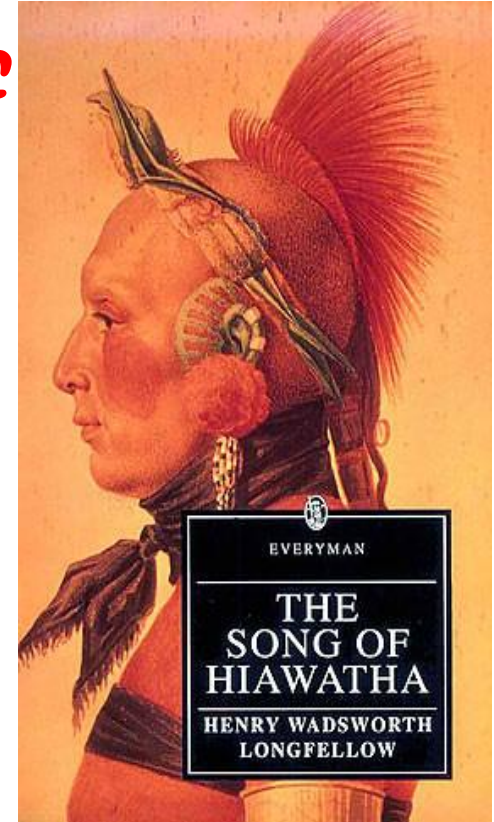


Trivia: my full name and its meaning 😊

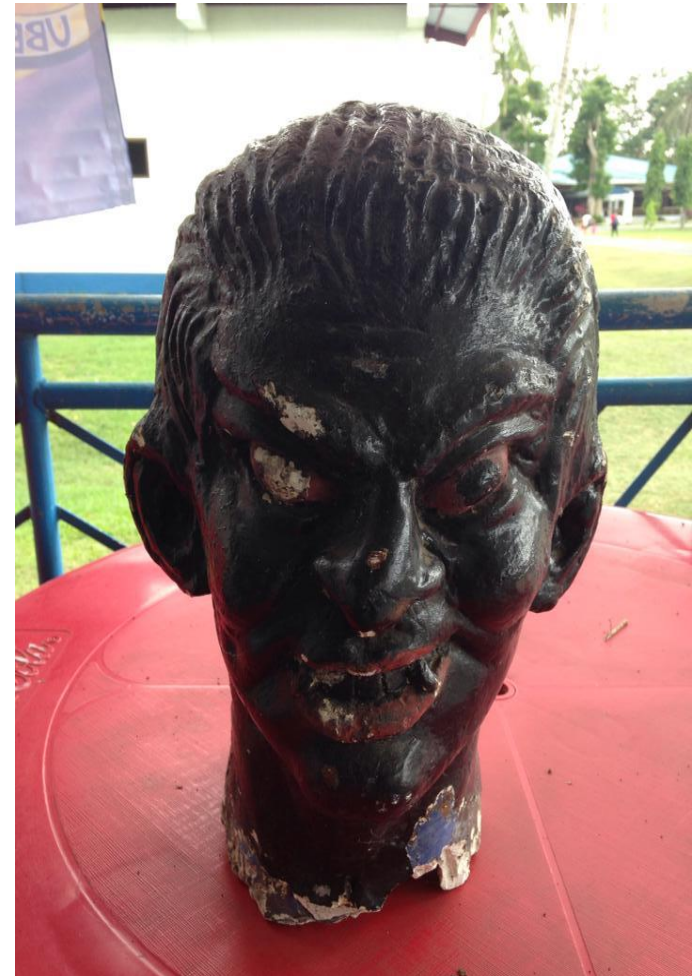
Mudjekeewis = ruler of winds

Dalisay = pure

Santos = saint



Mudjekeewis in PH



Follow me @



mudjiesantos@gmail.com



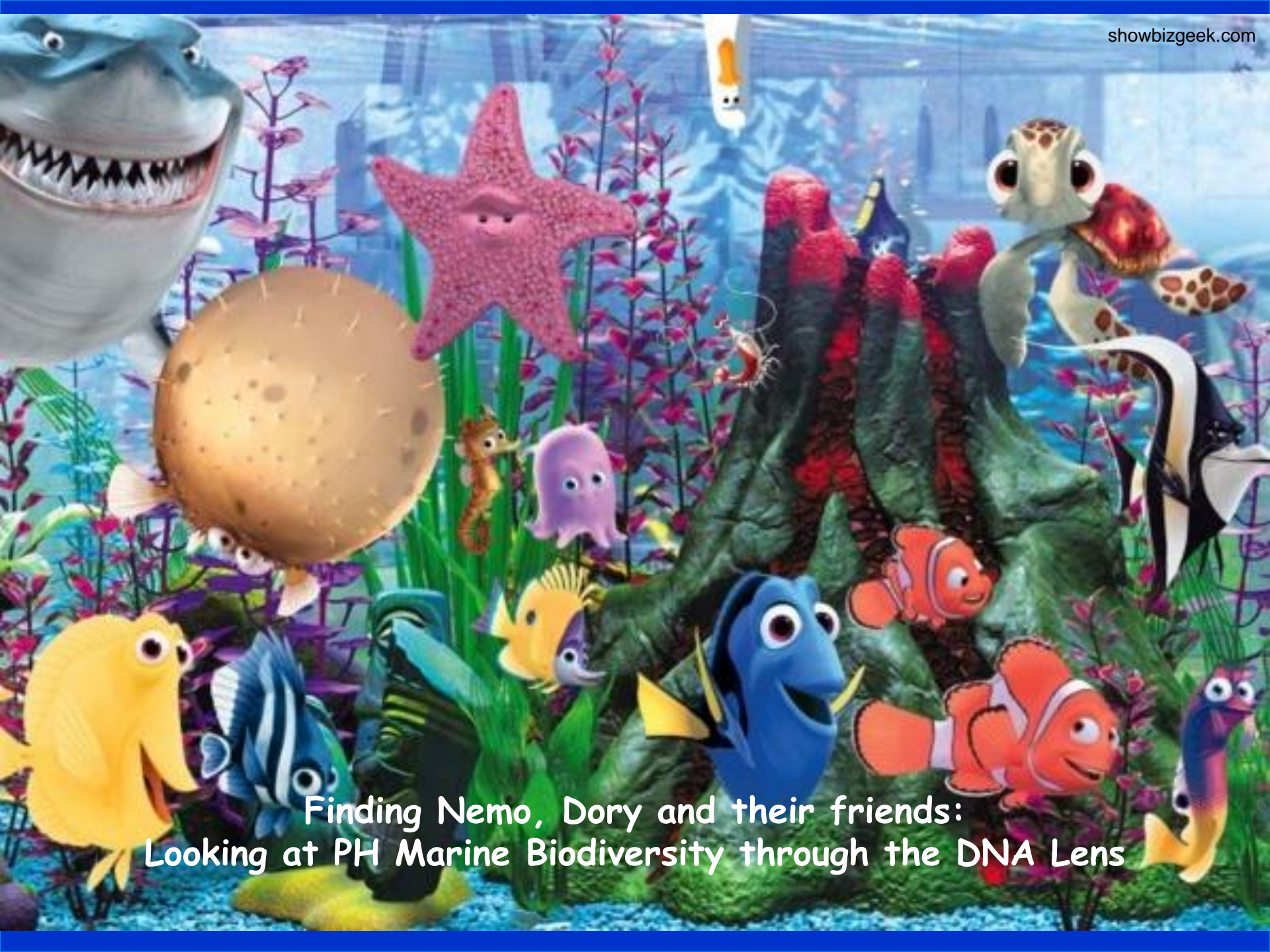
[/Mudjekeewis Santos](#)



[@mudjiesantos](#)

