

10 years inventorying marine species diversity in remote coral reefs of the Campeche Bank, Yucatan, Gulf of Mexico

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UMDI-Sisal, Fac. Ciencias, UNAM
Mexico



TEXAS A&M
UNIVERSITY
CORPUS
CHRISTI

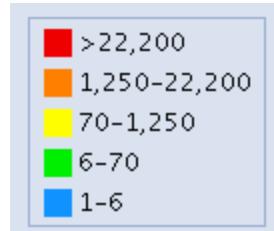
HARTE
RESEARCH INSTITUTE
FOR GULF OF MEXICO STUDIES



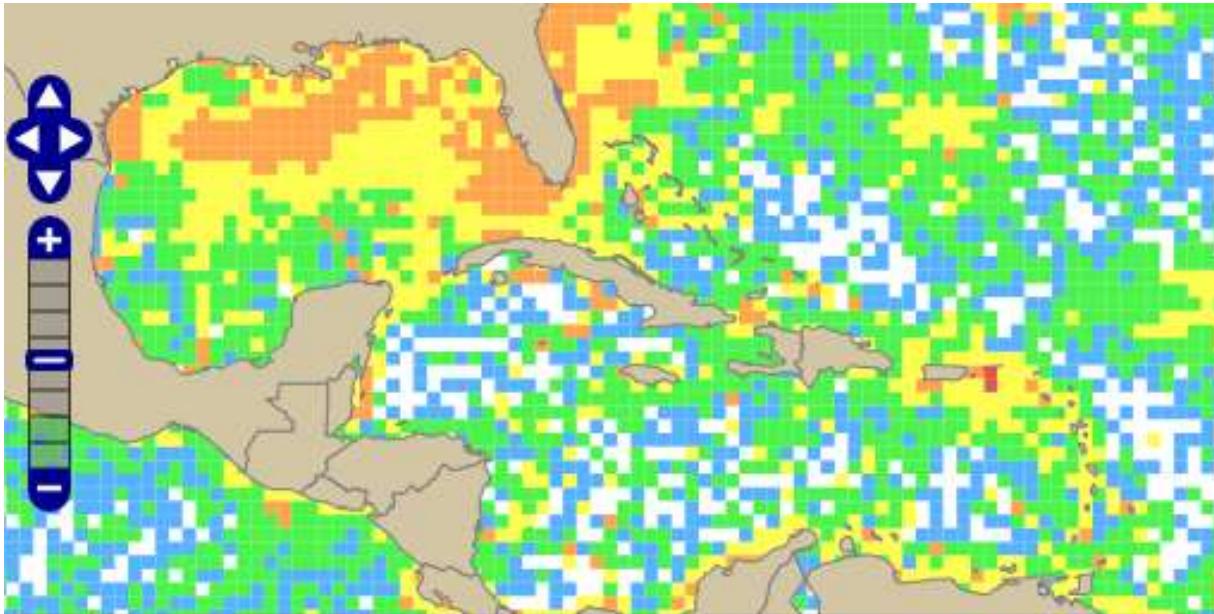
Sustained coastal and ocean observing systems in Mexico?

- ▶ first step is to know what to observe
- ▶ Mexico is a biodiverse country = many species
- ▶ CONABIO - biodiversity knowledge Mexican agency
- ▶ A lot is already described, but...
- ▶ Bias for terrestrial environments
- ▶ Several taxa are under-represented (invertebrates)
- ▶ 2008 a project started to increase our knowledge on the southern Gulf of Mexico marine species

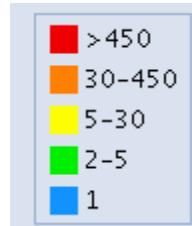
records



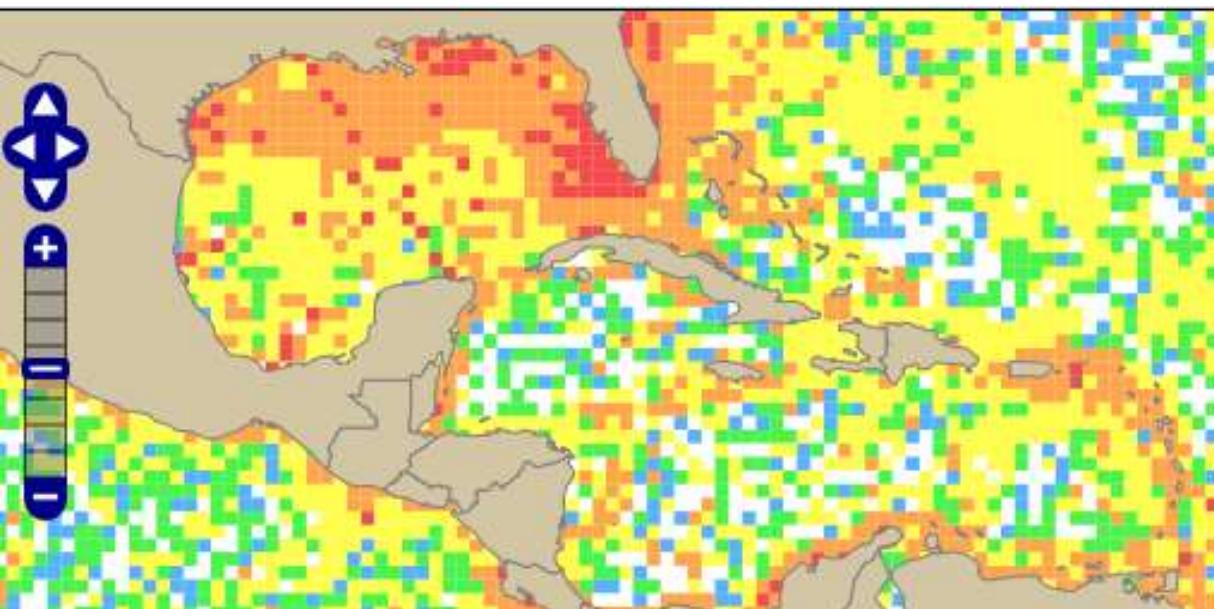
 OBIS OCEAN BIogeographic INFORMATION SYSTEM

