MarLIN
Marine Information Network
Information on the species and habitats around the coasts and sea of the British Isles

Short snouted seahorse (*Hippocampus hippocampus*)

MarLIN – Marine Life Information Network
Biology and Sensitivity Key Information Review

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The seahorse *Hippocampus hippocampus*.
Photographer: Sue Daly
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See online review for distribution map

Distribution data supplied by the Ocean Biogeographic Information System (OBIS). To interrogate UK data visit the NBN Atlas.

Researched by	Marisa Sabatini & Susie Ballerstedt	**Refereed by**	Neil Garrick-Maidment
Authority	(Linnaeus, 1758)		
Other common names	-	**Synonyms**	-

Summary

Description

The seahorse has a very distinctive shape with the head set at an angle to the body. The trunk of the body is short and rather fat whilst the tail is tapering, curled and prehensile. *Hippocampus hippocampus* can be up to 15 cm in length. The snout is short and upturned, and less than one third the length of the head. There is a prominent spine above each eye. The dorsal fin has 16-18 rays, usually with a dark stripe running parallel to the margin. The pectoral fins have 13-15 rays. Body rings carry bony tubercles, giving a knobbly, angular appearance. The body is variable in colour: brown, orange, purple or black, sometimes with pale blotches.

Recorded distribution in Britain and Ireland

Distributed along the south coast of England, with substantial populations around the Channel Islands and Ireland (Garrick-Maidment & Jones, 2004).

Global distribution

Reported from the Netherlands, Belgium, the east Atlantic coast of Europe, Algeria, Italy, Malta and Greece.

Habitat

Found in shallow muddy waters, in estuaries or inshore amongst seaweed and seagrasses, clinging by the tail or swimming upright. *Hippocampus hippocampus* can also be found in rocky areas.

Depth range

77 m

Identifying features

- Body up to 15 cm in length.
- Short, upturned snout.
- Prominent spine above each eye.
- Dorsal fin has 16-18 rays with a submarginal stripe.
- Pectoral fin has 13-15 rays.
- Lacks a mane
- Bony tubercles on body.

Additional information

Hippocampus hippocampus is one of two species of seahorses found in the British Isles, the other is *Hippocampus guttulatus*, which has a longer snout and elongated protuberances along the back of the neck, giving the impression of a 'horses mane'.

The exact size and distribution of the population of seahorses around the British Isles is not known at present. The British Seahorse survey is collating records currently and can be found at the Seahorse Trust.

Please note: the biology of seahorses is poorly known and little information on *Hippocampus hippocampus* was found. Therefore, the following review is based in part on reviews of the biology of seahorses by Vincent (1996), Garrick-Maidment (1997) and Lourie *et al*, (1999). See also the British Seahorse Survey Report 2004 (Garrick-Maidment & Jones, 2004).

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Further information sources

- FishBase
- Seahorse Trust

Search on:

NBN WoRMS

Biology review

Taxonomy

Phylum	Chordata	Sea squirts, fish, reptiles, birds and mammals
Class	Actinopterygii	Ray-finned fish, e.g. sturgeon, eels, fin fish, gobies, blennies, and seahorses
Order	Syngnathiformes	
Family	Syngnathidae	
Genus	Hippocampus	
Authority	(Linnaeus, 1758)	
Recent Synonyms	-	

Biology

Typical abundance	Low density
Male size range	15cm
Male size at maturity	
Female size range	Medium(11-20 cm)
Female size at maturity	
Growth form	See additional information
Growth rate	See additional information
Body flexibility	See additional information
Mobility	
Characteristic feeding method	Predator
Diet/food source	
Typically feeds on	Organic debris, plankton, brine shrimp, small crustaceans and small fish
Sociability	
Environmental position	Demersal
Dependency	No information found.
Supports	No information
Is the species harmful?	No

Biology information

Growth form
All seahorses have the same basic body shape, that is, a horse-like head held at right angles to an erect body.

Body flexibility
The tail is highly flexible although it cannot bend directly backwards very far (N. Garrick-Maidment, pers. comm.).

Abundance
Seahorse population density tends to be low (Vincent, 1996). However there are no published data about population trends or total numbers of mature animals for this species.

Camouflage
Hippocampus hippocampus has the potential (like all seahorses) to grow appendages on its body for camouflage and protection. However, none have ever been identified (Garrick-Maidment, 1998).