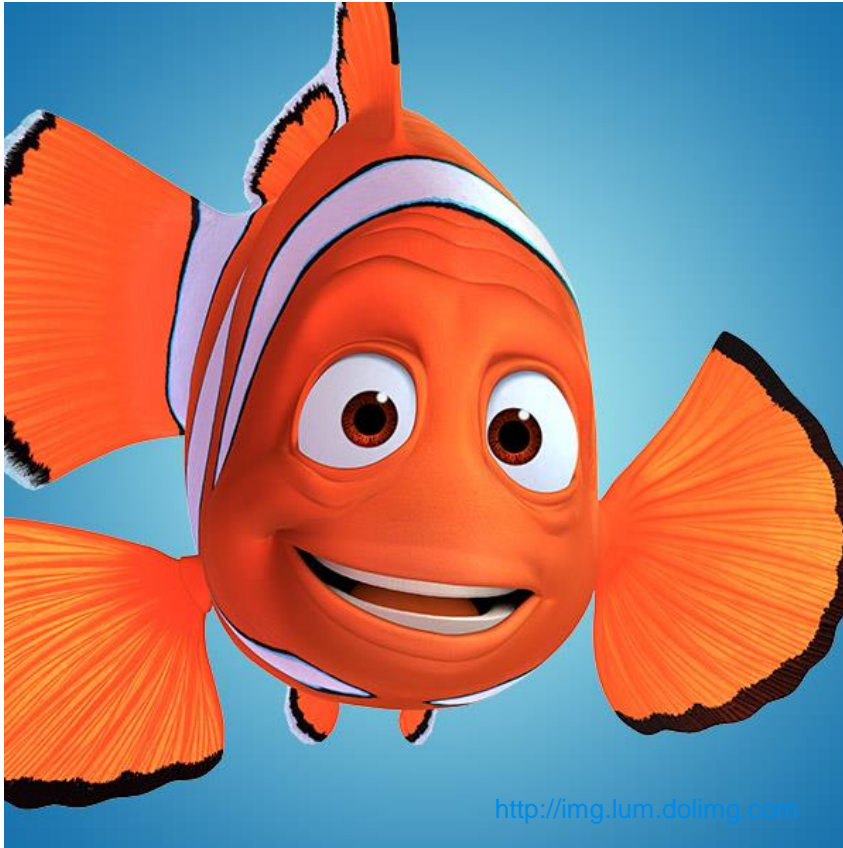


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Finding Nemo, Dory and their friends:
Looking at PH Marine Biodiversity through the DNA Lens

Talking points ...



- About us
- PH Marine Biodiversity
- DNA Barcoding
- Our findings (last 5 yrs)
- Way forward

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF AGRICULTURE
BUREAU OF FISHERIES AND AQUATIC RESOURCES
www.bfar.da.gov.ph

DEPARTMENT OF AGRICULTURE
DA-BFAR

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Linggo ng Pangisdaan

"Pinatatag na Batas Pangisdaan,
Hakbang sa Pagamit ng mas
Masaganang Karagatan"

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Generate scientific information, technologies and knowledge that will respond to the needs of the fisheries industry and fisherfolk and to serve as basis for sustainable fisheries management and policy formulation.



Today is February 28, 2015

NFRDI's Continuing Commitment to be Fit

POSTED BY: Information Group | DATE: 2014-08-29



The National Fisheries Research and Development Institute (NFRDI) capped this year's observance of the "Civil Servants Health and Wellness Month" by conducting its annual sports fest held from July 30 to July 31, 2014 at Quezon City Memorial Circle Sports Complex.

The sports activity has become the Institute's commitment in promoting health and wellness and further encourages its employees to engage in physical activities purposely to shed some calorie...

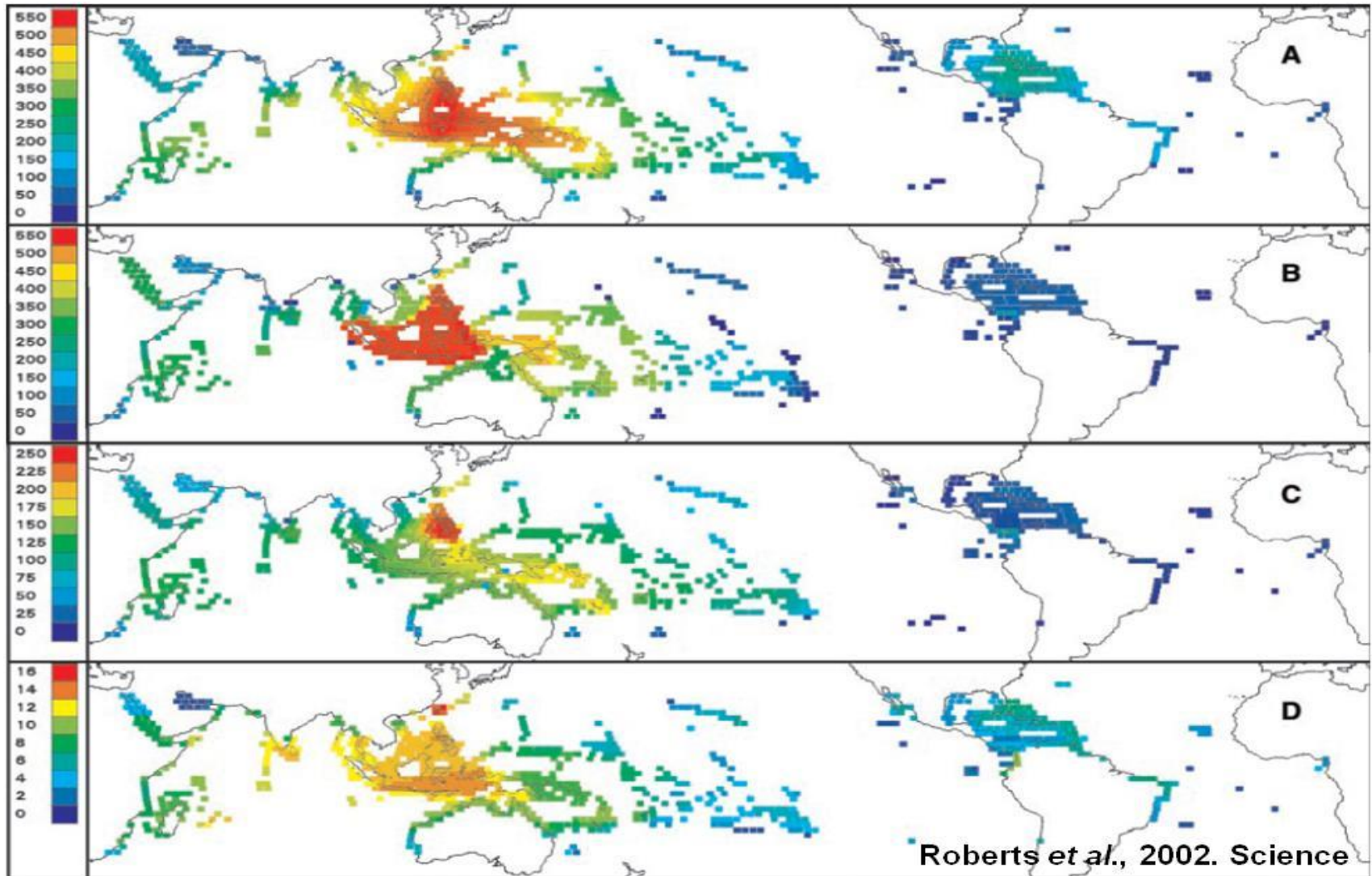
[Read More](#)

