



Humpback  
Whale  
World  
Congress

Santo Domingo, Dominican Republic  
6th - 10th March 2023

# HUMPBACK WHALE WORLD CONGRESS 2023

THE BLUE ECONOMY FOR SUSTAINABLE GROWTH



## FULL PROGRAM

MARCH 06TH - 10TH

With the financial support of



In partnership with





## EDITO

Welcome to the 2023 Humpback Whale World Congress!

Thank you, Dominican Republic, for hosting the third edition of this event!

The Humpback Whale World Congress was created 8 years ago. The first and the second edition were held in the Indian Ocean. It is a great honor for Cétamada to bring it halfway across the globe to land in the Atlantic Ocean and in the Caribbean Region. The organization of this congress reflects the message that we wish to transmit to all the actors of biodiversity conservation in the world: mutual help, support and determination. We would like to express our gratitude to all the people and institutions who have contributed in any way to the organization of this edition, you have done a great job!

The Humpback Whale World Congress aims to bring together all stakeholders involved in humpback whale conservation to share progress and exchange good practices. Dedicated solely to humpback whales, the event has quickly become an important forum for scientists from around the world to present their work and to share their research results with the general public and decision makers. Finally, this congress is the event for students, where they can present their projects and where their voice matters.

During the next 5 days, humpback whales will be highlighted. This impressive and emblematic species is the ambassador of all marine mammal species. The decisions and collaborative efforts we will make this week will impact other species and help to better protect marine wildlife and oceans.

This year's theme "The Blue Economy for Sustainable Development" reflects the importance of the humpback whale in their migratory areas. Not only this species contributes to our economy, but it has also become an important level for development. It is up to us to make good use of it!

We are honored by your presence and thank you all warmly.  
Long live the whales and long live those who protect them!

**Anjara SALOMA**  
**President of Cétamada**





Since the 1st Humpback Whale World Congress in 2015, scientific projects have continued to develop and bring new knowledge about this cetacean species around the world. For example, we now know more about the evolution of their songs and their cultural transmission, about the mother-calf interactions, and about their migratory routes.

The program of this 3rd HWWC is very dense. With the President of Cetamada Anjara Saloma and the Honorary President Peter Stevick, we have the pleasure to welcome 6 invited speakers of international renown: Liliana Betancourt, Jaime Bolaños-Jiménez, Erich Hoyt, Lindsey Jones, Lyne Morissette and Joy Reidenberg. During these 4 days organized in 11 oral sessions, we will have the pleasure to listen to almost 40 speakers, and to discover about ten posters, dealing with migrations, behaviors, anatomy, genetics, acoustics and participative sciences. Thematic workshops will be devoted to the blue economy, to the port measures in favor of the marine environment, and to the regional Caribbean project CAMAC led by the AGOA Marine Mammal Sanctuary. The participants will also go to Samana for an important meeting with the tourism operators.

We have also planned a very important ceremony: for the opening of the congress on Monday morning, a tribute will be paid to Mrs. Idelisa Bonnelly de Calventi, emblematic person of the marine mammal protection in the Dominican Republic.

The HWWC is an exceptional place for researchers, engineers, managers, professionals, artists and students to share their knowledge, experiences, methods and results. Together, we have the opportunity to describe our current projects and to consider collaborations for our future projects.

We thank you for your participation. Your contributions allow us to design sustainable oceans and to always act for the protection of cetaceans.

**Olivier ADAM**  
**Professor**





## **AUTORIDAD NACIONAL DE ASUNTOS MARITIMOS, DOMINICAN REPUBLIC**

The National Authority of Maritime Affairs (ANAMAR) was created by Law 66-07 to provide the Dominican State with the technical, scientific, and legal tools necessary for the research, conservation, and sustainable use of the living and non-living resources of the sea, existing in our maritime spaces. As part of its fundamental objectives, ANAMAR is set to harmonize state policies to give them coherence and make them compatible with current International Law, in order to achieve a correct oceanic administration and the full development of the maritime sector.

In this sense, ANAMAR promotes spaces in which scientists, businessmen, academics, and experts from different latitudes exchange their knowledge and discuss related projects, within the framework of the 3rd World Humpback Whale Congress.

It has been conceived, promoted and supported by the National Authority of Maritime Affairs (ANAMAR) as part of its strategic mission to assist the Dominican State with the technical, scientific, and legal knowledge necessary for the formulation of policies for the conservation and sustainable use of existing resources in our maritime spaces, and to contribute to the promotion and awareness of an integrated vision of the sea of the Dominican State, through the formulation and implementation of educational programs.

Humpback whales (*Megaptera novaeangliae*) are one of the most important living resources for the Dominican Republic, because they characterize an ecological, economic, social, and cultural value. But the importance of these animals as a resource does not necessarily imply that their conservation and protection are easy to achieve, it requires effort, understanding and a lot of dedication on the part of those who work and are committed to their monitoring. Each step in this direction involves the actions and wills to which ANAMAR is committed.

The Banco de la Plata, Banco de la Navidad, and Samaná Bay Marine Mammal Sanctuary, created in October 1986, is one of the first protected areas of its kind established worldwide, being the largest marine protected area in the Dominican Republic and the first marine mammal sanctuary in the Atlantic Ocean. This sanctuary protects the habitat of the largest population of humpback whales that arrive from the North Atlantic each year to the warm waters of the Caribbean Region during the winter season (December-March), carrying out vital functions such as mating and raising their calves.

Our waters also harbor other conservation targets such as coral reefs, seagrass beds, underwater cultural resources, all of which have high value for conservation and local economic development. These ecosystems are fundamental for the sustainability of fish, crustacean, and mollusk populations.

ANAMAR is a small institution that has demonstrated that it can do great things, and our commitment to this congress is part of that.

**Mr. Jimmy GARCIA**  
**President of ANAMAR**



## **FRENCH EMBASSY, DOMINICAN REPUBLIC**

The humpback whale is a powerful animal. Powerful because of its obvious physical characteristics, but powerful above all because of its ability to fascinate. Scientists, researchers, businessmen, students, artists, political representatives, all, one day, have stopped to listen to its song, observe its strength, feel its fragility. The humpback whale intrigues, fascinates, inspires. And it is the passion for this animal, emblematic of the Dominican Republic, that pushes us to meet today, in Santo Domingo, for the third edition of the Humpback Whale World Congress. This mammal has a rare and particularly valuable gathering capacity at a time when the climate situation requires rapid and global solutions.

It is no secret that the sea and the ocean are dear to France. With the largest maritime domain in the world, it is essential that we protect these spaces that are an integral part of the landscape and the economy. From the commitments of the President of the Republic Emmanuel Macron to the realization of the first edition of the One Ocean Summit last year in Brest, France, like the Dominican Republic, knows the resources that the sea and the ocean can offer and the urgency of their protection. The challenge is to combine the exploitation of maritime resources with respect for the environment, to meet the needs of the population without jeopardizing the natural balance of our seas and oceans. Many actions can be taken at the national level: development of renewable marine energies, dialogue with the private sector, regulation of fishing... However, the protection of the oceans and seas cannot be achieved without a global and coordinated action.

It is time for dialogue and the achievement of common goals.

While the clock is running, the third edition of the Humpback Whale World Congress fits perfectly into this trajectory. During these five days, Santo Domingo will be a place of awareness, exchange and meetings between the political, economic, social and scientific worlds, a real place of hope for the future of maritime spaces, with which France is fully associated.

I can only hope that this fascination for the humpback whale will be the breeding ground for a real rapprochement between our national policies in the field of ocean protection and will allow for collective action in environmental matters, including all actors of society.

May the power of the humpback whale be a source of inspiration for future decisions. Have a good discovery, a good week and a good conference to all of you.

**Mr. Eric FOURNIER**  
**French Ambassador, Dominican Republic**





## WELCOME TO THE DOMINICAN REPUBLIC

Dominican Republic is the second largest Caribbean country, situated just two hours south of Miami, less than four hours from New York and eight hours from most European cities. Known for our warm and hospitable people, Dominican Republic is a destination like no other, featuring astounding nature, intriguing history and rich culture.

Surrounded by the Atlantic Ocean on the north and the Caribbean Sea on the south, our lush tropical island paradise boasts nearly 1,000 miles (1,609 km) of coastline, 250 miles (402 km) of the world's top beaches, magnificent resorts and hotels, and a variety of sports, recreation and entertainment options. Here you can dance to the pulse pounding thrill of the merengue, renew in our luxurious and diverse accommodations, explore ancient relics of centuries past, delight in delicious Dominican gastronomy or enjoy ecotourism adventures in our magnificent national parks, mountain ranges, rivers, and beaches.

Discovered in 1492 by Christopher Columbus, the country overflows with fascinating history, museums and exciting cultural experiences like music, art and festivals, plus uniquely Dominican specialties such as cigars, rum, chocolate, coffee, merengue, amber and larimar.

The #1 destination for golf in the Caribbean and Latin America, Dominican Republic delights visitors with 26 designer golf courses amid breathtaking coastlines with mountain backdrops and lush green fairways. With so many beautiful natural settings like romantic waterfalls, breathtaking coasts and idyllic accommodations, Dominican Republic is a top destination for weddings and romance. Many world class-resorts and hotels also cater to meetings and incentive groups who flock to Dominican Republic for excellent, friendly service and dynamic meeting venues.

Dominican Republic offers a fantastic combination of environments to capture your imagination and refresh the soul. And with eight international airports, paradise has never been easier to explore. We invite you to discover our breathtaking island sanctuary and create memories that will last a lifetime.

The Dominican Republic's diverse topography and varying climates combine to create the perfect environment for over 6,000 species of thriving flora and fauna, including a high number of endemic species. In Bayahíbe, Cotubanamá National Park stretches from land—where you can spot the national, endemic Bayahíbe Rose—to the marine jewels of Saona and Catalina islands offshore, teeming with marine life. The largest of all national parks, and part of the DR's UNESCO Biosphere Reserve, Jaragua National Park includes beach, lagoons, dry forests and cays. Nearby, the Sierra de Bahoruco is the only cloud forest in the Caribbean. Among the most visited parks in the country is also its most stunning: Los Haitises National Park, toured mainly by boat to view its towering rock mounts rising out of the water. In one of the most remote, pristine areas of the country, Valle Nuevo National Park astounds with its dense pine tree forests and frosty mornings.

Whether for hiking, bird watching, or on flora expeditions, the DR's protected areas should feature on your vacation to do list.

<https://www.godominicanrepublic.com/about-dr/flora-fauna/>



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# OFFICIAL PROGRAM



MARCH 06TH - 10TH





**8:00 – 8:30am** *Transportation by bus from el Hotel Renaissance Jaragua to the Autonomous University of Santo Domingo*

## Opening Session

**9:00 – 9:10am** Introduction by the Master of Ceremony  
**9:10 – 9:15am** Mtro. Editrudis Beltran, Magnificent Rector of the Autonomous University of Santo Domingo (UASD)  
**9:15 – 9:20am** Roberto Alvarez, Minister of Foreign Affairs of the Dominican Republic.  
**9:20 – 9:25am** Dr. Miguel Ceara Hatton, Minister of Environment and Natural Resources of the Dominican Republic  
**9:25 – 9:30am** David Collado, Minister of Tourism of the Dominican Republic  
**9:30 – 9:35am** Franklin Garcia Fermin, Minister of Education Science and Technology  
**9:35 – 9:40am** Jimmy Garcia, President of the Maritime Affairs Authority (ANAMAR) of the Dominican Republic  
Screening of a video  
**9:40 – 9:45am** Marie Delille, Principal Consultant at the French Embassy of the Dominican Republic  
**9:45 – 10:00am** Laurie Chauvet, Project Manager, Agence Française de Développement  
**10:00 – 10:05am** Laurie Hec, Associate Director of the French marine mammal sanctuary AGOA  
**10:05 – 10:10am** Ernesto Reyna, Center for Environmental, Energy and Sustainable Development Studies, Global Foundation for Democracy and Development (FUNGLOBE)

## Tribute to Mrs Idelisa Bonnelly de Calventi

**10:10 – 10:20am** Students from CIBIMA - IBC comes on stage to give the award to Mrs Laura Calventi, daughter of Idelisa Bonnelly de Calventi  
**10:20 – 10:25am** Felicita Heredia, President of the Dominican Foundation for Marine Studies (Fundemar)  
**10:25 – 10:40am** Screening of a video  
**10:40 – 10:45am** Dr. Gladys Rosado: The historical evolution of the study of humpback whales at CIBIMA-IBC  
**10:45 – 10:50am** Dr. Peter Stevick, Honorary President of the 3rd HWWC  
**10:50 – 10:55am** Dr. Anjara Saloma, President of the Ngo Cetamada, Founder of the HWWC

**11:30 – 12:00pm** *Transportation by bus from UASD to Hotel La Renaissance Jaragua*

**12:00 – 3:00pm** *Lunch at Hotel La Renaissance Jaragua*

## Special Session | Topic: Scientific research on humpback whales in the Dominican Republic

**3:00 – 3:20pm** Federico Franco, Vice-Minister of Protected Areas and Biodiversity of the Dominican Republic: Humpback whales in the Silver Bank Marine Sanctuary  
**3:20 – 3:40pm** Oswaldo Vasquez: Marine mammal research and conservation in the Dominican Republic (CIBIMA, ATEMAR, FUNGLOBE)  
**3:40 – 3:50pm** *Coffee break in the Poster room*

## Invited Speaker #1 | Dr. Liliana Betancourt, CEBSE, Dominican Republic

**3:50 – 4:35pm** Humpback whales in Samana Bay

**4:40 – 4:50pm** Anna Safryghin: Ocean Governance: Towards effective management of marine mammals in MPAs: the Marine Mammals Management

*DEPARTURE AT 6:30PM: HOTEL LA RENAISSANCE JARAGUA*

**7:00 - 10:00pm**

ICEBREAKING EVENT for the opening of the exhibition Oceano el buceo insólito at the **National Museum of Natural History, Santo Domingo**  
<https://mnhn.gob.do>



# TUESDAY 7TH MARCH

|                                       |   |
|---------------------------------------|---|
| <b>Invited Speaker #2</b>             | <b>Dr. Lindsey Jones, Allied Whale at College of the Atlantic, USA</b>  |
| <b>8:30 – 9:15am</b>                  | An evolving ocean-basin wide perspective on the population ecology of humpbacks from the North Atlantic Humpback Whale Catalog  |
| <b>Oral session #2</b>                | <b>Topic: Whale watching</b> <b>Chair: MSc. Oswaldo Vasquez</b>   |
| <b>9:20 – 9:40am</b>                  | Dr. Cristina Castro: Whale watching tourism as a driving force for socio-economic development in Puerto López, Machalilla National Park, Manabí, Ecuador  |
| <b>9:40 – 10:00am</b>                 | Charline Fisseau: Understanding whale-whalers' expectations, a key to shaping "Quiétude" team actions in favor of sustainable whale-watching in Reunion Island  |
| <b>10:00 – 10:20am</b>                | <i>Coffee break in the Poster room</i>  |
| <b>Oral session #3</b>                | <b>Topic: Human activities and mitigation</b> <b>Chair: MSc. Rita Sellares</b>  |
| <b>10:20 – 10:40am</b>                | Dr. Alexander Werth: Interactions between humpback whale ( <i>Megaptera novaeangliae</i> ) baleen and microplastics   |
| <b>10:40 – 11:00am</b>                | Dr. Nadège Gandilhon: How to assess underwater noise according to the Marine Strategy Framework Directive (MSFD) indicator #11 applied to whales  |
| <b>11:00 – 11:20pm</b>                | Dr. Isabela Oliveira: How to save whales from extinction: methods employed by the Brazilian Humpback Whale Project  |
| <b>11:20 – 11:40pm</b>                | Sita Narayanan: Ports: crucial nodal points for Caribbean territories   |
| <b>11:40 – 12:00pm</b>                | Dr. Jennifer Tocny: Environmental monitoring: A management tool for natural areas of Guadeloupe Port Authority  |
| <b>Poster session #1</b>              | <b>(Authors have 2 min to orally pitch their poster)</b>  |
| <b>12:00 – 12:02pm</b>                | Dr. Benjamin de Montgolfier: Habitat use and co-occurrence of Humpback whales and North Atlantic Right Whales in Baie des Chaleurs (Québec, Canada)   |
| <b>12:02 – 12:04pm</b>                | Dr. Gilles Nolibé: Technological innovation for area surveillance usable to detect whales at sea by 360° thermal cameras  |
| <b>12:04 – 12:06pm</b>                | Cathy Lacourbas: Observation of possible food rivalry between killer whales and humpback whales Skjervoy-Kvaenangen Norway Winter 2022  |
| <b>12:06 – 12:08pm</b>                | Dr. Yira Rodríguez-Jerez: Humpback whale historical routes, based on collections of fluke photographs   |
| <b>12:08 – 12:10pm</b>                | Rachel Haderlé: Are white-backed dolphins and Florida-type dolphins different? A study of two bottlenose dolphin morphotypes around Guadeloupe  |
| <b>12:10 – 12:12pm</b>                | Salomé Martin-Marin: Educational tools  |
| <b>12:12 – 12:14pm</b>                | Dr. Rebeca Campos Cuellar: Humpback whale population of Lesser Antilles: Testing the individual's recognition through two photo-ID platforms  |
| <b>12:14 – 12:16pm</b>                | Dr. Yann Doh: Description of a Humpback song theme off Sainte Marie Island for the breeding season 2022   |
| <b>12:16 – 12:18pm</b>                | Bertrand Denis: ABYSS: a N.G.O dedicated to cetaceans' conservation in the western coast of La Reunion Island   |
| <b>12:18 – 12:20pm</b>                | Maevatiana Ratsimbazafindranahaka: CETAMADA: Malagasy Ngo for the conservation of cetaceans and their marine habitats   |
| <b>12:20 – 12:22pm</b>                | Franck Garita: White humpback whale calf in Costa Rica: Distribution, behavior, and group size  |
| <b>12:22 – 2:00pm</b>                 | <i>Lunch</i>  |
| <b>Invited Speaker #3</b>             | <b>Dr. Lyne Morissette, CEO and researcher at M - Expertise Marine, Québec</b>  |
| <b>2:00 – 2:45pm</b>                  | From sorrow to hope, from threats to solutions: how humpback whales affect our will to protect and save our oceans  |
| <b>Oral session #4</b>                | <b>Topic: Breeding areas</b> <b>Chair: Dr. Liliana Betancourt</b>   |
| <b>2:50 – 3:10pm</b>                  | Dr. Cristina Castro: Twenty-six years of humpback whale photo-identification in Ecuador   |
| <b>3:10 – 3:30pm</b>                  | Laura Daniela Benítez: Residence patterns of humpback whales in a breeding ground in the Southwest of the Colombian Pacific   |
| <b>3:30 – 3:50pm</b>                  | Dr. Maria Isabel Carvalho Gonçalves: Tracking interannual fluctuations in the presence of humpback whales on the Southern coast of Bahia, Brazil  |
| <b>3:50 – 4:10pm</b>                  | Dr. Juliana Castrillon: Moreton Bay; a previously unrecognized resting stopover for east-coast of Australia migrating humpback whales   |
| <b>4:10 – 4:30pm</b>                  | Dr. Olivier Adam: Study of humpback whale populations in the southwest Indian Ocean from high resolution satellite images   |
| <b>4:30 – 4:50pm</b>                  | <i>Coffee break in the Poster room</i>  |
| <b>Oral session #5</b>                | <b>Topic: Acoustics</b> <b>Chair: Dr. Yann Doh</b>  |
| <b>4:50 – 5:10pm</b>                  | Dr. Christina Perazio: Screaming singers: Correlations between boat noise and frequency structure of humpback whale ( <i>Megaptera novaeangliae</i> ) song  |
| <b>5:10 – 5:30pm</b>                  | Dr. Maria Isabel Gonçalves: South Atlantic humpback whale song revolution: evidence for a Southern Hemisphere cultural exchange?  |
| <b>5:30 – 5:50pm</b>                  | Dr. Maria Isabel Gonçalves: Characterization of the vocal activity patterns of humpback whale singers in a breeding area in Southern Bahia, Brazil  |
| <b>5:50 – 6:10pm</b>                  | Dr. Divna Djokic: Latin America humpback whale song dynamics  |
| <b>RDV DIRECTLY AT CASA DE TEATRO</b> |   |
| <b>8:00 - 10:00pm</b>                 | Screening of the DOCUMENTARY FILM "Where the Whales Sing?", directed by Andrew Stevenson, <b>at the Casa De Teatro, Santo Domingo</b> , <a href="https://casadetatro.mystrikingly.com/">https://casadetatro.mystrikingly.com/</a> |



