



# Are we forgetting our fish spawning aggregations?

Institutional amnesia and shifting baselines.

Stuart Fulton



**COBI**

Comunidad y Biodiversidad



Arrecife rocoso y coralino  
(Golfo de México)

Rocky reef and coral reef (Gulf of Mexico)

Arrecife coralino (Mesoamericano)  
Coral reef (Mesoamerica)

Comunidades  
Communities

Bosque de sargazo gigante  
(Océano Pacífico)

Kelp forests, (Pacific Ocean)

Arrecife rocoso (Golfo de California)

Rocky reef (Gulf of California)

- What are fish spawning aggregations?
- Why are they important?
- The MAR's fish spawning aggregations
- Shifting baselines
- Historical memories
- Institutional amnesia – what is it and how does it affect our work?
- What can we do about it?

# Many fish form spawning aggregations



Spawning aggregations are massive concentrations of fish that form for the purpose of reproduction.



They occur at specific times, places and moments:

- Time of the year

- Moon phases

- Biophysical characteristics of the site (bottom relief and depth)

⑦ 300 species of fish belonging to 44 families

# Types of spawning aggregations

## Transitory

Fish migrate long distances

Brief (days-weeks)

Specific times of the year

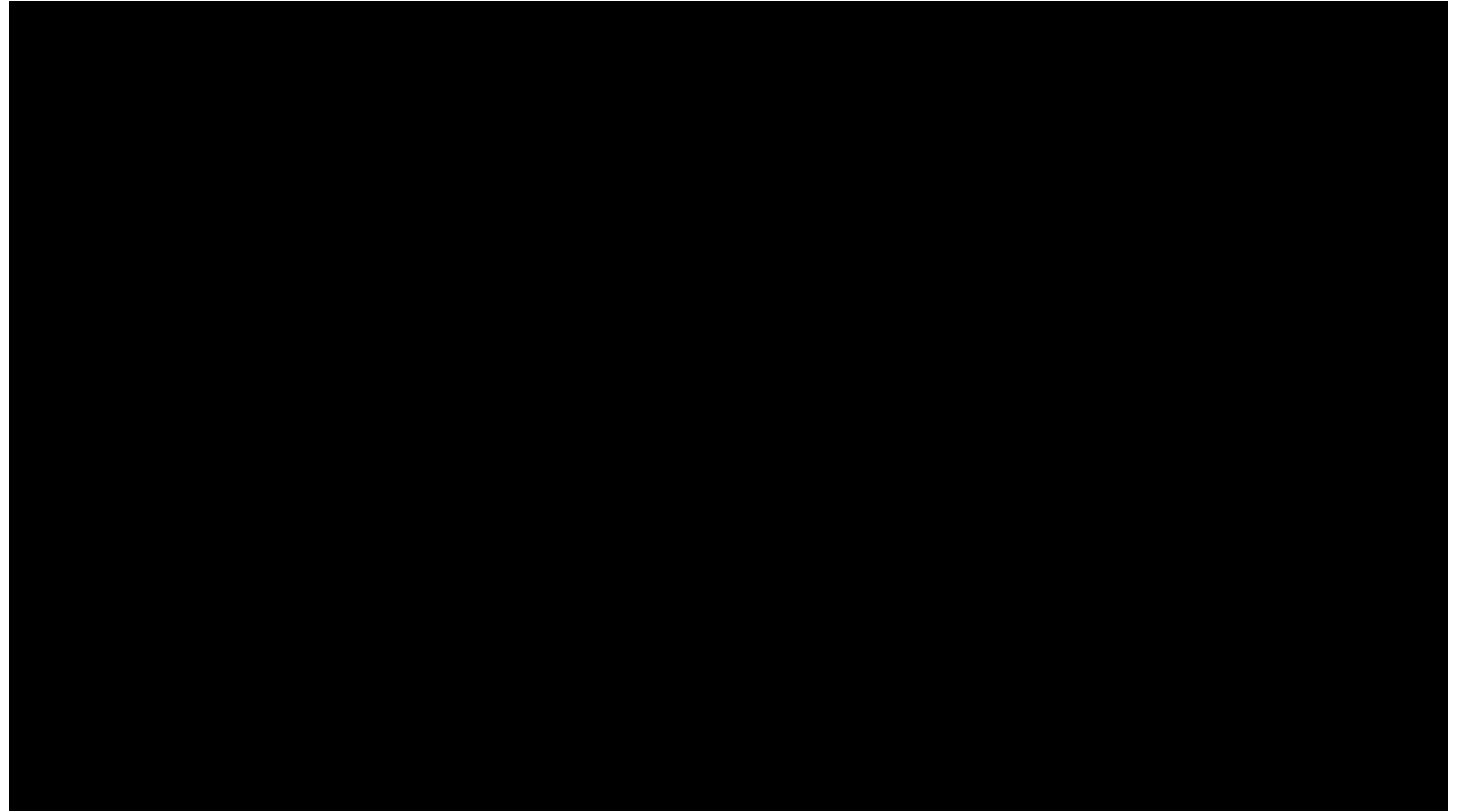
Higher predators

## Resident

Fish travel short distances

They last for months or all year

Close to/inside its range







They are temporary pockets of productivity that impact food networks.

There are high concentrations of food resources in the aggregations.

Stability, structure, function and health of reef ecosystems.

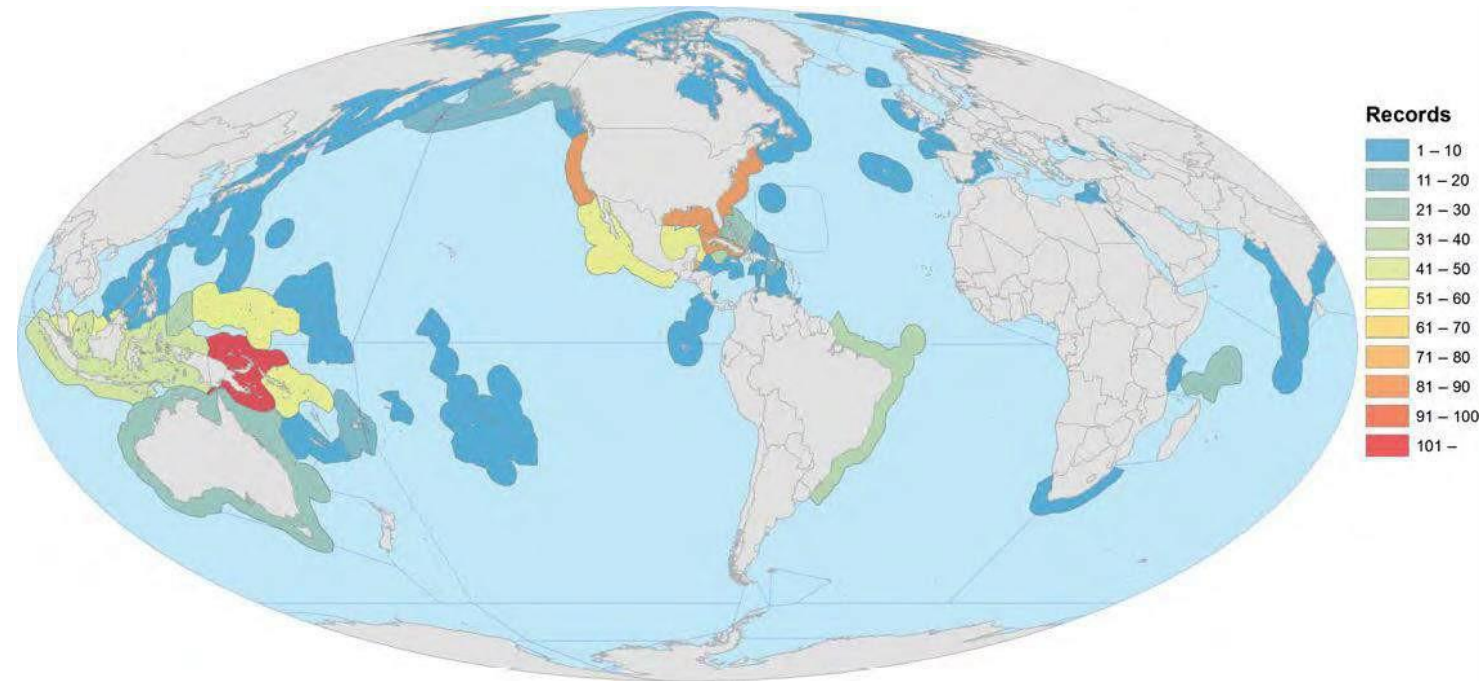
They are associated with synchronized migrations of large predators



Some animals feed on fish eggs.