Enhancing Reproductive Health in Women

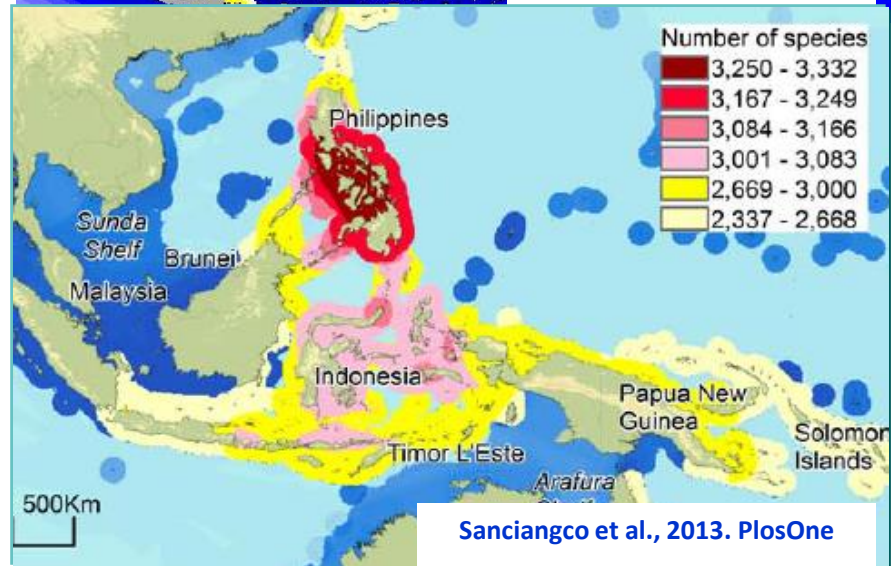
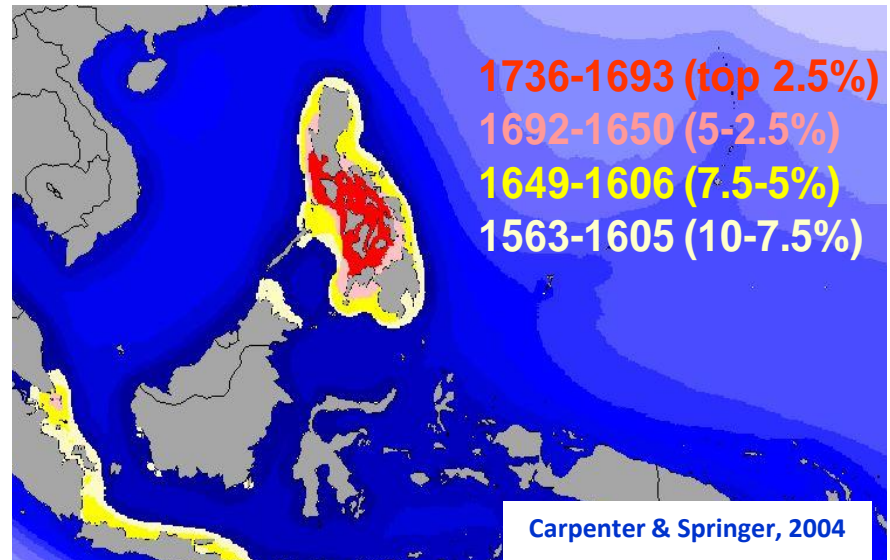


News and Events

Philippines: Epicenter of marine biodiversity in the world (?)



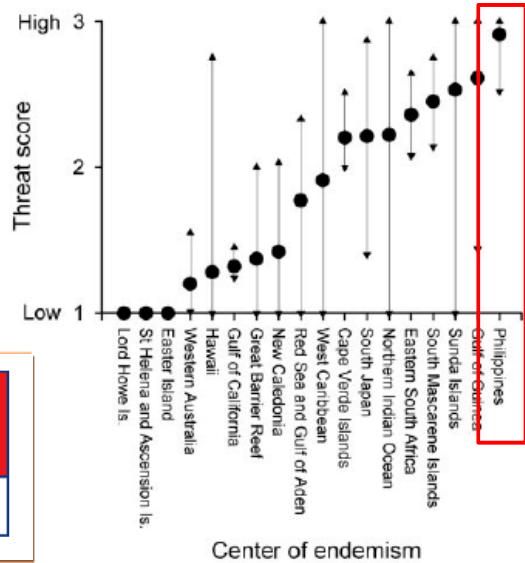
Philippines: Epicenter of marine biodiversity in the world (?)



- *Philippines host to the highest number of marine organisms per area.*

Hottest of the hotspots for marine conservation !!!

Fig. 3. Threats to reefs in centers of endemism. The figure shows mean (circles), maximum, and minimum threat scores for grid cells included within each center of endemism, calculated with data from Bryant *et al.* (3, 13).



Roberts et al 2002.



“Hottest of the Hotspots”



Resource/ Habitat	Status	Source
Corals	<i>Degraded state</i>	BFAR-NFRDI-PAWB. 2005. BINU
Seaweeds	<i>Unknown (except declining seed source)</i>	-do- GTZ. 2009.
Seagrasses	<i>Heavily stressed</i>	BFAR-NFRDI-PAWB. 2005. BINU
Mangroves	<i>Degraded state</i>	-do-
Invertebrates	<i>Declining trend</i>	-do-
Demersal fishes	<i>Declining trend</i>	-do-
Small pelagic fishes	<i>Declining trend</i>	-do-
Tunas	<i>Stable trend (except Bigeye tuna)</i>	WCPFC. 2009
Sharks and rays	<i>Declining trend</i>	NPOA Sharks. 2009
Marine turtles	<i>Threatened</i>	BFAR-NFRDI-PAWB. 2005. BINU
Marine Mammals	<i>Threatened</i>	IUCN Red List. 2009

www.nfrdigfl.weebly.com



GFL Labrats



Established in 2009 by Dr. Mudjkeewis D. Santos, the Genetic Fingerprinting Laboratory (GFL) under the Department of Agriculture – National Fisheries Research and Development Institute (DA-NFRDI) started housing the genetic researches of the institute. With a research assistant and three on-the-job-training Biology students, the laboratory, as headed by Dr. Santos, has since then grown to a good number of research assistants and laboratory technicians in its four years of existence. With an aim of providing genetic data to better understand and improve the Philippine fishery and aquaculture setting, GFL focuses on generating baseline DNA databases which contain profiles of the commercially important as well as endemic and CITES-listed aquatic organisms found in the country.

The GFL has contributed in resolving the cryptic *pikelet*, *Mesopristes cancellatus*, which has been previously known to be endemic only in Rio Grande de Mindanao and neighbor rivers in Cotabato, but was found out to be inhabiting in Aban River in Luzon. It has also contributed in

FISHCODES Project



??????????



DNA Barcodes

"DNA barcoding is a taxonomic method to identify a species using a short genetic marker, the cytochrome c-oxidase 1 (CO1) gene, found in an organism's mitochondrial DNA".