# WEDNESDAY 8TH MARCH

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|---------------------------|--|---------------------------------|
| <b>Invited Speaker #4</b> | <b>Dr. Erich Hoyt, Whale and Dolphin Conservation</b>  |                                 |
| <b>8:30 – 9:15am</b>      | The critical importance of humpback whales for MPAs, tourism and helping the climate emergency in light of site fidelity and fecundity   |                                 |
| <b>Oral session #6</b>    | <b>Topic: Acoustics</b>  | <b>Chair: Dr. Olivier Adam</b>  |
| <b>9:20 – 9:40am</b>      | Dr. Yann Doh: Humpback singers' interactions study from stereophonic acoustic dataset off Sainte Marie Island (Madagascar)   |                                 |
| <b>9:40 – 10:00am</b>     | Dr. Gilles Nolibé: Acoustic monitoring of whales and anthropogenic noise in the ocean using connected smart buoys  |                                 |
| <b>10:00 – 10:20am</b>    | <i>Coffee break in the Poster room</i>   |                                 |
| <b>Oral session #7</b>    | <b>Topic: Collaborations between researchers and citizens</b>  | <b>Chair: Dr. Anjara Saloma</b> |
| <b>10:20 – 10:40am</b>    | Serge Briez: Contribution of participatory citizen science to observe potential effects of climate change on humpback whale migrations   |                                 |
| <b>10:40 – 11:00am</b>    | Gabriel Dubus: Citizen science involved in detection and classification of cetaceans for passive acoustic monitoring   |                                 |
| <b>11:00 – 11:20am</b>    | Dr. Isabela Oliveira, The humpback whale spaces: the importance of interpretive centers as a tool to create awareness on the plight of our ocean   |                                 |
| <b>11:20 – 11:40am</b>    | Iro Tsarmpopoulou-Fokianou: Of whales and men: The cultural significance of whales in Iceland  |                                 |
| <b>11:40 – 2:00pm</b>     | <i>Lunch</i>   |                                 |
| <b>Invited Speaker #5</b> | <b>Dr. Joy Reidenberg, Professor at the Icahn School of Medicine at Mount Sinai's Center for Anatomy and Functional Morphology, New York, USA</b>  |                                 |
| <b>2:00 – 2:45pm</b>      | Blows and bubbles: humpback whale nasal anatomy influences airflow paths determining shapes of air releases above and below water  |                                 |
| <b>Oral session #8</b>    | <b>Topic: Anatomy, genetics and behaviors</b>  | <b>Chair: Dr. Jean-Luc Jung</b> |
| <b>2:50 – 3:10pm</b>      | Dr. Jodi Frediani: Humpback whales blow bubble rings for humans - a play prompt in poloidal parlance?  |                                 |
| <b>3:10 – 3:30pm</b>      | Sebastian Guillermin (video): Genetic diversity of humpback whales ( <i>Megaptera novaeangliae</i> ) in a Northeast Madagascar breeding ground   |                                 |
| <b>3:30 – 3:50pm</b>      | Maevatiana Ratsimbazafindranahaka: Humpback whale suckling behavior in the breeding grounds: duration, rate, spatial context, and activity context   |                                 |
| <b>3:50 – 4:10pm</b>      | <i>Coffee break in the Poster room</i>   |                                 |
| <b>Oral session #9</b>    | <b>Topic: Caribbean population</b>   | <b>Chair: Magali Combes</b>     |
| <b>4:10 – 4:30pm</b>      | Dr. Jaime Bolaños Jiménez: Spatial and temporal distribution of the humpback whale ( <i>Megaptera novaeangliae</i> ) in poorly-studied areas of the wider Caribbean Region                     |                                 |
| <b>4:30 – 4:50pm</b>      | Dr. Michel Vély: Humpback whale satellite-tracking confirms the connectivity between the Northern Lesser Antilles and the importance of regional collaboration to conserve marine biodiversity |                                 |
| <b>4:50 – 5:10pm</b>      | Jérôme Couvat: Acoustics Caribbean rhythms: first insights into humpback whale calls through the CARI'MAM large scale high sampling rate bioacoustic observatory                               |                                 |
| <b>5:10 – 5:30pm</b>      | Stéphane Chavin (video): Automatic classification of humpback whale ( <i>Megaptera novaeangliae</i> ) vocalization in the Caribbean  |                                 |
| <b>5:30 – 5:50pm</b>      | Dr. Andrew Stevenson: Acoustic characterisation of North Atlantic humpback whale vocalisations at an oceanic migration   |                                 |

DEPARTURE BY BUS AT 7:30PM FROM HOTEL LA RENAISSANCE JARAGUA

|                       |  |
|-----------------------|--|
| <b>8:00 - 02:00am</b> | Invitation to the GALA EVENING at the Restaurant Bar & Museo del Ron Dominicano, with the financial support of ITMX<br><a href="https://www.instagram.com/barymuseodelron/?hl=es">https://www.instagram.com/barymuseodelron/?hl=es</a> |
|-----------------------|--|



## THURSDAY 9TH MARCH

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|--|--|---|--|
| <b>Invited Speaker #6</b><br>8:30 – 9:15am | <b>Dr. Jaime Bolaños-Jiménez, Founder and co-Director of the Caribbean-Wide Orca project, Venezuela</b><br>Building bridges for marine mammal conservation in poorly-studied areas               |   |  |
| <b>Oral session #10</b>                    | <b>Topic: Interactions with human activities in the Caribbean</b>  |   | <b>Chair: Laurie Hec</b>               |
| 9:20 – 9:40am                              | Dr. Claire Pusineri: Status of marine mammals in the Caribbean and actions conducted by the SPAW RAC   |   |  |
| 9:40 – 10:00am                             | Magali Combes: Entanglement of large cetaceans (humpback whales and sperm whales) on fishing gear in the French West Indies: an increasing threat?   |   |  |
| 10:00 – 10:20am                            | Dr. Jamie Aquino: Effectiveness of community-based education and fisher training programs to sensitize local populations in Haiti about whales   |   |  |
| 10:20 – 10:40am                            | <i>Coffee break in the Poster room</i>   |   |  |
| <b>Oral session #11</b>                    | <b>Topic: Interactions with human activities in the Caribbean</b>  |   | <b>Chair: Dr. Claire Pusineri</b>      |
| 10:40 – 11:00am                            | Dr. Rocio Prieto: Like humpback whales, the Caribbean Cetacean Society is going beyond frontiers for cetacean conservation in the Lesser Antilles  |   |  |
| 11:00 – 11:20pm                            | Dr. Jaime Bolaños Jiménez: Contribution of the CWOP initiative to the knowledge of the humpback whale and other cetacean species in the wider Caribbean region                                   |   |  |
| 11:20 – 11:40pm                            | Dr. Benjamin de Montgolfier: Use of Fort-de-France Bay (Martinique) by humpback whales using passive acoustics   |   |  |
| 11:40 – 12:00pm                            | Dr. Mithriel MacKay: North Atlantic humpback whale ( <i>Megaptera novaeangliae</i> ) confirmed predation by orca ( <i>Orcinus orca</i> ) occurs in the Caribbean Sea                             |   |  |
| 12:00 – 2:00pm                             | <i>Lunch</i>   |   |  |
| <b>Workshops</b>                           | <b>Blue Economy</b>  | <b>Port activities and marine environment</b> | <b>CAMAC meeting</b>                   |
| 2:00 – 4:00pm                              | Chair: Nina Lysenko, Directora Recursos Marinos, Ministerio de Media Ambiente y Recursos Naturale<br>Israel Santana Carabello, Coordinator Regional Nordeste en Areas Protegidas y Biodiversidad | Chair: Dr. Nadège Gandilhon                   | Chair: Laurie Hec                      |
| 4:00 – 4:20pm                              | <i>Coffee break in the Poster room</i>   | <i>Coffee break in the Poster room</i>        | <i>Coffee break in the Poster room</i> |
| 4:20 – 6:00pm                              | Workshop (continued)   | Workshop (continued)                          | Workshop (continued)                   |
| <b>Closing session</b>                     |  |   |  |
| 6:00 – 6:15pm                              | Dr. Peter Stevick, Honorary President  |   |  |
| 6:15 – 6:30pm                              | Dr. Anjara Saloma, President of the Ngo Cetamada   |   |  |

## FRIDAY 10TH MARCH

### Whale Watching day - Samana

|                |  |
|----------------|--|
| 6:00 – 9:00am  | Transportation by bus from Hotel la Renaissance Jaragua to Samana    |
| 9:30 – 3:00pm  | Whale watching tour including picnic lunch on the beach and swimming |
| 3:00 – 5:00pm  | Free time to visit Samana  |
| 5:00 – 7:00pm  | Cocktail party with boat owners and whale watchers                   |
| 7:00 – 10:00pm | Transportation by bus from Samana to Santo Domingo                   |

MARINE MAMMALS MANAGEMENT TOOLKIT  
 “Toward Effective Management of Marine Mammals in MPAs,  
 The Marine Mammals Management Toolkit”  
<https://marine-mammals.info/hwwc-workshop/>

Meet them at the Hotel La Renaissance Jaragua, Santo Domingo  
 Date & Time sessions:

- 7th of March, 10am – 12pm; 4pm – 6pm
- 8th of March, 10am – 12pm; 2pm – 4pm



## **Cétamada**

Cetamada is a Malagasy non-profit organization aiming for conservation of marine mammals and marine habitats in Madagascar and in the Indian Ocean region. Cetamada is involved in four areas of intervention: the promotion of sustainable and responsible whale ecotourism, scientific research, community-based development and environmental education. Mandated by the Malagasy Ministry of Tourism for more than 10 years now, Cetamada is the guarantor of the application of the law on the observation of the marine megafauna in Madagascar. Through its scientific research programs, Cetamada works in close collaboration with regional and international organizations, as well as with national and international students. The results of this research work are intended to develop and expand strategies for marine mammals' conservation, particularly humpback whales. The devotion and passion shown by the members of Cetamada led to the creation of the Humpback Whale World Congress (HWWC) in 2015 on Sainte Marie Island and the second edition was held on Reunion Island in 2017. Cetamada is now organizing the third edition of this congress, from 06 to 10 March 2023 in Santo Domingo, Dominican Republic.

More information on:

Contact: Anjara Saloma, President, [anjara@cetamada.org](mailto:anjara@cetamada.org)

## **Autoridad Nacional de Asuntos Marítimos (ANAMAR)**

The National Authority for Maritime Affairs (ANAMAR) was created by Law 66-07 to provide the Dominican State with the technical, scientific, and legal tools for the research, conservation and sustainable use of the living and non-living resources existing in our maritime areas. As part of its fundamental objectives, ANAMAR must harmonize state policies to assure they are consistent and compatible with current international law, in order to achieve proper ocean stewardship and full development of the maritime sector.

More information on:

Contact: Jimmy García, Président [jgarcia@anamar.gob.do](mailto:jgarcia@anamar.gob.do)

## **Ambassade de France en République Dominicaine**

The French Embassy represents the French State on the territory of the Dominican Republic. Based in Santo Domingo, it receives fellow citizens for all administrative procedures, including the issuance of passports, identity cards, passes. It also organizes events linked to promoting France's interests, supporting artistic and cultural activities and promoting international exchanges.

More information on:

Contact: Marie-José Le Duc; [marie-jose.le-duc@diplomatie.gouv.fr](mailto:marie-jose.le-duc@diplomatie.gouv.fr)



## **Centro de Investigaciones de Biología Marina Idelisa Bonnelly de Calventi (CIBIMA IBC) de la Universidad Autónoma de Santo Domingo (UASD).**

### **CIBIMA IBC-UASD**

The Universidad Autónoma de Santo Domingo (UASD) is a public institution of higher education, decentralized from the Dominican State, with full legal identity and its own assets according to University Autonomy Law 5778, December 31, 1961 (amended by Law 292 of June 12, 1964); domiciled in its main campus located on Alma Mater Avenue, in the city of Santo Domingo, National District, duly represented by its Rector, Editrudis Beltran, MSc.

The Centro de Investigaciones de Biología Marina Idelisa Bonnelly de Calventi (CIBIMA IBC) hereinafter referred to as CIBIMA IBC-UASD, is a university institute of scientific research founded in 1962, administratively attached to the Faculty of Science and academically to the Directorate of Scientific Research of the Vice Rectory of Research, of the Universidad Autónoma de Santo Domingo (UASD).

CIBIMA IBC-UASD has been mainly dedicated to assessing coastal processes, including biodiversity of coastal ecosystems, tropical marine and aquatic areas in the Dominican Republic as well as in the Caribbean region.

### **Agence Française de Développement**

Agence Française de Développement (AFD) implements France's policy on international development and solidarity. Through its financing of NGOs and the public sector, as well as its research and publications, AFD supports and accelerates transitions towards a fairer, more resilient world. It also provides training in sustainable development (at AFD Campus) and other awareness-raising activities in France.

With our partners, we are building shared solutions with and for the people of the Global South. Our teams are at work on more than 4,000 projects in the field, in the French Overseas Departments and Territories, in 115 countries and in regions in crisis. We strive to protect global public goods – promoting a stable climate, biodiversity and peace, as well as gender equality, education and healthcare. In this way, we contribute to the commitment of France and the French people to achieve the Sustainable Development Goals (SDGs). Towards a world in common.



## **FUNDEMAR**

FUNDEMAR is a non-profit organization dedicated to promoting the sustainable use of coastal marine ecosystems and resources in the Dominican Republic, through 4 strategic lines: research, education, community integration, and conservation. It has a multidisciplinary technical team of biologists, ecologists, educators, and a network of local and international institutions.

It was created by Professor Idelisa Bonnelly in 1991, since then FUNDEMAR has established sustainable community programs with solutions based on nature and has successfully implemented projects since its foundations for the conservation of the country's marine resources, among which is the 1st laboratory and coral-assisted fertilization guide, and the 1st reintroduction of manatees in the country. Also, is a lead research institution, contributing to science through numerous scientific publications.

## ***CeSigma Signals & Systems***

CeSigma Signals & Systems is a research center which for more than 30 years has developed expertise in the design and production of complex systems, including: Data acquisition and physical measurements, Real-time signal and image processing, Studies & developments in Electronics, Mechanics, and Embedded Computing.

*CeSigma Signals & Systems* has technologies dedicated to monitoring and surveillance of the environment and the prevention of natural risks and has used its know-how to develop innovative solutions, dedicated to the acquisition of data on ecosystems and human activities. as well as for the detection of marine and terrestrial fauna: Hydrophones and acoustic polygons, optronics, multimodal & multiparameter acquisition and neural recognition solutions. Several of these systems have been deployed in various research support programs on marine mammals: passive acoustic monitoring of humpback whales (Madagascar), monitoring of cetaceans during port works (Guadeloupe), multimodal acquisition (visual and acoustic) of marine mammals and avifauna around wind mast.



## **Guadeloupe Port Caraïbes (Guadeloupe Port Authority)**

Guadeloupe Port Caraïbes is a multi-purpose port that handles a diversity of maritime traffic that ranges from cargo shipping to passenger vessels and leisure craft. Guadeloupe Port Caraïbes manages the maritime access and port facilities of all the ports within its domain with a clear mission: to optimise the quality of maritime access to Guadeloupe and to promote trade between Guadeloupe and the Caribbean while reinforcing the integration of the port within its environment. Within the perimeter of its jurisdiction, Guadeloupe Port Caraïbes oversees extension, improvement, renovation and reconstruction work, port operations, maintenance, and policing, as well as the management and development of the real estate and land under its authority. Guadeloupe Port Caraïbes is a logistic and industrial entity that provides an interface between land and sea for the benefit of the territory, its inhabitants, and its economy.

Thank you for their support:

- **Minister of Environment and Natural Resources of the Dominican Republic**
- **ATEMAR**
- **ITM GROUP**
- **The Natural History Museum of Santo Domingo**
- **Gualiba**
- **Marine Mammal Twinning**





Humpback  
W<sup>h</sup>ale  
World  
Congress

Santo Domingo, Dominican Republic  
6th - 10th March 2023

# OPENING SESSION



**MARCH 06TH - 10TH**



Introduction by the Master of Ceremony

Mtro. Editrudis Beltran, Magnificent Rector of the Autonomous University of Santo Domingo (UASD)

Roberto Alvarez, Minister of Foreign Affairs of the Dominican Republic.

