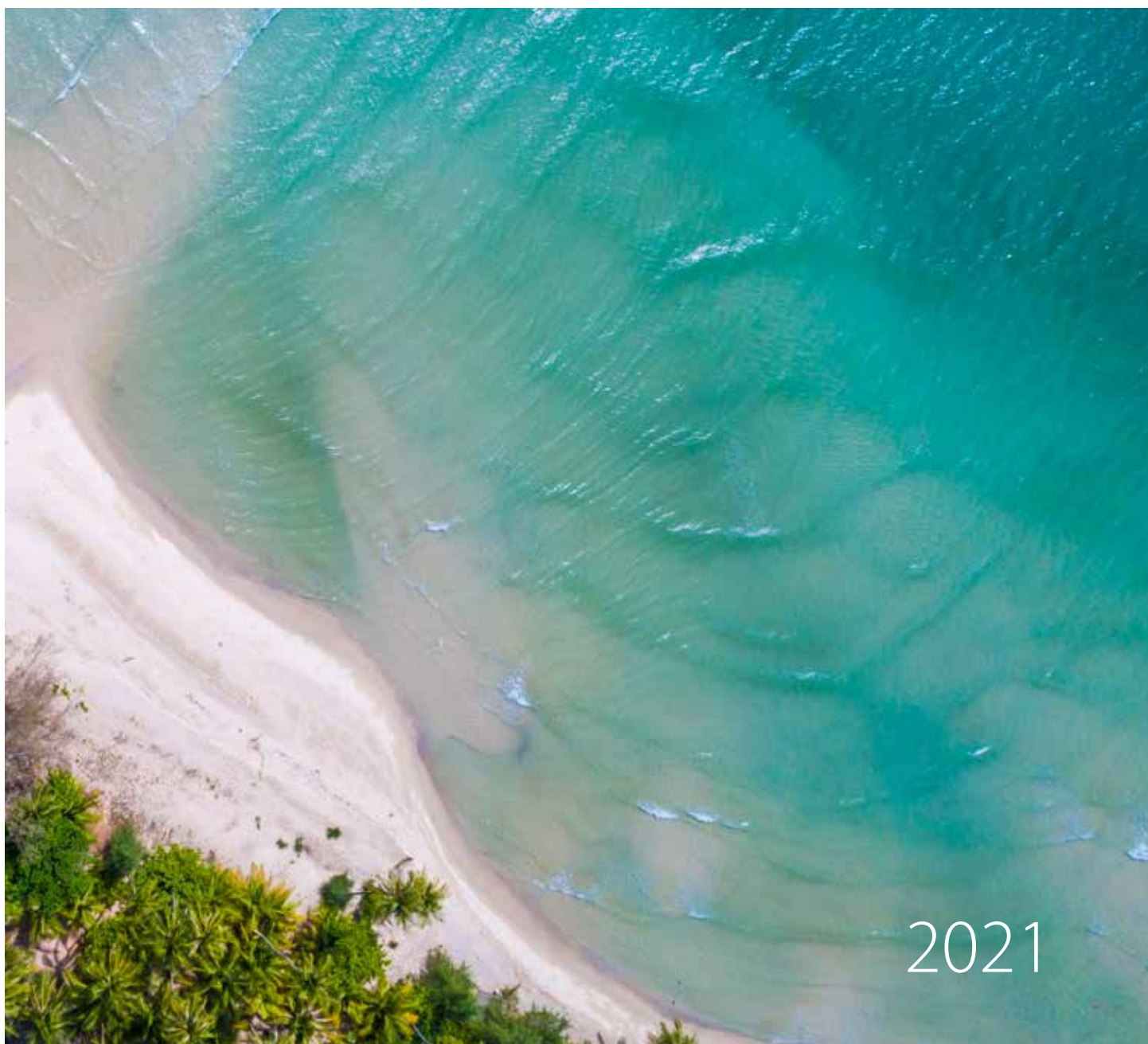


*Caribbean Region*  
Mercury Monitoring Network

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State of the Region



2021

# CREATING A HUB FOR REGIONAL MERCURY MONITORING

## Why a Mercury Monitoring Network?

Laboratory networks for mercury and other contaminant analyses in areas throughout the world, especially in mercury hotspots, will provide important information for the assessment of risk—to humans, wildlife, and ecosystems—in these regional environments.

Networking workshops will consolidate expertise within each region and provide a forum for communication, networking, and collaboration between laboratory directors/managers, relevant field personnel who may be collecting samples, and Ministries related to environmental monitoring, international trade, commerce, and human health.