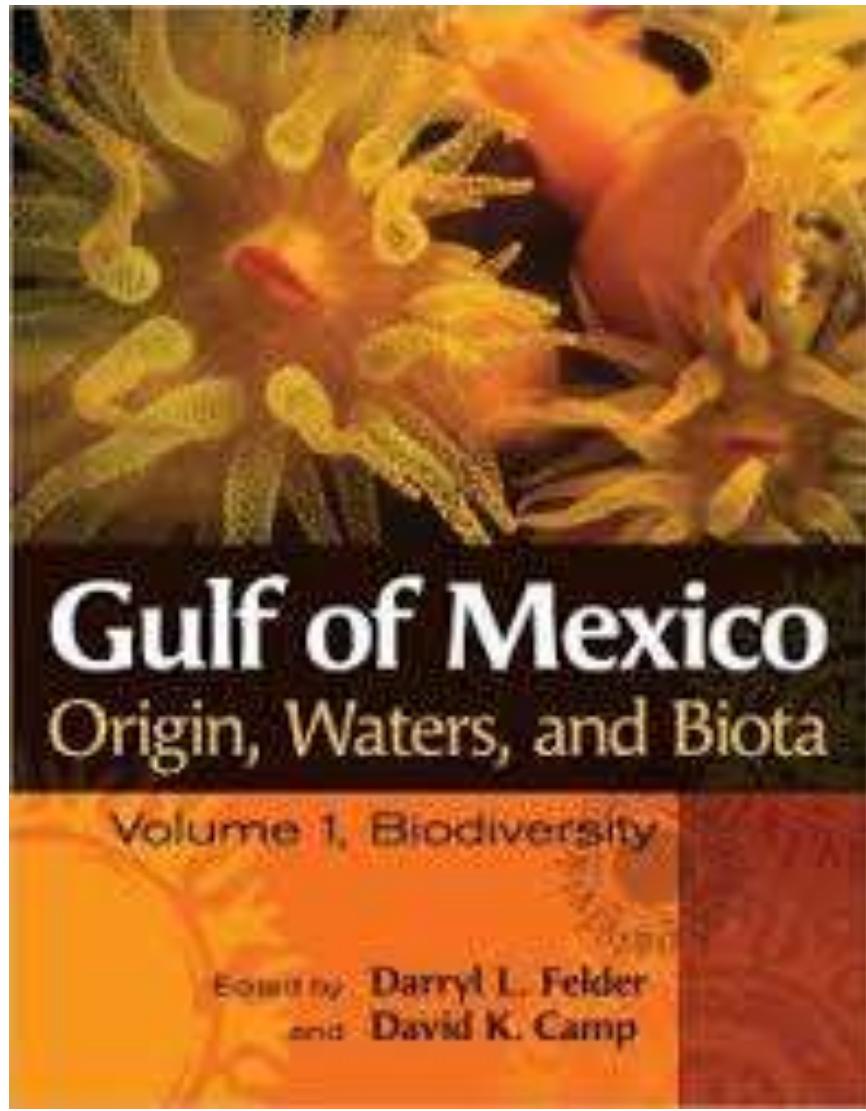


species



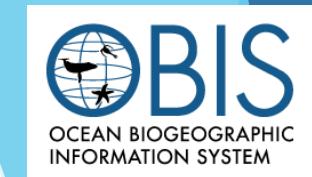
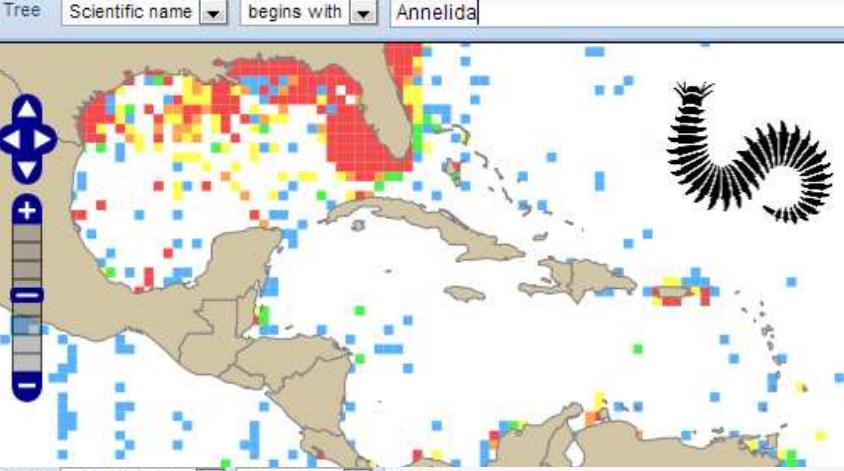
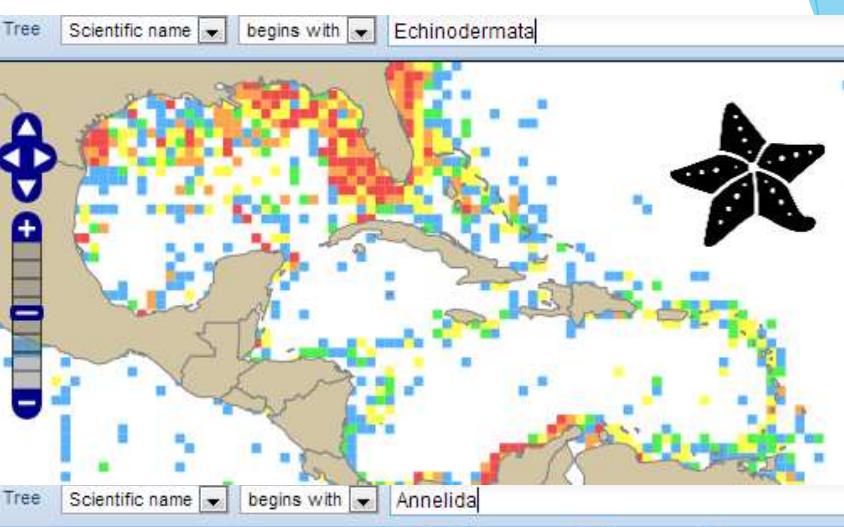
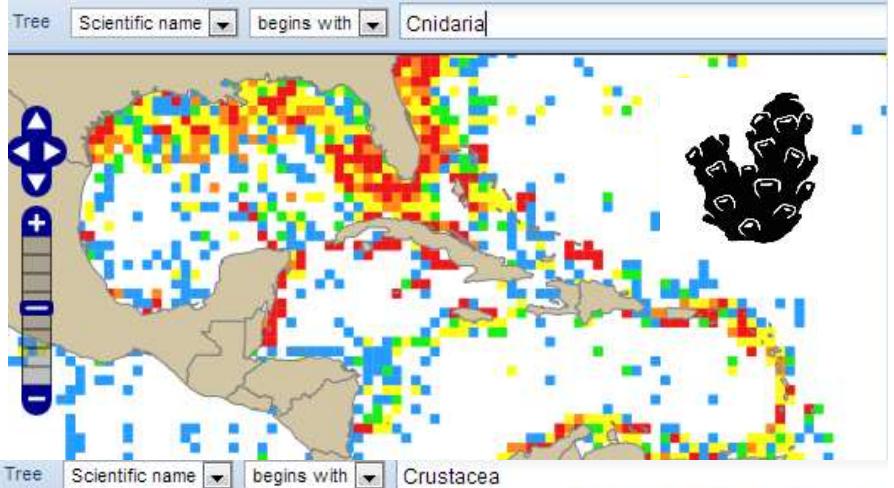
 OBIS OCEAN BIogeographic INFORMATION SYSTEM





2009 - 7834 species of invertebrates

Group / taxa	Spp N	endm	%
vertebrates (fish)	1541		
cnidarians	792	62	7.8
sponges	339	109	32.2
crustaceans	2579	388	15.0
moluscs	2455	257	10.5
annelids	866	120	13.9
equinoderms	522	31	5.9
platelmints	705	191	27.1
briozoans	266	55	20.7
Tunicates	78	5	6.4



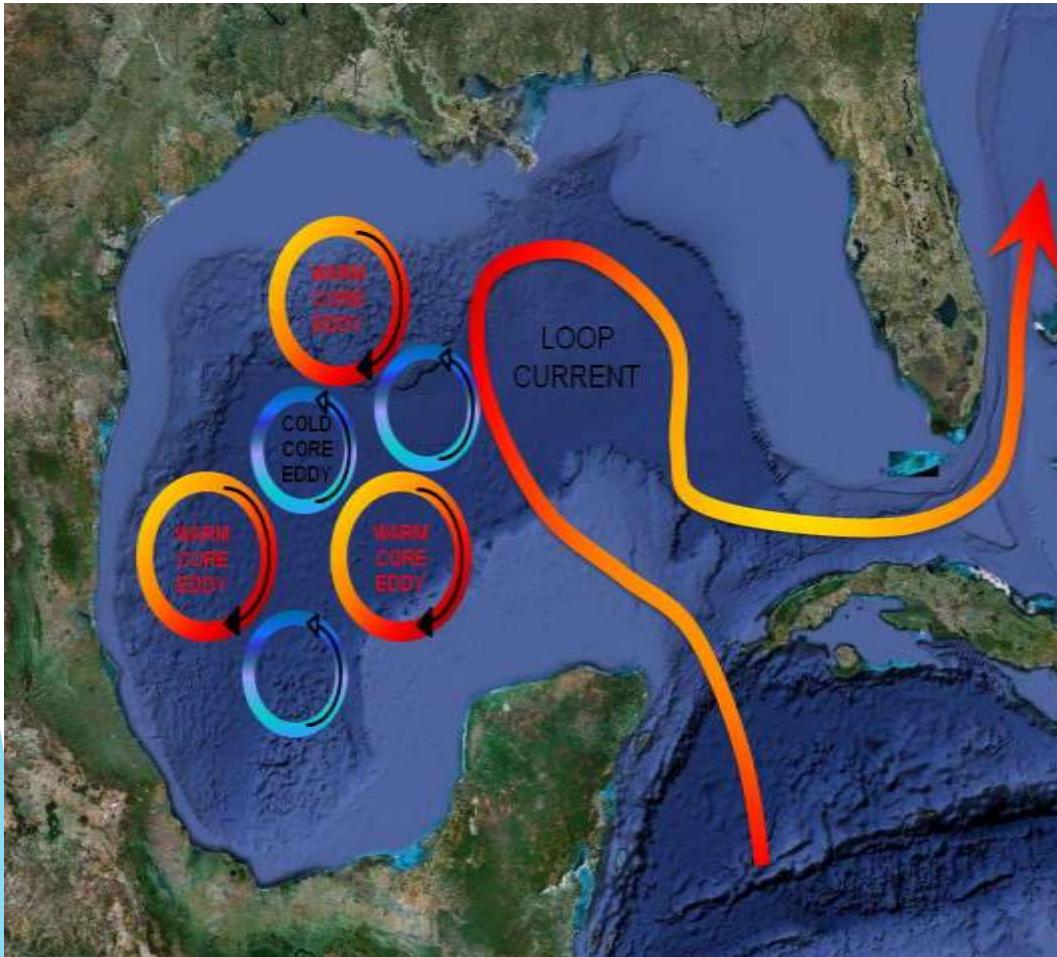
1) Training future Mexican biodiversity experts



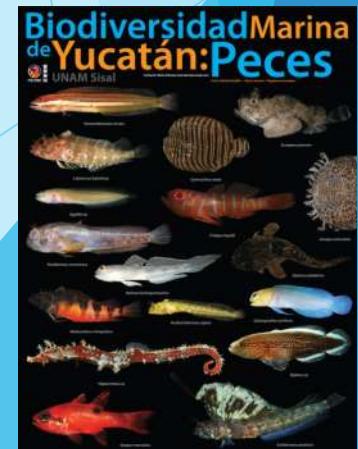
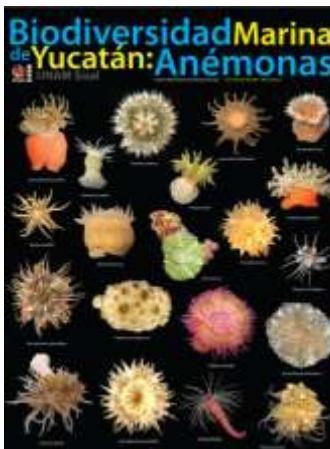
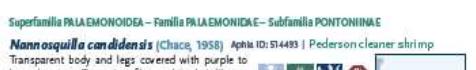
2) Generate biodiversity knowledge to better manage and mitigate potential negative impacts from the recently expanding offshore Mexico oil industry



3) Increase our understanding of the southern influence into the northern GMx biodiversity and fisheries



4) Produce high-quality public outreach materials in Spanish to foster education and training on marine biodiversity

