OSPAR COMMISSION

Background Document for the Long-snouted seahorse - *Hippocampus guttulatus* - update

Biodiversity Series

2013

OSPAR Convention

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the “OSPAR Convention”) was opened for signature at the Ministerial Meeting of the former Oslo and Paris Commissions in Paris on 22 September 1992. The Convention entered into force on 25 March 1998. The Contracting Parties are Belgium, Denmark, the European Union, Finland, France, Germany, Iceland, Ireland, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Convention OSPAR

La Convention pour la protection du milieu marin de l'Atlantique du Nord-Est, dite Convention OSPAR, a été ouverte à la signature à la réunion ministérielle des anciennes Commissions d'Oslo et de Paris, à Paris le 22 septembre 1992. La Convention est entrée en vigueur le 25 mars 1998. Les Parties contractantes sont l'Allemagne, la Belgique, le Danemark, l’Espagne, la Finlande, la France, l’Irlande, l’Islande, le Luxembourg, la Norvège, les Pays-Bas, le Portugal, le Royaume-Uni de Grande Bretagne et d’Irlande du Nord, la Suède, la Suisse et l’Union européenne.

Acknowledgement

This report has been prepared by Amelia Curd for France as lead country. The contributions of Patrick Louisy, Nikki Chapman and Lucy Woodall are gratefully acknowledged. The report was updated in 2013 by Benjamin Ponge (Agence des aires marines protégées, France) with contributions from Damien Grima.

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Background Document for the long-snouted seahorse *Hippocampus guttulatus* - update

Executive summary

This background document on the long-snouted seahorse – *Hippocampus guttulatus* - has been developed by OSPAR following the inclusion of this species on the OSPAR List of threatened and/or declining species and habitats (OSPAR Agreement 2008-6). The document provides a compilation of the reviews and assessments that have been prepared concerning this species since the agreement to include it in the OSPAR List in 2004. The original evaluation used to justify the inclusion of *Hippocampus guttulatus* in the OSPAR List is followed by an assessment of the most recent information on its status (distribution, population, condition) and key threats prepared during 2008-2009, and updated in 2013. Chapter 7 provides recommendations for the actions and measures that could be taken to improve the conservation status of the species. On the basis of these recommendations, OSPAR will continue its work to ensure the protection of *Hippocampus guttulatus*, where necessary in cooperation with other organisations. This document may be updated to reflect further developments.

Récapitulatif

Le présent document de fond sur le *Cheval de mer (hippocampe) à long bec* a été élaboré par OSPAR à la suite de l'inclusion de cette espèce dans la liste OSPAR des espèces et habitats menacés et/ou en déclin (Accord OSPAR 2008-6). Ce document comporte une compilation des revues et des évaluations concernant cette espèce qui ont été préparées depuis qu'il a été convenu de l'inclure dans la Liste OSPAR en 2004. L'évaluation d'origine permettant de justifier l'inclusion du *Cheval de mer (hippocampe) à long bec* dans la Liste OSPAR est suivie d'une évaluation des informations les plus récentes sur son statut (distribution, population, condition) et des menaces clés, préparée en 2008-2009, et actualisée en 2013. Le chapitre 7 recommande des actions et mesures à prendre éventuellement afin d'améliorer l'état de conservation de l'espèce. OSPAR poursuivra ses travaux, en se fondant sur ces recommandations, afin de s'assurer de la protection du *Cheval de mer (hippocampe) à long bec*, le cas échéant en coopération avec d'autres organisations. Le présent document pourra être actualisé pour tenir compte de nouvelles avancées.

1. Background Information

Name of species

Hippocampus guttulatus (formerly *ramulosus*).long-snouted seahorse. Also known as the spiny or many- branched seahorse.

Historically, *H. guttulatus* has been synonymous with *Hippocampus ramulosus* (Leach 1814) but examination of the *H. ramulosus* holotype, to which access is currently unavailable, suggested that this might represent a different species. Clarification requires further research: For the time being there is no genetic evidence of differentiation between *H.ramulosus* and *H.guttulatus.* Vasil'eva (2007) suggests renaming the species *Hippocampus hippocampus*, with the short-snouted seahorse being named instead *Hippocampus brevirostris*. However, until a general consensus is reached on this topic, *H. guttulatus* is retained (Curtis & Vincent, 2006).

