

IFRECOR –French Lesser Antilles – Report of Coral bleaching surveys in 2023/2024

Photo : K. Questel - ATE©

➤ Anomaly of sea temperatures in the Lesser Antilles in 2023/2024

- **2023**

In the Caribbean region, sea surface temperatures (SSTs) reached high levels between **July and December 2023**¹ (Temp. > 29°C, Fig.1). Due to these anormal warm temperatures, Coral Reef Watch/NOAA reported a « Level 2 » warning alert for these islands for « severe bleaching and risk of coral mortality » for 10 weeks, from September 4th, 2023 to November 17th, 2023 (Vaslet et Bissery 2024²).

In the French West Indies (FWI), coral bleaching was reported at the **end of August 2023 and had widespread over all the FWI’s coral reefs in early September 2023**. In December 2023, some coral colonies recovered from bleaching. Coral reefs of the FWI were thus **impacted by this bleaching event during 3 months**.

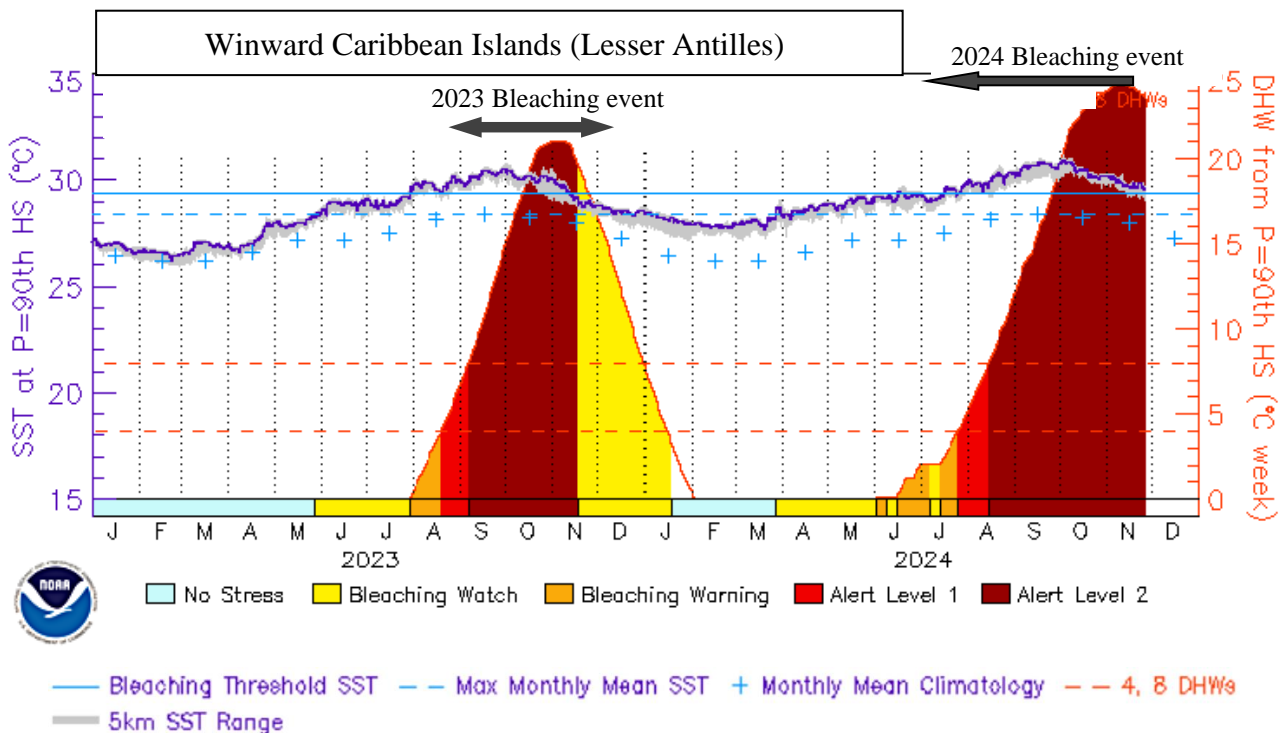


Fig. 1. Sea surface temperatures and bleaching alerts reported by NOAA/Coral Reef Watch in the Lesser Antilles in 2023/2024.

¹ https://coralreefwatch.noaa.gov/product/vs/gauges/leeward_caribbean.php

² https://ifrecor.fr/wp-content/uploads/2024/01/Note-synthese_blanchissement_coralliens-Antilles2023-v01-2024.pdf

- **2024**

This bleaching event has widespread in early 2024 over all the oceanic regions and has been officially declared on April 15th, 2024 as the **4^h global bleaching event** (ICRI / NOAA – April 2024³).

In the Antilles, SSTs have slightly decreased between December 2023 and February 2024, but remained higher than the normal average temperatures. High SSTs have led to several warning alerts for the Lesser Antilles (Tab.1).

First bleaching sightings on coral colonies have been documented in May 2024 in the reefs of Guadeloupe and Martinique, and have widespread over all the FWI by September/October 2024 (Fig.2).

