



**Wild Caught Ornamental Fish – The trade, The Benefits, The Facts**

**References and annotations by page**

## Contents

Front Cover .....	2
Foreword .....	3
Page 2. Wild caught fish: key facts .....	4
Page 3. Trade not Aid .....	4
Pages 4 and 5. Wild caught ornamental fish – An A-Z of global trade .....	4
Pages 6 and 7. How are fish caught? .....	5
Pages 8 and 9. From the wild to a UK home aquarium – The Fish’s Journey.....	5
Pages 10 and 11. How fish are protected by regulations .....	7
Pages 12 and 13. What would collectors do if they couldn’t catch wild fish? .....	9
Pages 14 and 15. 8 key benefits of wild caught fish.....	11
Page 16. Case study: Peru .....	11
Page 17. Case study: Bali.....	11
Page 18. Case Study Brazil: Celebration and Conservation .....	12
Page 19. Case Study: Malawi .....	13
Page 20. Some facts about the global ornamental fish industry (marine).....	14
Page 21. Some facts about the global ornamental fish industry (freshwater) .....	17
Page 22. The UK industry in context.....	20
Page 23. The worth of the UK industry .....	21
Page 24: Best Practice .....	24



## **Wild Caught Ornamental Fish – The trade, The Benefits, The Facts**

### **References and annotations by page**

#### **Front Cover**

*“The aquarium collecting industry in Hawai’i and especially in West Hawai’i has long been a subject of controversy... This controversy continues to this day with repeated efforts by anti-aquarium advocates to shut down the fishery by one stratagem or another.” (pg. 7)*

*“The Hawai’i marine aquarium fishery is currently the most economically valuable commercial inshore fishery in the State with FY 2014 reported landings greater than \$2.3 million.” (pg. 2; pg. 14)*

*“Overall Yellow Tang abundance in the 30’-60’ depth range over the entire West Hawai’i coast has increased 58% (over 1.3 million fish) from 1999/2000 to 2012-2013 to a current population of 3.6 million fish.” (pg. 3)*

*“In terms of reef fish biomass caught by the different fisheries in West Hawai’i, considerably more biomass is taken by the combined recreational and commercial fisheries either including Yellow Tang (2.8X) or excluding it (8.6X). The total take of reef fish by commercial and non-commercial fishers on other Main Hawaii Islands greatly exceeds the numbers and biomass of the fish taken by aquarium collectors.” (pg. 5, pg. 46)*

*“Additionally, unlike the aquarium fishery which targets mostly immature fish, the other fisheries selectively target the larger breeding portion of the population which has profound implications for the sustainable usage of the resource.” (pg. 46)*

DLNR (2014) Report on the Findings and Recommendations of Effectiveness of the West Hawai’i Regional Fishery Management Area Prepared by Department of Land and Natural Resources State of Hawai’i in response to Section 188F-5. Hawai’i Revised Statutes December 2014.  
[http://dlnr.hawaii.gov/dar/files/2015/01/ar\\_hrs188\\_2015.pdf](http://dlnr.hawaii.gov/dar/files/2015/01/ar_hrs188_2015.pdf) (accessed 25/04/16)



## Foreword

### **UN Development Goals**

With particular reference to the following:

**Goal 1.** End poverty in all its forms everywhere

**Goal 8.** Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

**Goal 9.** Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation (as applies to technology transfer)

**Goal 10.** Reduce inequality within and among countries

**Goal 10b.** Encourage official development assistance and financial flows, including foreign direct investment, to States where the need is greatest, in particular least developed countries, African countries, small island developing States and landlocked developing countries, in accordance with their national plans and programmes

**Goal 13.** Take urgent action to combat climate change and its impacts (by helping maintain rainforests which in turn act as carbon sinks)

**Goal 14.** Conserve and sustainably use the oceans, seas and marine resources for sustainable development

**Goal 14.7.** By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism

**Goal 14.b.** Provide access for small-scale artisanal fishers to marine resources and markets

**Goal 15.** Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

**Goal 15.8.** By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species

**Goal 15.a.** Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems

**Goal 17.11** Significantly increase the exports of developing countries, in particular with a view to doubling the least developed countries' share of global exports by 2020

<http://www.un.org/sustainabledevelopment/sustainable-development-goals/>



## Page 2. Wild caught fish: key facts

\* Consolidation of key points from the report \*

## Page 3. Trade not Aid

Watson, I. & Roberts, D. 2015. Annex E: The ornamental fish trade and livelihoods – The Rio Negro fishery (pg. 78, Table E5); Value chains and the ornamental fish industry (pg. 89, Table E9) *in* The Benefits of Wild Caught Ornamental Aquatic Organisms. Durrell Institute of Conservation and Ecology (DICE). University of Kent. UK. 175pp.

### **The trade benefits**

\* Industry informed experience \*

## Pages 4 and 5. Wild caught ornamental fish – An A-Z of global trade

Watson, I. & Roberts, D. 2015. Annex B: Industry Statistics (pg. 26) *in* The Benefits of Wild Caught Ornamental Aquatic Organisms. Durrell Institute of Conservation and Ecology (DICE). University of Kent. UK. 175pp.

*Note: Countries listed as exporters to the UK are based on UK (HM Customs) data, EU (Eurostat) trade statistics, and informed industry experience.*

UNDP. 2015. Human Development Report: Work for Human Development. (Statistical tables 1 and 2; pgs 208-212). New York, USA. Available at <http://hdr.undp.org/en>

UN-DESA. Least Developed Countries: Country Resolutions and Reports.  
[http://www.un.org/en/development/desa/policy/cdp/ldc2/ldc\\_countries.shtml](http://www.un.org/en/development/desa/policy/cdp/ldc2/ldc_countries.shtml) (accessed 22/04/16)

UN-OHRLLS. 2011. Small Island Developing States. Small Islands Big(ger) Stakes (pg.2) 28pp.  
<http://unohrlls.org/custom-content/uploads/2013/08/SIDS-Small-Islands-Bigger-Stakes.pdf>



## Pages 6 and 7. How are fish caught?

Watson, I. & Roberts, D. 2015. Annex F (pg 101): Fishing methods used in the wild caught ornamental trade *in* The Benefits of Wild Caught Ornamental Aquatic Organisms. Durrell Institute of Conservation and Ecology (DICE). University of Kent. UK. 175pp.

