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A GLOBAL TAXONOMIC REVISION OF THE SEAHORSES *HIPPOCAMPUS* SPP.

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A GLOBAL TAXONOMIC REVISION OF THE SEAHORSES *HIPPOCAMPUS* SPP.

In response to discussions with Australia regarding the nomenclature of Seahorses (*Hippocampus* spp.) [see document CoP17 Doc.81.2 (Rev.1)], Project Seahorse acting as the IUCN SSC Seahorse, Pipefish & Stickleback Specialist Group (IUCN SSC SPS SG) undertook a full revisionⁱ of *Hippocampus* taxonomy.

The revision addressed the validity of *Hippocampus* species that were recognized in the Catalogue of Fishesⁱⁱ at the time of analysis (July 2016). This source is considered by many to serve as the standard taxonomic reference for valid species of fishⁱⁱⁱ.

The new taxonomy, published in *Zootaxa*, provides an annotated list of 41 *Hippocampus* species that the IUCN SSC SPS SG recognizes as valid (Table 1). Decisions were based on available morphological, genetic and distributional data, re-examination of the relevant literature, previous examination of almost all original type specimens, familiarity with many thousands of other live and dead specimens, and photographs of seahorses.

The revision kept in mind three elements of guidance from the Nomenclature Specialist at AC28. First, it is preferable that the taxonomy be stabilized for Parties, and not subject to constant addition and removal of names. Second, it is preferable to avoid adding species that are tenuous. Third, the species should ideally be morphometrically distinguishable by Customs officers.

In the most recent update of the Catalog of Fishes (31 May 2017^{iv}), Eschmeyer *et al.* have incorporated the revisions from the *Zootaxa* paper for *Hippocampus* species (Table 1), with two exceptions. First, CoF synonymizes *H. curvicauspis* with *H. spinosissimus*, whereas Lourie *et al.* designates *H. curvicauspis* as a partial synonym of both *H. spinosissimus* and *H. hystrix* in the species descriptions. Second, CoF retains *H. lichtensteinii* as valid, whereas the review designated it as Species Inquirendum.

The revised taxonomy presented in *Zootaxa* supports Australia's three requests for *Hippocampus* nomenclature as presented in CoP17 Doc.81.2 (Rev.1): that *H. dahlia* and *H. planifrons* should be considered as distinct species, and that Australia should be removed as a range State for *H. trimaculatus*. Beyond the *Zootaxa* revision, new knowledge indicates that the range of *H. whitei* is probably limited to southeastern Australia.

The journal *Zootaxa* has kindly allowed the IUCN SSC Seahorse, Pipefish & Stickleback Specialist Group to make the taxonomic revision available online for CITES needs at:

<https://iucnseahorse.wordpress.com/pwdocuments>

password = CITESeahors3!

Parties are also invited to contact the IUCN SSC SPS SG for copies of the review (iucn-seahorse@projectseahorse.org).

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Title: A global revision of the Seahorses *Hippocampus* Rafinesque 1810 (Actinopterygii: Syngnathiformes): Taxonomy and biogeography with recommendations for further research

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Abstract: Nomenclatural clarity is vital for the collection, dissemination, and retrieval of natural history information, which itself is necessary for effective conservation and management of species. Seahorses (genus *Hippocampus*) are small marine fishes that in many cases are heavily exploited and suffering severe population declines worldwide, leading to conservation concern and action. Here we provide a brief history of seahorse taxonomy, and attempt to clarify seahorse nomenclature by reducing redundancy and exposing areas of disagreement in need of further study. We provide an annotated list of the 41 species we currently recognize as valid, and describe their geographical distributions to offer a solid foundation for future research and conservation efforts. We base our conclusions on available morphological, genetic and distributional data, re-examination of the relevant literature, previous examination of almost all original type specimens, familiarity with many thousands of other live and dead specimens, and photographs of seahorses. This work should lead to greater taxonomic clarity by highlighting known research gaps and by ensuring that each species designation is justified by robust and defensible taxonomic protocols. Such clarity should facilitate greater efficacy in management and conservation.

