Project title: *Understanding seahorse ecology and extraction in West Africa: critical contributions to a global trade*

Project heads: 1) Prof. Amanda C.J. Vincent; 2) Chris Ransom (co-PI)

Institute: 1) Project Seahorse, Fisheries Centre (now the Institute for the Oceans and Fisheries), The University of British Columbia, Canada; 2) Zoological Society of London, UK

Country project is based in: Guinea and Senegal

Project start and end date: Originally set as 1 May 2012 to 31 December 2012. However, we were able to combine the PTES grant of £7397 with a grant of USD 7000 from the Mohamed bin Zayed Species Conservation Fund and extend the project until 31 December 2013. We here report on both grants combined.

Date of report: 1 February 2016

Species/ habitat: We set out to undertake conservation work on *Hippocampus algiricus*, the West African Seahorse. To our surprise, we found a second seahorse species in West Africa, *Hippocampus hippocampus*, that we were also able to study and support; this species was previously associated with western Europe and the Mediterranean.

IUCN conservation action/ research action being undertaken:

We addressed the only conservation action in the Red List assessment in 2002: "Further research on this species is needed. It is listed on CITES Appendix II". The Red List assessment of 2012 noted only that the species is included in Appendix II and may occur in one reserve.

Our work was notable in conducting the first biological, fisheries and trade research on this species, *H. algiricus*. All such work provides a background for implementation of the CITES Appendix II listing for the species.

Main aims of the project and our achievements to date:

Aims as described in the application

1. To develop enough understanding of the trade in *H. algiricus*, the only seahorse found off most of West Africa, to hold Senegal and the Republic of Guinea accountable for the sustainability of their exports of this species (as required under its listing on CITES Appendix II).
2. To develop a sketch understanding of the biology and ecology of this species, hitherto unstudied, to mobilize serious research on its populations for conservation purposes.

3. To lay the groundwork for ongoing initiatives in marine conservation in West Africa with a focus on *H. algiricus*.

Achievements to date

Our good fortune in attracting complementary funding from the Mohamed bin Zayed Species Conservation Fund allowed us to extend and expand the project. We here report on both grants together, and invite PTES to share our pride in – and credit for – all the outputs and outcomes.

We were able to conduct two field surveys on the biology, fisheries and trade of seahorses in West Africa with associated consultations and feedback: Kate West went to Senegal and Guinea in May-June 2012 and Andres Cisneros-Montemayor went to Senegal and the Gambia in June-July 2013.

Field work executed

- Conducted research with Senegalese assistants at 41 sites in West Africa (Figure 1). Most were in Senegal (n=29) but we also surveyed 5 sites in The Gambia and 7 in Guinea. These mainly consisted of fishing villages and/or landing sites but also included larger markets and processing facilities in Dakar, Senegal.
- Interviewed 272 people – fishers, traders, scientists and government officials – in Wolof, Fulah, French, English or Spanish as necessary/possible.
- Met with 53 government officials, researchers and NGO leaders. (e.g. Direction des Eaux, Forêts, Chasse et de la Conservation des Sols, Centre National des Sciences, National CITES Authority, Conseil local de peche artisanale, WWF, IUCN, USAID-Comfish etc).
- Sampled 256 seahorses including 242 *H. algiricus* and 14 *H. hippocampus*. Most specimens (n=237) were dry but we did obtain 19 fresh specimens, too.
- Collected 12 dried *H. algiricus* (n=8) and *H. hippocampus* (n=4) for genetic analysis.
- Surveyed six sites underwater for habitat description, including rocky reef (4), sand and seagrass (5), sand (6), shelf reef and algae (13), sheltered mangrove (17) and exposed mangrove (20).
- Counted 175 individual embryos (together weighing 0.6 g), to obtain the first brood size estimate for *H. algiricus*, totalling about 200 with the few that were stuck inside the pouch.

Aim 1: To develop an understanding of seahorse trade

- Prepared one report and one manuscript about the trade in seahorses in West Africa, the first ever such analysis, made more distinctive by being based on extensive

fieldwork and consultations with stakeholders. These contributions provided the basis for CITES review of trade in *H. algiricus*.