## Pages 8 and 9. From the wild to a UK home aquarium – The Fish's Journey

Watson, I. & Roberts, D. 2015. The Benefits of Wild Caught Ornamental Aquatic Organisms. Durrell Institute of Conservation and Ecology (DICE). University of Kent. UK. 175pp.

\* Based on the above reference and industry informed experience \*

### **Did you know?**

#### **Box 1.**

Aquatic animal health directive 2006/88

<http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32006L0088&from=EN>

The Aquatic Animal Health (England and Wales) Regulations 2009

[http://www.legislation.gov.uk/ukxi/2009/463/pdfs/ukxi\\_20090463\\_en.pdf](http://www.legislation.gov.uk/ukxi/2009/463/pdfs/ukxi_20090463_en.pdf)

Commission Regulation (EU) No 346/2010

<http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32010R0346&from=EN>

CITES Import/ Export permits <https://cites.org/eng/resources/faq.php#permit>

CITES Imports (EU) - The Differences between EU and CITES Provisions in a Nutshell

[http://ec.europa.eu/environment/cites/pdf/differences\\_b\\_eu\\_and\\_cites.pdf](http://ec.europa.eu/environment/cites/pdf/differences_b_eu_and_cites.pdf)

Endangered species: imports and exports and commercial use (UK)

<https://www.gov.uk/guidance/cites-imports-and-exports>



**Box 2.**

IATA Live Animal Regulations. Container requirements 51 and 52 (fish); 56 (live corals) and 57 (other invertebrates).

**Box 3.**

From Hansard records Thursday March 30, 2006. Vol. No. 680. Part No. 130:.

**Baroness Miller of Chilthorne Damer** asked Her Majesty's Government:

*Whether they have made an assessment of the percentage of wild-caught fish imported into the United Kingdom as pets which die before they are sold.*

**The Parliamentary Under-Secretary of State, Department for Environment, Food and Rural Affairs (Lord Bach):** *Most wild-caught fish imported into the UK as pets are tropical species. No specific assessment has been made of mortalities on arrival or of mortalities between arrival and point of sale. However, all commercial consignments of live fish imported directly to the UK from third countries must be routed through a border inspection post and all consignments are subject to a programme of targeted inspection. Evidence from this inspection programme suggests that mortalities account for approximately 1 per cent of consignments of live fish.*

<http://www.publications.parliament.uk/pa/ld200506/ldhansrd/vo060330/text/60330w04.htm>  
(Accessed 22/04/2016)

**Box 4.**

The Pet Industry. Helping CBD Parties to Meet the 2020 Aichi Biodiversity Targets – Together We Can Achieve More. Prepared for the CBD SBSTTA, Montreal, Canada. November 2011.

<http://www.ornamentalfish.org/wp-content/uploads/2012/08/cbd-booklet.pdf>

Three Years' Progress – Together We Can Achieve More. An Update on how the Pet Industry Continues to Help CBD Parties to Meet the 2020 Aichi Biodiversity Targets. Prepared for the CBD SBSTTA, Montreal, Canada. June 2014.

<http://www.ornamentalfish.org/wp-content/uploads/2014/06/CBD-three-years-progress-2014-compressed.pdf>



## Pages 10 and 11. How fish are protected by regulations

### **Page 10.**

#### **Country of Origin**

Watson, I. & Roberts, D. 2015. Annex C (pg 35): A review of legislation on the ornamental fish trade *in* The Benefits of Wild Caught Ornamental Aquatic Organisms. Durrell Institute of Conservation and Ecology (DICE). University of Kent. UK. 175pp.

#### **Did you know? Box 1.**

Animal Welfare Act 2006 and equivalent acts in Scotland and Northern Ireland

[http://www.legislation.gov.uk/ukpga/2006/45/pdfs/ukpga\\_20060045\\_en.pdf](http://www.legislation.gov.uk/ukpga/2006/45/pdfs/ukpga_20060045_en.pdf)

[http://www.legislation.gov.uk/asp/2006/11/pdfs/asp\\_20060011\\_en.pdf](http://www.legislation.gov.uk/asp/2006/11/pdfs/asp_20060011_en.pdf)

[http://www.legislation.gov.uk/nia/2011/16/pdfs/nia\\_20110016\\_en.pdf](http://www.legislation.gov.uk/nia/2011/16/pdfs/nia_20110016_en.pdf)

#### **Did you know? Box 2.**

Watson, I. & Roberts, D. 2015. Annex C: A review of legislation on the ornamental fish trade – Maldives legislation (pg. 40) *in* The Benefits of Wild Caught Ornamental Aquatic Organisms. Durrell Institute of Conservation and Ecology (DICE). University of Kent. UK. 175pp

Watson, I. & Roberts, D. 2015. Annex K: The ornamental trade in perspective (Table K.1, pg168) *in* The Benefits of Wild Caught Ornamental Aquatic Organisms. Durrell Institute of Conservation and Ecology (DICE). University of Kent. UK. 175pp

Saleem, M, & Islam, F. 2008 Management of the aquarium fishery in the Republic of the Maldives. *Proceedings of the 11th International Coral Reef Symposium, Ft. Lauderdale, Florida, 7-11 July 2008* session no. 22: 1038-1042.

#### **Did you know? Box 3.**

EU Wildlife Trade Regulations (EC) No 338/97

<http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31997R0338&from=EN>

The Differences between EU and CITES Provisions in a Nutshell

[http://ec.europa.eu/environment/cites/pdf/differences\\_b\\_eu\\_and\\_cites.pdf](http://ec.europa.eu/environment/cites/pdf/differences_b_eu_and_cites.pdf)



**Page 11.**

**In the air**

IATA Live Animal Regulations.

