.)



Description

Spangled Emperor (*Lethrinus nebulosus*), Grass Emperor (*Lethrinus laticaudis*) and Bluespotted Emperor (*Lethrinus punctulatus*) all frequent the waters surrounding Barrow Island. Most emperor live to at least 15 years, with some species reaching up to 30 years of age.⁹

Distribution

Found throughout the Indonesian and West Pacific region (Spangled Emperor and Bluespotted Emperor) through to south Indonesia, New Guinea and the Solomon Islands (Grass Emperor).⁹

Preferred Habitat

Lethrinus spp. are demersal¹⁰, living on or near the ocean floor, with the three species listed above generally preferring shallow water from 5 to 30m depth.⁹ Emperor inhabit coral reefs, seagrass beds, mangrove habitat and sand and rubble habitats.²⁴ During the surveys, emperor were observed in every habitat, although individual species appeared to favour particular habitats. For example, about 80% of Bluespotted Emperor were observed in macroalgal habitats.

Behaviour and Ecology

Diet consists of small fish and invertebrates such as crabs, shrimps, worms and squid.⁹ Juveniles live in large schools in shallow, sheltered areas moving offshore as they mature, while adults typically are solitary or live in small schools.²⁴

Conservation Status

High vulnerability, long-lived and slow growing.¹⁰

Several species of Lethrinidae including the Spangled Emperor are known as 'protogynous hermaphrodites' - they sexually mature as females before becoming males later in life.⁹



Spangled Emperor (*Lethrinus nebulosus*)
Photo - Stereo-BRUVS footage

Family: Scaridae

Blue-barred Parrotfish

(*Scarus ghobban*)

Description

With a distinctive fused, beak-like mouth, parrotfish scrape algal material from the surface of reef structures.⁹ Male Blue-barred Parrotfish are distinguished by their blue-edged scales, while females appear predominantly yellow with blue spots on the side.⁹ The Blue-barred Parrotfish can reach 100 cm in length and 6.5 kg.⁹ This species is fast growing and lives to around 13 years of age.²⁵

Distribution

Found throughout the Indonesian and East Pacific region.⁹

Preferred Habitat

Common in coral reef areas and around seagrass and algal beds.⁹ During the surveys, the majority (over 55%) of Blue-barred Parrotfish were observed in coral reef habitat.

Behaviour and Ecology

Parrotfishes, like many reef fish, undergo a female to male sex change during their lives and can appear very different in colour during each phase.⁹

Parrotfish play an important role in coral reef ecosystems. By grazing on algae they prevent algal overgrowth on the reef, allowing new corals to settle on the bare rock.²⁵



Blue-barred Parrotfish (*Scarus ghobban*)
Photo - Alexia Jankowski

Family: Serranidae

Coral Trout

(*Plectropomus* spp.)



Description

Coral trout are generally identified by numerous round spots covering the head and body.⁹ Classified within the Rockcod Family (Serranidae), some coral trout species can grow very large. The Common Coral Trout (*Plectropomus leopardus*), for example, reaches around 120 cm and 24 kg²⁶ and has been recorded to live more than 25 years.²⁷ Two species of coral trout exist in the waters off Barrow Island: the Common Coral Trout (*P. leopardus*) and the Spotted Coralgrouper (*Plectropomus maculatus*).

Distribution

The Common Coral Trout and the Spotted Coralgrouper are found throughout north west Western Australia, the Great Barrier Reef and most of South East Asia and the West Pacific.^{9, 28}

Preferred Habitat

Plectropomus species are demersal¹⁰, living on or near the ocean floor within coral reefs habitats. Across all surveys, the majority of coral trout were observed in coral reef (68%) and macroalgal (26%) habitat.