DNA Barcodes

Biological identifications through DNA barcodes

Paul D. N. Hebert*, Alina Cywinska, Shelley L. Ball
and Jeremy R. deWaard

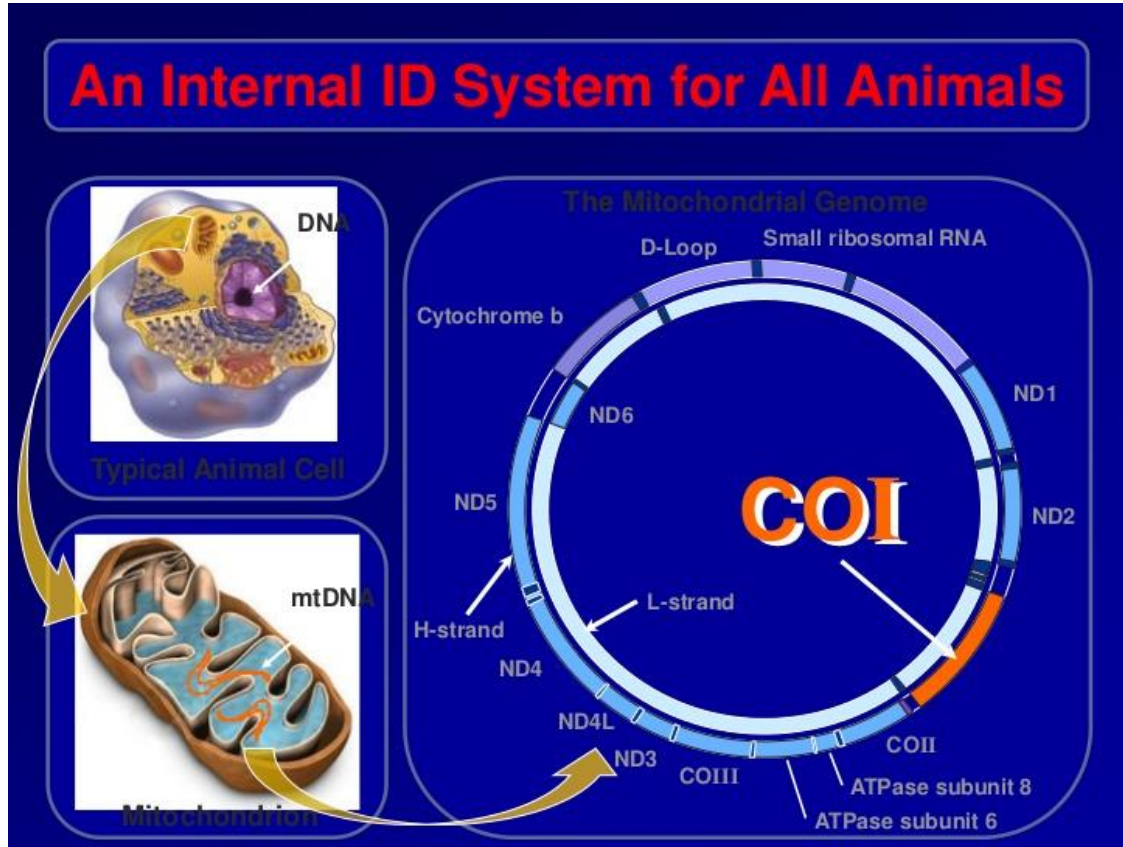
Department of Zoology, University of Guelph, Guelph, Ontario N1G 2W1, Canada

Although much biological research depends upon species identification, we are convinced that the sole prospect for a sustainable system of systems that employ DNA sequences as taxon 'barcodes' is the cytochrome *c* oxidase I (COI) can serve as the core of a system. We demonstrate that COI profiles, derived from the low resolution of COI profiles, ordinarily assign newly analysed taxa to the appropriate species-level assignments can be obtained by creating a system based upon the analysis of a single individual from each species. The system is 100% successful in correctly identifying subsequent specimens. The system will provide a reliable, cost-effective and accessible method of identification. Its assembly will also generate important data on the rules of molecular evolution.

Keywords: molecular taxonomy; mitochondrial DNA; species identification



CO1 = DNA fingerprint

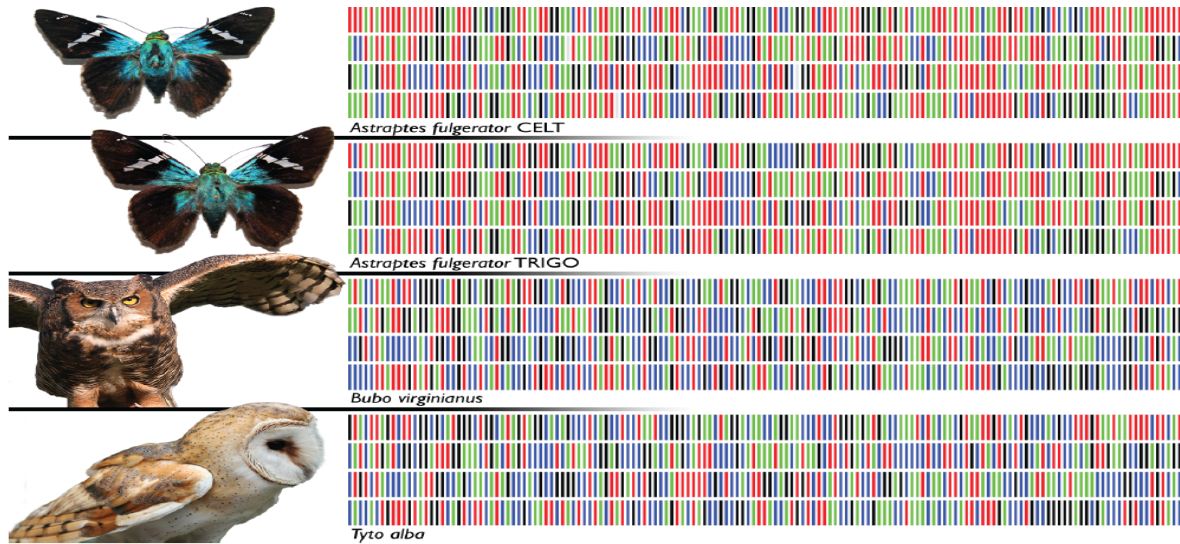
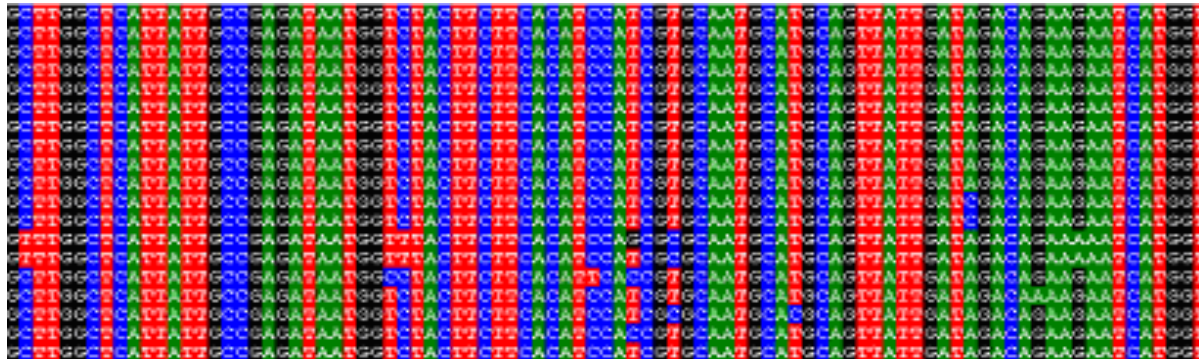
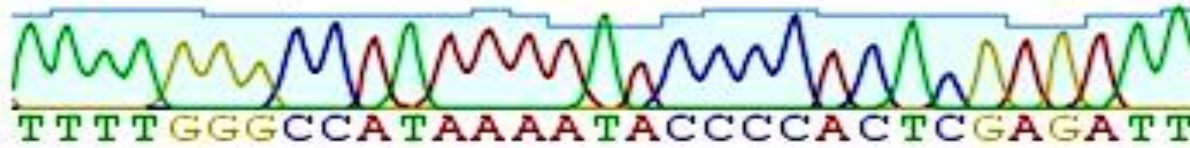


=

globaltimes.cn

Cytochrome c-oxidase 1 gene

CO1 = DNA fingerprint





Making  Every  Species  Count

Building a Bioliterate World

What would it be like to live in a bio-literate world - a world where you could know, in minutes, the name of any animal or plant - any time, anywhere? And not just its name but everything about it - what are its habits, is it endangered, is it dangerous, should it even be there or is it an invader from somewhere else?

How could we use that knowledge to protect our planet's biodiversity and promote human health and well-being?

The International Barcode of Life project (iBOL), the largest biodiversity genomics initiative ever undertaken, is unlocking the door to that world by creating a digital identification system for life.



Start

• Breaking News for Monday, Aug 6, 2012 •

iBOL announces governance changes, sequencing charges



The iBOL project is changing its governance structure and introducing partial cost recovery for sequencing at its core facility in Guelph.

[Read more](#)

40 new reptile species found on Madagascar



A major DNA barcode study of Madagascar reptiles has uncovered 40 new species of snakes, skinks, chameleons and geckos.

[Read more](#)

Philippines adopts barcoding to regulate fish trade



The National Fisheries Research and Development Institute is now using DNA barcoding to promote food safety and crack down on seafood fraud.

[Read more](#)

Barcode IDs new moth species invading Italy's vineyards



A team of Italian and Dutch scientists have used DNA barcoding to identify a previously unnamed leafminer moth that is infesting vineyards across northern Italy.