Dr. Miguel Ceara Hatton, Minister of Environment and Natural Resources of the Dominican Republic

David Collado, Minister of Tourism of the Dominican Republic

Franklin Fermin Garcia, Minister of Education Science and Technology

Marie Delille, Principal Consultant at the French Embassy of the Dominican Republic

Jimmy Garcia, President of the Maritime Affairs Authority (ANAMAR) of the Dominican Republic

Screening of a video

Laurie Hec, Associate Director of the French marine mammal sanctuary AGOA

Laurie Chauvet, Project Manager, Agence Française de Développement

Ernesto Reyna, Center for Environmental, Energy and Sustainable Development Studies, Global Foundation for Democracy and Development (FUNGLOBE)

Tribute to Mrs Idelisa Bonnelly de Calventi

Felicita Heredia, President of the Dominican Foundation for Marine Studies (Fundemar)

Screening of a video

Federico Franco will give an award to Mrs Laura Calventi, daughter of Mrs Idelisa Bonnelly de Calventi

Dr. Gladys Rosado: The historical evolution of the study of humpback whales at CIBIMA-IBC

Dr. Peter Stevick, Honorary President of the 3rd HWWC

Dr. Anjara Saloma, President of the Ngo Cetamada, Founder of the HWWC



# SPECIAL SESSION

TOPIC: SCIENTIFIC RESEARCH ON  
HUMPBACK WHALES IN THE  
DOMINICAN REPUBLIC





## **Humpback whales in the Silver Bank Marine Sanctuary**

**Federico Franco**

Vice-Minister of Protected Areas and Biodiversity of the  
Dominican Republic



## **Marine mammal research and conservation in the Dominican Republic (CIBIMA, ATEMAR, FUNGLODE)**

**Oswaldo Vasquez**

CEO and Researcher ATEMAR



Humpback  
W hale  
world  
Congress

Santo Domingo, Dominican Republic  
6th - 10th March 2023

# PLENARY CONFERENCE ABSTRACTS



MARCH 06TH - 10TH





# Invited Speaker #1

**Humpback whales in Samana Bay**

**Dr. Liliana Betancourt**

Affiliation: CEBSE, Dominican Republic



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## **Towards effective management of marine mammals in MPAs: the Marine Mammals Management Toolkit.**

**Anna Safryghin**

Affiliation: Marine Mammals Twinning – EU Ocean Governance

### **Abstract**

With climate change predicted to aggravate the detrimental effects that shipping, bycatch and pollution are having on marine mammal populations, the need for the development and implementation of effective management plans for the conservation of these species is at its highest. Marine protected areas (MPAs) have been essential in conserving and managing marine mammal population, however their success is often hindered by lack of resources, capacity and/or knowledge. To tackle these threats, fill knowledge gaps and empower MPA managers, the Marine Mammal Twinning, as part of the EU-funded Ocean Governance project, created the Marine Mammals Management Toolkit. Aimed at aiding MPA managers to effectively take into account marine mammals into MPA management plans, the Toolkit comprises Factsheets, Good Practices, a Self-Assessment Tool (SAT) and a Community of Practice (CoP). The SAT, through a series of graded questions enables MPA managers to monitor and evaluate the status and effectiveness of the MPA's management plan with respect to marine mammals. The use of the SAT and the wider Toolkit is then supported by the CoP, a network of MPA practitioners working with marine mammals, which promotes knowledge sharing, capacity building and transboundary cooperation. With the toolkit already being successfully adopted into management plans in multiple MPAs across the globe, the 3rd Humpback Whale World Congress will provide an important platform to increase the reach and uptake of the Toolkit, and welcome MPA managers into a global network of marine mammal MPA practitioners. With more governments committing to the "30x30" Agenda, the danger of "paper" parks is at its highest. Thus, this tool is crucial for ensuring that MPAs are equipped, and managers have the capacity, to conserve marine mammals effectively, preserve critical habitats, mitigate threats and protect biodiversity.

Contact: [www.marine-mammals.info](http://www.marine-mammals.info)







# Invited Speaker #2

## An ocean-basin wide perspective of humpback whales from the North Atlantic Humpback Whale Catalog

**Dr. Lindsey Jones**

Affiliation: Allied Whale at College of the Atlantic, USA

### Abstract

Photo-identification (photo-ID) studies have contributed significantly to the scientific knowledge and conservation of humpback whales globally. Within the North Atlantic Ocean, research using photo-ID methods has documented the life history and movement patterns of humpback whales since the 1970s. The North Atlantic Humpback Whale Catalog (NAHWC), the result of the collaboration of over 800 research groups and individuals from 40 countries, has tracked humpbacks across every known breeding and feeding area in the North Atlantic Ocean basin.

This talk will describe results from the NAHWC and concurrent studies throughout its 45-year history. From local to global, we'll examine what photo-ID studies have taught us about humpback whales and what questions remain to be explored.

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# ORAL SESSION #2

TOPIC: WHALE WATCHING

CHAIR: MSC. OSWALDO VASQUEZ  
CEO & RESEARCHER

ATEMAR, DOMINICAN REPUBLIC





## **Whale watching tourism as a driving force for socio-economic development in Puerto López, Machalilla National Park, Manabí, Ecuador**

**Cristina Castro\*, Juliana Castrillón and Wendy Gómez**

Affiliation: Pacific Whale Foundation Ecuador

### Abstract

We aim to analyze the socio-economic impact of whale-watching industry in one of the poorest areas in Ecuador. Puerto López, in Manabí, went from being a fishing area to leading the whale-watching industry in Ecuador. Thanks to the tourist attraction offered by the humpback whales, the number of tourists in the area has increased by 15,000% since 1980, concentrating mainly during the whale season months, which go from June to October. As a consequence, tourist services and employment opportunities also increased, bringing development and a better lifestyle to the region. The industry has become so important in the region that its value was around USD 4.5 million in 2019. However, this estimation is conservative and real worth could be even higher. Whale-watching benefits are not only economic, the whales have brought a sense of identity to the region, which has worked for these animals conservation at a national level, promoting laws in favor of their conservation. In recent years, the emergence of illegal operators has become a threat to the industry, the region's economy and the protection of the species, urging immediate action by the authorities.

\*Presenting author

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# Understanding whale-watchers' expectations, a key to shaping "Quiétude" team actions in favor of a sustainable whale-watching in Reunion Island

**Charline Fisseau\*, Anne-Emmanuelle Landes, Sylvain Delaspre**

Affiliation: Centre d'Etude et de Découverte des Tortues Marines, Reunion Island

## Abstract

In Reunion Island, whale-watching has rapidly developed since 2008 due to an increasing number of humpback whale sightings during their breeding seasons. The large demand for interaction targets humpback whales in the austral winter season and coastal dolphins throughout the year. To promote sustainable practices, guidelines were initiated in 2009 and have evolved into a local decree in 2019. In parallel, a dedicated-at-sea patrol team named "Quiétude" was committed in 2017 to raise awareness towards whale-watching stakeholders and to improve and to monitor the compliance with regulation. Additional studies on human/cetaceans interactions were conducted by the team to understand the potential impacts of whale and dolphin-watching on the animals' behaviour responses (Barra et al., 2020 ; Hoarau et al., 2020 ; Quintana et al., 2021). In parallel, other approaches have focused on understanding the social dimensions of the activity. Initial assessments of the socioeconomic effects related to this activity have been carried out to better understand the weight of this growing sector (Sandron, 2015). More recently, the evolution of whale-watching, the profile of whale-watchers and their global opinion on the activity has been investigated (Saisho, 2022).

On this basis, the team conducted a further pilot study in 2022 to investigate the motivations and expectations of whale-watching tourists, which could serve as a lever to consolidate good practices and to contribute to structure a sustainable eco-tourism industry in Reunion island over time. A total of 21 trips to the sea on 6 professional boats allowed us to interview 158 clients. A directive interview based on 35 questions was conducted, covering the observer's profile, motivations and expectations, choice of service provider, knowledge about the whale-watching activity and satisfaction.

Of all the respondents, 79% were tourists and 21% were residents. 50.3% of the participants went on the trip by opportunity, and 33.1% on the advice of a local relative. The choice of providers was made by word-of-mouth for 60% of them, and main choice criteria were: price, respect for the environment, comfort of the service and type of boat. 85.4% of the participants would have been influenced by the presence of a label. 56% of them absolutely wanted to see cetaceans but 44% were aware of the uncertainty induced by the natural environment. The overall satisfaction is related to the concrete observations of cetaceans, but also to the opportunity to learn new knowledge.

In conclusion, "Quiétude" has observed an improvement in whale-watching practices in Reunion Island since 2017, coupled with a strengthening of the management framework. Due to a continuous activity expansion, a long-term strategy of empowering the whale-watchers is needed to reduce the pressure.

\*Presenting author - Correspondent author's email: [quietude@cedtm-asso.org](mailto:quietude@cedtm-asso.org)

## References

- Barra, T., Bejder, L., Dalleau, M., Delaspre, S., Landes, A.E., Harvey, M. & Hoarau, L., 2020. Social Media Reveal High Rates of Agonistic Behaviors of Humpback Whales in Response to Swim-with Activities Off Reunion Island. *Tourism in Marine Environments*, 15(3), 191-209. <https://doi.org/10.3727/154427320X15960647825531>
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- Saisho M., 2022. Évolution et perceptions du whale watching à La Réunion et dans le sud-ouest de l'océan Indien. Thèse de doctorat en sociologie. 352p.
- Sandron, F., 2015. Analyse socioéconomique du whale watching. Madagascar et La Réunion : résultats détaillés du programme AS2W. Saint-Denis : IRD, 182p. AS2W.



# ORAL SESSION #3

TOPIC: HUMAN ACTIVITIES AND  
MITIGATION

CHAIR: MSC.RITA SELLAES  
EXECUTIVE DIRECTOR

FUNDEMAR, DOMINICAN REPUBLIC





## **Interactions between humpback whale (*Megaptera novaeangliae*) baleen and microplastics**

**Dr. Alexander J. Werth**

Affiliation: Hampden-Sydney College, Virginia USA

### Abstract

**Background:** Mysticete ingestion of meso-, micro-, and nanoplastics has been documented. As part of ongoing studies on baleen filtration and contamination/fouling, humpback whale baleen was exposed in experimental flow tank tests to microplastics to determine the extent of the problem.

**Methods:** Single and multiple (mini-rack) plate sections of humpback whale baleen were tested in marine and freshwater flowing at various rates in a 90 L flow tank. Plastic particles (pellets, fibers, fragments) were added in varying amounts of differing size: mesoplastic (5-25 mm), microplastic (0.1-5 mm), and nanoplastic (<100 µm). In some trials, chemicals released from plastic degraded in seawater were also added to the flowing water; these include BPA, styrene oligomers, and polystyrene oligomers. The aim was to determine if, and how well, plastic particles and/or dissolved chemicals are A) captured by and B) adhere to keratin of baleen plates and fringes.

**Results:** Humpback baleen readily captures meso- and microplastic, especially in the form of fibers, foam, and irregular fragments. Pellets (e.g., microbeads or nurdles) are effectively captured by baleen fringe mats, but not as well as they are caught by right/bowhead whale baleen. Plastic fragment size and capture rate correlate positively. Fortunately, plastic fragments and chemical residues do not adhere to keratin in baleen plates and eroded fringes. Unfortunately, once aggregated and collected from water by baleen filtration, plastics are likely to be shed, and are therefore more likely to be ingested via the digestive tract.

**Conclusions:** Humpback baleen effectively captures many types of primary and secondary (=degraded) meso-, micro-, and nanoplastic. Whales are likely at greater risk of plastic ingestion via trophic transfer (i.e., by consuming prey contaminated with plastic). Reducing plastic use and release into seawater is the best way to protect whales. Creating artificial filters with properties similar to baleen could help to remove plastic pollution in marine habitats, protecting all sealife.

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## **How to assess the risks of underwater noise on whales: methodological approach according to indicator #11**

**Nadège Gandilhon\*, Yan Doh, Olivier Adam**

Affiliations: Marine Studies Office, Terre Mer Veille, Institut d'Alembert, Sorbonne Université, France

### **Abstract**

The EU Marine Strategy Framework Directive identifies underwater noise as pollution and devotes a specific descriptor (11) to this issue for impulsive and continuous underwater noise. Here we show the biological and acoustic approach to distinctly assess underwater noise risks to whales based on thresholds and different sound parameters. We consider in our model: the parameters of the sound source (source, level of the source, frequency, duration); environmental parameters (sound propagation, water depth, season, seabed characteristics); the species of cetaceans concerned (bandwidth class of their auditory system, behavioral activity, spatial distribution, temporal extent).

Two levels of methodological evaluation results are presented. The first concerns an interpretation of criterion D11-1 (anthropogenic sources of impulsive noise) not to be exceeded for large whales according to a general model of spatial distribution, temporal frequentation, and typical levels of impulsive noise. The second presents the process for assessing criterion D11-2 (continuous low-frequency anthropogenic sounds) that can affect large whales.

The purpose of this presentation is to show the benefits of a "standardized" assessment approach proposed by the European Commission to collectively establish underwater noise threshold values to ensure that anthropogenic noise do not exceed the levels that could affect the populations of marine mammals, with here an example on whales. The perspectives and the discussion will raise the need to integrate the specificities, and in particular the multitude of regional or sub-regional parameters: sound, environmental, number of species and their auditory characteristics.

\*Presenting author

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## **How to Save Whales from Extinction: Methods employed by the Brazilian Humpback Whale Project**

**José Truda Palazzo Jr., Sergio Cipolotti, Isabela Oliveira\*, Luena Fernandes**

Affiliations: Projeto Baleia Jubarte/Instituto Baleia Jubarte, Brazil

### Abstract

Established in 1988 to study and promote the recovery of the remaining population of humpback whales in Brazil, Projeto Baleia Jubarte, the Brazilian Humpback Whale Project (HWP), has since strived to incorporate the species as an esteemed asset of the Brazilian society. Having scientific research as the main pillar of its work, the Project has been directly involved in the development of protective legislation that ensured the recovery of humpbacks in Brazilian waters from an estimated 500-800 surviving animals in 1988 to more than 25,000 in 2022 according to the latest population estimate. Some of the methods employed are systematic photo-identification, DNA analysis, bioacoustics, photogrammetry assessments of body size and body condition, and behavioral studies. Recent conservation challenges such as ship strikes are being addressed through novel programs developed in partnership with industry stakeholders. The development of a sustainable whale watching program, with capacity-building activities at community level, is enhancing the generation of jobs and income stemming directly from whale conservation. Accompanied by HWP qualified researchers, whale-watching vessels provide an excellent platform for data acquisition, besides aiding the social and economic development of the regions where humpback whales occur. As an example, in the last 3 regular seasons (2018, 2019 e 2022), in 675 whale-watching cruises, 957 photo-identifications were collected, which represents 54% of the total of photo-ids of the period. Moreover, recent studies about the contribution of humpback whales to the carbon balance of the planet and energy exchanges with the Abrolhos Bank ecosystem are being undertaken to better understand the ecosystem services provided by the species. Preliminary studies conducted by the HWP and partner researchers indicate that these services, which stem from Brazil's state policy of fully protecting whales in our waters, are worth 82 billion dollars. Successes accrued during these 35 years of efforts have contributed to their recovery and removal in 2014 from the Brazilian official list of endangered species, leading us to believe in a bright forecast for the future of humpbacks in Brazil despite the many challenges ahead.

\*Presenting author

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## **Ports: crucial nodal points for Caribbean territories**

**Sita Narayanan**

Affiliation: Guadeloupe Port Authority, Guadeloupe

### Abstract

At the global level, the best-known consequence is the rising of temperature world-wide. In the Caribbean, we will have to face specific threats for our territories and industries: Increased intensity of extreme weather events and rising sea level and receding coastlines. Climate change is a game changer for Caribbean ports. To maintain optimal quality of service in an exceptional and threatened environment, Caribbean ports should get prepared by integrating environmental issues. Guadeloupe Port Authority - Guadeloupe Port Caraïbes is a multi-purpose port that handles a diversity of maritime traffic that ranges from cargo shipping to passenger vessels and leisure craft. The 15 years of experience in the integration of environmental issues today enables us to propose a mature strategy of environmental integration at the Caribbean scale for the benefit of the CariPorts project. This project, in partnership with the Caribbean Shipping Association, consists in providing support to other Caribbean ports for the definition of their environmental programme. For Guadeloupe Port Caraïbes, this means both capitalising on its acquired expertise in the field of the environment and developing a new skill of assistance in this field provided via CariPorts, and to consolidate the techniques already implemented by testing and enhancing them in other Caribbean territories. The main goals are creating an environmental label for Caribbean ports, providing tailor-made support for integration of environmental matters in port development and increasing the response capacity of Caribbean ports in the face of the natural risks. In operational terms, the challenge is to involve voluntary Caribbean ports in the approach to analyse and determine the room for manoeuvre to encourage the increase in environmental competence of Caribbean ports, and to create the conditions for setting up an environmental label for Caribbean ports.

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## **Environmental monitoring: A management tool for natural areas of Guadeloupe Port Authority**

**Dr. Jennifer Tocny**

Affiliation: Guadeloupe Port Authority, Guadeloupe

### Abstract

Guadeloupe Port Authority – Guadeloupe Port Caraïbes (GPC) manages the natural areas in its district. Thus, in the context of its operations, GPC must combine economic activity, compliance with regulations and environmental protection. Understanding the connections between ecosystems is a major challenge for the GPC. Indeed, several key ecosystems are identified within the port (coral reefs, seagrass meadow and mangroves). To better protect them, we need to know more about them. This desire on the part of GPC has resulted in the implementation of a vast environmental monitoring program. This program includes two types of monitoring: Physical environments monitoring (water, sediments, air quality, currents) ; Species and natural areas monitoring (coral reefs, sea grass beds, coastal forests, ichthyofauna, avifauna, herpetofauna, entomofauna, chiropterans, terrestrial flora, invasive species, coastal strip). For GPC, the acquisition of knowledge on ecosystems has the following objectives: Monitor the evolution of ecosystems; Measure quantitatively and qualitatively the success/failure of operations; Evaluate the impact of port activities on the environment; Respond to regulatory expectations; Develop habitat management strategies ; Take corrective measures as soon as antagonistic effects are observed during monitoring; Anticipate future trajectories necessary for the "port of tomorrow"; Communicate and raise awareness of the results obtained. To meet its ambitions, GPC has deployed a monitoring strategy that is scalable in time and space, scientifically rigorous and flexible enough to allow for the insertion of new techniques or issues of concern. To this end, the port has surrounded itself with an international network of researchers and consultancy firms for the implementation of monitoring.

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# Invited Speaker #3

## From sorrow to hope, from threats to solutions: how humpback whales affect our will to protect and save our oceans

**Dr. Lyne Morissette**

Affiliation: M-Expertise Marine

### Abstract

2017: the last time I have presented a talk on conservation biology at HWWC... What happened since then? An extraordinary paradigm shift, to work together, not against each other, to protect our oceans. All this inspired, I am deeply convinced, by the humpback whales. Throughout their lives and during their annual migrations, these giants of the sea are present in many ecosystems of the North Atlantic, giving them a role as ambassadors par excellence for ocean conservation. Along their journey from Canada to the Caribbean, they manage to create a real connection to the oceans, by inspiring the promotion, the study, and the protection of entire ecosystems along their North Atlantic migration route. In the past decade, many Humpback Whale projects and expeditions enthused scientists, NGOs, communities, and kids from several countries to work together to study their ecology, learn about the sea, and promote ocean conservation on a global scale. Many projects and initiatives engaged coastal communities in conservation actions for ensuring healthy ecosystems and sustainable use of marine resources, and impacting many endangered species, not only whales. Whales don't know the boundaries that us humans have put in place across countries. They teach us to collaborate and be efficient. This is especially true when they are facing extinction. Despite the sadness of their fate in certain areas of the world, endangered whales have the superpower of inspiring innovation, effectiveness, creativity, and concertation. One of the most inspiring stories we witnessed since 2017 in Atlantic Canada is the "Fishers helping whales" initiative which harnessed the power and will of all coastal communities to protect whales, re-think our place in the ecosystem, and ensure a sustainable future for both whales and fisheries, and healthy oceans for future generations. In five years, the efforts and place of fishermen in innovating and developing solutions to save whales has been unprecedented. This story is now inspiring across borders and around the globe. Seeing them as allies, not threats, turning doom and gloom into optimism, changing desolation for hope, is the best way to be effective in protecting and restoring our fragile oceans ...and it all started with humpback whales.