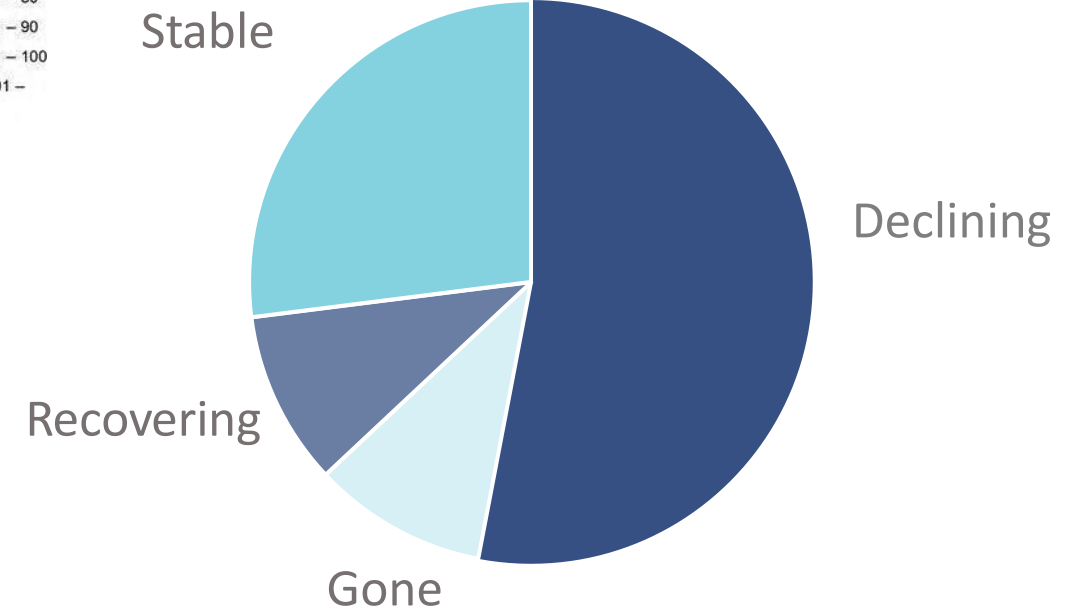
FSA have been observed in almost all marine regions and habitat types