Mobility
Hippocampus hippocampus is better suited to manoeuvrability than speed (Blake, 1976). Only the dorsal fin on their back provides propulsion, while the 'ear-like' pectoral fins below the gill openings are used for stability and steering. *Hippocampus hippocampus* is able to use its prehensile tail as an anchor, wrapping it around the stems of seagrass, coral heads or any suitable object. It uses its tail to hold on in strong currents (N. Garrick-Maidment, pers. comm.) and the tail is used by both sexes to grasp a partner in mating and greeting rituals. The tail is also used a great deal for climbing and is used as a hand when grasping for climbing (N. Garrick-Maidment, pers. comm.).

Growth rates
Growth rates have not been investigated in any detail but young fry are known to exhibit growth inflection points as they switch between prey types (Boisseau, 1967; cited in Vincent, 1996). Adults are known to grow more slowly as they grow larger (Vincent & Sadler unpublished; cited in Vincent, 1996).

Feeding
On average, an adult seahorse will eat between 30-50 mysid shrimp a day (Garrick-Maidment, 1997). *Hippocampus hippocampus* is an ambush predator that feeds on live, moving food. *Hippocampus hippocampus* will remain motionless until a small animal such as a mysid shrimp passes within reach. Within a second, the seahorse will flick its head and suck its prey out of the water column through its long tubular snout. *Hippocampus hippocampus* has no teeth or stomach, therefore prey that are caught are swallowed whole and pass rapidly through the digestive system.

Predators
Few predators appear to target adult seahorses. Lourie *et al.* (1999) suggested that this could be due to camouflage and immobility that makes the seahorse difficult to detect. They are, however, taken by crabs, and large pelagic fish (Lourie *et al.*, 1999). There are also records of sea gulls and penguins eating seahorses of which the former appear to eat them commonly (N. Garrick-Maidment, pers. comm.).

Habitat preferences

Physiographic preferences	Offshore seabed, Strait / sound, Estuary
Biological zone preferences	Lower eulittoral, Mid eulittoral, Sublittoral fringe, Upper eulittoral
Substratum / habitat preferences	Macroalgae, Bedrock, Mud, Seagrass
Tidal strength preferences	Very Weak (negligible), Weak < 1 knot (<0.5 m/sec.)
Wave exposure preferences	Extremely sheltered, Moderately exposed, Sheltered, Ultra sheltered, Very sheltered
Salinity preferences	Variable (18-40 psu)
Depth range	77 m

Other preferences	None found
Migration Pattern	Non-migratory / resident

Habitat Information

Seahorses are often found in water less than one metre deep. Most species of seahorse live at depths between 1-15 metres and as deep as 77 m when they move out into deeper waters over winter (Garrick-Maidment, 1998) but the depth varies throughout its range according to habitat (N. Garrick-Maidment, pers. comm.). In the Channel Islands, they are found in much deeper water because here they have a wide tidal range and deep gullies (N. Garrick-Maidment, pers. comm.). On the whole, *Hippocampus hippocampus* is found below 5 m whereas *Hippocampus guttulatus* is found in shallower depths (N. Garrick-Maidment, pers. comm.). They occupy only certain parts of seemingly suitable habitats, for example sticking to the edge of seagrass beds leaving large areas unoccupied. These microhabitats have not been investigated but is has been suggested that seahorses find more food in areas of good water exchange (Vincent, 1996). Habitat / substratum preferences may be seasonal and related to seasonal migration (N. Garrick-Maidment, pers. comm.).

Adults may disperse during short range migrations but most movement to new areas happens when adults are cast adrift by storms or carried away while grasping floating debris (Vincent, 1999). They can cope with strong tidal strength for varying periods of time (N. Garrick-Maidment, pers. comm.).

Life history

Adult characteristics

Reproductive type	Gonochoristic (dioecious)
Reproductive frequency	Annual episodic
Fecundity (number of eggs)	See additional information
Generation time	Insufficient information
Age at maturity	6-12 months
Season	April - November
Life span	See additional information

Larval characteristics

Larval/propagule type	-
Larval/juvenile development	Viviparous (Parental Care)
Duration of larval stage	Not relevant
Larval dispersal potential	See additional information
Larval settlement period	Not relevant

Life history information

Sexual maturity

Hippocampus hippocampus becomes sexually mature during the first reproductive season after birth i.e. at age six to twelve months (Lourie *et al.*, 1999). Sexual maturity in males can be recognized by the presence of a brood pouch, although the size of the pouch will vary with its reproductive state. Any physical manifestation of sexual maturity is less obvious in females (Vincent, 1996).