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# ORAL SESSION #4

TOPIC: BREEDING AREAS

CHAIR: DR. LILIANA BETANCOURT  
CEBSE, DOMINICAN REPUBLIC





## Twenty-six years of humpback whale photo-identification in Ecuador

**Cristina Castro\*<sup>1</sup>, Luna Barragan<sup>1</sup>, Juliana Castrillon<sup>1</sup>, Ted Cheeseman<sup>2</sup>  
and Stephanie H. Stack<sup>3</sup>**

Affiliations: <sup>1</sup>Pacific Whale Foundation Ecuador, <sup>2</sup>Happywhale, Southern Cross University, <sup>3</sup> Pacific Whale Foundation & Pacific Whale Foundation Australia

### Abstract

Southern Hemisphere humpback whales (*Megaptera novaeangliae*) migrate from their feeding grounds in Antarctic waters to the tropics, where they reproduce. The humpback breeding stock G migrates from the feeding Area I (west of the Antarctic Peninsula) and Magellan Strait in Chile to the north of Peru, Ecuador, Colombia, Panamá, and Costa Rica during the austral winter.

From 1996 to 2022, humpback whales in Ecuadorian waters were photographed and identified through permanent natural or acquired marks located on the ventral side of the tail flukes. The boat-based photo identification was conducted daily, weather permitting, from July-October of each year from a combination of dedicated research boats and opportunistically from whale-watching boats.

The PWF Ecuador catalogue consists of photos taken by PWF (Pacific Whale Foundation) Ecuador researchers and is supplemented by photos donated by the general public and other researchers. Most encounters were off the Manabí province (4,109 whales with ID); however, there are also sightings from Esmeraldas, Santa Elena, and the Galapagos Islands. Comparison of individual photographs provides direct evidence of whale movement, residency, habitat use, and longevity. In 2022 the PWF Ecuador catalogue was uploaded to the open-access digital platform Happywhale to find more information on the whales photographed off Ecuador and promote education about and conservation of humpback whales in Latin America.

In total, the PWF Ecuador Catalogue has 5,080 whales identified. Of these, 3,347 animals with ID were new to the Happywhale database. A total of 1,733 humpback whales (34%) were re-sighted one or more times. The longest span between sightings was 28 years. One hundred thirty-nine identified individuals were re-sighted within the same year. The maximum period between the first and last sighting within a season was 98 days, while the minimum was one day.

We have five whales recaptured with the Galapagos Islands, the first connection between Galapagos Islands and mainland Ecuador. A total of 258 whales were recaptured (5.82%) between Ecuador and the rest of the breeding area. In the feeding grounds, the recapture percentage was 17% (n=755) with the Antarctic Peninsula and X% (n=26) with the Strait of Magellan. Recaptures with other areas along the migratory route in southern Peru and Chile, such as Ica, Antofagasta, and Chañaral de Aceituno, have been observed for the first time. Long migrations from Ecuador to unusual areas such as Feeding Area II (Southwest Atlantic/Scotia Sea), Brazil, and Polynesia were recorded.

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## **Residence patterns of humpback whales in a breeding ground in the Southwest of the Colombian Pacific**

**Laura Daniela Benítez\*, Angela Recalde Salas, Guido J. Parra, Juan Carlos Tafur Henao, Lilián Flórez González y Juan Capella Alzueta**

Affiliations: (1) Fundación Yubarta, Cali-Colombia, (2) Centre for Marine Science and Technology, Curtin University, Western Australia, (3) Cetacean Ecology, Behaviour and Evolution Lab (CEBEL), Flinders University, Australia, (4) Fundación Whale Sound, Punta Arenas, Chile, (5) Bush Heritage Australia

### Abstract

The humpback whale (*Megaptera novaeangliae*) Breeding Stock G (BSG) also referred to as the Southeast Pacific Stock migrates annually from feeding grounds in Antarctica and the Patagonian Channels to breeding grounds from the North of Peru to Costa Rica. The Gorgona island National Park (GNP) located in the southwest of the Colombian Pacific, represents a key breeding ground for the BSG humpback whale population. In this study, we investigated the residence patterns of humpback whales breeding in GNP waters by analyzing photo-identification data collected over nine breeding seasons (1986-1994). We modeled residence patterns by applying a multistate open robust design mark-recapture model (MSORD). MSORD was also used to evaluate the effect of reproductive status and gender on residence patterns of three demographic groups of humpback whales: calving females, adult males, and unknown sex adults. The average recapture rate within a breeding season was estimated at 17.95% for all groups. The best model suggested similar patterns across seasons but differences between demographic groups. A staggered arrival and departure patterns and differences in residence patterns were observed in all groups. Adult males spend more time in GNP than calving females (46,88 vs 40,56 days), unknown sex adults spent the least amount of time in the area (37,92 d). Results from this study provide a baseline on the amount of time humpback whales spend around the GNP waters and should aid management and conservation efforts as well as future environmental impact assessments.

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## **Tracking interannual fluctuations in the presence of humpback whales on the Southern coast of Bahia, Brazil**

**Maria Isabel Carvalho Gonçalves\*, Renata Santoro de Sousa-Lima, Rita De Cassia De Carli, Mariana Silva Campelo, Julio Ernesto Baum**

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### **Abstract**

Local narrow continental shelf and a high observation point close to the coastline make Serra Grande (southern Bahia) an excellent platform for the study of humpback whales off Brazil. Systematic visual monitoring from a land-based station to assess the relative abundance, habitat use, and movement patterns of humpback whales has been carried out in the region from 2014 until 2022. The average number of whales observed per hour between 2014 and 2020 progressively increased ( $3.19 \pm 3.16$  to  $11.69 \pm 7.65$ ), and in 2021 a significant drop was recorded ( $2.07 \pm 2.89$ ) with a subsequent significant increase in 2022 ( $13.16 \pm 7.95$ ). The number of adults observed over the years was significantly higher during full moon than during the new and first quarter moon phases. The highest number of calves was observed in 2022 ( $1.64 \pm 1.52$ ), which occurred after an odd season characterized by calf absence. Usual peak abundance occurred between late August/early September but in 2021 and 2022, whale numbers peaked earlier. In 2021, humpback whales anticipated both their arrival to breeding grounds and their return to the feeding areas but in 2022 they extended their stay in Brazil an additional month, until November. Since the onset of our study in 2014, whales approach the coastline throughout the season but in 2021 the animals passed through at a greater mean distance ( $10,164.21 \pm 2,152.12$  m). In 2022 the opposite was recorded; whales approached the closest to shore ( $6,742.13 \pm 3,356.98$  m), and the lowest group leg speed was recorded ( $5.39 \pm 2.79$  km/h). In the odd season of 2021, whales moved more linearly compared to other seasons. Cyclical factors such as El Niño and La Niña can lead to the occurrence of specific patterns that may only be observable in intervals of 4/5 years. These cycles can be intensified by climate change and be influenced by co-factors such as the availability and consumption of prey before migration, the presence of ice, and temperature anomalies in the feeding and breeding areas. All these factors can all be reflected in whales' behavior in our study area. Thus, continuous monitoring helps our understanding of the multi-year fluctuations and trends of humpback whale occurrence in Brazil.

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## **Moreton Bay; a previously unrecognized resting stopover for east-coast of Australia migrating humpback whales**

**Juliana Castrillon\*, Raphael Mayaud, Craig Wilson, Greta Dalle Luche, Jenny Allen, and Susan Bengtson Nash**

Affiliations: Centre for Planetary Health and Food Security, Griffith University, QLD, Australia

### Abstract

Humpback whales enter Moreton Bay, in southeast Queensland, Australia, each year during their annual migration. Little is known about the ecological relevance of the bay to the humpback whale population. In a region of characterised by rapid coastal and maritime development, as well as a growing humpback whale population, there is an urgent need to fill knowledge gaps surrounding the populations' seasonal distribution and habitat use in these coastal waters. This study procured the first detailed information regarding humpback whale distribution, behaviour, and habitat use within Moreton Bay, relative to the main east coast migratory corridor. It was found that on average 43.49% of the individuals observed on the southern leg of the migration entered the bay. 76.7% of pods entering the bay had accompanying calves and 47% of these pods were found to be resting or logging (a behaviour often associated with nursing) at the time of observation. These findings provide strong evidence of a previously undocumented role of Moreton Bay as a resting stopover for migrating whales.

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## Study of humpback whale populations in the southwest Indian Ocean from high resolution satellite images.

**Marion Ovize<sup>1</sup>, Olivier Adam<sup>2\*</sup>, Yann Doh<sup>3</sup>, Beverley Ecalte<sup>1</sup>, and Bertrand Denis<sup>1</sup>**

<sup>1</sup> Association Abyss, La Réunion, <sup>2</sup> Sorbonne Université, France, <sup>3</sup> Terre Mer Veille, Guadeloupe

### Abstract

The preservation of the oceans represents a strong environmental and societal challenge, and the marine megafauna is often considered as a sentinel of the state of health of the ocean environment.

Southwestern Indian Ocean humpback whale population is heterogeneously observed in the breeding area, because many coast do not have marine mammal observers. Then various gaps have been identified on the ecology and ethology of this migratory species in the area of interest: population abundance, spatial distribution and migration trajectories, inter-annual variability factors. To provide the missing information, it is necessary to combine existing methods and also to think of other methods that would allow the collection of observations at the ocean basin. To contribute to the observation of this humpback whale population, our work will be based on Image satellites.

We first did a preliminary study in 2021, with the support of the NGO Abyss and some main producers of spatial data with the objective to detect humpback whales from VHR satellite images during their reproductive season. .

To cover the Southwestern Indian Ocean, we selected the following sites: the south African coasts, Madagascar, Comoros, Mayotte, Reunion Island.

We showed the best resolutions on the global satellite imagery scene. The first steps were to program satellite acquisitions and to organize field surveys synchronously with the passage of satellites. Then the challenge was to manually annotate these images by visual detection of the cetacean species and also the human activities, with the idea to characterize their marine environment and the potential anthropologic impacts on their population. Initial pre-processing tests for spectral analysis are also part of the objectives of this feasibility study.

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# ORAL SESSION #5

TOPIC: ACOUSTICS

CHAIR: DR. YAN DOH  
CEO AND RESEARCHER

TERRE MER VEILLE





## **Screaming singers: Correlations between boat noise and frequency structure of humpback whale (*Megaptera novaeangliae*) song**

**Christina E. Perazio\* and Eduardo Mercado III**

Affiliation: The State University of New York at Buffalo

### Abstract

Humans are rapidly and radically altering marine environments. Long lived and migratory baleen whales, such as the humpback whale (*Megaptera novaeangliae*), communicate and use sound across vast distances, making their signals susceptible to masking by anthropogenic noise. Although our understanding of the destructive effects of noise have been increasing over the past decades, we know little about how singers might adjust frequency structure to avoid masking by boat noise. We predicted that bands of peak frequency (those with the greatest relative energy) would be present regardless of boat traffic but that the frequency bandwidth would differ across noise classes. Methods: To characterize variations in the frequency content of song, we analyzed high-quality recordings in five regions throughout the eastern North Pacific Ocean: The Colombian Pacific, the Gulf of Chiriqui in Panama, Can?o Island Biological Reserve in Costa Rica, Los Cabos in Mexico, and the Monterey Bay National Marine Sanctuary in California. We then classified song recordings across these distinct population segments of humpbacks as containing no, medium, or high amounts of boat noise and compared the frequency structure of song across locations. Results: Data showed that in places inundated with boat noise, singers 'screamed' in a narrower frequency range. However, the frequency values of the most intense peaks (consistently centered around 300-400Hz and 600-700Hz) were similar across time, regardless of boat noise, environmental characteristics of various regions, and recording equipment. Conclusion: Bands of concentrated spectral energy appear to be a universal feature of song, regardless of the amount of vessel noise contributing to the soundscape. This suggests that individual singers across populations are employing similar strategies in noise. However, whether these are active changes made by whales in response to noise, or if frequency content has emerged differently in areas with different amounts of vessel noise, is currently unknown. When anthropogenic noise distorts or masks a signal beyond what whales have evolved to accommodate, the singer is faced with a challenge: modify the signal for detectability with potential degradation to functionality or forgo vocalizing. The consequences of this situation highlight the need for monitoring and mitigating the presence of noise in the oceans.

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## Characterization Of the Vocal Activity Patterns Of Humpback Whale Singers In A Breeding Area In Southern Bahia, Brazil

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### Abstract

Humpback whale song is an exclusive behavior of males whose activity is associated with the species' mating system (Payne & McVay, 1971; Glockner, 1983). Studies of this behavior showed a strong relationship between the vocal activity of singers and ecological factors (Cerchio et al., 2010; Sousa-Lima et al., 2018). In order to describe the patterns of vocal activity of male singers in a breeding area in southern Bahia (Brazil), we evaluated the influence of the following factors: days of the season, time of day, and the lunar cycle. Through visual and acoustic monitoring, we recorded the relative abundance of adults and male singers, respectively, applying 1-hour of visual scan from a land-based station, covering 224.5 km<sup>2</sup>, and deploying bottom-mounted Oceanpods recorders from July to November in 2014, 2015, 2018, and 2019. We analyzed the recording samples every 30 minutes in windows of 2 seconds, counting the number of singers in a scale of 0 to 4 individuals by inspecting spectrograms in Raven Pro 1.6. We evaluated the effect of predictors in a selection of models (Generalized Linear Mixed Models) and for the relationship between vocal activity and relative abundance of adults over the days, we applied a segmented regression. The patterns were consistent over years and the best model included all the predictors and interactions between them. The vocal activity was highest during crepuscular periods and lowest during full moon phases. Fluctuations in adult abundance and vocal activity were similar over the days, with the breakpoint (peak of the season) estimated for late August. The positive relationship between the abundance of adults and vocal activity can be a result of higher intra-sexual competition, with a higher chance of finding a sexual partner, and a constant proportion of singers among adults present at the study site. The peak of activity in the crepuscular period corroborates the findings of other breeding grounds, assumed to facilitate the maintenance of conspecific contact during periods of lower visibility (Au et al., 2000). Nonetheless, no relationship was found related to the variation of lunar luminosity, since the moon phase of highest activity was the first quarter, followed by the new moon, third quarter, and full moon. Future studies should include factors such as tide height and its relationship with changes in the acoustic landscape.

Presenting author: M.I.C. Gonçalves

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## **South Atlantic humpback whale song revolution: evidence for a Southern Hemisphere cultural exchange?**

**Maria Isabel C. Gonçalves\*, Divna Djokic, Julio E. Baumgarten, Milton C. C. Marcondes, Linilson R. Padovese, Leonardo D. S. Eugenio, Renata S. Sousa-Lima**

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### Abstract

Background: Humpback whale song dynamics consists of two known phases- evolutions and revolutions. So far, revolutions- intense and abrupt changes in a short period of time- of songs were known to happen only in the humpback whale stocks off Australia, since 20 years ago. In this work, we present the first instance of song revolution recorded in the Southwest Atlantic breeding stock A. Methods: Song recordings of 2017 and 2018 breeding season of breeding stock A were compared based on the Levenshtein Similarity Index, also comparing the unit content for each song, as its most simple element- Unit dictionary comparison- whose credibility was checked by Random Forest analysis. Results : The Levenshtein Similarity Index between two consecutive seasons songs shows values  $\sim 0$ , as only 1 out of 20 (in 2017) and 8 (in 2018) unit types were in common between two seasons. Negligible similarity, intensive drop in the number of unit types, thus song complexity from one season to the next implies the song went through the revolution in 2-year time. Conclusion : This is, so far, the first evidence different stocks of the Southern Hemisphere tend to revolve their songs. However, we still do not know if this is a species-specific practice, or if it is specific for the Southern Hemisphere stocks only. This further brings contextual material for the discussion of vocal culture in humpback whales.

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## Latin America humpback whale song dynamics

**Maria Isabel C. Gonçalves<sup>1,2,3,4</sup>; Divna Djokic<sup>3\*,5</sup>; Julio E. Baumgarten<sup>1,6,t</sup>; Milton C. C. Marcondes<sup>7</sup>; Linilson R. Padovese<sup>8</sup>; Leonardo D. S. Eugenio<sup>3</sup>; Renata S. Sousa-Lima<sup>3,5</sup>**

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### Abstract :

**Background :** Humpback whale song dynamics consists of two known phases- evolutions and revolutions. So far, song revolutions- intense and abrupt changes in a short period of time- were known to happen only in the humpback whale stocks off Australia, since 20 years ago (Noad et al, 2000; Garland et al, 2011; Allen et al, 2018). In this work, we present the first instance of song revolution recorded in the Southwest Atlantic breeding stock A.

**Methods :** Song recordings of 2017 and 2018 breeding season of breeding stock A were compared based on the Levenshtein Similarity Index, also comparing the unit content for each song, as its most simple element- Unit dictionary comparison- which credibility was checked by Random Forest analysis.

**Results :** The Levenshtein Similarity Index between two consecutive seasons songs shows values  $\sim 0$ , as only 1 out of 20 (in 2017) and 8 (in 2018) unit types were in common between two seasons. Negligible similarity, intensive drop in the number of unit types, thus song complexity from one season to the next implies the song went through the revolution in 2-year time.

**Conclusion :** This is, so far, the first evidence different stocks of the Southern Hemisphere tend to revolve their songs. However, we still do not know if this is a species-specific practice, or if it is specific for the Southern Hemisphere stocks only. This further brings contextual material for the discussion of vocal culture in humpback whales.

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Santo Domingo, Dominican Republic  
6th - 10th March 2023





# Invited Speaker #4

## **The critical importance of humpback whales for MPAs, tourism and helping the climate emergency in light of site fidelity and fecundity**

### **Erich Hoyt, Whale and Dolphin Conservation**

Research Fellow, Whale and Dolphin Conservation, Chippenham, UK  
Co-chair, IUCN SSC-WCPA Marine Mammal Protected Areas Task Force, Gland, Switzerland

Humpback whales have a strong sense of place, even more than other whales. Their nearshore breeding grounds are reliably marked out in many of the first protected areas for whales starting with the landmark 1986 Silver Bank Sanctuary and the Sanctuary for the Marine Mammals of the Dominican Republic, followed by the Hawaiian Islands Humpback Whale National Marine Sanctuary (NMS), Agoa Sanctuary and others. Humpback feeding areas are similarly demarcated such as at Stellwagen Bank NMS off Massachusetts. But we still have an incomplete picture of where whales are and which areas are best to protect. The IUCN Marine Mammal Protected Areas Task Force has identified 209 Important Marine Mammal Areas (IMMAs) in work to date examining marine mammal habitats in 67% of the global ocean. Of 132 marine mammal species, humpback whales were the most identified species, named in more than 50 IMMAs as the main qualifying species. A comparison of humpback migrations in the global ocean reveals “migratory route fidelity” despite oceanographic and geomagnetic changes. This consistent site fidelity makes humpback whales the perfect whale for marine protected area zoning, ship route planning, as well as whale watching. It also means that they are less likely to disperse despite boat noise, threats from bycatch and ship strike, and habitat disturbance. This suggests the need for a firm call for precautionary spatial measures for tourism and other overlapping uses of humpback habitats (e.g. 1/3 space and time rules both within and outside marine protected areas). As the most accessible, active and photogenic whale, humpbacks support high-value whale watching operations around the world. In an extreme case, a single humpback whale that wintered in Faxafloi Bay supported the substantial 2 daily whale watching tours throughout the winter in Reykjavik, Iceland in 2022-23. The relatively fast reproductive rate and long reproductive period of humpback whales – Salt from the North Atlantic has had 16 calves, 19 grand calves, and 3 great grand calves between 1975-2022, about 45 reproductive years – ultimately increases their value to the whale watching industry, as well as to science, biodiversity conservation and the environment. Their fecundity makes humpbacks the most valuable whale for increasing the biomass of whales, leading to more carbon capture and nutrient mixing in the ocean. To harness all this value and bring the greatest contribution to conservation, with associated economic values, we need effective, fully protected MPAs, zoned for whale watching tourism and working together in mutually supportive networks that include IMMAs and other spatial designations.