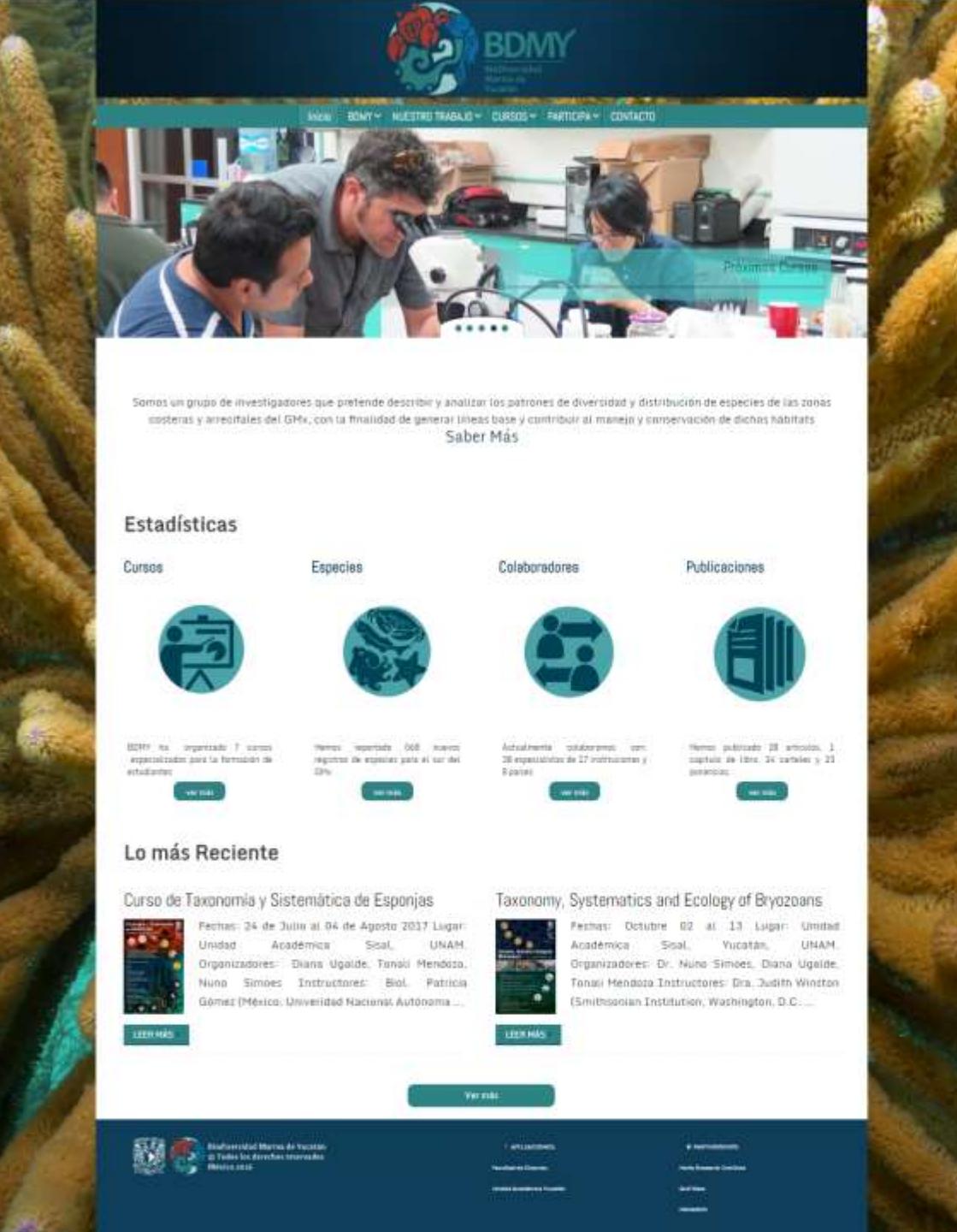


5) Support Mexico biodiversity agency (CONABIO) to increase their databases on the southern GMx marine species diversity, ecology and distribution

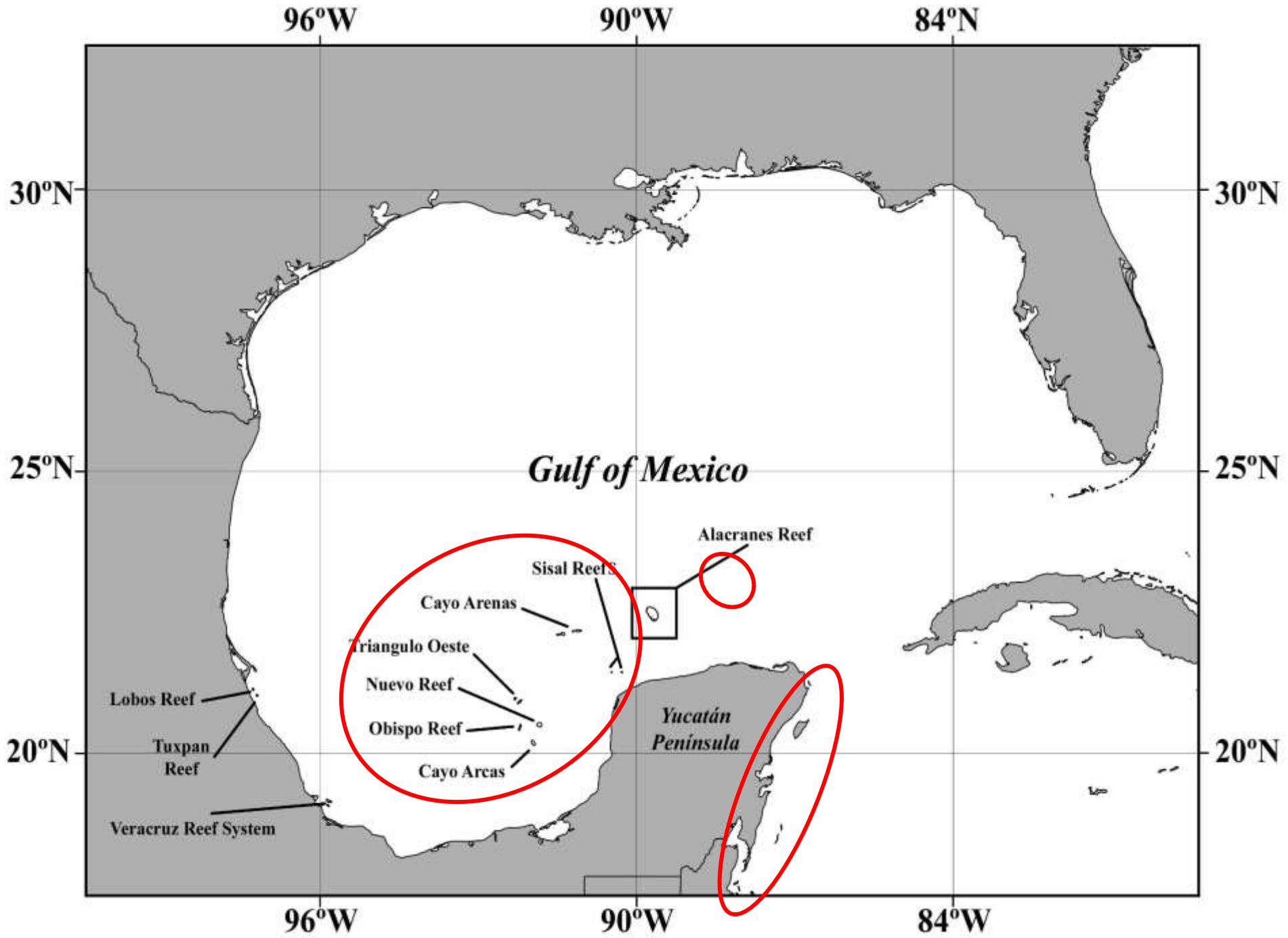


www.bdmy.org.mx

- ▶ New species, genus and families for science
- ▶ 200+ new species records for Mexico
- ▶ Focus on poorly described taxa
- ▶ Traditional taxonomy courses
- ▶ Discovery of three invasive species (*Charybdis helleri*, *Neopomacentrus cyanomus*, *Tubstrea coccinea*)
- ▶ Information for species distribution modelling
- ▶ Focus on communicating biodiversity science results to the wider public using visual media

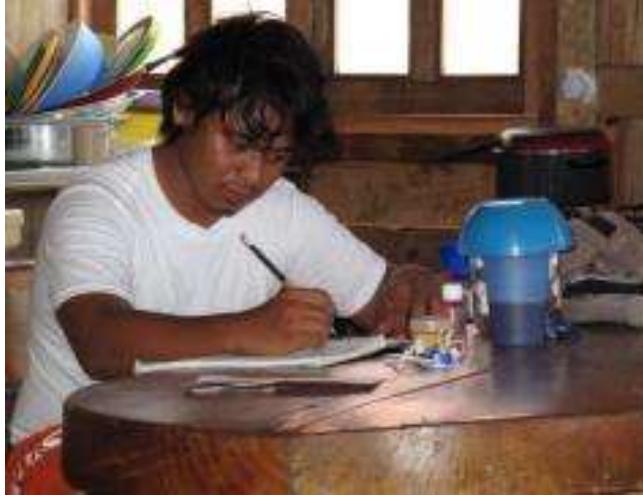
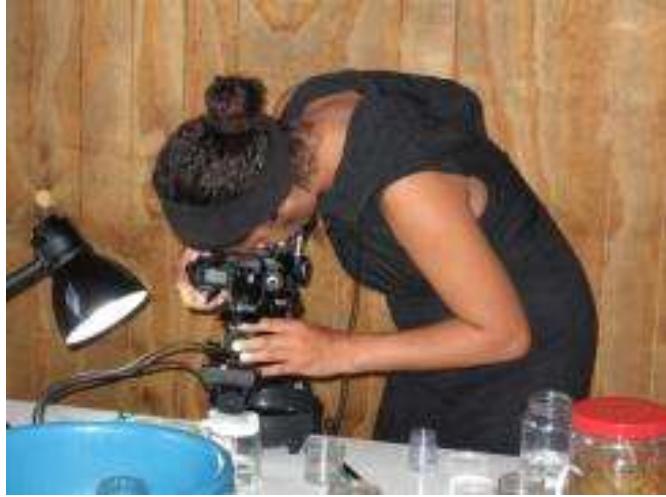


The screenshot shows the homepage of the BDMY website. At the top, there's a banner featuring a photograph of two researchers in a laboratory setting, looking at a specimen under a microscope. The BDMY logo is in the top right corner. Below the banner, there's a brief description in Spanish about their research goals, followed by a "Saber Más" button. The main content area has several sections: "Estadísticas" with four categories (Cursos, Especies, Colaboradores, Publicaciones) each with an icon and a "VER MÁS" button; "Lo más Reciente" with two course announcements (Curso de Taxonomía y Sistemática de Esponjas and Taxonomy, Systematics and Ecology of Bryozoans), each with a thumbnail image, details, and a "VER MÁS" button; and a footer with social media links and copyright information.





Alacranes Reef 2009





Celestun y
Bajos de Sisal,
2011



Cayo Nuevo y
Alacranes Reef 2016



Triangulos, Obispos,
Banco Pera, Banco Nuevo
2017

Scientific Expedition Reports (in spanish)

CAYO ARCAS: 4ta Campaña "Nortes"
Unidad Académica de Yucatán

Horario local informe de trabajo:
14 horas (horario local) - 16 horas (horario de centro)
Laboratorio de Biología de Puerto Lázaro
Unidad Académica de Yucatán | 10 de mayo 2017

Imagen: [http://bit.ly/2qfjWzD](#)

CAYO ARENAS:
mayo 2017

Horario local informe de trabajo:
14 horas (horario local) - 16 horas (horario de centro)
Laboratorio de Biología de Puerto Lázaro
Unidad Académica de Yucatán | 10 de mayo 2017

Imagen: [http://bit.ly/2qfjWzD](#)

Reporte Crucero Oceanográfico Perdido II

Equipo Científico de la campaña oceanográfica Perdido-7 en el (D) JUAN SERRA

Fecha: 9 al 9 de junio de 2017.

