Belize Fisheries Project

Developing a Shared View of the Status of Belize's Fishery Resources

June 13-15, 2023

The Fisheries of Belize: Overview of Results

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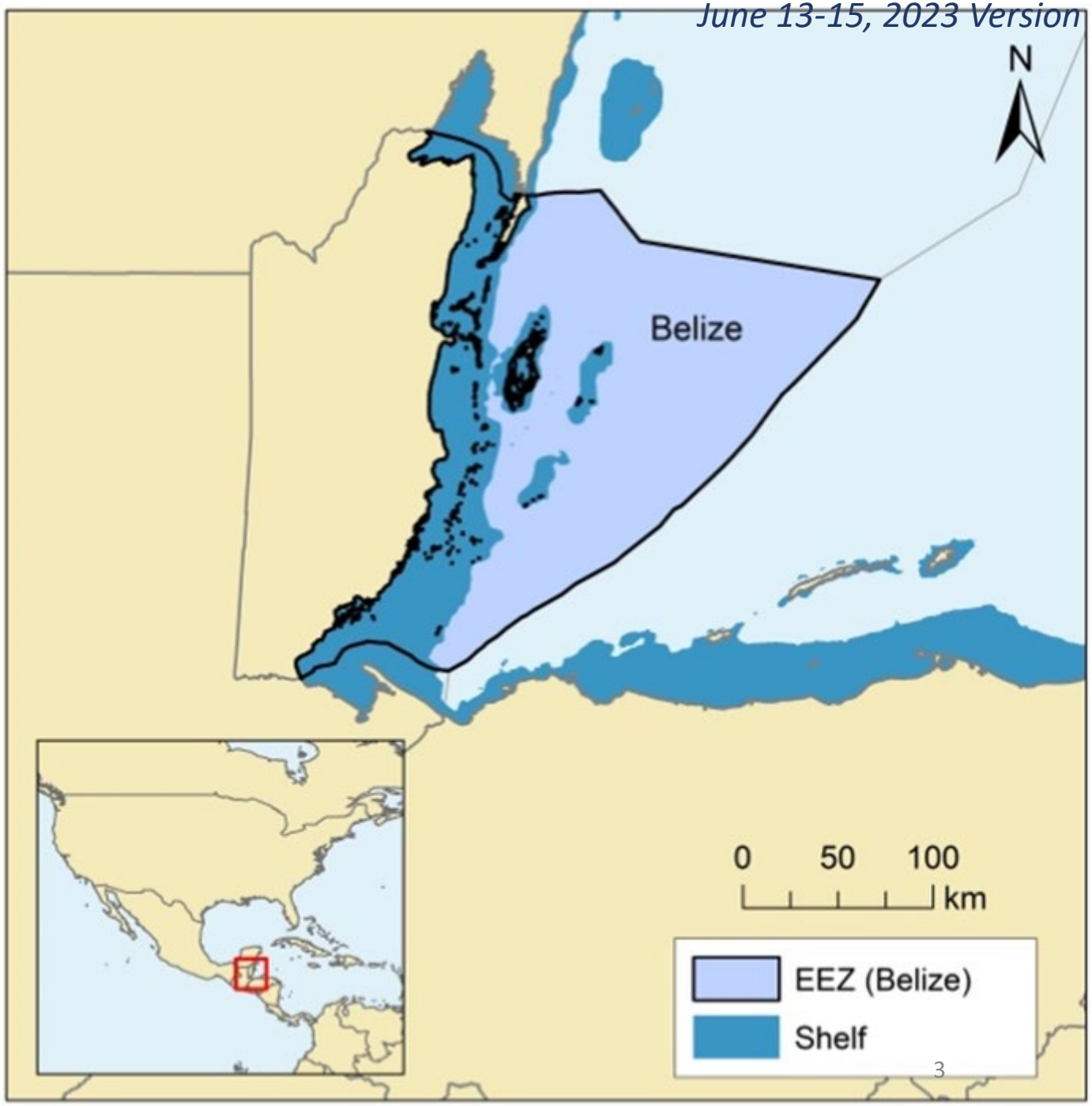
Sea Around Us Research Initiative, IOF, UBC

Belize, 12 June 2023

- The Exclusive Economic Zone (EEZ) of Belize covers 36,182 km^2

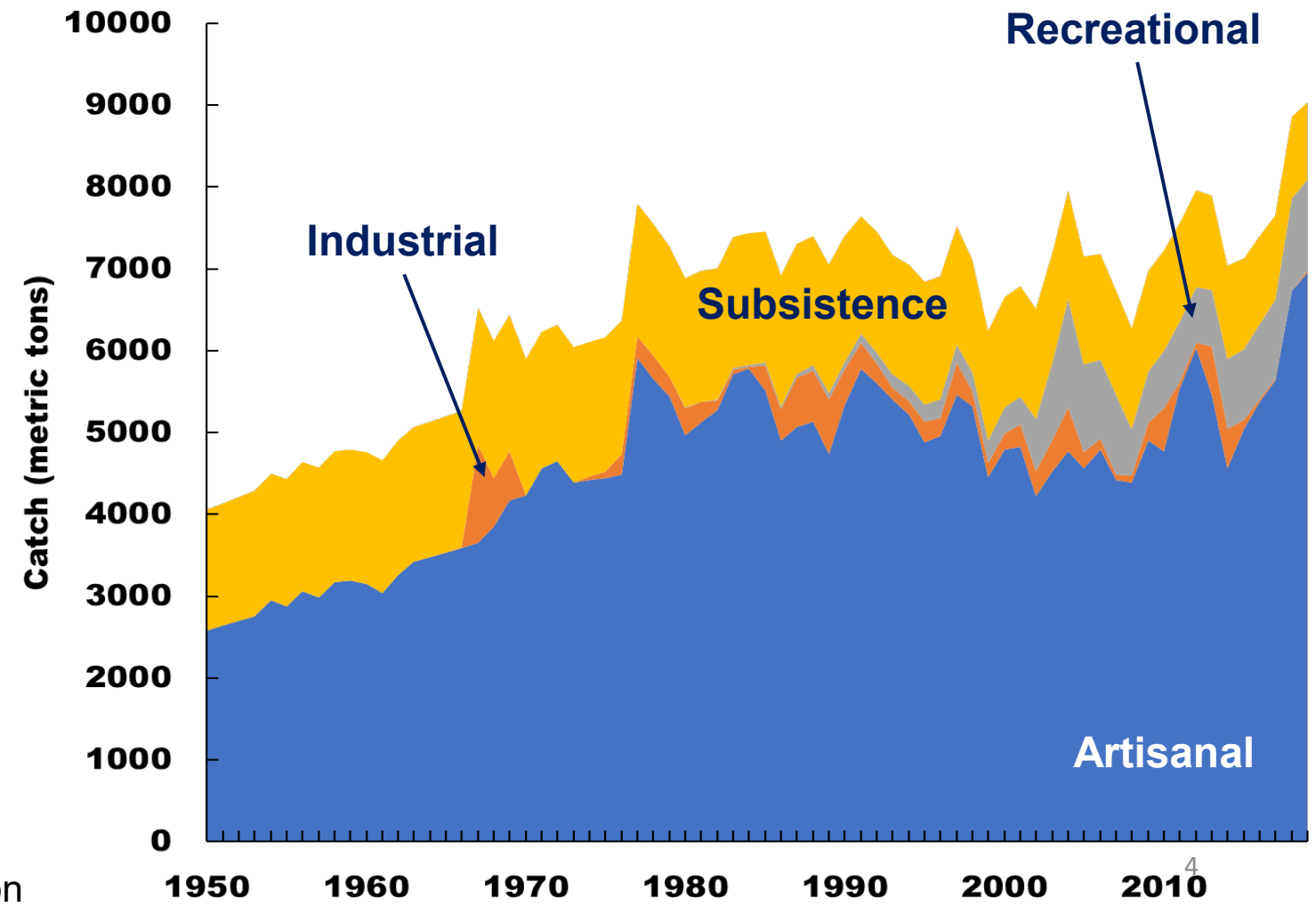
- The Territorial Sea includes three distinct atolls, Glover's Reef, Lighthouse Reef and Turneffe Atoll.



