# Guide to the Sea Snakes of the Kimberley Coast of Western Australia

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# Guide to the Sea Snakes of the Kimberley Coast of Western Australia

*Text and design by Ruchira Somaweera & Kate Sanders*

*Of the 10,000 different species of living reptiles, only about 60 species of live-bearing 'true' sea snakes are fully adapted to a life in salt water. All other marine reptiles, including the sea kraits (a group of ocean-going snakes that evolved separately), sea turtles and the saltwater crocodile, must leave the water to lay eggs on land.*

*Sea snakes originated in Australian waters and have since colonised the tropical and subtropical waters of the Indian and Pacific Oceans. Most species are found in shallow waters along coasts, in inshore habitats, and around islands and coral reefs. An exception is the Yellow-bellied Sea Snake (Hydrophis platurus) that lives in the open oceans and has the largest distribution of any snake.*

## Kimberley coast and sea snakes

Australia's Kimberley coast has the world's highest recorded diversity of sea snakes supporting more than one third of all known species, with at least three species found only in this region. Sea snakes occupy varied habitats in the Kimberley, ranging from deeper offshore waters to shallow coral reefs and mangroves. Some Kimberley species have extremely small distributions and are considered critically endangered or endangered. For example, the Short-nosed Sea Snake (*Aipysurus apraefrontalis*) and Leaf-scaled Sea Snake (*Aipysurus foliosquama*) have disappeared from offshore Ashmore and Hibernia Reefs and are now known only from scattered records along the northwest coast.

Coral reefs such as the Hibernia Reef can support sea snake assemblages of as many as nine species, each with a different prey preference

## Life in the ocean

Being entirely aquatic, sea snakes show remarkable adaptations to a life in water:

- A vertically flattened paddle-like tail for propulsion (absent in all other snakes, including freshwater and brackishwater species).
- Dorsally positioned nostrils each with a valve that closes when they dive.
- Salt regulating glands (specialised excretory glands on the base of the tongue).
- A single lung that extends nearly the full length of the body, and a special ability to absorb oxygen through the skin.

## Biology

### Feeding

While some sea snakes, such as the Olive Sea Snake, have generalist diets, most have highly specialised preferences, feeding almost entirely on eels, gobies or catfish-like prey. Three species, including the Turtle-headed Sea Snake, specialise on fish eggs and have accordingly reduced their venom systems. There are also records of some sea snakes eating crabs, shrimps, sea snails and squid.

A Stokes' Sea Snake (*Hydrophis stokesii*) feeding


Species such as the Slender Sea Snake (*Microcephalophis gracilis*)* that specialise on burrowing eel prey have evolved tiny heads and thin forebodies for probing burrows
[* species not found in the Kimberley]

### Breeding

All sea snakes give birth to live young in the water, with typical numbers of young per clutch ranging from 3 in Leaf-scaled and Mosaic Sea Snakes to more than 10 in Spine-bellied and Elegant Sea Snakes. Although not found in Kimberley waters, sea kraits are amphibious snakes that lay eggs on land but no known nesting populations exist in Australia.

### Behaviour

Although sea snakes are able to absorb a portion of their oxygen requirements from sea water through the skin, all sea snakes are air-breathers and therefore need to surface to breathe. They are remarkable divers and a single breath may last over two hours but usually lasts as little as 30 minutes when the snake is actively swimming. They also use the water surface for resting (especially at night), basking in the sun and drinking fresh water during rain. Daily home ranges are poorly understood, but studied species such as the Olive and Turtle-headed Sea Snakes rarely move further than 2000 m².

Turtle-headed Sea Snakes (*Emydocephalus annulatus*) in courtship before mating at Hibernia Reef

The Black-ringed Mangrove Snake (*Hydrelaps darwiniensis*) is among the most terrestrial sea snakes, often visiting mudflats in search of prey

## Sea snake bites

As a general rule all sea snakes must be regarded as dangerously venomous and handled with great caution. Some species are inoffensive and only bite under provocation, but other species are much quicker to defend themselves when threatened. Sea snakes are quite curious creatures and sometimes approach people in the water. Avoid interacting with the snake if one approaches you and wait patiently until it moves off.

It is important to know that all species carry potent venom and bites could be fatal if untreated. The people at most risk in getting bitten are commerical and recreational fishers handling nets.