- All fisher respondents (commercial and artisanal) stated that seahorses were always caught as accidental by-catch, with no claims of targeted fisheries for seahorses in the past or present.
- The most common fishing methods observed and reported by artisanal fishers, in order of most likely to catch seahorses, were seine nets, bottom-trawls, set gillnets, traps (mainly targeting cuttlefish), cast nets, spearfishing gear and hand lines
- Seahorses were caught most frequently by artisanal fisheries in the South of Senegal, where the waters off the coast are shallower.
- Fisher and traders reported only trade in dried seahorses with no sale of live seahorses, past or present.
- Our results for Senegal suggest that in one twelve month period during 2012-2013, a total of 371,000 individual seahorses were caught, and 184,000 retained, for total landings of around 980 kg (Table 2). **This estimate is far higher than the number reported by CITES or other trade data.**
- Using the same methods, we estimate that in The Gambia, a total of 4,800 individual seahorses were caught, and 2,800 kept, for total landings of about 15 kg in one year.
- Most fishers expressing an opinion reported marked declines in seahorse catches and a decrease in the size of seahorses over their fishing careers.

Aim 2: To develop an understanding of the biology and ecology of this species

- Published the first ever primary paper about the biology of *H. algiricus* in trade, co-authored with our excellent Senegalese research assistant.
- Contrary to our expectations, discovered that *H. algiricus* was not the only seahorse in West African waters. Our team was surprised to learn that *H. hippocampus* is also found, fished and traded in the region.
- Produced the first biological data on *H. algiricus* and the first data from West Africa on the biology of *H. hippocampus.* These findings help establish reference points for assessing future effects of extraction and suggest potential risks.
- Some *H. algiricus* (n=11, 5% of samples) were larger than the previous maximum reported size (19 cm height; Lourie et al., 2004), with the largest measuring 22 cm in height, making it the fourth largest known seahorse species in the world.
- Conducted genetic analysis of the mtDNA control region and cytochrome B gene to confirm the identification of 12 dried seahorse specimens initially designated by morphometrics as *H. algiricus* (n=8) and *H. hippocampus* (n=4).

- Found that *H. algiricus* cytochrome B sequences were identical to those previously reported from Senegal (Otero-Ferrer et al 2015) and Ghana (Casey et al 2004) and suggested little population differentiation along the West African coast
- Found that *H. hippocampus* cytochrome B sequences were indicative of both the West African and European clades. Either fishers are active in two regions or two clades of *H. hippocampus* mix along the African coastline. Further analysis of specimens with known providence would be needed to distinguish between these hypotheses.

Aim 3: To lay the groundwork for on-going initiatives in marine conservation

- Held consultations and planning sessions with Senegal's CITES Authorities and a cross-section of interested Senegalese organizations.
- Findings from this research were shared with 12 local authorities, fishing industry representatives and researchers during a meeting hosted by Department of Water and Forestry (Direction des Eaux, Forêts, Chasse et de la Conservation des Sols), which serves as the CITES Management Authority for Senegal.
- Participants from Senegal's CITES Management Authority included (i) M. Sonko, Chief of Wildlife Management and CITES representative for Senegal (ii) M. Diouf, Adjunct Director (iii) M. Badji and M. Faye, enforcement, and (iv) Ma. Sakho, CITES Focal Point, who is responsible for administering CITES permits.
- Other participants included (i) M. Mamadou Diallo (Species and Habitat Program Manager, WWF), (ii) Dr. Diop (fisheries researcher, Commission Sous-Régionale des Pêches, an intergovernmental agency), (iii) Dr. Fall (Head of Fisheries Surveys, Centre de Recherches Océanographiques de Dakar-Thiaroye (CRODT)), (iv) M. Gningue (seafood exporter), (v) Yoan Mutone (Director of Océanium, a Senegalese environmental NGO), (vi) M. Sidi Ndaw (Head of the Statistics Division, Department of Marine Fisheries), and (vii) Dr. Seck (CITES Scientific Authority for Senegal, IFAN/CA Diop University).
- Participants at the meeting agreed three immediate points of action:
    - People must be made aware of this issue and of Senegal's obligation to CITES. With the help (and funding) of IUCN, design a communication strategy (perhaps including a workshop and posters) for top-to-bottom stakeholders, and particularly those involved in enforcement at customs.
    - There is a need to close the "personal consumption" loophole. Inform and educate the sanitation permit office about this issue so that they may require a CITES permit before extending a personal consumption permit for seahorses.
    - Find out how the issue of Illegal, Unregulated and Unreported (IUU) trade from Senegal is being handled by the destination countries, which are also CITES signatories, and ensure a concerted effort on both ends of the market