Lugar de participación:

Nº	Nombre	Resumen	Puesto o función
1	Cecilia Escalante Espinoza	10:000	JEFE DE CREW
2	Yader Morel Sotomayor	CRIVELARO	COPIADOR
3	Juliana Flores Huerta	CRIVELARO	COPIADOR
4	Wenceslao Flores Rosales	CRIVELARO	COPIADOR
5	Alfredo Rodríguez Hernández	CRIVELARO	COPIADOR
6	Alejandra Rivas Gómez	CRIVELARO	COPIADOR
7	José María Gómez Landa	CRIVELARO	COPIADOR
8	Alegria Ruiz Pacheco	CRIVELARO	COPIADOR

Reporte salida a Dzilam de Bravo

Fecha: 26 al 28 de junio 2017

Lugar local: Dzilam de Bravo

Personal invitado:

Equipo de la expedición Perdido-7 - Unidad Académica de Yucatán - México
M. en C. **Óscar Pérez Pérez** - Arqueólogo
M. en C. **Freddy González Amador** - Arqueólogo - Director - Coordinador campo de campo

Imagen: [http://bit.ly/2qfjWzD](#)

Reporte salida a Río Lagartos

Imagen: [http://bit.ly/2qfjWzD](#)

Reporte de salud a arrecife Serpiente

Fecha: 20 de Agosto 2017

Lugar local: Isla Mujeres, Yucatán

Imagen: [http://bit.ly/2qfjWzD](#)

Reporte de salida a arrecife Madagascar

Fecha: 10 de Septiembre 2017

Lugar local: Isla Mujeres, Yucatán

Imagen: [http://bit.ly/2qfjWzD](#)

CAYOS SUMERGIDOS DEL OESTE

8 al 16 de septiembre 2017

Informe de trabajo

Biodiversidad Marina de Yucatán
Unidad Académica de Yucatán | 3 de octubre 2017

Imagen: [http://bit.ly/2qfjWzD](#)

Reporte del Crucero Oceanográfico: Perdido 4

Imagen: [http://bit.ly/2qfjWzD](#)

Parque Nacional ARRECIFE ALACRANES

2 al 5 de noviembre 2017

Informe de trabajo

Biodiversidad Marina de Yucatán
Unidad Académica de Yucatán | 11 de noviembre 2017

Imagen: [http://bit.ly/2qfjWzD](#)