Award from IBOL 2015

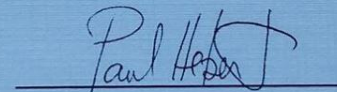
6TH INTERNATIONAL BARCODE OF LIFE CONFERENCE

AWARD OF EXCELLENCE

This is to certify that

Mudjekeewis D. Santos

Has been awarded the Travel Award for Excellence in Socio-Economic Applications of DNA Barcoding with support from the International Development Research Centre (IDRC) and the 6th International Barcode of Life Conference. The conference took place at the University of Guelph in Guelph, Ontario, Canada, from August 18-21, 2015.



PAUL D. N. HEBERT
Director, Biodiversity Institute of Ontario
Scientific Director, International Barcode of Life

We are pleased to announce an update to the BOLD platform, version 3.6. This version addresses a lot of usability gaps and introduces new functionality to further enable investigation and retrieval of barcode data. New features include a unified search panel in the Workbench, embedded sequence editor, an education portal, and many more.

Barcodes: 2,663,188

Per Site: 1000 100 10 1

Taxonomy

Search



Public Data Portal:

A data retrieval interface that allows for searching over 1.7M public records in BOLD using multiple search criteria including, but not limited to, geography, taxonomy, and



Barcode Index Numbers:

A searchable database of Barcode Index Numbers (BINs), sequence clusters that closely approximate species.

... feeling 😊



First record in PH ... shocking !!!



Bali sardine, *Sardinella lemuru*

First record in PH ... only in the North



Taiwan sardine, *Sardinella hualiensis*

Mystery solved ... origin of "Tawilis"



