OSPAR COMMISSION

Background Document for the short-snouted seahorse - *Hippocampus hippocampus* - 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, 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 short-snouted seahorse *Hippocampus hippocampus* – update

Executive summary

This background document on the short-snouted seahorse – *Hippocampus hippocampus* - 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 hippocampus* 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 hippocampus*, 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 museau court* 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 museau court* 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 museau court*, 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 hippocampus. short-snouted seahorse.

The taxonomy of these fish still remains unsettled; Vasil'Eva (2007) suggests renaming the species *Hippocampus brevirostris*. However, until a general consensus is reached on this topic, *H. hippocampus* 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

II, III, IV, V

Dinter biogeographic zones: Azores shelf, Lusitanean (Cold/Warm), Lusitanean-boreal, Boreal-lusitanean, Boreal (part).

List of OSPAR Regions 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. hippocampus 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 further elaborated upon under section 4.

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

Criterion	Comments	Evaluation
Global importance	Primarily an eastern Atlantic species, occurring from the Wadden Sea southward to the Gulf of Guinea, Canary Islands and along the African coast to Guinea. Also occurs in 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. Further work will need to be done to determine the status of these colour forms.	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 recolonise 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 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 nominated for the OSPAR List.

H. hippocampus can be found in most coastal habitats and has a much more even spread on habitat preference and in contrast to *H.guttulatus*, the long-snouted seahorse, which seems to prefer some form of cover. Woodall (2009) found the greatest number of *H.hippocampus* 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 the OSPAR Maritime Area, the Hippo-ATLAS data (Louisy, 2011) suggest that *H.hippocampus* lives in a wider variety of habitats than *H.guttulatus*. Short snouted seahorses were encountered on muddy and sandy substrates, but also on shells, rocks or pebble. Observed habitat was dominated by living organisms in only 63% of the

occurrences; the main dominant living organism categories were (in decreasing order) benthic animals (mostly sessile), seagrass, and seaweed.

Some seahorses change habitat and depth choice as they grow (Foster & Vincent, 2004). A study by Boisseau (1967) of the Arcachon Basin, France inferred that *H.hippocampus* adults may make seasonal migrations to deeper water in the winter months.

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 Fig.1 below).

