



Parc national
de la Guadeloupe



Estimation de l'abondance des Oursins blancs (*Tripneustes ventricosus*) et des Oursins verts (*Lytechinus variegatus*) dans les herbiers de Phanérogames marines de Guadeloupe (Petites Antilles)

Long-term monitoring of white sea urchins (*Tripneustes ventricosus*) and green sea urchins (*Lytechinus variegatus*) in the marine seagrass beds in Guadeloupe (Lesser Antilles)

Monitoreo a largo plazo de erizos de mar blancos (*Tripneustes ventricosus*) y erizos de mar verdes (*Lytechinus variegatus*) en las praderas de fanérogamas marinas de Guadeloupe (Antillas Menores)

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1-Parc National de la Guadeloupe 2-EcoRécif Environnement



National Park of Guadeloupe

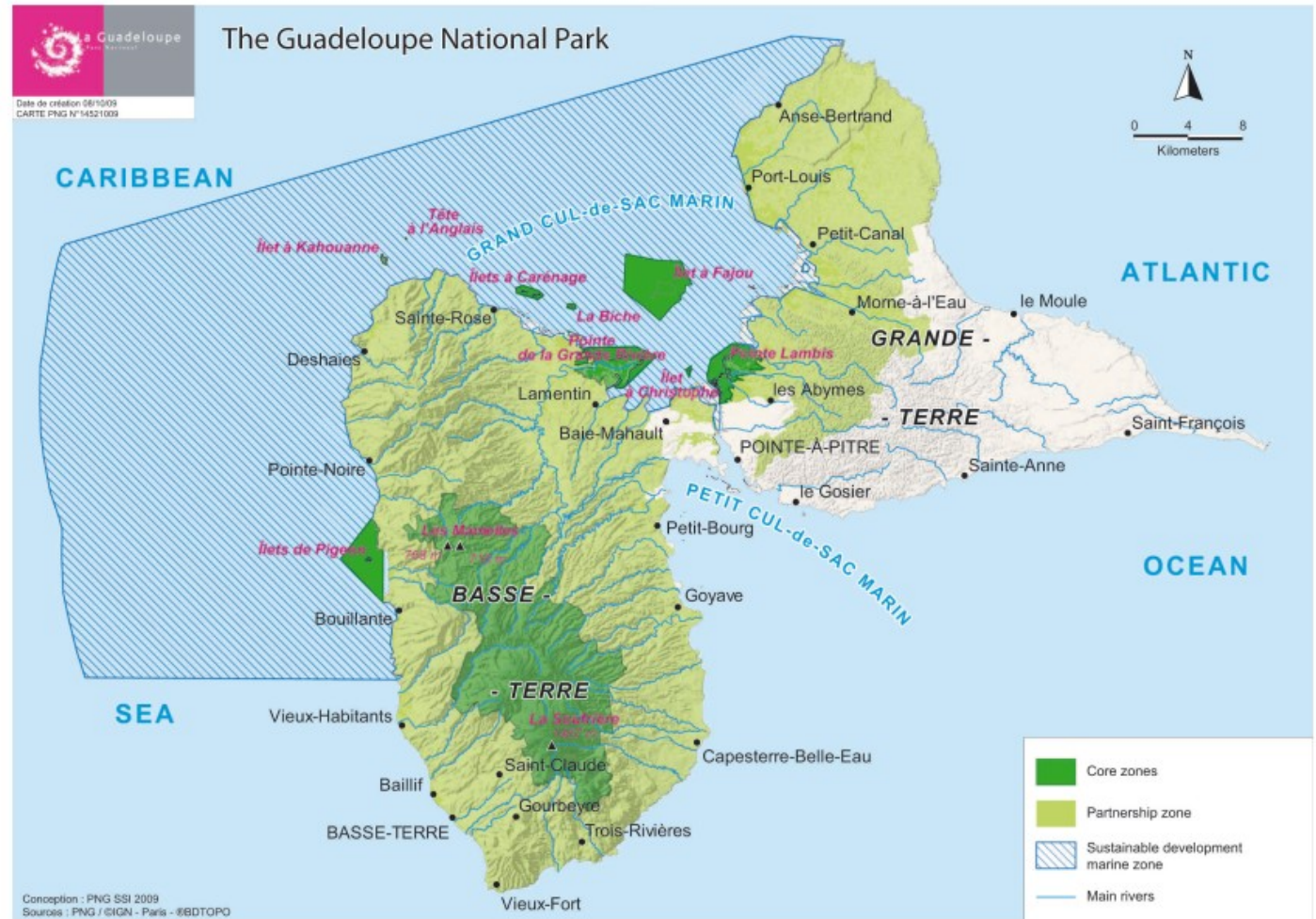
Created in 1989

Marine and terrestrial cores :

21 850 ha (5000 ha of marines cores)

A partnership area of **94 000 ha**
(10 towns with a marine frontier)

A sustainable development
marine zone of **130 000 ha**



Ecosystems : mangroves, seagrass beds, coral reefs, swamp forests, tropical forests...

The study species



Tripneustes ventricosus
(white sea urchin)

Habitat : Seagrass beds and coral reefs invaded by macroalgae

Food : Algae, seagrass leaves

Reproduction : sexual (two spawnings per year, one during the dry season, one during the wet season) – aggregative behavior

Sexual maturity : 6,5 cm

Important consumption in the lesser Antilles

Fishing regulation



Lytechinus variegatus
(green sea urchin)

Habitat : Seagrass beds

Food : Algae, seagrass leaves

Reproduction : sexual (march to october)