The length and timing of the reproductive season varies with location, and will be influenced by light, temperature and water turbulence. It was originally thought that *Hippocampus hippocampus* and *Hippocampus guttulatus* only bred from Spring (April) to the Autumn (October) (Lourie *et al.*, 1999) but recent work (Garrick-Maidment, British Seahorse Survey 2004) has found juveniles in February that would have been born in November (N. Garrick-Maidment, pers. comm.).

Pair bonding
Hippocampus hippocampus like all seahorses are monogamous and form faithful pair bonds. The male seahorses are the predominant competitors for access to mates as they compete more to get pregnant than females do to give their eggs away (Vincent, 1994a). In courtship, males exhibit higher levels of aggressive competitive behaviour patterns (wrestling and snapping) than females. Competitive wrestling and snapping are described below.

- Snapping occurs when a male aims his snout at his competitors opercular flap before flicking his snout hard in order to propel the rival male away. A well aimed powerful snap could propel a seahorse as much as 10 cm and lead to the recipient darkening and flattening in a submissive posture (Vincent *et al.*, 1994a).
- When two seahorses are wrestling, one male will refuse to release his competitor from its grasp. Both males may then tumble with locked tails. Eventually, the submissive male will darken and flatten in a submissive posture until it is released by the dominant male (Vincent *et al.*, 1994a).

Tail wrestling and snapping with the snout is confined to males (Vincent *et al.*, 1992). Although females do compete for access to males (in the sense that they exhibit higher levels of courtship when in the presence of another member of the same sex than when courting alone) but to a far lesser extent than males (Vincent, 1994a). Courtship included the following behaviour.

1. Both seahorses may grasp a common holdfast with their tails and rotate around it.
2. Male and female may promenade together often holding tails.
3. Head tilting and quivering (Vincent, 1994a).

Hippocampus hippocampus forms sexually faithful pairs that endure through multiple mating and breeding seasons. Pair bonding is more on a seasonal basis in temperate species and there is no evidence from the wild to prove that they pair for life (N. Garrick-Maidment, pers. comm.). The male and female reproductive state changes are always synchronized within a pair and only within a pair, confirming that they are faithful to each other (Vincent, 1996). Pair bonding is reinforced by daily greetings performed only with an individuals partner. These greetings commonly last six to eight minutes (Vincent *et al.*, 1992).

Reproduction
The seahorse has a unique method of reproduction in which the male plays the dominant role. It is the male rather than the female that becomes pregnant (Vincent, 1994a). At the beginning of the mating season the males prepare their brood pouches. Females eggs ripen in an assembly line ovary, throughout the reproductive season. In order to mate males must eliminate the previous brood from the pouch and females must hydrate their eggs. Each sex provides a signal of readiness

to mate, males pump water in and out of their pouch and females point their head towards the water surface (Fiedler, 1954; cited in Vincent, 1994b). Females also have a trunk which is visibly distended with hydrated eggs, which becomes concave after the egg transfer (Vincent, 1994b). The female aligns the base of her trunk with the males pouch opening and inserts her ovipositor into the pouch. The female then deposits her eggs into the brood pouch where they are fertilized (Dipper, 2001). Egg transfer takes about 6-10 seconds (Vincent, 1994a).