Reconstructed Belizean marine fisheries catches*

- Catches within the EEZ of Belize are dominated by artisanal (67%) and subsistence (22%) fisheries.

- Industrial and recreational fisheries made up only 11%, with the former currently absent.



* See: www.seaaroundus.org
23 of 443 sources were used for this reconstruction

Belizean marine catch by species (I)

Queen conch and spiny lobster make up a third of these catches.

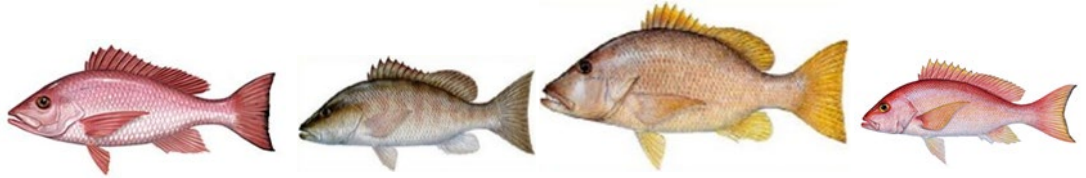
21% of the catch

10% of the catch

Snappers make up a quarter of these catches

Yellowtail Mutton Lane

23% of the catch



Red Grey Dog Silk

3% of the catch

Belizean marine catch by species (II)

- Other species included in these assessments:

Crevalle jack

Horse-eye jack

King mackerel

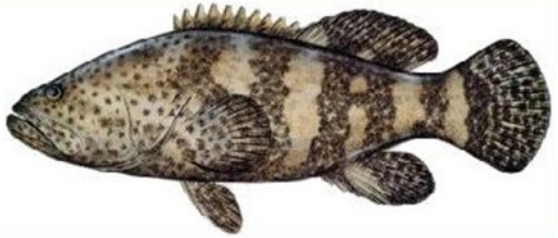
8% of the catch

Great barracuda

2% of the catch

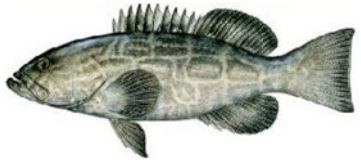
Snook

2% of the catch



Goliath grouper

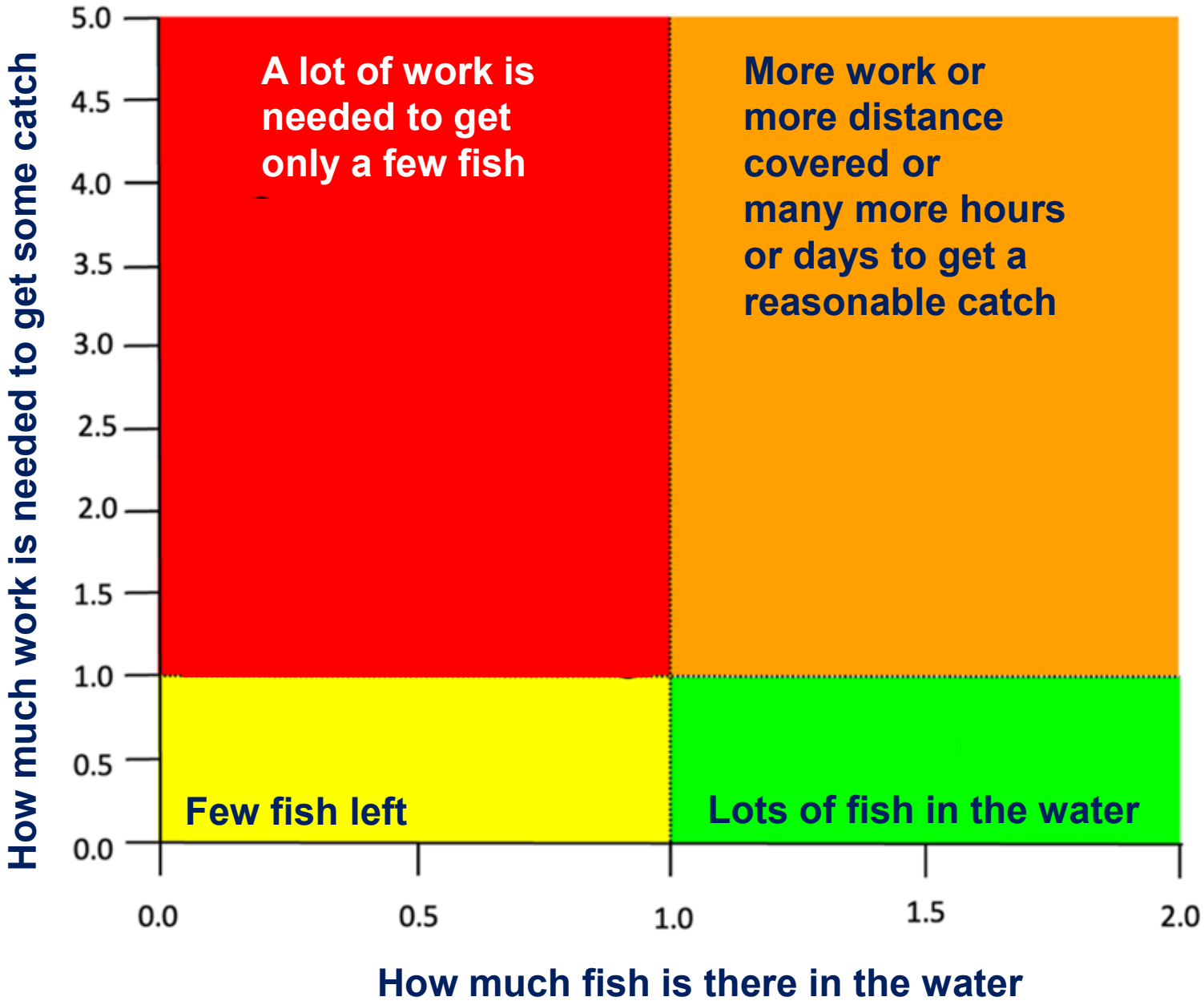
Nassau Grouper



Black grouper

<1% of the catch

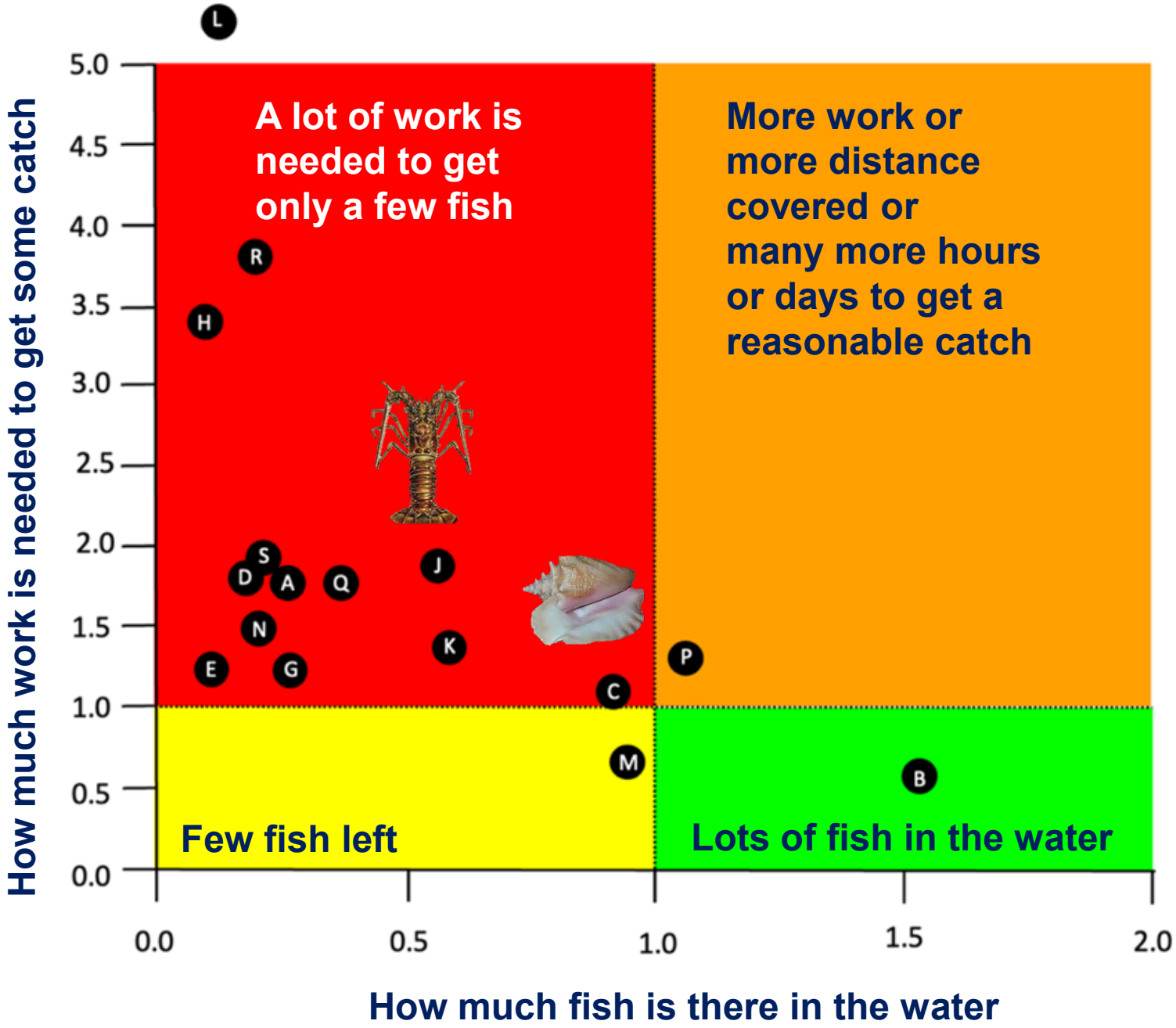
Sea Around Us stock analyses



Sea Around Us stock analyses

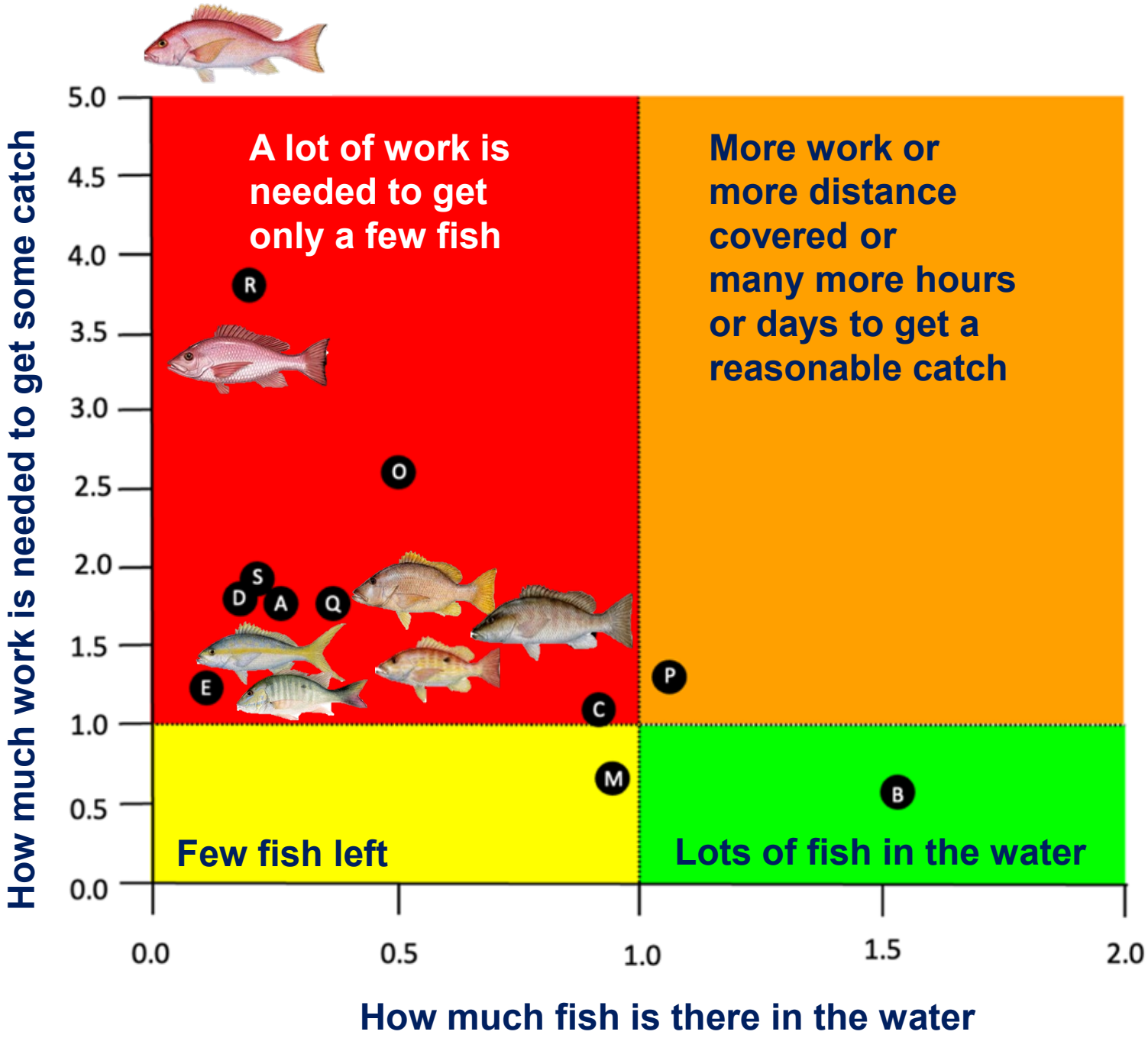
In general, the most commercially important species are in the red:

There are not enough fish left in the water, and it takes more work to catch them.



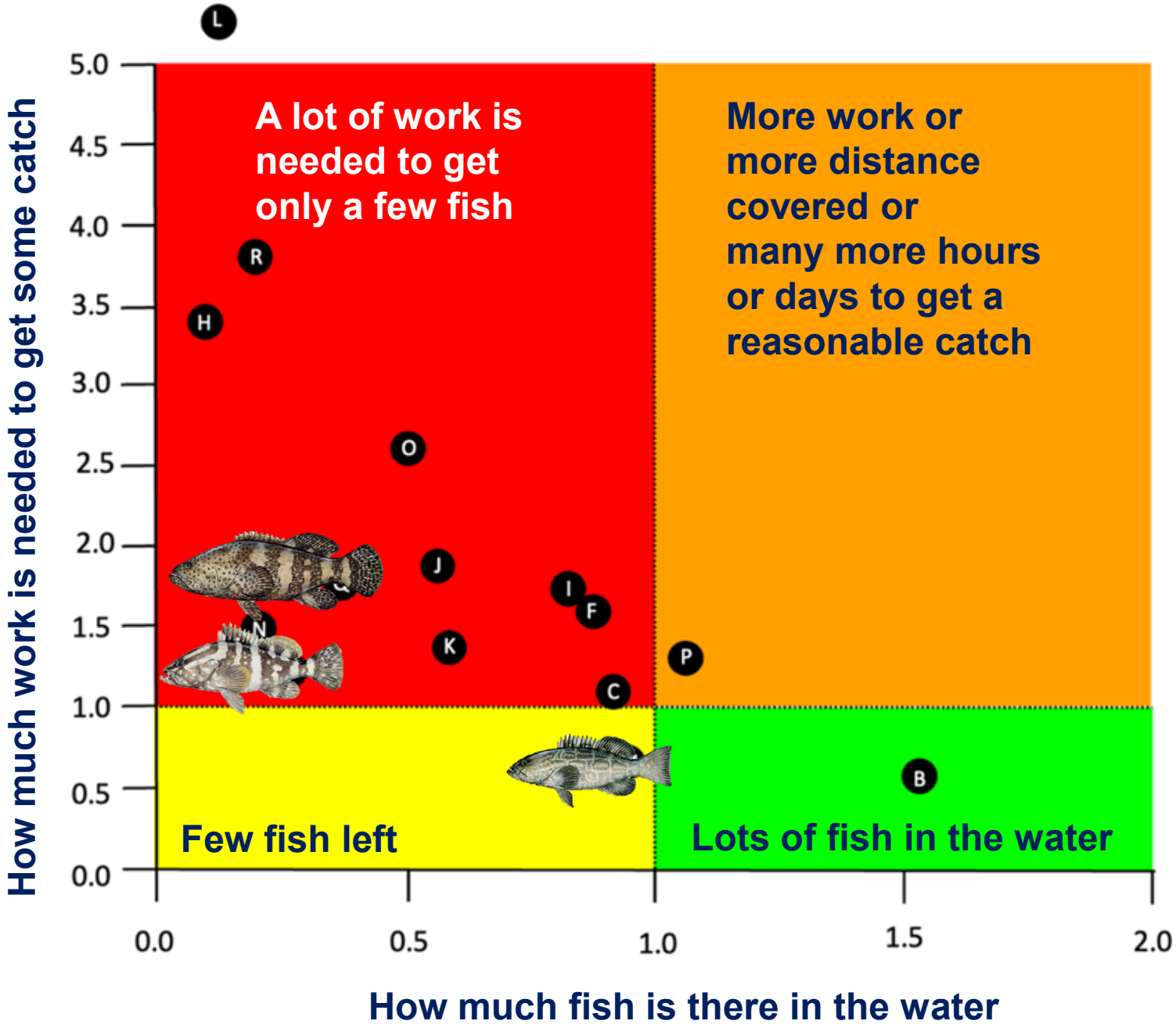
Sea Around Us stock analyses

Snappers are less abundant, and a lot work of needed to catch the few of them left in the water.



Sea Around Us stock analyses

There are few groupers left and it now takes much more work to catch them.