Behaviour and Ecology

Coral Trout feed on fish and invertebrates.²⁹ For around three months each year, depending on the location, adults form large groups during the new moon to spawn.³⁰

Conservation Status

High vulnerability, long-lived and slow growing.¹⁰

The colour of the Common Coral Trout can vary with the time of day, the surrounding habitat and the type of activity.³¹



Common Coral Trout (*Plectropomus leopardus*)
Photo - Peter Michael

Family: Serranidae

Rockcod and Groupers

(*Epinephelus* spp.)



Description

A number of rockcod and grouper species of the genus *Epinephelus* are common in Barrow Island waters. Distinguished by various combinations of irregular blotches, bands and spots, *Epinephelus* species range significantly in size. The Frostback Rockcod (*Epinephelus bilobatus*) grows to 40 cm⁹, the Rankin Cod (*Epinephelus multinotatus*) grows to 100 cm, the Goldspotted Rockcod (*Epinephelus coioides*) grows to 120 cm³², while the Queensland Groper (pictured) can grow over 250 cm and weigh up to 400 kg.⁹

Distribution

The Rankin Cod inhabits coastal waters of Western and north west Australia, the Frostback Rockcod is found from Western Australia north to West Papua, the Goldspotted Rockcod is found throughout the Indo-West Pacific, and the Queensland Groper occurs in the Indo-Pacific region.^{9, 28}

Preferred Habitat

Rockcod are demersal¹⁰, living on or near the ocean floor within inshore coral reefs and nearby sandy areas, with some species also found deeper offshore.⁹ Across all surveys, about 70% of *Epinephelus* sp. individuals were observed in coral reef habitat.

Behaviour and Ecology

Rockcod and groupers are able to change from female to male and some species are known to form dense groups during spawning periods.⁹

Conservation Status

High vulnerability, long-lived and slow growing.¹⁰ The Queensland Groper is classified as Vulnerable internationally and is a protected species in Western Australian waters.³³

A Queensland Groper observed in Barrow Island waters (pictured) was two metres in length. This protected species is the largest bony fish found within coral reef habitats and feeds on spiny lobster, small sharks, juvenile turtles and crustaceans.²⁸



Queensland Groper (*Epinephelus lanceolatus*)
Photo - Stereo-BRUVS footage

Family: Echeneidae

Slender Suckerfish

(*Echeneis naucrates*)

Description

The Slender Suckerfish is easily distinguished by its sharply striped body and flattened head with a sucker-like disc structure on top.⁹ They can grow up to 100 cm in length.¹⁶

Distribution

Located worldwide in temperate and tropical seas.⁹

Preferred Habitat

Inshore reefs as well as deeper offshore waters.³⁴ During the surveys, the majority of Slender Suckerfish were observed in sand and macroalgal habitats.

Behaviour and Ecology

The Slender Suckerfish uses its sucking disc to temporarily attach to a wide range of hosts, from larger fish (such as sharks and rays) to sea turtles and even ships.³⁵ Slender Suckerfish have even been recorded attaching themselves to the limbs of scuba divers. Unlike the majority of remoras, this species is also often observed swimming alone without a host.³⁶ They feed on small fish, parasites attached to the host and scraps from the host's prey.³⁶

Suckerfish have been used by traditional fishermen, who attach a line to the suckerfish before it is released. When it attaches to another fish, the line is retrieved, bringing in both the suckerfish and its host.³⁵



Slender Suckerfish (*Echeneis naucrates*)

Photo - Tammy Gibbs, Western Australian Underwater Photographic Society (WAUPS)

Family: Lutjanidae

Stripey Snapper

(*Lutjanus carponotatus*)



Description

Distinguished by their brightly coloured, yellow striped pattern, Stripey Snapper can live up to 20 years³⁷ and grow to 40 cm.⁹

Distribution

Distributed throughout the Indo-West Pacific region.³⁸

Preferred Habitat

Inhabits nearshore coral reefs in sheltered lagoons, as well as outer reef slopes.⁹ During the surveys, over 80% of Stripey Snapper were observed in coral reef habitat.