Once the eggs are fertilized the brood pouch then seals up. The pear shaped eggs become embedded into the pouch wall and enveloped by tissues. Oxygen is provided via capillaries in the pouch wall (Carcupino *et al.*, 2002; Dipper, 2001). The pouch acts like the womb of a female mammal, complete with a placental fluid that bathes the eggs and provides nutrients and oxygen to the developing embryos while removing waste products. Nevertheless most of the nutrition comes from the mother. The egg yolk provides nutrients, while the male secretes a hormone called prolactin (Boisseau, 1967b; cited in Lourie *et al.*, 1999; Dipper, 2001). Prolactin induces enzymatic breakdown of the outer part of the egg (chorion) to produce a placental fluid (Boisseau, 1967b; cited in Lourie *et al.*, 1999). The pouch fluid is altered during pregnancy from being similar to body fluids to being more like the surrounding seawater. This helps reduce the stress on the offspring at birth (Dipper, 2001).
Pregnancy in male *Hippocampus hippocampus* can last for about 20-21 days (Garrick-Maidment, 1998). At the end of this period the male goes into labour (usually at night), which can last for hours. The brood pouch opens and fully formed young are pushed out by vigorous pumping movements. Male seahorses have relatively small broods (TRAFFIC, 2002). Brood size depends largely but not entirely on the size of the adults (Lourie *et al.*, 2002). The number of young produced by *Hippocampus hippocampus* can range from 50-100 (Garrick-Maidment, 1998) although recent information shows that the number can be as high as 250 (N. Garrick-Maidment, pers. comm.). Fecundity depends on the age of the male, older males producing a larger number of offspring (N. Garrick-Maidment, pers. comm.). In pairs that are familiar with each other the male is able to mate again within a few hours of emptying his brood pouch without any decline in his physical condition (Carcupino *et al.*, 2002)

Dispersal potential
It has been suggested that young fry are more likely to colonize new or depleted areas because they are often carried away from natal habitats despite attempts to settle into the substrata (Vincent, 1996). The extent of dispersal by this mechanism is unknown (Vincent *et al.*, 1999).
Longevity
The natural lifespan and mortality rates of seahorses and the parameters that define them are virtually unknown and in need of research (Anon, 1990a; cited in Vincent, 1996). It has been suggested that the lifespan is only about 1 year in very small species such as *Hippocampus zosterae* (~ 2.5 cm) (Strawn 1953; cited in Vincent, 1996) whereas larger seahorses, such as *Hippocampus hippocampus*, have a lifespan of 1-5 years (Lourie *et al.*, 1999). *Hippocampus hippocampus* has been regularly recorded living up to 5-6 years in captivity (N. Garrick-Maidment, pers. comm.).

Natural adult mortality rates are likely to be low but the data on mortality rates is very limited (Vincent, 1996). Fry are released at an advanced stage of development, which probably gives them a higher chance of survival than in many other species (TRAFFIC, 2002). However, it has been suggested that mortality is probably highest in young fry, as they are highly vulnerable to piscivorous fish (Vincent, 1996).

Sensitivity review

This MarLIN sensitivity assessment has been superseded by the MarESA approach to sensitivity assessment. MarLIN assessments used an approach that has now been modified to reflect the most recent conservation imperatives and terminology and are due to be updated by 2016/17.

Physical Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Substratum Loss	High	High	Moderate	Very low

Hippocampus hippocampus lives in a wide range of habitats from eelgrass, micro- and macro-algae to silt, mud and rocky substrata (N. Garrick-Maidment & Jones, 2004). A removal of the substratum, micro- or macro-algae or seagrasses would make an area unsuitable for seahorse colonization. However *Hippocampus hippocampus* are mobile and potentially able to find another site to recolonize. Therefore intolerance has been assessed as high with a high recoverability.

Smothering	Low	Very high	Very Low	Very low

Hippocampus hippocampus can be found clinging by the tail to seagrasses and macroalgae. Seagrasses and macroalgae are intolerant of smothering and typically bend over with the addition of sediment and are buried in a few centimetres (Fonseca, 1992). However, it is more common to see all seahorse species at the base of the algae than at the end (N. Garrick-Maidment, pers. comm.). *Hippocampus hippocampus* will not be as affected by smothering as they are mobile and able to slowly swim away to another suitable area. Therefore, intolerance has been assessed as low with a very high recoverability.

Increase in suspended sediment	Low	Very high	Very Low	Low

Hippocampus hippocampus does not rely on increases in suspended sediments to increase food availability as it feeds by predation. The seagrass habitats of *Hippocampus hippocampus* are likely to be intolerant of increases in suspended sediment which may result in a loss of habitat. However, *Hippocampus hippocampus* is mobile and may find more suitable conditions if necessary. Therefore, intolerance has been assessed as low with a very high recoverability.