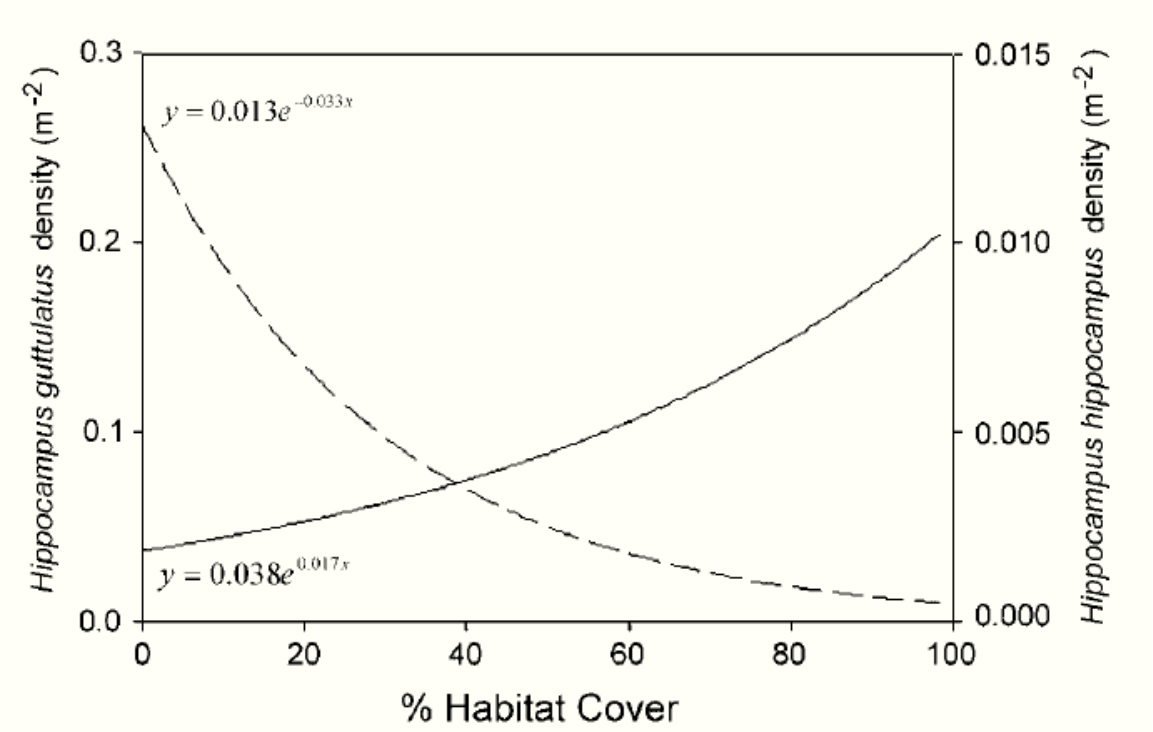

Fig. 1: Habitat–abundance curves for sympatric European seahorses in the Ria Formosa lagoon. Equations are given for the curves fitted to densities of *Hippocampus guttulat*us (solid line) and *Hippocampus hippocampus* (dashed line) plotted as a function of the percentage of substrate covered by seagrasses, 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,* particularly in naturally deep-water areas such as around the Channel Islands where it occurs in rocky areas over 30m deepThey 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 is 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.). In northern Brittany in the Mont St-Michel Bay area *H.*

hippocampus is frequently observed on flat oyster (*Ostrea edulis)* beds where it is thought to feed and shelter on the associated epifauna. Off the Belgian coast, where huge densities of *H.hippocampus* have been caught on several occasions by a gillnet fisherman, (see annex 1) they are thought to attach themselves to bryozoan colonies which occur on rough ground between sandbanks.

Population (current/trends/future prospects)

There are no published data on 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 there are insufficient data to properly assess its status 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. Some voluntary survey networks are currently 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)A signature for this boom and bust type phenomena is also seen in seahorse genetic data (Woodall, 2009).

No overall trend in populations across the OSPAR Maritime Area is evident, 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 threatened by local and transient changes in environmental conditions, though the most important variables have not been identified

Condition (current/trends/future prospects)

No known change 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

Future trends are very unclear as little information is available on population dynamics, reproductive rate and ecology of *H.hippocampus* in the NE Atlantic. 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 they are the same species. First results show that there is no species difference across the range, however regional genetic structuring is obvious in both European species (Woodall, 2009).

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

4. Evaluation of threats and impacts

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

Type of impact	Cause of threat	Comment
Accidental by-catch	Fishing: benthic trawling/scallop dredging; potting/creeling; fixed netting	Seahorses are 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 activities, Extraction: sand/gravel (aggregate dredging) Waste: land/riverine runoff Development: docks, ports and marinas	*H.hippocampus* prefers less complex habitats to *H.guttulatus* and is generally found on sand flats grasping shells, benthic invertebrates and small tufts of algae, and is also encountered more frequently on artificial structures. Because they are thinly spread over a wide range of habitats, any disturbance to the coastal zone will be damaging.
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 for use in traditional medicine.
Directed Fisheries	Aquarium trade	Seahorses are highly sought after for aquariums, both public and private. It has been estimated that up to 1 million individuals (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 our waters, 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 had a major impact on a local population due to the size of the seahorse's territory. A large area of eel grass 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).

Type of impact	Cause of threat	Comment
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 5th of 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 minimum permissible height of 10 cm.

The Convention on the Conservation of European Wildlife and Natural Habitats (the Berne 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 are listed.