Tab. 1. Bleaching warning alerts reported by NOAA/ Coral Reef Watch in 2024 in the Antilles.

DATE	ALERT LEVELS	BLEACHING OBSERVATIONS
12 MAY 2024	“Bleaching warning”	
29 JUNE 2024	Bleaching alert “Level 1”	Risk of reef-wide bleaching
11 JULY 2024	Bleaching alert “Level 2”	Risk of reef-wide bleaching with mortality of heat-sensitive corals
20 SEPT. 2024	Bleaching alert “Level 3”	Risk of multi-species mortality
30 SEPT. 2024	Bleaching alert “Level 4”	Risk of severe, multi-species mortality (> 50% of corals)
21 OCT. 2024	Bleaching alert “Level 5”	Risk of near complete mortality (> 80% of corals)

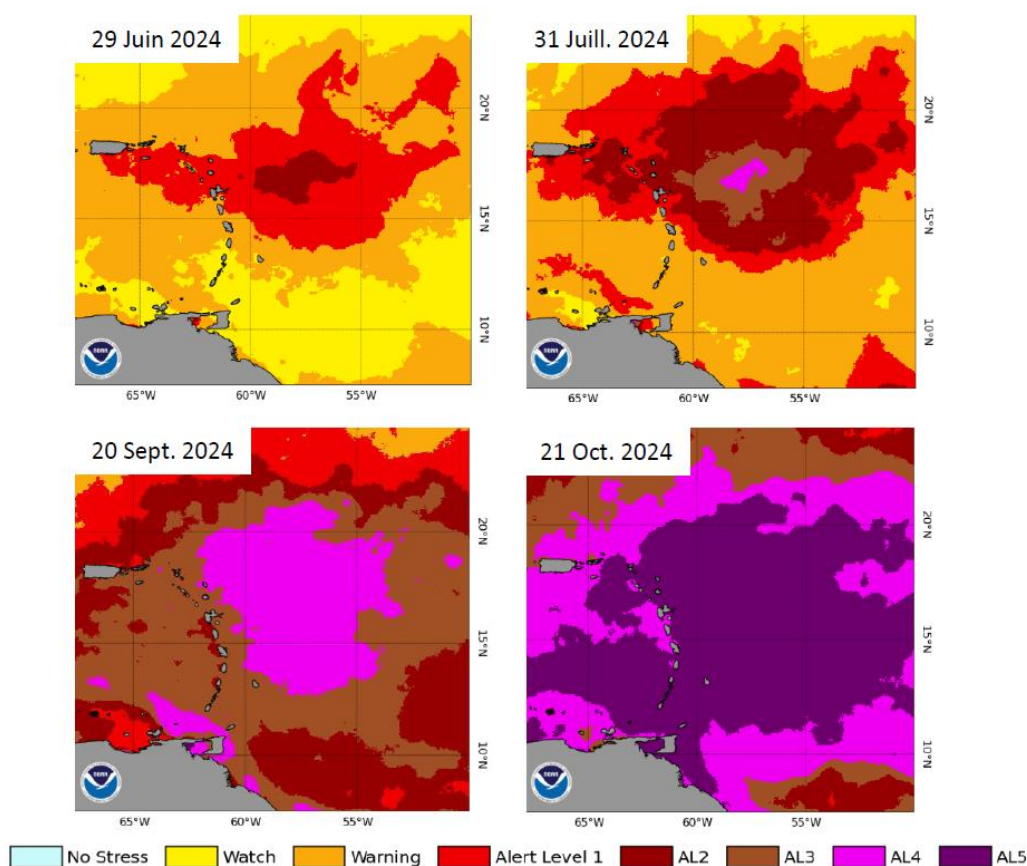


Fig. 2. Bleaching alerts from NOAA/Coral Reef Watch in the Lesser Antilles between June and October 2024.

³ <https://icriforum.org/4gbe/>

➤ Summary of coral bleaching surveys performed in the FWI in 2023/2024

Stakeholders of the “Ifrecor – French West Indies (FWI) Coral Reef Network” have conducted several coral reefs surveys in 2023 and 2024 to monitor the impact of the 2023 bleaching event and to evaluate coral mortality. These on-going studies are presently performed in order to characterize the 2024 bleaching event. The summary of these monitoring surveys, as well as field observations, carried out in the 4 territories of the FWI is reported Table 2.

In Guadeloupe and Martinique, the first quantitative surveys were conducted during the peak of the 2023 bleaching event (between October and December 2023). These surveys were funded in 2023/ early 2024 in Guadeloupe by the Office de l’Eau (ODE-Water Office), Parc National de Guadeloupe (National Park of Guadeloupe), Grand Port Maritime de Guadeloupe (GPMG – Maritime Port of Guadeloupe), IGREC Mer (private company) and in Martinique by the DEAL (Ministry in charge of the Environment) and ODE (Water Office).

In the FWI northern islands, these surveys have not been performed in 2023/early 2024 due to a lack of fundings (for Saint-Martin’s oversea Collectivity) and to a lack of availability of the contractor to perform the survey (for Saint-Barthélemy’s oversea Collectivity). However, field observations were carried out in these two territories in order to qualify the extent of coral bleaching.