Behaviour and Ecology

Snapper are highly active predators feeding on crabs, shrimp, fish, snails and cephalopods.⁹ This species is often observed swimming in schools of 20 to 30 individuals.³⁸

Conservation Status

Moderate vulnerability.¹⁰

Popular with recreational fishers, the Stripey Snapper have a minimum recreational catch size limit in Western Australia. Please check with the Western Australian Department of Fisheries for the minimum length and bag limits for this species.



Stripey Snapper (*Lutjanus carponotatus*)
Photo - Katherine Ross

Family: Lutjanidae

Chinamanfish

(*Symphorus nematophorus*)



Description

Juvenile Chinamanfish are pale orange to brown in colour, with the dorsal fin forming several long filaments.³⁹ Adult Chinamanfish lack distinctive filaments and are an olive, grey-brown to reddish colour.⁹ The largest fish observed in Barrow Island waters was 92 cm and the maximum size recorded for this species is 100 cm.⁴⁰

Distribution

Asia Pacific distribution, mainly found in the Western Pacific region.⁹

Preferred Habitat

Inshore coral reefs, as well as offshore areas to at least 50 m depth.⁹

Behaviour and Ecology

The Chinamanfish is a solitary species and feeds mainly on other fish.⁹

Large individuals are not recommended for eating as they have been known to cause ciguatera poisoning.¹⁰ The toxin involved is cumulative, which means the largest fish can be the most toxic.⁹



Chinamanfish (*Symphorus nematophorus*)
Photo - Stereo-BRUVS footage

Family: Acanthuridae

Inshore Surgeonfish

(*Acanthurus grammoptilus*)

Description

Easily distinguished by their uniformly dark colour and pale, crescent-shaped marking at the base of the tail.⁹ Like many other surgeonfish species, the Inshore Surgeonfish has a sharp spine on either side of the tail's base.⁹ A total of 789 individual fish were counted during the surveys.

Distribution

Western Pacific, northern Australia, Indonesia and the Philippines.⁴¹

Preferred Habitat

During the surveys, Inshore Surgeonfish were abundant in coral reef habitats. They also frequent rocky reefs⁹ and silty inshore areas.¹⁶

Behaviour and Ecology

Inshore Surgeonfish can be observed swimming in large schools, grazing widely on algae growing on reef substrate.⁹

The common name 'surgeonfish' is due to the sharp spines at the base of the tail that are shaped like a surgeon's scalpel and are used by the fish as a defensive weapon.⁹



Inshore Surgeonfish (*Acanthurus grammoptilus*)
Photo - Alexia Jankowski

Family: Pomacentridae

Damselfish

Description

A total of 22 species of damselfish from the family Pomacentridae were observed during the surveys, with the Brown Demoiselle (*Neopomacentrus filamentosus*) the most abundant. Other species observed include the Staghorn Damselfish (*Amblyglyphidodon curacao*) and the Bengal Sergeant (*Abudefduf bengalensis*). Damselfish range in colour and size and a number have different coloured juvenile life stages.⁹

Distribution

Most damselfish inhabit the tropics, but a number live in cooler temperate regions.⁹ The Staghorn Damselfish is found predominantly in the West Pacific region and the Bengal Sergeant in the Indo-West Pacific region, while the Brown Demoiselle is found from the Indo-Australian Archipelago south to Shark Bay.⁹

Preferred Habitat

Damselfish inhabit a wide range of inshore and outer reef environments. The Brown Demoiselle, for example, favours inshore coral reefs and shallow, protected lagoons whilst the Staghorn Damselfish prefers reef passages and outer reefs.⁴²

Behaviour and Ecology

Many damselfish are highly territorial, defending their territory against intruders. They form pairs during breeding and males guard eggs that are laid in nests within coral branches or on the sea floor.⁹

Damselfish with dull colours of brown, black and grey mainly feed on algae or detritus, whereas colourful or brightly patterned species generally eat plankton.⁹