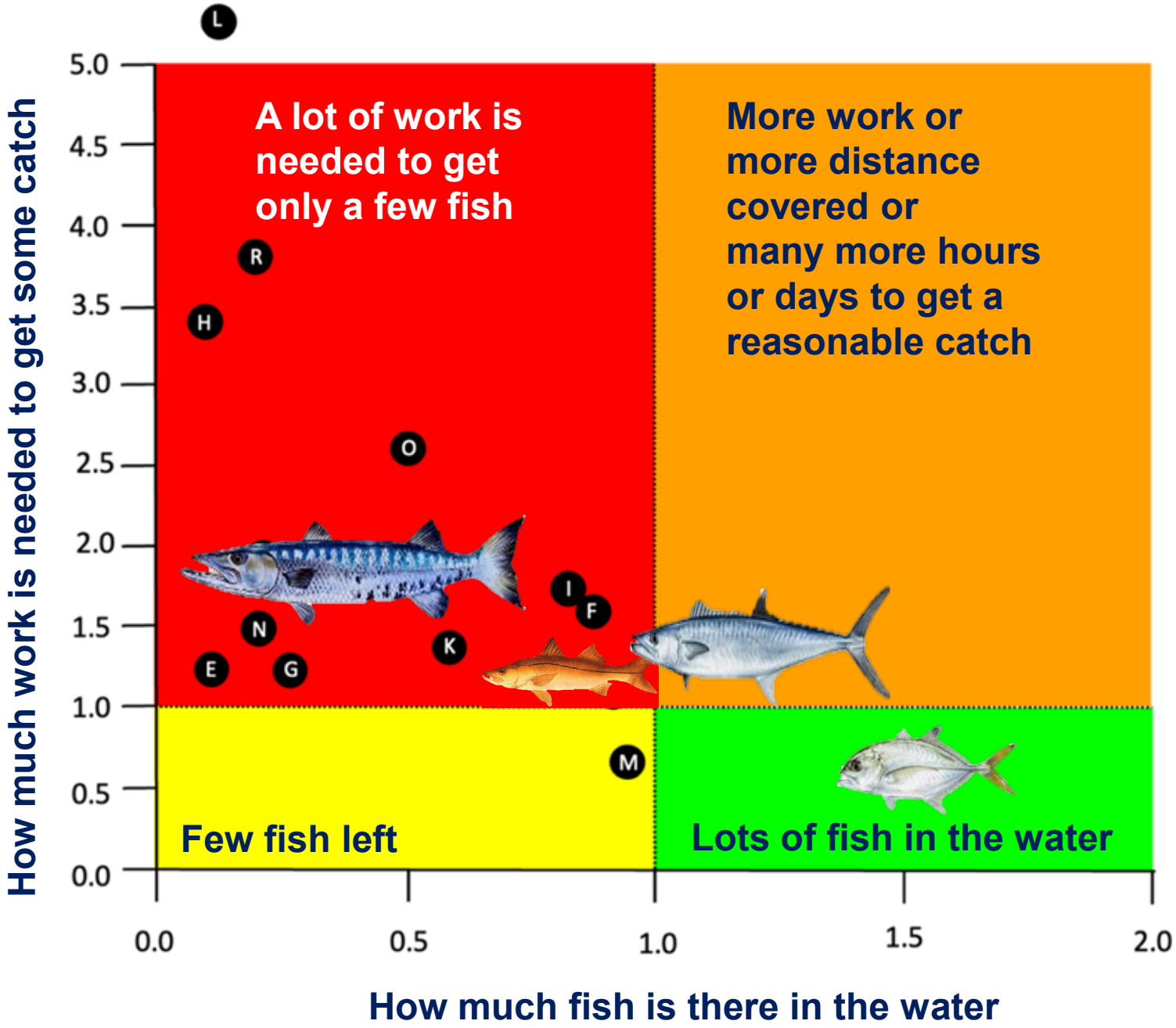


Sea Around Us stock analyses

The horse eye jack is abundant.

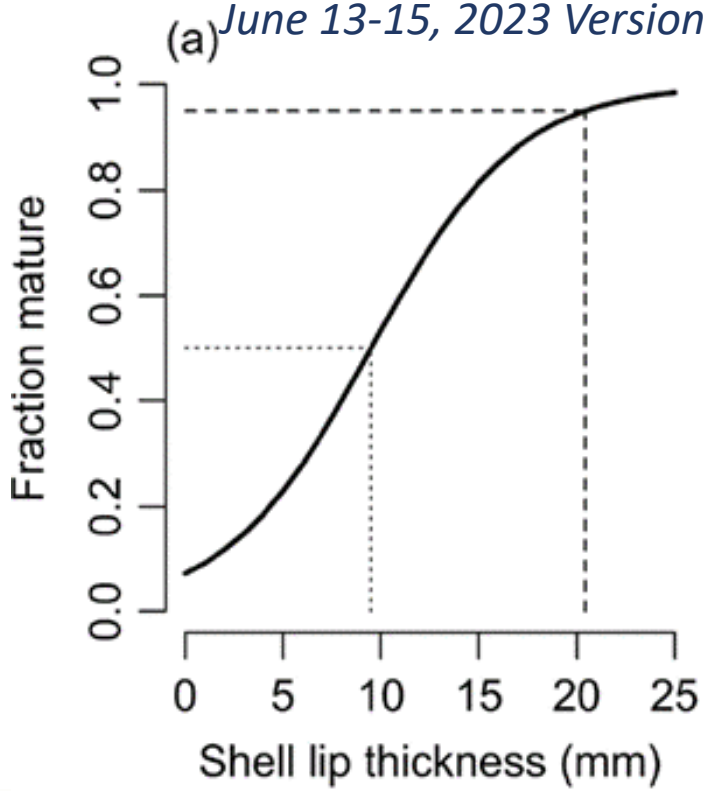
Although there is enough king mackerel, it is now taking more work to catch them.

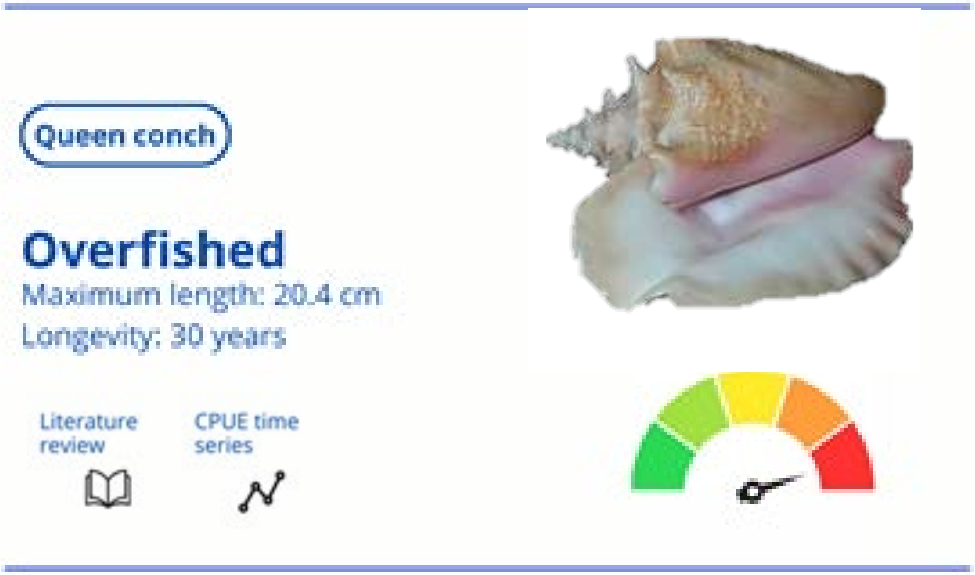
The barracuda and snook are less abundant and takes a lot more work catch them.