over 12,500 cataloged specimens



5033



2488



1540



532



374



1200



550



960

44

Crustaceos

Moluscos

Cnidaria

Tunicata

Esponjas

Echinodermos

Peces

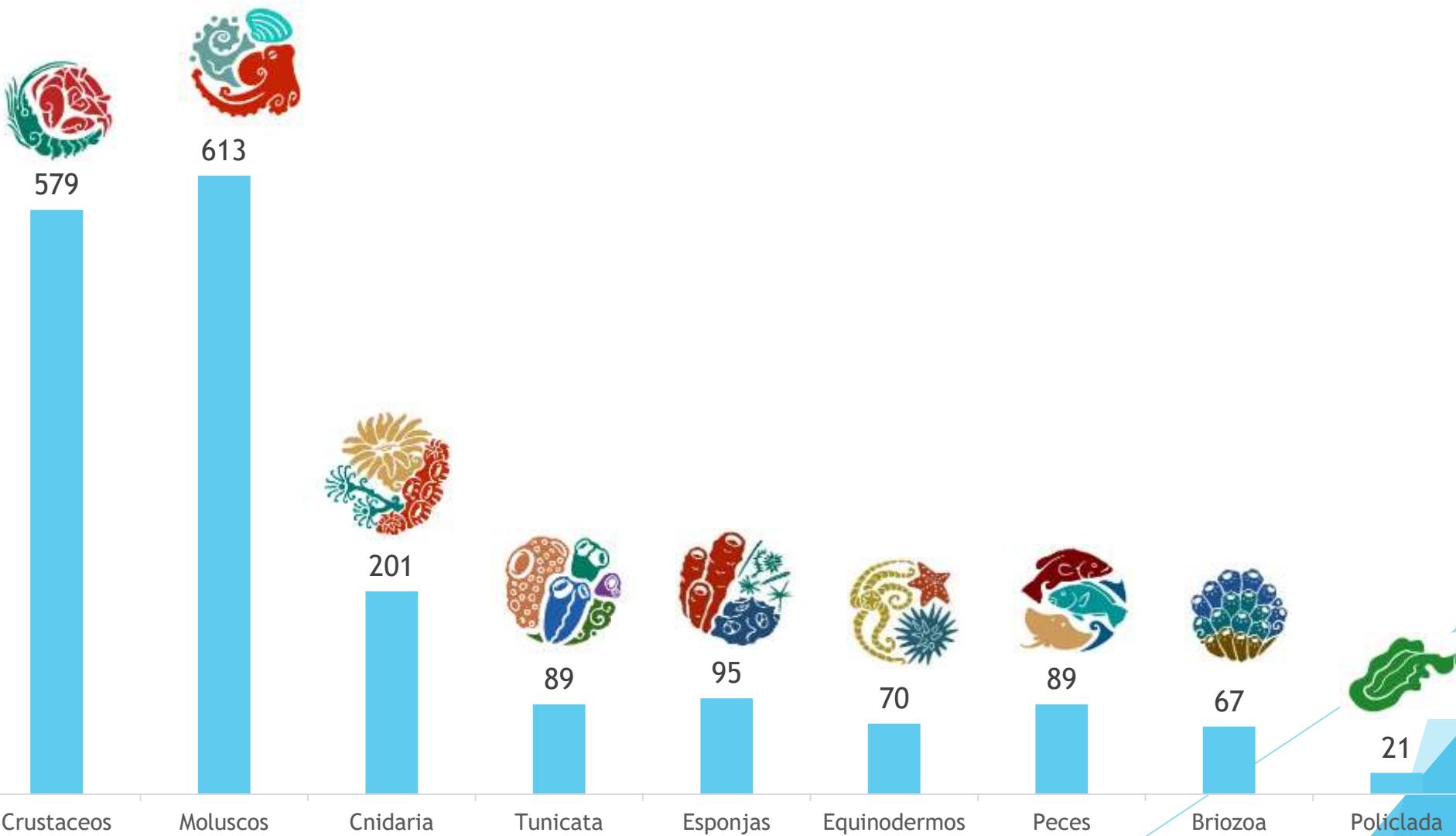
Briozos

Policlados

Actual

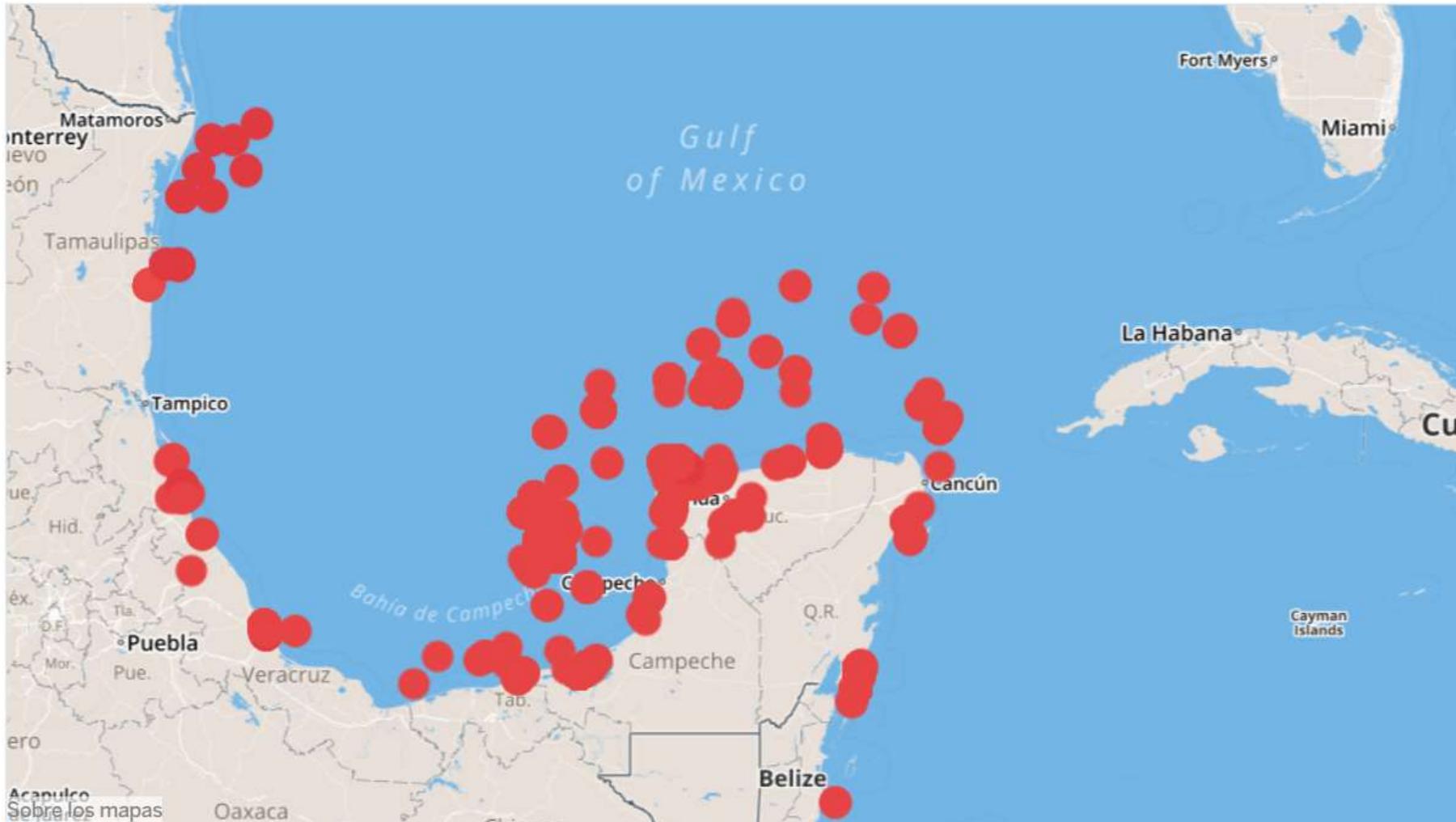


1824 Species in scientific collections

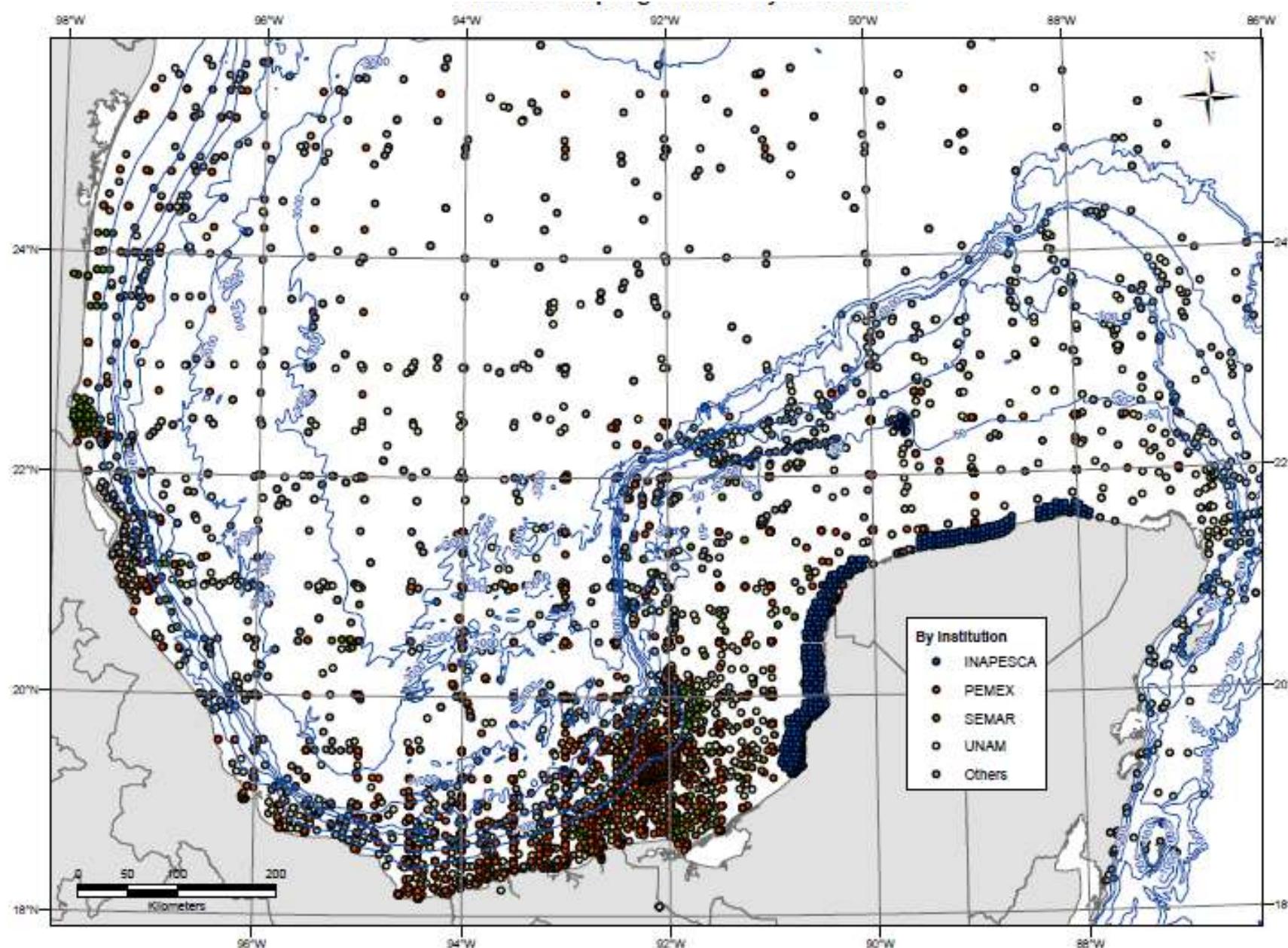




Geographical Scope



Benthic Sampling stations (historic, by institution)

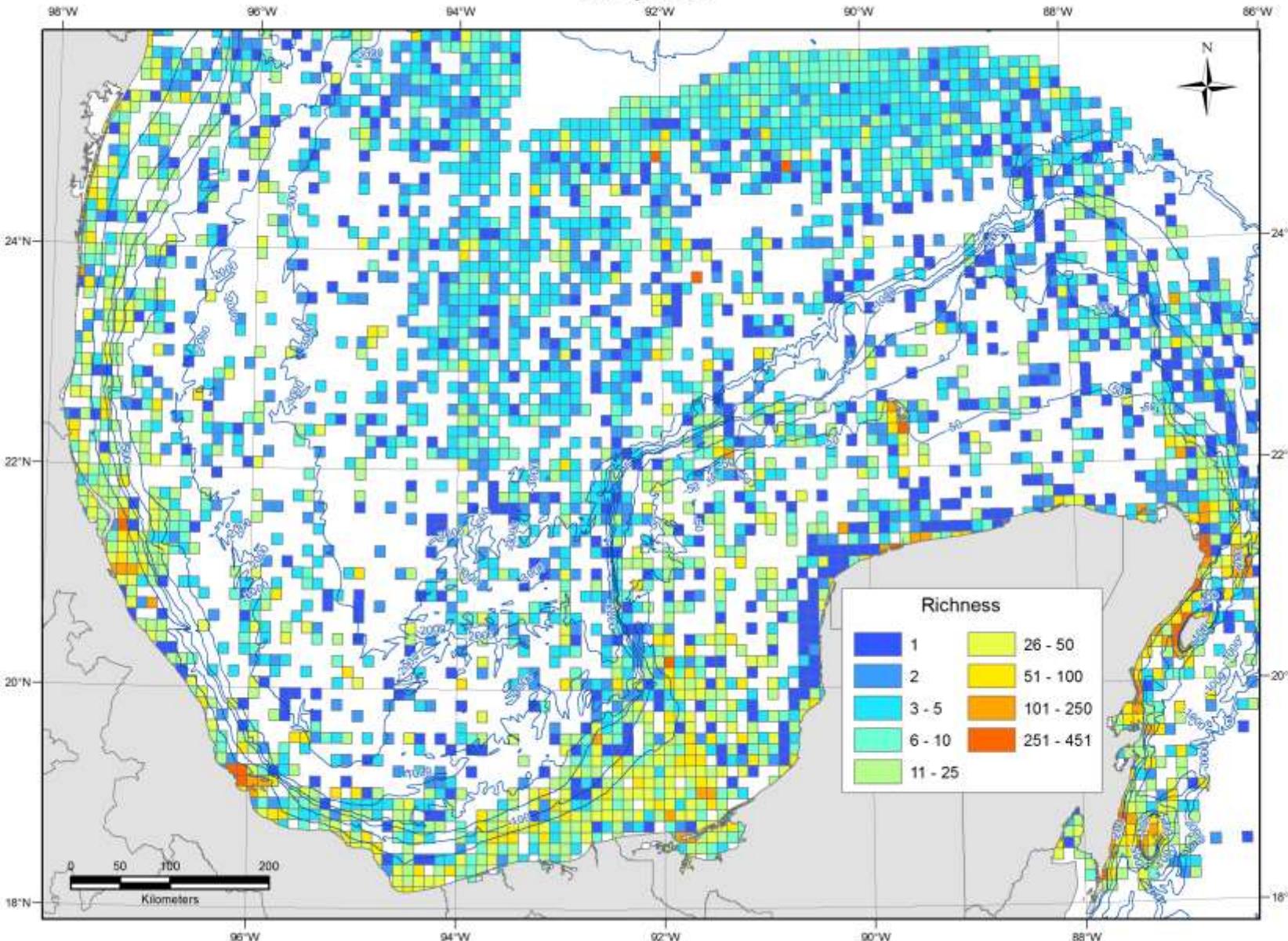


Registered sampling points

UNAM (excl.PEMEX) 1829
SEMAR 202
PEMEX 2560
INAPESCA 728
CINVESTAV (incl. PEMEX y otros)
OTROS 2758