EC Regulation 1/2005. Annex 1. Chapter II (paragraph 4.1) and Annex VI – International standards for containers, pens or stalls appropriate for transporting live animals by air (as an example of IATA Live Animal Regulations in domestic law)

<http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32005R0001&from=en>

**On arrival into the UK**

The Aquatic Animal Health (England and Wales) Regulations 2009

[http://www.legislation.gov.uk/ukxi/2009/463/pdfs/ukxi\\_20090463\\_en.pdf](http://www.legislation.gov.uk/ukxi/2009/463/pdfs/ukxi_20090463_en.pdf)

Aquatic Animal Health Directive 2006/88/EC

<http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32006L0088&from=EN>

The Welfare of Animals (Transport) (England) Order 2006 and corresponding legislation in devolved administrations (derived from EC Regulation 1/2005)

[http://www.legislation.gov.uk/ukxi/2006/3260/pdfs/ukxi\\_20063260\\_en.pdf](http://www.legislation.gov.uk/ukxi/2006/3260/pdfs/ukxi_20063260_en.pdf)

CITES Import/ Export permits <https://cites.org/eng/resources/faq.php#permit>

CITES Imports (EU) - The Differences between EU and CITES Provisions in a Nutshell

[http://ec.europa.eu/environment/cites/pdf/differences\\_b\\_eu\\_and\\_cites.pdf](http://ec.europa.eu/environment/cites/pdf/differences_b_eu_and_cites.pdf)

Import of Live Fish (England and Wales) Act 1980

<http://www.legislation.gov.uk/ukpga/1980/27/data.pdf>

EU Regulation 1143/2014 on Invasive Alien Species

<http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R1143&from=EN>





### **In the pet shop**

Animal Welfare Act 2006 and equivalent acts in Scotland and Northern Ireland

[http://www.legislation.gov.uk/ukpga/2006/45/pdfs/ukpga\\_20060045\\_en.pdf](http://www.legislation.gov.uk/ukpga/2006/45/pdfs/ukpga_20060045_en.pdf)

[http://www.legislation.gov.uk/asp/2006/11/pdfs/asp\\_20060011\\_en.pdf](http://www.legislation.gov.uk/asp/2006/11/pdfs/asp_20060011_en.pdf)

[http://www.legislation.gov.uk/nia/2011/16/pdfs/nia\\_20110016\\_en.pdf](http://www.legislation.gov.uk/nia/2011/16/pdfs/nia_20110016_en.pdf)

### **Did you know?**

OATA. 2014. Freedom of Information Request on Pet Shop Licensing.

[http://www.ornamentalfish.org/wp-content/uploads/2014/04/FOI-Request-on-Pet-Shop-Licensing\\_FINAL.pdf](http://www.ornamentalfish.org/wp-content/uploads/2014/04/FOI-Request-on-Pet-Shop-Licensing_FINAL.pdf)

## Pages 12 and 13. What would collectors do if they couldn't catch wild fish?

FUNDAMAZONIA. 2015. The Benefits of Wild Caught Ornamental Aquatic Organisms in The Pacaya Samiria National Reserve, Peru. 20pp.

LINI. 2015. A Survey of Marine Ornamental Fishers' Livelihoods in North Bali. 23pp.

### **Fishing for food**

Watson, I. & Roberts, D. 2015. Annex E: The ornamental fish trade and livelihoods – Comparison with the food fish trade (pg. 97) *in* The Benefits of Wild Caught Ornamental Aquatic Organisms. Durrell Institute of Conservation and Ecology (DICE). University of Kent. UK. 175pp

### **Logging, ranching, tourism and coral mining**

Watson, I. & Roberts, D. 2015. Annex I (pg 120): Threats to the wild caught ornamental fish trade *in* The Benefits of Wild Caught Ornamental Aquatic Organisms. Durrell Institute of Conservation and Ecology (DICE). University of Kent. UK. 175pp

Watson, I. & Roberts, D. 2015. Annex K (pg 154): The ornamental trade in perspective *in* The Benefits of Wild Caught Ornamental Aquatic Organisms. Durrell Institute of Conservation and Ecology (DICE). University of Kent. UK. 175pp

Project Piaba <http://projectpiaba.org/>



### **Tourism with a sting in the tail**

Watson, I. & Roberts, D. 2015. Annex I: Threats to the wild caught ornamental fish trade – Tourism (pgs. 123-124) *in* The Benefits of Wild Caught Ornamental Aquatic Organisms. Durrell Institute of Conservation and Ecology (DICE). University of Kent. UK. 175pp

Góes de Araújo, M.L., Charvet-Almeida, P., Pinto Almeida, M., and H. Pereira. 2004. Freshwater stingrays (Potamotrygonidae): status, conservation and management challenges. Information paper for the 20<sup>th</sup> CITES Animals Committee meeting (AC20 Inf. 8). Johannesburg (South Africa), 29 March-2 April 2004. 6pp. <https://www.cites.org/sites/default/files/common/com/ac/20/E20-inf-08.pdf> (accessed 20/04/16)

### **Carbon Locking and Climate Change**

Department of Energy and Climate Change. February 2016. 2014 UK Greenhouse Gas Emissions, Final Figures. 34 pp.

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/496942/2014\\_Final\\_Emissions\\_Statistics\\_Release.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/496942/2014_Final_Emissions_Statistics_Release.pdf) (accessed 22/04/16)

*Note: 67 Billion tonnes of carbon are locked in the State of Amazonas. Barcelos and Santa Isabel do Rio Negro are c. 12% of the area of the entire State. Thus 8 billion tonnes of carbon are locked in this area alone.*

US EPA. US Greenhouse Gas Inventory Report: 1990-2014.

