

Appendix 1—The species on the International Union for Conservation of Nature and Natural Resources (IUCN) Red List

Scientific Name	Common Name(s)	Red List and Criteria
<i>Doryrhamphus dactyliophorus</i>	BANDED PIPEFISH	DD ver 2.3 (1994)
<i>Hippocampus abdominalis</i>	BIG-BELLY SEAHORSE KIORE POT-BELLIED SEAHORSE	VU A2d ver 2.3 (1994)
<i>Hippocampus angustus</i>	NARROW-BELLIED SEAHORSE	DD ver 3.1 (2001)
<i>Hippocampus bargibanti</i>	BARGIBANT'S SEAHORSE PYGMY SEAHORSE	DD ver 3.1 (2001)
<i>Hippocampus breviceps</i>	KNOBBY SEAHORSE SHORT-HEADED SEAHORSE SHORT-SNOURED SEAHORSE	DD ver 2.3 (1994)
<i>Hippocampus fisheri</i>	FISHER'S SEAHORSE	DD ver 3.1 (2001)
<i>Hippocampus kelloggi</i>	GREAT SEAHORSE KELLOGG'S SEAHORSE OFFSHORE SEAHORSE	DD ver 3.1 (2001)
<i>Hippocampus kuda</i>	COMMON SEAHORSE ESTUARY SEAHORSE SPOTTED SEAHORSE YELLOW SEAHORSE	VU A4cd ver 3.1 (2001)
<i>Hippocampus minotaur</i>	BULLNECK SEAHORSE	DD ver 2.3 (1994)
<i>Hippocampus spinosissimus</i>	HEDGEHOG SEAHORSE	VU A4cd ver 3.1 (2001)
<i>Hippocampus subelongatus</i>	TIGER SNOUT SEAHORSE WEST AUSTRALIAN SEAHORSE	DD ver 3.1 (2001)
<i>Hippocampus trimaculatus</i>	FLAT-FACED SEAHORSE LOW-CROWNED SEAHORSE THREE-SPOT SEAHORSE	VU A4cd ver 3.1 (2001)
<i>Hippocampus whitei</i>	NEW HOLLAND SEAHORSE SYDNEY SEAHORSE WHITE'S SEAHORSE	DD ver 3.1 (2001)
<i>Hippocampus zebra</i>	ZEBRA SEAHORSE	DD ver 3.1 (2001)
<i>Phycodurus eques</i>	LEAFY SEADRAGON	DD ver 2.3 (1994)
<i>Phyllopteryx taeniolatus</i>	WEEDY SEADRAGON	DD ver 2.3 (1994)
<i>Solegnathus dunckeri</i>	DUNCKER'S PIPEHORSE	VU A1d+2d ver 2.3 (1994)
<i>Solegnathus hardwickii</i>	HARDWICKE'S PIPEFISH PALLID SEAHORSE ⁵	VU A1d+2d ver 2.3 (1994)
<i>Solegnathus lettiensis</i>	GÜNTHER'S PIPEHORSE	VU A2d ver 2.3 (1994)
<i>Solegnathus robustus</i>	ROBUST PIPEHORSE	VU A2d ver 2.3 (1994)
<i>Solegnathus spinosissimus</i>	SPINY PIPEHORSE	VU A1d+2d ver 2.3 (1994)
<i>Syngnathoides biaculeatus</i>	ALLIGATOR PIPEFISH DOUBLE-ENDED PIPEFISH	DD ver 2.3 (1994)

DD = Data Deficient

Vu = Vulnerable

Source: IUCN 2004. 2004 IUCN Red List of Threatened Species. <www.redlist.org>.