### In case of a sea snake bite

- Wrap a 'pressure bandage' (e.g. a broad crepe bandage) around the limb starting at the fingers or toes and wrap toward the body. It should be tight but the fingers and toes should remain pink so that the circulation is not cut off (this is not supposed to be a tourniquet) bending at the joints.
- Apply a rigid object as a splint and bind it firmly to as much of the limb as possible.
- Keep the patient as still, calm, warm and comfortable as possible.
- Call for proper medical treatment as quickly as possible.

### Did you know..

While most sea snakes grow to around one metre in length, some species that prey on large eels reach close to three metres..

A few of the world's sea snakes are actually freshwater species and inhabit lakes in Thailand, Cambodia, the Philippines, and Solomon Islands..

The Olive Sea Snake (*Aipysurus laevis*) is reported to have a light receptor on the tip of its tail. This may allow sheltering snakes to keep their tail paddles retracted and out of reach of predators..

## Threats to sea snakes in the region

Many sea snakes have low dispersal rates, restricted distributions and specialist habitat preferences. In northwest Australia, marine habitats are potentially threatened by infrastructure developments and associated dredging projects, as well as climate change-related rising sea temperatures. Being sensitive to low frequency vibrations, sea snakes might also be vulnerable to anthropogenic noise (shipping, seismic air guns, pile driving).

In Australia, up to several thousand sea snakes get collected as by-catch in the trawler fishing industry each year. Being air-breathers, sea snakes often drown and die in the nets.

A Spine-bellied Sea Snake (*Hydrophis curtus*) caught as bycatch in a fishing trawler

## Conservation Status

Sea snakes are a conspicuously understudied group of Australia's marine vertebrates. An IUCN Red List (www.iucnredlist.org) assessment listed a third of sea snake species as 'Data Deficient', meaning that a lack of basic data on taxonomy, distribution and life history precluded assessment of conservation status. The Kimberley region is especially sparsely surveyed for sea snakes, which means that discoveries of new and threatened species are very likely.

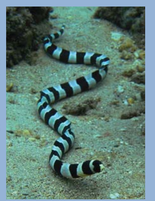
## We are not sea snakes

Several species of eels closely resemble sea snakes in color pattern and body shape. For this reason, people often confuse the two. Here's how to tell them apart:

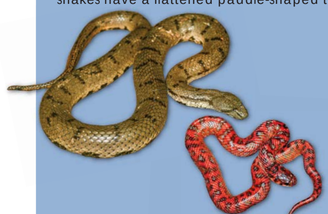
1. Eels have a scaleless, mucus-coated skin. The heads and bodies of snakes are covered in scales, although the body scales of some sea snakes are very small.

2. As most other fish do, eels have gills (either circular of slit-shaped). Sea snakes on the other hand are reptiles with lungs so don't have visible gill openings on the head.

3. Most eels have fins located along the top or bottom of the fishes' body, or protruding from just behind the head. All sea snakes have a flattened paddle-shaped tail, but none have fins.



Banded Snake Eels (*Myrichthys colubrinus*) closely resemble sea snakes



Estuaries, mangroves and mudflats of the Kimberley region are also inhabited by 'Mud snakes' of the family Homalopsidae. These are live-bearing, aquatic snakes that forage on fish and crustaceans. Mud snakes have fangs at the back of the upper jaws and are not highly venomous, whereas all sea snakes have fangs at the front of their upper jaws. Unlike the paddle-shaped tails of sea snakes, the tails of mud snakes are tapering to a point.

The Australian Bockadam (*Cerberus australis*) (L) and the White-bellied Mangrove Snake (*Fordonia leucobalia*) (R) are common mud snakes along the Kimberley coast. The body colour of these species varies largely from brown to grey to red

## What you can do

If you see a live or a dead sea snake…

- Use the key in this booklet to identify down to species or as close as possible if it can be done safely.
- Take a clear photograph if possible .
- Report your sighting with a photograph, location, date and time and potential ID to the nearest Department of Parks and Wildlife office.