<https://www3.epa.gov/climatechange/ghgemissions/usinventoryreport.html> (accessed 04/05/16)

Mitchell A.W., Secoy, K, and N. Mardas. 2007. Forests First in the Fight Against Climate Change. Global Canopy Programme.



## Pages 14 and 15. 8 key benefits of wild caught fish

Watson, I. & Roberts, D. 2015. The Benefits of Wild Caught Ornamental Aquatic Organisms. Durrell Institute of Conservation and Ecology (DICE). University of Kent. UK. 175pp

Wabnitz, C., Taylor, M., Green, E., and Razak, T. 2003. From Ocean to Aquarium. UNEP-WCMC, Cambridge, UK. [http://www.unep.org/pdf/from\\_ocean\\_to\\_aquarium\\_report.pdf](http://www.unep.org/pdf/from_ocean_to_aquarium_report.pdf) (accessed 25/04/16).

## Page 16. Case study: Peru

FUNDAMAZONIA. 2015. The Benefits of Wild Caught Ornamental Aquatic Organisms in The Pacaya Samiria National Reserve, Peru. 20pp.

Video of fish collectors in Peru <https://www.youtube.com/watch?v=Bvv951YwTFw>

## Page 17. Case study: Bali

LINI. 2015. A Survey of Marine Ornamental Fishers' Livelihoods in North Bali. 23pp.

Video on the Ornamental fish collectors in Les Village, Bali  
<https://www.youtube.com/watch?v=HDxKefqcC3w&feature=youtu.be>



## Page 18. Case Study Brazil: Celebration and Conservation

*“With the recent decline in the ornamental fishing trade, families were gradually abandoning the community and moving to land areas where other economic activities are possible. Therefore, in these new areas, a considerable portion of upland forest was removed to accommodate plantations of cassava, maize, and other crops.”* (pg. 420)

*“The decline in ornamental fishery is believed to have had a negative impact on regional forest conservation”* (pg. 420)

*“The Imazon Deforestation Alert System detected a deforestation area of 838 km<sup>2</sup> in August and September 2014, in Amazonia, which represents an increase of 191 % in relation to 288 km<sup>2</sup> of August–September 2013 (<http://imazon.org.br/publicacoes/deforestation-report-for-the-brazilian-amazon-august-2014-sad/?lang=en>).”* (pg. 421)

Alho, C. J. ., R.E. Reis and Aquino, P. P.U. 2015. Amazonian freshwater habitats experiencing environmental and socioeconomic threats affecting subsistence fisheries. *Ambio* 44(5): 412-425. DOI 10.1007/s13280-014-0610-z. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4510326/> (accessed 22/04/16).

### **Greater London Area**

Office for National Statistics. August 2012. Regional Profiles: Key Statistics – London.  
[http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/dcp171780\\_275206.pdf](http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/dcp171780_275206.pdf)

Project Piaba <http://projectpiaba.org/>

Video on Project Piaba: For Ornamental Fish <https://vimeo.com/124670986>



## Page 19. Case Study: Malawi

Video on Malawi's Fishy Export Business <http://www.bbc.co.uk/news/business-33476396>

Also related:

*“In terms of fish exports, Lake Malawi has over 800 endemic fish species which are of both local and international scholarly importance and also act as a source of tourism attraction. Some fish species such as Mbuna are exported outside the country and this helps to bring much-needed foreign exchange. The total exports of aquarium fish and some dried fish products for 2011 amounted to 66,479kg generating revenue of MK70,617,625 (USD 451,148)*

*Ladies and Gentlemen the sector is also playing a positive role in contributing to the household income and national GDP. Fish landings amounting to 81,072 tonnes in 2011 had a beach or landed value of MK18.96 billion (approx USD 71.5 million) and contributed to the national GDP. The national average beach price was at MK230 per kilogram. All this illustrates how important is the fisheries sector to national development agenda.” (pgs. 4 and 5)*

From: Opening statement by the Minister for Agriculture and Food Security Honourable Prof. Peter Mwanza at the national stakeholder's validation workshop on the revised second edition of the national fisheries policy 2012-2017. Held at Golden Peacock Hotel, Lilongwe. 14<sup>th</sup> December, 2012.  
<http://bit.ly/1Uv7mZT>



## Page 20. Some facts about the global ornamental fish industry (marine)

*Note: extent of collecting areas for marine ornamental fish is based on FAO export data and informed industry experience. See also pages 4 and 5: Wild caught ornamental fish – An A-Z of global trade*

### **Species resilience**

Cooney, R., Kasterine, A., MacMillan, D., Milledge, S., Nossal, K., Roe, D. and S.,'t Sas-Rolfes, M. (2015). The trade in wildlife: a framework to improve biodiversity and livelihood outcomes. Chapter 3.1.1 Species Factors- Resilience to Harvest. Pg. 8. International Trade Centre, Geneva, Switzerland. <https://www.cbd.int/financial/monterreytradetech/iucn-wildtrade.pdf> (accessed 21/04/16).

Watson, I. & Roberts, D. 2015. Annex K: The ornamental trade in perspective – Ornamental fisheries and their impact. Table K1. Data on the ability of reef species to withstand fishing pressure and adapt to aquarium life (pgs 168-170) *in* The Benefits of Wild Caught Ornamental Aquatic Organisms. Durrell Institute of Conservation and Ecology (DICE). University of Kent. UK. 175pp

Australian Institute of Marine Science. About Corals – Distribution and Reproduction Fact Sheets. <http://coral.aims.gov.au/info/about.jsp> (accessed 22/04/16).

UNEP-WCMC (2004) Review of marine ornamental species. UNEP-WCMC, Cambridge, United Kingdom. 109pp.