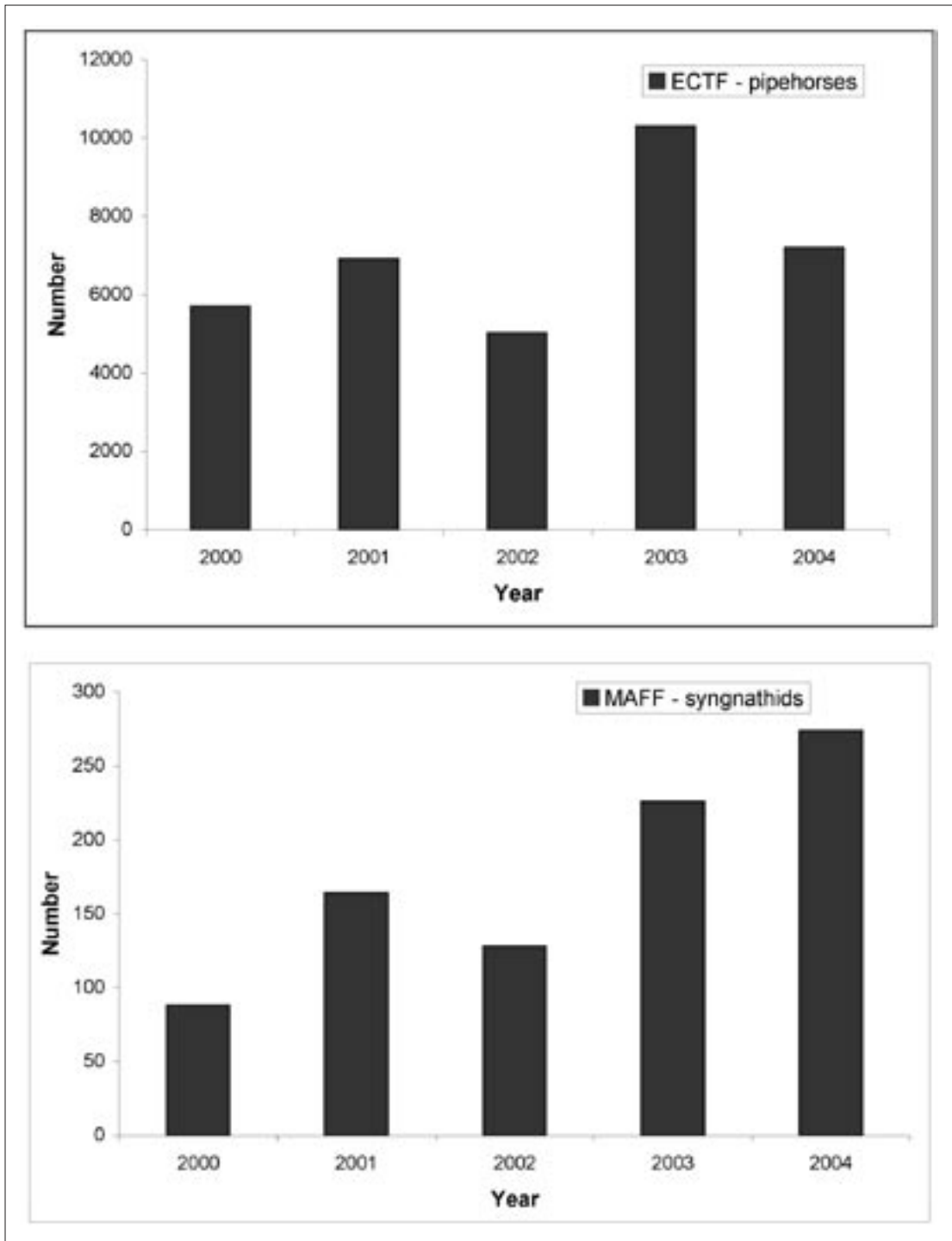
Downloaded on 15 July 2005

These species are listed because they meet certain criteria set by the IUCN. In the case of the vulnerable Australian syngnathid species they have been listed because there has been an observed, estimated, inferred or suspected reduction⁶ in population size over the last 10 years or three generations, which ever may be the longest.

⁵ The above is an extraction from IUCN (2004); however, the 'pallid seahorse' is actually a pipehorse and is commonly referred to as a 'pallid pipehorse' in all Queensland legislation.