Review of existing knowledge: Queen conch

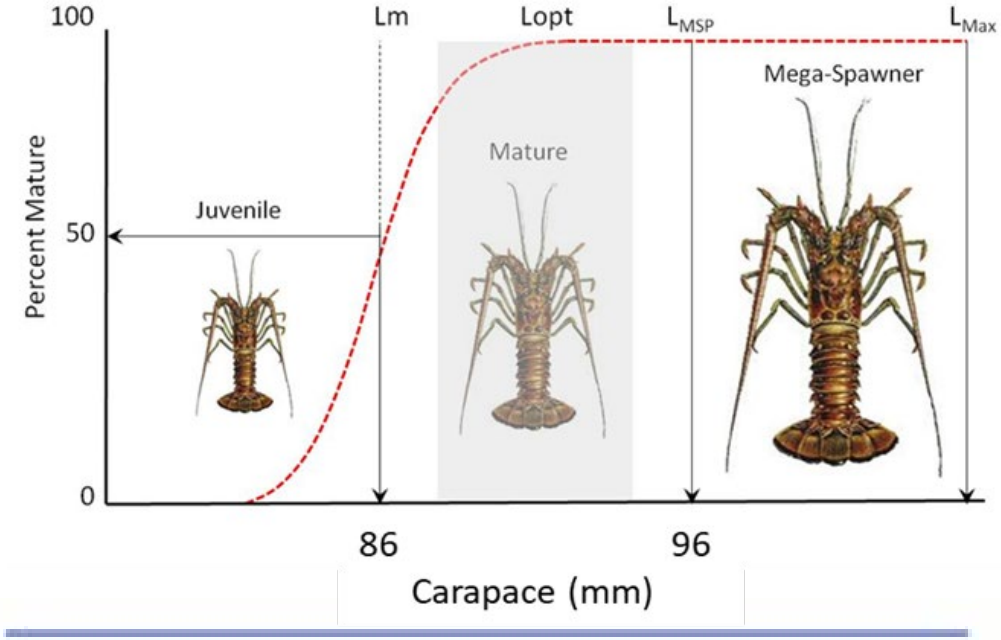
- Exploitation peaked in 2008-2013, which led to listing in Appendix II of CITES.
- Currently managed using size limits established in 1978 based on shell height and meat weight.
- Maturity is measured by thickness of shell lip (Tewfik et al. 2019).
- Bulk of catch is of immature individuals.





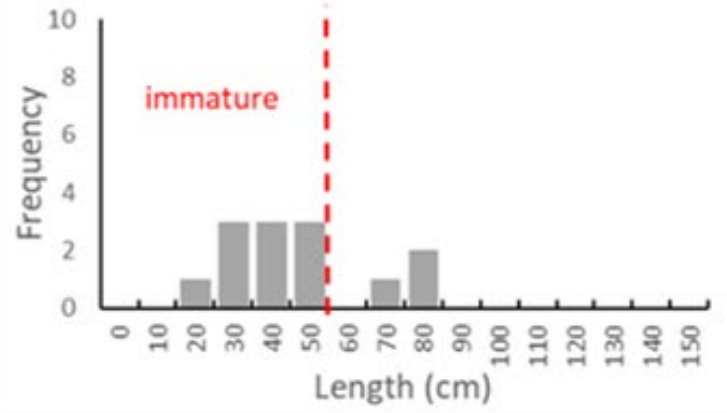
Review of existing knowledge: Spiny lobster

- 100 years of commercial fishery;
- Depletion of northern populations and expansion to the south and to atolls (Tewfik *et al*. 2020);
- Dramatic increases in catch in 21st century with all fishing grounds fully utilized for some time;
- Replenishment zones help but overfishing continues with landing of immature individuals;
- Belizean catches in the AVOID and NOT RECOMMENDED lists of Seafood Watch and Ocean Wise.



Review of existing knowledge: Nassau Grouper

- Heavily exploited since the 1920s. Management intervention, although with adequate size limits, came too late.
- Stock is depleted.

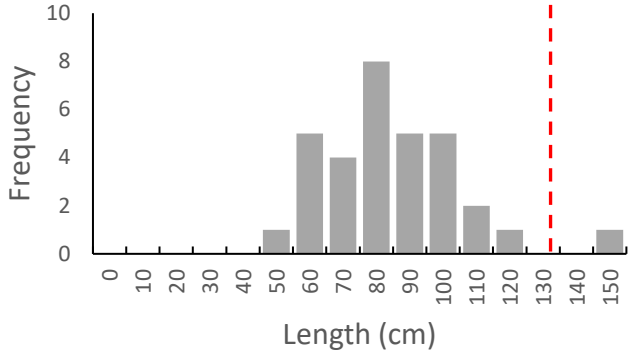


Review of existing knowledge: Goliath and Black Groupers

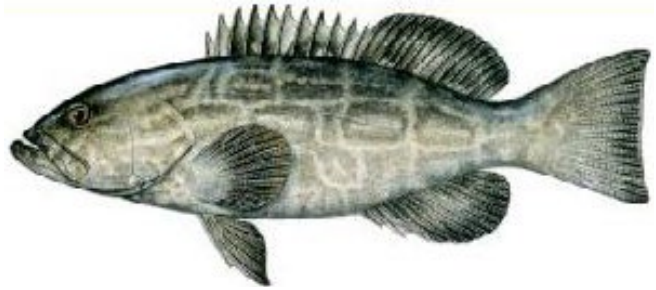
- In similar conditions as Nassau grouper