Tab. 2. Summary of coral reef surveys conducted in 2023/2024 in the French West Indies (FWI).
(Further surveys are mentioned in *italics*)

Client	Implementation	Sites	Calendar	
			2023 surveys	2024 surveys
GADELOUPE				
Maritime Port of Guadeloupe (GPMG)	ÉcoRécif Environnement & Caraïbes Aqua Conseil	26 sites (2023) 18 sites (2024)	Sept. / Oct. / Nov. / Dec. 2023	Jan. to Oct. 2024 & next surveys: <i>Nov.- Dec. 2024</i>
Water Office of Guadeloupe (ODE)	Créocéan	6 sites (2023) 18 sites (2024)	Nov. / Dec. 2023	May/June 2024
IGREC Mer / Aquarium of Guadeloupe		5 sites	Sept. /Oct. /Nov. /Dec. 2023	Jan. to Oct. 2024 & next surveys: <i>Nov.- Dec. 2024</i>
National Parc of Guadeloupe (PNG)		3 sites	June 2023	June/ July 2024 & next surveys: <i>Nov.- Dec. 2024</i>
MARTINIQUE				
Water Office of Martinique (ODE) / DEAL*	Impact Mer	12 sites	October 2023	Feb. / May / Nov. 2024
ASSO-Mer		Coral nursery & 3 reef sites	Sept. – Oct. – Nov. – Dec. 2023	<i>Next surveys: Nov. 2024</i>
SAINT-BARTHELEMY				
Environmental Territorial Agency of St-Barthélemy (ATE)	ÉcoRécif Environnement	2 sites	Field observations (ATE): Sept. to Dec. 2023	Field obs. (ATE): Jan. to Oct. <i>Next survey: Nov.</i>
SAINT-MARTIN				
UT DEAL SBSM (Sept.2024) & Manager of St-Martin Marine Park (AGRNSM)	AquaSearch & SeaLens & Stegastes Csltg	8 sites	Field observations (AGRNSM): Sept. to Dec. 2023	Sept. 2024 & Field obs. (AGRNSM): Jan. to Oct. 2024

* Ministry in charge of the Environment

Summary of the post-bleaching surveys in Guadeloupe and Martinique's reefs

About 95% of coral species and between 50% and 80% of coral colonies (variation among sites) were impacted by the 2023 bleaching event (Bouchon et al. 2024ab, Créocéan 2024b, Impact Mer 2024).

Post-bleaching monitoring surveys conducted until September 2024 reported a mortality of coral colonies between **34% for the reefs in Martinique** (12 sites – Impact Mer 2024) and **29 % for the reefs in Guadeloupe** (18 sites - Bouchon et al. 2024b). Several sensitive coral species exhibiting high mortality rates in 2024 (between 70% to 100% of mortality) were: *Acropora palmata*, *Acropora cervicornis* (for both territories), *A. prolifera*, *Porites furcata*, *Agaricia agaricites*, and the blade fire-coral *Millepora complanata* (data from the surveys in Guadeloupe), *Agaricia humilis* and *Porites porites* (data from the surveys in Martinique) (Bouchon et al. 2024b, Créocéan 2024b, Impact Mer 2024, Mège 2024).

The 2023 bleaching event and its strong impact on coral mortality (reported in 2024) was among **one of the most significant bleaching events that have affected the FWI's coral reefs**.

Further monitoring surveys will enable to evaluate coral colonies recovery as well as the impact of the 2024 bleaching event.

Detailed information is provided hereafter for each territory of the French West Indies.

Guadeloupe



In Guadeloupe, quantitative surveys were conducted in 2023 on 26 reef sites and on 18 sites between January to September 2024, including the 4 sites of the GCRMN (Bouchon et al. 2024ab).

These surveys were funded by the **Maritime Port of Guadeloupe** and performed by the private environmental offices **EcoRécif Environnement** and **Caraïbes Aqua Conseil**.

In 2024, post-bleaching surveys reported a **mortality of 29% of the coral colonies**, with variation among sites between 20% to 55%. In September 2024, 64% of the coral species were impacted by a mortality related to the 2023 bleaching event. High mortality rates (between 70% to 100%) were recorded for the most sensitive species: the Acroporids (*Acropora cervicornis*, *A. palmata*, *A. prolifera* - between 98% to 100% of mortality), *Porites furcata* (74%) and the blade fire-coral *Millepora complanata* (74%) (Bouchon et al. 2024b).

A **significant decrease in juvenile coral densities** was highlighted in September 2024 (Bouchon et al. 2024b).

For the coral fish communities, a significant decrease was observed in 2023 for the **juvenile fish abundance** (representing between 50% to 70% of the total fish abundance). This decrease of fish recruitment could be related to the increase of SSTs in 2023. The recruitment of juvenile fishes increased in 2024 (Bouchon et al. 2024b).



Fig. 3. Fish communities in dead coral colonies (Guadeloupe: Bouchon et al. 2024).

