

Dorsal View (♀)



Ventral View (♀)



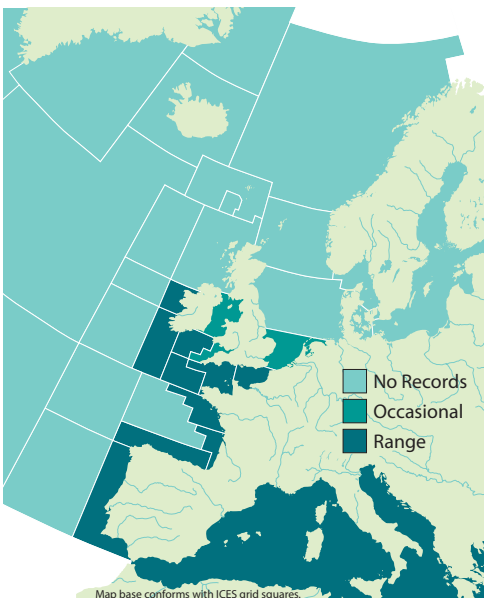
COMMON NAMES

Undulate Ray, Undulate Skate, Painted Ray, Raie Brunette (Fr), Raya Mosaica (Es), Razza Ondulata (It), Golfrog (Ne).

SYNONYMS

Raja picta (Lacepède, 1802), *Raja mosaica* (Lacepède, 1802), *Raja fenestrata* (Rafinesque, 1810), *Raja atra* (Muller & Henle, 1841).

DISTRIBUTION



The Undulate Ray is found in the east Atlantic from Senegal to the southern British Isles. It is encountered in the western Mediterranean, mainly along the African coast, and as far west as the Canary Islands (Whitehead *et al.*, 1986). Around the UK, the Undulate Ray is found off the southern coasts of England, Wales and much of Ireland (Barnes, 2008).

APPEARANCE

- Maximum total length 85cm.
- One row of 20–55 thorns along midline on males, three on females.
- Upper surface from light yellow to black.
- Pattern of dark wavy bands lined with twin row of white spots.
- Other larger white spots add to pattern.
- Lower surface white with dark margins.

The leading edge of the disc undulates from the snout to the wingtips, giving the species its name. The dorsal surface, except for the rear quarters, is covered with small prickles with a dense patch on the snout region. The dorsal fins are widely spaced, normally with two dorsal spines between them. Median spines are scattered in adults, regular on young. Males have one row of 20–55 median thorns while females have three (Whitehead *et al.*, 1986).

Colouration ranges from almost black to light yellow-brown with dark wavy bands lined by a twin row of white spots. Other white spots add to the complex pattern. The underside is white with dark margins (Barnes, 2008).

Some sources claim total lengths for the Undulate Ray of up to 100cm but the largest reliable reports are closer to 85cm. Coelho *et al.* (2005) found the maximum total length for males was 88.2cm and 83.2cm for females (Coelho *et al.*, 2005). This suggests that there is little sexual dimorphism.

SIMILAR SPECIES

Leucoraja naevus, Cuckoo Ray

Raja brachyura, Blonde Ray

Raja microocellata, Small-eyed Ray

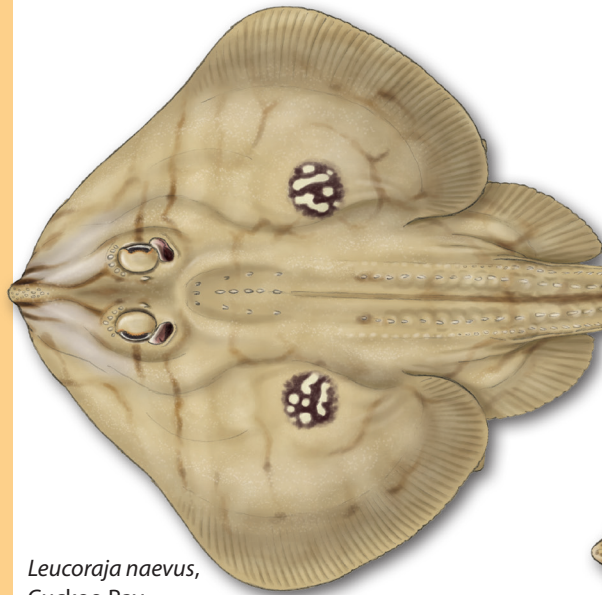
Raja miraletus, Brown Ray (not illustrated)