Total: 8077 points

Relative species richness



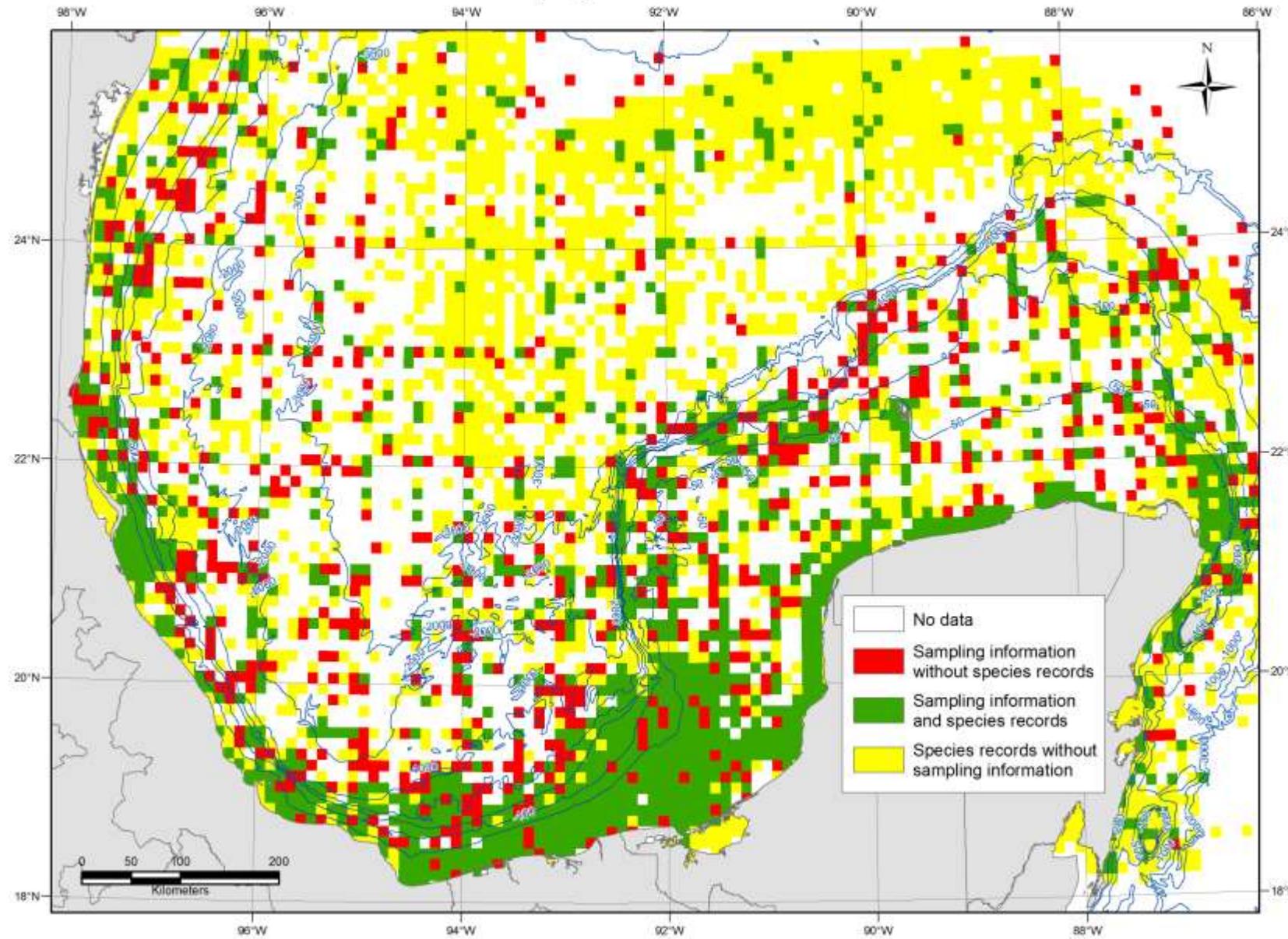
Pixel 0.1

Mexico's EEZ total
pixels = 7572

4015 pixels
Without information

53% no knowledge...

Benthic sampling and species records differences



2018

Peer Preprints

NOT PEER-REVIEWED



An Indo-Pacific damselfish in the Gulf of Mexico: origin and mode of introduction

D Ross Robertson ¹, Omar Dominguez-Dominguez ², Benjamin Victor ³, Nuno Simões ^{4,5,6}

A dataset on the species composition of amphipods (Crustacea) in a Mexican marine national park: Alacranes Reef, Yucatan

Carlos E. Paz-Ríos⁴, Nuno Simões^{3,4}, Daniel Pech⁴

Species richness and spatial distribution of benthic amphipods (Crustacea: Peracarida) in the Alacranes Reef National Park, Gulf of Mexico

Carlos E. Paz-Ríos¹ · Nuno Simões^{2,3,4} · Daniel Pech¹

Received: 26 September 2017 / Revised: 21 December 2017 / Accepted: 26 December 2017

Anthopleura dalyae sp. nov. (Cnidaria: Actiniaria), a new species of sea anemone from the southern Gulf of Mexico

Ricardo González-Muñoz¹ · Agustín Garese¹ · Fabián H. Acuña¹

Received: 26 June 2017 / Revised: 18 December 2017 / Accepted: 3 January 2018

2017

PeerJ



Ordinary kriging vs inverse distance weighting: spatial interpolation of the sessile community of Madagascar reef, Gulf of Mexico

Salvador Zarco-Perello^{1,2} and Nuno Simões¹

First report of the parasite crustacean *Leidya distorta* (Isopoda: Bopyridae) on the fiddler crab *Uca spinicarpa* (Decapoda: Brachyura) in Yucatán coasts, Mexico

Primer reporte del crustáceo parásito *Leidya distorta* (Isopoda: Bopyridae) en el cangrejo Uca spinicarpa (Decapoda: Brachyura) en las costas de Yucatán, México

Jesús Romero-Rodríguez¹, Sergio Guillén-Hernández^{2,3}, Nuno Simões¹

The social feather duster worm *Bispira brunnea* (Polychaeta: Sabellidae): aggregations, morphology and reproduction

Yasmín Dávila-Jiménez, María Ana Tovar-Hernández & Nuno Simões

ZooKeys

2016

CHECKLIST

The fishes of Cayo Arcas (Campeche Bank, Gulf of Mexico): an updated checklist

D. Ross Robertson¹, Horacio Pérez-España², Enrique Nuñez Lara³, Francisco Puc Itzá⁴, Nuno Simões⁵

ELSEVIER

3D chemoecology and chemotaxonomy of corals using fatty acid biomarkers: Latitude, longitude and depth

Cátia Figueiredo ^{a,1}, Miguel Baptista ^{a,1}, Inês C. Rosa ^a, Ana Rita Lopes ^a, Gisela Dionísio ^{b,1}, Rui J.M. Rocha ^b, Igor C.S. Cruz ^c, Ruy K.P. Kikuchi ^d, Nuno Simões ^e, Miguel Costa Leal ^b, Inês Tojeira ^f, Narcisa Bandarra ^b, Ricardo Calado ^b, Rui Rosa ^{a,2}

Journal of Ocean Science

New records of 'opisthobranchs' (Gastropoda: Heterobranchia) from Arrecife Alacranes National Park, Yucatan, Mexico

DENEZ ORTIGOSA^{1,3}, ELIA LEMUS-SANTANA² AND NUNO SIMÕES¹

MARINE BIODIVERSITY RESEARCH

An Indo-Pacific damselfish well established in the southern Gulf of Mexico: prospects for a wider, adverse invasion

D. ROSS ROBERTSON

Sea anemones (Cnidaria: Actiniaria, Corallimorpharia, Ceriantharia, Zoanthidea) from marine shallow-water environments in Venezuela: new records and an updated inventory

Ricardo González-Muñoz^{1,2*}, Nuno Simões³, Edilj J. Guerra-Castro⁴, Carlos Hernández-Ortíz⁵, Gabriela Carrasco⁶, Enric Méndez⁷, Carlos Lira⁸, Martín Rada⁹, Iván Hernández^{10,11}, Sheila M. Paula⁷, Aldo Croquer⁸ and Juan J. Cruz-Motta⁹

ZooKeys

Checklist of Fishes from Madagascar Reef Campeche Bank, México

(Crustacea: Peracarida: Amphipoda) asociados a colonias hidroides de regiones someras del sur del Golfo de México.

www.sisal.unam.mx

This poster displays a grid of fish images, a map of the study area, and a bar chart showing the distribution of different fish species across various depths.

Caprélidos
(Crustacea: Peracarida: Amphipoda)
asociados a colonias hidroides (Cnidaria: Hydrozoa)
de regiones someras del sur del Golfo de México.

This poster features a detailed chart of amphipod species associated with hydroid colonies, along with images of the amphipods and their hydroid hosts.

Relaciones Comensalistas entre Crustáceos y Ascidias

(Cnidaria: Hydrozoa)

This poster illustrates commensal relationships between crustaceans and ascidians, showing various species and their interactions.

Hidroides (Cnidaria: Hydrozoa)
de ambientes someros del Atlántico mexicano

A circular poster featuring a variety of hydroid species found in shallow waters of the Mexican Atlantic.

Diversidad de Equinodermos (Phylum Echinodermata) en Cayo Amias, Campeche

This poster shows a collection of equinoderm images, including starfish, sea urchins, and brittle stars, from Cayo Amias, Campeche.

Anomuros de aguas someras (2-10 m) del sur del golfo de México

This poster displays a grid of crab images and a map of the study area, showing the distribution of different crab species.

Diversidad y distribución de
Antípodos bentónicos (Peracarida)
en la plataforma continental de Yucatán,
sur del Golfo de México.

This poster shows a variety of amphipod species found on the continental shelf off the coast of Yucatan, Mexico.

Moluscos intersticiales
de Cuyo Nuevo, Golfo de México:
Resultados preliminares
de la composición taxonómica

This poster presents preliminary results on the taxonomic composition of interstitial molluscs from Cuyo Nuevo, Gulf of Mexico.

Primer registro de la asociación
parásito-hospedero entre
Leydigia distorta (Gastropoda: Nopontidae)
y el cangrejo *Uca spinicarpa* (Decapoda: Brachyura)
en las costas de Yucatán, México

This poster documents the first record of a parasitic-host association between *Leydigia distorta* and *Uca spinicarpa* along the Yucatan coast.

On the presence of
Charybdis hellerii
(Müne-Edwards, 1867)
along the Mexican coast of the Gulf of Mexico

This poster discusses the presence of the giant stone crab *Charybdis hellerii* along the Mexican coast of the Gulf of Mexico.



Courses Organized (since 2016)

- ➡ **8** courses
- ➡ **19** instructors
- ➡ **148** attendees
- ➡ **69** class days
- ➡ **>570** teaching hours
- ➡ **11** countries

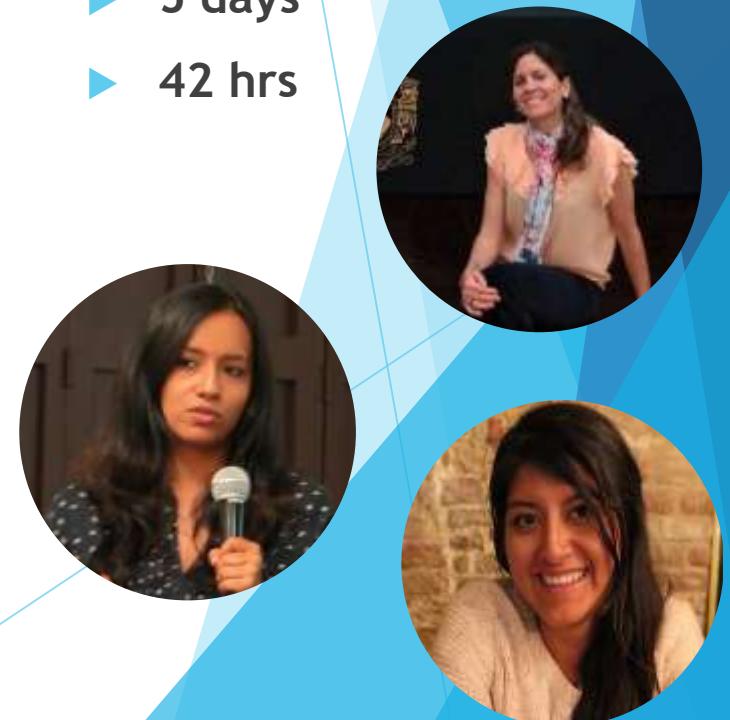
Country	alumni	Instructors
México	105	6
Colombia	14	1
Argentina	3	
Costa Rica	1	
Perú	2	
Honduras	1	
Chile	1	
Cuba	1	
Brasil	4	6
USA	1	2
Venezuela		4