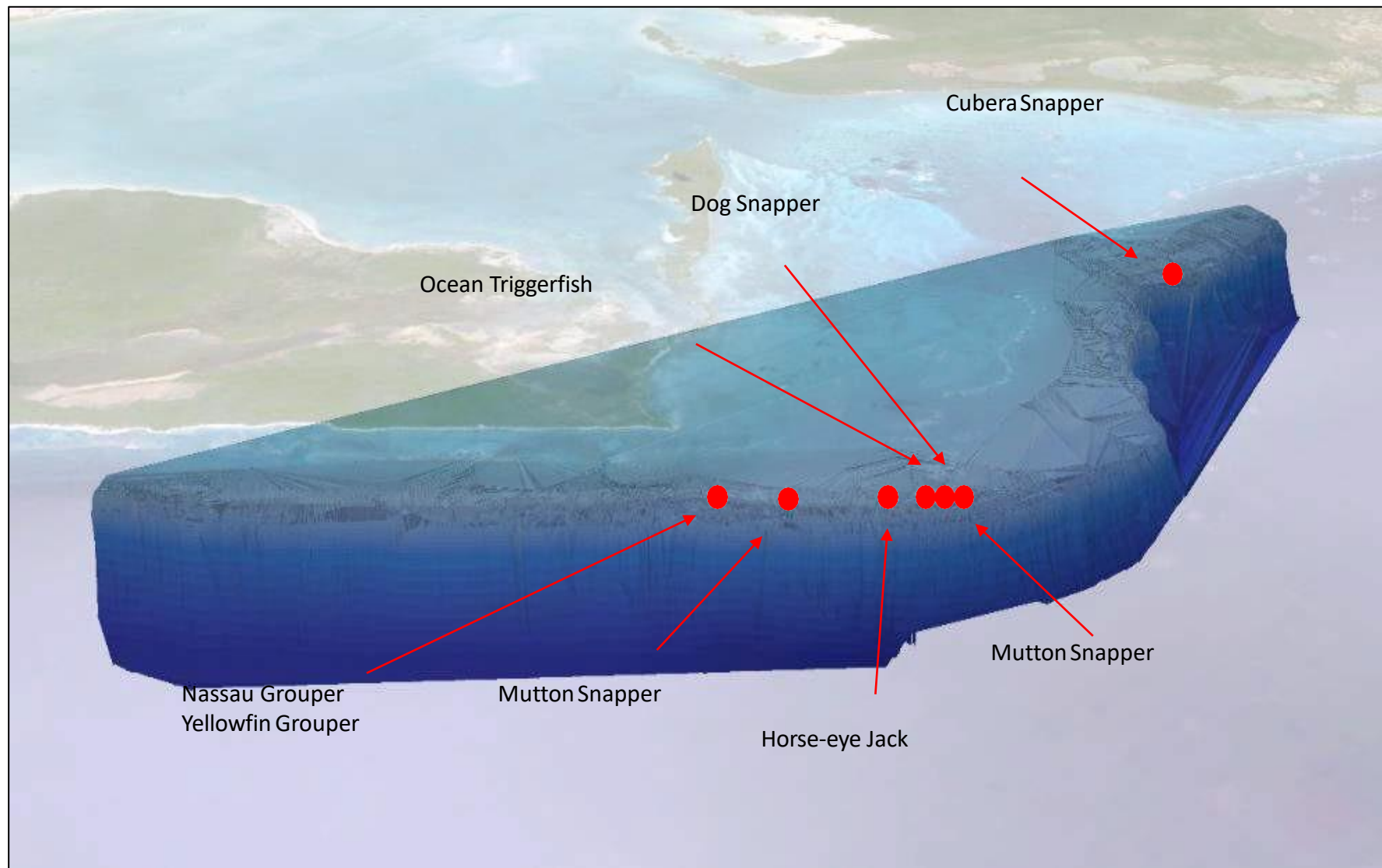


52% of fish aggregations have not been evaluated

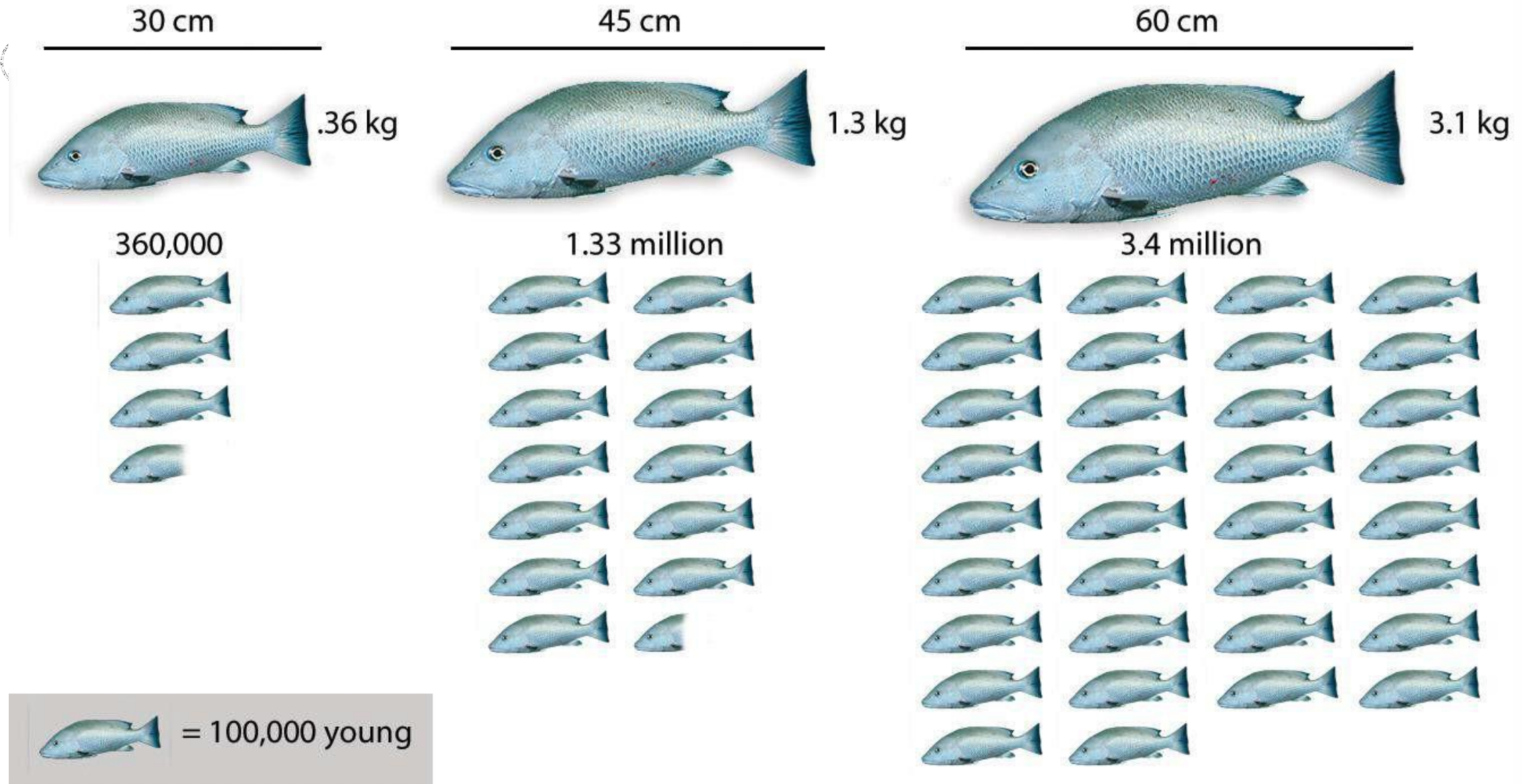
<35% of fish aggregations are protected

Only 25% of aggregations are monitored





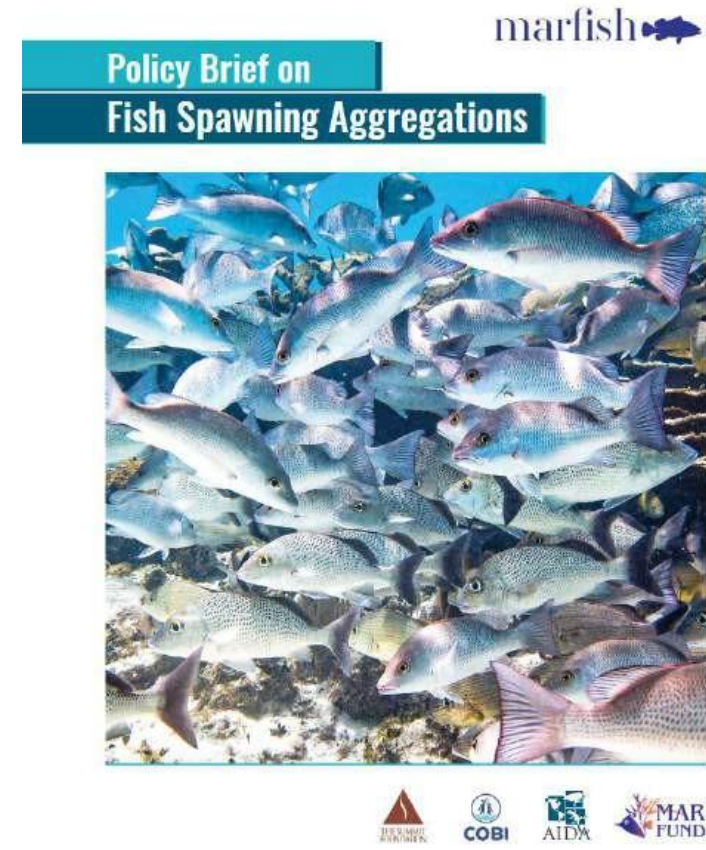




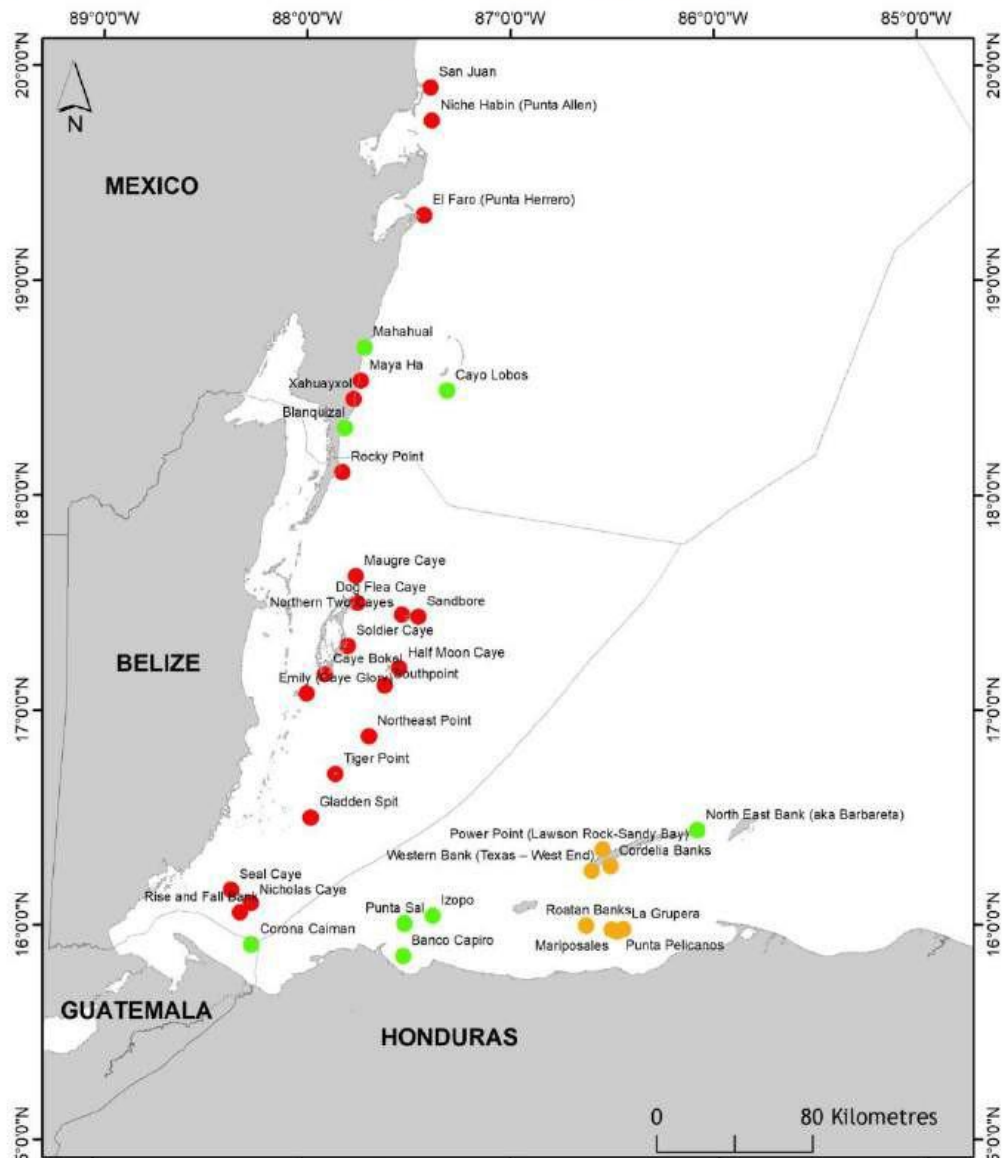
Average numbers of young produced by three different sizes of gray snapper.  
*Data: Bortone & Williams (1986) US Fish and Wildlife Service Biological Report*