H. hippocampus is listed as Data Deficient by IUCN. *H. hippocampus* is listed in the Red Data Book of 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 since 2005 been compiling a “Hippo-Atlas” database of diver observations and photos (http://www.subaquapixel.net/peaubleue.php?page_id=149). In Spain, the Marine Research Institute of Vigo launched in 2006 project “Hippocampus”, 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. hippocampus* populations (Kramer & Chapman, 1999). To date the only MPA reported to the OSPAR database as containing *H.hippocampus* 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 proposed to be listed by OSPAR in 2001. 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 the actions and measures to prevent the loss of seagrass habitat within the population range of *H. hippocampus*.

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. hippocampus* 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. hippocampus:*

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 hippocampus*

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 Parties 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	http://doris.ffessm.fr/fiche2.asp?fiche_numero=299 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		Sabatini, M. & Ballerstedt, S., 2007. *Hippocampus hippocampus*. Short snouted seahorse. *Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme* [on-line]. Plymouth: Marine Biological Association of the United Kingdom. [cited 26/11/2008]. Available from: <http://www.marlin.ac.uk/species/Hippocampushippocampus.htm>

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

Contact Person: Fátima Brito, Direcção Geral do Ambiente, Rua Murgueira-Zambujal, 2720-865 Amadora, Portugal.

Summaries of country-specific information provided

Belgium: On 26 September 2008 a Belgian gillnet fisherman operating around 10 miles off the Belgian coast ("Buitenratel" sandbank) caught (at least) 175 *Hippocampus hippocampus.* In the period before 26th September he had already caught a lower number of seahorses. Previously, the same fisherman in the same location caught over 100 individuals in 1998 at the same time of year. Between 21-26 September 1998 one fisherman caught around 120 *H.hippocampus* over a 5-day period close to the Belgian coast. Given the fact that these small fish are rather inconspicuous between other by-catch organisms and debris, it might well be that more were caught in the net and discarded, and also that a number came loose during the hauling of the net (given the mesh size, the animals must have been attached by the tail to the net or bryozoan colonies caught in the net).

The fisherman told that during previous years he has regularly caught seahorses in the same period of the year and in the same region, but this year they were more abundant than usual. There were many pieces of *Alcyonidium diaphanum* in the nets, as on other occasions when seahorses were caught. He said that the seahorses were fixed to the net and to the *Alcyonidium*. A number of specimens have been brought to the Antwerp Zoo for their breeding programmes and, according to them, all specimens were young *H. hippocampus*.

These seahorses probably did not originate from the Buiten Ratel region itself. It is likely they were transported by currents from a nearby area with rough ground in the eastern Channel. Alternatively, there exist other (small) areas of rough ground off the Belgian coastthat are not fished by bottom trawlers and where *Alcyonidium* could grow.

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 filled with reports and photos from amateur divers. In this database, *H. hippocampus* are often reported from Arcachon Bay, and south of it, Capbreton; many reports also come from the Eastern Channel French coasts; some are reported from Etel (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. hippocampus could be high in Arcachon Bay, up to at least 20 individuals per 100 square meters (Louisy pers. obs.). According to recent observation (Grima D. & Louisy, 2012), the population of *H. hippocampus* is ten times lower than the *H. guttulatus* population in the Arcachon Bay.

Ireland and the UK: 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) .

One of Project Seahorse bases, the Zoological Society of London (ZSL), recently discovered a number *H. hippocampus* in the Thames during routine conservation surveys. Seahorses are usually found in shallow muddy waters, estuaries or seagrass beds. Their presence in the Thames estuary is a good sign that the water quality of the river is improving. There are a substantial number of *H.hippocampus* inhabiting the waters around the Channel Islands, where very few sightings of *H.guttulatus* are recorded. There is also a greater number of H.hippocampus records found around the Irish coast compared to *H.guttulatus*.

Distribution map courtesy of MARLIN

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.hippocampus* 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 the 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

Very little is known about the life history and population dynamics of *H.hippocampus*, thus it is difficult to define any assessment criteria. For this reason it is vital that OSPAR works towards collecting and facilitating the collection of biological information on *Hippocampus sp*. 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 predictores 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 populations of H.hippocampus but not all. Seahorses are also affected by weather conditions and are observed 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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