"Tawilis", *Sardinella tawilis*

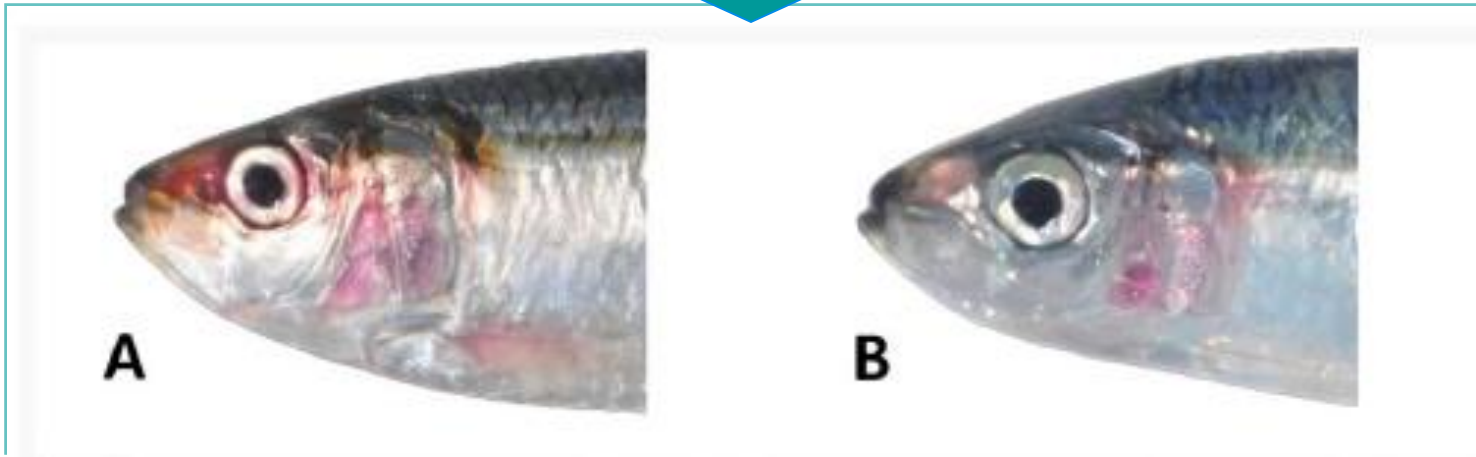


Taiwan sardine, *Sardinella hualiensis*

Untangled ... cryptic sardines



Goldstripe sardine, *Sardinella gibbosa*



Sardinella gibbosa sp.1

Sardinella gibbosa sp.2

First record in PH ... rare and protected



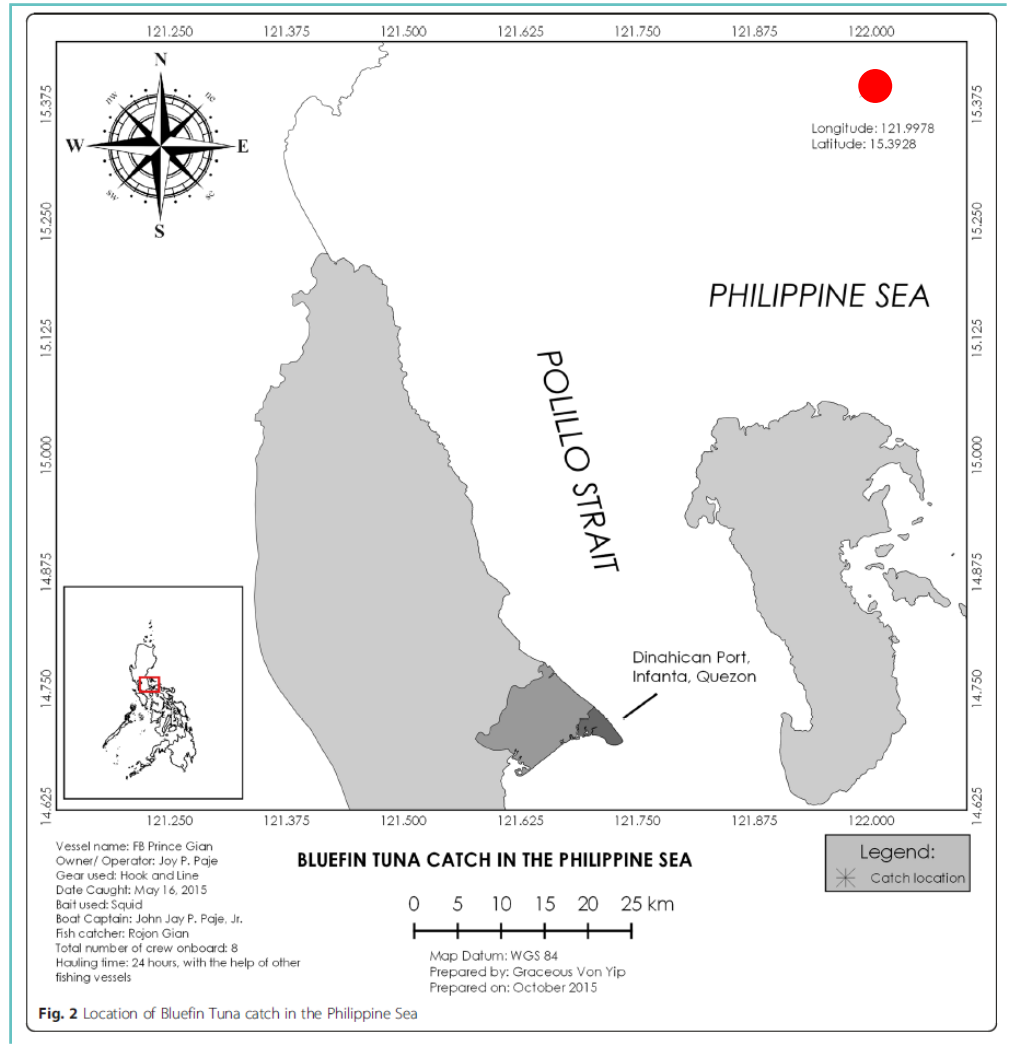
Noah's Giant Clam, *Tridacna noae*

First record in PH ... rare and protected



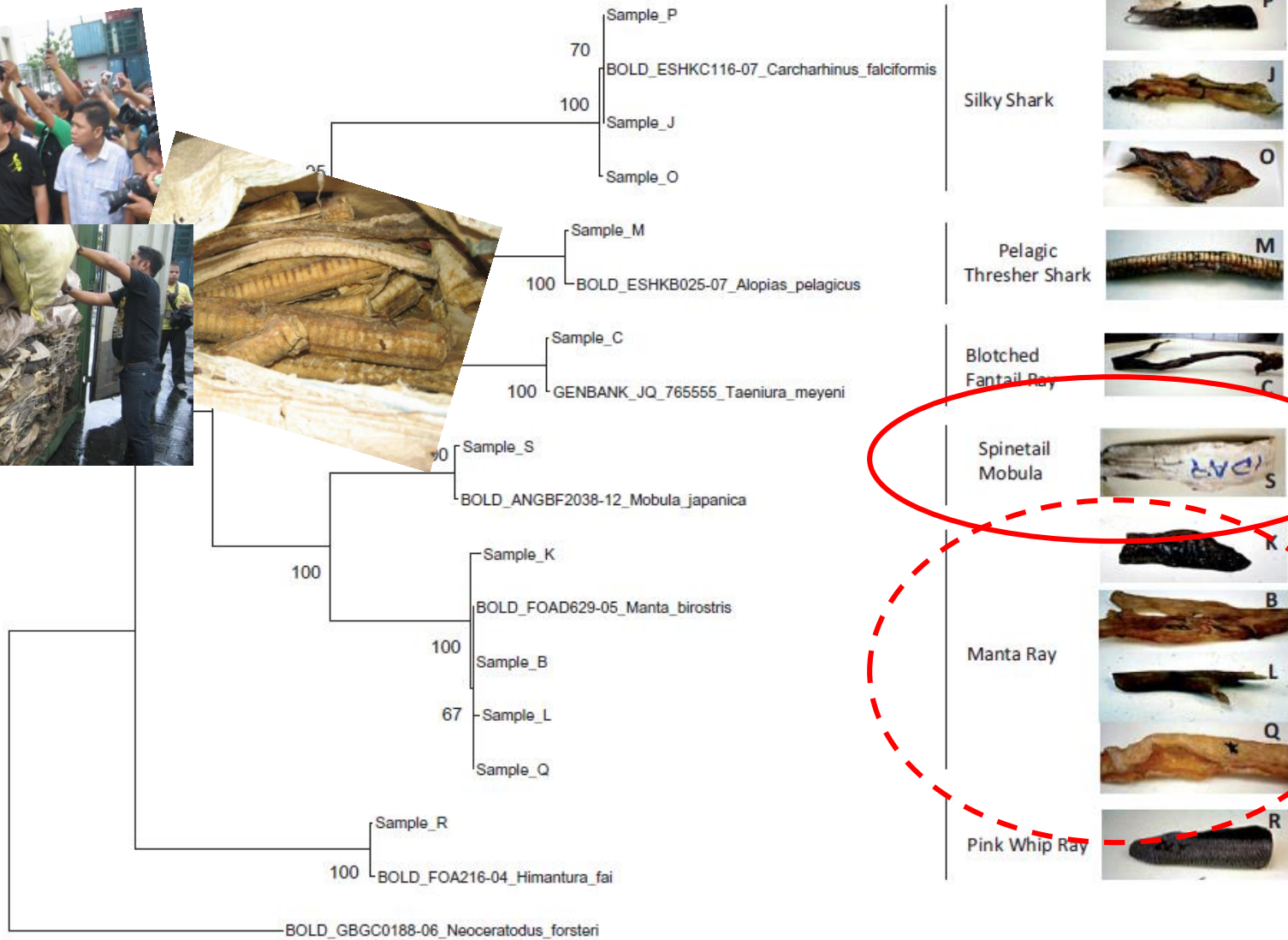
Derinyagala's Beaked Whale, *Mesoplodon hotaula*

First record in PH ... commercially important but threatened



Pacific bluefin tuna, *Thunnus orientalis*

First record of ray from PH found in illegal wildlife trade

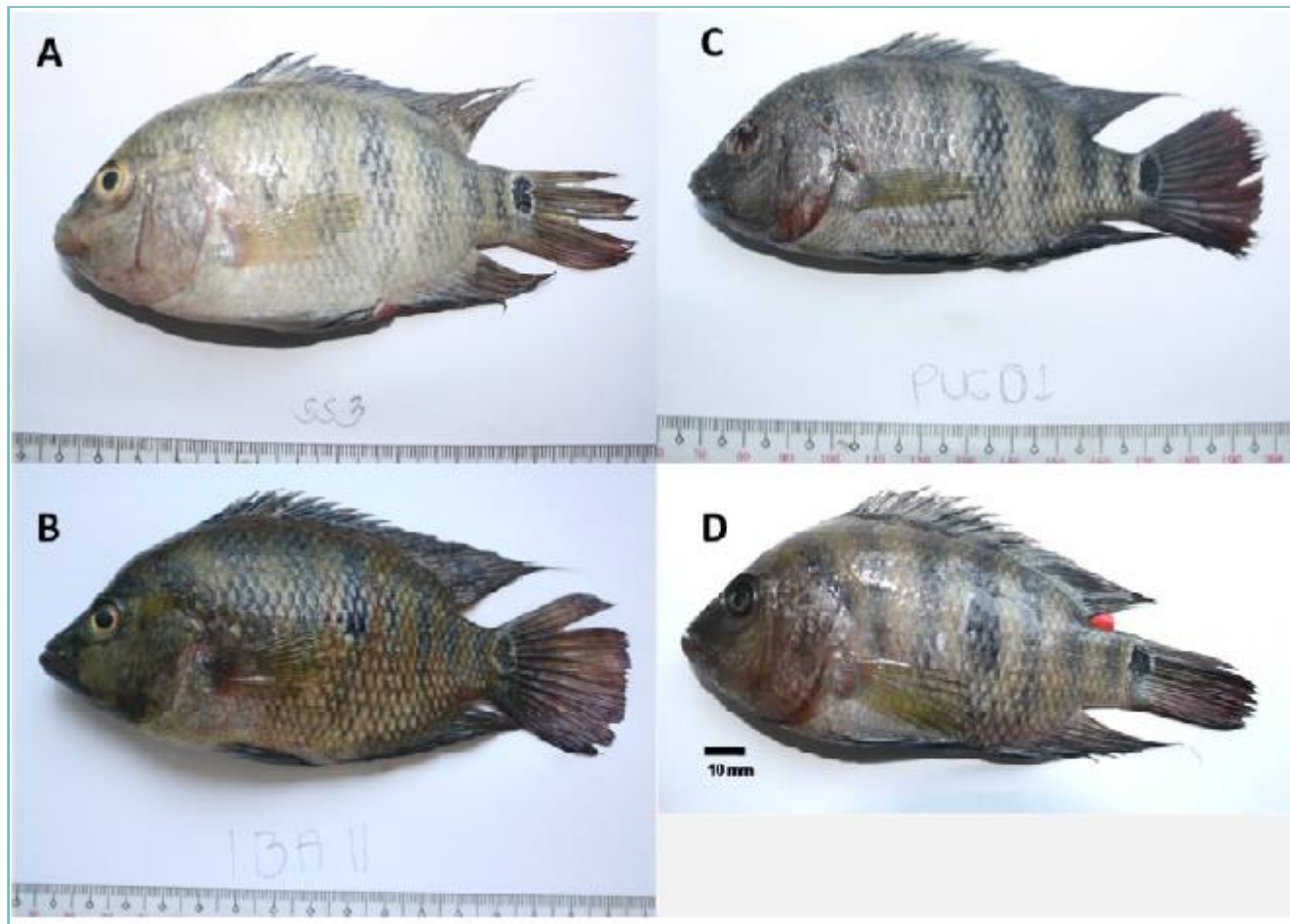


First record in Manila Bay ... invasive tilapia



Black chin tilapia, *Sarotherodon melanotheron*

First record in Manila Bay ... invasive tilapia



Mayan cichlid, *Cichlasoma urophthalmus*

New fish species from Iloilo



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Article

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<http://zoobank.org/urn:lsid:zoobank.org:pub:501BD04B-EB95-4533-B377-239AB03C0020>