Species ecology and breeding biology

While present knowledge of seahorse life history is incomplete, existing information indicates that seahorse populations are commonly vulnerable to overfishing either due to by-catch in non-selective fishing gear or through direct exploitation for use in traditional medicine, the aquarium trade and for sale as curiosities, as well as being vulnerable to degradation of their inshore habitats (Foster & Vincent 2004). *Hippocampus* spp. populations are particularly sensitive to activities which deplete the number of individuals in a particular area due to the following biological traits:

a. male brooding means that survival of the young *in marsupio* depends on the survival of the male;

b. lengthy parental care combined with low fecundity and small brood size limit reproductive rates;

c. low mobility and small home ranges restrict recolonisation of depleted areas;

d. sparse distribution means that lost partners are not quickly replaced;

e. strict mate fidelity means that social structure is easily disrupted;

f. typically low rates of adult mortality mean that fishing exerts a relatively substantial selective pressure;

g. patchy distribution means that recolonisation of a site is unlikely if that site is disturbed.

2. Original Evaluation against the Texel-Faial selection criteria

List of OSPAR Regions and Dinter biogeographic zones where the species occurs

OSPAR Regions:	II, III, IV, V
Dinter biogeographic zones:	Azores shelf, Lusitanean (Cold/Warm) , Lusitanean-boreal, Boreal-lusitanean

List of OSPAR Regions and Dinter biogeographic zones where the species is under threat and/or in decline

All where it occurs

Original evaluation against the Texel-Faial criteria for which the species was included on the OSPAR List

H. guttulatus was nominated for inclusion on the OSPAR list with particular reference to its regional importance, decline and sensitivity, with information also provided on threat.

Threats have not changed since the species was listed, but are discussed further in section 4.

Table 1: Summary assessment of *H. guttulatus* against the Texel-Faial criteria

Criterion	Comments	Evaluation
Global importance	Primarily a species of European waters, occurring in the Eastern Atlantic from the Netherlands, south to Portugal, into and around the whole of the Mediterranean, east as far as the Aegean Sea and into the Black Sea.	Qualifies
Regional importance	Only two of the 32 species in the world live in the Northeast Atlantic: *Hippocampus guttulatus* and *Hippocampus hippocampus*. This species of seahorse has been reported from four of the five OSPAR Regions where it is found close inshore. This species is thought possibly to change in size and base coloration across its distribution: a study by Woodall (2009) found no genetic evidence to suggest these size and colour changes are due to sub-speciation.	Qualifies
Rarity	Total population size and number of locations in the OSPAR area unknown.	Unknown
Sensitivity	While present knowledge of seahorse life history is incomplete, existing information indicates that seahorse populations are commonly vulnerable to overexploitation, whether direct or indirect: low population densities mean that seahorses may have trouble finding a new partner; low mobility and small home range sizes mean that seahorses may be slow to recolonize overexploited areas (although this may be offset by planktonic dispersal of juveniles over short distances only); possible low rates of natural mortality mean that heavy fishing will place unsustainable pressure on the population; monogamy in most species means that a widowed partner may stop reproducing, at least temporarily; male brooding means that survival of the young in marsupio depends on the survival of the male; and a small brood size limits the potential reproductive rate of the pair (although this may be offset by frequent spawning and enhanced juvenile survival through parental care). Even if seahorses are returned to the water after being caught in non-selective gear, they may still experience deleterious effects that include physical injury, habitat damage, removal from home ranges and disturbance of pair bonds (Foster & Vincent 2004).	Qualifies-very sensitive
Keystone species	Not a species known to have a controlling influence on any community within the OSPAR region as there is no information on seahorse predators and very little on seahorse prey items. Prey species may be significantly affected by seahorse presence as they are voracious feeders and tend to stay in a small home range, therefore locally having a large effect (Woodall, pers.comm.).	Unknown
Decline	There are reports and strong circumstantial evidence of declining numbers and diminishing size in catches among a number of the commonly traded species of *Hippocampus*. However, there are no specific figures for this species in the OSPAR Maritime Area although important habitat for seahorses (seagrass) is known to have become less extensive, with the exception of visual underwater census data from the Ria Formosa lagoon in Portugal which shows a large decrease in population (Woodall, 2009).	Unknown

3. Current status of the species

Distribution in the OSPAR Maritime Area

No known changes since the time it was listed in 2001.