⁶ The specifics of the reduction in population size vary between the criteria (see www.redlist.org/info/categories_criteria.html)

Appendix 2—A combined annual estimate of the retained syngnathids as reported in CFISH (1 January 2000 to 31 December 2004) for the East Coast Trawl Fishery and Marine Aquarium Fish Fishery (CFISH February 2005)



Appendix 3—The Department of the Environment and Heritage’s declaration of an Approved Wildlife Trade Operation for Syngnathids

Syngnathid (pipefish) Harvest from the Queensland East Coast Trawl Fishery

Declaration of an Approved Wildlife Trade Operation

Commonwealth of Australia Gazette No. S261, 11 July 2002

Commonwealth of Australia

Environment Protection and Biodiversity Conservation Act 1999

Declaration of an Approved Wildlife Trade Operation

I, David Kemp, Minister for the Environment and Heritage, have considered in accordance with section 303FN of the *Environment Protection and Biodiversity Conservation Act 1999* (the Act) the application from the Queensland Fisheries Service, public comments on the proposal as required under section 303FR, and advice on the ecological sustainability of the operation. I am satisfied on those matters specified in section 303FN of the Act.

I hereby declare the operations for the incidental harvesting of *Solegnathus dunckeri* and *Solegnathus hardwickii* by licensed operators under the Queensland *Fisheries Act 1994*, a commercial fishery in accordance with section 303FN (10)(2), to be an approved Wildlife Trade Operation for the purposes of the Act.

Unless amended or revoked, this declaration:

- a) has effect in relation to the regulated native specimens listed in the Schedule and subject to the conditions applied under section 303FT specified in the Schedule, and
- b) is valid from 1 July 2002 until 1 July 2005.

Dated this 10th day of July 2002

[Signed]

David Kemp

Minister for the Environment and Heritage

Subject to the *Administrative Appeals Tribunal Act 1975*, a person or persons whose interests are affected by this declaration may, within 28 days, make an application in writing to Department of the Environment and Heritage for the reasons for the decision. An application for independent review of the decision may be made to the Administrative Appeals Tribunal, on payment of the relevant fee, by or on behalf of the person or persons whose interests are affected, either within 28 days of receipt of the reasons for the decision, or within 28 days of this declaration if reasons for the decision are not sought. Further information may be obtained from:

Director, Sustainable Fisheries Section
Marine and Water Division
Department of the Environment and Heritage
GPO Box 787
Canberra ACT 2601
Telephone: (02) 6274 1917 Facsimile: (02) 6274 1006

Schedule

Additional Provision (s303FT)

Declaration of the Harvest Operations for *Solegnathus dunckeri* and *Solegnathus hardwickii* in Queensland waters as an approved Wildlife Trade Operation

Regulated native specimens to which the declaration applies

Taxon	Common name	Product type
<i>Solegnathus dunckeri</i>	Duncker's pipehorse	Dried product
<i>Solegnathus hardwickii</i>	Pallid pipehorse	Dried product

Relating to the harvesting of *Solegnathus dunckeri* and *Solegnathus hardwickii* harvested from Queensland waters by licensed operators under the *Fisheries Act 1994*.