Sexual maturity : 4 cm

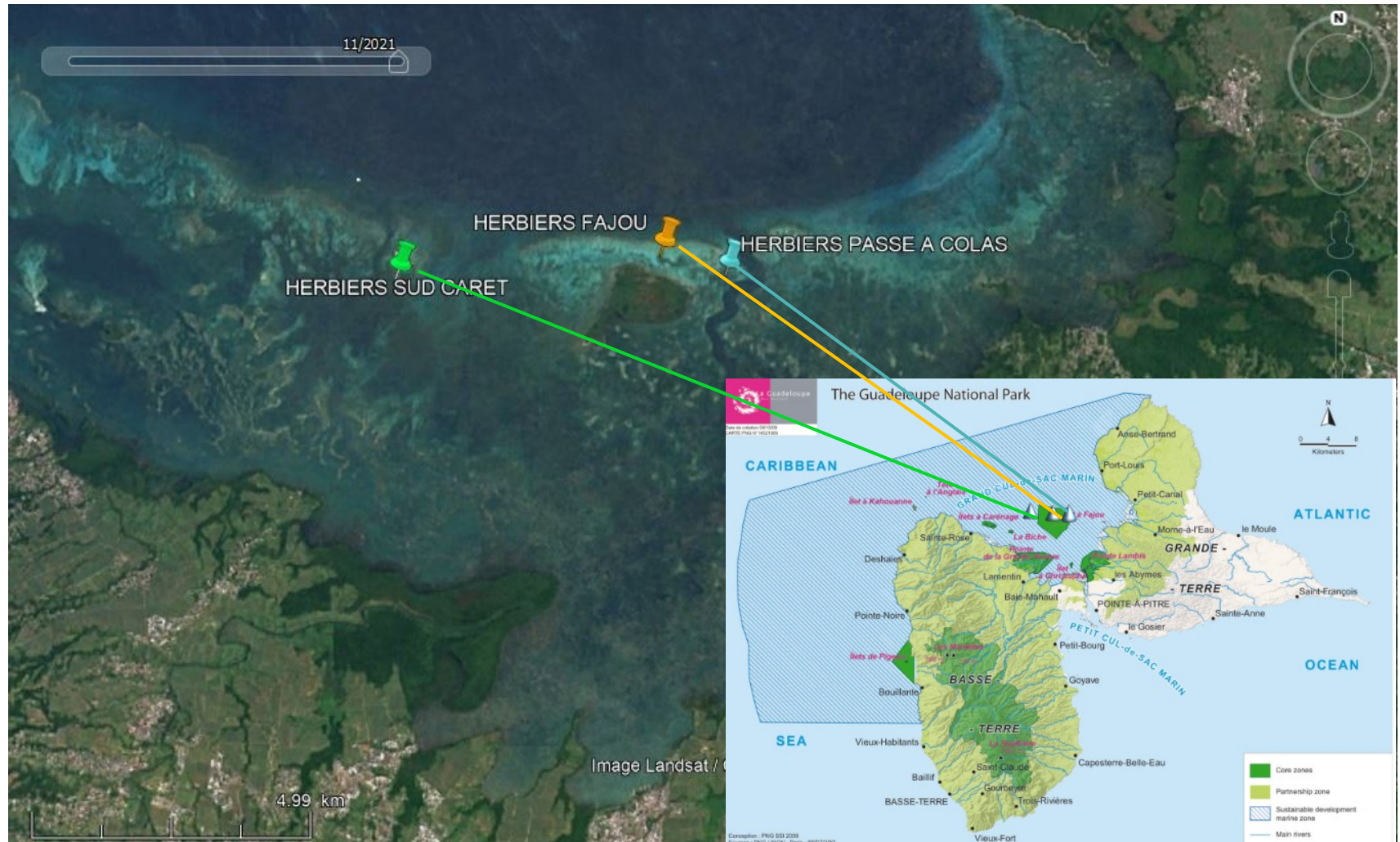
No consumption in the lesser Antilles

No fishing



The study sites