H. guttulatus seems to have a need for some form of cover whether this is weed or rock. They are seldom found out in the open over sand or silt or mud. *H. hippocampus,* the short-snouted seahorse, has a much more even habitat preference and can be found in most areas. A study by Woodall (2009) found the highest densities of *H.guttulatus* in seagrass beds, whereas the greatest numbers of *H.hippocampus* were found on artificial structures: however sites surveyed were specifically targeted as populations with large densities and may not be a true representation of habitat preference. In the French part of OSPAR Maritime Area, the Hippo-ATLAS data (Louisy, 2011) suggest that *H. guttulatus* mainly lives on sandy bottoms, with living organisms dominant in 83% of the occurrences. Seagrass was the most common dominant living category: 62% of the total occurrences (other possible dominant organism categories are algae and sponges/tunicates).

Some seahorses change habitat and depth choice as they grow (Foster & Vincent, 2004). In a Portuguese lagoon, juvenile *H. guttulatus* only began occupying the same habitat as adults when they neared maturity (J. Curtis, pers. comm.). A study by Boisseau (1967) of the Arcachon Basin in France inferred that *H. guttulatus* adults may make seasonal migrations to deeper water in the winter months, however studies in Portugal (Curtis & Vincent, 2006) suggested that adult *H. guttulatus* remained within their home ranges year round.

A further study by Curtis & Vincent (2006) revealed that the 2 sympatric seahorse species encountered in the OSPAR Maritime Area, *H. guttulatus* and *H. hippocampus*, with similar life histories (reviewed in Foster & Vincent 2004) differed markedly in their habitat use over multiple spatial scales and along a gradient of habitat complexity: One species was positively associated with habitat cover at both landscape and microhabitat scales, whereas the other species used more open and less speciose habitats at the landscape scale despite preferring covered microhabitats (see graph in Figure 1 below).