Web: [erichhoyt.com](http://erichhoyt.com); [erichhoytbooks.com](http://erichhoytbooks.com); [whales.org](http://whales.org); [marinemammalhabitat.org](http://marinemammalhabitat.org)



# ORAL SESSION #6

TOPIC: ACOUSTICS

CHAIR: DR. OLIVIER ADAM  
PROFESSOR

SORBONNE UNIVERSITY, FRANCE





## **Description of a Humpback song theme off Sainte Marie Island for the breeding season 2022**

**Yann Doh\*, Anjara Saloma, Bertrand Denis, Beverley Ecalle, Marion Ovize, Laurent Pagnol, Olivier Adam**

Affiliations: Terre Mer Veille

### Abstract

The humpback whale (*Megaptera novaeangliae*) is one of the most studied species of cetaceans, in particular for the fact that the males emit songs during the breeding seasons (Payne 1971) and because they are a coastal species, thus easy to observe from boats. In August 2022, isolated humpback singers have been acoustically recorded off the Ste Marie Channel (Madagascar) from the research boat of the CETAMADA Ngo. Acoustic recordings have been made at about 100 m from the last singer sightings on a duration at least 30 min. The objective was to record and describe the complete song theme of the 2022 breeding season. During the field mission, 3 different males have been successively recorded at different locations in the channel. At least one song theme common for 2 singers and have been manually extracted. The patterns repetitively emitted after breathing by each animal presented a similar part for both and some individual specificity: one singer has more complicated and longer theme. As a perspective, a particular sound unit called “creaking door” could be associated with a jump in frequency. This gap in frequency seemed stable within the complete theme. Further investigations are needed to determine if it results from an adaptation to song or to individual morphological features. The poster presents time frequency representations of the observed sound units for 2 singers and describes one of the song themes recorded for the season 2022 off Madagascar.

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## **Acoustic monitoring of whales and anthropogenic noise in the ocean using connected smart buoys**

**Nolibé Gilles\*, Nolibé Laurent, Vives Joel, Gandilhon Nadège**

Affiliations: CeSigma Signals & Systems

### Abstract

Detecting whales at sea by passive acoustics is a means currently widely used to indicate their presence in an area. However, it is complex to carry out these acoustic measurements in isolated environments or in the open sea, and a fortiori, to detect whales and to transmit their information to users. Methods Based on a project carried out with IFREMER, connected smart acoustic buoys, equipped with acquisition systems (wideband hydrophones) will make it possible to carry out certain sound measurements in the marine environment to provide information on the evolution of the noise of a frequented area and its impacts on biodiversity. These buoys are currently connected to a main focal point. Thanks to an adaptation, integrating Kinéis IoT, the device can transmit information to end users via a software interface, even over long distances. Results The first tests in the factory indicate that the sonic buoys can transmit, via Kinéis IoT, information that can be shared for users on biological signals (presence of whales, for example) or activity of anthropogenic sound on a specific site (boat noise, ambient noise, etc.). The major innovation is the bidirectionality of the solution, which makes it possible to send orders to one or more buoys on the one hand, but also that the latter transmit their signals (whale detection, sound threshold alert, signaling for recovery). Conclusion A second phase of design is envisaged with an extension of nomadic intelligent connected buoys, so that they can be deployed in the open sea (Overseas) or in very isolated places (Islands Eparses, Kerguelen, etc.), thanks to energy optimization. These buoys can also be used for monitoring sound levels (for example, Marine Renewable Energy sites or other applications).

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# ORAL SESSION #7

TOPIC: COLLABORATIONS BETWEEN  
RESEARCHERS AND CITIZENS

CHAIR: DR. ANJARA SALOMA  
CÉTAMADA PRESIDENT,

CÉTAMADA MADAGASCAR





## **Contribution of participatory citizen science to observe potential effects of climate change on humpback whale migrations**

**Serge Briez**

Affiliation: Les Peuples de La Mer

### **Abstract**

Humpback whale (*Megaptera novaeanglia*) migrations are affected by many factors including global warming, industrial noises, over-fishing, and persistent pollutants, often acting cumulatively. Recent protection measures and the ban on whaling have allowed this whale species to return to high population levels within a few decades. However, the current natural and human pressures exerted on this species are still raising strong concerns. Participatory science is an effective way to engage groups of volunteers to observe humpback whales in “real time” to dynamically account for the potential effects of climate change on their numbers, behavior and migrations. Local networks of individual citizens and organizations already exist. Tools such as digital photography, allow strong photo identification; such data can now easily be shared by universal information technologies through cell phones and the Internet. Citizens engaged in this process are often excellent ambassadors for publicizing the effects of climate change and species conservation needs. However, such data are scattered or at least not easily unified. It is therefore urgent, but also a challenge, to harmonize, centralize and analyze relevant information in order to rapidly send warnings when this species meets threats. Understanding weather fluctuations, migratory routes and timing, controlling human pollution and fishing quotas, all constitute fundamental knowledge on which to act for the preservation of such major species in the oceans. As a naturalist – photographer-director and founding President of the NGO “Les Peuples de la Mer”, this author was involved for twenty years in participatory science and recorded hundreds of observations on several species of Cetaceans in European waters. Since 2021, we observed more than 1000 cetaceans individuals in the Mediterranean (Golfe du Lion), and hundreds each day in the Arctic. From that experience, we are proposing an international vision to assemble all available citizen’s resources from regions of migratory paths. A recent tour as a naturalist guide in the Norwegian Arctic led us to actively test participatory science, involving tourists and professional guides in the recording of pods of humpback and other whales. This presentation will share our recent and past experiences. knowledge enables protection.

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## **Citizen science involved in detection and classification of cetaceans for passive acoustic monitoring,**

**Dubus G\*, Cazau D, Torterotot M, Béésau J and Adam O.**

Affiliation: Institut d'Alembert

### Abstract

Passive acoustic monitoring (PAM) using 24/7 underwater recordings over very long time period offers a unique solution in the study of cetaceans that use vocal emissions during all their vital activities and social interactions. The long duration of observations allow new discovering in multiple aspects : migration, monitoring, population dynamics, behavior, ... To process and to analyze this huge amount of acoustic data, detection or classification of acoustic events can be provided with recent artificial intelligence methods.

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## **The Humpback Whale Spaces: The Importance of Interpretive Centers as a Tool to Create Awareness on the Plight of our Ocean**

**Isabela Oliveira\*, Sergio Cipolotti, Luena Fernandes, José Truda Palazzo Jr.**

Affiliation: Projeto Baleia Jubarte/Instituto Baleia Jubarte

### Abstract

The Brazilian Humpback Whale Project (HWP), Projeto Baleia Jubarte, was established in 1988 and has since been studying and promoting the recovery of the remaining population of humpback whales in Brazil. Through a proactive environmental education program and several interpretive centers, the Project has used the whales as a tool to create awareness on the plight of our shared ocean. The so-called Humpback Whale Spaces (HWS) are equipped with life-size whale replicas, skeletons and other visual tools, and are visited by tourists of all ages and backgrounds, school and university students, whale-watchers and the local community. To improve the visitors' learning experience, the Young Guide Program was implemented in 2016, to give local public high school students the opportunity of a professional internship. The young interns are introduced to the world of cetaceans and basic IT in order to welcome visitors, perform guided tours and lectures, as well as participate in boat activities. To this date, 55 teenagers, aged 16 to 18, have been part of the program, of which 54.5% are female and ~67.3% are black. The experience introduces them to the labour market, improves their communication skills and their ability to work as a team, and for most it represents the first time they earn and manage their own income. The HWS also play an important role in the Project's sustainable whale-watching program, receiving on average 2,000 whale-watchers each year for a brief lecture on humpback whales and sighting rules before going out to sea. More than 100,000 people have visited the HWS located in our bases in Praia do Forte, Itacaré and Caravelas, in Bahia, Vitória, Espírito Santo, and Ilhabela, in São Paulo, which are an important tool for cetacean conservation and contribute to the social and economic development of coastal communities.

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## **Of whales and men: The cultural significance of whales in Iceland**

**Iro Tsarmpopoulou-Fokianou**

Affiliation: Panteion University

### Abstract

This thesis is based on ethnographic research conducted in Iceland, in 2021. The research question centered on the cultural significance of whales in Iceland, a topic approached through different forms of human-whale relationality. For the purposes of this research, I interviewed people who work with whales through different fields, such as whale watching, research, activism. In doing so I hoped to analyze the ways in which they conceptualize whales and how they connect with them emotionally. I then analyzed these relationships in relation to the Icelandic socio-political context. The theoretical starting point is one that criticizes traditional anthropocentrism in cultural studies, focusing rather on interspecies relationality and the anthropology of emotions. I argue that animals are not merely symbolic additions to our anthropo-cosmology, but rather key factors and agents in our cultures. The main argument of this thesis is that through a history of whaling, animal rights movements, mythology and folk spirituality, whales and whaling have become a nationalized and heritagized issue. To navigate the ways in which whales have been nationalized and to avoid overly one-sided economic-political explanations that scrutinize culture and emic ideas, the approach of this research is relationality and emotion.

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# Invited Speaker #5

## **Blows and bubbles: humpback whale nasal anatomy influences airflow paths determining shapes of air releases above and below water**

**Joy S. Reidenberg\*, Lazar Fleysler, Brianna Francis, Eric Angel Ramos**

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\*Presenting author

Joy Reidenberg

Professor at the Icahn School of Medicine at Mount Sinai's Center for Anatomy and Functional Morphology, New York, USA

Abstract

Background: The humpback whale nasal tract is adapted for efficient surface exchange of large air volumes, underwater visual bubble-release displays, protection from water intrusion, and pressure equilibration of air-filled cavities during diving/ascent. The mechanisms that alter nasal shape or direct airflow during these activities are not understood. Methods: Nasal tissue specimens (blowholes, nasal plugs) were obtained from deceased beach-stranded whales, donated by U.S. Marine Mammal Health and Stranding Response Program. Tissues from two humpback (*Megaptera novaeangliae*) whales were dissected and compared with one fin (*Balaenoptera physalus*) and three minke (*B. acutorostrata*) whale specimens. All specimens were scanned via Magnetic Resonance (MR) to assess fat/muscle composition. Results: Humpbacks have large nasal plugs relative to body size, with rounded distal tips. Plugs are comprised of fat interlaced with muscles and covered by black epithelium. Plugs attach rostrally to skull dorsum and medially to nasal septum, while the distal tips remain unattached. Muscle fiber directions visualized with MR predict plug movements. Contraction opens nasal passageway by withdrawing plugs dorso-rostrally ahead of blowhole and stretching plugs from their medial septal attachments. Muscle in distal tips compresses plugs ventro-laterally. Relaxation recoils plugs caudally into the nasal passageways towards their septal attachments. Plug epithelium contacts caudo-medial passageway walls that are reinforced by curved cartilage plates. Partially retracted plugs re-shape airflow through a convoluted route; exhaled air travels from lungs/larynx in a near-spiral path going rostrally, then laterally, then dorsally, then medially, and finally re-curving dorso-laterally through the external nares. Conclusion: Nasal plugs, evolutionarily derived from the upper lip (skin, fat, and muscle), are highly mobile tissues. Contracted plugs move rostrally and raise the V-shaped blowhole crown, creating splashguards that deflect water laterally. Stretched plugs become thin and flatten against the nasal walls, opening the passageways for airflow. No energy is required for relaxed plugs to recoil and occlude nasal passageways, preventing water incursions to the lower respiratory tract. Water occasionally trapped above plugs during submergence is exhaled first, contributing to initial liquid appearance of a blow (spout). Nasal plug muscles determine plug shape, influencing airflow paths that may define various bubble formations released underwater or unique blow shapes above water.

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# ORAL SESSION #8

TOPIC: ANATOMY, GENETICS AND  
BEHAVIORS

CHAIR: DR. JEAN-LUC JUNG  
PROFESSOR

MUSÉUM NATIONAL D'HISTOIRE NATURELLE





## **Humpback Whales Blow Bubble Rings for Humans - A Play Prompt in Poloidal Parlance?**

**Fred Sharpe (fsharpe@alaskawhalefoundation.org), Jodi Frediani\* (jodifredi@aol.com),  
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Brenda McCowan (bjmccowan@ucdavis.edu), Laurance Doyle (ldoyle@seti.org)**

Affiliations: Alaska Whale Foundation; Jodi Frediani Photography; Doug Perrine Photography;  
Icahn School of Medicine at Mount Sinai; Population Health and Reproduction/UC Davis  
Veterinary Medicine: SETI Institute

### **Abstract**

Among mysticetes, humpback whales (*Megaptera novaeangliae*) make extensive use of bubbles (bursts, trails, curtains) for display by combative breeding males and to create barrier traps (nets, clouds) when hunting schooling prey. Here we describe another genre of air release, the bubble ring, a donut-shaped, poloidally spinning, air-infused, vortex (analogous to a “smoke ring”). We analyzed eight ring-production episodes documented by naturalists, citizen scientists and researchers. These episodes involved seven whales in summering and wintering areas of two oceans. We examined evidence for three functional hypotheses and found no support for a role in conspecific aggression or feeding. Ring making as a form of play was most consistent with the data. We interpret these findings in light of other observations of play in baleen whales and ring play in aquaria-housed dolphins. The latter provides insight into mood, quality assessment and technical savvy. Humpback bubble rings appear to be discharged at a relatively shallow depth, apparently within the topmost atmosphere. The largest was estimated at 4 m in diameter. Rings appear to be produced from one nostril indicating high unilateral blowhole dexterity. Rings co-occur with bubble plumes and bursts and align along a structural and behavioral continuum. Bubble ring blowing appears to have spontaneously materialized in different populations where there are friendly interactions between humpback whales and whale watchers. It is noteworthy that independent humpback populations appear to have innovated ring presentation, as inter-oceanic cultural transmission was unlikely to have played a role. The plume-burst-ring continuum described herein, regarding humpback whales, provides a promising model for further investigation, “as all bubble ‘types’ are constructed from variations in air release parameters and have a continuum of possible features rather than the clearly distinct categories with which we treat them,” (K. Moreno pers. com.). Dolphins have demonstrated remarkable ingenuity (McCowan et al., 2000) concerning playful manipulation of bubble rings. Perhaps we can take a page from their playbook. Communication theory, and the tenants of animal play, oblige taking turns, mirroring, and innovation. Patterns of bubble production in cetaceans constitute a mode of communication not available to terrestrial mammals (Pryor, 1990). As noted by Bearzi et al. (2018) concerning cetacean sentience, “we must acknowledge our present ignorance and keep a door open to the unexpected.”

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## ***Video presentation***

### **Genetic diversity of humpback whales (*Megaptera novaeangliae*) in a Northeast Madagascar breeding ground**

**Sébastien Guillermin\*, Anjara Saloma, Laurène Trudelle, Loriane Mendez, Oswaldo Vasquez, Jean-Benoit Charrassin, François-Xavier Mayer, Olivier Adam, Jean-Luc Jung, Sébastien Guillermin**

Affiliations: ISYEB

#### Abstract

The humpback whale (*Megaptera novaeangliae*) is a migratory species that feeds at high latitudes in summer and breeds in the tropics in winter. The species has preferred breeding sites in all ocean basins. Madagascar represents one of the most important breeding sites in the Indian Ocean. We have studied for 7 years the dynamics of genetic diversity of humpback whales in this area, collecting biopsies near Sainte-Marie Island, located in northeast Madagascar. Tissue samples were collected by the NGO Cetamada during seven breeding seasons from 2012 to 2018 in the Sainte Marie Channel, located in northeast Madagascar. Genetic analyses were performed on 532 individuals (328 males and 204 females) using 8 microsatellite markers. A high genetic diversity was observed, which is consistent with the findings of previous studies. Genetic variation over time was identified, more marked in males than in females. Analyses without a priori group definition allowed the detection of genetic clusters, in greater number for males than for females. These genetic structures are not easy to explain. They could be related to variability in breeding site fidelity, and could be consistent with the hypothesis of male-mediated genetic dispersal. They also suggest that females do not express strict fidelity to small-scale breeding areas such as the Sainte Marie Canal. The present study highlighted the need to study patterns of genetic differentiation at the local scale within breeding sites in order to understand their dynamics at a larger scale.

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## **Humpback whale suckling behavior in the breeding grounds: duration, rate, spatial context, and activity context**

**Maevatiana Nokoloina Ratsimbazafindranahaka\*, Chloé Huetz, Aristide Andrianarimisa, Anjara Saloma, Olivier Adam, Isabelle Charrier**

Affiliations: Institut des Neurosciences Paris-Saclay, Université d'Antananarivo, Cétamada, Institut d'Alembert

### **Abstract**

**Background:** Despite its biological importance, suckling behavior has been poorly documented in humpback whales mainly because of the challenges in tracking whales in their natural environment. Our study investigated the suckling behavior in < 3 months old humpback whale calves. We investigated the duration of suckling events, their rate, and partially their spatial and activity context, with interest in behavioral ontogeny. **Methods** Our study used accelerometry data from animal-borne multi-sensor tags equipped or not with a camera. We conducted our study off Sainte Marie, Madagascar, an important breeding ground in the Southwestern Indian Ocean. **Results:** We found that the suckling events duration does not vary much with the calves' relative age (estimated based on the angle of furling of the dorsal fin). We also found that the time suckling proportion is low but significantly higher than previously found in the feeding ground. The suckling was mostly recorded at depth. Strong evidence of humpback whale suckling at night is proposed for the first time. **Conclusion:** Overall, we provided a brand new and more robust description of the suckling behavior in humpback whales. We provide valuable information that helps understand potential disturbances from human activities around MC pairs, a critical and sensitive group, and thus adapt conservation and management measures to ensure the durability of the species.