Raja montagui, Spotted Ray

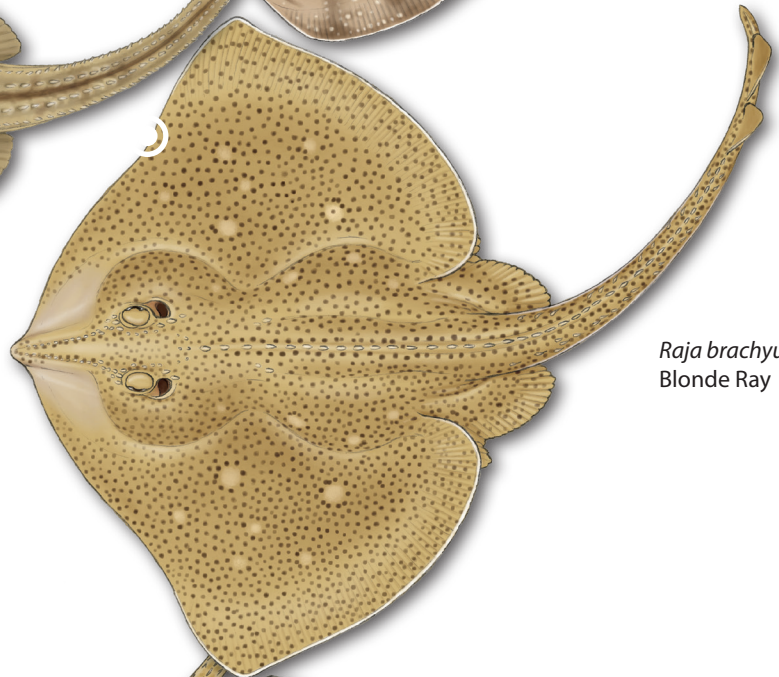
Raja radula, Rough Ray (not illustrated)



Raja undulata,
Undulate Ray



Leucoraja naevus,
Cuckoo Ray



Raja brachyura,
Blonde Ray



Raja microocellata,
Small-eyed Ray

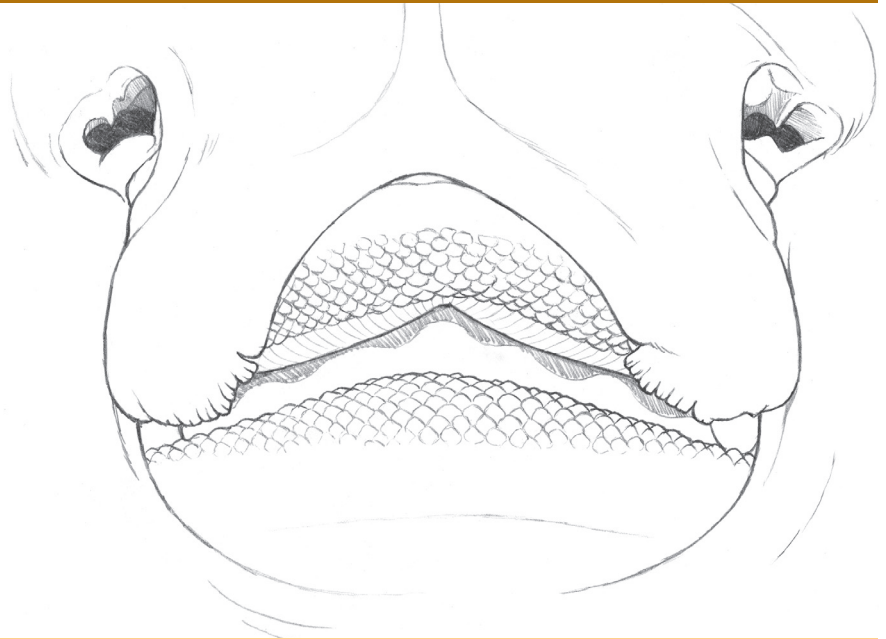


Raja montagui,
Spotted Ray

(Not to scale)

TEETH

There are 40-50 rows of teeth in the upper jaw. The inner series are wedge-shaped, the middle series are pointed and the outer series are chisel-edged (Clark, 1926).



ECOLOGY & BIOLOGY

HABITAT

The Undulate Ray is a bottom dwelling species found on continental shelves, most commonly on sandy substrates (Barnes, 2008). Studies from the Portuguese continental shelf show that the Undulate Ray is most common from 10-30m (33-100ft) with the number of individuals caught decreasing rapidly with depth (Coelho *et al.*, 2005). The maximum depth the species has been recorded at is ~200m (655ft), whilst in UK waters it has been found at depths of up to 72m (235ft) (Moura *et al.*, 2008; Ellis *et al.*, 2004).