A new fish species of the subfamily Serraninae (Perciformes, Serranidae) from the Philippines

JEFFREY T. WILLIAMS¹ & KENT E. CARPENTER²

¹Division of Fishes, Department of Vertebrate Zoology, National Museum of Natural History, Smithsonian Institution, 4210 Silver Hill Road, Suitland, MD 20746, USA. E-mail williamsjt@si.edu

²Department of Biological Sciences, Old Dominion University, Norfolk, Virginia 23529, USA. E-mail: kcarpent@odu.edu

Abstract

A new species of serranine fish is described from the Philippine Islands. A single specimen of a new species, *Chelidoperca santosi*, captured by fishermen working in Palawan waters was discovered in the public fish market in Iloilo City, Panay, Philippines. Two additional specimens of the new species, also from the Philippines, were subsequently discovered in the collections of the Museum Victoria, Australia. The new species is currently known only from the Philippines and is characterized by its distinctive coloration with a row of four small dark spots on the snout (two in front of each eye) and two dark spots on the chin (one on each side of the symphysis of the dentaries), a white anal fin with six large yellow spots separated by broad white interspaces and a narrow yellow distal border, caudal fin with narrow yellow bars and a yellowish distal margin and no dark spots, and a combination of meristic and morphological characters.

Key words: *Chelidoperca santosi*, perchlet, Serranidae, Philippines, endemic



• discovered 2014, reported 2015
• from fish market in Iloilo
• endemic in PH



Chelidoperca santosi
(Williams & Carpenter, 2015)

“Pogi perchlet”


Etymology. The species is named *santosi* in honor of Mudjekeewis Santos of the NFRDI-BFAR, Manila, our Philippine colleague and collaborator, without whose assistance the discovery of this colorful perchlet would not have been possible, and in recognition of his many contributions to the advancement of science in the Philippines. The common name is based on the Tagalog word *pogi* meaning handsome in reference to its striking fresh coloration.


Another new fish species from Aurora and Sta. Ana, Cagayan



"Labahita"

NFRDI-GFL Database





TISSUE BANK

Record Details for Specimen Number: **MDS_IPON01**

TAXONOMY

Phylum: Chordata
 Family: Gobiidae
 Genus: *Awaous*
 Specific Epithet: *ocellaris*
 Identified By: **ASIS, ANGELLI MARIE JACYNTH**
 Common Name: **Ipon/Ioby**
 GenBank ID: **KC959858.1/FP/PHLO77-13**
 BOLD ID:
 GFL Accession Number: **1**


COLLECTION DETAILS

Collection Location: **Aparri, Cagayan**
 Collection Remarks:
 Date Entered: **08-Aug-14**
 Date Collected: **January 23 2012**
 Entered By: **ASIS, ANGELLI MARIE JACYNTH**
 Status Of Sample: **Ethanol preserved, whole sample**
 Project ID: **PROJ-7**
 Tissue Type Preserved: **muscle**
 Tissue Container: **1.5 MCT**
 Tissue Certainty: **DNA Barcode**
 Basis Of ID: **DNA**
 Part of a Publication: **Yes**
 Publication Reference: **Ash AMIM, AB Aguilta, BI Calanog, R Calingag and MD Santos, 2015. First report of *Awaous ocellaris* in goby fry or "ipon" fishery in Northern Luzon, Philippines. Philippine Science Letters, 6(2): 198-203**


DNA SEQUENCE

DNA Profile:
**IPON1
 TCTTTTAGACACGACCAACTATATGTGATGTACAGACAGTCAATGATTAATTTCTTATATG
 AATCAACAATTATATGGGGCTTGGGAGCTGACTACTCCCTCAATGATGGCCCTGACATGCC**

SPECIMEN IMAGE



MAP LOCATION: Aparri, Cagayan



GFL RECORD LIST

MDS_ID	Common Name	Date Collected	Identified By	Collection Location	Common Name	Image
MDS_RT-001	Rhinodon typus	3 October 2012	LACSAMAHN, JOANNE KRISHA	Marilyn Bay	Whale shark	
MDS_DFBOC_M	Alopias pelagicus	26 October 2012	LACSAMAHN, JOANNE KRISHA	Cebu	Pelagic thresher shark	
MDS_DFBOC_P	Carcharhinus falciformis	26 October 2012	LACSAMAHN, JOANNE KRISHA	Cebu	Silky shark	
MDS_DFBOC_J	Carcharhinus falciformis	26 October 2012	LACSAMAHN, JOANNE KRISHA	Cebu	Silky shark	
MDS_DFBOC_O	Carcharhinus falciformis	26 October 2012	LACSAMAHN, JOANNE KRISHA	Cebu	Silky shark	
MDS_DFBOC_R	Himantura fai	26 October 2012	LACSAMAHN, JOANNE KRISHA	Cebu	Pink whipray	
MDS_DFBOC_I	Himantura sarnakii	26 October 2012	LACSAMAHN, JOANNE KRISHA	Cebu	Belted skate whiptail	

Showing Records 1 to 85

GENETIC FINGERPRINTING LABORATORY

List of Records by Common Name

Specimen Num	Date Entered	Year Collected	Scientific Name	Identified By	GenBank	Bold ID	Collection Location	Status Of Sample
MDS_SF06	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Sarangani	Ethanol preserved, who
MDS_SF07	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Sarangani	Ethanol preserved, who
MDS_SF08	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Sarangani	Ethanol preserved, who
MDS_SF10	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Sarangani	Ethanol preserved, who
MDS_SF11	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Sarangani	Ethanol preserved, who
MDS_SF12	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Sarangani	Ethanol preserved, who
MDS_SF13	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Sarangani	Ethanol preserved, who
MDS_SF14	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Sarangani	Ethanol preserved, who
MDS_SF15	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Sarangani	Ethanol preserved, who
MDS_SF20	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Sarangani	Ethanol preserved, who
MDS_SF24	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Sarangani	Ethanol preserved, who
MDS_O8B4X	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Bohol	Ethanol preserved, who
MDS_BF853A2	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Bohol	Ethanol preserved, who
MDS_BF853A5	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Bohol	Ethanol preserved, who
MDS_BF853A3	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Bohol	Ethanol preserved, who
MDS_BF853A1	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Bohol	Ethanol preserved, who
MDS_BF853A4	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Bohol	Ethanol preserved, who
MDS_O8L54	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Ilocos Norte	Ethanol preserved, who
MDS_O8L64	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Ilocos Norte	Ethanol preserved, who
MDS_O8L63	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Ilocos Norte	Ethanol preserved, who
MDS_O8S15X	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Ilocos Norte	Ethanol preserved, who
MDS_BFC01	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Ilocos Norte	Ethanol preserved, who
MDS_BFC02	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Ilocos Norte	Ethanol preserved, who
MDS_BFC03	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Ilocos Norte	Ethanol preserved, who
MDS_BFC04	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Ilocos Norte	Ethanol preserved, who
MDS_BFG01	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Ilocos Norte	Ethanol preserved, who
MDS_BFG03	8/8/2014	2013	Chanos chanos	ASIS, ANGELLI MARIE JACYNTH			Ilocos Norte	Ethanol preserved, who