Goliath

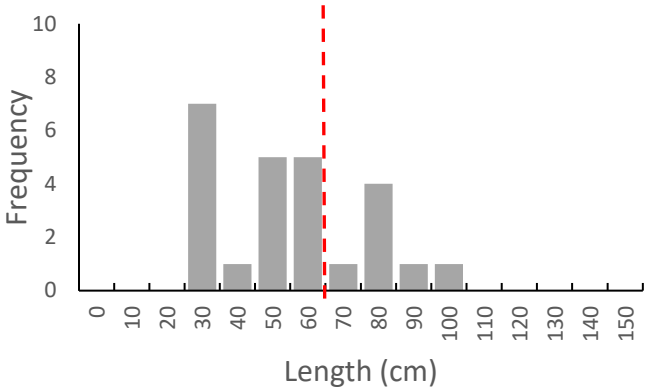
Max: 250 cm/360 kg



Black



Max: 150 cm/45 kg



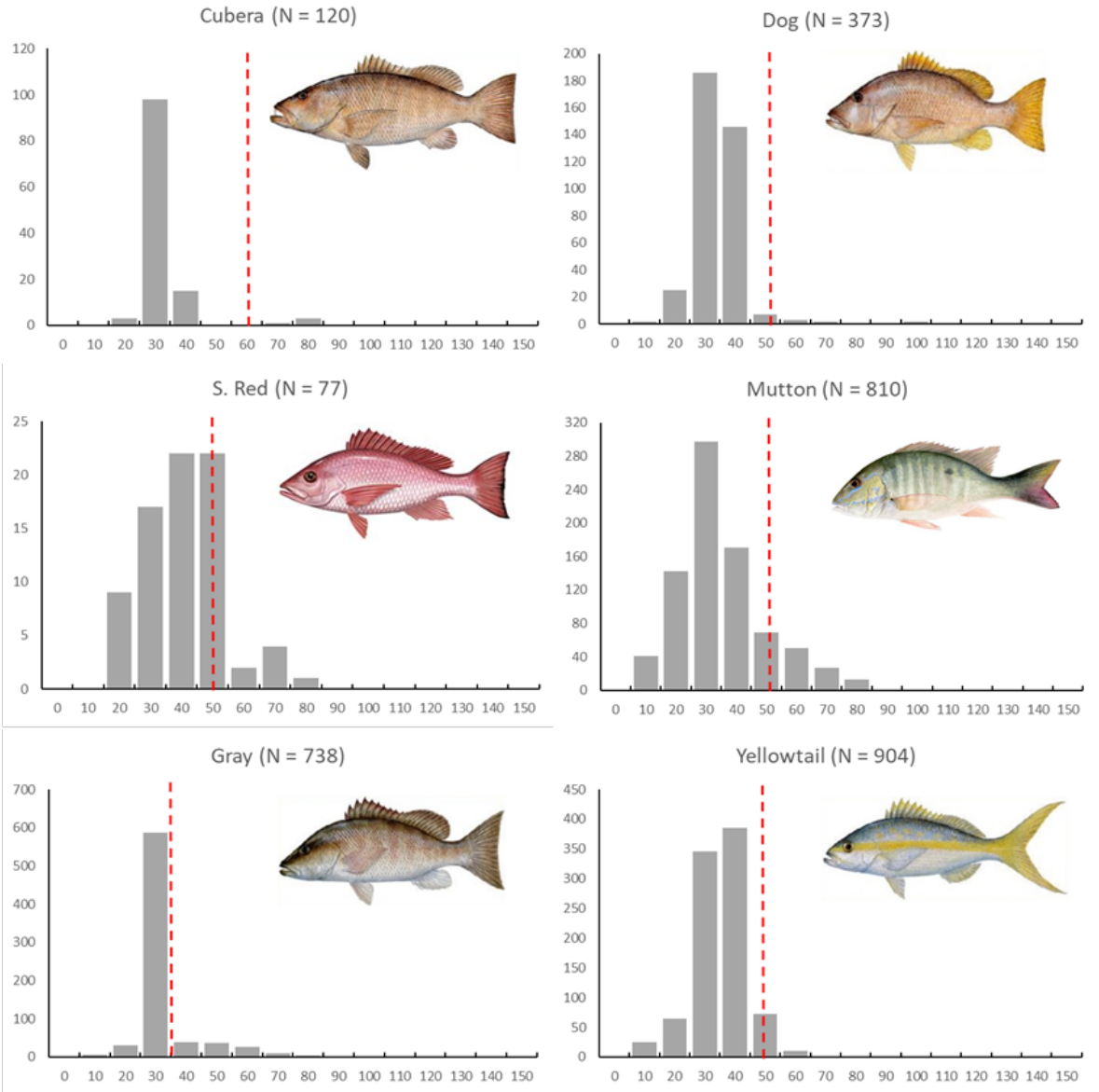
Review of existing knowledge: Snappers

Red

Cubera

Mutton

Lane



Status of stocks

- Review of existing knowledge conducted by Tewfik *et al*. (2020, 2022) suggest **growth overfishing**
  - Groupers, snappers, jacks and mackerels
  - Much of the catch consist of fish lengths < length at maturity, that is, the bulk of the catch are immature individuals.

- *Sea Around Us* stock analyses based on reconstructed catches point to the same conclusion: most of these species are **overexploited**.

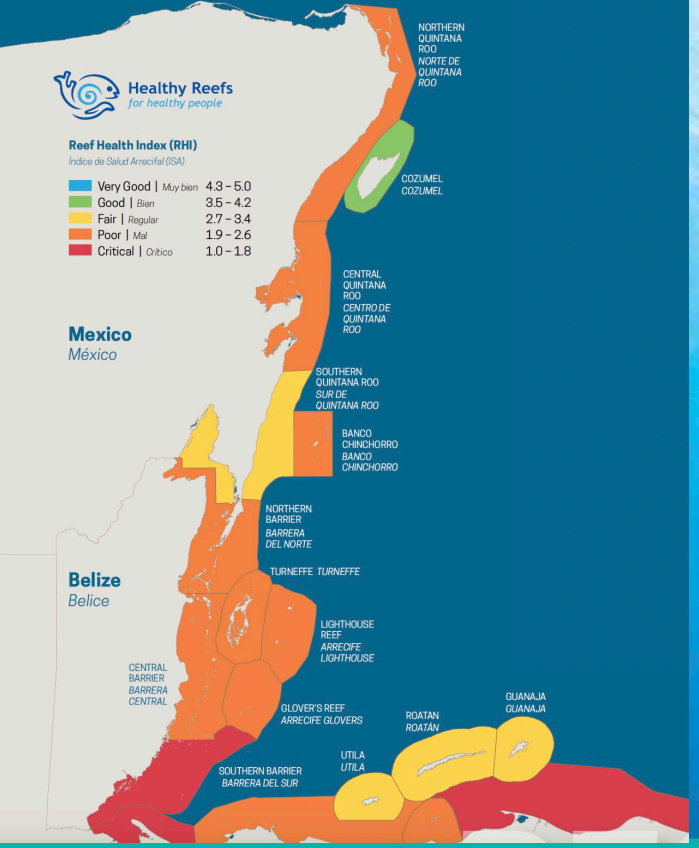
Reef Health Survey Results

Dr. Melanie McField

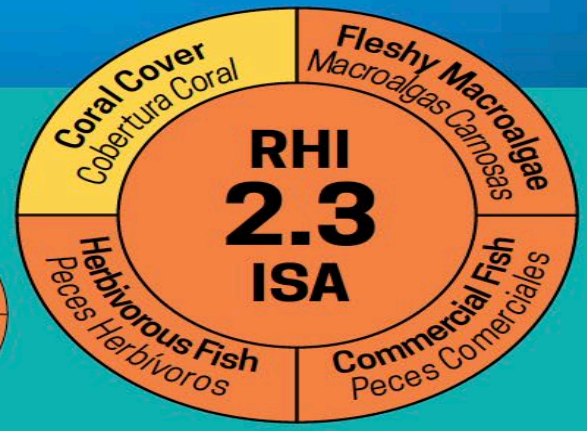
Healthy Reefs Initiative and Smithsonian Institution