Two sites in the National Park core and another one in the sustainable development marine zone

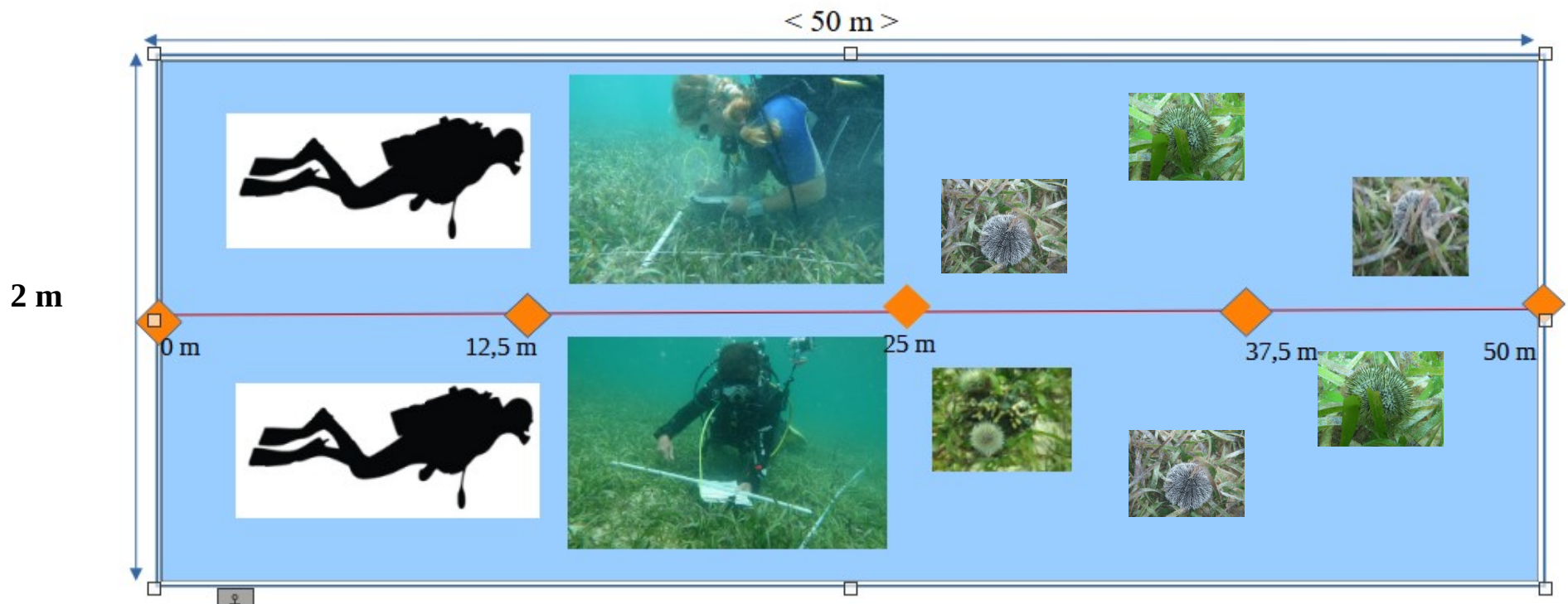
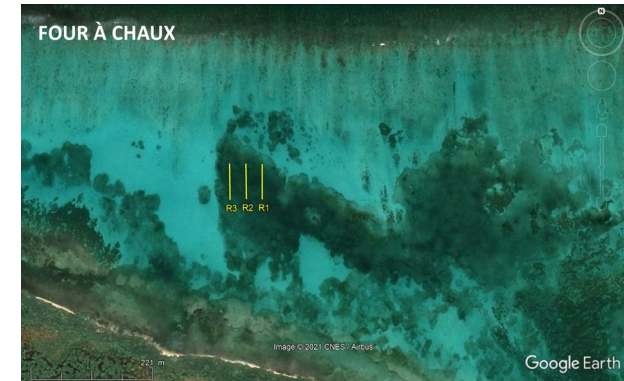