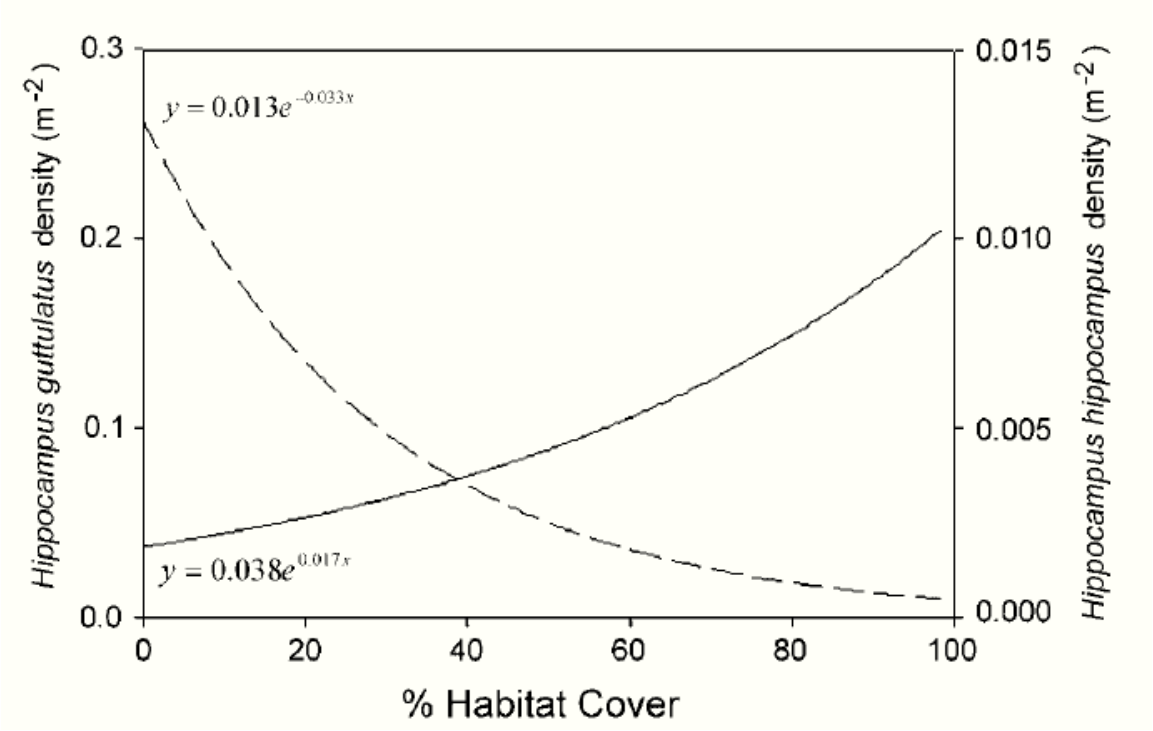

Figure 1: Habitat–abundance curves for sympatric European seahorses in the Ria Formosa lagoon. Equations are given for the curves fitted to densities of *Hippocampus guttulat*us (solid line) and *Hippocampus hippocampus* (dashed line) plotted as a function of the percentage of substrate covered by seagrasses, macroalgae and benthic invertebrates (data from Curtis and Vincent (2005))

Although both species are found at similar depths (usually no deeper than 7m although this is linked to SCUBA-dived based observations), depth variance appears to be greater for *H. hippocampus,* whereas *H.guttulatus* is found in shallower depths (N. Garrick-Maidment, pers. comm.). They occupy only certain parts of seemingly suitable habitats, for example staying close to the edge of seagrass beds leaving large areas unoccupied. These microhabitats have not been investigated but it has been suggested that there is a trade-off between the shelter provided by dense seagrass and the food availability in areas of good water exchange at the periphery of seagrass patches . Habitat / substratum preferences may be seasonal and related to seasonal migration (N. Garrick-Maidment, pers. comm.).

Population (current/trends/future prospects)

There are no published data about population trends or total numbers of mature animals for this species. There is very little available information about its extent of occurrence or its area of occupancy. There have been no quantitative analyses examining the probability of extinction of this species. As a result, this species was listed as Data Deficient by the IUCN Red List assessors in 2003 as they have insufficient data to properly assess the species against any of the IUCN criteria (IUCN 2008). There is however much anecdotal evidence for massive changes in seahorse population size over the short term. A signature for this boom and bust type phenomenon is also seen in seahorse genetic data (Woodall, 2009). Some voluntary survey networks are reporting an increase in sightings, but this may be due to increased public awareness rather than an increase in seahorse abundance. Unpublished data from southern Portugal shows a massive decrease since 2002, whereas data from southern France shows a decrease followed by an increase since 2004 (Woodall, 2009).

There is no overall trend evident across the OSPAR Maritime Area, as some populations appear to be increasing and some decreasing. Populations seem to be dynamic with massive fluctuations between years. This suggests that they are greatly threatened by local and transient changes. The key parameters causing these changes are the most significant still requires more research.

Condition (current/trends/future prospects)

There is no known change in overall condition of the species since the time it was listed. Future trends are currently very unclear due to the limited data on seahorses in the OSPAR Maritime Area.

Limitations in knowledge

No known changes since the time it was listed. Future trends are very unclear as little information is available on population dynamics, reproductive rate and ecology in the OSPAR area. Pioneering work is being undertaken at present in Spain and the UK using DNA to analyse how this species varies throughout its range, or if indeed there is more than one species. Initial results show that there is no species difference across the range, however regional genetic structuring is obvious in both species (Woodall, 2009).

More research is required on seahorse movement and dispersal, particularly for newly released young (Foster & Vincent, 2004). Seahorse ecology, particularly the influence of habitat structure remains largely unexplored at present.