## Regional activities

- Standardization of monitoring protocols
- Status report on FSAs
- Multistakeholder workshops
- Policy brief

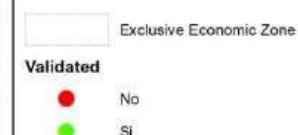
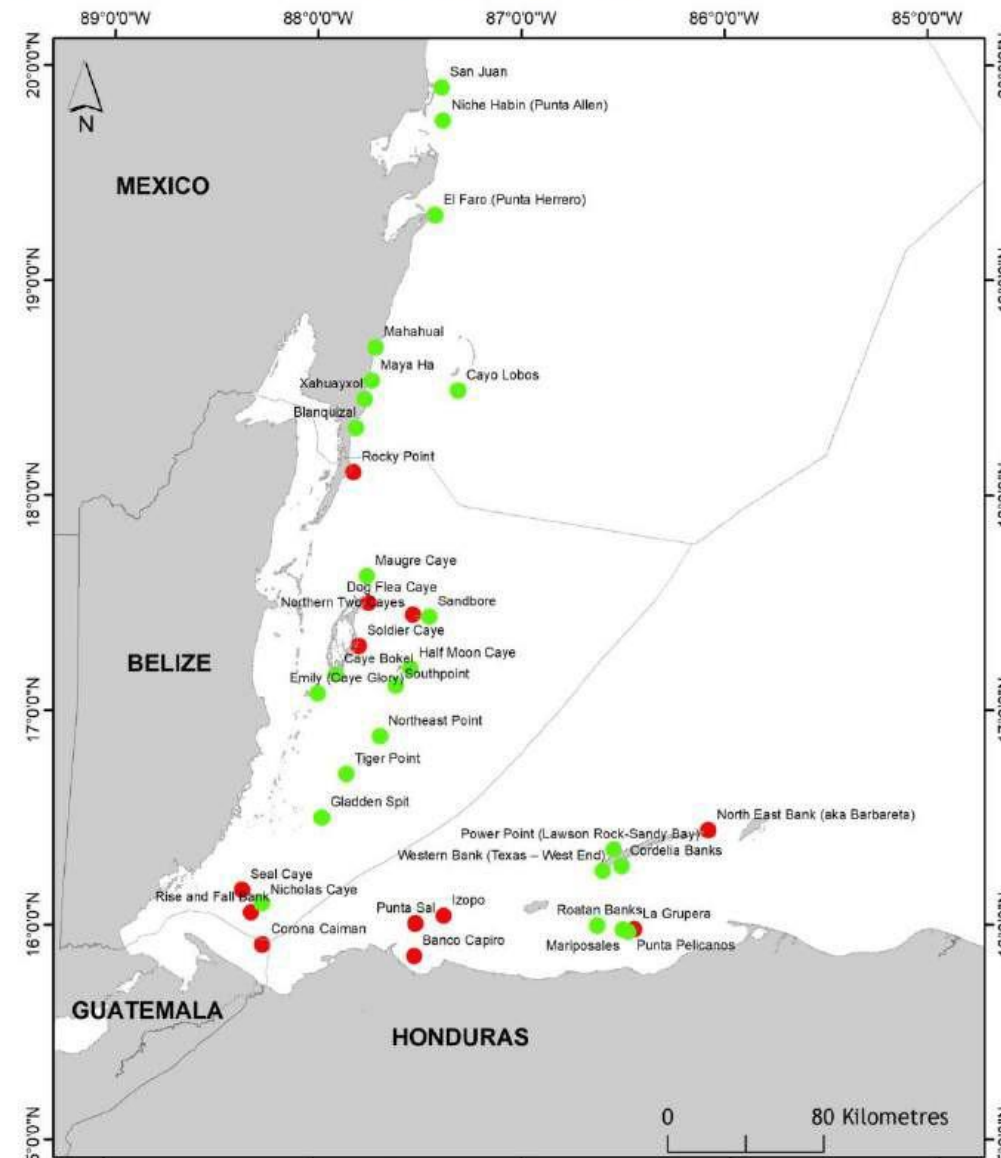