Method

3 fixed transects for the 3 sites (length: 50 m - width: 2m) – Studied surface: 300 m²

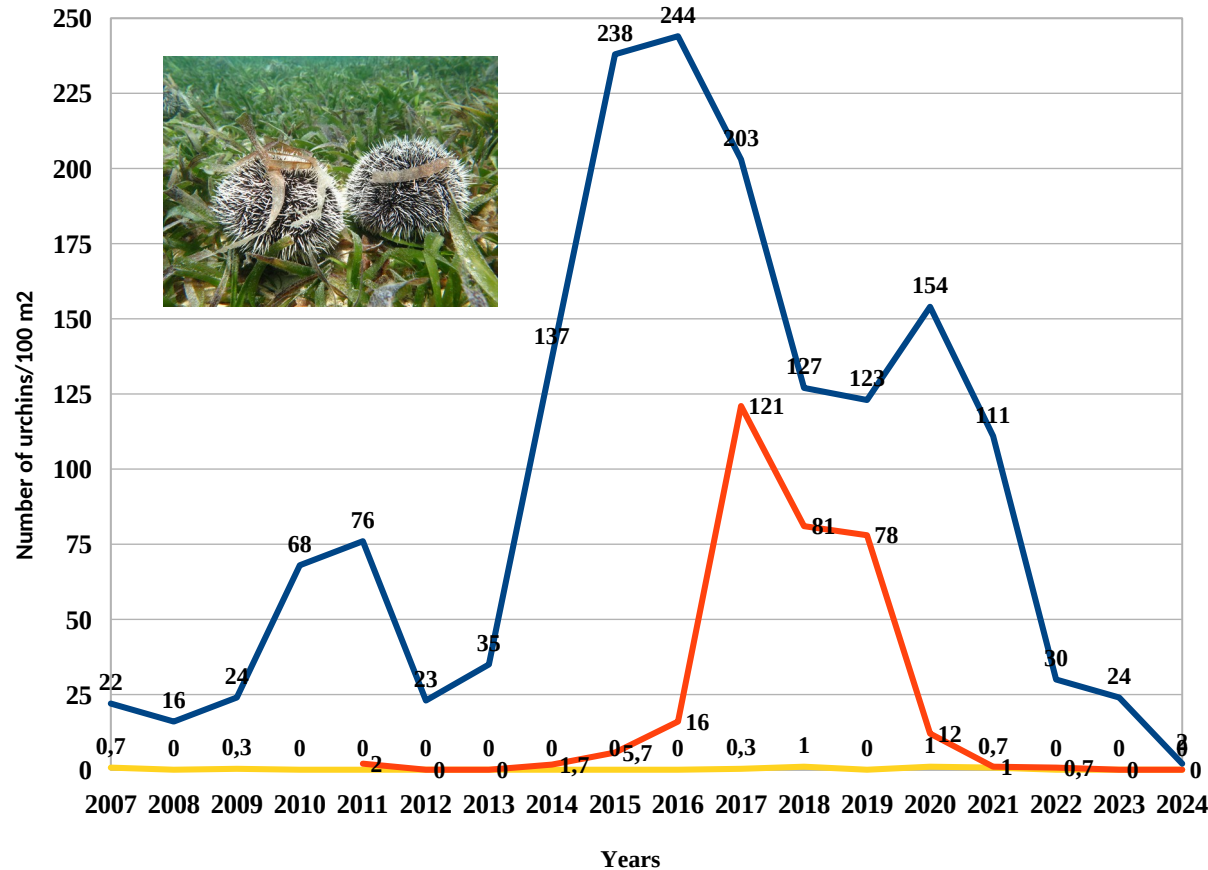
In the transects:

- Counts and measurements of white sea urchins (*Tripneustes ventricosus*) ;
- Counts of green sea urchins (*Lytechinus variegatus*).



Results

Evolution of the density of white sea urchins (*Tripneustes ventricosus*) (2007 - 2024)



➡ In the cores :

- 5925 white sea urchins for 9600 m² = 1,15 ind/m²

➡ In the sustainable development marine zone :

- 13 white sea urchins for 5400 m² = 0.002 ind/m²

— Fajou (Core)
— Passe à Colas (Core)
— Caret (AMA)

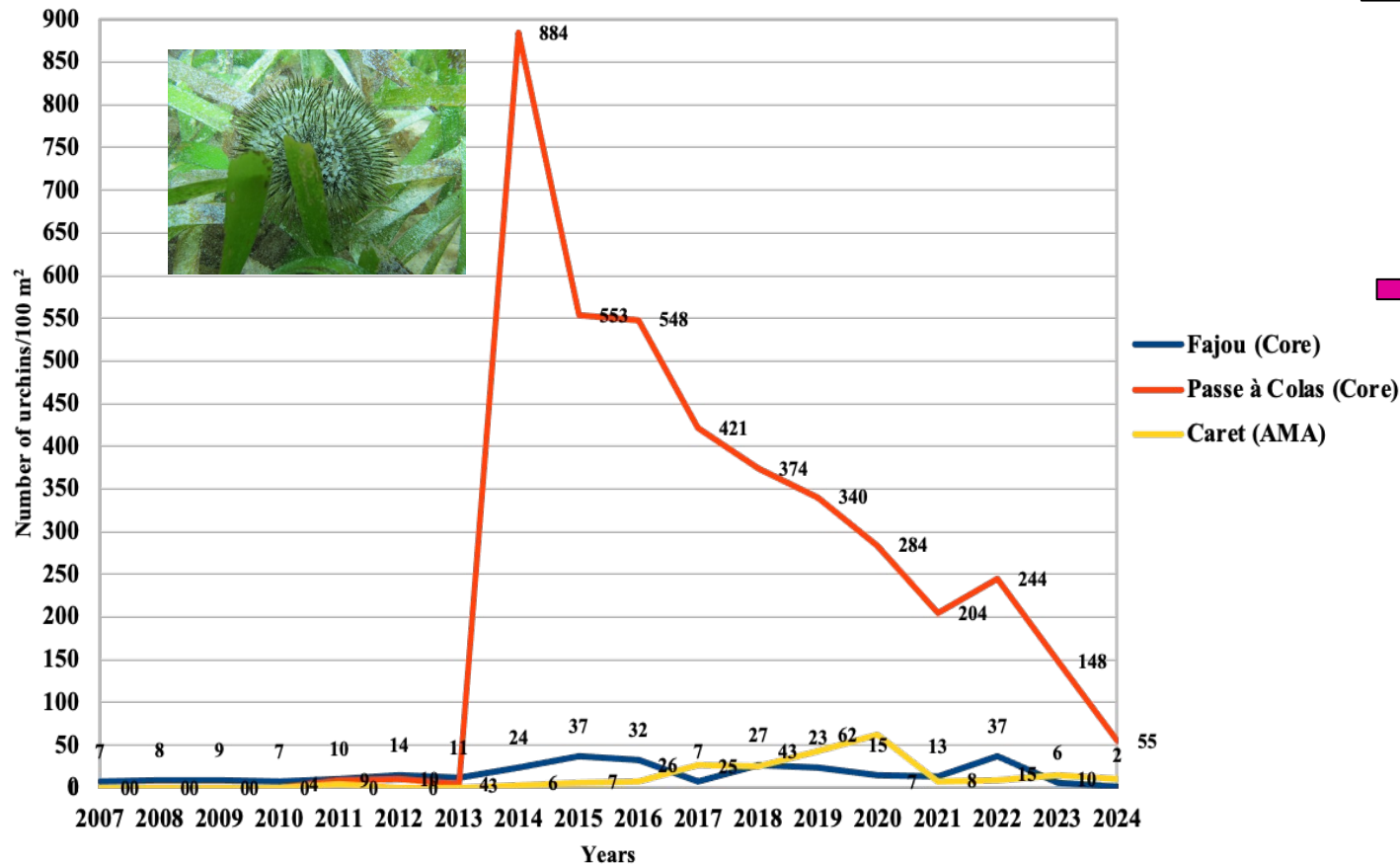
Decrease of populations for the site « Fajou » and the site « Passe à Colas »

Average number of *Tripneustes ventricosus* (ind/m²)

Sites	2007 – 2024	2011 – 2024	2024	Decrease
Fajou	0,92		0,02	98 %
Passe à Colas		0,23	0	100 %
Caret	0,002		0	100 %

Results

Evolution of the density of green sea urchins (*Lytechinus variegatus*) (2007 - 2024)



➡ In the cores :

- 13063 green sea urchins for 9600 m² = 3,06 ind/m²

➡ In the sustainable development marine zone :

- 647 green sea urchins for 5400 m² = 0.12 ind/m²

Decrease of populations for the site « Passe à Colas »

Average number of *Lytechinus variegatus* (ind/m²)

Stations	2007 – 2024	2011 – 2024	2024	Decrease
Fajou	0.15		0.023	85 %
Passe à Colas		2.91	0.55	81 %
Caret	0.12		0.096	20 %

Hypotheses

Quality of the water (Payne, 2003)

- Nutrients and organic pollution affect gametes and embryos of white sea urchins

Global warming (Payne, 2003)