4. Evaluation of threats and impacts

Table 2. Summary of key threats and impacts to *H.guttulatus*

Type of impact	Cause of threat	Comment
Accidental by-catch	Fishing: benthic trawling/scallop dredging; potting/creeling; fixed netting	Seahorses are also taken as by-catch in a variety of fishing gears (trawls, beach seines, push nets, gill and trammel nets, and pots). By-catch currently accounts for the majority of specimens in international trade, destined for the traditional medicine and curio markets Even if seahorses are returned to the water after being caught in non-selective gear, they may still experience deleterious effects that include physical injury, habitat damage, removal from home ranges and disturbance of pair bonds (Davis, 2002; Baum *et al*., 2003).
Habitat disturbance and loss	Bottom-fishing activites, Extraction:sand/gravel (aggregate dredging) Waste: land/riverine runoff Development: docks, ports and marinas	The density of *H. guttulatus* has been found to be positively correlated with vegetation cover (including seagrass and macroalgae) and epibenthos (including ascidians and tube-dwelling polychaetes) (J. Curtis, pers. comm.); therefore any decline in cover is likely to affect the abundance of this species. Habitat disturbance and loss is a primary cause of concern particularly the Zostera beds in which they breed during the spring, summer and early winter and in which they may reside year-round. This habitat is lost due to a number of factors, including silt deposits from land run off and fishing practices such as scalloping through the seagrass beds. Marina building and other developments are also damaging, and a naturally occurring wasting disease also results in additional mortality.
Directed fisheries	Medicinal trade	Seahorses in general are targeted around the world for the traditional medicine trade, which takes in excess of 30 million animals per year (Vincent 1996). There are more than 65 countries taking part in this trade and new locations are being sought all the time. Trade in recent years appears to be increasing, with demand particularly high in China.
Directed Fisheries	Aquarium trade	Seahorses are highly sought after for aquariums, both public and private. It has been estimated that up to 1 million (for all *Hippocampus* species) are taken each year for this purpose. The vast majority of these individuals die in transit and if they do reach the relative safety of the aquarium, most die within the first few weeks because they are notoriously difficult to maintain in captivity. Because survival rates for seahorses in captivity are low, almost all seahorses in aquariums are wild-caught. As stocks diminish in other countries and as more unusual species of seahorse are collected, then this lucrative trade is bound to increase in the OSPAR area, leading to a larger scale fishery. Using forensic genetic techniques, Woodall (2009) has found *H.hippocampus* traded when other 'tropical' species have been named on trade licences.Over the last few years, seahorses have been taken from the wild for sale in aquariums and in Britain, they can be sold for quite high prices which makes them a viable proposition for collectors. The number taken may be small, but this could have a major impact on a local population due to the size of the seahorse's territory. A large area of eelgrass can only support a small number of individuals; if seahorses are taken regularly from the same area it does not take long for a local population to be wiped out. Seahorse populations are being increasingly decimated in other countries and more unusual species of seahorse are being sought for aquariums (Garrick-Maidment 2004).

Directed Fisheries	Curio trade	Seahorse bodies are made up of a series of hard bony plates fused together, with a fleshy covering. This exo-skeleton means that when the seahorse is dead and dried out it keeps its shape well. For this reason seahorses are taken from the wild for the curio trade where they are bought as souvenirs of a seaside trip or as crude key rings and trinkets. Unfortunately, people who innocently buy the seahorses (and even some who sell them) believe they have been found dead, but they are nearly always taken alive and left to dry out in the sun, strung up by their necks (Garrick-Maidment 2004).

5. Existing Management measures

The entire genus *Hippocampus* is listed in Appendix II of CITES, effective since the 5 May 2004. All signatory countries to CITES are legally obliged to manage seahorse exports for sustainability. International trade is monitored through a licensing system and a universal minimum size limit for all seahorses in trade .

The convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention) lists both *H.guttulatus* and *H.hippocampus* in Appendix II. Deliberate capture, keeping, killing or disturbance, deliberate damage to or destruction of breeding or resting sites and the possession of and internal trade in these animals, alive or dead, is prohibited. At present, only the Mediterranean populations of these two species are listed.