In 2024, the structure of reef fish communities was not affected by significant changes related to the bleaching event, in terms of abundances, biomasses or trophic structure. Further surveys will be conducted until August 2025 in order to evaluate the impact of the 2024 bleaching event (Bouchon et al. 2024b).



Fig. 4. Illustration of coral bleaching and mortality observed between 2023 and 2024 on the barrier reef of the Grand cul-de-sac marin lagoon (Guadeloupe: Bouchon et al. 2024ab).



The **National Park of Guadeloupe** performed post-bleaching surveys in June/July 2024 on 3 historically monitored reef stations: 2 sites in the lagoon of the Grand Cul-de-Sac Marin and one site in Pigeons’ islets (leeward coast).

These surveys showed an **important decrease of the coral cover, with a mean coral mortality of 36%**, varying between 11% to 53% among the sites. In the meantime, algal cover has increased from 36% to 59% in 2 sites (Mège 2024). Wide colonies of Acroporids (*Acropora* spp.) have been strongly impacted by this bleaching event leading to the death of all the colonies within the monitoring sites (Fig. 5). Sea temperatures recordings from thermographs located at 23 meters deep revealed that sea temperatures were higher than 29°C from May 19th, 2024 (Mège 2024).

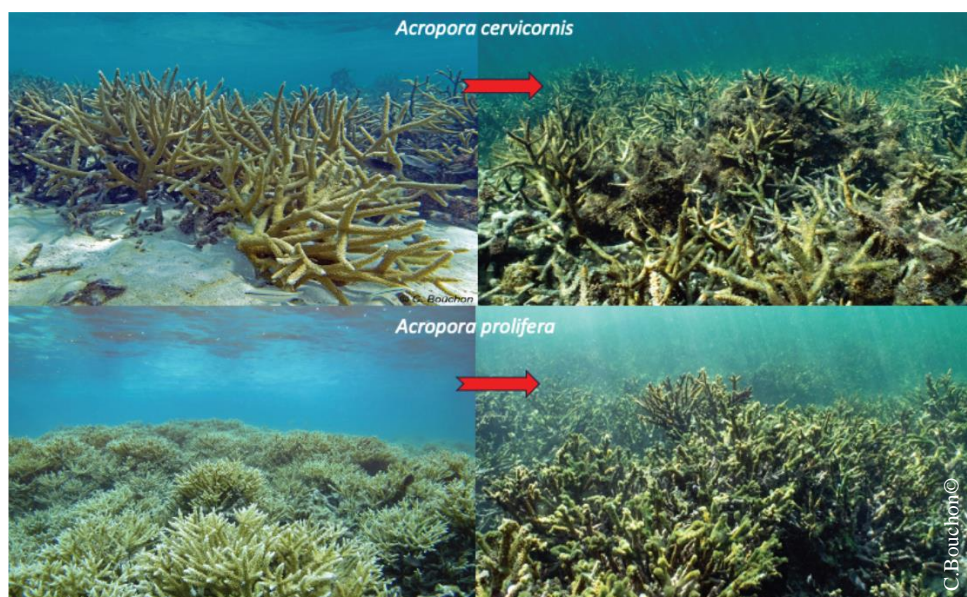


Fig. 5. Illustration of Acroporid colonies mortality observed in 2023 in the Grand cul-de-sac marin lagoon (Guadeloupe: Mège 2024).



In 2023 and 2024, the **Water Office of Guadeloupe** (ODE) funded a survey, conducted by **Créocéan**, during the peak of the 2023 bleaching event (Nov./Dec. 2023) and 6 months after (May/June 2024).

About 52% of coral colonies were impacted by the 2023 bleaching episode. Post-bleaching surveys performed in June 2024 on 4 reef sites highlighted a **coral mortality of 14%** that can be linked to the 2023 bleaching event, with mortality rates up to 60% in some sites (Créocéan 2024ab). Among the most sensitive coral species, 100% of *Acropora cervicornis* colonies, 94% of *Agaricia agaricites* colonies and about 65% of *Pseudodiploria strigosa* colonies are dead in 2024 (Créocéan 2024b).



Fig. 6. Illustration of the bleaching and mortality of *Acropora cervicornis* colonies between 2021 and 2024 (Guadeloupe: Créocéan 2024ab).



Post-bleaching surveys conducted by the private company **IGREC Mer** (Guadeloupean Initiative for the Restoration of Marine Ecosystems) on 5 sites between January and September 2024 highlighted high mortality levels of *Acropora palmata* colonies with rates between 90% to 98% among sites. From 40 to 50% of mortality have been recorded for *Porites porites* colonies and fire corals *Millepora* spp. On-going surveys until October 2024 underlined that the 2024 bleaching event impacted 80 to 95% of coral colonies (Marianne Aimar, pers. comm. Oct. 2024).

▪ Martinique



Cadre sur l'Eau) (Impact Mer 2023 & 2024).