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# ORAL SESSION #9

TOPIC: CARIBBEAN POPULATION

CHAIR: MAGALI COMBES  
CAMAC PROJECT MANAGER - CARIBBEAN MARINE  
MEGAFUNA AND ANTHROPOGENIC ACTIVITIES

THE FRENCH AGOA SANCTUARY







## **Spatial And Temporal Distribution Of The Humpback Whale (*Megaptera Novaeangliae*) In Poorly-Studied Areas Of The Wider Caribbean Region**

**Jaime Bolaños Jiménez\* (1,2), Angiolina Henríquez (1,3), Dagmar Fertl (4), Lilián Flórez-González (5), Jolanda Luksenburg (1,6), Yurasi Briceño (7), Leonardo Sánchez-Criollo (8)**

1: Caribbean-Wide Orca Project (CWOP, Aruba/Venezuela), 2: Asociación Civil Sea Vida (Venezuela), 3: Aruba Marine Mammal Foundation (AMMF, Aruba), 4: Ziphius EcoServices, Magnolia, Texas, 5: Fundación Yubarta, Cali, Colombia, 6: CML, Leiden University, Leiden, The Netherlands, 6: Proyecto Sotalia, Venezuela, 7: Centro para la Investigación de Tiburones (CIT, Venezuela)

### Abstract

The Caribbean Sea is known as a wintering ground for at least two distinct populations of humpback whales that spend the summer in feeding grounds in the Eastern or Western North Atlantic Ocean. Most current research focuses on the Dominican Republic and, more recently, the French West Indies, while the remainder of the Wider Caribbean Region remains poorly studied. We reviewed published and gray literature, online biodiversity platforms (OBIS SEAMAP, GBIF, International Whaling Commission), social media, news sites, and field books, compiling 185 records spanning the period 1913-2021. These included sightings (68.6%), intentional takes (24.9%), strandings (5.4%), and acoustical (1.1%). Scientific activities and citizen-based contributions generated 78% and 22% of the records, respectively. About one-third of the records were detected during both vessel and aerial, large-scale surveys. Most of the records were located in St. Vincent and The Grenadines (24.9%), the ABC Islands (Aruba/Bonaire/Curacao: 19.5%), Venezuela (17.8%), and French Guiana (9.7%). A humpback whale that was stranded in Belize in April 2016 had been seen previously in Guatemala and Belize between February-April the same year. This is the only individual humpback whale confirmed so far in waters off Central America. The monthly distribution of records showed whale presence during all the months of the year, except in July, with peaks in February-March (34.6%) and October-November (16.7%). Our results highlight that the southeastern Caribbean (Aruba, Bonaire, Curacao, Trinidad and Tobago, and Venezuela) play an important role as wintering grounds for humpback whales from the Northern Hemisphere. The presence of humpback whales in the ABC islands, Venezuela, and French Guiana in the period August-November is consistent with the potential presence of humpbacks from the Southern hemisphere in these tropical waters. The only record available for Surinam, a cow-calf pair, in April 2013 probably corresponds to humpbacks from the Northern Hemisphere. Current research provides preliminary evidence that the waters of the Guianas region, the ABC Islands, and Venezuela, are used by humpback whales from both the northern and southern hemispheres during their respective wintering seasons, highlighting the need for increased monitoring and research efforts.

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## **(CAMAC) Humpback whale satellite-tracking confirms the connectivity between the Northern Lesser Antilles and the importance of regional collaboration to conserve marine biodiversity.**

**Michel VELY(1)\*, Mads-Peter HEIDE-JØRGENSEN(3), Mikkel VILLUM JENSEN (4), Julien CHALIFOUR(2), Nicolas MASLACH (2), Sabrina FOSSETTE (1)(5)**

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### ABSTRACT

To efficiently protect marine migratory species and conserve marine biodiversity, knowledge of animal movements and how these movements relate to political boundaries and current marine protected areas and/or marine sanctuaries is required.

Following the success of the MEGARA 2014 (= MEGaptera Reproduction Area) mission, we used again, satellite tracking, using SPOT 6 satellite tags, to study the movements of migratory Humpback whales (*Megaptera novaeangliae*) from and within the area of the Northern Lesser Antilles during their 2019 reproductive season (MEGARA 2019). Six individuals were followed for an average of  $20 \pm 25$  days (max = 45 days). During that time, Humpback whales traveled back and forth between islands and revealed an unexpected strong connectivity between the waters of the islands of Saint-Martin (French and Dutch sides), Anguilla, Saint-Barthélemy, Saint Kitts and Nevis, Statia, Antigua and Barbuda, and Guadeloupe on one hand, and Bermuda's waters on the other hand. These movements are similar to the ones described by satellite tagged Humpback whales during 2014 MEGARA mission which showed an additional connectivity with the British Virgin Islands and the Dominican Republic waters (Silver Bank).

Humpback whales therefore seem to be a shared « resource » among the islands and countries of the Northern Lesser Antilles and Great Antilles and Bermuda, highlighting the need for regional cooperation and offering scientific support for a larger transboundary marine sanctuary and corridors.

Ultimately, such partnership between the Agoa Sanctuary of the French Islands, the Yarari Sanctuary of the Dutch islands, the Dominican Republic Marine Mammals Sanctuary and all the precedingly referred islands, would support a common strategy for joint conservation and scientific actions (with regards specially to telemetry) on the totality of the breeding grounds of Humpback whales in the Northern Lesser Antilles and help conserve marine biodiversity.

KEY WORDS: Humpback whales, satellite tracking, Northern Lesser Antilles, islands, connectivity, conservation, marine protected areas.

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- 4) Years of the North Atlantic Humpback (YoNAH) project <https://coastalstudies.org/humpback-whale-research/yonah/>
- 5) Dutch Caribbean: "home" of unique, and likely vulnerable, populations of Bryde's and humpback whales <http://www.dcbd.nl/sites/default/files/documents/BioNews20-Whales.pdf>

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## **Caribbean rhythms: first insights into humpback whale calls through the CARI'MAM large scale high sampling rate bioacoustic observatory**

**Jérôme Couvat, Hervé Glotin, Valentin Gies**

Affiliations: Agoa Sanctuary French Biodiversity Agency, Université de Toulon

### Abstract

The Interreg CARI'MAM project (2018-2021) aimed to enhance connection and cooperation between marine mammal conservationists throughout the Caribbean. One of the main actions of this project was the deployment of 17 hydrophones in the Great Caribbean Region, from Bermuda to Bonaire and Jamaica to Martinique for one year. This project was led by the French Biodiversity Agency through the Agoa Sanctuary and the partners from each island were local NGOs and MPA managers. The objective was to increase knowledge about spatial and temporal distribution of marine mammals in the region and ultimately inform conservation policies. The versatile low power and low-cost high velocity recorder, called "Jason HighBlue" has been tailor-made and was distributed by LIS IM2NP CNRS and the "Scientific Microsystems for Internet of Things" Platform of the University of Toulon. It can record marine sounds from a large bandwidth (here set to 256 kHz SR, 500Go Storage, 5 Hz to 125 kHz bandwidth), encompassing the 20 cetacean species present in the region[1]. It was scheduled to record 1min every 5min during sessions of 40 days. After removing noise, a sample of the data was annotated with detections via Audacity and fed to dedicated detection algorithms based on convolutional neural networks (CNN) to automatically detect whale vocalisations and odontocete clicks in the whole dataset. Another CNN was designed to detect and classify call types within each humpback whale (*Megaptera novaeangliae*) vocalisation to study song structure and its evolution through time. Between December 2020 and September 2021, 6,000 hours of recordings were collected during 1,300 days of deployment. 1,026,235 humpback whale vocalisations were detected over 15 stations. 12 different call types were identified with various duration, frequency and shape. In total, 83% of calls were correctly classified, with variations in their distribution and occurrence between territories. Although these results should be taken with care, these preliminary results are promising both from a computer engineering and a biological point of view. Data from September to December 2021 are currently being processed and should help refine these results.

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## ***Video presentation***

# **Automatic classification of humpback whale (*Megaptera novaeangliae*) vocalization in the Caribbean**

**Stéphane Chavin\*, Best Paul, Ferrari Maxence, Poupard Marion and Glotin Hervé**

Affiliation: Université de Toulon

### **Abstract**

For years, researchers have been studying the sounds emitted by humpback whales (*Megaptera novaeangliae*) especially the songs they compose, and trying to create a vocal repertoire (R. Payne and McVay 1971). The basic unit of a song is called a unit, it is a single vocalization lasting less than 3 seconds and spaced on either side by silence. Its frequency is relatively low compared to certain cetaceans sound because it is between 15 Hz and 4,000 Hz depending on the area (Fournet, Szabo and Mellinger 2015). With nearly 1,302 days, or more than 6,000 hours, of underwater recordings from the year 2021 in the Caribbean Sea, it was possible to develop a convolutional neural network whose objective is to detect vocalizations humpback whales (*Megaptera novaeangliae*). The latter showed very good performance (mean average accuracy of 0.9948). Subsequently, in order to highlight the different units composing the song of humpback whales during this given period of time, an auto-encoder made it possible to reduce the dimensions of the detections to 16 in order to perform a clustering. The use of the HDBSCAN method proved effective on a UMAP projection and made it possible to identify the presence of 12 different units. These 12 units, already known in the literature for some (M. Epp, M. Fournet, and G. Davoren 2021, H. Winn and L. Winn 1978, Cusano et al. 2021), were therefore learned by a classifier (accuracy of 0.83). Finally, by studying the sequences of songs and measuring their occurrence in the recordings, it was possible to make a hypothesis on the evolution, in time but also geographically, of the song of humpback whales during the reproduction period (Mercado III and C. E. Perazio 2021, Ellen C Garland and McGregor 2020).

\*Presenting author Video

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## **Acoustic characterisation of North Atlantic humpback whale vocalisations at an oceanic migration**

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### Abstract

Humpback whales (*Megaptera novaeangliae*) produce song and non-song vocalisations, which allows their presence to be detected through passive acoustic monitoring. To determine the seasonal and diel acoustic presence and acoustic behaviour of humpback whales at the migratory stopover site off Bermuda, three hydrophones were deployed between March 2018 and April 2019 on Challenger Bank and the Bermuda platform. Song was the predominant vocalisation type encountered, with 65% of song recordings containing whale chorus and a clear seasonal trend of humpback whale occurrence in the spring and winter months from late December to midMay. A strong diel pattern in singing activity was detected. Singing activity significantly increased at night relative to the daytime ( $p < 0.01$ ), whilst twilight periods were characterised by intermediate levels of singing. The song structure encountered in spring 2018 consisted of 18 units, 6 themes and 5 transitional phrases. The high occurrence of whale chorus and the strong seasonal and diel patterns of male humpback whale singing activity highlights the importance of Bermuda not just on their northward migration during spring, as described historically, but also on their southward migration during winter. Bermuda therefore constitutes a two-way migratory stopover site for humpback whales. The present study also provides Bermuda's planning authorities with better constraints on the duration and intensity of anthropogenic activities in these waters.

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# Invited Speaker #6

## **The Caribbean-Wide Orca Project: Building bridges for marine mammal conservation in poorly-studied areas**

**Dr. Jaime Bolaños Jiménez**

Caribbean-Wide Orca Project (CWOP)  
Asociación Civil Sea Vida (Venezuela)

The Caribbean-Wide Orca Project (CWOP) is an informal initiative aimed at reviewing the distribution, threats, and current status of marine mammals in the Wider Caribbean Region (WCR). CWOP was started in 2009 with cooperation amongst researchers from Venezuela, Aruba, and The Netherlands to review killer whale (*Orcinus orca*) distribution in the Caribbean Sea. That effort represented the first comprehensive review of any species at a basin scale. The initiative follows the guidelines of the Marine Mammal Action Plan of the Specially Protected Areas and Wildlife (SPAW) Protocol of the Cartagena Convention and, currently, counts on the participation of a network of 59 researchers and research teams belonging to 42 organizations distributed on two continents (Europe and the Americas) and 21 countries/territories. The current status of species reviews is as follows: Killer whale, *Orcinus orca*: compilation of 378 records, a photo-ID catalog in development, two papers published, and a thesis project started; humpback whale *Megaptera novaeangliae*: 137 records; common minke whale, *Balaenoptera acutorostrata*: 149 records and a review accomplished; Antarctic minke whale *B. bonaerensis*: 2 records; fin whale, *B. physalus*: 23 records; false killer whale, *Pseudorca crassidens*: 350 records and a thesis project completed; pilot whale, *Globicephala macrorhynchus*: 605 records, and a thesis completed; rough-toothed dolphin *Steno bredanensis*: 89 records and a thesis project started; Blainville's beaked whale, *Mesoplodon densirostris*: 392 records; Gervais' beaked whale *M. europaeus*: 284 records, Sowerby's beaked whale, *M. bidens*: 2 records, and Cuvier's beaked whale, *Ziphius cavirostris*: 226 records. Among the limitations because of the scarcity of systematic research efforts in some regions of the WCR and the consequences of the COVID pandemic, CWOP's approach has been able to provide data and baseline information on the spatial and temporal distribution of 11 cetacean species, which constitutes about one-third of the regional inventory of marine mammal species.

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# ORAL SESSION #10

TOPIC: INTERACTIONS WITH  
HUMAN ACTIVITIES IN THE  
CARIBBEAN

CHAIR: LAURIE HEC  
ASSOCIATE DIRECTOR

THE FRENCH MARINE MAMMAL SANCTUARY AGOA







## **Status of marine mammals in the Caribbean and actions conducted by the SPAW RAC**

**Pusineri, C.\*, Conruyt, G.**

Affiliations: Carspaw

### **Abstract**

The protocol of the Cartagena Convention for the conservation of specially protected areas and wildlife (SPAW) in the Wider Caribbean Region, was signed in January 1990, and is currently endorsed by 18 countries. Based in Guadeloupe, the SPAW protocol Regional Activity Center (SPAW RAC) is hosted and cofunded by the French Ministry of Environment. It works under the aegis of SPAW Secretariat, to facilitate the implementation of the protocol. The Caribbean hosts a diversified community of marine mammals, with more than 35 species currently identified, among which the emblematic Humpback Whale, and 2 endemic species. All of them are fully protected under the SPAW protocol. The main threats to these species are: interaction with fisheries, chemical and acoustic pollutions, and vessel strikes. Six species are classified as Endangered or Vulnerable in the IUN redlist and one as nearly threatened. In an effort to strengthen Marine Mammal conservation in the region, the SPAW RAC has contributed to several projects these last years. The Caribbean Marine Mammals Preservation Network, CARI'MAM (2018-2022), was a regional cooperation project cofunded by the EU. It was led by the Agoa sanctuary (French Antilles) and SPAW RAC. Its major outputs were: the development of networking tools, a review of current threats and regulations related to marine mammals and the identifications of priority areas for action, capacity building for species monitoring, propositions for a sustainable whale watching, and knowledge enhancement. The project is now concluded but the network is still active, with 273 participants, from 78 organizations and 31 Caribbean territories. Building upon CARIMAM outputs and SPAW countries recommendations, SPAW RAC and the Agoa Sanctuary have built up the 5 years CAMAC project. It will aim at strengthening knowledge and regional collaboration to provide governing bodies and environmental stakeholders with practical recommendations and tools to reduce the negative impacts resulting from the interactions between human activities and marine megafauna in the Caribbean Region. In addition, the SPAW marine mammal action plan is currently under review by SPAW countries and they are exploring the feasibility of the establishment of a SPAW Regional Activity Network which would facilitate its implementation.

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## **Entanglement of large cetaceans (humpback whales and sperm whales) on fishing gear in the French West Indies: an increasing threat?**

**Combes Magali\*, Herfaut Johanna, Hebert Gaelle, Lecomte Rachel and Couvat Jérôme**

Affiliations: Agoa Sanctuary, French Agency of Biodiversity, Les Trois-Ilets, Martinique, French West Indies, 2) Fish Consult, Sainte-Rose, Guadeloupe, French West Indies, 3) Autoentreprise Gaelle Hébert, Sainte-Rose, Guadeloupe, French West Indies, and 4) Poissons des îles, Schoelcher, Martinique, French West Indies

### Abstract

Bycatch by fishery gear is one of the major threats for cetaceans, affecting more than 90% of species worldwide. In the Lesser Antilles, fisheries are artisanal and their interactions with cetaceans do not emerge among species conservation conflicts. However, since the early 2000s, fisheries operated a shift towards offshore areas to target large pelagic fish. The fishing techniques evolved with the installation of rope-anchored gear (FAD, Fish Aggregating Devices, and deep traps). This recent evolution may enhance the frequency and severity of interactions, as similar gear is known to cause entanglement of large cetaceans, notably in North-Atlantic humpback whales feeding grounds. In this study, we aim to assess the interactions of large cetacean with those now largely spread gear types through a sociological survey approach.

Questionnaire-based interviews were conducted with 70 fishermen accounting for about 6.5% of the French West Indies fleet. Questions referred to the knowledge of cetaceans, the experienced interactions and their perception by fishermen. Finally, the survey's results were put in perspective with interviews of local cetacean experts such as stranding networks.

Surveyed fishermen possess a vast apprehension of their profession and of the sea, with an average experience of 23 years and the use of a variety of gears and techniques. Cetacean species were regularly encountered, 71% of fishermen observing them at least once a month. In contrast, 61% of fishermen declared that they never experienced an incident with a cetacean, and only 3 of 26 bycatch events reported involved humpback whale entanglements (the rest consisting in small cetacean bycatch).

However, since 2010, stranding networks reported 8 other large cetacean entanglement cases, not reported by fishermen. Those were caused by drifting ropes from FADs and/or deep traps, and in a lesser extent by nets. While the densification of anchored FADs clearly shows over the last decade, these could become problematic by forming in some areas a real obstacle course to be avoided by large cetaceans. Through the cumulative effect of threats, losses on breeding grounds, including entanglement, may not be negligible for populations.

To build on this study, which was well received by surveyed fishermen, their collaboration with conservation managers appears as an efficient tool to pursue the monitoring of interactions. An open and permanent dialogue will be necessary for the proper continuation of the reflections and to accompany the fisheries sector towards more sustainability.

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## **Effectiveness of community-based education and fisher training programs to sensitize local populations in Haiti about whales**

**Jamie Aquino\*, Courtney Vail, Francklin Barbier, Charlens Calixte, Claude Pressoir, Cleeford Joseph, Myson Samedi**

Affiliations: Haiti Ocean Project

### Abstract

**Background:** In Haiti, whales have historically been considered mythical creatures originating from folklore. Generations have enjoyed a classic tale, Lasirèn ak Labalèn, translating to ‘The Mermaid and The Whale.’ This story is about searching for happiness with the help of two mysterious creatures, one being a whale. While whales are traditionally considered a mystical spirit of the sea, they are also feared mostly by fishers who encounter them often. There is a disparity between what is imagined about whales from storytelling and what is observed firsthand. Fishers have antagonized whales and tried to harm them. In January 2015, an adult humpback whale was speared by local fishers on the north coast near Fort Liberte, eventually stranding and dying in shallow waters. Fishers in southern Haiti have thrown rocks at sperm whales passing by their canoes in the Gulf of Gonave. They have also been targeted as a food source. A stranded beaked whale in April 2018 was killed by locals for human consumption. A dwarf sperm whale was speared by a fisher in 2019 near a FAD at Anse a Veau. These whales have sparked genuine panic in Haiti among fishers and locals who have seen them from shore. **Methods:** To sensitize the coastal communities about the true nature of these magnificent whales and the vital role they play in the marine ecosystem, we have organized educational workshops for local Haitians residing in coastal communities. We also train fishers on how to photograph whales through our marine mammal sighting network. **Results:** Having worked in multiple coastal communities throughout Haiti, we have met with great success in educating the locals about the value of whales. The youth have been especially engaged, and excited to learn more about these mythical creatures. Fishers, who observe whales at sea often, have become very involved in photographing and gathering information about them. **Conclusion:** Whales are a valuable marine species in need of protection in Haiti’s waters, serving as an important habitat for these marine mammals, including humpbacks. Community-based education and fisher training programs are the keys to changing perceptions and mindsets about whales.