H. guttulatus is listed as Data Deficient by IUCN. *H. guttulatus* is listed in the Red Data Books of France and Portugal; the species is protected in Slovenia under the 1993 Protection of Threatened Animal Species Act, which prohibits trade in and bans the keeping of the animal in captivity.

Several countries have dedicated, albeit voluntary seahorse survey networks. The British Seahorse Survey has been run by the Seahorse Trust since 1994 and was set up to look for and monitor the populations of seahorses around the British Isles and Ireland (http://www.britishseahorsesurvey.org/). In France the “Peau Bleue” association has been compiling a “Hippo-Atlas” database of diver observations and photos since 2005 (http://www.subaquapixel.net/peaubleue.php?page_id=149). In Spain, the Marine Research Institute of Vigo launched project “Hippocampus” in 2006. This is a coordinated national research programme (Planas *et al.*, 2008a) which studies the wild populations of seahorses in Galicia and the Canary Islands. Additionally Project Seahorse (http://seahorse.fisheries.ubc.ca/) has monitored seahorse populations in southern Portugal since 2000.

Marine reserves are thought to be most effective for animals such as seahorses with intermediate levels of juvenile and adult movement (Foster & Vincent, 2004). Site fidelity to small, overlapping home ranges by adults means that marine protected areas may be effective tools for protecting critical spawning biomasses for *H. guttulatus* populations (Kramer & Chapman, 1999), particularly if established in preferred seagrass- and macroalgal-dominated communities (Curtis & Vincent, 2005). To date the only MPA reported to the OSPAR database as containing *Hippocampus* sp. is the Islas Atlanticas MPA (Spain).

6. Conclusion on overall status

There is no known change in the status of this species since it was listed by OSPAR in 2004. The absence of precise information on the population size of this species in the OSPAR Maritime Area renders future trends very unclear.

A study by Curtis *et al.* (2007) suggests that management actions that promote an increase in habitat complexity may benefit *H. guttulatus*, but lead to declines of *H. hippocampus* unless the management strategy also provides for the maintenance of more open habitats. Given that both species are of conservation concern and potentially subject to a variety of non-selective towed demersal fishing gears, this is an important trade-off to consider when developing conservation strategies for these species (Curtis *et al*., 2007). Small sub-adult and adult home ranges may mean that seahorses are slow to recolonise heavily exploited areas, however another positive consequence of their limited dispersal is that it may allow small protected areas to support viable seahorse populations (Kramer & Chapman 1999).

Despite the lack of long-term studies on seahorses, it is widely believed that their charismatic nature may provide a powerful means of mobilizing public will and political support to develop appropriate conservation solutions to be broadly applied across lagoonal and other marine systems (Martin-Smith & Vincent 2005; Goffredo *et al.*, 2004).

7. What action should be taken at an OSPAR level?

Actions/measures that OSPAR could take, subject to OSPAR agreement

OSPAR should contact the European Commission and the standing committee of the Bern Convention to:

a. notify them of the listing under OSPAR, threats facing the species, and the willingness of OSPAR to co-operate in developing conservation measures;

b. request information on the effectiveness of any measures taken for the protection of this species;

c. highlight the need to revise the Bern convention listing to include the OSPAR Maritime Area seahorse populations;

OSPAR should work with relevant Contracting Parties (see Table 3 below) to:

a. raise awareness of status and threats to the species among both management authorities, fishermen, retailers and the general public.

b. improve communication and information exchanges between *Hippocampus* sp. researchers and authorities

Actions/measures for relevant Contracting Parties

OSPAR should recommend that relevant Contracting Parties (see Table 3 below):

a. should identify and select appropriate areas for inclusion in the OSPAR MPA network , particularly as seahorses are not covered by the EU Habitats Directive

b. develop and implement actions and measures to prevent the loss of seagrass habitat, within the population range of *H. guttulatus*.

OSPAR should establish a mechanism by which Contracting Parties report back on the implementation of the above recommendations so that the development of the necessary measures can be evaluated. As a first step Contracting Parties who have *H. guttulatus* present in their coastal waters should make an assessment of the effectiveness of the regulations they already have in place for its protection, consider how those regulations might be made more effective through improved monitoring, control and surveillance and report the results to the OSPAR Commission.