NOAA/ NMFS. August 24, 2015. Endangered and Threatened Wildlife and Plants; Notice of 12-month Finding on a Petition to List the Orange Clownfish as Threatened or Endangered Under the Endangered Species Act. Federal Register Vol. 80, No. 163. Pp 51235 – 51246. <http://1.usa.gov/1rsZP2p>

### **Global catch**

Watson, I. & Roberts, D. 2015. Annex B: Industry Statistics (pg. 26) *in* The Benefits of Wild Caught Ornamental Aquatic Organisms. Durrell Institute of Conservation and Ecology (DICE). University of Kent. UK. 175pp.



### **Fish discarded**

FAO. 2015. FAO Global production database updated to 2013 – Summary information. 5pp. <http://www.fao.org/3/a-i4883e.pdf> (accessed 22/04/16)

Kelleher, K. 2005. Discards in the world's marine fisheries. An update. FAO Fisheries Technical Paper. No. 470. Rome, FAO. 131p. <http://www.fao.org/docrep/008/y5936e/y5936e09.htm#bm09.1> (accessed 22/04/16)

Davies, R.W.D., S.J. Cripps, A. Nickson and G. Porter. 2009. Defining and estimating global marine fisheries bycatch. doi:10.1016/j.marpol.2009.01.003.

[http://assets.wwf.org.uk/downloads/bycatch\\_paper.pdf](http://assets.wwf.org.uk/downloads/bycatch_paper.pdf) (accessed 22/04/16).

*Note: Kelleher (2005) estimates 8% of global catch is bycatch. Davies, et. al. (2009) estimate 40.4% is bycatch. Based on FAO global marine capture figures for 2013, this is between 7 and 33 million tonnes of bycatch.*

Also related: “No-one wants to see perfectly edible fish being thrown back into the sea dead,” (comment on discard ban in North Sea by Scots Minister Richard Lochhead) <http://www.north-star-news.co.uk/News/Fish-discard-ban-will-benefit-industry-Lochhead-31122015.htm>

### **Sold alive in the aquarium trade**

Wabnitz, C., Taylor, M., Green, E., and Razak, T. 2003. From Ocean to Aquarium. UNEP-WCMC, Cambridge, UK.

*Note: Wabnitz, et. al. 2003 estimate 20 – 24 million marine fish in the global ornamental trade. The average marine ornamental fish is c. 3 g (average from industry experience and companies' import records). Therefore, the estimated weight of marine ornamental fish is c. 70 tonnes.*

### **Did you know? Tropical prawn trawlers**

Hill, B.J. and Wassenberg, T. J. 2000. The probable fate of discards from prawn trawlers fishing near coral reefs: A study in the northern Great Barrier Reef, Australia. Fisheries Research 48(3): 277-286. <http://www.sciencedirect.com/science/article/pii/S0165783600001855> (accessed 25/04/16).

Clucas, I. 1997. Chapter 9: Discards and bycatch in shrimp trawl fisheries (Table 11) *in* A Study of the options for utilization of bycatch and discards from marine capture fisheries. FAO Fisheries circular No. 928 FIIU/C928. <http://www.fao.org/docrep/w6602e/w6602e09.htm#a> (accessed 25/04/16).



### **Did you know? Trade in Seahorses**

Watson, I. & Roberts, D. 2015. Annex D: CITES and the ornamental aquatics trade – Results Seahorses (pgs. 53-59) *in* The Benefits of Wild Caught Ornamental Aquatic Organisms. Durrell Institute of Conservation and Ecology (DICE). University of Kent. UK. 175pp

### **Wanted Alive!**

Wabnitz, C., Taylor, M., Green, E., and Razak, T. 2003. From Ocean to Aquarium (pg. 9). UNEP-WCMC, Cambridge, UK. [http://www.unep.org/pdf/from\\_ocean\\_to\\_aquarium\\_report.pdf](http://www.unep.org/pdf/from_ocean_to_aquarium_report.pdf) (accessed 25/04/16).

### **Why aren't more marine fish captive reared?**

Pelagic spawners are generally more difficult to spawn and rear larvae.

*“The second way to assess that the export of aquarium fish to the U.S. comes from a small numbers of individuals representing many species is that overall, for these data, there are 5,647 unique species-country combinations of exports. Only 710 of the species-country combinations (12.6%) exceed 1,000 individuals per species, indicating that the trade consists primarily of low-volume species.”* (pg. 5)

*Note that it may never be commercially feasible to create hatcheries to raise small numbers of many species.*

*From:*

Rhyne A.L., Tlusty M.F., Schofield P.J., Kaufman L, Morris J.A. Jr, and Bruckner A.W. 2012 Revealing the Appetite of the Marine Aquarium Fish Trade: The Volume and Biodiversity of Fish Imported into the United States (page 5). PLoS ONE 7(5): e35808. doi:10.1371/journal.pone.0035808 <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0035808> (accessed 25/04/16)





## Page 21. Some facts about the global ornamental fish industry (freshwater)

*Note: The percent of marine and freshwater species that are captive bred is based on industry experience.*

### **Annual global catch of freshwater fish**

FAO. 2015. FAO Global production database updated to 2013 – Summary information. 5pp. <http://www.fao.org/3/a-i4883e.pdf> (accessed 22/04/16)

### **Fish caught for food in Amazonas**

Ministério da Pesca e Aquicultura (MPA Brasil). Coordenação-Geral de Monitoramento e Informações Pesqueiras. Produção nacional de pescados em 2011 (Tabela 4, página 21) *in* Boletim estatístico da pesca e aquicultura 2011. 60 pp. [http://www.mpa.gov.br/files/docs/Boletim\\_MPA\\_2011\\_pub.pdf](http://www.mpa.gov.br/files/docs/Boletim_MPA_2011_pub.pdf) (accessed 25/04/16)

Ministério da Pesca e Aquicultura (MPA Brasil). Coordenação-Geral de Monitoramento e Informações Pesqueiras. Fevereiro 2012. Produção nacional de pescados em 2010 (Tabela 4, página 19) *in* Boletim estatístico da pesca e aquicultura 2010. 128 pp. [http://www.mpa.gov.br/files/docs/Informacoes\\_e\\_Estatisticas/Boletim%20Estat%3%ADstico%20M PA%202010.pdf](http://www.mpa.gov.br/files/docs/Informacoes_e_Estatisticas/Boletim%20Estat%3%ADstico%20M PA%202010.pdf) (accessed 25/04/16)

Ministério da Pesca e Aquicultura (MPA Brasil). Coordenação-Geral de Monitoramento e Informações Pesqueiras. Produção nacional de pescados em 2008 -2009 (Tabela 4, página 14) *in* Boletim estatístico da pesca e aquicultura 2008 – 2009. 99pp. <http://www.mpa.gov.br/files/docs/Publicidade/anu%3%A1rio%20da%20pesca%20completo2.pdf> (accessed 25/04/16).