In Martinique, three bleaching monitoring surveys were funded by the **Water Office of Martinique** (ODE) and conducted by **Impact Mer** between October 2023 and May 2024 on 12 reef sites of the Water Framework Directive (WFD – DCE Directive

These surveys highlighted that **81% of the coral cover of Martinique's reefs** was impacted by the 2023 bleaching event, leading to a **coral mortality of 34% in 2024** (Fig.7). Most sensitive coral species were: *Agaricia humilis* (94% of mortality), *Porites porites* (92%), *Acropora palmata* (81%), *Agaricia agaricites* (77%) as well as fire-corals *Millepora* spp. (75%).

Other reefal benthic communities, such as the encrusting gorgonians *Erythropodium caribaeorum* and zoanthids *Palythoa caribaeorum*, were also impacted (Impact Mer 2024).

Reef sites showing the highest coral mortality rates were also those with the highest sea temperatures recorded. Daily sea temperatures records using thermographs underlined the positive impact of short-term decrease of sea temperatures in some locations where benthic communities were less impacted by bleaching (Impact Mer 2024).

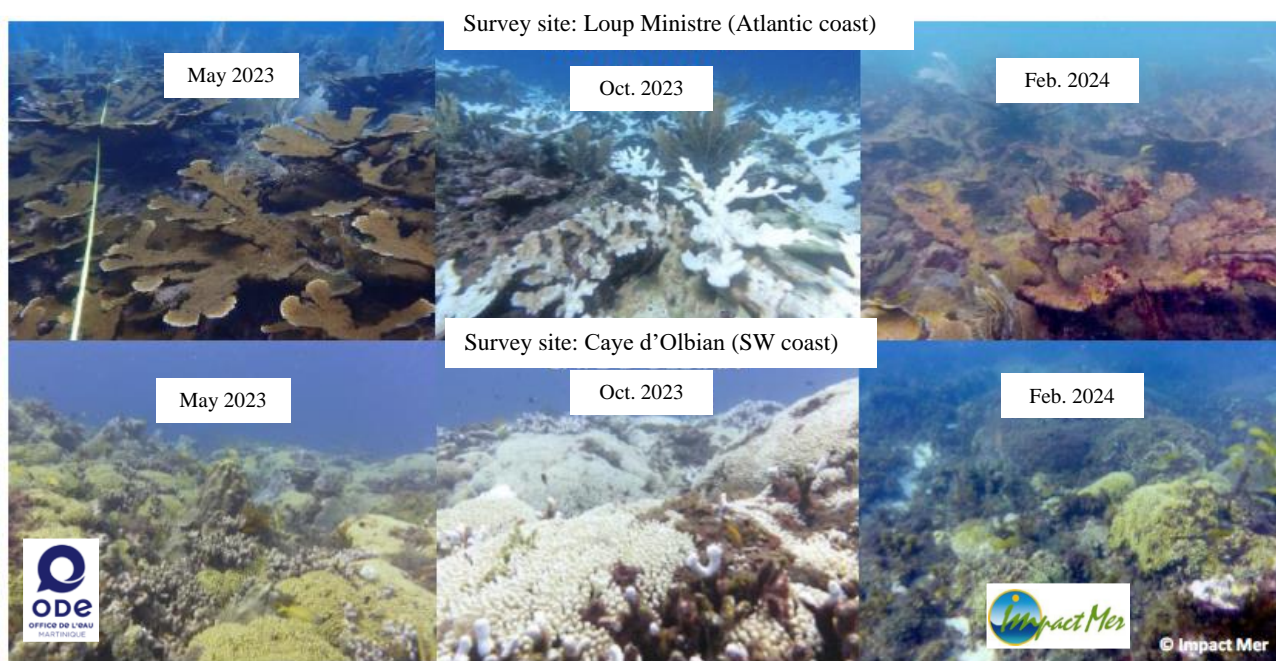


Fig. 7. Illustration of the bleaching and coral mortality observed in 2023 and 2024 in Martinique’s coral reefs (Martinique: Impact Mer 2023 & 2024).

Further surveys were conducted in November 2024 during the peak of the 2024 bleaching event and will be performed in 2025 in order to evaluate the impact of this second event on the Martinique’s coral reefs (fundings from DEAL Martinique and Natural Marine Park of Martinique (Parc Naturel Marin de Martinique)).



In 2023, the NGO ASSO-Mer reported **signs of bleaching followed by a high mortality of fragments of staghorn coral (*Acropora cervicornis*)** growing in coral nurseries (domes) as well as those transplanted on the reef. The move (from 8 to -18 meters deep) of 3 out of 6 domes conducted in September 2023 before the bleaching peak did not enable the recovery of the fragments. All the coral fragments in the nurseries are dead due to this bleaching event (Asso-Mer, pers. com. Jan. 2024).

Monitoring surveys conducted in December 2023 in Loup Caravelle reef site (Atlantic coast) showed that 30 % of coral colonies were impacted by the bleaching and that **24% of corals were recently dead** that can be linked to the bleaching event (Chourot et Tramoni 2023). Further surveys will be performed in November 2024 on this site to assess the impact of the on-going bleaching event (Chourot L., pers. com. Nov. 2024).