Declaration Conditions

1. Operation of the fishery will be carried out in accordance with the Queensland Fisheries (East Coast Trawl) Management Plan 1999 and the requirements of any permits issued under the *Queensland Fisheries Act 1994* or other directions to operators relating to capture and retention of syngnathid fishes (species in the families Syngnathidae and Solenostomidae).
2. The Queensland Fisheries Service shall by May 2003, make the necessary arrangements for the expansion of the current recording of data on catches of syngnathid species in the ECTF (T1) logbooks to include recording by species for retained permitted catch of pipehorses.
3. The Queensland Fisheries Service shall refine and implement programs for the independent validation of catch and bycatch data from the ECT fishery logbook program, including the following:
 - a) Design, implementation and preliminary assessment of a pilot observer program by May 2004; and
 - b) using information gained from the pilot study, design and develop for implementation a long-term observer program capable of providing statistically-robust estimates of bycatch in the East Coast Trawl Fishery and the Stout Whiting Fishery within five years, and provide by April 2005 a report on the proposed program and its implementation.
4. The Queensland Fisheries Service shall identify measures for the progressive reduction and avoidance of catches of syngnathids, particularly in those areas associated with higher rates of syngnathid bycatch. Measures may include gear modification, seasonal or area closures or other operational measures and should be applied progressively as they are identified and can be implemented. The Department of Environment and Heritage shall be notified of any proposed change to management measures to implement such measures.
5. The Queensland Fisheries Service shall develop and implement by May 2003 processes for the routine collection and analysis of information from buyers of pipehorses from the Queensland ECT fishery, including to the extent practicable species composition, quantities and weights of product, size distribution and indicators of reproductive status.
6. The Queensland Fisheries Service will complete a review of existing information, on habitat types within the East Coast Trawl Fishery area, habitat distribution and relationships with levels of catch of selected principal target species and syngnathids by January 2003. This analysis will be updated annually and reported by 30 April each year to the Department of the Environment and Heritage. Included in this will be an assessment of the characteristics of benthic habitat in untrawled (green zones and untrawled ground), and lightly, moderately and heavily trawled areas based on the results of seabed biodiversity research work undertaken as part of CRC Reef Research Centre Projects and other QDPI research and monitoring projects.

7. The Queensland Fisheries Service shall provide for the design and implementation of expanded fishery-independent surveys of bycatch in the East Coast Trawl Fishery area by 1 July 2005, to provide progressive improvement in the understanding of the associations of syngnathid catch and bycatch with habitat characteristics.
8. The Queensland Fisheries Service shall complete and report by 31 December 2002 on a desk top study to:
 - a) refine the current preliminary compilation of information on life history characteristics of syngnathid species which may be taken in the fishery;
 - b) refine current preliminary assessments of vulnerability; and
 - c) identify information gaps and priority areas for further work on vulnerability, management and minimisation of the interactions with syngnathid in this fishery
9. The Queensland Fisheries Service shall to the extent practicable, by 1 July 2004, commission or support research to assess the reproductive potential, growth rates and other population characteristics of syngnathid species impacted by the East Coast Trawl Fishery relevant to assessment of the ecological sustainability of impacts from the ECTF. Progress and final reports on such work will be provided to the Department of the Environment and Heritage.
10. The Queensland Fisher Service shall complete and report on a risk analysis of the vulnerability of syngnathids to the impacts of fishing activities under the ECTF by 15 April 2005. This analysis should include:
 - a) the distribution and catches of all east coast syngnathid species mapped against trawling activity;
 - b) an assessment of the effectiveness of the retention limits for permitted species in relation to total catch levels as a protective measure for syngnathids;
 - c) assessment of effectiveness of other implemented management measures in minimising the identified risks to syngnathids, including measures implemented in accordance with Condition 4; and
 - d) options for enhanced protection and the avoidance and progressive reduction of interactions with syngnathids. These may include gear modification, seasonal or areas closures and/or other operational measures focussing on catch 'hotspots' highlighted in fishery and fishery-independent data.
11. Reports to be provided annually by 30 April each year by the Queensland Fisheries Service to the Department of the Environment and Heritage to include:
 - a) total catch and catch per unit effort, by species, by fishery statistical reporting grid by month, submitted for syngnathid catch taken in the previous calendar year;
 - b) an overall assessment of syngnathid bycatch in the East Coast Trawl Fishery including, but not limited to, progress on addressing monitoring, compliance issues and research; and
 - c) review of progress on conditions 2 to 10 above.
12. This declaration is valid until 1 July 2005.

Appendix 4—Syngnathidae classification

There are two primary sources used to identify syngnathids within this survey. Dawson (1985) reviews the species of Indo-Pacific pipefishes and pipehorses and Kuitert (2001) reviews seahorses.

Kuitert (2000) discusses four subfamilies of Syngnathidae that have been discussed in this document by their common names, these include:

Syngnathinae (pipefishes)

The most stick-like subfamily, their head is in line with their body. Usually a small caudal fin is present and the eggs are incubated in a pouch, formed by simple or overlapping membranes under the trunk or tail (Plate 1).



Plate 1. An example of a pipefish, *Trachyrhamphus bicoarctatus* (double-ended pipefish).

