

# New fish records for Christmas Island, Indian Ocean (2002-2008).



## Report to Parks Australia Christmas Island May 2008

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Cover images are Christmas Island new records: redfin butterflyfish (*Chaetodon lunulatus*) and silky shark (*Carcharhinus falciformis*). Cover images by JP Hobbs and Justin Gilligan ©.



**Abstract:** 592 fish species have been recorded previously from Christmas Island. Underwater observations in 2002, 2005 and 2008 revealed 15 new fish records. Surveys were carried out on all four coasts and focussed on shallow water habitats (0-70 m). The new records span 9 families and include pelagic and reef species from a range of body sizes, habitats and geographic distributions. Many new records are rare in abundance (possibly vagrants) or occur in discrete habitats or locations. A large proportion of new records were found in Flying Fish Cove, in addition to two undescribed coral gobies that require further investigation. The observation of a lone rabbitfish is notable because no other rabbitfishes (family Siganidae) have been recorded from the Island. The 15 new records increase the total number of fish species recorded at the Island to 607. However, one previously recorded species, the harlequin or longnose filefish, was noticeably absent and may have gone locally extinct. More new records are likely in the future, particularly in deepwater habitats (>70 m).

**Introduction:** Christmas Island (10°30' S, 105°40' E) is an isolated oceanic island located approximately 2600 km northwest of Perth, and 360 km south of Java. Although the Island is located in the Indian Ocean, it is situated on the western edge of the Western Pacific marine biogeographic region. Consequently, the marine faunal assemblage largely resembles the tropical Indo-West Pacific with only a small proportion of Indian Ocean species (Allen *et al.*, 2007). The Island is bounded by narrow coral reef system that extends 20 - 100 m from the shoreline, seaward of which the reef drops rapidly to depths of 5000 m (Allen *et al.*, 2007).

592 species of tropical fish have been recorded from the Island, most of which inhabit the shallow (0–20 m) coral reef surrounding the Island (Allen *et al.* 2007). Most of these species were recorded by Gerald Allen and Roger Steene during expeditions to the Island in 1978, 1986, 1987 and 2006 (Allen *et al.*, 2007). Despite these expeditions, there are still many areas of Christmas Island that have not been surveyed. The aim of this study was to conduct an island-wide survey of the fish fauna of Christmas Island in an attempt

to identify new records. Special attention was given to previously unsurveyed sites and habitats.

**Methods:** The fish fauna of Christmas Island were surveyed during a series of trips: December 2002, April – June 2005, February and April, 2008. Surveys were conducted on all 4 coasts (north, south, east and west) of the Island. Due to the prevailing south-easterly winds and south swells, more surveys were conducted on the northern and western half of the Island. Reef fishes were surveyed using underwater observations made whilst snorkelling in the shallow waters (0–5 m) and SCUBA diving in deeper waters (5–70 m). Species were only recorded where visual identification was certain.

**Results:** 15 new fish records from 9 families were observed at Christmas Island on fieldtrips in 2002, 2005 and 2008 (Appendix 1). The new records cover a broad range of fish from a variety of habitats including pelagic fishes (silky shark), shallow (e.g. damselfish and butterflyfish), and deepwater reef fishes (angelfish). Fishes from a variety of sizes were recorded, ranging from the silky shark (2 m) down to fish as small as 4 cm (Andaman damsel). The new records comprise fishes with different geographic distributions such as: Pacific Ocean species whose range now extends westward to Christmas Island (e.g. redfin butterflyfish), Indian Ocean species whose range now extends eastward to Christmas Island (e.g. Indian Ocean mimic surgeonfish), widespread Indo-Pacific species (e.g. flowery cod), worldwide species (e.g. silky shark) and species with restricted ranges (e.g. Andaman damselfish).

**Discussion:** Allen *et al* (2007) estimated 592 fish species have been recorded at Christmas Island. The 15 new records reported in this study increase the total number of fish species to 607. The new records are a cosmopolitan group covering a range of families, body sizes, habitats and geographic distributions.

Some of the new records are abundant and their populations are well established, but they have only been discovered recently at the Island because their habitat had not been surveyed. However, the majority of new records, particularly those inhabiting shallow waters or are easily recognisable, were not discovered previously because they are rare. Some of these rare species are likely to be vagrants that have only recently colonised the

Island. For example, the entire family of rabbitfishes is noticeably absent from the Island, but one individual was seen. For rare species, establishing a population may be difficult if they are unable to locate a mate. A scarcity of partners may lead rare species to interbreed with a more common, closely-related species, as appears to be the case with *Chaetodon lunulatus* (Appendix 1).