Table 1. A list of all species names within the genus *Hippocampus* that were valid in the Catalog of Fishes (CoF) in July 2016ⁱⁱⁱ, along with taxonomic status assigned in the *Zootaxa* paper (Lourie *et al.*ⁱ), and in the CoF as of July 2017^{iv}.

Purported <i>Hippocampus</i> species	Status in CoF (July 2016)	Status in Lourie <i>et al</i> (published August 2016)	Status in CoF (July 2017)
<i>abdominalis</i>	Valid	Valid	Valid
<i>alatus</i>	Valid	Synonym of <i>H. spinosissimus</i>	Synonym of <i>H. spinosissimus</i>
<i>algericus</i> ^k	Valid	Valid	Valid
<i>angustus</i>	Valid	Valid	Valid
<i>arnei</i>	Valid	Synonym of <i>H. barbouri</i> <i>H. spinosissimus</i>	Synonym of <i>H. spinosissimus</i>
<i>barbouri</i>	Valid	Valid	Valid
<i>bargibanti</i>	Valid	Valid	Valid
<i>bicuspis</i>	Valid	Species Inquirendum	Uncertain as <i>Hippocampus</i> species inquirenda
<i>biocellatus</i>	Valid	Synonym of <i>H. planifrons</i>	Synonym of <i>H. planifrons</i>
<i>bleekeri</i>	Valid	Synonym of <i>H. abdominalis</i>	Synonym of <i>H. abdominalis</i>

<i>borboniensis</i>	Valid	Synonym of <i>H. kuda</i>	Synonym of <i>H. kuda</i>
<i>breviceps</i>	Valid	Valid	Valid
<i>camelopardalis</i>	Valid	Valid	Valid
<i>capensis</i> ^k	Valid	Valid	Valid
<i>casscio</i>	Valid	Valid	Valid
<i>chinensis</i>	Valid	Synonym of <i>H. kuda</i>	Synonym of <i>H. kuda</i>
<i>colemanni</i>	Valid	Valid	Valid
<i>comes</i>	Valid	Valid	Valid
<i>coronatus</i>	Valid	Valid	Valid
<i>curvicauspis</i>	Valid	Synonym of <i>H. histrix</i>	Synonym of <i>H. histrix</i> and <i>H. spinosissimus</i>
<i>dahli</i>	Valid	Valid	Valid
<i>deblius</i>	Valid	Valid	Valid
<i>denise</i>	Valid	Valid	Valid
<i>erectus</i>	Valid	Valid	Valid
<i>europaeus</i>	Valid	Synonym of <i>H. hippocampus</i>	Synonym of <i>H. hippocampus</i>
<i>fisheri</i>	Valid	Valid	Valid
<i>fuscus</i>	Valid	Synonym of <i>H. kuda</i>	Synonym of <i>H. kuda</i>
<i>grandiceps</i>	Valid	Synonym of <i>H. angustus</i>	Synonym of <i>H. angustus</i>
<i>guttulatus</i>	Valid	Valid	Valid
<i>hendriki</i>	Valid	Synonym of <i>H. angustus</i>	Synonym of <i>H. angustus</i>
<i>hilonis</i>	Valid	Synonym of <i>H. kuda</i>	Synonym of <i>H. kuda</i>
<i>hippocampus</i>	Valid	Valid	Valid
<i>histrix</i>	Valid	Valid	Valid
<i>ingens</i>	Valid	Valid	Valid
<i>japonicus</i>	Valid	Synonym of <i>H. mohnikei</i>	Synonym of <i>H. mohnikei</i>
<i>jayakari</i>	Valid	Valid	Valid
<i>jugumus</i>	Valid	Valid	Valid
<i>kampylotrachelos</i>	Valid	Synonym of <i>H. trimaculatus</i>	Synonym of <i>H. trimaculatus</i>
<i>kelloggi</i>	Valid	Valid	Valid
<i>kuda</i>	Valid	Valid	Valid
<i>lichtensteinii</i>	Valid	Species Inquirendum	Valid
<i>manadensis</i>	Valid	Synonym of <i>H. trimaculatus</i>	Synonym of <i>H. trimaculatus</i>
<i>minotaur</i>	Valid	Valid	Valid
<i>mohnikei</i>	Valid	Valid	Valid
<i>moluccensis</i>	Valid	Synonym of <i>H. kuda</i>	Synonym of <i>H. kuda</i>
<i>montebelloensis</i>	Valid	Synonym of <i>H. zebra</i>	Synonym of <i>H. zebra</i>
<i>multispinus</i>	Valid	Synonym of <i>H. angustus</i>	Synonym of <i>H. angustus</i>
<i>natalensis</i>	Valid	Synonym of <i>H. kuda</i>	Synonym of <i>H. kuda</i>
<i>paradoxus</i>	Valid	Valid	Valid
<i>patagonicus</i>	Valid	Valid	Valid