Staghorn Damsel fish (*Amblyglyphidodon curacao*)
Photo - Peter Michael



Bengal Sergeant (*Abudefduf bengalensis*)
Photo - Peter Michael

Family: Sphyrnidae

Great Hammerhead

(*Sphyrna mokarran*)

Description

This shark is distinguished by its tall, pointed, sail-like dorsal fin and by the flat front edge of its head.⁹ The largest Great Hammerhead observed during the surveys was around 290 cm; however this species can grow to over 610 cm in length.⁹

Distribution

Globally distributed throughout warm temperate and tropical seas.⁹

Preferred Habitat

Found both close inshore and far offshore⁹, this species is generally associated with reef habitats up to 80 m deep.⁴³

Behaviour and Ecology

Great Hammerhead are considered a highly migratory species.⁴⁴ They feed predominantly on stingrays, grouper, squid and lobster as well as bony fish and other sharks.^{45, 46, 47}

Conservation Status

Classified as Endangered, the Great Hammerhead is targeted by shark finning operations in waters surrounding Asia, West and Southeast Africa and the northwest Atlantic due to the large size of its fins. It is also taken as bycatch (caught unintentionally during commercial fishing activities).⁴⁴

Hammerhead sharks use electric sense organs in their head to detect electric fields emitted by other animals and locate their prey on the sea floor.⁴⁸



Great Hammerhead (*Sphyrna mokarran*)
Photo - Stereo-BRUVS footage

Family: Carcharhinidae

Reef Sharks

Description

A number of reef shark species are found in Barrow Island waters including the Grey Reef Shark (*Carcharinus amblyrhynchos*), Blacktip Reef Shark (*Carcharhinus melanopterus*) and the Whitetip Reef Shark (*Triaenodon obesus*). Grey Reef Sharks can grow to 255 cm in length and are distinguished by a thick, black margin on the end of their tail.⁹ Blacktip and Whitetip Reef Sharks grow to about two metres and can be identified by either white or black (margined with white) coloured tips on their fins.⁹ Grey and Whitetip Reef Sharks live to about 25 years.^{47,49} Female Blacktip Reef Sharks live to 15 years whereas males live to 10 years.⁵⁰

Distribution

Whitetip and Blacktip Reef Sharks are found throughout the Indo-Pacific Region while Grey Reef Sharks are distributed globally.⁹

Preferred Habitat

All three reef shark species are generally associated with coral reef habitats. Grey Reef Sharks are most commonly encountered on the outer edge of reefs close to drop-offs.⁹

Behaviour and Ecology

Blacktip and Grey Reef Sharks must swim constantly, passing water and oxygen over their gills in order to breathe. In contrast, Whitetip Reef Sharks can pump water over their gills to breathe and can be observed resting on the sea floor or under rock ledges.

Conservation Status

The Grey Reef Shark, Blacktip Reef Shark and Whitetip Reef Shark are not target of recreational or commercial fisheries in Australia, however all three species are considered Near Threatened as a result of international fishing pressure.⁷²

The Grey Reef Shark is considered dangerous while Whitetip and Blacktip Reef Sharks are usually harmless unless cornered.⁹



Grey Reef Shark (*Carcharinus amblyrhynchos*)
Photo - Tammy Gibbs, Western Australian Underwater
Photographic Society (WAUPS)



Blacktip Reef Shark
(*Carcharhinus melanopterus*)
Photo - Alexia Jankowski



Whitetip Reef Shark
(*Triaenodon obesus*)
Photo - Alaina Varr

Family: Carcharhinidae

Tiger Shark

(*Galeocerdo cuvier*)

Description

During the surveys, the largest fish measured was a Tiger Shark with a total length of 290 cm. Distinguished by a blunt nose and vertical stripes that fade slightly in adults⁹, the Tiger Shark commonly grows to a length of 500 cm⁵¹ and a weight of 520 kg⁹, however a maximum length of 750 cm⁵² and weight of over 800 kg⁵³ has been recorded. Tiger Sharks can live to 50 years.⁵⁴