## Building a Mercury Monitoring Network

Biodiversity Research Institute's extensive mercury work in the Caribbean region has led the way for the first network of integrated laboratories to be established. The primary toxicology laboratory will be located in Antigua and Barbuda, with secondary laboratories in other Caribbean countries. These labs will serve as the regional hubs for mercury analyses of abiotic and biotic samples that are used for assessing human and environmental health.

Standardized biotic sampling will help with national and regional interests for mercury monitoring. Standardized protocols for biological sampling, handling, and shipping of samples to the regional lab hubs will be produced for each region.

Our goal for the first network is to engage at least eight other countries that are already Parties to (or plan to ratify) the Minamata Convention on Mercury. Emphasis will be on those countries that have already participated in pilot projects developed through the Minamata Initial Assessment process and organized by the Basel Convention Regional Centre for Training and Technology Transfer in the Caribbean (BCRC-Caribbean) office in Trinidad and Tobago.

*Monitoring mercury in fish and wildlife provides important information about the environmental health of a region.*



Brown Pelican



*Island nations that rely on fish as a major protein source are especially vulnerable to the risks of mercury in their food.*

## Meeting Minamata Convention Requirements

This project is critically important for helping the many Caribbean countries that have ratified (or plan to ratify) the Minamata Convention on Mercury, to meet its obligations and effectively implement its provisions.

The development of an integrated network of laboratories will:

- Help facilitate countries with limited resources to be more efficient in evaluating the effectiveness of the Convention.
- Provide a way for countries to coordinate their activities toward understanding the risks of mercury to human and environmental health.
- Help with better response to regulatory needs by the European Union (EU) about seafood mercury concentrations (e.g., assist countries with sustainable economic activities related to seafood resources).
- Provide assistance and help build capacity for relevant Ministries to make independent assessments to protect human and ecological health.

### Toxicology Laboratory

The toxicology laboratory provides analysis of tissue samples for total mercury using a Milestone Direct Mercury Analyzer-80. Laboratory development will emphasize building on current laboratory capacity in Antigua and Barbuda, as well as establishing new capacity in other countries.

Initial laboratory training, calibrations, and standards will be made with the toxicology laboratory at Biodiversity Research Institute.

Fish mercury concentrations provide important information on the potential for human exposure through their consumption from freshwater, estuarine, and marine ecosystems. This is of particular importance to vulnerable populations including children, pregnant women, and indigenous

communities that rely on fish as a major protein source.

Fish and wildlife also serve as important bioindicators of the environmental impacts of mercury pollution and potential risks related to human and ecological health.

Young fish (<1 year) can reflect rapid changes of environmental mercury loads, while long-lived predatory fish, commonly consumed by humans, are of greater significance for human health. These bioindicators can also be used to assess impacts to piscivorous wildlife.

## Target Bioindicators

### Fish

#### Yellowfin Tuna



Tuna, a popular fish group for exporting to the European Union (EU), may have elevated mercury levels.

#### Mahi Mahi



Mahi mahi is a popular food item for local consumption and younger individuals tend to have safe mercury levels.

#### Barracuda



While the barracuda is a common species, its popularity as a local food item is dictated by the incidence of ciguatera fish poisoning. Barracuda regularly have elevated mercury levels.

#### Red Snapper



Red snapper are abundant and widespread. They have relatively low mercury levels and are regularly used for local consumption.

### Mammals

#### Bats



Bats are good bioindicators of mercury in the invertivore food web for freshwater systems.

#### Neotropical River Otter



Otters are good bioindicators of freshwater systems based on the fish food web.

#### Pilot Whale



Pilot whales are good bioindicators of marine ecosystems and are sometimes related to human health.

### Birds



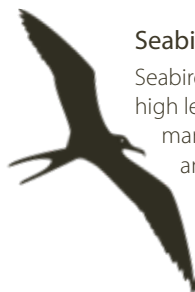
#### Kingfishers

The five species of kingfishers are good bioindicators of fresh and saltwater.



#### Resident Songbirds

Wood wrens and other wrens often forage on invertebrates with elevated methylmercury levels (e.g., spiders).



#### Seabirds

Seabirds are at great risk of consuming high levels of mercury that build up in marine food webs. Slow molt patterns and slow rate of reproduction limit opportunities to reduce their mercury burden.



#### Migrant Songbirds

Certain species of neotropical migrants that breed in the U.S. and Canada, such as this Hooded Warbler, can have elevated blood mercury levels (which reflect on-site dietary uptake of methylmercury within the prior few days of sampling).