A high proportion of new records were observed in Flying Fish Cove. More dives were done at this location, however the abundance of new records is probably due to its unique habitat rather than greater sampling intensity. Flying Fish Cove is the most sheltered location with a relatively wide reef flat, large sandy areas and the coral community differs to the rest of the island. The difference in habitat is reflected in the uniqueness of the fish community with numerous fishes only occurring in the Cove. Many of the new records are species that prefer sheltered environments, and therefore its not surprising that they are first observed at the Cove. Although the Cove provides a sheltered environment, it is not lagoonal and therefore new records (such as rabbitfish and flowery cod) that prefer lagoonal habitats at some stages of their life will find it difficult establishing populations. Rabbitfishes and flowery cod are present in greater abundance at Cocos (Keeling) Islands, which is more isolated than Christmas Island, but has an extensive lagoon. This indicates that lagoonal species are able to disperse to Christmas Island but have difficulty establishing populations due to the absence of a lagoon.

In contrast to the new records, one species, the harlequin or longnose filefish (*Oxymonacanthus longirostris*), appears to have gone locally extinct at Christmas Island. This conspicuous shallow-water fish was recorded by Gerry Allen and Roger Steene during their earlier surveys and was listed as rare (Allen *et al*, 2007). Despite intensive surveys in 2002, 2005 and 2008 we were unable to locate this species, and local divers have not seen this species for over 5 years. The harlequin filefish feeds on *Acropora* corals, particularly branching morphologies, and these corals are currently in low abundance at Christmas Island. Habitat loss (e.g. due to coral bleaching) has led to severe declines and local extinctions of this sensitive species in other locations (Kokita and Nakazono, 2001; Graham *et al*, 2006) and is the most likely explanation for its decline and apparent extinction at Christmas Island.

Further habitat loss is likely as key threats, such as coral bleaching and disease, are expected to increase in the future (Hoegh-Guldberg 1999; Sheppard 2003; Hughes *et al*, 2003; Bruno *et al*, 2007). Ongoing monitoring is required to document declines or local extinctions of fishes in response to increased habitat loss. While some species may disappear from the Island in the future, new records are inevitable, especially from deepwater habitats (>70 m) and through the arrival of vagrants from distant locations.

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**Appendix 1:** New fish records from Christmas Island based on underwater observations during fieldtrips made in 2002, 2005 and 2008. Numbers and asterisks follow Allen and Smith-Vaniz, 1994 \* = also known from Cocos (Keeling) Islands; “1 = widespread Indo-Pacific or Indo-west Pacific; 2 = West Pacific species that reach their western distributional limit at Cocos (Keeling) [or Christmas Island]; 3 = Indian Ocean species (may include western extremity of west Pacific); 4 = Circumtropical or cosmopolitan; 5 = uncertain extralimital distribution.” Information on geographic ranges is based on Allen and Smith-Vaniz, 1994; Allen *et al*, 1998, Kuitert and Debelius, 2006, Allen *et al*, 2007 and Froese and Pauly, 2007.

### **Carcharhinidae - Requiem sharks**

Silky shark

4 \**Carcharhinus falciformis*

Frequently encountered off the northeast coast in 2008. Observed swimming up to the surface from deepwater off the reef dropoff, and in open water (> 1000 m) particularly in the vicinity of bait schools. Worldwide distribution.

### **Chanidae - Milkfishes**

Milkfish

1 \**Chanos chanos*

Seven individuals observed in 2008 in 10 m depth on the reef crest in front of the casino, approximately 200 m northwest of Ethel Beach. Another individual seen at similar depth at the Million Dollar Bombie dive site. Distributed throughout the Indo-Pacific, common at Cocos (Keeling) Islands but rare at Christmas Island.

### **Serranidae – Cods/groupers**

Flowery Cod

1 \**Epinephelus fuscoguttatus*

One large individual (1.2 m) was seen in 2008 at 25 m in Flying Fish Cove. This species is widely distributed throughout the Indian and Pacific Oceans. Common at Cocos (Keeling) Islands but rare at Christmas Island.

## **Chaetodontidae - Butterflyfishes**

### Philippine or panda butterflyfish

#### *Chaetodon adiergastos*

Two individuals seen in 2005 at Boat Cave in 2 m of water (Hobbs *et al*, 2007). Two individuals seen in 2008, one in 2 m depth at Ethel Beach and one on the western side of North-West Point in 20 m. This species is found in the Indonesian region (extending to Japan and northwest Australia) and this new record is a southwestern extension of its current range. On two occasions this rare species was observed partnered with *C. collare*, another rare butterflyfish at Christmas Island.