MAR FSA sites 2020 - Protected



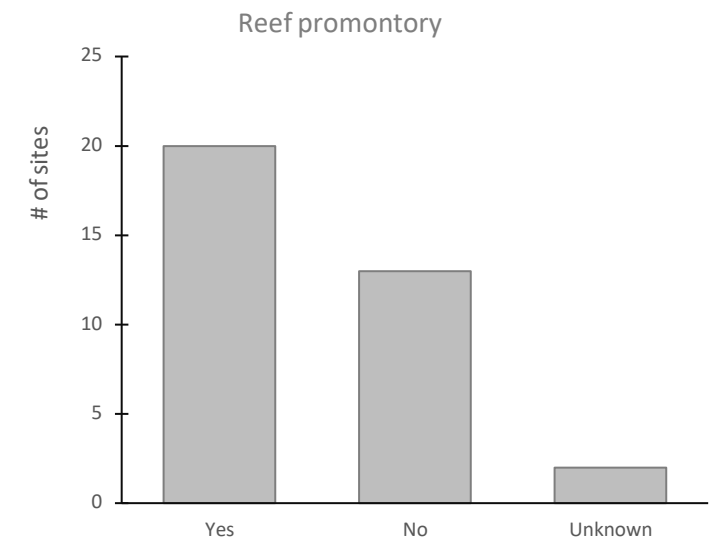
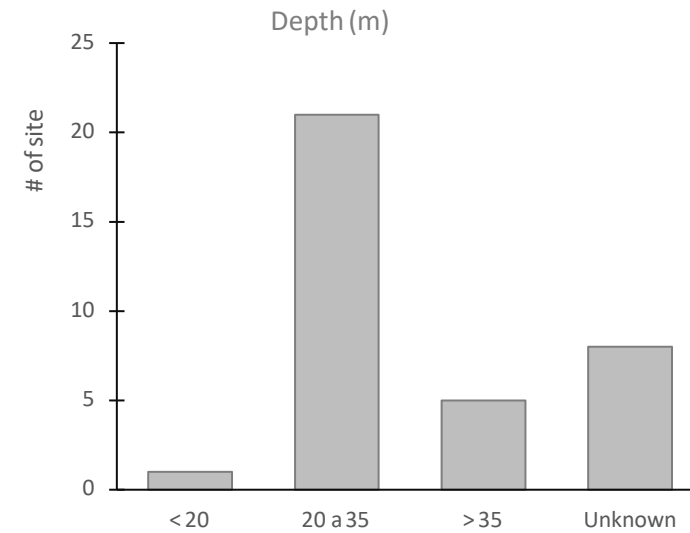
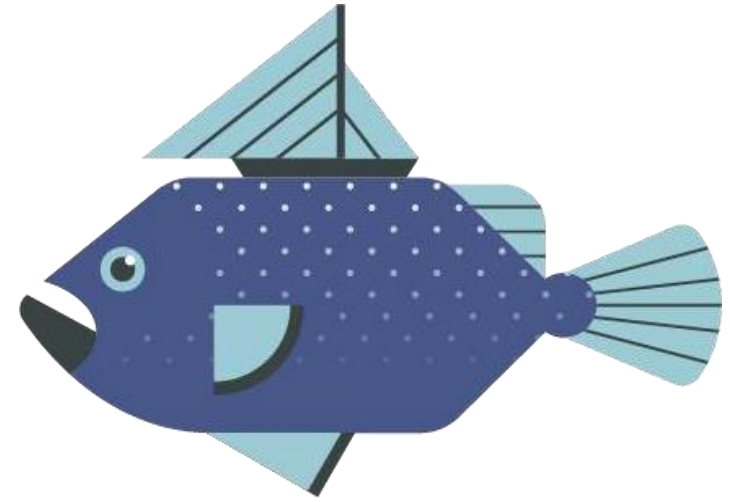
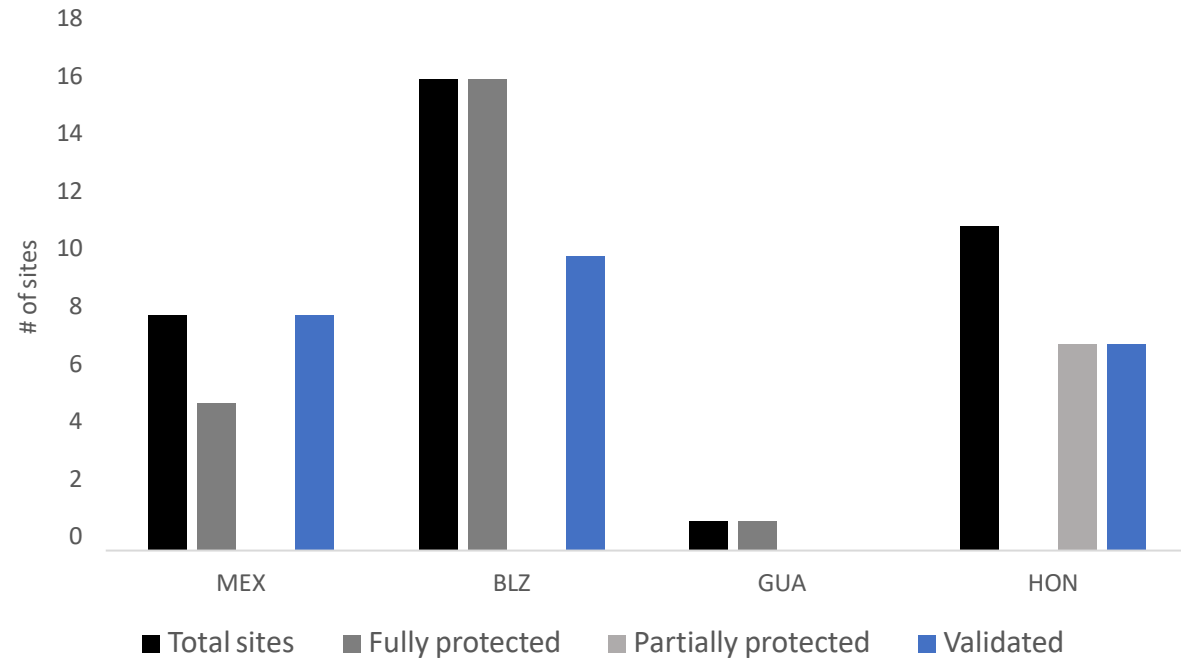
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 Projection: Transverse Mercator  
 Datum: WGS 1984  
 False Easting: 500,000.0000  
 False Northing: 0.0000  
 Central Meridian: -87.0000  
 Scale Factor: 0.9996  
 Latitude Of Origin: 0.0000  
 Units: Meter

MAR FSA sites 2020 - Validated



Coordinate System: WGS 1984 UTM Zone 16N  
 Projection: Transverse Mercator  
 Datum: WGS 1984  
 False Easting: 500,000.0000  
 False Northing: 0.0000  
 Central Meridian: -87.0000  
 Scale Factor: 0.9996  
 Latitude Of Origin: 0.0000  
 Units: Meter

## Protection status of FSA sites

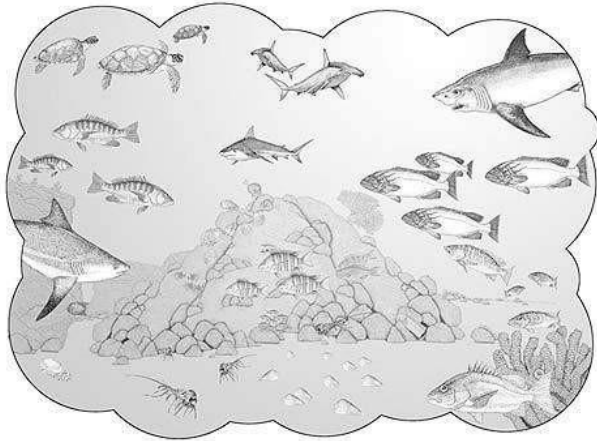




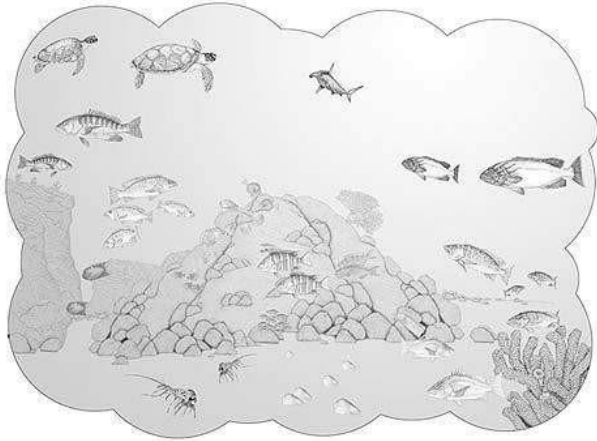
# Shifting baseline

The concept of a "shifting baseline" refers to the idea that *our perceptions and benchmarks about the state of an ecosystem or environment change over time.*

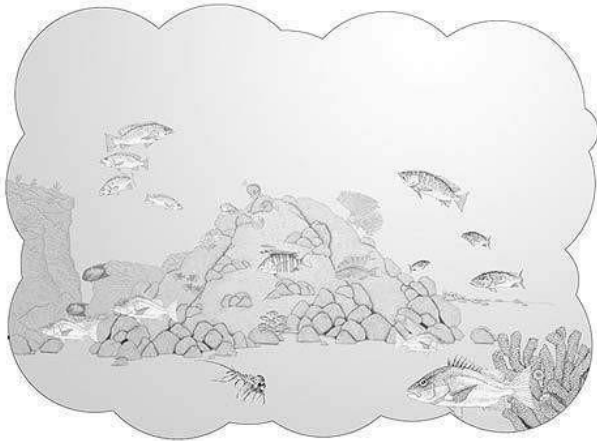
As generations pass, each accepts as normal and natural the levels of environmental degradation that exist in their time, regardless of what the environment was like in the past.