***The information you provide will help scientists and conservation managers better understand these fascinating creatures and assist in their conservation.***

Information current as June 2015

***Photo credits*: Arne Rasmussen** - *H. macdowelli* (L) | **Brad Maryan** - *A. apraefrontalis, A. duboisii, A. foliosquama, A. mosaicus, E. annulatus, H. curtus* (L), *H. czeblukovi, H. elegans* (L), *H. kingii, H. peronii, H. platurus* | **Clay Bryce** - *H. stokesii* feeding, Hibernia Reef | **David Gower** - *H. elegans* (R) | **Jenna Crowe-Riddell** - *A. fuscus, H. platurus* head | **Kate Sanders** - *E. annulatus* mating, *H. coggeri, M. gracilis* | **Lochman Transparencies** - *H. darwiniensis* on mudflat | **Nick Hobgood** - *M. colubrinus* | **Peter Mitschin** - *H. macdowelli* (R), *H. major* (Adult) | **Steven Lindfield** - cover photo of *A. laevis* | **Vinay Udyawer** - bycatch | all other photos by **Ruchira Somaweera**.

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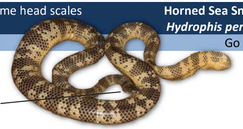
sea snake specialist group IUCN SSC

Department of Parks and Wildlife

# Key to sea snake species in the Kimberley

| | | |
|---|---|---|
| 1 | Dorsal surface of the body black, sharply delineated from the yellowish flanks and belly (a). Head elongated with a bill-like, flattened snout and very wide jaws | **Yellow-bellied Sea Snake** ***Hydrophis platurus*** |
| | Not as above | Go to 2 |


| | | |
|---|---|---|
| 2 | Head small relative to body with the free edges of some head scales raised in to blunt, spinous horn-like structures (b) | **Horned Sea Snake** ***Hydrophis peronii*** |
| | No scales on the head raised | Go to 3 |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| 3 | Short blunt head with only 3 upper lip scales, with the 2nd very elongated (c), creating a unique turtle-like appearance. Variable colour patterns, often with cross bands | **Turtle-headed Sea Snake** ***Emydocephalus annulatus*** |
| | Not like above | Go to 4 |


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| 4 | No preocular scale between the eye and the nostril scale (d). Prominently ringed body with flat belly scales. Usually found in tidal creeks and mudflats | **Black-ringed Mangrove Snake** ***Hydrelaps darwiniensis*** |
| | Preocular scale present between the eye and the nostril (e) | Go to 5 |



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| 5 | Ventrals (belly scales) small, either indistinguishable from adjacent body scales (f) or not more than 2 times as broad as adjacent body scales (g) | Go to 13 |
| | Ventrals large, each at least 3 times as broad as adjacent body scales (h) | Go to 6 |




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| 6 | Very broad ventrals (i), as much as 4 times broader than the closest body scales. Tail paddle low in profile and downward pointing. Semi-terrestrial and often found on mudflats | **Mangrove Sea Snake** ***Ephalophis greyae*** |
| | Ventrals not more than less than 3 times broader than the closest body scales | Go to 7 |


* **Note**: This key has been simplified for the use of non-technical users. Identification of sea snakes (especially members of the genus *Hydrophis*) to the species level is very difficult. Most species show wide variations in body colour as well as body form making it difficult to exclusively use external characters for identification. For confirmation of species identity, the reader may refer to more technical keys that incorporate scale counts and internal characters.

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| 7 | Ventrals with a deep notch (j) in the middle of the hind border (free end) | Go to 8 |
| | Ventrals without or with only a slight median notch (k) on the hind border | Go to 9 |



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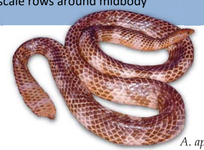
| 8 | Prefrontal scales present in-between the frontal and nasal scales . At least 19 or 21 scale rows around midbody. Body scales with extensive free hind-edges and greatly overlapping | **Leaf-scaled Sea Snake** ***Aipysurus foliosquama*** |
| | No prefrontal scales (l). Less than 17 scale rows around midbody | **Short-nosed Sea Snake** ***Aipysurus apraefrontalis*** |



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| 9 | Head scales large and symmetrically arranged (m). Lip scales not divided horizontally | **Mosaic Sea Snake** ***Aipysurus mosaicus*** |
| | Head scales more or less broken up into smaller scales (o). Some lip scales divided horizontally (n) | Go to 10 |