DIET

The Undulate Ray has a varied diet depending on sex, maturity stage and season. When young, it has a fairly generalised diet consisting of crustaceans, molluscs and small fish. When mature, it becomes more specialised and feeds almost entirely on crustaceans. In southern Portugal, the vast majority (up to 79.5% by mass) of the diet of the Undulate Ray is *Polybius henslowi*, a small, pelagic crab. This is unusual among rajids, many of which show a change in diet from predominantly small crustaceans to bony fish as they mature (Moura *et al.*, 2008).

REPRODUCTION

Female Undulate Rays mature around 75cm in length when around 9 years old, males mature slightly smaller at ~73cm when around 7½ years old. In common with most elasmobranchs, it matures relatively late in its life cycle as its maximum estimated age is just over 20 years (Coelho *et al.*, 2005).

The Undulate Ray is oviparous, meaning that it lays eggs that then develop outside the parent until ready to hatch. It breeds seasonally between March and June and its eggcases are commonly found on beaches across the south coast of England (Moura *et al.*, 2008; Shark Trust, 2008). These eggcases are 70-90mm long and 45-60mm wide when wet with very long horns on each corner. These horns are distinctive in that they curve inwards at the end and have thin and curly tips. When washed up on beaches however, these tips are sometimes not present (Shark Trust, 2008). In 1997, a female Undulate Ray in the Benalmádena Sea Life Centre in Spain started laying 25 days after mating and continued for 77 days, during which time she laid 88 eggs. The incubation period before the first skate hatched was 91 days and it measured 14cm in length (De la Rosa, 1998). It is not known if this is typical for wild populations.

EGGCASE

1. 70-90mm in length (excluding horns).
2. 45-60mm in width.
3. No keels (Shark Trust, 2008).

Similar eggcase to the Spotted Ray, *Raja montagui*.



COMMERCIAL IMPORTANCE

Historically a commercially important fish, the Undulate Ray was taken as bycatch in multispecies trawl fisheries across much of its range, particularly in the south (Gibson *et al.*, 2006). In southern Portugal, it can constitute more than 40% of all elasmobranchs caught in trammel net fisheries and is often taken on longlines (Coelho *et al.*, 2005).

THREATS, CONSERVATION, LEGISLATION

The status of the Undulate Ray in Europe is uncertain. It is potentially vulnerable to exploitation because, as with most elasmobranchs, it matures relatively late and produces few young. As a result, juvenile and immature specimens are vulnerable to fishing mortality before they have had a chance to breed (Gibson *et al.*, 2006). It is targeted across much of its range by trawl and trammel nets, as well as occasionally being caught by long-line fishing techniques. In some areas, it also constitutes a substantial portion of fisheries by-catch. In southern Portugal, it represents more than 40% of all elasmobranchs caught in trammel nets (Coelho *et al.*, 2005).

The Undulate Ray is also considered a game fish and is caught by recreational anglers, though the majority of these are returned alive and stand a good chance of surviving (Catchpole *et al.*, 2007). Data from areas where the Undulate Ray was locally common has suggested serious declines due to fishing pressure. In Tralee Bay, southwest Ireland, populations have declined by 60-80% since 1981 and it has been absent in English Channel surveys in recent years (Gibson *et al.*, 2006).

In 2007, the Undulate Ray was included on the UK Biodiversity Action Plan (BAP) list. Though this does not provide any legal protection for the species in itself, it includes provisions to work towards European conservation legislation. Its main targets included plans to stabilise populations in refuge areas and to facilitate the migration of animals from refuge populations to areas where they are scarce or extinct.

In 2009 the Undulate Ray received full protection from the European Council in ICES areas VIa-b, VIIa-k, VIII and IX, meaning that it cannot be retained or landed if caught. As elasmobranchs have no swim bladder that can overinflate or rupture, they are more likely to survive capture and release than teleost fish (DEFRA, 2008). The mandatory release order is therefore likely to significantly reduce the level of fishing mortality.

IUCN RED LIST ASSESSMENT

Endangered (2008).

HANDLING AND THORN ARRANGEMENT

- Handle with care.
- Strong row of midline thorns.
- Thorns present between dorsal fins.



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Shark Trust; 2009. An Illustrated Compendium of Sharks, Skates, Rays and Chimaera. Chapter 1: The British Isles. Part 1: Skates and Rays.

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