# THE BIOMONITORING PROCESS

## Develop a Mercury Biomonitoring Plan

Based on the integrated network of laboratories and the participating countries developed during the Networking Workshop, participants will establish a mercury biomonitoring plan for countries of interest. Participants will represent each country that has an interest and abilities related to laboratory procedures, field sampling, and policy.

### STEP 1 Select Target Species (for each country)

Country-specific biomonitoring projects may emphasize:

- Shellfish and fish sampling for all countries
- Bird sampling in Antigua and Barbuda, Belize, and potentially elsewhere
- Marine mammals in Saint Vincent and the Grenadines
- Humans (with Ethics Committee approval) in Antigua and Barbuda, Grenada, and potentially elsewhere.



*Biomonitoring efforts follow results and interests from MIA projects conducted by BRI and BCRC for 10 countries in the Caribbean Region.*

### STEP 2 Collect Samples (permits required)

#### Fish/Marine Mammals

Fish sold at market; marine mammal muscle tissue (collected through nonlethal biopsies)



#### Birds

Bird tissue samples (nonlethal collection): blood (for short-term exposure); adult feathers (long-term exposure); and eggs

#### Humans

Hair—an easy and effective tissue type to test for mercury exposure



Mercury-added Products—skin lightening creams and cosmetics

Standard operating procedures have been developed by BRI in close coordination with Antigua and Barbuda and other countries.

To download copies of these sampling protocols (as well as information about passive air sampling), please visit:

[www.briwildlife.org/sampling](http://www.briwildlife.org/sampling)

### STEP 3

#### Prepare Samples — Transport/Storage



Proper labeling and storage of samples is imperative to ensure quality results. Researchers should adhere to protocols that may vary according to sample type and national permits.

### STEP 4

#### Analyze Samples in Toxicology Labs

Participating countries will ship biotic samples to regional laboratory hubs (e.g., Antigua and Barbuda) and to BRI's mercury lab to compare interlab calibration.



### STEP 5

#### Analyze and Manage the Data

Analysts should strive for the highest quality in data preparation and standardization, ensuring quality control of data processing and management. An integrative approach that includes field-based measures and data synthesized from disparate databases on mercury concentrations helps to improve confidence in findings.

### STEP 7

#### Public Outreach

Outreach materials, such as science communications, presentations, and websites, serve as a foundation for:

- local workshops tailored to the specific country or region
- policy development workshops
- legislative hearings
- public events
- press conferences

### STEP 6

#### Report Results — Translate the Science

Science communications pieces and web pages translate findings into succinct, clear language that engage readers who are not experts in the field; photography and infographics help convey complex scientific topics.



## MEETING MINAMATA CONVENTION OBLIGATIONS

There are many ways that the scientific activities in this mercury monitoring network can help countries, especially with Articles 14, 16, 17, 18, 19 and 22.

Information about the *Global Mercury Monitoring Guidelines* as developed in response to Article 22–Effectiveness and Evaluation can be found at:

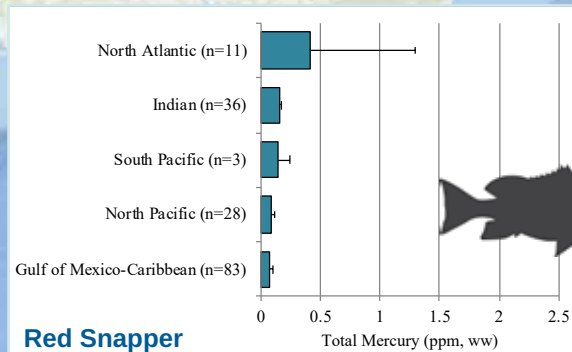
[www.mercuryconvention.org/meetings/intersessionalwork/](http://www.mercuryconvention.org/meetings/intersessionalwork/)

Final decisions for this guidance document will be made at COP4 (Indonesia 2022).





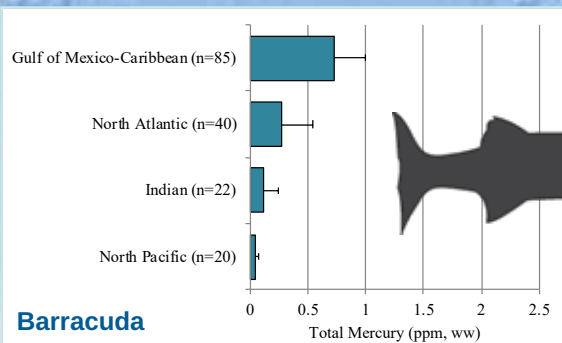
# Monitoring Mercury in Fish and Birds in the CARIBBEAN REGION



## Red Snapper

Mercury levels in red snapper are comparatively low in the Caribbean Sea.