Distribution

Globally distributed in temperate and tropical seas.⁹

Preferred Habitat

The Tiger Shark has been observed in deep water, well offshore near continental shelves⁹, however it is not considered an oceanic species as it also frequents nearshore lagoons and coral reefs and generally lives close to the sea floor.^{45, 43}

Behaviour and Ecology

Tiger Sharks are top-order predators and consume a wide range of prey including stingrays, other sharks, turtles, fish, sea birds, seals, sea snakes and dugong. They are also scavengers and have been known to consume inedible objects such as rubbish they encounter on the sea floor.⁵⁵

Conservation Status

Tiger Sharks have declined in number by 60 to 70% over the past 15 years, and are considered Near Threatened due to overfishing globally.⁷²

A total of 31 Tiger Sharks were recorded in waters surrounding Barrow Island during the surveys.



Tiger Shark (*Galeocerdo cuvier*)
Photos - Stereo-BRUVS footage

Family: Carcharhinidae

Lemon Shark

(*Negaprion acutidens*)

Description

Unlike many other shark species, the Lemon Shark has two almost equal-sized dorsal fins.⁹ It is yellow to brown in colour with a short nose and stocky body.⁹ The largest Lemon Shark measured during the surveys was 224 cm, however they can grow to a maximum length of 380 cm.²¹

Distribution

Lemon Sharks are located throughout the Indo-West Pacific region.⁹

Preferred Habitat

Lemon Sharks are generally associated with coral reef habitats and in tropical shallow inshore and offshore areas including lagoons and reef flats.^{56, 57} During the surveys, the majority of Lemon Sharks were observed in macroalgal (70%) and coral (24%) habitats.

Behaviour and Ecology

Lemon Sharks feed on stingrays, bony fish and other small sharks.⁵⁸ They are generally considered harmless to divers unless provoked.⁴⁵

Conservation Status

Lemon Shark are considered Vulnerable due to heavy fishing pressure and the destruction of coral reef habitat outside Australian waters.⁴⁵

A total of 38 Lemon Sharks were recorded in waters surrounding Barrow Island during the surveys.



Lemon Shark (*Negaprion acutidens*)
Photo - Stereo-BRUVS footage

Family: Hemiscylliidae

Grey Carpet Shark

(*Chiloscyllium punctatum*)

Description

The Grey Carpet Shark, also known as the Brown-banded Bamboo Shark, grows to a maximum length of 120 cm.⁵⁹ Grey to brown in colour when adults, they are marked with strong, banded patterns along the body as juveniles.⁹ Barbels (sensory projections) on the snout are distinguishing features of this small shark.⁹

Distribution

Grey Carpet Sharks are found throughout the Indo-West Pacific region.⁴⁵

Preferred Habitat

Carpet sharks are generally associated with shallow, inshore coral reef habitats and tide pools.⁴⁵

Behaviour and Ecology

This harmless shark hunts predominantly at night for a range of benthic invertebrates and small fish.⁶⁰

Conservation Status

Grey Carpet Shark are considered Near Threatened internationally due to fishing pressure and habitat destruction outside Australian waters.⁷²

Grey Carpet Sharks are able to survive out of water for up to 12 hours, allowing them to survive in tidal pools and on reef flats at low tide.⁴⁵



Grey Carpet Shark (*Chiloscyllium punctatum*)
Photo - Stereo-BRUVS footage

Family: Stegostomatidae

Zebra Shark

(*Stegostoma fasciatum*)

Description

Zebra Sharks are distinguished by horizontal ridges along their sides and a top (caudal) tail fin almost the length of the entire body.⁶⁰ Adults are yellow to brown with dark spots, while juveniles are black with pale bands and spots.^{9,58} This species can grow up to 350 cm in length.⁹