Decrease in suspended sediment	Low	Very high	Very Low	Low

This species is probably tolerant of decreases in suspended sediment as it feeds by predation and is not reliant on food uptake through the sediments, however, its prey may be affected. Therefore, an assessment of low is given with a very high recoverability.

Dessication	Not relevant	Not relevant	Not relevant	Not relevant

Stranding of the individual and subsequent exposure to sunshine and air for an hour would more than likely result in death. However, *Hippocampus hippocampus* is subtidal and unlikely to be exposed to air save by stranding. Therefore this factor is not relevant.

Increase in emergence regime	Low	Very high	Very Low	Low

Hippocampus hippocampus generally occurs below 5 m and is unlikely to be affected by increases in emergence. Any periods of emergence of the habitat in which *Hippocampus hippocampus* occurs are, therefore, likely to be brief and the wetness of the algae and the seagrass would protect the seahorses. *Hippocampus hippocampus* is mobile and may be able to recolonize in deeper water. Some stress may occur, therefore, intolerance has been assessed as low with a very high recoverability.

Decrease in emergence regime	Intermediate	Moderate	Moderate	Low

As a predominantly sublittoral species, a decrease in emergence may benefit populations of *Hippocampus hippocampus* found on the lower shore by providing additional substratum for colonization. Therefore tolerant* has been recorded.

Increase in water flow rate	Intermediate	Moderate	Moderate	Low

Water flow is vital in aiding the distribution of seahorse fry (N. Garrick-Maidment, pers. comm.). However, an increase in water flow associated with storms could have a detrimental affect, such as carrying adults and young fry away from their home range, or separating a bonded pair, but not in normal circumstances. The benchmark suggests an increase in flow rate of two categories which could see the seahorses experiencing flow rates of 6 knots therefore, intolerance has been assessed as intermediate with a moderate recoverability.

Decrease in water flow rate	Tolerant	Not relevant	Not sensitive	Low

Hippocampus hippocampus inhabit sheltered areas. A decrease in water flow would reduce the risk of young fry or one individual from a bonded pair being carried away to another home range. *Hippocampus hippocampus* are active ambush feeders, therefore are not reliant on water flow for food availability. Therefore a further decrease in the water flow rate at the benchmark level is unlikely to affect this species and tolerant has been recorded.

Increase in temperature	Tolerant*	Not relevant	Not sensitive*	Low

No specific information was found on the effects of temperature on *Hippocampus hippocampus*, although temperature is known to affect reproduction rates. *Hippocampus hippocampus* is a predominantly southern species in British waters. It is also found in the Mediterranean, the Black Sea, and round the African coast to the Gulf of Guinea. *Hippocampus hippocampus* has been recorded in temperatures between 18 to 25 °C (Fishbase, 2000) and as low as 5 or 6 °C in the winter in British waters (N. Garrick-Maidment, pers. comm.). An increase in temperature may affect spawning levels. In captivity, *Hippocampus hippocampus* can be adapted to tropical temperatures. This was done by raising the water temperature very slowly over a period of time so that the seahorses are able to adapt with no adverse affects. Therefore an increase in temperature at the benchmark level may increase the viability of the population in British waters. *Hippocampus hippocampus* would therefore be tolerant* of this factor.

Decrease in temperature	Intermediate	Moderate	Moderate	Not relevant

No specific information could be found on the effect of a decrease in temperature on *Hippocampus hippocampus*. *Hippocampus hippocampus* predominantly occurs in the southern waters of the British Isles. However, there has been reports of *Hippocampus hippocampus* in water temperatures as low as 5-6 °C (Garrick-Maidment, pers. comm., February 2004). Therefore *Hippocampus hippocampus* is likely to be tolerant of a decrease in temperature at the benchmark level. However, reproductive output is likely to be reduced and adults may migrate away from an area that has cooled, therefore intolerance has been assessed as intermediate with a moderate recovery.

Increase in turbidity	Low	Very high	Very Low	Very low

No information on the specific effects of an increase in turbidity could be found. *Hippocampus hippocampus* is found in areas of low water flow rate and wave exposure and on substrata including silt and mud. Therefore is unlikely to be directly adversely affected by increases in turbidity at the benchmark level. However, light attenuation limits the depth to which seagrasses can grow as light is a requirement for photosynthesis. Turbidity resulting from dredging and eutrophication caused a massive decline of *Zostera* populations in the Wadden Sea (Geisen *et al.*, 1990; Davison & Hughes, 1998). Seagrass populations are likely to survive short term increases in turbidity, however, a prolonged increase in light attenuation, especially at the lower depths of its distribution, will probably result in loss or damage of the population. This may cause a loss of habitat and hence displacement of *Hippocampus hippocampus*. Therefore intolerance has been assessed as low with a very high recovery.