*Note: The three references above show the volume of fish caught for food in the state of Amazonas as follows:*

<b>Year</b>	<b>Landings in Amazonas</b>
<b>2011</b>	<b>63,743</b>
<b>2010</b>	<b>70,896</b>
<b>2009</b>	<b>71,109</b>
<b>2008</b>	<b>70,684</b>
<b>2007</b>	<b>60,306</b>



### **Did you know? Fish exported from Brazil**

Number and value of live ornamental fish exported from Brazil (2014) from <http://aliceweb.desenvolvimento.gov.br/> (also see table on page 19 of these notes)

IBAMA – DBFLO. Agosto 2008. Anexo 1 – Estatísticas gerais de exportação de peixes ornamentais *in* diagnóstico geral das práticas de controle ligadas a exploração, captura, comercialização, exportação e uso de peixes para fins ornamentais e de aquariofilia. [http://www.ibama.gov.br/phocadownload/recursos\\_pesqueiros/diagnostico\\_completo.pdf](http://www.ibama.gov.br/phocadownload/recursos_pesqueiros/diagnostico_completo.pdf) (accessed 25/04/16)

Anjos, H.D.B.; Amorim, R.M., Siqueira, J.A. and Anjos, C.R. 2009. Exportação de peixes ornamentais do estado do Amazonas, Bacia Amazônica, Brasil. *B. Inst. Pesca*, São Paulo, 35(2): 259-274. [ftp://ftp.sp.gov.br/ftppeca/35\\_2\\_259-274.pdf](ftp://ftp.sp.gov.br/ftppeca/35_2_259-274.pdf) (accessed 25/04/16)

*Note: The two references above show that tetras (*Paracheirodon axelrodi*, all *Paracheirodon* spp.) are roughly 70% of the total number of ornamental fish exported from Brazil. The relevant tables can also be found at [http://www.ibama.gov.br/category/40?download=1380%3A\\_-p-2006\\_-p](http://www.ibama.gov.br/category/40?download=1380%3A_-p-2006_-p) and [http://www.ibama.gov.br/category/40?download=1382%3A\\_-p-2007\\_-p](http://www.ibama.gov.br/category/40?download=1382%3A_-p-2007_-p)*

*Using Aliceweb 2014 export figures of 6.5 million fish and assuming a weight 0.2 g per fish (see Watson & Roberts (2015) pg.172), this is just under 1 tonne. Assuming a weight of 4 grams per fish for the remaining 30% of individuals exported in 2014, this is equivalent to 7.8 tonnes (8.8 tonnes total export of freshwater ornamental fish from Brazil in 2014).*

### **Tropical rivers:**

Thlusty, M.F., Rhyne, A.L., Dowd, S., and Kaufman, L. May 2014. Controlling the destiny of the trade: Proactive steps now can address the major impediments to developing a more sustainable ornamental fish industry. *Ornamental Fish International (OFI) Journal* 75: 23-26. [http://projectpiaba.org/wp-content/uploads/2014/01/OFI\\_Thlustyetal\\_2014.pdf](http://projectpiaba.org/wp-content/uploads/2014/01/OFI_Thlustyetal_2014.pdf) (accessed 25/04/16)

Watson, I. & Roberts, D. 2015. Annex K: The ornamental trade in perspective – Rio Negro cardinal tetra fishery (pg 171) *in* The Benefits of Wild Caught Ornamental Aquatic Organisms. Durrell Institute of Conservation and Ecology (DICE). University of Kent. UK. 175pp

Watson, I. & Roberts, D. 2015. Annex F: Fishing methods used in the wild caught ornamental trade – Hand picking (pg 101) *in* The Benefits of Wild Caught Ornamental Aquatic Organisms. Durrell Institute of Conservation and Ecology (DICE). University of Kent. UK. 175pp



### **Alive & Kicking:**

Kottelat, M, & Whitten, T (1996) Freshwater Biodiversity in Asia with Special Reference to Fish (pg. 27). World Bank Technical Paper No. 343. World Bank, Washington DC, USA. 87pp [http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/1996/09/01/000009265\\_3970128131744/Rendered/PDF/multi\\_page.pdf](http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/1996/09/01/000009265_3970128131744/Rendered/PDF/multi_page.pdf) (accessed 25/04/16)

### **Catch cardinals or release carbon**

Total ornamental fish exported from Brazil (<http://aliceweb.desenvolvimento.gov.br/> (accessed 25/04/16)). Note that approximately 70% of the number of fish exported corresponds to cardinal tetras.

<i>Year</i>	<i>Number of fish exported (million)</i>	<i>Value (USD million)</i>
<b>2000</b>	<b>56.6</b>	<b>3.24</b>
<b>2005</b>	<b>31.7</b>	<b>4.4</b>
<b>2010</b>	<b>14.2</b>	<b>6.8</b>
<b>2011</b>	<b>10.4</b>	<b>7.3</b>
<b>2012</b>	<b>6.9</b>	<b>9.3</b>
<b>2013</b>	<b>7.8</b>	<b>10.5</b>
<b>2014</b>	<b>6.4</b>	<b>13.8</b>

*“To compare the local inspection to satellite images, it was confirmed that the forests of the mid Negro region are still very well preserved and, only recently, with the sharp decline in ornamental fishery, have areas begun to open up for subsistence agriculture.”*

*“The decline in ornamental fishery is believed to have had a negative impact on regional forest conservation.”*

Alho, C. J. ., R.E. Reis and Aquino, P. P.U. 2015. Amazonian freshwater habitats experiencing environmental and socioeconomic threats affecting subsistence fisheries. *Ambio* 44(5): 412-425. DOI 10.1007/s13280-014-0610-z. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4510326/> (accessed 25/04/16).