List and provide details of any aims that haven't been achieved and why:

We exceeded our expectations overall but there were three twists:

First, we spent much more time than anticipated in Senegal (and added the Gambia) and much less time than expected in Guinea, for two reasons: (1) Guinea proved very difficult and uncomfortable for research and (2) Senegal's was very involved in seahorse fisheries and trade warranted considerable attention. This former is not surprising, given Guinea's status as an unstable 'failed state' (e.g. https://www.globalpolicy.org/nations-a-states/failed-states/49966.html?itemid=720). Indeed, so chaotic has been its management of wildlife exports that CITES decided in March 2013 to suspend all commercial trade in CITES-listed species from Guinea https://cites.org/eng/resources/ref/suspend.php. Our first researcher simply didn't feel safe in the complex areas that she had to visit to assess animal trade that was largely illicit.

Second, our project led to more work than expected with the CITES Convention globally and less work than anticipated directly with the CITES Authorities in Senegal or Guinea. After applying for the PTES grant in February 2012, the global context shifted, drawing much of our attention to global CITES action. I explain this evolution in the section on "contributions to the long-term conservation of the species" below. We still fedback results and provided information to Senegal but our major influence was through global processes. We are now seeking funds to re-focus efforts on national empowerment and support.

Third, we attracted fewer sightings than hoped to iSeahorse (www.iseahorse.org), our emerging international citizen science initiative for seahorse sightings and population monitoring. This is largely because the launch of iSeahorse was delayed to late 2013, after both field trips had been completed. It is also partly because iSeahorse is still only in English, is web-based and has only an iPhone App. In the Philippines, we have addressed similar issues in two ways: (1) we have set up an accompanying FaceBook page in the local language, through which sightings can be recorded for later uploading to iSeahorse by volunteers and Project Seahorse staff; (2) we have developed SMS-text messaging approach (with reimbursement for the charges) which is far more democratic than the web-based and app focused approach. Both approaches are showing real promise but we have not had the chance to trial them in West Africa.

Was your methodology sound and repeatable in other areas? Have you revised it whilst undertaking your project?:

Our research methods were sound and repeatable. Indeed they represent the gold standard globally for trade surveys on seahorses and their relatives, published (by us) in the primary literature over decades and endorsed by TRAFFIC, the wildlife trade monitoring agency. I

trained the two Western field biologists in all Project Seahorse techniques and approaches, as outlined in the proposal (and they trained Senegalese counterparts). It is worth noting that Project Seahorse serves as the IUCN SSC Seahorse, Pipefish and Stickleback Specialist Group because of its globally recognised expertise in seahorse research, management advice and policy development.

The joint support from PTES and MBZ allowed us to extend the originally proposed research to cover two separate sets of field surveys, in 2012 and in 2013, with the latter complementing and enhancing the former. As planned, we used three methods to gather information: (1) **Consultation on available knowledge and data** with government, line agencies, academic institutions, non-governmental organizations, and community groups. (2) **Interviews and focus group discussions with knowledgeable individuals** (e.g. fishers, processors and traders) in order to discern fragments of information. (3) **Technical evaluation of size distribution, sex ratio, and reproductive status of landed and traded seahorses.**

Our field research was focused on gathering information on seahorse biology, ecology, methods of extraction (e.g. target/incidental), catch per unit effort, total volumes, values (at different trade levels), uses (domestic and international), trade structure, trade routes, and seasonality of the trade. We then probed underlying temporal trends and geographic differences in these parameters, with a view to deducing conservation implications for the species. Our approach was to identify patterns across trade levels and data sets while definitely respecting outlying information as informative.