Decrease in turbidity Tolerant* Not relevant Not sensitive*

Decreases in turbidity may benefit algal growth and therefore increase the preferred habitat of *Hippocampus hippocampus*. This would be beneficial to the population providing more suitable habitats and holdfasts for individuals. It is therefore likely that a decrease in turbidity may benefit populations of *Hippocampus hippocampus*.

Increase in wave exposure Intermediate Moderate Moderate Low

Increased wave exposure may carry young fry away from their home range or disrupt a bonded pair. However *Hippocampus hippocampus* are mobile and use seagrasses and algae as holdfasts. *Hippocampus hippocampus* has been known to move out into deeper waters over winter. It has been suggested that this occurs in order for the seahorses to avoid storms and their effects (Garrick-Maidment, 1998).

Increased wave exposure may also be effect the substratum, reducing the extent of seagrass present. Seagrasses are vulnerable to damage cause by increased wave exposure, which could reduce the available habitat for *Hippocampus hippocampus* (see IMS.Zmar for further information). *Hippocampus hippocampus* are found in sheltered areas with gentle currents. Therefore, it is likely that they would be intolerant of an increase in wave exposure at the benchmark level. Hence, intolerance has been assessed as intermediate with a moderate recoverability.

Decrease in wave exposure Not relevant Not relevant Not relevant

Hippocampus hippocampus and the seagrass beds that they inhabit are found in sheltered areas. Therefore, a decrease in wave exposure at the benchmark level is unlikely to affect *Hippocampus hippocampus* and this factor has been considered not relevant.

Noise Not relevant

No information was found concerning the effects of noise on *Hippocampus hippocampus* although it is likely that *Hippocampus hippocampus* would not be affected by the level of noise at the benchmark level.

Visual Presence Tolerant Not relevant Not sensitive Very low

Hippocampus hippocampus is likely to respond to movement in order to avoid predation. However, it also uses camouflage as a defence against predators and sometimes may not move at all. Therefore, it is unlikely that *Hippocampus hippocampus* will be affected by visual disturbance at the benchmark level, so a rank of tolerant has been recorded.

Abrasion & physical disturbance Intermediate Moderate Moderate Very low

Hippocampus hippocampus is likely to be vulnerable to mobile fishing gear, for instance scallop dredging. Individuals may be crushed and killed but it is more likely that individuals would avoid the source of the disturbance. If a pregnant male is caught or killed the developing brood would also be lost. Intolerance has been assessed as intermediate with a moderate recoverability but with a very low confidence.

Displacement	Tolerant	Not relevant	Not sensitive	Low

Displacement of *Hippocampus hippocampus* may occur when adults or fry are cast adrift by storms or carried away while grasping floating debris, resulting in a loss of the portion of the population from the affected area (Vincent, 1994a). However, if transported to a suitable habitat they will resettle and survive. Therefore, *Hippocampus hippocampus* is likely to be tolerant of displacement at the benchmark level.

Chemical Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Synthetic compound contamination				Not relevant

No information was found concerning the effects of synthetic chemicals on *Hippocampus hippocampus*.

Heavy metal contamination				Not relevant

No information was found concerning the effects of heavy metals on *Hippocampus hippocampus*.

Hydrocarbon contamination				Not relevant

No information was found concerning the effects of hydrocarbons on *Hippocampus hippocampus*.

Radionuclide contamination				Not relevant

No information was found concerning the effects of radionuclides on *Hippocampus hippocampus*.

Changes in nutrient levels				Low

As *Hippocampus hippocampus* is a predator it is not reliant on nutrients for growth, however, a change in nutrients would affect the quality of the water and the availability of the prey of *Hippocampus hippocampus*. However, no information was found concerning the direct effects of nutrients on *Hippocampus hippocampus*.

Increase in salinity				Low

No information could be found on the effects of increased salinity on *Hippocampus hippocampus* .