Doryrhamphinae (free-swimming pipefishes)

Free-swimming, this subfamily mostly has exposed brood and a large flag-like caudal fin.

Hippocampinae (seahorses and pygmy pipehorses)

This subfamily has a fully enclosed pouch with a small opening for incubation of eggs and a prehensile tail (Plate 2).



Plate 2. An example of a sea horse *Hippocampus tristis* (sad seahorse).

Solegnathinae (pipehorses and seadragons)

The tail is more or less prehensile and the brood is mostly exposed under the tail or trunk section (Plate 3).



Plate 3. Example of a pipehorse *Solegnathus dunckeri* (Duncker's pipehorse).

There are three known pipehorses that inhabit Queensland waters. *S. hardwickii* are found along the entire Queensland east coast, *S. dunckeri* are found south of Fraser Island's Sandy Cape and *S. spinosissimus* are found in the most southerly waters of Queensland (Dawson, 1985). A trawl survey conducted in 1985 and 1986 off the coast of Townsville, between 18°S and 19.5°S, collected pipehorse specimens of *Solegnathus lettiensis* (Jones and Derbyshire, 1988). This is the only known record of this species along the Queensland coast, which is located outside the current known distribution of Western Australia and Indonesia (Dawson, 1985). This record should therefore be treated with caution and has not been included in this report. The three known species to exist in Queensland each differ in their appearance:

- *S. dunckeri* is pink-orange-red in colouration with an unbroken darkened stripe along the two outer dorsal ridges to past the dorsal fin (Bowles, 2001). The tail is darkened dusky to almost black (Dawson, 1985) and it has a deep body compared to the other two species (Bowles, 2001).
- *S. spinosissimus* is pink-orange in colouration with yellow tinges and stripes, and a red patch around the anus. Its body is covered in small blunt spines and its middle dorsal ridge is raised above the adjacent ridges (Bowles, 2001). There are seven dark bars on dorsal surface of the trunk, reducing to one or more pairs of dark bilateral spots (Dawson, 1985).
- *S. hardwickii* differs in colouration along its distribution with the colouration and markings of the east Australian population differing to that of the Chinese population. In east Australia the species appears off-white to pink-yellow in colouration, its two outer dorsal ridges are raised above the middle ridge and are characterised by broken darkened lines which extend to the dorsal fin (Bowles, 2001). The side and venter of tail sometimes have two to four dusky bars separated by pale interspaces (Dawson, 1985). The Chinese populations are white in colouration with black markings, forming lines along back ridges from behind head to almost tip of tail (Kuitert, 2000). The difference in the markings of differing populations has suggested that there is a need to revise the species.

Due to the low numbers of freshly caught specimens identified by scientific staff in the past, there was little information on the key differences between *Solegnathus* spp. (pipehorses). However, most documentation indicates that the key defining characteristic between Queensland's *S. hardwickii* and *S. dunckeri* is the shift in the lateral trunk ridge to the tail ridge (see: Connolly *et al.*, 2001; Dawson, 1985). When classifying the *Solegnathus* spp. in this survey it became evident that there was a high degree of variation in the shift of the lateral ridge in *S. dunckeri*. After consultation with the Queensland Museum ichthyologist (Jeff Johnson, May 2005) it was concluded that there is variation in the lateral ridge where the trunk and tail meet.

This variation is evident between specimens and between sides of the one specimen. Specimens collected during the survey were identified as *S. hardwickii* only if the lateral trunk ridge was confluent with the superior tail ridge on both sides of the specimen (Plate 4). If the lateral ridge was not confluent or did not remain confluent with the superior tail ridge on either side of the specimen then it was identified as *S. dunckeri* (Plate 5, Plate 6 and Plate 7).