Please detail how your project has contributed to the long-term conservation of the species you are working on. If it has not, please explain:

Our PTES-funded project was the single most significant influence in a CITES decision to suspend trade (ban exports) of *H. algiricus* from Guinea and Senegal. This is an important move that should help reduce pressures on wild seahorses in these waters while also providing the context for significant new conservation work in the region. Illegal export poses its own challenge, of course, and we will tap into other aspects of CITES enforcement process to address it. I here outline how this suspension/ban arose and the role played by PTES/MBZ field research.

In March 2012, the CITES Animals Committee (the technical body of the Convention) decided to pursue a full Review of Significant Trade for *H. algiricus* from Guinea, Senegal and ten other nations (https://cites.org/sites/default/files/eng/com/ac/26/wg/E26-WG07-R1.pdf). Such a decision meant commissioning UNEP-WCMC to probe the sustainability of exports from these range states. After due consideration, the CITES Secretariat decided to focus this investigation on only two countries: Guinea and Senegal (https://cites.org/sites/default/files/eng/com/ac/27/E-AC27-12-04.pdf). Not coincidentally, these are also the focal countries in our PTES/MBZ grants. The other ten countries had

reported no commercial trade in the previous ten years and any illegal exports fell beyond the scope of this review.

As Chair of the IUCN SSC Seahorse, Pipefish and Stickleback Specialist Group, I was heavily involved in CITES work to determine sustainability of *H. algiricus* exports. Indeed, my team provided the vast majority of the technical information that the CITES Animals Committee (through UNEP-WCMC) used to evaluate sustainability in this species. **In particular, the report produced with PTES support (West, 2012) was a key source document (https://cites.org/sites/default/files/eng/com/ac/27/E-AC27-12-04.pdf).**

Based on all available information, the CITES Animals Committee decided in May 2014 to evaluate the exports of *H. algiricus* from Guinea and Senegal as posing Urgent Concern, and issued "Recommendations" (instructions) for remedial work by both Parties (https://cites.org/sites/default/files/eng/com/ac/27/wg/E-AC27-WG-01.pdf). As neither Party met these recommendations, **the CITES Standing Committee decided in January 2016 that the other 180 CITES member countries must suspend trade in *H. algiricus* with each of Guinea and Senegal** (https://cites.org/sites/default/files/eng/com/sc/66/E-SC66-31-01.pdf).

Project Seahorse is now planning to support Guinea and Senegal as they move to address CITES recommendations and **establish sustainable trade in seahorses**. In so doing, we will have ensured that these Parties have developed a respectful exploitation of seahorses that is not detrimental to wild populations. To this end, we will be seeking funds to provide direct support to the CITES Authorities in Senegal. Our support for Guinea would follow if national governance improves and the total CITES suspension on all exports of Appendix II listed species were lifted.

In addition to our CITES successes, findings from our PTES-funded research in West Africa – and from some of our other PTES-funded work – are centrally important to our new global analysis of seahorse bycatch, in final review with *Fisheries*. **This paper is most unusual in focusing attention on the effects of indiscriminate gear on small benthic species of very limited commercial value.** Our paper is entitled *Small bycatch of small fishes can add up to big numbers*. It addresses the problem that, as in Senegal and Guinea, non-selective fishing gear extracts a great many small marine species, with little documentation or assessment of their impacts. Our review of published and unpublished data sources synthesises and analyses data on seahorse bycatch for five gear type categories and 22 countries. The median bycatch across all five gear types was a very low catch-per-unit-effort of 0.96 seahorses per vessel per day. **Nonetheless, fleet sizes were so large that annual catches were estimated at nearly 40 million seahorses with just these sample gears across just 21 countries.** Fisher interviews suggested that seahorse catches were declining, although effort data were unavailable. CITES official data are clearly not capturing the magnitude of seahorse volume in bycatch. We discuss our findings for seahorses in the context of rare bycatch and how such information can inform fisheries management in developing nations.