The ASSO-Mer will pursue its outreach and communication activities through citizen science to gather information on coral bleaching, recovery or mortality over Martinique’s reefs.



Fig. 8. Illustration of the bleaching of *Acropora cervicornis* fragments on the coral nursery of the Acropore project (Martinique: ASSO Mer, Chourot & Tramoni 2023).

■ Saint-Barthélemy



The **Territorial Environmental Agency of Saint-Barthélemy** (ATE- Agence Territoriale de l'Environnement) conducted field observations during the 2023 and 2024 bleaching events.

During the 1st semester 2024, low rates of coral mortality were reported over Saint-Barthélemy's reefs but with no quantitative data information on the impacted species or coral cover. At this time, the wide Acroporid colonies (*Acropora spp*) of the Bay of Grand Cul-de-sac showed no sign of bleaching and were still a thriving coral reef (ATE pers. com. June 2024, Vaslet et Bissery 2024).

In October 2024, **almost all *Acropora palmata* and *A. prolifera* colonies of the Bay of Grand Cul-de-sac**, as well as most *Porites porites* colonies and fire corals *Millepora spp.*, **were impacted by bleaching** (Fig.9, ATE pers. com. Nov. 2024).

A quantitative survey of the coral bleaching and mortality will be conducted in November 2024 on 2 GCRMN sites (performed by EcoRécif Environnement and funded by ATE of St-Barthélemy).



Fig. 9. Illustration of the bleaching of wide Acroporid colonies in the Bay of Grand cul-de-sac Bay between May and October 2024 (St-Barthélemy: ATE).

▪ Saint-Martin



Quantitative surveys of Saint-Martin's coral reefs were conducted in September 2024 by **AquaSearch, SeaLens & Stegastes Consulting** and funded by **Ifrecor / UT DEAL St-Barthélemy -St-Martin (UT DEAL SBSM)** (Ministry in charge of the Environment).

During this survey, relatively low coral cover was reported, with values ranging between 2% to 10% among sites; values also observed in the previous surveys performed in 2022. In 2024, a significant increase of macroalgae cover was highlighted, with values higher than 50% and the presence of cyanobacteria in several sites.

In September 2024 few bleaching coral colonies were observed (mostly *Porites porites*, *P. astreoides*, *Pseudodiploria spp.*). This survey conducted about 9 months after the 2023 bleaching peak does not enable to rely directly the observed trends and coral mortality rates to this event (AquaSearch-SeaLens-Stegastes Consulting, pers. com. Oct. 2024 – report in progress).



Mid-October 2024, the **NGO managing the National Reserve of Saint-Martin** (Association de Gestion de la Réserve Naturelle Nationale de Saint-Martin - **AGRNSM**) performed field observations on 10 reef sites within and nearby the Reserve.

At this time, sea temperature higher than 31°C was recorded. The overall coral reefs prospected showed bleaching signs **impacting between 75% to 95% of coral colonies**. Several species appeared to be particularly sensitive to bleaching: *Porites porites*, *P. astreoides*, *Siderastrea sp.*, *Colpophyllia natans*, *Orbicella annularis*, *Stephanocoenia mechelini*, *Madracis sp.*, *Acropora palmata*, *A. cervicornis*, as well as fire-corals *Millepora spp* (Fig. 10). Other reefal benthic species such as encrusting gorgonians, some Sea Plumes and Sea fans, also showed signs of bleaching (Julien Chalifour - AGRNSM, pers. com. Oct. 2024).

Further surveys will enable to assess the impact of the 2024 bleaching event on coral colonies.



Fig. 10. Illustration of coral colonies bleaching on Saint-Martin's reefs in October 2024 (Saint-Martin: AGRNSM).

References

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Citation of this note:

Vaslet A. 2024. IFRECOR – French Lesser Antilles – Report of coral bleaching surveys in 2023/2024, 10p & one appendix.

Glossary

AGRNSM – NGO Manager of the St-Martin National Reserve (Terrestrial and Marine Park) / Association de Gestion de la Réserve Naturelle Nationale de Saint-Martin

ATE – Territorial Environmental Agency of St-Barthélemy / Agence Territoriale de l'Environnement de St-Barthélemy

DEAL – French Ministry in charge of the Environment / Direction de l'Environnement, de l'Aménagement et du Logement

GPMG – Maritime Port of Guadeloupe / Grand Port Maritime de Guadeloupe

Ifrecor – French Coral Reef Initiative / Initiative Française pour les RÉcifs CORalliens

IGREC Mer – Guadeloupean Initiative for the Restoration of marine ecosystems / Initiative Guadeloupéenne pour la Restauration des Ecosystèmes marins