Distribution

Located in tropical waters throughout the Indo-West Pacific region.⁹

Preferred Habitat

Zebra Sharks are generally associated with coastal and offshore coral reef habitats.⁹

Behaviour and Ecology

Commonly observed resting on the sea floor, these sharks feed on molluscs, crustaceans, small fish and sea snakes.^{61,62}

Conservation Status

Zebra Sharks are considered Vulnerable internationally due to heavy fishing outside Australian waters.⁷²

Zebra Sharks are slow-swimming and sluggish during the day and generally considered harmless.^{45,9} The common name 'Zebra' is derived from the appearance of juveniles which have distinct vertical stripes. This species is also occasionally referred to as 'Leopard Shark' based on the spotted adult colouration.



Zebra Shark (*Stegostoma fasciatum*)
Photo - Stereo-BRUVS footage

Family: Myliobatidae

White Spotted Eagle Ray

(Aetobatus ocellatus)



Description

The White Spotted Eagle Ray has a dark green-grey coloured, diamond-shaped body with white spots across the dorsal surface, a flattened snout and a long tail.⁶³ This species reaches a maximum length of 150 cm, including the tail.⁶³

Distribution

The White Spotted Eagle Ray is distributed throughout tropical and subtropical areas of the Indo-West Pacific region.⁶⁴

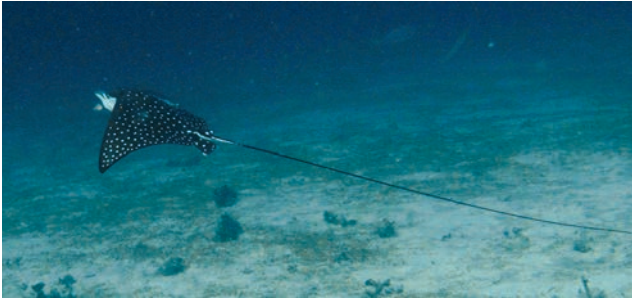
Preferred Habitat

This species of ray is benthopelagic⁶⁵, living and feeding near the sea floor as well as in mid-water or near the surface. This species is generally associated with coral reef habitats and found at depths of up to 100 m.^{63, 65}

Behaviour and Ecology

The White Spotted Eagle Ray can be observed digging in the sand for prey such as shellfish, crabs and worms.⁶³ Usually solitary, this species can also occur in schools of hundreds of individuals.⁶³

The White Spotted Eagle Ray has up to six venomous spines at the base of the tail.^{63, 64}



White Spotted Eagle Ray (*Aetobatus ocellatus*)

Photo - Stephen Grail, Western Australian Underwater Photographic Society (WAUPS)

Family: Rhinobatidae

White Spotted Guitarfish

(*Rhynchobatus australiae*)



Description

Distinguished by a sharply pointed head and white spots along the body, this species grows to a length of at least 300 cm and weighs up to 220 kg.⁶⁶ In total, 62 Individuals were recorded during the surveys, the largest of which measured 267 cm.

Distribution

Found in the Indo-West Pacific from the Gulf of Thailand and the Philippines to northern Australia.⁶⁷

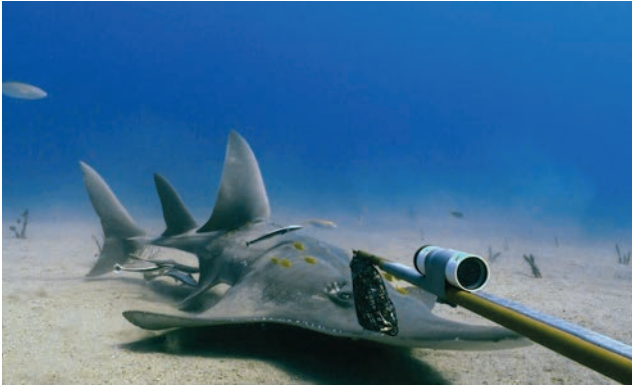
Preferred Habitat

The White Spotted Guitarfish is demersal, living and feeding near the sea floor.⁵⁹ It prefers sandy bottomed habitats near coral reefs.⁵⁹