OBIS, 2017



- ▶ 3 instructors
- ▶ 22 students
- ▶ 5 days
- ▶ 42 hrs





Sponges 2017



- ▶ 5 instructors
- ▶ 11 students
- ▶ 10 days
- ▶ 80 hrs





Bryozoans, 2017



- ▶ 2 instructors
- ▶ 12 students
- ▶ 10 days
- ▶ 80 hrs





Molluscs, 2018



- ▶ 4 instructors
- ▶ 18 students
- ▶ 8 days
- ▶ 72 hrs



Tunicates, march 2018



- ▶ 3 instructors
- ▶ 13 students
- ▶ 10 days
- ▶ 90 hrs



High Quality Scientific illustrations based on good macro photography



High Quality Scientific illustrations based on good macro photography





Stomatopod shrimps
Kingdom: Animalia – Phylum Arthropoda – Subphylum Crustacea – Class Malacostraca – Subclass Eumalacostraca – Superorder Eucarida – Order Decapoda – Suborder Palaemonidea – Infraorder Caridea

Neognadactylus bresili (Chace, 1958) Aphid ID:514483 | Pederson cleaner shrimp
Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly.



Neognadactylus bresili (Chace, 1958) Aphid ID:514483 | Pederson cleaner shrimp
Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly. Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly.



Superfamily PALASMONIOIDEA – Family PALASMONIIDAE – Subfamily PONTONINAE

Nannosquilla candidipes (Chace, 1958) Aphid ID:514483 | Pederson cleaner shrimp
Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly.



Lysiosquillina gabriacula (Chace, 1958) Aphid ID:514483 | Pederson cleaner shrimp
Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly.



Neognadactylus cerstedi (Chace, 1958) Aphid ID:514483 | Pederson cleaner shrimp
Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly.



Neognadactylus curacaoensis (Chace, 1958) Aphid ID:514483 | Pederson cleaner shrimp
Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly.



Pontonid crabs

Acanthonautes granulosus (Chace, 1958) Aphid ID:514483 | Pontonid crab
Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly.



Acanthonautes granulosus (Chace, 1958) Aphid ID:514483 | Pontonid cleaner shrimp
Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly. Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly.



Gymnophthalmidae subfamilies – Indo-Pacific – Subfamily PONTONINAE

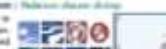
Gymnophthalmus regius (Chace, 1958) Aphid ID:514483 | Pontonid cleaner shrimp
Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly.



Palaemonellus elongatus (Chace, 1958) Aphid ID:514483 | Pontonid cleaner shrimp
Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly.



Spirontocarcinus griseus (Chace, 1958) Aphid ID:514483 | Pontonid cleaner shrimp
Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly. Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly.



Caribbean shrimps

Superfamily PALASMONIOIDEA – Family PALASMONIIDAE – Subfamily PONTONINAE

Anelasmis pedersen (Chace, 1958) Aphid ID:514483 | Pontonid cleaner shrimp
Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly.



Periclimenes yucatanicus (Fries, 1851) Aphid ID:47911 | Spotted cleaner shrimp
Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly.



Periclimenes schmitti (Mills, 1931) Aphid ID:47911 | Caribbean cleaner shrimp
Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly.



Pontonia mexicana (Goldschmidt, 1935) Aphid ID:514483 | Caribbean cleaner shrimp
Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly.



Tubiferiscus neglectus Chace, 1958 Aphid ID:514483 | Black-shelled shrimp
Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly.



Lophozymus alpinus (Brock, 1988) Aphid ID:514483 | Pontonid cleaner shrimp
Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly.



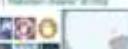
Mysidotea difformis (Dana, 1852) Aphid ID:514483 | Pontonid cleaner shrimp
Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly.



Neognadactylus bresili (Chace, 1958) Aphid ID:514483 | Pontonid cleaner shrimp
Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly.



Neognadactylus bresili (Chace, 1958) Aphid ID:514483 | Pontonid cleaner shrimp
Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly.



Neognadactylus bresili (Chace, 1958) Aphid ID:514483 | Pontonid cleaner shrimp
Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly.



Pseudosquillina mediterranea (Bürolsteiner, 1960) Aphid ID:514483 | Pontonid cleaner shrimp
Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly. Transparent body and legs covered with purple to lavender spots. Two pairs of long, white, hair-like antennae. Rows of pinkish eggs occasionally attached to belly.



Colección
Miniguías de campo

- Moluscos
- Feces
- Aves
- Cangrejos
- Espárragos y corales



BDMY

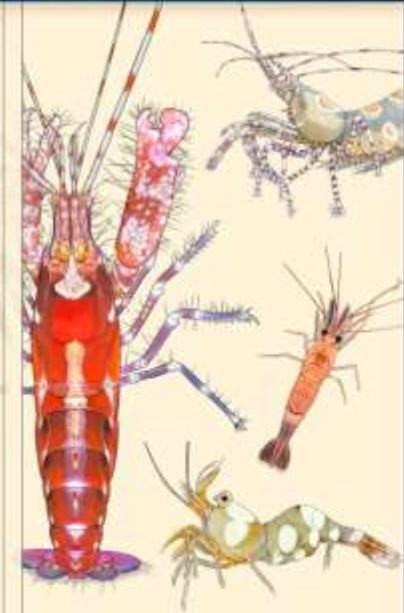
Miniguía de campo
camarones

60 especies ilustradas

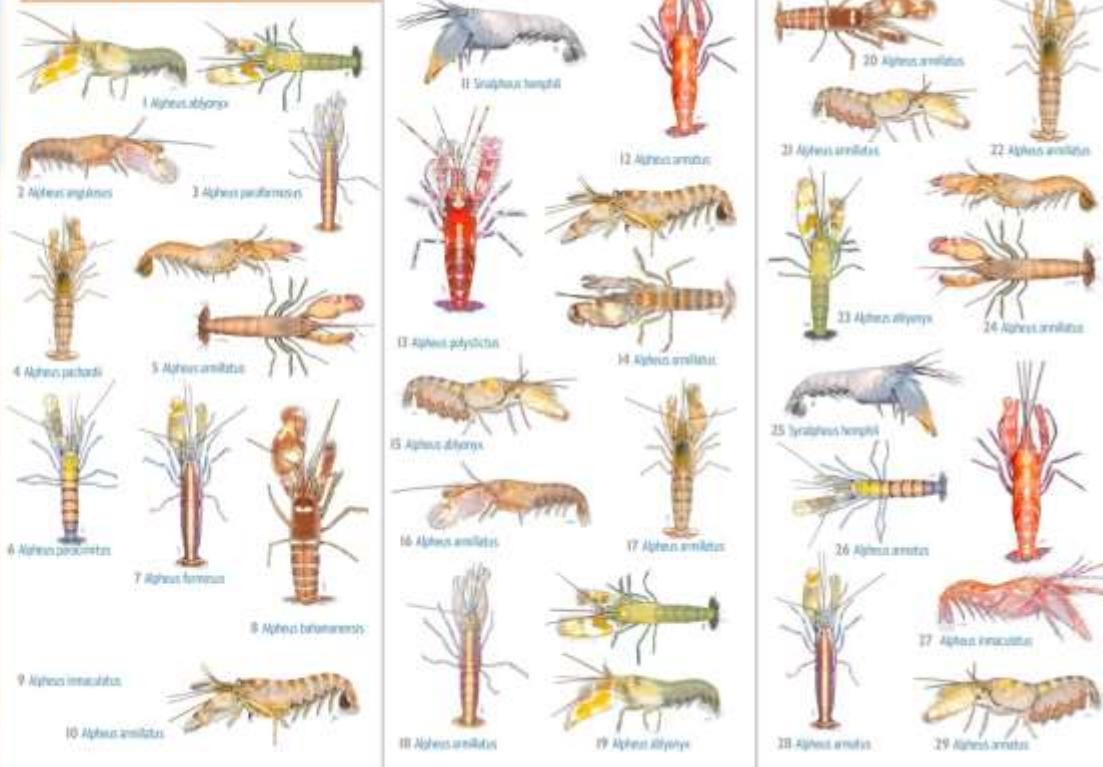
Nº 10

camarones

- Guías prácticas para el conocimiento de la naturaleza de Yucatán
- Accesible y fácil de usar
- Fácil escrit., non nullaborum vendita volvata.
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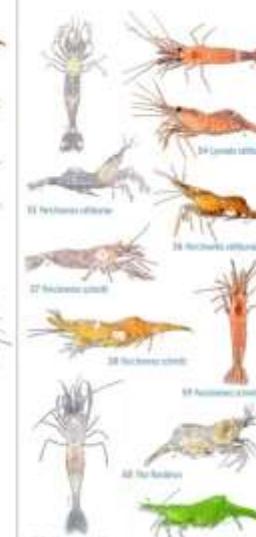


camarones alfeideos



General Public Field Guides

camarones carideos



20 *Scaphidium*

Scaphidium carideos liberdad, car a las dñeas veces
conspicua con apéndices lobulados, con órganos de respiración
en forma de espátulas, con órganos de respiración en forma
de órganos respiratorios, que se desprenden del caparazón en forma de una banda desprendible
que se desprenden del caparazón para facilitar la respiración
cuando el organismo se encuentra en agua con poco oxígeno.