### **Did you know? Number of ornamental fish collectors**

*“We estimate that close to 10 000 people in the region were earning at least some income from collecting fishes for the trade.”*

Moreau, M.A. and Coomes, O.T. 2007. Aquarium fish exploitation in western Amazonia: Conservation issues in Peru. *Environmental Conservation* 34(1): 12-22. doi:10.1017/S0376892907003566. [https://www.researchgate.net/publication/231890837\\_Aquarium\\_fish\\_exploitation\\_in\\_western\\_Amazonia\\_Conservation\\_issues\\_in\\_Peru](https://www.researchgate.net/publication/231890837_Aquarium_fish_exploitation_in_western_Amazonia_Conservation_issues_in_Peru) (accessed 25/04/16)

## Page 22. The UK industry in context

### **Fish landings in the UK (2014)**

Marine Management Organisation. 2015. UK Sea Fisheries Statistics 2014 (Table 3.4). 156pp. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/462753/UK\\_Sea\\_Fisheries\\_Statistics\\_2014\\_-\\_online\\_version.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/462753/UK_Sea_Fisheries_Statistics_2014_-_online_version.pdf) (accessed 25/04/16)

*Note: Total volume of pelagic and demersal fish landed into the UK by UK and foreign vessels equals 379.3 tonnes with a value of £408.7 million. That is just over £1,000/tonne compared to £800,000/tonne of live marine ornamentals arriving at LHR.*

### **Fish and chips**

*“British consumers eat some 382 million portions of fish and chips every year.”*

British Federation of Fish Friers. <http://www.federationoffishfriers.co.uk/pages/facts-and-figures-603.htm> (accessed 25/04/16)

*“The average portion weight of chips is 13oz /367g and the average portion weight of fish is 8oz /226g”*

<http://www.colbeck.co.uk/sf-docs/marketing-tips/Profits-out-the-door.pdf> (accessed 25/04/16)

*Note: 382 million portions of fish at an average weight of 226 g is over 86,000 tonnes of filleted fish.*



### **Catch from recreational angling**

Armstrong, M., Brown, A., Hargreaves, J., Hyder, K., Pilgrim-Morrison, S., Munday, M., Proctor, S., Roberts, A., and Williamson, K., November 2013. Sea Angling 2012 – a survey of recreational sea angling activity and economic value in England. DEFRA.

[http://randd.defra.gov.uk/Document.aspx?Document=12025\\_SeaAngling2012synthesisreportFINAL.pdf](http://randd.defra.gov.uk/Document.aspx?Document=12025_SeaAngling2012synthesisreportFINAL.pdf) (accessed 25/04/16).

*Note: Between 230 and 440 tonnes of bass (Box 17, pg. 9) and between 430 and 820 tonnes of cod (Box 19 pg. 10) were landed and kept by anglers annually. The combined range for these two species is 660 – 1,260 tonnes, with a midpoint of 960 tonnes.*

### **Marine ornamental imports in the UK (2014)**

Watson, I. & Roberts, D. 2015. Annex E: The ornamental fish trade and livelihoods – Comparison with the food fish trade (pg 96) *in* The Benefits of Wild Caught Ornamental Aquatic Organisms. Durrell Institute of Conservation and Ecology (DICE). University of Kent. UK. 175pp

## **Page 23. The worth of the UK industry**

### **The Retail Sector**

#### **Number of pet shops**

OATA. 2014. Freedom of Information Request on Pet Shop Licensing.

[http://www.ornamentalfish.org/wp-content/uploads/2014/04/FOI-Request-on-Pet-Shop-Licensing\\_FINAL.pdf](http://www.ornamentalfish.org/wp-content/uploads/2014/04/FOI-Request-on-Pet-Shop-Licensing_FINAL.pdf) (accessed 25/04/16)

### **Employment figures**

DEFRA. December 2009. Impact assessment of an amendment to the Import of Live Fish Act 1980 (ILFA) Order (pg 24).

<http://webarchive.nationalarchives.gov.uk/20100505154859/http://www.defra.gov.uk/corporate/consult/fish-imports/100119-condoc-impact-assessment.pdf> (accessed 25/04/16)

\* Also based on informed industry opinion \*



## **The Fishkeepers**

### **Number of households**

Office for National Statistics. November 2015. Statistical bulletin: Families and households: 2015. Section 8. – Household size.

<http://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/families/bulletins/familiesandhouseholds/2015-11-05#household-size> (accessed 25/04/16)

PFMA Pet Population 2015 <http://www.pfma.org.uk/pet-population-2015> (accessed 25/04/16)

*Note: PFMA data indicate approximately 40 million fish are kept in UK households. From repeated in-store surveys, OATA estimates this figure to range between 100 and 150 million fish.*

National Survey for Wales: Headline results, April 2014 – March 2015 (Revised). Pet Welfare Section page 40. <http://gov.wales/docs/statistics/2015/150914-national-survey-wales-2014-15-headline-results-revised-en.pdf> (accessed 25/04/16)

National Survey for Wales 2014-15. Table 2. Pet Welfare. <https://statswales.wales.gov.uk/Catalogue/National-Survey-for-Wales/2014-15> (accessed 25/04/16)

### **Fishkeepers spend over £400 million**

DEFRA. December 2009. Impact assessment of an amendment to the Import of Live Fish Act 1980 (ILFA) Order (pg 24).