Decrease in salinity				Low

The gill structure of *Hippocampus hippocampus* allows them to cope with brackish waters, showing a tolerance for a slight decrease in salinity (Garrick-Maidment, pers. comm., February 2004) but no information could be found on the effects of decreased salinity on *Hippocampus hippocampus*.

Changes in oxygenation				Not relevant

No information was found concerning the effects of hypoxia on *Hippocampus hippocampus*.

Biological Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Introduction of microbial pathogens/parasites	Intermediate	Moderate	Moderate	Moderate

In captivity seahorses are prone to 'Gas bubble disease' which can manifest itself in two forms (Garrick-Maidment, 1997). The first form can be caused by stress and bacteria. Visible symptoms include:

- gas bubbles under the skin of the tail;
- and gas bubbles under the skin on the snout (Garrick-Maidment, 1997).

This type of 'Gas bubble disease' is very destructive. It may be accompanied by fungus and will eventually cause death (Garrick-Maidment, 1997).

The second type of 'Gas bubble disease' may be caused by decaying embryos but there is a suggestion that high levels of dissolved oxygen from protein skimmers can cause problems in aquaria (Garrick-Maidment pers. comm., February 2004). An internal injury in the pouch may also be responsible (Garrick-Maidment, 1997). The consequences of gaseous build up is that the male loses control of his buoyancy and hangs upside down in the water and is not able to anchor itself (Garrick-Maidment, 1997). This form of the disease can be cured (Garrick-Maidment, 1997). No specific effects of microbial pathogens or parasites could be found for *Hippocampus hippocampus*, however inference may be drawn from other species of *Hippocampus*. For example:

- an abundant growth of parasitic hydroids (believed to be *Serialia lendigera*) on the head, neck, and anterior body parts in an aquarium held *Hippocampus ramulosus* was reported but no specific effects were observed (Newman, 1873; cited in Lauckner, 1984), and
- in a New York aquarium the ciliate *Uronema marinum* was found in the musculature and skin in seahorses. The ciliates also invaded the kidneys, urinary bladder, neural canal, blood vessels and gills and was highly destructive to the hosts tissues, ingesting blood cells and tissue debris (Cheung *et al*., 1980).

. Therefore, intolerance has been assessed as intermediate with a moderate recoverability.

Introduction of non-native species Not relevant

No information was found concerning the effects of alien species on *Hippocampus hippocampus*.

Extraction of this species Intermediate Moderate Moderate Moderate

Hippocampus hippocampus is targeted for extraction for trade as medicines, aquarium pets and curios. Seahorse populations are believed to have declined world-wide, although there is little quantitative harvest and trade data to support this (U.S. Fish & Wildlife Service, 2000).
At least 20 million dried seahorses are traded world-wide annually (Lourie *et al*., 1999). The majority of seahorses go to traditional Chinese medicine and its derivatives (e.g. Japanese and Korean traditional medicines). The impact of removing millions of seahorses can only be inferred indirectly because global seahorse numbers are unknown, and fisheries undocumented (Vincent, 1996).

Europe primarily trades seahorses as curios and aquarium fishes. Each import shipment is small but total imports amount to hundreds of thousands of seahorses annually. The UK imports live seahorses from around the world. Records show that in 1994, 4000 seahorses were imported (Wilson, 1995; cited in Vincent, 1996). The British Isles is now being targeted for collection for the aquarium trade, with a small but significant number of animals being taken in Weymouth Bay in Dorset commercially (price reported as £65 per fish) and a handful of animals being taken by divers and fishermen particularly around the Channel Islands of Jersey and Guernsey (JNCC, 2002). Seahorse fisheries are individually small but collectively very large and potentially damaging to wild seahorse populations, which are often caught in trawls and seines.

Trawling activities also damage the habitat of seahorses, for example, destroying seagrass beds. Extracting seahorses at the current rate appears to be having a serious effect on their populations (Vincent, 1996). Therefore, intolerance has been assessed as intermediate with a moderate recoverability.

Extraction of other species	Intermediate	Moderate	Moderate	Moderate

Although no information was found concerning the effects of extracting other species, it is known that seahorses are also caught as by-catch in trawls, seine and set nets in commercial fisheries directed at food fish or shrimps and prawns (Lourie *et al.*, 1999). Therefore, intolerance has been assessed as intermediate with a moderate recoverability.