Suggestions for further research

OSPAR should emphasise to relevant scientific funding bodies and existing national monitoring programmes the following research needs with respect to *H. guttulatus:*

a. further development of decision-support tools such as microsatellite markers and biogeographical models

b. further international collaboration to investigate the genetic diversity and relationships among the various populations of seahorses in Europe.

c. further data collection, harmonisation and collation to augment the baseline data collection where resources allow.

d. further research on seahorse movement and dispersal, particularly for newly-released young.

e. further research to refine the maximum adult size and size at first maturity of this species in order to determine whether the CITES minimum is permissible

f. further research on the ecological interactions affecting seahorses (e.g competitors, prey, predators, habitat usage and complexity)

Table 3: Summary of key threats and existing protection for *Hippocampus guttulatus*.

Key threats	Accidental by-catch, habitat disturbance and loss, directed fisheries (outside OSPAR waters)	
Relevant Contracting Parties	UK, Ireland, Belgium, the Netherlands, France, Spain, Portugal	
Other responsible authorities	EC, national monitoring bodies	
Already protected? **Measures adequate?**	Bern Convention Annex II (Mediterranean only) Bonn Convention Annex II Barcelona Convention Annex II CITES Appendix II IUCN Red List (Data Deficient)	One of the first steps contracting countries are recommended to take is an assessment of the effectiveness of the regulations they already have in situ, and how those regulations might be made more effective through improved monitoring, control and surveillance.

Annex 1: Overview of data and information provided by Contracting Parties

Contracting Party	Feature occurs in CP's Maritime Area	Contribution made to the assessment (e.g. data/information provided)	National reports References or weblinks
Belgium	Y		
Denmark			
European Commission			
France	Y	Y	**DORIS**, 31/12/2008 : *Hippocampus guttulatus* (Cuvier 1829), http://doris.ffessm.fr/fiche2.asp?fiche_numero=302 Hippo-ATLAS photo database: http://www.subaquapixel.net/programmehippocampe/
Germany			
Iceland			
Ireland	Y		
Netherlands	Y		
Norway			
Portugal	Y	Y	http://seahorse.fisheries.ubc.ca/portugal-where.html
Spain	Y	Y	http://www.iac2008.cn/en/pdf02/Day1_IAC2008%20Congress%20Proceedings_Paper.pdf
Sweden			
UK	Y		Neish, A.H., 2007. *Hippocampus guttulatus*. Long snouted seahorse. *Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme* [on-line]. Plymouth: Marine Biological Association of the United Kingdom. [cited 21/11/2008]. Available from: <http://www.marlin.ac.uk/species/Hippocampusguttulatus.htm>

H.guttulatus was nominated for inclusion in the OSPAR List in 2001 by Portugal.

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Summaries of country-specific information provided

Britain and Ireland

Distribution map courtesy of MARLIN

After a seven year campaign by The Seahorse Trust based on data collected by the British Seahorse Survey (www.theseahorsetrust.co.uk;www.britishseahorsesurvey.org) and since 6 April 2008, both *H.guttulatus* and *H.hippocampus* are protected under the UK Wildlife and Countryside Act 1981 (http://www.opsi.gov.uk/si/si2008/uksi_20080431_en_1) .

H.guttulatus is recorded as present from the south and south west coasts of Britain and Ireland, and on the western coasts of Orkney and Shetland, but is most commonly seen from the Thames estuary to the north Devon coast. *Hippocampus guttulatus* has a much wider range around the British Isles than *H.hippocampus*, with sightings being recorded from the East coast, along the South coast and continuing to the west coast of Wales, with sightings being recorded as far north as the Shetland Isles.

France: Locally common to abundant in certain lagoons, notably in Arcachon Bay and around the coast of Brittany. The “Hippo-Atlas” database managed by the “Peau-Bleue” association is largely filled with reports and photos from amateur divers. In this database, *H. guttulatus* are often reported from Arcachon Bay, and sometimes south of it, Hossegor lagoon; some are reported from Western and Southern Brittany. Photos are also visible in the DORIS website from the FFESSM, the French Sub-Marine Sports Federation.