Latest Record for Fish in PH

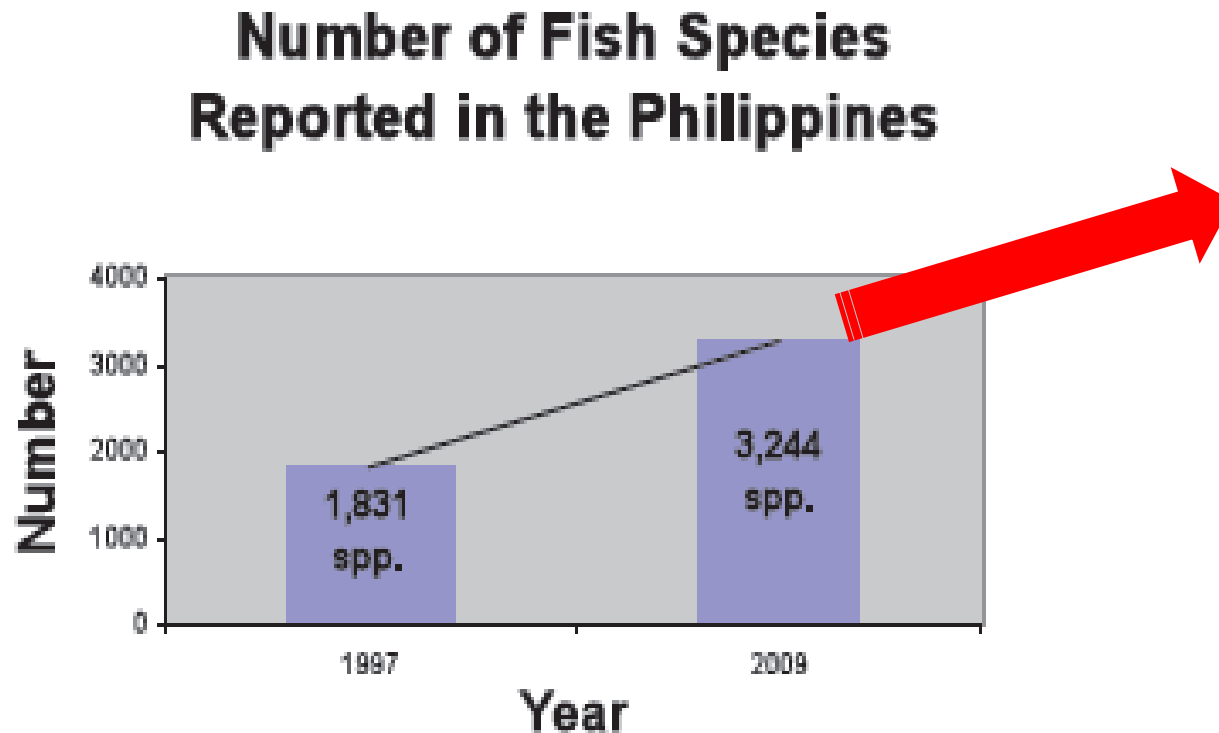
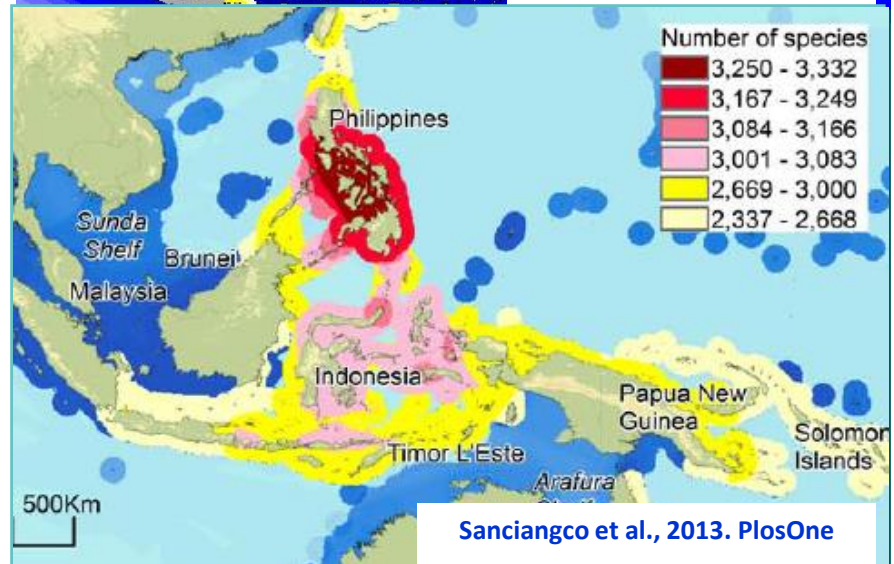
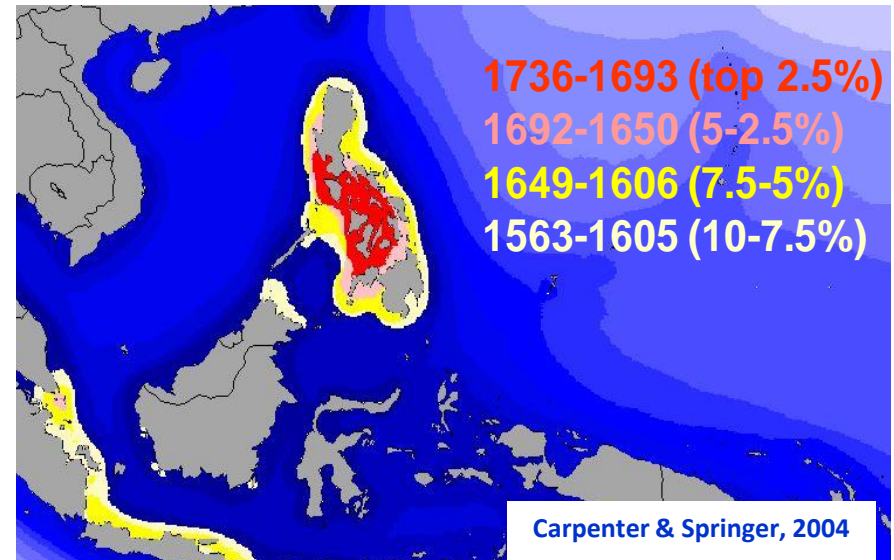


Figure 1.1. Number of fish species reported in the Philippines in 1997 and 2009. (Sources: DENR 1997; Froese and Pauly 2009).

Epicerter of marine biodiversity in the world INDEED !!!



- *Philippines host to the highest number of marine organisms per area.*

DNA Barcoding o' Philippine Fish: First Record of Marine Species in a Biodiversity Hotspot

Mudjkeewis D. Santos, Minerva Fatimae H. Ventolero, Angelli Marie Jacynth M. Asis, Apollo Marco D. Lizano, Joanne Krishna M. Lacsamana, Billy Joel N. Catacutan, John T. dela Peña, June Feliciano F. Ordoñez, Jacqueline Marjorie R. Pereda, Jom Acebes and Darell Blatchley

The first report on the presence of invasive species blackchin tilapia, *Sarotherodon melanotheron* in the coastal waters of Manila Bay

Ordoñez et al. 2015



The occurrence of the invasive Central American Mayan cichlid, *Cichlosoma urophthalmus*, is also confirmed for the first time in Bulacan

Ordoñez et al. 2015

First direct evidence of the presence of mobula ray, *Mobula japonica* sampled from an illegal shipment of dried shark meat and bones

Asis et al., 2014



The recently discovered endemic marine fish species in Iloilo City, the Pogi Perchlet, *Chelidoperca santosi* Williams and Carpenter, 2015



The first record of rare and protected beaked whale, *Mesoplodon hotaula* stranded in Compostela Valley

Lacsamana et al., 2015



The first report of recently resurrected endangered giant clam *Tridacna noae*

Lizano and Santos, 2014



First record of the rare reef manta ray, *Manta alfredi* in Bohol (2015)

Photo by: Y. Lee



THREAT

DISCOVERY

CONSERVATION

DNA Barcode

Taxonomic Identification



Genetic Fingerprinting Laboratory
National Fisheries Research and Development Institute

nfrdigfl.weebly.com
www.nfrdi.gov.ph

Graphical Design by:
Michael John R. Mendiola

Why bother ???

"A healthy marine biodiversity means a healthy fishery that is resilient to climate change."

... Doc Pogi 😊

Thank you !!!



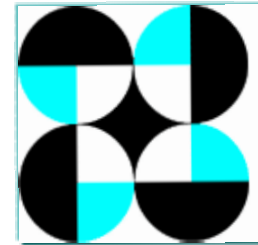
NFRDI



SU



BAR



DOST-GIA



UNDP



CT-PIRE



DA



BFAR



GEF



UP



PCAMRD
(PCAARD)



UST



CLSU



UNOPS



TUMSAT