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# ORAL SESSION #11

TOPIC: INTERACTIONS WITH  
HUMAN ACTIVITIES IN THE  
CARIBBEAN

CHAIR: DR. CLAIRE PUSINERI  
BIODIVERSITY PROJECT OFFICER

REGIONAL ACTIVITY CENTER FOR THE PROTOCOL  
RELATING TO SPECIALLY PROTECTED AREAS AND  
WILDLIFE OF THE GREATER CARIBBEAN REGION<sup>5</sup>(CAR-  
SPAW).





## **Like humpback whales, the Caribbean Cetacean Society is going beyond frontiers for cetacean conservation in the Lesser Antilles**

**Rocío Prieto González\*, Valentin Teillard, Rebeca Campos, Jeffrey Bernus**

Affiliation: Caribbean Cetacean Society (CCS)

### Abstract

All Caribbean islands depend on the marine ecosystem for their livelihood. Its waters, rich and diverse, contain more than thirty species of cetaceans which play an essential role in the ecological balance of the ecosystem. Humpback whales, frequent the warm waters of the Lesser Antilles, from December to May, as part of their breeding area before returning to the cold-water feeding areas of the North Atlantic Ocean. The goal of the Caribbean Cetacean Society (CCS) is to protect these animals, pillars of the blue economy. The CCS is going beyond the island's frontiers (with different cultures, languages and regulations) for cetacean conservation in the Lesser Antilles through international cooperation, research, capacity building and education actions. The project "Ti Whale An Nou", meaning "our own little whales" in a Creole mix, is the largest research program in the Caribbean. It includes six scientific missions of 15 days, between Anguilla and Grenada, to study cetaceans every year. During these sailboat expeditions, cetacean observations, photo-identifications and passive acoustic data through a towed hydrophone array were collected. Here, we present some results, especially from Humpback whale data gathered during the 2021 and 2022 expeditions, where 21 different species were visually identified in more than 400 observations. First, distribution models with explanatory environmental covariates and their uncertainty maps are presented. Second, based on a photo-id analysis, we analyse their migratory patterns and the threats they are facing. Flukebook and Happywhale are two free automated photo-ID recognition software platforms, permitting identify humpback whales by their unique markings and track them around the globe through matched sightings. Both platforms were compared. In addition, in 2021, more than half of the cetacean's photos had scars of possible anthropogenic origin: (propellers, nets, collisions, etc). This study fills the data gaps highlighted by the latest marine mammals action plan of the Caribbean, establishing a basis for appropriate and effective conservation measures within each territory.

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## **Contribution of the CWOP initiative to the knowledge of the humpback whale and other cetacean species in the wider Caribbean region**

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### Abstract

The Caribbean-Wide Orca Project (CWOP) is an ad hoc, cooperative initiative aimed to review the distribution, threats, and current status of all species of marine mammals in the Wider Caribbean Region under the framework provided by the Specially Protected Areas and Wildlife (SPAW) Protocol of the Cartagena Convention. Our reviews started in 2009 and are based primarily on a literature review, original data from coauthors, contributions from citizen-based initiatives, social media, and online biodiversity information platforms. Currently, CWOP counts on the participation of a network of 53 collaborators who belong to 38 organizations distributed on two continents (Europe and the Americas) and 20 countries/territories. The current status of reviews is as follows: *Orcinus orca*: dataset with 378 records, a photo-ID catalog in development, and two papers published; *Megaptera novaeangliae*: 112 records; *Balaenoptera acutorostrata*: 149 records and a review accomplished; *B. bonaerensis*: 2 records; *B. physalus*: 23 records; *Pseudorca crassidens*: 350 records and a thesis project concluded; *Globicephala macrorhynchus*: 605 records, and a thesis concluded; *Steno bredanensis*: 89 records; *Mesoplodon densirostris*: 392 records; *M. europaeus*: 284 records, *Ziphius cavirostris*: 226 records, and *M. bidens*: 2 records. On the basis of a sample size of 868 records, the origin of the records included scientific projects/activities (67%), citizen science (29%), and direct takes or bycatch (4%). Our research highlights the growing importance of citizen science and biodiversity information platforms as data sources. Our results confirm that: 1) the killer whale is widely distributed in the region throughout the year, but in low densities; 2) the common minke whales occur primarily during the boreal winter, and 3) the region is visited by humpback whales from both the southern and northern hemispheres, but most records correspond to whales from the latter. The eco-regions more represented in our sample are the Greater Antilles and the West Indies, whereas Central America is the lesser represented. Therefore, it is important to highlight the need for the establishment of transboundary, systematic research, under standardized protocols, including both visual and acoustical methods, which is urgently needed to improve both the availability and quality of information.

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## **Use of Fort-de-France Bay (Martinique) by humpback whales using passive acoustics**

**Benjamin de Montgolfier, Anatole Gros-Martial, Coline Violo, João Bernardo Vasconcelos Barreiros, Marion Poupard, Hervé Glotin**

Affiliations: Aquasearch, Université du Québec, Université de Toulon

### **Abstract**

The bay of Fort-de-France is an essential site for the economy of Martinique. In spite of the important exposure of the bay to a strong anthropic pressure, 11 different species of cetaceans, including humpback whales, are regularly or occasionally present. These animals come to the warm waters of the Caribbean from December to May to mate or give birth. In order to better understand the use of the bay by humpback whales, and to identify potential anthropogenic disturbance, we used passive acoustic technics. To capture the maximum of sounds in the bay, the hydrophones were installed in triangulation on January 18, 2022, moreover the orientation of each tube, equipped with two hydrophones, was calculated and will remain identical for the whole project. We can thus not only detect the presence of animals, but also locate them and follow their movements with precision. All data recorded with the three passive acoustic monitoring stations were processed with convolutional neural networks developed in the DYNi team. Once the positive files were validated, the position of the vocalizations in each file was extracted using Audacity software. A calculation of the time of arrival delays (TDoAs) between these vocalizations is calculated between the two hydrophones of each antenna by inter-correlations ? 21. The high sampling rate (128 kHz) allowing accurate TDoAs to be measured. A solver was set up to convert the arrival delay times (TDoAs) into angle theta in order to obtain first a direction of the source, then the junction of these directions allowed us to obtain a position and then an attendance area. Thanks to the joint acoustic detections of the blue and white antennas (as of April 23, 2022), it was possible to calculate the position of an/several individual(s). The location showed us that the area of frequentation of this/these individual(s) was outside the bay (south-west), and that at no time during the recording period (i.e. from January to June 2022) did an individual enter the bay of Fort-de-France.

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# North Atlantic Humpback Whale (*Megaptera novaeangliae*) Confirmed Predation by Orca (*Orcinus orca*) Occurs in the Caribbean Sea

Mithriel MacKay

## Background

North Atlantic humpback whale (NAHW) (*Megaptera novaeangliae*) mothers return to feeding grounds with new calves after migrating from breeding grounds. Calves frequently arrive with scars from orca (*Orcinus orca*) dentition indicating predation attempts. The location of these predation events in the western North Atlantic has not been identified. We tested the hypothesis that NAHW calves are the target of predation attempts by orcas while still in the Greater Antilles of the Caribbean Sea, which aligns spatially and temporally with NAHW calves and orca groups being concurrently sighted over the past several years. Here we present 3 separate records of orca predation on NAHW calves in the Greater Antilles, including a predation event where CATS tags were deployed on 2 individuals.

## Methods

Aerial and vessel surveys were conducted between 2010 and 2021 in the Dominican Republic, Turks and Caicos Islands, and Puerto Rico when humpback whales are known to occupy these areas. Still and video images of NAHW were obtained from above and below the sea surface. Data were analyzed for indications of recent attacks by orca and confirmation of predation events in progress.

## Results

The 3 confirmed predation events are as follows: In 2013, orcas were photographed from an aircraft during an encounter with a NAHW mother-calf-escort between Puerto Rico and Dominican Republic; In 2012, a NAHW calf was photographed with injuries less than 3 days old from an orca attack in the same area; In 2021, a predation event was witnessed during ship-based surveys off the Dominican Republic and a tagging effort successfully placed CATS tags on 2 individuals, secured DSLR images, ethograms, and aerial images. This latter data set reveals complex and coordinated efforts by two groups of orcas cooperating to successfully acquire the calf from the mother.

## Conclusion

The survey ship in 2021 was strategically placed where orcas were anticipated to be hunting NAHW in the Caribbean. Data collected confirms 3 predation events including two groups of orcas performing complex, coordinated movements which strongly suggests they have hunted together previously. The records described here confirm orca predation of NAHW is occurring in the Greater Antilles.

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Humpback  
W hale  
World  
Congress

Santo Domingo, Dominican Republic  
6th - 10th March 2023

# POSTER SESSION#1



MARCH 06TH - 10TH



## **Habitat use and co-occurrence of Humpback whales and North Atlantic Right Whales in Baie des Chaleurs (Québec, Canada)**

**Benjamin de Montgolfier\*, Aurore Feunteun, Jean Côté, Lyne Morissette**

Aquasearch, Université du Québec ISMER, Regroupement des pêcheurs professionnels du sud de la Gaspésie, M-Expertise Marin

A sudden crisis hit Quebec and the Gulf of St. Lawrence in 2017. Indeed, for more than three years, the North Atlantic right whale (NARW), *Eubalaena glacialis*, designated as endangered by the Committee on the Status of Endangered Wildlife in Canada and under the protection of the Species at Risk Act of Canada since 2005, has been increasingly present in the waters during the summer period. This new range has also created overlap with fisheries activities, and coexistence challenges. The marine mammal population survey in the northern part of the Baie des Chaleurs was conducted each summer from 2019 to 2022. The vessel-based surveys at sea were conducted between Percé (North) and Gascons (South), in the area where the depth is less than 20 fathoms (50 meters), where most fishing effort for lobster is happening. For each transect, information was collected on environmental and weather conditions, marine mammal and seabirds species diversity and location, and human activities (presence of boats, their activities, speed, etc). Among the six species of marine mammals observed, three species of cetaceans were identified and none were right whales or humpback whales during these four years of monitoring. The co-occurrence of these two species is known for other areas of the world, so we discuss in this paper the habitat use of Humpback Whales and the indices that can allow us to understand their ecology in areas where threats can be important. Despite different niches and habitat uses, both species are often observed together. This “double absence” on lobster fishing grounds is interesting and should be studied further, as the humpback whale may be an indirect indicator of the distribution of NARW in habitats where fewer observation tools and efforts are deployed. These two species have close migratory routes. The right whale stops in Florida, the humpback whale goes down in the Caribbean, especially in the waters of the Agoa Sanctuary in the French West Indies. The continuation of joint studies on these two species and between France and Quebec will allow the acquisition of essential data for a better management and protection of these animals.

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## **Technological innovation for area surveillance usable to detect whales at sea by 360° thermal cameras**

**Nolibé Gilles\*, Nolibé Laurent, Martin Christine, Gandilhon Nadège**

Affiliation: CeSigma Signals & Systems

Background Detecting whales at sea, in bad weather or at night, remains a problem in monitoring or research projects. Methods Based on the monitoring of an integral reserve, isolated in the Pacific Ocean (Atoll of Chesterfields), an innovative IR (infrared) vision device is developed to detect variations in heat from several thermal vision cameras.

Positioned to cover a 360° field with electronic stabilization, these devices can be placed on a mast, or be embarked. The concept is based on a technological integration between IR sensors and an interpretation algorithm (computer) aimed at assisting the detection of the object (animal, human intrusion, other movements).

Results The first imaging tests collected show that it is possible to analyze the masses, size, and displacements of a thermal "object" in a satisfactory manner, to generate an alert and to transmit or store detection information according to the mission setup.

Conclusion Our first R&D results allow us to consider adapting this system to the thermal detection of bulky objects such as whales at sea, including thermal detection of their blow, up to 500m.

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## **[CAMAC] Observation of possible food rivalry between killer whales and humpback whales Skjervoy-Kvaenangen NORWAY Winter 2022**

**Cathy Lacourbas\*, Pierre Robert De Latour**

Breach Antilles, USEA Orques sans frontières

Every winter, around 3,500 killer whales enter the fjords of northern Norway to feed on spawning herrings. Since 2018, humpback whales have also been observed. This winter 2022, observations seem to show behavioral changes and possible food rivalry. Skippers and underwater guides for ORCA NORWAY, a Norwegian company that has been offering snorkeling with killer whales since 1998, have noticed the increasing presence of humpback whales at killer whale feeding sites. The killer whales use the carousel feeding technique: they make balls of herrings and bring them up to the surface from the bottom, then hit them with their caudal fin, to finally catch the herrings one by one. There is no noted food competition between killer whales. Since 2019, pods of 10 to 15 humpback whales have been observed coming in from the bottom with their mouths wide open and taking on much of the herring ball. This caused a first change in technique on the part of the killer whales : they manage to move constantly the ball on the surface limiting its engulfment by the whales. We bear witness, with images and videos, to a quite exceptional observation this winter (2022). Groups of 40 to 50 humpbacks arrived, but also fin whales. This density of whales seems to have caused new changes in inter-specific behavior. An orca attack on an isolated whale with a bite on the caudal fin was reported on November 20, then on December 24, with an intense surface activity: caudal and pectoral slapping, rapid movement, movement while turning around and 4 to 5 orcas around. Found, which begs the question : is it a fight or a game ? The killer whales ended up moving away and we were then surprised to see the whale following them at good speed for several hundred meters to resume the confrontation. This was repeated 3 times. Are we witnessing social games, a demonstration of superiority or a food rivalry between marine mammals ?

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## **Humpback whale historical routes, based on collections of fluke photographs**

**Yira Rodríguez-Jerez, Nicolás Mejía**

Centro de Investigaciones de Biología Marina Idelisa Bonelly de Calventi, CIBIMA IBC;  
Universidad Autónoma de Santo Domingo, UASD

The humpback whale, *Megaptera novaeangliae*, (Borowski, 1781) is the best-known species of whale that usually visit the waters of the Dominican Republic. It is known that the populations that arrive at La Plata and Navidad banks located in the northeast of the country come mainly from high latitude areas like Labrador, Newfoundland, Greenland, Iceland and the Gulf of Maine, which they use as feeding grounds. Whale sightings on their migratory routes have been reported in the Dominican Republic for more than 30 years, commercial whale watching began around 1985. Between 1988 and 1993, humpback whales were the subject of a multidisciplinary study with experts from several countries under the direction of the Center for Coastal Studies, where CIBIMA-IBC of the Universidad Autónoma de Santo Domingo (UASD) participated in these investigations through its marine mammal program, PROMAR. CIBIMA-IBC keeps a collection of around 1250 black and white photographs of whale tails from these years. Using a high-resolution scanner, some 610 photographs have been digitized and 65 photos were sent to the Happy Whale platform, obtaining matches for 13 individuals, which have been sighted from 1989 to 2021, all with the objective of obtaining a historical view of the recurring sightings that remain to the present day. This platform uses the natural markings on the whale's tail to identify a whale as an individual, using automated models driven by algorithms similar to those used in facial recognition, comparing photographs of whale tails with scientific collections from around the world with a success rate of 97 to 99%. So far, 13 individuals identified using this tool, have been identified again on their feeding migratory routes in high latitude areas.

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## **Are white-backed dolphins and Florida-type dolphins different? A study of two bottlenose dolphin morphotypes around Guadeloupe**

**Rachel Haderlé (M2 SBM IUEM, ISYEB, équipe homologues, et Station marine de Dinard du Muséum national d'Histoire naturelle)**

**Jean-Luc Jung (MNHN Station marine de Dinard et UMR ISYEB)**

**Laurent Bouveret (OMMAG)**

Abstract: Poster

The bottlenose dolphin *Tursiops truncatus* is a cosmopolitan cetacean species, which is found in both tropical and temperate waters and for which two ecotypes have been described in various regions of the world. The two ecotypes of bottlenose dolphins are generally named coastal and pelagic. In the West Indies, the two ecotypes are occasionally distinguished in some geographical areas but their recognition is not clear on a large scale, e.g. at present, they have not been clearly defined in the Lesser Antilles.

In Guadeloupe, long term studies conducted by the OMMAG (Observatoire des Mammifères Marins de l'Archipel Guadeloupéen) has made it possible to differentiate two distinct morphotypes of bottlenose dolphins: the Florida type morphotype which seems to correspond to the coastal ecotype, and a morphotype known as white back. White backs were the subject of a first study, carried out by Rachel Haderlé during her M1 internship. Using photo-identification, a catalog of remarkable individuals was produced from more than 13,000 photos and 72 videos. This catalog was used to track conspicuous individuals between sightings, allowing co-occurrence data to be established and analyzed in order to study the social structure of white backs. The study of the social groups carried out revealed that the group of white backs corresponds to a fission-fusion type society characteristic of the species. This result is a novelty because the characterisation of societies of bottlenose dolphins have generally been carried out only on coastal groups. GPS data from the sightings of white backs were used to describe their preferred habitat and capture-recapture data were used to estimate the fidelity of white backs to the Guadeloupe archipelago.

The information gathered on white backs combined with the available bibliography on the species, allowed the hypothesis to be put forward that this group could correspond to the pelagic ecotype. To validate this hypothesis, the objective of this study is to explore the genetic diversity of the different groups of bottlenose dolphins in the West Indies in order to try to distinguish the two ecotypes of *T. truncatus* on the basis of genetic data. The analyses will be carried out on several samples of bottlenose dolphins stranded in the West Indies area.

The results obtained will be essential tools for the conservation of bottlenose dolphins in the Agoa sanctuary, particularly in the Guadeloupe archipelago, where bottlenose dolphins are classified as locally near threatened by the IUCN. At present, major differences between the habitats, behaviors and social groups of the two bottlenose dolphin morphotypes have been identified. Clarifying and affirming the distinction between the groups of *T. truncatus* will allow us to better target the management policies to be applied to these different groups.

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## **Educational Tools**

**Martin-Marin Salomé**

Caribbean Cetacean Society

Jacques Cousteau said : « We protect what we love and we love what we know » . The most effective way to protect cetaceans is to prevent threats to them. Some of these threats can be minimized through education and public awareness of these issues. However, this requires changing habits, and sometimes even traditions, such as fishing methods, whale watching practices or even whaling. However, these changes will be slow, and targeting the education of new generations today is a major investment for the future of cetaceans, but also of humanity. Connecting local population to their environment and give them the tools to protect it, is a bottom up approach that can inspire and empower new leaders. We will present here the tools set up by the Caribbean Cetacean Society to educate and raise awareness to the protection of cetaceans in the Caribbean.