### Collare butterflyfish

#### *Chaetodon collare*

One individual observed in 2005 at Boat Cave in 2 m (Hobbs *et al*, 2007). In 2008, two individuals were observed in Flying Fish Cove at 8 m depth and one on the western side of North-West Point in 20 m. On two occasions this rare species was observed partnered with *C. adiergastos*, another rare butterflyfish at Christmas Island. This species ranges from the Arabian Peninsula in the western Indian Ocean eastward to the Philippines and Christmas Island is now the southernmost known record for this species (Hobbs *et al*, 2007).

### Lattice butterflyfish

#### 1 \**Chaetodon rafflesi*

In 2005 one individual was observed near the Police Station in 3 m (Hobbs *et al*, 2007) and in 2008 five individuals were observed in 2-8 m depth at Flying Fish Cove. This species is widely distributed in the Indian and Pacific Oceans.

### Redfin butterflyfish

#### 2 *Chaetodon lunulatus*

In 2008, ten individuals were seen in 2-10 m depth at Flying Fish Cove. On some occasions individuals formed pairs with its Indian Ocean sister species (*C. trifasciatus*) or with hybrids of the two species. This species is found in the West-Pacific and as far west as the west Australian coastline and western Indonesia.

## **Pomacanthidae – Angelfishes**

Colin's pygmy angelfish

2 \**Centropyge colini*

In 2008, one individual was observed in 65 m at Rhoda Beach Wall. This species may be more common, but we were unable to adequately survey the deepwater habitat where it is normally found. This species is distributed from Cocos (Keeling) Islands to Fiji.

Ornate angelfish

2 \**Genicanthus bellus*

In 2005, fifteen individuals in 3 discrete social groups were observed at Boat Cave and near the Police Station in 62-65 m of water (Hobbs *et al*, 2007). This species may be more common, but we were unable to adequately survey the deepwater habitat where it is normally found. This species is distributed from Cocos (Keeling) Islands to the Society Islands.

Multi-barred Angelfish

2 \**Paracentropyge multifasciata*

In 2008, one individual was observed at 40 m depth in Flying Fish Cove. This secretive and deepwater species may be more common. This species is distributed from Cocos (Keeling) Islands to the Society Islands.

## **Pomacentridae – Damselishes**

Andaman damsel

*Pomacentrus alleni*

Commonly observed in 2008 on the west coast (e.g. Sydney Dale's #6) at 20-30 m depth hovering above rubble habitat. This species is mainly restricted to the Andaman Sea, Thailand and western Indonesia and this new record is a southward extension of its range.

Lemon damsel

2 *Pomacentrus moluccensis*

Two individuals were observed in Flying Fish Cove in 2 m of water. This is a southwestern range extension for this species.

### **Labridae - Wrasses**

Tarry hogfish

*Bodianus bilunulatus*

In 2008, a total of 4 individuals were observed in depths of 5-25 m at Sydney's Number 6 Dale, the south side of North-West Point and the Million Dollar Bombie dive site. This species has a disjointed distribution throughout the Indo-Pacific. Christmas Island individuals have a larger dorsal spot and slightly different facial patterns. A photograph of a Christmas Island individual is provided in Figure 1.

### **Gobiidae - Gobies**

Two species of coral gobies (genus: *Gobiodon*) were observed inhabiting *Acropora* corals in 1-8 m at Flying Fish Cove. One species is mostly brown and grows to about 4.5 cm total length, while the other species is green with red markings on the face and a red stripe on each side of the body and grows to about 3 cm. This genus contains a number of undescribed species and these two Christmas Island species require further investigation to determine if they are new species or new records.

### **Acanthuridae – Surgeonfishes**

Indian Ocean mimic surgeonfish

3 *Acanthurus tristis*

Approximately six juveniles were observed in 2008 in 15-30 m mainly on the west coast (Sydney's Dale Number 6) but also at the MV Eidsvold shipwreck. Juveniles seen mimicking the angelfish *Centropyge eibli*. Distributed from Chagos Archipelago to Indonesia and this record extends its known range to the southeast. Observed occasionally at Christmas Island but may be more common.

### **Siganidae - rabbitfishes**

Blue-spotted spinefoot

1 *Siganus corallinus*

One individual observed in 2002 and one in 2008. Both observed at the MV Eidsvold shipwreck, possibly the same individual. Distributed throughout the Indo-Pacific, extremely rare at Christmas Island.



**Figure 1:** Underwater photograph of *Bodianus bilunulatus* from Christmas Island. Total length of fish was approximately 25 cm.