Has long-term monitoring been put in place to ensure the outcomes are sustainable? How will this be funded, undertaken?:

The CITES Appendix II listing for seahorses ensures that conservation scrutiny of – and support for – Senegal and Guinea are guaranteed. The formal recommendations under the Review of Significant Trade provide clear guidance on formally required action by Senegal and Guinea. Last month's suspension of trade in the dominant species, *H. algiricus*, generates further scrutiny as CITES determines next steps for this member country.

Project Seahorse – serving as the IUCN SSC Seahorse, Pipefish and Stickleback Specialist Group and as the lead implementing partner for the CITES Secretariat on seahorse issues – has a clear mandate to continue engaging with the region, as funds become available.

Please detail how you have/ plan to disseminate your results (please include a rough timetable) e.g. giving talks, preparing papers, producing management guidelines, submitting evidence to change government policy, getting media interest, carrying out workshops for conservation officers. Would you like to work with PTES to achieve media coverage for your project? Do you have any plans to publish the findings from your work in journals?:

Papers and reports

We have produced the first primary paper on the biology of the most traded species, *H. algiricus,* with a Senegalese co-author. We also completed a substantial report on trade in West African seahorses in the form of a MSc thesis (as approved by PTES when we were granted the funds). We are also ready to submit a revised version of a primary paper on West African trade in seahorses to Oryx.

- Cisneros-Montemayor, A., K. West, I.S. Boiro and A.C.J. Vincent. 2015. An assessment of West African seahorses in fisheries catch and trade. Journal of Fish Biology doi:10.1111/jfb.12818.
- Cisneros-Montemayor, A., K. West, S. Wiswedel and A.C.J. Vincent. in final preparation. West African trade in CITES-restricted seahorse species. For Oryx.
- West. K. 2012. Investigations into the Senegalese trade in CITES-listed seahorses, *Hippocampus algiricus.* MSc thesis, University College London, UK. 78 pp

Blogs

We wrote five blogs on West African seahorse trade and/or *H. algiricus* for the Project Seahorse website:
http://www.projectseahorse.org/search?q=west%20africa&f_collectionId=55931b13e4b053f866d08074

Media coverage

We released a video of *H. algiricus* obtained during this fieldwork that **reached more than 26 million viewers**. The video of a seahorse swimming served to introduce the story of seahorse

exploitation and conservation in the accompanying text.

- Sky News: http://news.sky.com/story/996094/rare-video-of-west-african-seahorse-released
- Telegraph: http://www.telegraph.co.uk/news/earth/wildlife/9600519/West-African-seahorse-filmed-for-first-time.html
- Guardian: http://www.theguardian.com/environment/video/2012/oct/10/west-african-seahorse-video
- National Geographic: http://video.nationalgeographic.com/video/news/west-africa-seahorse-first-video-vin
- Daily Motion: http://www.dailymotion.com/video/x31aaxk
- Express (UK): http://www.express.co.uk/news/weird/351303/First-Look-Never-before-seen-footage-of-rare-West-African-seahorse
- Yahoo! News UK: https://uk.news.yahoo.com/rare-video-west-african-seahorse-released-204730727.html
- Sea Monster: http://theseamonster.net/2012/10/senegalese-seahorse-caught-on-camera/

Website/blogs

We released the following:

- 3 news stories on www.projectseahorse.org
  http://www.projectseahorse.org/news/2012/10/10/first-ever-video-footage-of-elusive-west-african-seahorse?rq=west%20africa
  http://www.projectseahorse.org/news/2012/10/10/project-seahorse-captures-first-ever-video-footage-of-elusive-west-african-seahorse
- 1 news story on the ZSL website: https://www.zsl.org/conservation/news/first-ever-video-elusive-west-african-seahorse
- 1 news story on the Imperial College website: http://www3.imperial.ac.uk/newsandeventspggrp/imperialcollege/newssummary/news_15-10-2012-18-12-12
- 1 news stories on the UBC website: http://news.ubc.ca/2012/10/10/first-video-footage-of-unstudied-west-african-seahorse-released/

Please give a breakdown of the how your budget was spent compared with the budget in your original application:

As a result of our success in securing additional funding for this project from the Mohammed bin Zayed Species Conservation Fund, we were able to expand our originally proposed project activities considerably. This expansion of the project led us to reallocate funds between the two grants in order to maximize overall effectiveness. The table below reflects the results of this reallocation in how we expended PTES funds against the budget we originally submitted to PTES for this work.