El Golfo de California  
para un pescador de la  
tercera edad (años 40)



El Golfo de California  
para un pescador adulto  
(años 70)



El Golfo de California  
para un pescador  
joven(años 90)

An Obituary for a Traditional Aggregation Site of Nassau Grouper  
in the Mexican Caribbean

Un Obituario para el Sitio Tradicional de Agrupación del Mero en el Caribe Mexicano

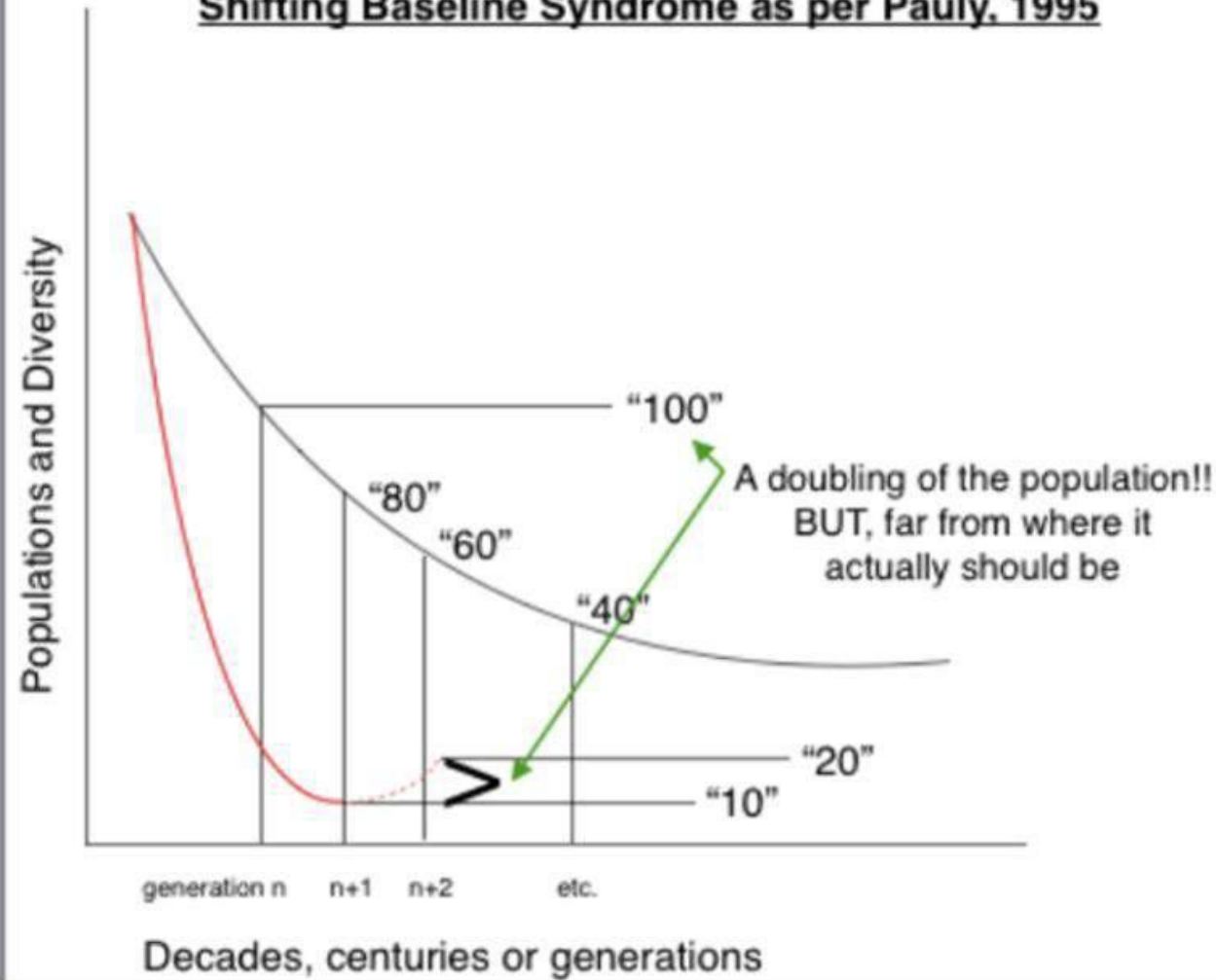
Une Notice Nécrologique pour un Site Traditionnelle de Regroupement  
de Merou des Caraïbes Mexicaines

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## Shifting Baseline Syndrome as per Pauly, 1995



### ARTICLE

<https://doi.org/10.1057/s41599-020-0526-0>

OPEN

Check for updates

## Shifting baseline syndrome among coral reef scientists

Milton Muldrow Jr.<sup>1</sup>, Edward C. M. Parsons<sup>2</sup> & Robert Jonas<sup>2</sup>

### LETTER

## Evidence for shifting baseline syndrome in conservation

S.K. Papworth<sup>1</sup>, J. Rist<sup>2</sup>, L. Coad<sup>3</sup>, & E.J. Milner-Gulland<sup>4</sup>

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## Shifting baseline syndrome highlighted by anecdotal accounts from snapper (*Ocyurus chrysurus*) fishery

Visualizações: 1708



"Algunos de los pescadores deportivos que pescan en aguas mexicanas no encuentran dificultad en pescar grandes cantidades de las abundantes cabrillas y meros. De hecho les resulta prácticamente imposible pescar algo mas a lo largo de las playas rocosas."

Richard Crocker 1937

"Se dificulta un poco obtener los peces debido a que con esta abundancia de peces, hay bastantes liburones de talla grande que frecuentemente atrapan a todas nuestras presas."

James Colnett, 1798



"Se pescaron 9 o 10 peces  
(orden perciformes, probablemente  
*Epinephelus quinquefasciatus*)  
algunos de los cuales nos comimos y  
el resto los salamos."

William Dampier, 1697

"Su carne es harto apetecida,  
pudiendo sustentar una fuerte  
pesquería."

Solis Ramirez, 1966

1928. Honduras Británica (Belice).  
El explorador británico F. Mitchell y su ayudante.  
Obtuvieron un pez de 817 libras.





## Preliminary Observations of the Spawning Aggregation of Nassau Grouper, *Epinephelus striatus*, at Mahahual, Quintana Roo, Mexico

ALFONSO AGUILAR-PERERA

Vol. 327: 289–296, 2006

MARINE ECOLOGY PROGRESS SERIES  
Mar Ecol Prog Ser

Published December

## Disappearance of a Nassau grouper spawning aggregation off the southern Mexican Caribbean coast

Alfonso Aguilar-Perera<sup>1,2,\*</sup>

1910

1950

1960

1989

2006

2014

Aggregation begins to be fished

Aggregation becomes commercially important

Spear gun becomes popular.  
>24 tons per season

Aggregation in decline

An Obituary for a Traditional Aggregation Site of Nassau Grouper in the Mexican Caribbean

Un Obituario para el Sitio Tradicional de Agrupación del Mero en el Caribe Mexicano

Une Notice Nécrologique pour un Site Traditionnelle de Regroupement de Merou des Caraïbes Mexicaines

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## Institutional Amnesia: A Paradox of the 'Information Age'?