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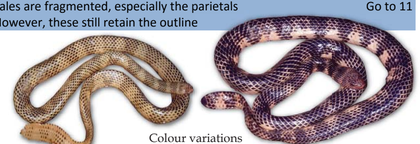
| 10 | All head scales fragmented into small irregular scales (o). Often with cream/whitish triangular markings along flanks | **Dubois' Sea Snake** ***Aipysurus duboisii*** |
| | Only some of the head scales are fragmented, especially the parietals (scales behind the eye). However, these still retain the outline | Go to 11 |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| 11 | Relatively slender and long with 19 scale rows at mid body and at least 180 ventrals. Head usually darker than body | **Mjoberg's Sea Snake** ***Aipysurus tenuis*** |
| | Relatively stout and short with less than 180 ventrals | Go to 12 |

| | | |
|---|---|---|
| 12 | Body usually uniform dark purplish brown, with or without obscure paler bands on lower flanks. Less than 21 scale rows around midbody | **Dusky Sea Snake** ***Aipysurus fuscus*** |
| | Coloration extremely variable. At least 21 scale rows around midbody | **Olive Sea Snake** ***Aipysurus laevis*** |



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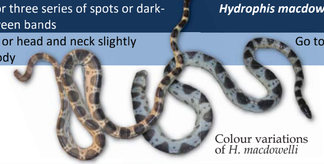
| 13 | Very thin fore body with a very small head and very robust and laterally compressed hind body. Two or three series of spots or dark-edged markings on the sides and between bands | **Small-headed Sea Snake** ***Hydrophis macdowelli*** |
| | Entire body of fairly uniform thickness or head and neck slightly slender compared to the rest of the body | Go to 14 |

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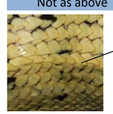
| 14 | Robust body with a large head and a thick neck. Ventrals very small and divided into 2 strongly overlapping rows forming a distinct ventral keel (p) (except on the throat). With or without large dark dorsal blotches alternating with narrow bands (q) | **Stoke's Sea Snake** ***Hydrophis stokesii*** |
| | Not as above | Go to 15 |





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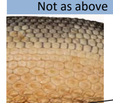
| 15 | Ventrals very small and difficult to distinguish (f), scales in the lowermost scale rows on flanks enlarged compared to dorsal scales. Adult males in breeding season have prominent tubercles or spines on these enlarged scales (r) | **Spine-bellied Sea Snake** ***Hydrophis curtus*** |
| | Not as above | Go to 16 |





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| 16 | Dark brown, dark grey or black with prominent geometrical (mainly hexagonal and pentagonal) marks on the dorsal and lateral sides | **Geometrical Sea Snake** ***Hydrophis czeblukovi*** |
| | Body colouration includes cross bands | Go to 17 |

| | | |
|---|---|---|
| 17 | Body with darker broad cross bands but no other markings | Go to 18 |
| | Body with darker broad cross bands or blotches and other markings in-between bands/ blotches | Go to 19 |
| 18 | Less than 40 bands on body and tail | **Cogger's Sea Snake** ***Hydrophis coggeri*** |
| | More than 40 bands on body and tail | **Large-headed Sea Snake** ***Hydrophis pacificus*** |



| | | |
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| 19a | 24-30 broad dark bands across the back alternating with narrow dark bands within the lighter interspace and each narrow band aligned with a dark spot on the flanks (sides of the lower body). Body more or less of uniform thickness throughout. Closely resembles *Hydrophis stokesii* but ventrals not divided | **Olive-headed Sea Snake** ***Hydrophis major*** |



| | | |
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| 19b | 35-55 dark bands, widest on the dorsal side and often broken in to spots on the flanks. Narrower bands or a row of black spots often between wider bands. Very slender snake- head and forebody often reduced in size relative to hindbody | **Elegant Sea Snake** ***Hydrophis elegans*** |


| | | |
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| 19c | 30-60 broad dark bands or dorsal blotches with a series of large ocellate ('eye-like') markings on the sides (s). Body more or less of uniform thickness throughout but some populations have a slender head and forebody | **Ocellate Sea Snake** ***Hydrophis ocellatus*** |



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| 19d | Black head with a white ring around the eye (t). Head separated from body in a whitish band. More than 45 bands on the extremely slender body- elliptic on forebody and more circular and short in hindbody | **Spectacled Sea Snake** ***Hydrophis kingii*** |