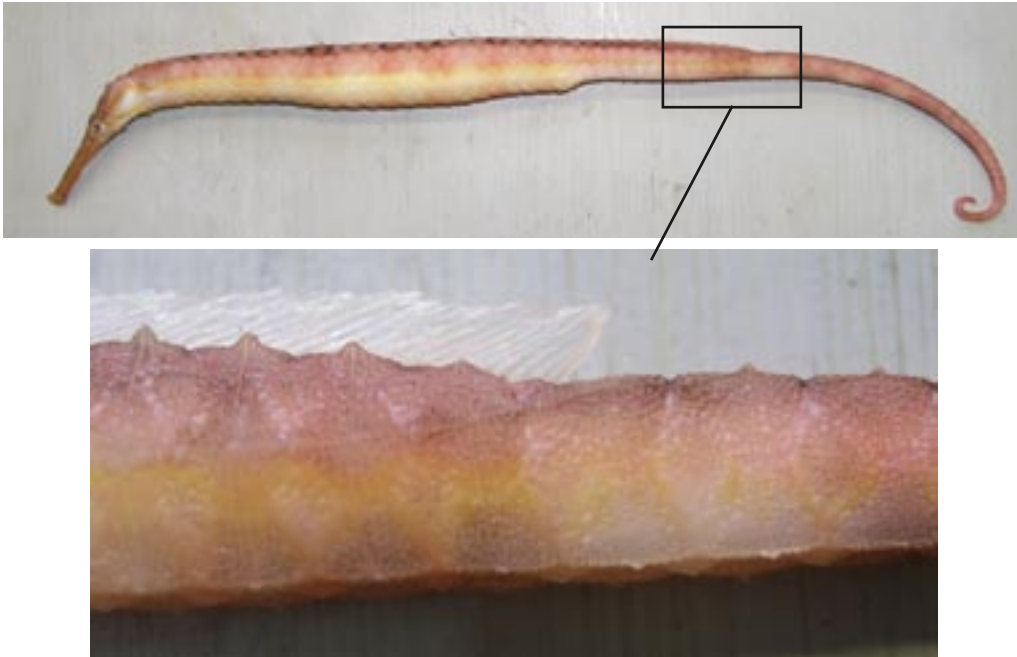


Plate 4. *Solegnathus hardwickii* whole specimen and enlarged photograph showing the lateral trunk ridge confluent with the superior tail ridge on both sides of the specimen.

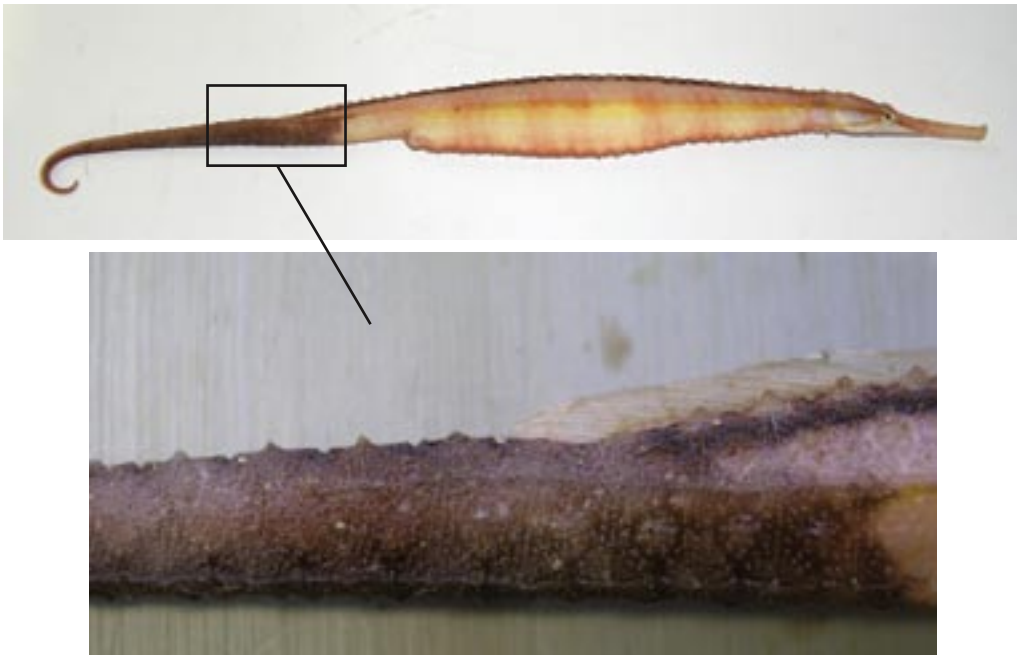


Plate 5. *Solegnathus dunckeri* whole specimen and enlarged photograph showing the lateral ridge not confluent – or not remaining confluent – with the superior tail ridge.