*“while new information technologies have provided us with the ability to store, retrieve, manipulate and communicate more data, faster than ever before, at the same time many of our public institutions seem to be losing their memories”*

Polit 2000

The concept of "institutional amnesia" *refers to the loss or lack of institutional memory within an organization, institution, or government.* It involves the inability or unwillingness to remember and learn from history, past experiences, and lessons learned.

When an institution suffers from institutional amnesia, *it runs the risk of reinventing the wheel over and over again, without taking advantage of previous knowledge and experience.*

**PERSPECTIVE**

# Institutional amnesia pushes fish spawning aggregations towards extirpation

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Email: [sfulton@cobi.org.mx](mailto:sfulton@cobi.org.mx)**Funding information**

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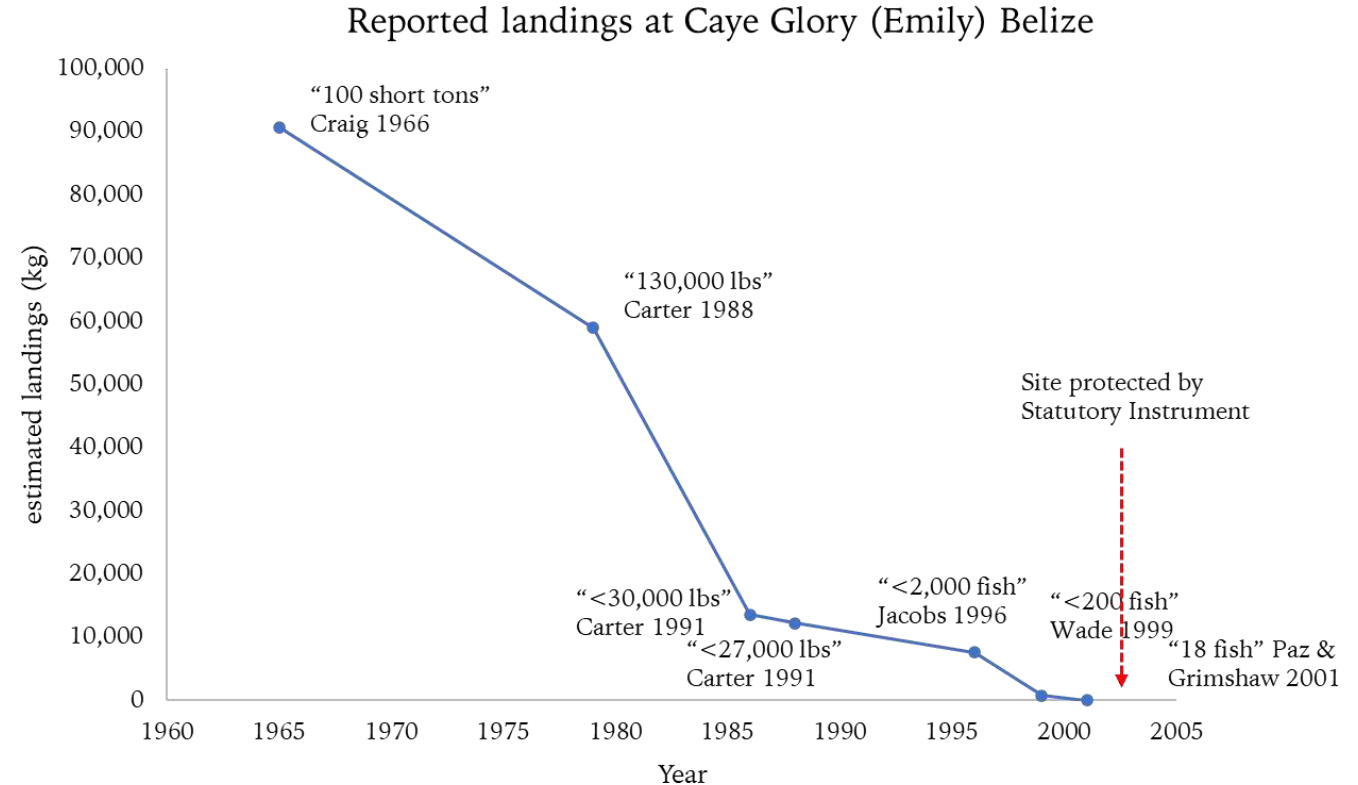
Handling Editor: Andrea Belgrano

**Abstract**

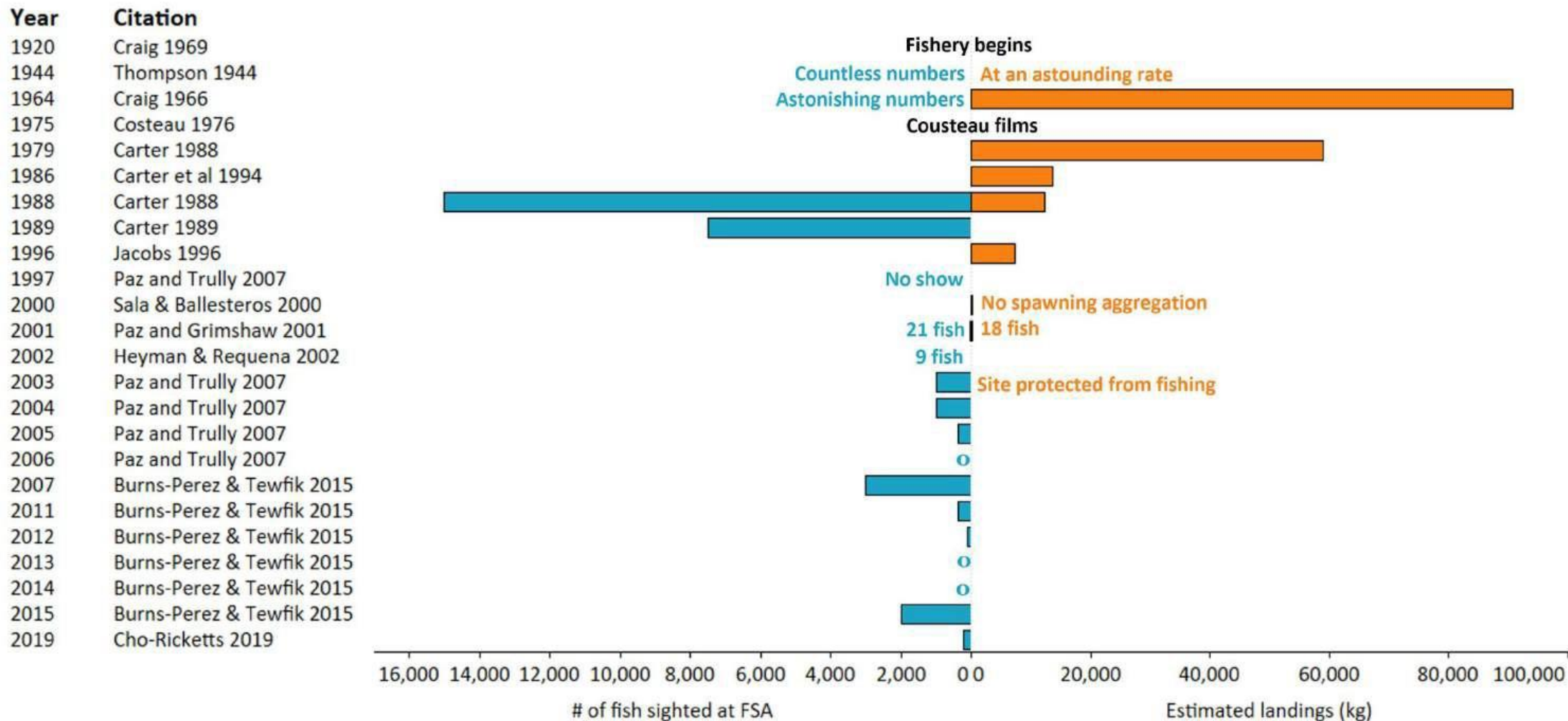
1. How institutions create and manage knowledge has been explored in the context of management and business science. However, little effort has been made to understand how, and why, these institutions forget what works or does not work, and no research in this field has been conducted in conservation or fisheries science.
2. This paper examines the concept of institutional amnesia by focussing a lens on fish spawning aggregations and efforts to monitor and protect them in the Mesoamerican Reef.
3. For over 20 years, underwater visual census survey data has been collected periodically at 36 spawning aggregation sites, and grey literature is available since the 1940's, yet managers and conservation practitioners report that abundance ten-

## Why?

- In 2020, we interviewed managers (government and CSO) of marine reserves/FSA sites in the MAR.
- 36 grouper and snapper spawning sites in four countries.
- 30 fishing sites protected from fishing.
- **Managers reported that 48% of species abundance trends were “unknown.”**
- In the places *they manage*.