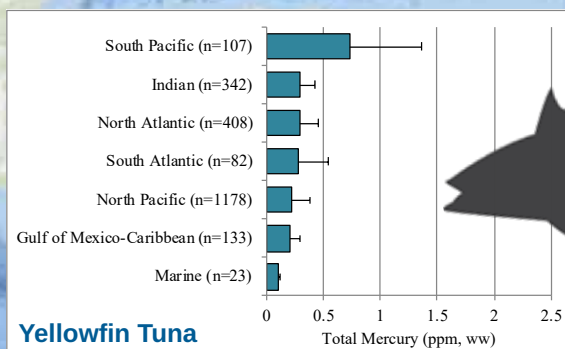
Generally **SAFE** for human consumption.



## Barracuda

Mercury levels in barracuda in the Caribbean Sea are highest compared to global data (although, sample sizes are small and data are not normalized for size).

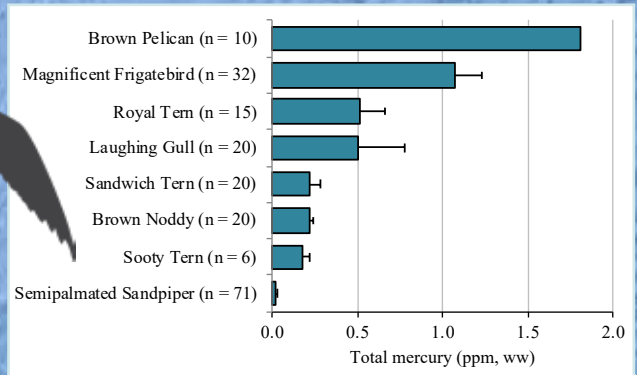
Generally **NOT SAFE** for human consumption.



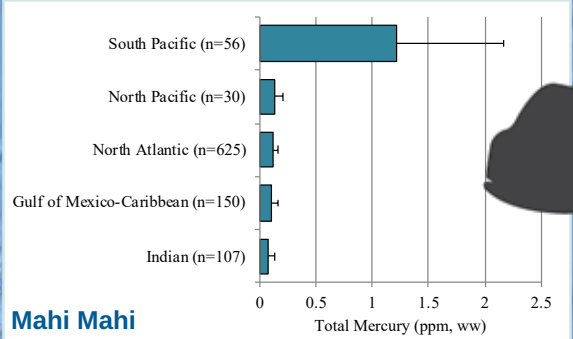
## Yellowfin Tuna

Caribbean Sea populations of yellowfin tuna tend to be comparatively low based on global mercury data.

Generally **SAFE** for human consumption.



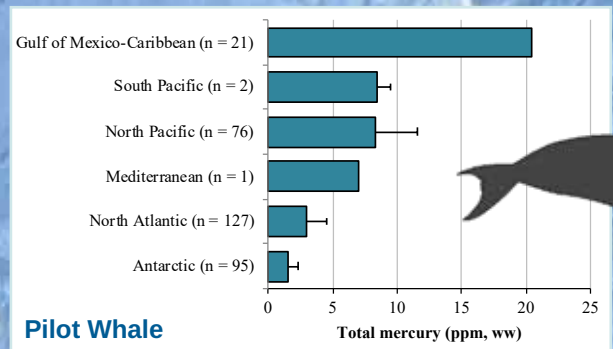
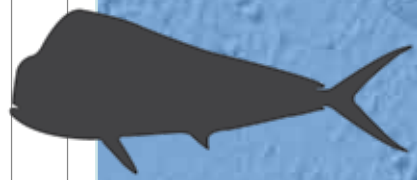
*Seabirds of greatest interest for understanding potential elevated levels of mercury in a system tend to be the largest species, such as the Brown Pelican and Magnificent Frigatebird (pictured).*



**Mahi Mahi**

*Caribbean Sea populations of mahi-mahi tend to be comparatively low based on global mercury data.*

Generally **SAFE** for human consumption.



**Pilot Whale**

*Mercury levels in pilot whales in the Caribbean Sea are high compared to global data.*

**NOT SAFE** for human consumption.





Antigua & Barbuda

Bahamas

Barbados

Belize

Dominica

Grenada

Guyana

Saint Kitts & Nevis

Saint Vincent & the Grenadines

Saint Lucia

Trinidad & Tobago

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**Biodiversity Research Institute**  
[www.briwildlife.org/hgcenter](http://www.briwildlife.org/hgcenter)

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