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## **Humpback whale population of Lesser Antilles: Testing the individual's recognition through two photo-ID platforms.**

**Rebeca Campos Cuellar\*, Rocío Prieto González, Laurent Bouveret, Mustafa Sözen, Alaxey Yanchukov, Nastassia Uludüz, Karina Vishnyakova, Jeffrey Bernus**

Affiliation: CCS

Abstract: Poster

The humpback whale is a migratory species. In the Caribbean Sea, a humpback whale population frequents the water of the Lesser Antilles as part of its breeding area before returning to the cold-water feeding areas of the North Atlantic Ocean. These migration patterns can be followed by telemetry; however, a less invasive and more frequently used method is the photo-identification (photo-ID) of the flukes. Humpback whales have a unique pigmentation and pattern on the underside and trailing edge of their tail flukes. Each one is different just like a fingerprint, leading to identify individual animals through photos. The Caribbean Cetacean Society (CCS) is going beyond the island's frontiers (with different cultures, languages and regulations) to protect these animals. The CCS conducted more than twelve scientific cetaceans monitoring across the lesser Antilles under the "Ti Whale An Nou" program. It consists of six scientific cetacean survey expeditions of 15 days per year between Anguilla and Grenada, covering 31 islands of nine countries. These expeditions, conducted by sailboat, have made it possible to collect presence/absence data, acoustics recording and photo-identification data during 2021 and 2022. As a result, humpback whales have been observed 27 times, and more than 50 individuals have been identified. The identification of flukes used to be done by manual examination of catalogues: find a unique feature on the fluke shape, trailing edge, and notch shape. Nevertheless, this manual procedure was time consuming. Nowadays, the creation of automated photo-ID recognition software platforms engages citizen and scientists to easily identify individuals, speeding up the process of monitoring the whale population. The popularization of platforms as Happywhale and Flukebook allowed the recording of data over many years and regions, tracking them around the globe though matched sightings. The aim of this project is to test and compare the performance of both free platforms through the analysis of the "Ti Whale An Nou" database. This will help further understanding of the humpback whale population on its breeding area in Lesser Antilles.

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## **Description of a Humpback song theme off Sainte Marie Island for the breeding season 2022**

**Yann Doh\*, Anjara Saloma, Bertrand Denis, Beverley Ecalle, Marion Ovize, Laurent Pagnol, Olivier Adam**

Terre Mer Veille

The humpback whale (*Megaptera novaeangliae*) is one of the most studied species of cetaceans, in particular for the fact that the males emit songs during the breeding seasons (Payne 1971) and because they are a coastal species, thus easy to observe from boats. In August 2022, isolated humpback singers have been acoustically recorded off the Ste Marie Channel (Madagascar) from the research boat of the CETAMADA Ngo. Acoustic recordings have been made at about 100 m from the last singer sightings on a duration at least 30 min. The objective was to record and describe the complete song theme of the 2022 breeding season. During the field mission, 3 different males have been successively recorded at different locations in the channel. At least one song theme common for 2 singers and have been manually extracted. The patterns repetitively emitted after breathing by each animal presented a similar part for both and some individual specificity: one singer has more complicated and longer theme. As a perspective, a particular sound unit called "creaking door" could be associated with a jump in frequency. This gap in frequency seemed stable within the complete theme. Further investigations are needed to determine if it results from an adaptation to song or to individual morphological features. The poster presents time frequency representations of the observed sound units for 2 singers and describes one of the song themes recorded for the season 2022 off Madagascar.

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## **ABYSS: a Ngo dedicated to cetaceans' conservation in the western coast of La Reunion Island**

**Bertrand Denis<sup>1</sup>, Marion Ovize<sup>1</sup>, Beverley Ecalte<sup>1</sup>, Yann Doh<sup>2</sup>, Fabienne Delfour<sup>3</sup>, and Olivier Adam<sup>4</sup>**

1: Association Abyss

2: Terre Mer Veille

3: EPHE

4: Institut d'Alembert, Sorbonne Université

Founded in 2009, ABYSS is a non-profit association under the 1901 law based in Réunion. Its actions are generally dedicated to improving ecological knowledge of the marine environment. It now has around sixty members, ensuring the coordination, management of scientific projects and operations in the field. ABYSS relies on a network of expert service providers in multiple fields: bioacoustics, ethology, engineering, IT, biology, modelling, see [www. Abyss-oi.com](http://www.Abyss-oi.com). ABYSS has its own boat based in the Port, and its own data collection equipment.

An important part of the association's activities concerns the observation and study of cetaceans in the Indian Ocean through the development of scientific and eco-volunteer programs; The implementation of actions to preserve and protect endangered cetacean species; Awareness of the population on the preservation of the Indian Ocean sanctuary. Given the vastness of the territories or the migratory distances of certain species, scientific questions and conservation issues can only be relevant on an extended geographical scale. It is therefore essential for ABYSS to develop strong partnerships abroad, particularly in key areas such as: Madagascar, the Comoros and South Africa.

Guarantor of the good ecological state of their biotope, the megafauna that constitute the marine mammals, today brings added tourist value to the intermediate waters that they frequent. The South West Indian Ocean region is a place of great interest for humpback whales. As such, during the World Congress on the Humpback Whale (HWWC 2017), the Réunion Region, co-organizer of the event, announced the registration of the whale path with UNESCO World Heritage. This project is aimed at managers of marine areas in the Indian Ocean concerned by the presence of cetaceans, as well as their partners and service providers.

ABYSS believe strongly in mutualization and synchronization of observation methods and then takes advantage of all the cues provided by animals underwater and at the surface as well.



## **Humpback whale suckling behavior in the breeding grounds: duration, rate, spatial context, and activity context**

**Maevatiana Nokoloina Ratsimbazafindranahaka\*, Chloé Huetz, Aristide Andrianarimisa, Anjara Saloma, Olivier Adam, Isabelle Charrier**

Institut des Neurosciences Paris-Saclay, Université d'Antananarivo, Cétamada, Institut d'Alembert

Background: Despite its biological importance, suckling behavior has been poorly documented in humpback whales mainly because of the challenges in tracking whales in their natural environment. Our study investigated the suckling behavior in < 3 months old humpback whale calves. We investigated the duration of suckling events, their rate, and partially their spatial and activity context, with interest in behavioral ontogeny. Methods Our study used accelerometry data from animal-borne multi-sensor tags equipped or not with a camera. We conducted our study off Sainte Marie, Madagascar, an important breeding ground in the Southwestern Indian Ocean. Results: We found that the suckling events duration does not vary much with the calves' relative age (estimated based on the angle of furling of the dorsal fin). We also found that the time suckling proportion is low but significantly higher than previously found in the feeding ground. The suckling was mostly recorded at depth. Strong evidence of humpback whale suckling at night is proposed for the first time. Conclusion: Overall, we provided a brand new and more robust description of the suckling behavior in humpback whales. We provide valuable information that helps understand potential disturbances from human activities around MC pairs, a critical and sensitive group, and thus adapt conservation and management measures to ensure the durability of the species.

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## **White humpback whale calf in Costa Rica: Distribution, behavior, and group size**

**Jose David Palacios Alfaro, Felipe Chavez Jimenez, Frank Garita Alpizar\***

Panacetacea, Instituto de Formación Aeronáutica

Background: The Pacific coast of Costa Rica is a breeding and nursery area for two different populations of humpback whales, one feeding in the Antarctic Peninsula and the other in northern California and Oregon. The southern hemisphere population is observed from July through November. Most individuals are characterized by mainly having bellies and tails with white pigmentation as opposed to the northern hemisphere whales, which are mostly dark. There are few sightings worldwide of all-white humpback whales, with three reports in Oceania, two of them corresponding to dead stranded juvenile females and one corresponding to an adult male which was last seen in 2016. On September 30, 2022, an all-white calf with mother, just a few days old, was sighted for the first time on the northwest Pacific coast of Costa Rica, in Nosara 9° 58' N and 85° 41' W, Guanacaste province by FCJ from an aircraft. Methods: A follow-up was conducted by researchers and tour operators during the coming weeks to record the migratory route of the mother and calf. Results: Additional five sightings were recorded towards the central (Nicoya gulf) and South Pacific of Costa Rica, where it was last seen in Osa (9° 5' N and 83° 45' W) on 16 October 2022. In all the encounters the group size were 2, and predominant behavior were traveling (1.8 km/h). In the last sighting the group moved to deep waters to avoid a group of false killer whales. A map with the sighting sites, and photos of the individual are presented. Conclusion: All encounters were in coastal and shallow waters. To deduce the success of this whale's migration and its physical condition, an informal network of researchers was established from Panama, Colombia, Ecuador, Peru and Chile were contacted. So far, we have not found any other records of this whale.

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## Both local Caribbean fishing gears and the ones from northern feeding grounds entangle migratory Humpback whales

**Caroline Rinaldi, Renato Rinaldi, Manolo Rinaldi**

French Caribbean Stranding & Rescue Center Guadeloupe Archipelago – Association Evasion Tropicale

There is still little information on the high latitude feeding-ground destination of the North Atlantic Humpback whales from the lesser Antilles, a large portion of the population over-wintering in the West Indies is concentrated in the Greater Antilles. The first resighting between the French Lesser Antilles and the high latitude occurred in 2004 with a match of an individual off Guadeloupe previously sighted several times in the feeding grounds off Canada (Rinaldi et al. 2009).

Since then, if other matches of photo identification resightings occur, threats on that migratory species remain poorly known in the Caribbean waters.

Every day, in all the seas of the globe, thousands of sea turtles, whales, dolphins, fishes and birds are captured accidentally by deadly traps of pieces of nets and discarded line drifting indiscriminately in the oceans. It is unknown how many animals are entangled by fishing gear in activity or ghost gear each year in the Caribbean.

In response to such events in the French Archipelago of Guadeloupe, a professional rescue team has been specially trained on disentanglement by David Mattila, IWC.

We report here two cases of entangled Humpback whales which were freed with success.

The first event occurred in March 2010 : Blows! The captain of the research boat Tzigane VI sighted two humpback whales thrashing and turning around at the surface. One of them rapidly approached the boat, dragging buoys and line behind it. After assessing the situation, the rescue team carefully approached, grapple the lines and cut them off. The humpback remained calm during the procedure, swimming slowly close to the boat. Then, the whales headed north at a speed of 8 knots. The pieces of rope, wood and buoys have been identified as the remains of a lobster trap from the northeastern United States (Rinaldi et al. 2010).

The second event occurred in January 2022. At 9:30AM, a whale watching boat reported an entangled Humpback Whale. The rescue team immediately went to the scene. The whale was trying to free itself, remaining active at the level of the caudal section, blocked by a stretched end at the bottom. A cluster of ropes and buoys mainly encircled the left pectoral fin, more weakly the right pectoral fin and the back.

Abrasions were observed on the dorsal fin, linked to the friction of the ropes. The rescue team disentangled the whale with specific tools and freed it at 11:00AM. Then, the animal quickly dived. The equipment hindering the whale was recovered : buoys and ends of a local fishing trap which was held by the bottom (Rinaldi et al. 2022).

The best solution to prevent entanglement is to find the means to STOP discarding fishing gear and trash in the ocean, and working with fisheries to modify gear to prevent entangling wildlife.

The northern feeding ground fisheries and the Caribbean ones have to mutualize their efforts and expertise to secure the survival of this migratory species.

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#### Bibliography cited:

C. Rinaldi, R. Sears, P. T. Stevick, C. Carlson (2009). First re-sighting of a humpback whale between the French Lesser Antilles and the North Atlantic feeding grounds off Canada. Report for the IWC SC/61/03, 4 pages.

C. Rinaldi, R. Rinaldi, N. Ward (2010). Entangled, a Humpback whale released. Report for the East Caribbean Cetacean Network (ECCN), 2 pages.

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Humpback  
W<sup>h</sup>ale  
World  
Congress

Santo Domingo, Dominican Republic  
6th - 10th March 2023

# WORKSHOP SESSIONS



MARCH 06TH - 10TH

# WORKSHOP



LOCATION: HOTEL LA RENAISSANCE JARAGUA, SANTO DOMINGO, DOMINICAN REPUBLIC

# BLUE ECONOMY

## CHAIR

**NINA LYSENKO,**

DIRECTORA RECURSOS MARINOS, MINISTERIO  
DE MEDIA AMBIENTE Y RECURSOS NATURALE

**ISRAEL SANTANA CARABELLO,**

COORDINATOR REGIONAL NORDESTE EN AREAS  
PROTEGIDAS Y BIODIVERSIDAD

## INVITED SPEAKERS

**ILEANA GONZALEZ**

EXCURSIONS MOTO MARINA TOURS  
SAMANA EXCURSIONS

**ELIZABETH HACKLEY**

DIRECTOR OF ENVIRONMENTAL MANAGEMENT  
PROGRAMS ROYAL CARIBBEAN GROUP

**DATE**

09 March, 2023

**TIME**

2:00 - 06:00 PM

[hwwc@cetamada.org](mailto:hwwc@cetamada.org)





## WORKSHOP - BLUE ECONOMY

"Let's all go in the same direction!"

**Context:** Be it coastal and maritime tourism including cruises, the natural capital of the ocean and the ecosystem services it provides, the extraction of mineral resources from the seabed, maritime transport, fisheries and aquaculture, marine biotechnologies, or the use of marine energy, the blue economy must integrate the three pillars of sustainability of the oceans: environmental, economic, and social.

**Objective:** The objective of this workshop is to present the blue economy through some themes of economic activities linked to the oceans. What does a sustainable blue economy mean? How to move towards a sustainable use of ocean resources while preserving the health of the ocean ecosystem and the well-being of marine fauna, including marine mammals?

In particular, the following themes could serve as illustrations: Environmentally friendly Whale Watching, sustainable maritime traffic and cruise passengers, sustainable fisheries.

During this workshop, several concrete examples will be presented to open the debate and answer questions.

A final summary will present current progress, feedback and issues remaining to be resolved towards a Blue Economy, with the active participation of maritime stakeholders.

Registration during the Congress, at the hotel.

# WORKSHOP



LOCATION: HOTEL LA RENAISSANCE JARAGUA, SANTO DOMINGO, DOMINICAN REPUBLIC

## PORT ACTIVITIES AND MARINE ENVIRONMENT

### CHAIR

**DR. NADÈGE GANDILHON**

CEO AND RESEARCHER  
MSO & SORBONNE UNIVERSITY

### INVITED SPEAKERS

**SITA NARAYANAN**

DIRECTOR OF PLANNING AND SUSTAINABLE DEVELOPMENT  
GUADELOUPE PORT AUTHORITY

**MARIANA PERRILLIAT**

VP CORP STRATEGY, ITMGROUP MX

### DATE

09 March, 2023

### TIME

2:00 - 06:00 PM

[hwwc@cetamada.org](mailto:hwwc@cetamada.org)



# WORKSHOP - PORT ACTIVITIES AND MARINE ENVIRONMENT

"Take a small step together, and in the right direction"

**Background:** The activities of seaports play a crucial role in the maintenance and development of Caribbean economies. Their missions must integrate economic, social, and environmental issues. For the latter, it is a question of pursuing their ecological commitment, of putting in place more solutions to reduce their impact on the marine environment while remaining resilient to prevent disasters and pursuing their economic development participating in the standard of living of the inhabitants (employment pool).

Cooperation seems to be a key to this ambitious goal. For example, during the One Ocean Summit (February 9-11, 2023), a joint commitment was made by stakeholders (about fifteen member states of the European Union, North America, and Asia and about twenty major seaports) to reduce the environmental impact by 2028, by working together on low-carbon ports of call.

**Objective:** This workshop aims to bring together port actors from the Caribbean, willing to exchange on their practices and their contribution to a development concerned with the environment and sustainability. What programs and tools (measures) have these economic actors developed to reduce their environmental impact in recent years and for what future? How do they strengthen their contribution to decarbonization and preservation of the oceans against pollution and the effects of climate change?

During this workshop, concrete examples will be presented to open the debate and answer the questions.

At the end of this workshop, the solutions presented by the Caribbean port actors, and which could be the object of cooperation or collective actions in the future to contribute to the preservation of the marine environment and the prevention of climate risks will be restituted.

Registration during the Congress, at the hotel.

# WORKSHOP



LOCATION: HOTEL LA RENAISSANCE JARAGUA, SANTO DOMINGO, DOMINICAN REPUBLIC

# PROJECT LAUNCH : CAMAC CARIBBEAN MARINE MEGAFAUNA AND ANTHROPOGENIC ACTIVITIES

## CHAIR

**LAURIE HEC**

ASSOCIATE DIRECTOR  
THE FRENCH MARINE MAMMAL  
SANCTUARY AGOA

**Interreg**  
Caraïbes  
**CAMAC**  
Fonds européen de développement régional



**DATE**

09 March, 2023

**TIME**

2:00 - 06:00 PM

## Project launch: CAMAC Caribbean Marine Megafauna and Anthropogenic Activities

This workshop will be dedicated to the new Caribbean cooperation project CAMAC, inviting actors of the Caribbean but also any curious attendees. We will present the project and the main objectives in its fields of activities: fisheries, stranding networks, environmental education, and scientific surveys. The presentation will then give way to a collective reflection on the project's working axes. The goal of the workshop will be to hear and refine the needs of the different actors to build inclusive, coherent actions adapted to the stakes of Caribbean species conservation.

Registration during the Congress, at the hotel or at [sanctuaire.agoa@ofb.gouv.fr](mailto:sanctuaire.agoa@ofb.gouv.fr) and [claire.pusineri@developpement-durable.gouv.fr](mailto:claire.pusineri@developpement-durable.gouv.fr)

**Interreg**  
**Caraïbes**  
**CAMAC**  
Fonds européen de développement régional



LOCATION: HOTEL LA RENAISSANCE JARAGUA, SANTO DOMINGO, DOMINICAN REPUBLIC

## “Toward Effective Management of Marine Mammals in MPAs – The Marine Mammals Management Toolkit”

### MARINE MAMMALS MANAGEMENT TOOLKIT

#### Date & Time

- 7th of March, 10am – 12pm; 4pm – 6pm
- 8th of March, 10am – 12pm; 2pm – 4pm

#### Description

At Humpback Whale World Congress (HWWC), the Marine Mammal Twinning part of the EU funded Ocean Governance Project will host 4 training workshops to introduce the Marine Mammals Management Toolkit and bring to the attention of MPA managers, policy makers and cetacean experts.

The workshops will provide an opportunity to learn more about the Toolkit, its core components and receive training on the use of the Self-Assessment Tool (SAT) to monitor and evaluate MPAs with respect to marine mammal conservation.

#### Agenda

- Introduction of the Marine Mammal Twinning and Marine Mammals Management Toolkit
- Case Study: Application of the Marine Mammals Management Toolkit across 11 MPAs in the Americas
- Guided exploration of the Self-Assessment Tool (SAT) and SAT-Lite
- Discussion of results, applicability and benefits of the SAT
- Introduction of the Community of Practice
- Questions & Answers

**For more information about the Marine Mammals Management Toolkit and the workshop:**

Contact: [ocean-governance@biodiv-conseil.fr](mailto:ocean-governance@biodiv-conseil.fr) and visit <https://marine-mammals.info/hwwc-workshop/>





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