In Arcachon Bay, interviews on the historical variation of seahorse populations (both species) led to the following conclusions (Grima, 2011) :

- Up to 1970-1975, seahorses where considered to be abundant in Arcachon Bay.
- Most questioned persons point out a marked decrease for the 1985-1990 period.
- Since 2008, population levels are perceived as high, although abundance may have decreased locally, in relation with coastal works (Grima, 2011).

In 2011, observed local densities of *H. guttulatus* could be high in Arcachon Bay, up to at least 30 individuals per 100 square meters (Louisy pers. obs.). According to recent observation (Grima D. & Louisy, 2012), the population of *H. guttulatus* is ten times higher than the *H.hippocampus* population in the Arcachon Bay.

Besides, this and other studies (Louisy, 2011b and Grima & Louisy, 2012), have confirmed in the Atlantic that the presence of *H. guttulatus* is linked with the presence of seagrass (contrary to the Mediterranean Sea for instance where this correlation is not established).

Portugal: Seen along most of the coastline, in estuary mouths and lagoon systems. Pressure from habitat disruption, i.e. dredging for substrate. Stable populations from 2000-2004, significant decrease from 2004 to present day.

Spain: In Spain, it is thought that *H. guttulatus* is not subject to high fishing pressure for international trade, but wild populations have disappeared/reduced in many sites of the coast as reported by fishers, divers and marine naturalists, although there is a lack of investigation to quantify this statement (Planas 2008b).

The main objectives of the project 'Hippocampus' launched in 2006 and coordinated by the " Instituto de Investigaciones Marinas de Vigo" are the study of wild populations in some areas of the Spanish coast (Galicia and Canary Islands), to develop a breeding programme in captivity and to assay a genetically-controlled repopulation programme in selected natural areas (Planas 2008b).

Annex 2: Detailed description of proposed monitoring and assessment strategy

Rationale for the proposed monitoring

Present knowledge of seahorse life history is incomplete: virtually nothing is known about the ecology or population dynamics of this species. A good understanding of a wide array of life-history parameters is a major asset in planning for long-term persistence and recovery of depleted populations (Foster & Vincent 2004). More information is needed to improve wild seahorse population management initiatives, therefore for OSPAR monitoring and assessment purposes it will be necessary to bring together an in-depth overview of the separate efforts underway at the level of the OSPAR Region.

Use of existing monitoring programmes

Monitoring of the Ria Formosa lagoon and in southern France (although mostly on the Mediterranean coast) is ongoing. There is also a network of European wide dive centres that are monitoring local seahorse populations although not scientifically.

Synergies with monitoring of other species or habitats.

Seahorse monitoring could be incorporated into existing seagrass bed surveys, however not all seahorse populations are correlated with seagrass therefore no seagrass does not exclude the presence of seahorses

Assessment criteria

So little is known about the life history and population dynamics of *H.guttulatus* that it is currently very difficult to set any assessment criteria. For this reason it is vital that OSPAR works towards collecting and facilitating the collection of biological information on *Hippocampus* spp. throughout the OSPAR Maritime Area.

Techniques/approaches

As seahorses are cryptic, dive surveys with divers that are not experts at diving with seahorses are of limited use. Fishing methods have been used for sampling (see Curtis *et al*., 2007), however the best approach may be to assess habitat and develop predictors for habitat presence: this requires further research.

Selection of monitoring locations

Suggestions for locations are provided in Woodall (2009), however a more holistic view of the OSPAR region seahorse distribution would be obtained by carrying out first of all a survey of divers and local coastal fishers.

Timing and Frequency of monitoring

Seasonal observations are needed, as there appears to be a seasonal migration in some, but not all, populations of *H.guttulatus*. Seahorses are also affected by weather conditions and are more often seen in deeper water after heavy storms**.**

Data collection and reporting

A global seahorse sighting website is being set up (more information from Lucy Woodall), which includes photos, habitat and seahorse data.

Quality assurance

Refer to Curtis *et al*., 2007.

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ISBN 978-1-909159-49-5
Publication Number: 616/2013