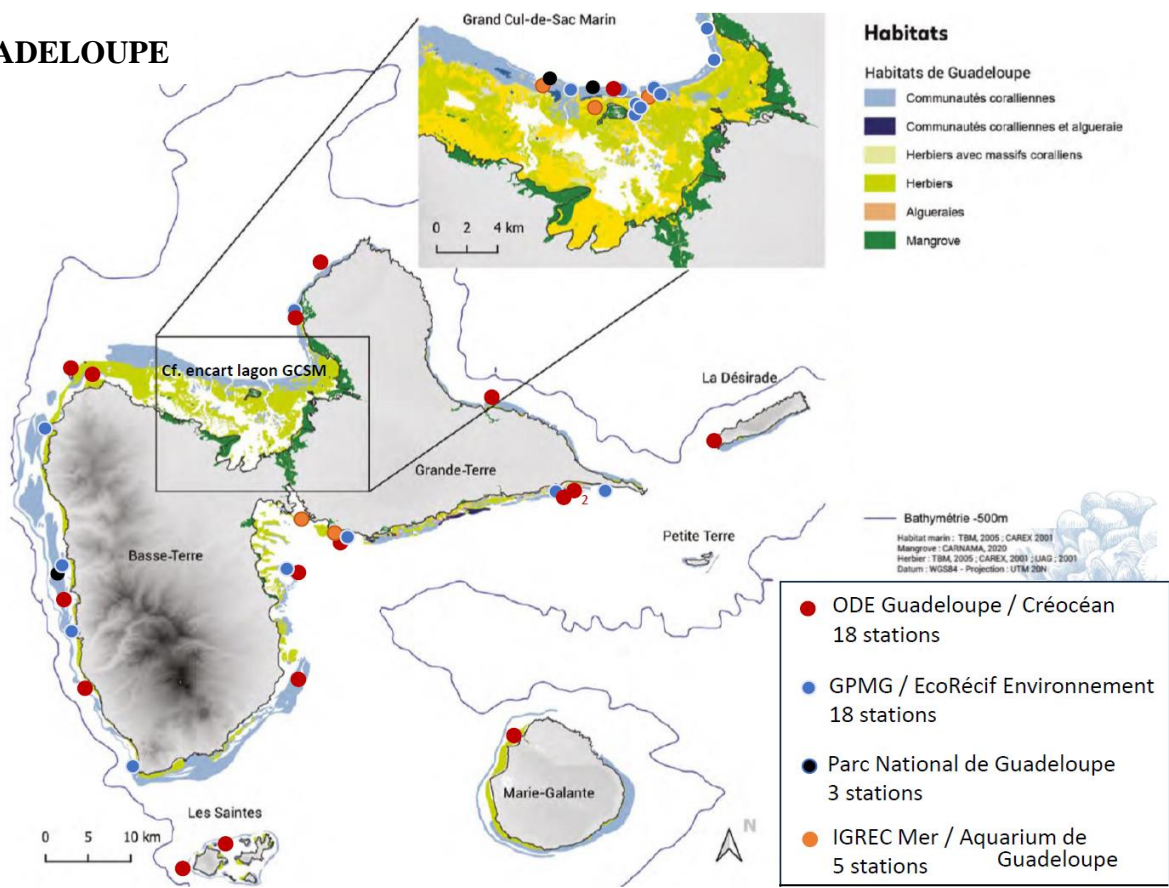
ODE – Water Office / Office De l'Eau

PNG – National Parc of Guadeloupe / Parc National de la Guadeloupe

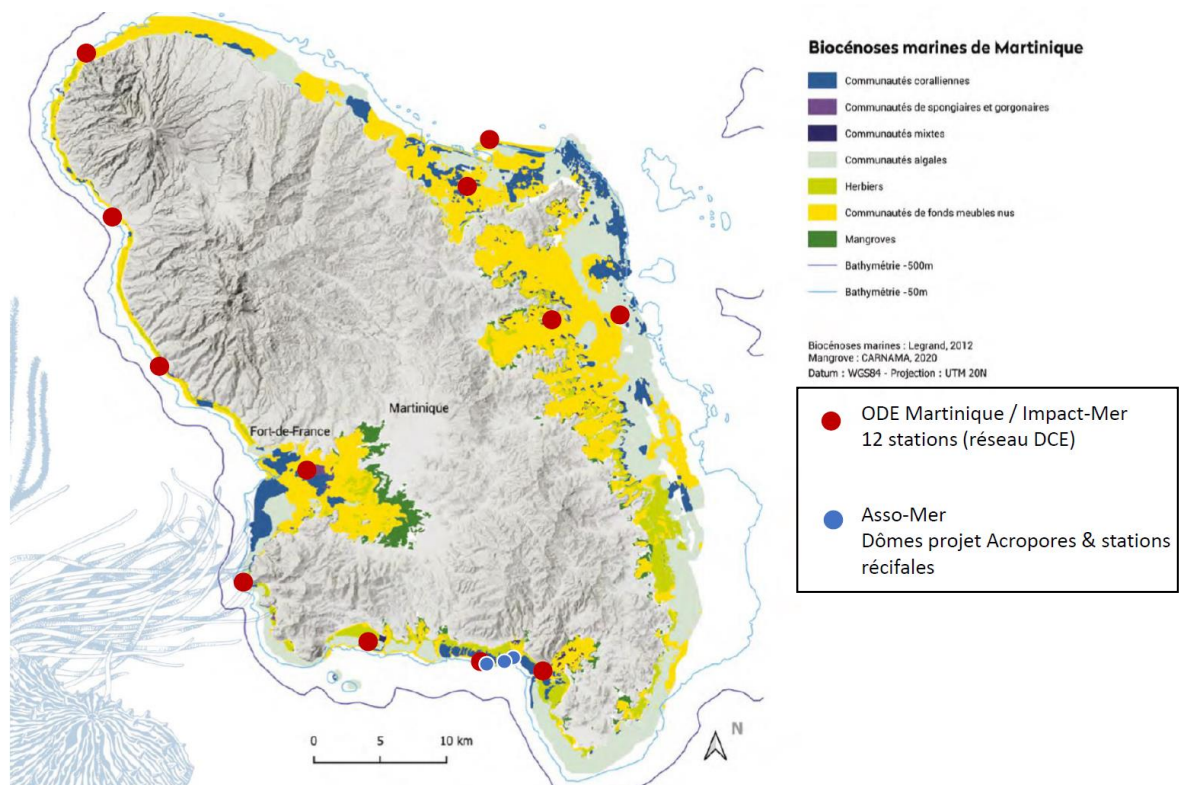
WFD – Water Framework Directive / DCE – Directive Cadre sur l'Eau