Additional information

Recoverability
If an external factor causes or forces the removal of a population of seahorses, recolonization is likely to be slow. Similarly, if one half of a bonded pair is separated, seahorses will probably be slow to recolonize areas, as partners are not quickly replaced (Lourie *et al.*, 1999). Dispersal is sporadic, and unpredictable as adults may disperse during short range migrations but most movement to new areas happens when adults are cast adrift by storms or carried away while grasping floating debris. It has been suggested that young fry are more likely to colonize new or depleted areas because they are often carried away from natal habitats despite attempts to settle into the substratum (Vincent, 1996). Slow swimming movements, combined with a limited home range may also delay recolonization of any areas from which they have been removed (Lourie *et al.*, 1999). Therefore, the overall evidence suggests that recoverability is slow .

Importance review

Policy/legislation

Berne Convention	Appendix II
CITES	Appendix B
Wildlife & Countryside Act	Schedule 5, section 9
UK Biodiversity Action Plan Priority	✔
Species of principal importance (England)	✔
OSPAR Annex V	✔
IUCN Red List	Data Deficient (DD)
Features of Conservation Importance (England & Wales)	✔

Status

National (GB) importance	Not rare/scarce	**Global red list (IUCN) category**	Data Deficient (DD)

Non-native

Native	-		
Origin	-	**Date Arrived**	-

Importance information

To date, few conservation strategies have been implemented for *Hippocampus hippocampus*. However, seahorses are listed for protection in various statutes, directories and conventions .

- The entire genus *Hippocampus* was listed in Appendix II of the IUCN Red List in November 2002 but implementation of the listing is delayed until 2004.
- *Hippocampus hippocampus* was previously listed in 1996 as vulnerable (VU A2cd) under the 1994 criteria. This assessment was based on suspected past declines in occupancy, occurrence and habitat, as well as on potential levels of exploitation. The IUCN reported that there is no appropriate data on the biology and ecology, habitat, abundance or distribution of *Hippocampus hippocampus*. As a result *Hippocampus hippocampus* has been reassessed as 'data deficient' under new criteria (Marsden *et al*., 2003).
- The European Union regulate and/or monitor the use of dried and live syngnathids but without management requirements (TRAFFIC, 2002).
- In the UK, the Seahorse Trust submitted *Hippocampus hippocampus* and *Hippocampus guttulatus* for full protection under section 5 of the Wildlife and Countryside Act 1981 in February 2000 (Garrick-Maidment & Jones, 2004). This proposal is still under review and is awaiting consultation by the Government with a wide range of organisations and individuals concerned with the review process.
- In 2002, JNCC supported this proposal and recommended that both species be given full legal protection under section 5 of the Wildlife and Countryside Act.

The seahorse trade

Seahorses of *Hippocampus* spp. are globally exploited for use as medicines, aquarium fishes, curios and even foods. The majority of seahorses go to traditional Chinese medicine and its derivatives (e.g. Japanese and Korean traditional medicines) (Vincent, 1996). Treatments including seahorses are believed to benefit a range of conditions including respiratory disorders such as asthma, sexual dysfunctions, general lethargy and pain (Lourie *et al.*, 1999).

The statistics on the seahorse trade are limited and the few that have been published suggest that the annual consumption within the Asian nations alone may amount to 45 t of dried seahorse (about 16 million individuals). The largest users appear to be the Chinese (estimated 20 t), Taiwan (11.2 t), and Hong Kong (10 t) (Vincent, 1996). These figures are underestimates as they include only the trade that passed through China, Hong Kong and Singapore. Therefore, total global consumption of seahorses will be much greater, and as of yet no statistics are available (Vincent, 1996).

The British Isles is now being targeted for collection for the aquarium trade, with a small but significant number of animals being taken in Weymouth Bay in Dorset commercially (price reported as £65 per fish) and a handful of animals being taken by divers and fishermen particularly around the Channel Islands of Jersey and Guernsey (JNCC, 2002). It has been suggested that as stocks of *Hippocampus hippocampus* diminish in other countries and as more unusual species of seahorse are sought after, then this lucrative trade is bound to increase in UK waters, which could lead to a larger scale fishery (JNCC, 2002).

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