21 *Scaphidium*

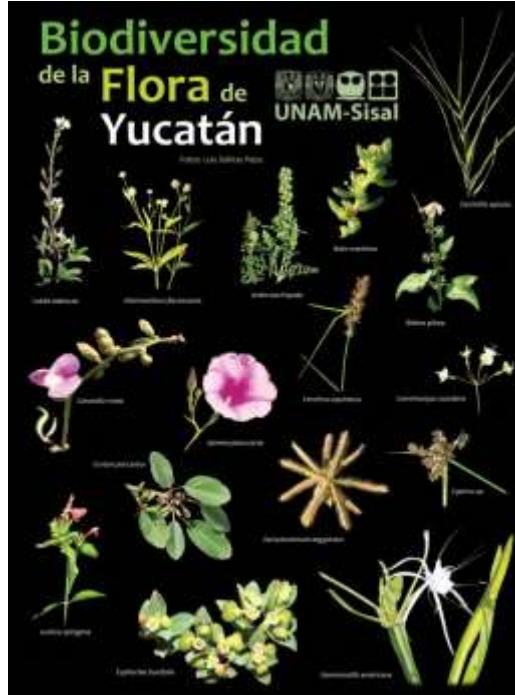
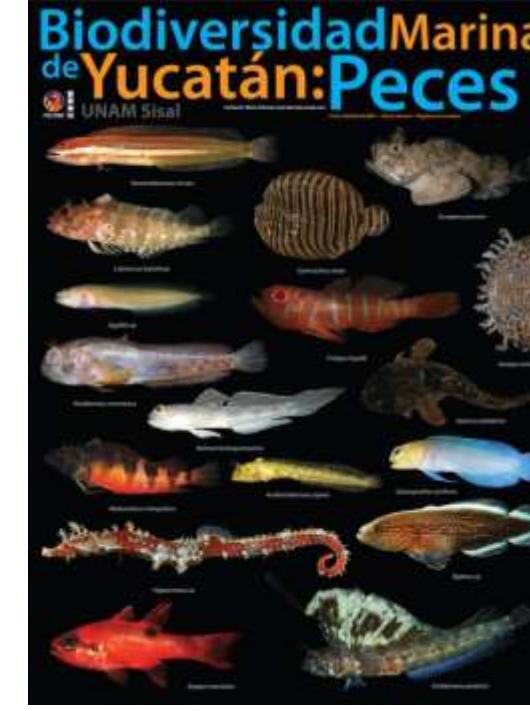
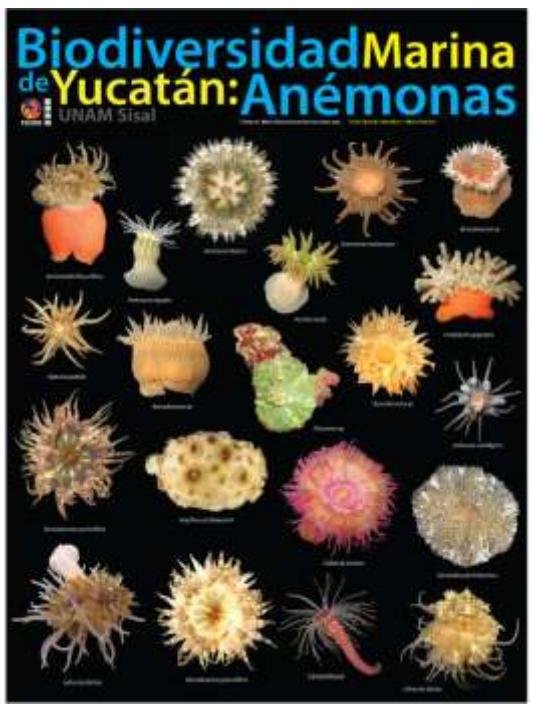
Scaphidium carideos liberdad, car a las dñeas veces
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en forma de espátulas, con órganos de respiración en forma
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cuando el organismo se encuentra en agua con poco oxígeno.



Coastal and Marine Biodiversity Posters



Dichotomous
Identification Keys

IPT × M Recibidos × Página prin × Informe_BD × Biodiversid × Biodiversid × Biodiversid × Biodiversid ×

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BioDiversidad Marina de Yucatán

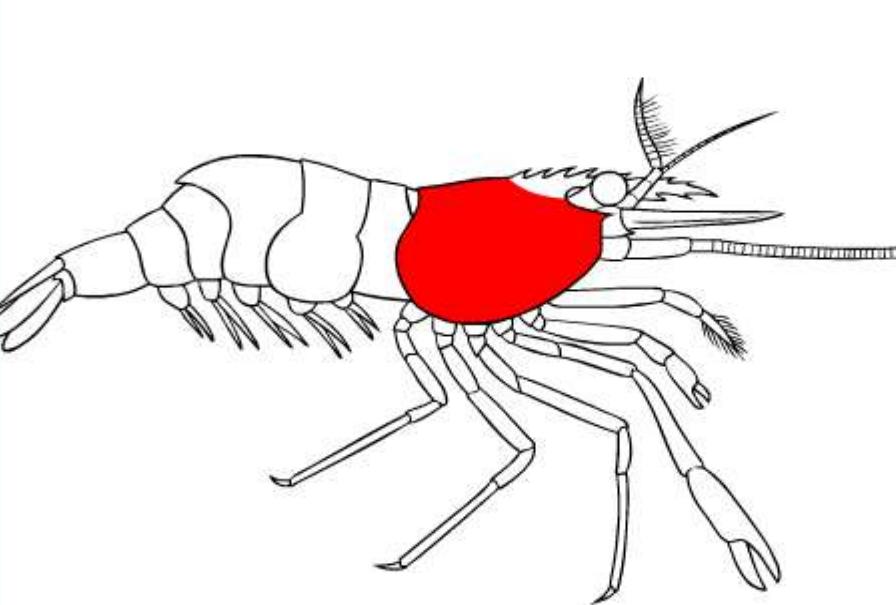
BioDiversidad Marina de Yucatán

Quienes Somos · Objetivo · Infraestructura · Oportunidades · Resultados y Colaboraciones · Especies · Colecciones · Contacto

UNAM-Sisal

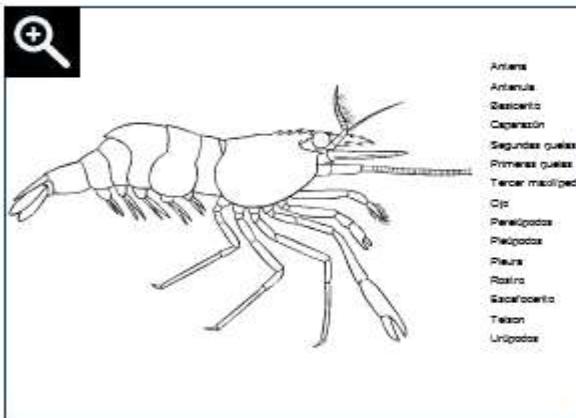
Texto de introducción a claves

Título de la clave



Antena
Antenula
Basicerito
Caparazón
Segundas quelas
Primeras quelas
Tercer maxilípedo
Ojo
Pereiópodos
Pleópodos
Pleura
Rostro
Escafocerito
Telson
Urópodos

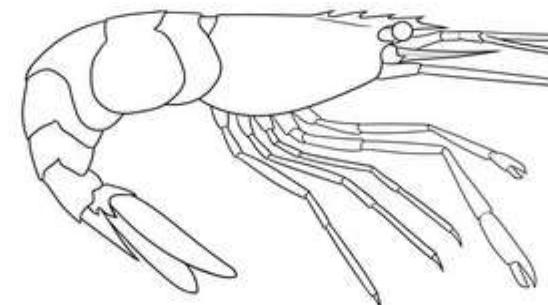
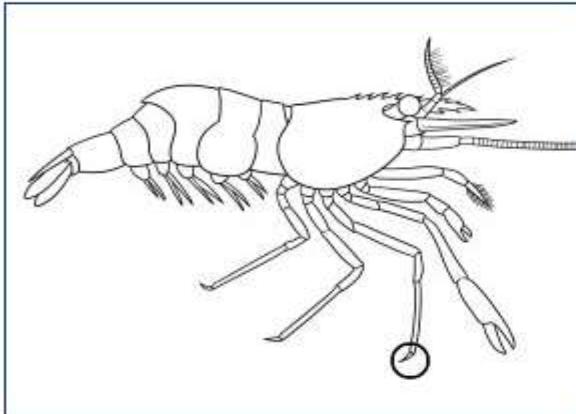
Iniciar



Paso 1

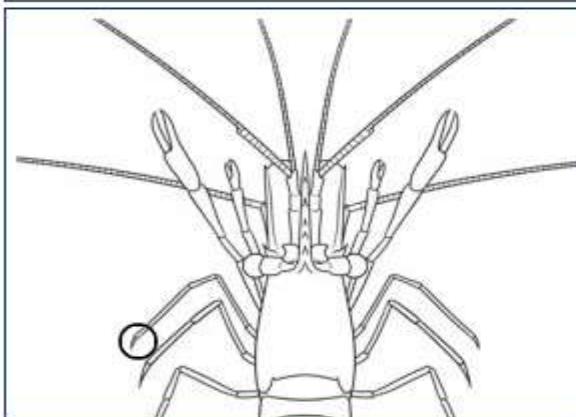
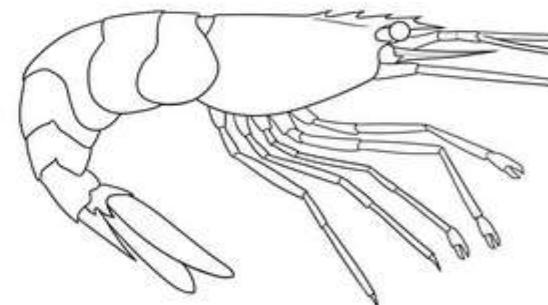
Sin quela en el tercer pereiopodo; pleura del segundo somito abdominal sobrelapada en el primer y tercer segmento (reducida en *Glypocrangonidae*)

Seleccionar esta opción



Quela presente en el tercer par de pereiopodos, ocasionalmente pequeña; pleura del segundo somito abdominal no sobrelapando en el primer segmento

Seleccionar esta opción



Regresar

Iniciar de nuevo

The Future? Sustained coastal and ocean observing systems in Mexico?

- ▶ Essential biodiversity variables
- ▶ Video and Acoustic monitoring
- ▶ Taxonomy to calibrate eDNA
- ▶ Species functional traits matrix
- ▶ Species interactions maps
- ▶ Species distribution modelling
- ▶ Trinational GMx species diversity web portal
- ▶ GMx OBIS node project



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Nuno Simoes - ns@ciencias.unam.mx