Appendix 1 - Location of the coral reef sites surveyed in the French West Indies in 2024 following the bleaching event.

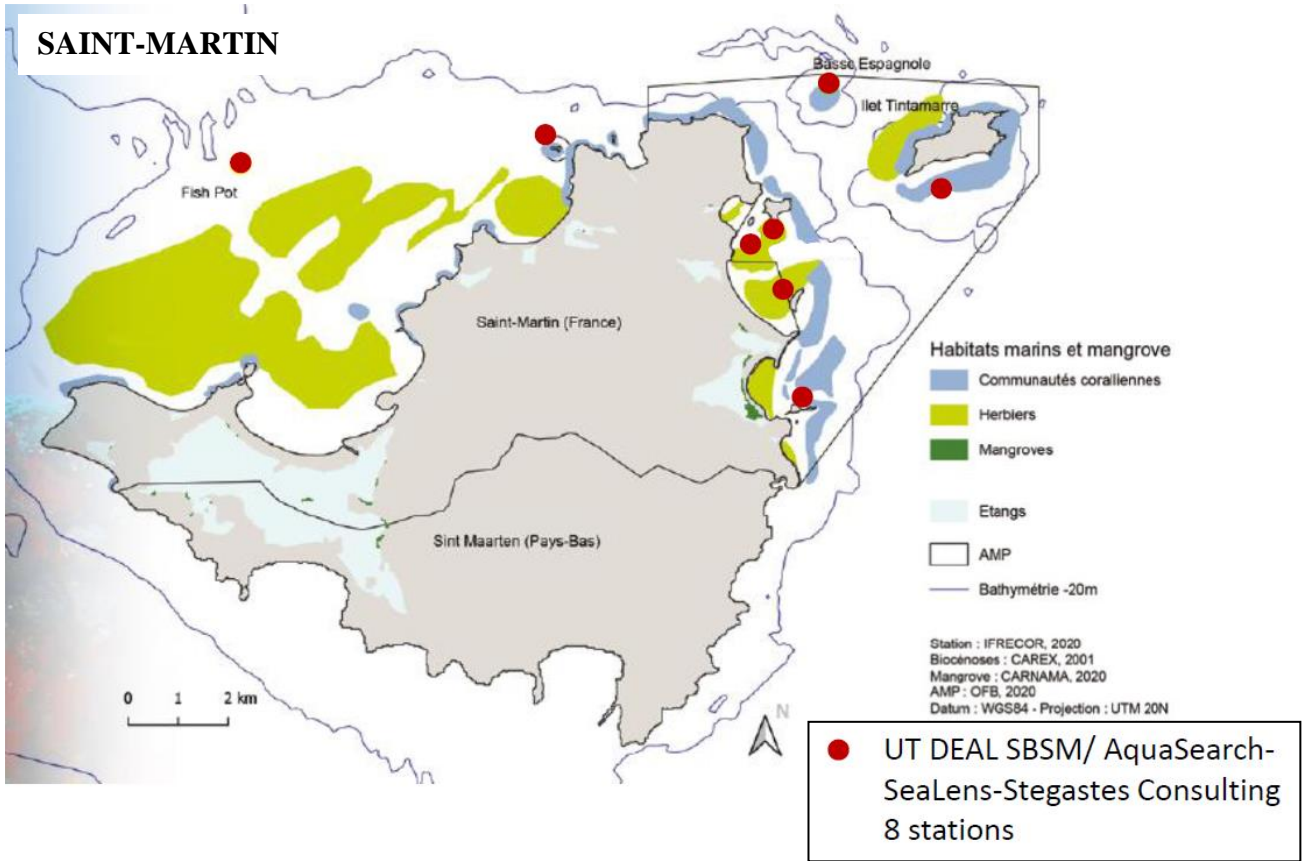
GUADELOUPE



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SAINT-MARTIN



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