The photos below are two sides of the same *S. dunckeri* individual.

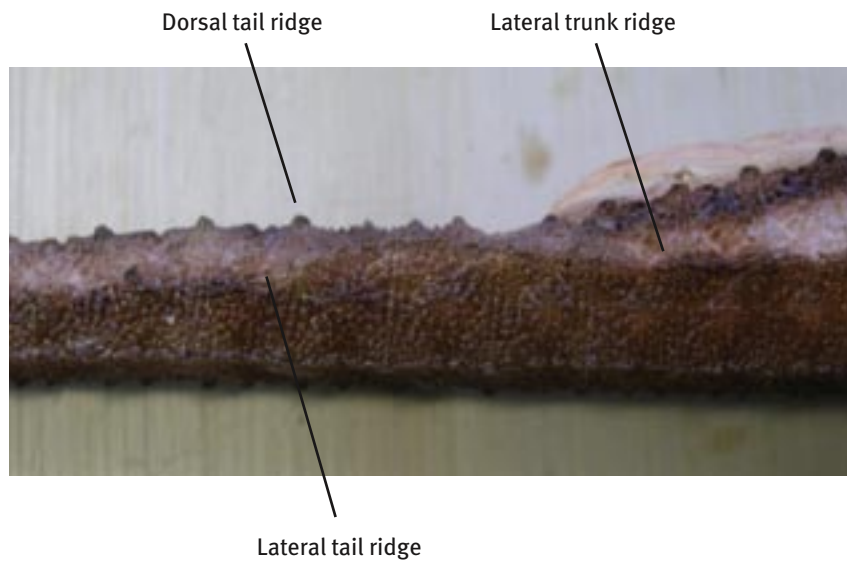


Plate 6. *S. dunckeri* showing the lateral trunk ridge moving up towards the dorsal tail ridge, not joining the ridge; and then moving back down to form a lateral tail ridge.

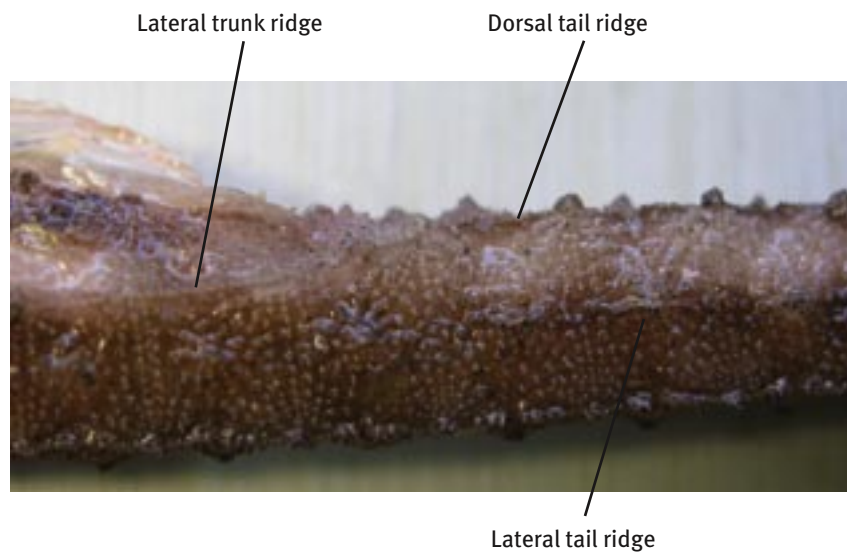


Plate 7. *S. dunckeri* showing the lateral trunk ridge moving up to join with the dorsal tail ridge. However, there is still a lateral tail ridge present.