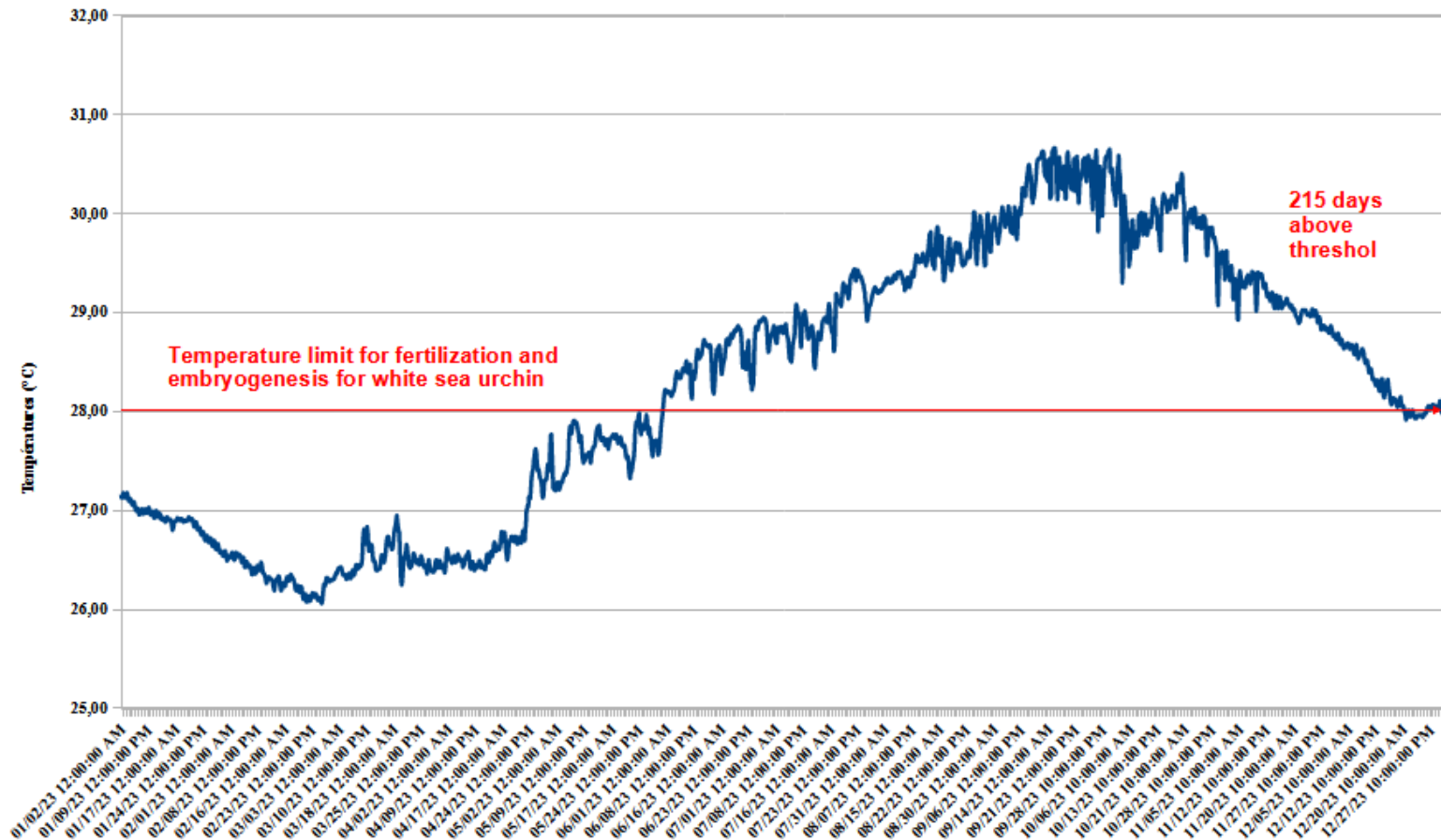
- Increase of the temperature above 28°C => negative impact on fertilization and embryogenesis
- Increase of the temperature above 32°C => more important impacts, sea urchins use their energy to stay alive and female could use less energy to product eggs.

Evolution of the sea temperature above 28°C in Guadeloupe island from 2012 to 2024