# Nassau grouper (*Epinephelus striatus*) “...too little, too late but possibilities for recovery”

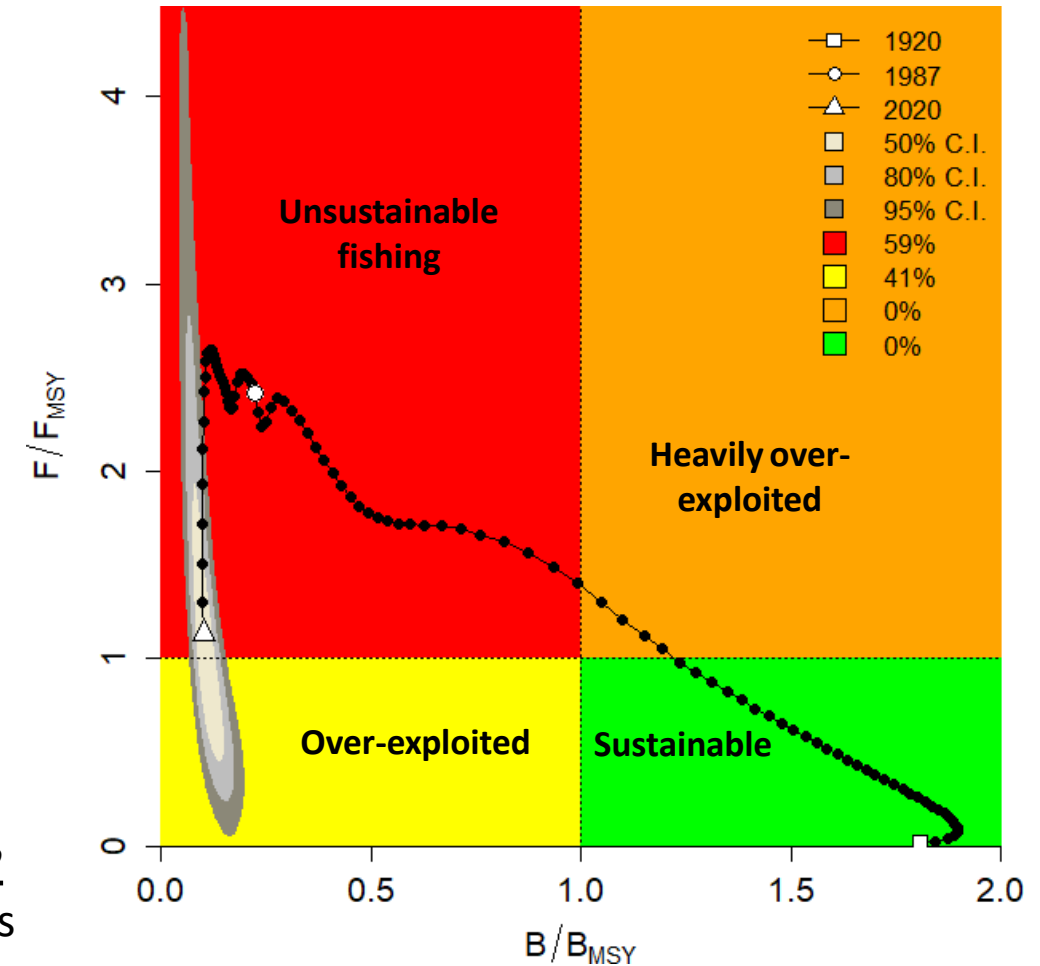


## Background

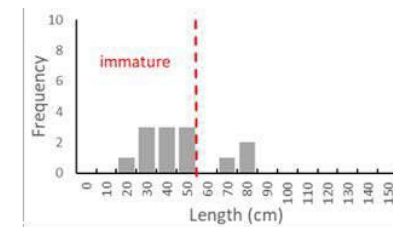
- In 1966, when the fishery had been active for over 40 years, it was reported that over 300 boats fished Caye Glory and over **90 metric tonnes** (200,000 lbs) were caught.
- Concerns around the fishery grew, with Jacques Cousteau, in 1976, saying, “*I think it would be very important to protect this area...*”
- Nassau grouper are currently listed as a critically endangered species by the IUCN.

## Size limits adequate – in Belize

- Nassau grouper have to be landed whole when in season and measure more than 20 inches (50.8 cm) and less than 30 inches (76.2 cm) where Nassau grouper reach maturity at approximately 19 inches (48 cm), with the upper limit protecting the largest, most fecund mega-spawners, up to 122 cm in length.
- However, **very few fish are landed** (ranked 64<sup>th</sup>) and **often under sized** (inset).



Max: 122 cm/25 kg



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*I think it would be very important to protect this area against any [fishery] improvement as a way to protect the [livelihoods] of these fishermen for years to come... The area to protect is tiny, but it would be enough' (Cousteau, 1976)*

<https://youtu.be/k09tlo0ME5o>

## What have we forgotten?

- "There are no data"
- "Monitoring doesn't work/data aren't useful"
- "I didn't know"
- "I didn't read it"
- "I don't have the data"
- "It's good for me not to know..."

## The Reality

- There is visual monitoring data since 2000.
- There are fishing data since 1960.
- There is an established monitoring protocol at the international level.
- There are dozens of scientific reports and papers.
- Belize has had a centralized database since 2005.



## What can we do?



- Reduce staff turnover (difficult in NGOs and government)
- Improve the participation of local scientific institutions
- Strengthen local NGOs
- Improve the collection and management of information - documentation
- Storytelling

1. **Regional coordination:** Fish spawning aggregations are cross-boundary resources. They must be managed as such, through international collaborations and effective dialogue and decision-making between governments, academics, fishers, and civil society.
2. **Effective data management:** Data and knowledge loss has occurred over the previous decades due to personnel changes, siloed information, and poor data management. Regional digital ecosystems and repositories will reduce data loss.
3. **Standardized and systematic monitoring:** Simple, robust, and systematic indicators for each spawning site should be available, while sensitive data should be protected to prevent overfishing. Standardized monitoring protocols and a regional database, information hub and dashboards should be made available.
4. **Scientific principles and local knowledge:** Management tools should be based on the best scientific information available, effective design principles and always consider the traditional ecological knowledge of the local fishers.
5. **Encourage participation:** Concerns in the conservation community about fishers “discovering spawning sites” must be overcome. Fishers already know the sites. Participatory processes encourage best practices and in the long-term help fill the void left by underfunded and overstretched managing agencies.
6. **Adaptive management:** Climate change brings uncertainty. Management tools need to be continually reviewed over the coming decades.