<http://webarchive.nationalarchives.gov.uk/20100505154859/http://www.defra.gov.uk/corporate/consult/fish-imports/100119-condoc-impact-assessment.pdf> (accessed 25/04/16)

### **Knowing your ornamental fish**

\* Based on informed industry opinion \*



### **Did you know? Pets are good for our health**

ProPets. Pets are an essential part of the social, cultural and economic fabric of the UK.  
<http://www.propetsgroup.org.uk/2015%20election%20brochure.pdf> (accessed 25/04/16)

*“Fish tanks and displays are often associated with attempts at calming patients in doctors’ surgeries and dental waiting rooms. This study has, for the first time, provided robust evidence that ‘doses’ of exposure to underwater settings could actually have a positive impact on people’s wellbeing.”*

Quote from:

Williams, A. 30 July 2015. Aquariums deliver health and well-being benefits. Plymouth University.  
<https://www.plymouth.ac.uk/news/aquariums-deliver-health-and-wellbeing-benefits> (accessed 25/04/16)

Cracknell, D., White, M.P., Pahl, S., Nichols, W.I. and Depledge, M.H. 2015. Marine biota and psychological well-being: a preliminary examination of dose-response effects in an aquarium setting. *Environment and Behavior* 1-28. DOI: 10.1177/0013916515597512  
<http://eab.sagepub.com/content/early/2015/07/27/0013916515597512.full.pdf+html> (accessed 25/04/16)

### **Cost of setting up a marine aquarium**

\* Based on informed industry experience \*



## Page 24: Best Practice

### **The use of chemicals**

Bruckner, A.W. and G. Roberts (editors). 2008. Proceedings of the International Cyanide Detection Testing Workshop. NOAA Technical Memorandum NMFS-OPR-40, Silver Spring, MD 164 pp. <http://www.nmfs.noaa.gov/pr/pdfs/nmfsopr40.pdf> (accessed 06/05/16)

### **Fish welfare and mortality**

Olivier, K. 2001. The ornamental fish market. FAO Globefish Research Programme, Vol 67. FAO Rome. 91pp.

*Note: Olivier (2001) quotes mortalities of 50% to 60% even before the animals are shipped and further quotes Gery (1984) who states that only 10% of the 10 – 20 million cardinal tetras collected in the tributaries of the Rio Negro (State of Amazonas) survive transport down to the storage tanks of the firms in Manaus and the packaging prior to shipment.*

*These quotes are not only dated, but also unverifiable and unreliable, as national fisheries statistics show that the number of ornamental fish exported from the State of Amazonas in 1984 was 17.9 million and that approximately 75% of these, would be cardinal tetras (Anjos, et. al., 2009). That means that an estimated 13.4 million cardinal tetras were exported that year from Amazonas – way above the suggested 1 or 2 million fish surviving to transport to exporters' facilities.*

Anjos, H.D.B.; Amorim, R.M., Siqueira, J.A. and Anjos, C.R. 2009. Exportação de peixes ornamentais do estado do Amazonas, Bacia Amazônica, Brasil. *B. Inst. Pesca*, São Paulo, 35(2): 259-274. [ftp://ftp.sp.gov.br/ftppesca/35\\_2\\_259-274.pdf](ftp://ftp.sp.gov.br/ftppesca/35_2_259-274.pdf) (accessed 25/04/16)

*“Most companies surveyed reported pre-shipment mortality rates of about 1-2 per cent, and there is no reason to doubt this figure. Fishes which die usually do so as a result of improper decompression or abuse from other fishes, factors which are well-controlled by most. Included within these reported mortality figures are fishes which are released back to the ocean because they are not suitable for exportation.”*

From:

Pyle, R (1993) Marine aquarium fish. Unattributed report downloaded at [http://www.spc.int/digitalibrary/doc/fame/reports/pyle\\_93\\_marineaquariumfishes.pdf](http://www.spc.int/digitalibrary/doc/fame/reports/pyle_93_marineaquariumfishes.pdf)

*Note: the above reference demonstrates that best practice achieving low mortalities has been in place for decades.*





Wabnitz, C, & Nahacky, T (2014) *Rapid aquarium fish stock assessment and evaluation of industry best practices in Kosrae, Federated States of Micronesia*. Noumea, New Caledonia: Secretariat of the Pacific Community. 24pp. <http://bit.ly/1SYuTjy> (accessed 04/05/16)

From Hansard records Thursday March 30, 2006. Vol. No. 680. Part No. 130:.

**Baroness Miller of Chilthorne Domer** asked Her Majesty's Government:

*Whether they have made an assessment of the percentage of wild-caught fish imported into the United Kingdom as pets which die before they are sold.*

**The Parliamentary Under-Secretary of State, Department for Environment, Food and Rural Affairs (Lord Bach):** *Most wild-caught fish imported into the UK as pets are tropical species. No specific assessment has been made of mortalities on arrival or of mortalities between arrival and point of sale. However, all commercial consignments of live fish imported directly to the UK from third countries must be routed through a border inspection post and all consignments are subject to a programme of targeted inspection. Evidence from this inspection programme suggests that mortalities account for approximately 1 per cent of consignments of live fish.*

<http://www.publications.parliament.uk/pa/ld200506/ldhansrd/vo060330/text/60330w04.htm>  
(Accessed 22/04/2016)

### **Online sales**

HMRC. December 2015. Tackling the hidden economy: Extension of data-gathering powers. Summary of responses. <http://bit.ly/1QgWKMM> (accessed 06/05/16)

Pet Advertising Advisory Group (PAAG) <https://paag.org.uk/>

OATA's guide to responsible distance selling of livestock <http://bit.ly/1O24Xo9>

### **Welfare in the aquarium**

OATA's "How to" guides and videos and care sheets for fish, aquatic reptiles, aquatic invertebrates and plants <http://www.ornamentalfish.org/fish-keeper/useful-information>

OATA's code of conduct for businesses <http://bit.ly/1Ycns9T>