Year	Depth	T°>28°C	Duration (days)	T° max	Date	Month	Fajou site		Passe à Colas		Caret site	
							<i>Tripneustes ventricosus</i>	<i>Lytechinus variegatus</i>	<i>Tripneustes ventricosus</i>	<i>Lytechinus variegatus</i>	<i>Tripneustes ventricosus</i>	<i>Lytechinus variegatus</i>
2012	10 m	08/06/12	187	29,8°C	07/10/12	September	68	41	0	31	0	0
2016	23 m	25/04/16	247	29,9°C	22/09/16	August	732	96	48	1645	0	22
2017	23 m	23/05/17	210	29,6°C	04/09/17	October	607	22	362	1263	1	77
2018	23 m	18/06/18	168	29°C	10/09/18	June	382	82	243	1122	4	76
2019	23 m	21/06/19	193	29,9°C	08/09/19	June	369	70	235	1019	0	129
2020	23 m	21/05/20	198	29,9°C	25/09/20	June	462	46	37	852	3	186
2021	23 m	04/07/21	154	29,6°C	01/10/21	June	332	39	4	612	2	21
2022	23 m	25/05/22	193	29,5°C	14/09/22	June	90	93	2	733	0	24
2023	23 m	30/05/23	215	30,7°C	14/09/23	June	71	17	0	444	0	45
2024	23 m	22/03/24	142 (until 20/08/2024)	29,9°C		June	5	7	0	164	0	29

Hypotheses

Global warming



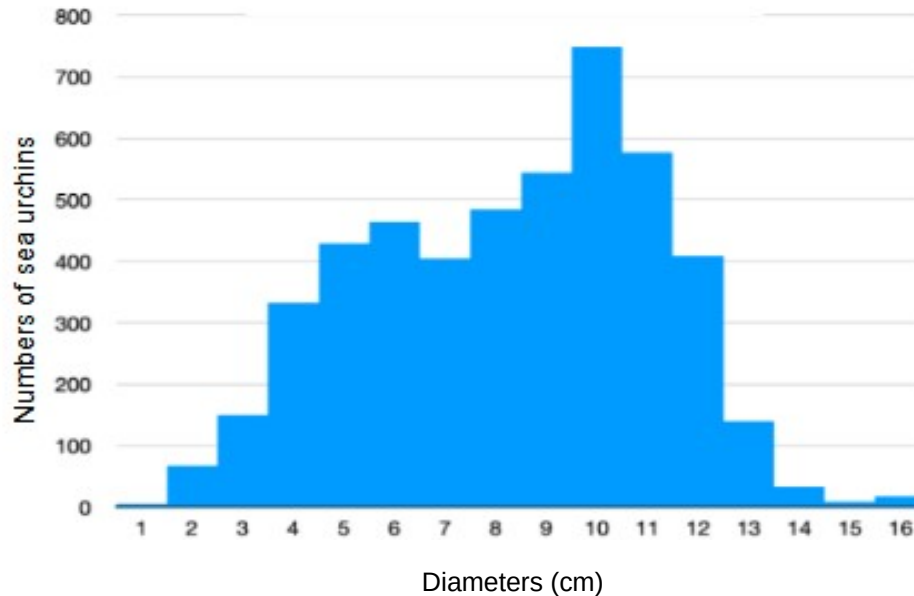
Variations of seawater temperatures on the barrier reef
of the Bay of Grand Cul-de-Sac Marin in 2023 (-23 m)



Hypotheses

Predation : the helmet gastropods (Cassidae) ; certain reef fishes (trigger fishes...)

Recruitment : observed populations are dominated by adults.



□

Frequency histogram of the size of the sea urchin test of *Tripneustes ventricosus* for the site of Fajou

Fajou site (core of the National Park)			
Size/age for the white sea urchins		Numbers	Percentage
<6,50 cm	immature sea urchin	1651	33 %
Between 7 and 16 cm	Average adult size	3332	67 %

Passe à Colas site (core of the National Park)			
Size/age for the white sea urchins		Numbers	Percentage
<6,50 cm	immature sea urchin	251	26 %
Between 7 and 16 cm	Average adult size	713	74 %



Conclusions

SEA URCHINS POPULATION DECLINE

- Environmental factors ?
 - Global warming, pollution ...
- Biological factors ?
 - Low recruitment rate, predation,
 - Hazardous fluctuations of populations
- Management factors ?
 - Protective measures can be improved...



Monitoring program must go on.





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Thank you for
your attention !



Questions ?