Behaviour and Ecology

Very little is known about the biology and ecology of this species. Records show that the White Spotted Guitarfish feeds predominantly on crabs and shellfish.⁶⁷

This species is classified as Vulnerable. It is highly sought after in South East Asia for its fins and is one of the most commonly caught elasmobranchs (sharks and rays) in the bycatch of trawl fisheries in the Northern Territory.⁶⁸



White Spotted Guitarfish (*Rhynchobatus australiae*)
Photo - Stereo-BRUVS footage

Family: Dasyatidae

Fantail Rays

(*Taeniura* spp.)



Description

Both the Blotched Fantail Ray (*Taeniura meyeni*) and the Bluespotted Fantail Ray (*Taeniura lymma*) were occasionally observed in Stereo-BRUVS footage in Barrow Island waters. As their names suggest, both are distinguished by tails ending in a distinct fan shape. The Blotched Fantail Ray is round in shape with dense, dark blotches and spots and grows to a total length of 330 cm.⁹ The Bluespotted Fantail Ray is kite-shaped with bright blue spots and grows to a total length of 70 cm.⁹

Distribution

Both species are found throughout the Indo-West Pacific region.⁹

Preferred Habitat

Sandy sea floor habitats in close proximity to coral reefs.⁹

Behaviour and Ecology

The Blotched Fantail Ray is solitary and can be observed swimming with cobia or other schools of fish.⁶⁹ The Bluespotted Fantail Ray moves in groups into shallow areas during the high tide to feed on worms, shrimps and crabs.⁶⁰

Both species of fantail ray have between one and two venomous spines on their tails and are considered dangerous.⁹



Blotched Fantail Ray (*Taeniura meyeni*)
Photo - Stereo-BRUVS footage



Bluespotted Fantail Ray (*Taeniura lymma*)
Photo - Alexia Jankowski

Family: Dasyatidae

Bluespotted Maskray

(Dasyatis kuhlii)



Description

The Bluespotted Maskray is distinguished by a mask-like band across the eyes, a grey to brown coloured body and blue and black spots across the back. This small ray grows up to 70 cm.⁹

Distribution

Found throughout the Indo-West Pacific region.⁹

Preferred Habitat

Sandy sea floor habitats in close proximity to coral reefs.⁹

Behaviour and Ecology

The Bluespotted Maskray is solitary and can be observed burying itself in the sand with only its eyes exposed or swimming in shallow lagoons at high tide searching for crabs and shrimps.^{47, 58}

This ray usually has one to two venomous spines on the tail and is considered dangerous.⁶⁶



Bluespotted Maskray (*Dasyatis kuhlii*)
Photo - Alaina Varr

Family: Dasyatidae

Black Stingray

(*Dasyatis thetidis*)



Description

The Black Stingray is grey-black in colour with a pale underside and short thorns on the dorsal surface and along the tail.⁷⁰ The tail is thick-based and much longer than the body, with two venomous spines with the potential to inflict serious wounds.⁵⁸

Distribution

The Black Stingray is distributed within the Indo-West Pacific region, temperate and subtropical Australia, as well as New Zealand and South Africa.⁶⁰

Preferred Habitat

Inshore lagoons and coral reefs as well as offshore to depths of over 400 m.⁷⁰

Behaviour and Ecology

The Black Stingray is found on sandy bottoms and feeds predominantly on crabs, shrimps, bivalves and worms.⁵⁸

The Black Stingray is one of the largest species of stingrays in Australia, growing to a total length of 400 cm⁹ and weighing over 200 kg.⁷¹



Black Stingray (*Dasyatis thetidis*)
Photo - Stereo-BRUVS footage

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