Category	Item	Budgeted Amt.	Actual Amt.
Staff costs	Salary for local counterpart	£840	£2,603
Field Equipment	Seahorse specimens	£20	£99
Travel	Return flight to Guinea	£750	£3
	Return flight Conakry to Dakar	£371	£235
	In-country travel	£420	£694
	Travel to/from airport	£32	£46
	Travel for training	£38	£85
	Travel post project	£33	£0
Subsistence	Accommodation	£3,760	£2,667
	Food	£532	£545
Report Production	Printing and binding	£60	£68
	Translation into French	£160	£139
Administration	Communications in-country	£70	£92
Other	Visa	£90	£36
	In-kind payments to interview respondents	£20	£85
	Entry and exit fee at airport	£200	£0
	TOTALS:	**£7,397**	**£7,397**

Have you succeed in raising other funds for the project? If so, this is really good news! Please list the sources and levels of investment:

We were very fortunate in attracting a grant of USD 7000 from the Mohamed bin Zayed Species Conservation Fund, to complement the generous support of GBP 7397 from PTES. The combination of these funds allowed us to add a second short field trip for feedback, consultation, and complementary research. We here report on both grants together, and invite PTES to share our pride in all the outputs and outcomes.

What are the best lessons you've learned so far?

Here are three of the most important lessons we deduced from this work.

1. Failed states are not a great place to do wildlife trade surveys, especially for species under international export restrictions. It all gets too stressful and dangerous.
2. If funds allow, as ours did this time, it is wonderful to schedule two separate trips to a focal country: (i) initial consultation, field work and first feedback; (ii) full feedback, field work to fill gaps, and formal consultation on management and policy options. Our feedback and follow up fieldwork during the second trip were both highly effective because we knew well the results of the first surveys. Now, of course, we need to find the funds to support development of those options…

3. We always need to be extremely proactive and persistent in maintaining direct ties with national agencies and organizations, through many and diverse routes. We took our eyes off the ball on this – simply because CITES global process demanded so much attention – and communication with Senegal lapsed such that we now have to strengthen ties considerably for the next stage of this conservation work.

Please provide a Project conclusion/ summary: (300 words) including objective(s) at outset, lessons learned, and recommendations for future practice:

Our PTES-funded project was the single most significant influence in a CITES decision to ban imports from Guinea and Senegal of *Hippocampus algiricus*, the main species in the region. Such a notable outcome arose from our success in meeting the three project aims of (i) investigating seahorse biology, (ii) assessing seahorse fisheries and trade and (iii) helping ensure that exports do not damage wild populations of seahorses.

We conducted two field surveys on seahorse biology, fisheries and trade with associated consultations and feedback, in 2012 and 2013. We interviewed 272 people at 41 fishing villages, landing sites, larger markets and processing facilities in and Guinea (n=7), Senegal (n=29), The Gambia (n=5). We also met with 53 government officials, researchers and NGO leaders and surveyed six underwater sites.

Our fieldwork was effective. We published the first paper about *H. algiricus* while discovering that *H. hippocampus* is also found and exploited in the region. We established that most seahorses are accidentally caught by artisanal fishers using seine nets, bottom-trawls, and many other gears. A total of 371,000 seahorses were caught in Senegal in one year and 184,000 were retained, far more than reported in the CITES database. All seahorses were traded in dried form. Most fishers reported marked declines in seahorse catches and sizes. We discussed our findings for Senegal with representatives from government, NGOs, the fishing industry and acadaemia during a workshop hosted by the CITES Management Authority.

CITES' suspension of imports from Guinea and Senegal is an important move that should help reduce pressures on wild seahorses while also prompting significant new conservation work. Project Seahorse is now hoping to support Guinea and Senegal as they move to address CITES recommendations and establish sustainable trade in seahorses. We also want to put concerted effort into mobilising citizen conservation.

Figure 1. Map of Senegal and The Gambia with research and survey sites. Distance between degrees of latitude is 111 km.