<i>planifrons</i>	Valid	Valid	Valid
<i>polytaenia</i>	Valid	Synonym of <i>H. kuda</i>	Synonym of <i>H. kuda</i>
<i>pontohei</i>	Valid	Valid	Valid
<i>procerus</i>	Valid	Synonym of <i>H. whitei</i>	Synonym of <i>H. whitei</i>
<i>pusillus</i>	Valid	Valid	Valid
<i>queenslandicus</i>	Valid	Synonym of <i>H. spinosissimus</i>	Synonym of <i>H. spinosissimus</i>
<i>reidi</i> ^k	Valid	Valid	Valid
<i>satomiiae</i>	Valid	Valid	Valid
<i>semispinosus</i>	Valid	Synonym of <i>H. spinosissimus</i>	Synonym of <i>H. spinosissimus</i>
<i>severnsi</i>	Valid	Synonym of <i>H. pontohei</i>	Synonym of <i>H. pontohei</i>
<i>sindonis</i>	Valid	Valid	Valid
<i>spinosissimus</i>	Valid	Valid	Valid
<i>subelongatus</i>	Valid	Valid	Valid
<i>suezensis</i>	Valid	Synonym of <i>H. kelloggi</i>	Synonym of <i>H. kelloggi</i>
<i>taeniopterus</i>	Valid	Synonym of <i>H. kuda</i>	Synonym of <i>H. kuda</i>
<i>titcacaensis</i>	Valid (questionable)	Nomen nudum	N/A
<i>trimaculatus</i>	Valid	Valid	Valid
<i>tristis</i>	Valid	Synonym of <i>H. kuda</i> (but see <i>H. kelloggi</i> account)	Synonym of <i>H. kuda</i>
<i>tuberculatus</i>	Valid	Synonym of <i>H. breviceps</i>	Synonym of <i>H. breviceps</i>
<i>tyro</i>	Valid	Valid	Valid
<i>waleananus</i>	Valid	Synonym of <i>H. satomiiae</i>	Synonym of <i>H. satomiiae</i>
<i>whitei</i>	Valid	Valid	Valid
<i>zebra</i>	Valid	Valid	Valid
<i>zosteriae</i>	Valid	Valid	Valid

^k Species that are members of the *H. kuda* complex

ⁱ Lourie, S.A., Pollom, R.A., & Foster, S.J. (2016) A global revision of the Seahorses *Hippocampus* Rafinesque 1810 (Actinopterygii: Syngnathiformes): Taxonomy and biogeography with recommendations for further research. *Zootaxa*, 4146(1), 1–66.

ⁱⁱ Eschmeyer, W.N. & Fricke, R.A. (2016) Catalog of Fishes: Genera, Species, References. Available from: www.calacademy.org/scientists/projects/catalog-of-fishes (Accessed 27 July 2016)

ⁱⁱⁱ Eschmeyer, W., Fricke, R., Fong, J. & Polack, D. (2010) Marine fish diversity: history of knowledge and discovery (Pisces). *Zootaxa*, 2525, 19–50.

^{iv} Eschmeyer, W.N. & Fricke, R.A. (2017) Catalog of Fishes: Genera, Species, References. Available from: www.calacademy.org/scientists/projects/catalog-of-fishes (Accessed 5 July 2017)