June 13-15, 2023 Version

Mesoamerican Reef Health



5 is top Score



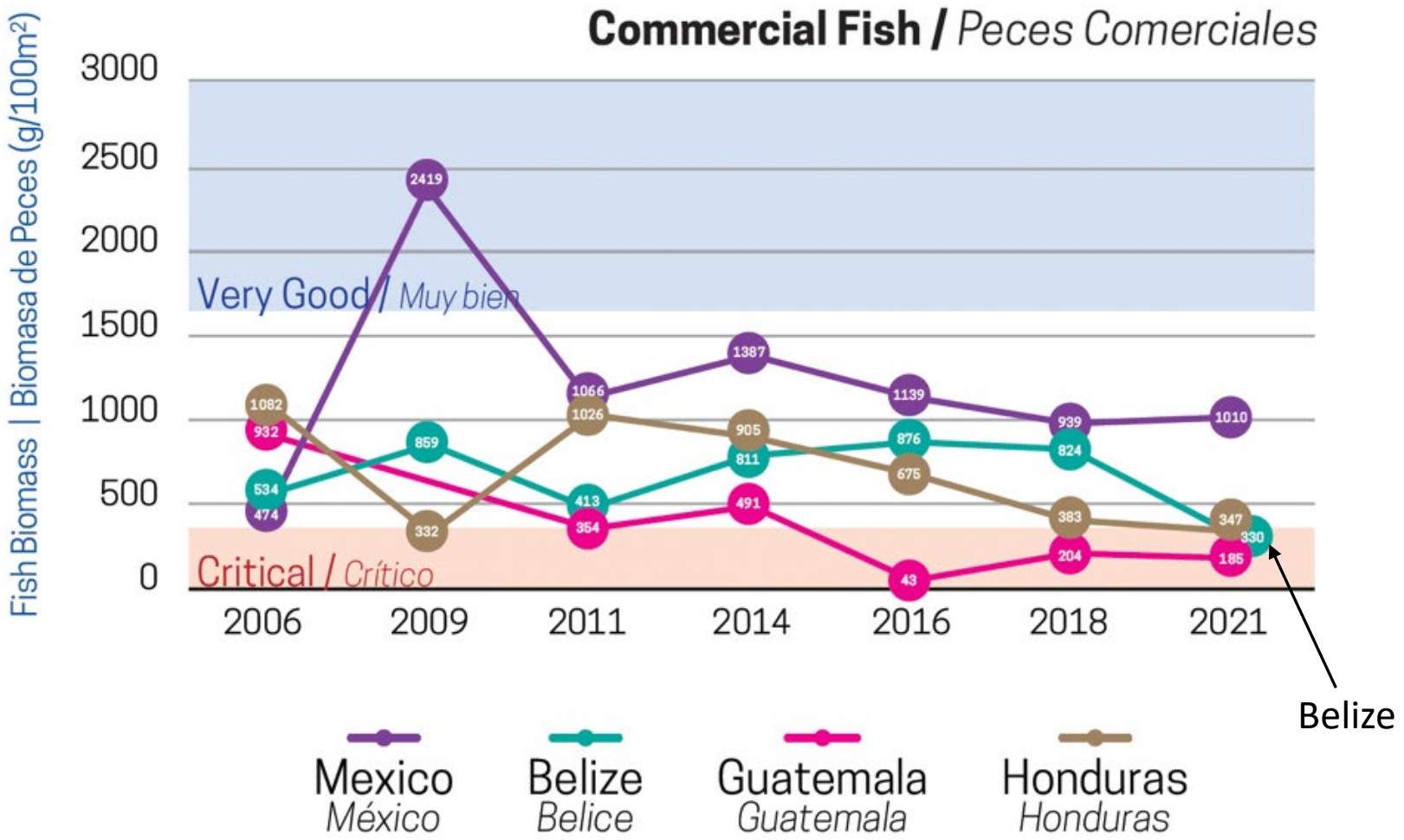
2006	2009	2011	2014	2016	2018	2021
2.3	2.3	2.5	2.8	2.8	2.5	
326 SITES SITIOS	130 SITES SITIOS	193 SITES SITIOS	249 SITES SITIOS	319 SITES SITIOS	286 SITES SITIOS	234 SITES SITIOS

Years shown represent when data was collected not year report card was printed | *Los años que se muestran representan cuándo se colectaron los datos y no cuándo se imprimió el reporte.*

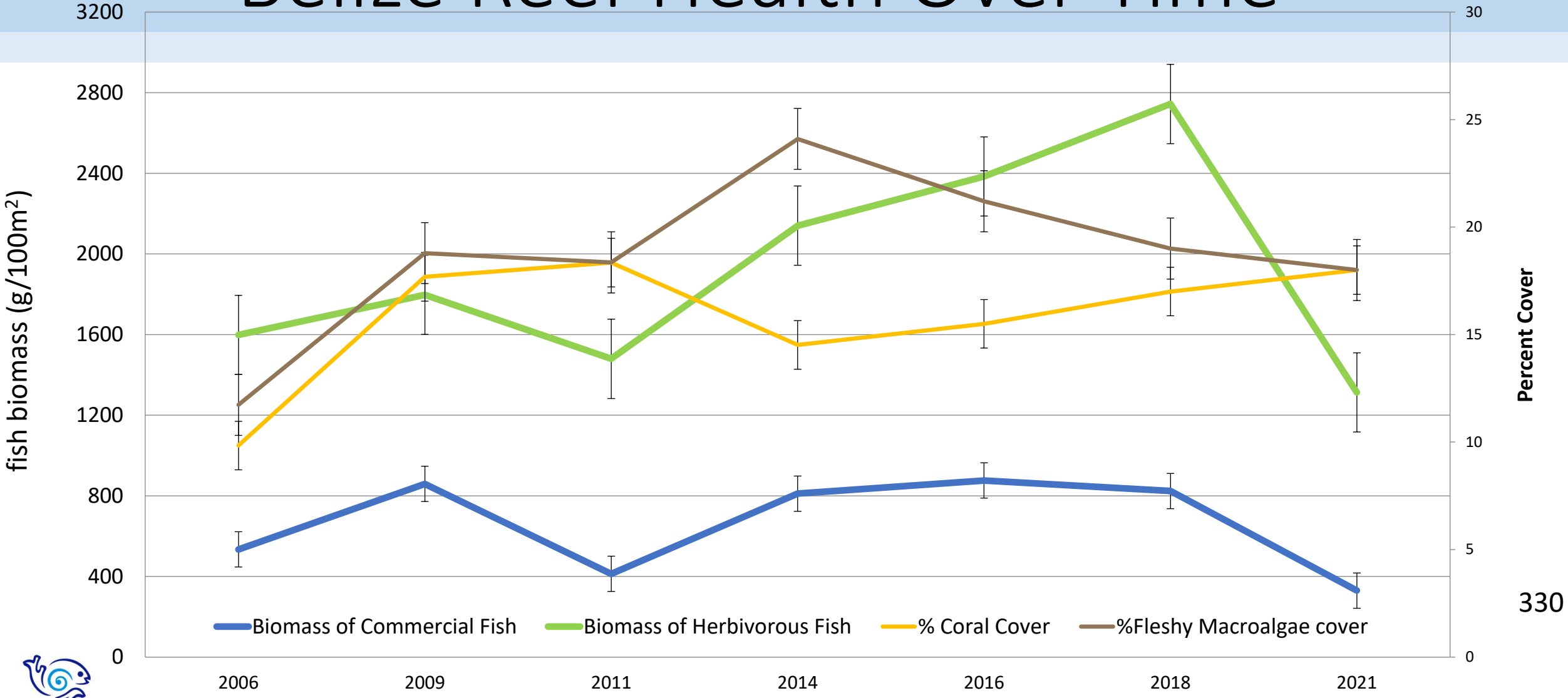
Living coral cover has slowly increased over the last 15 years, but diseases and bleaching are starting to have an impact. MAR average is 19%. A 5% increase is needed to attain a "Good" score.

Coral Cover / *Cobertura de Coral*

Critical Commercial fish biomass (snappers & groupers) indicates the extent of overfishing, critical habitat loss, potential biodiversity loss, and dire ecological consequences. MAR average is 499 g/100m². A 142% increase is needed to attain a "Good" score.



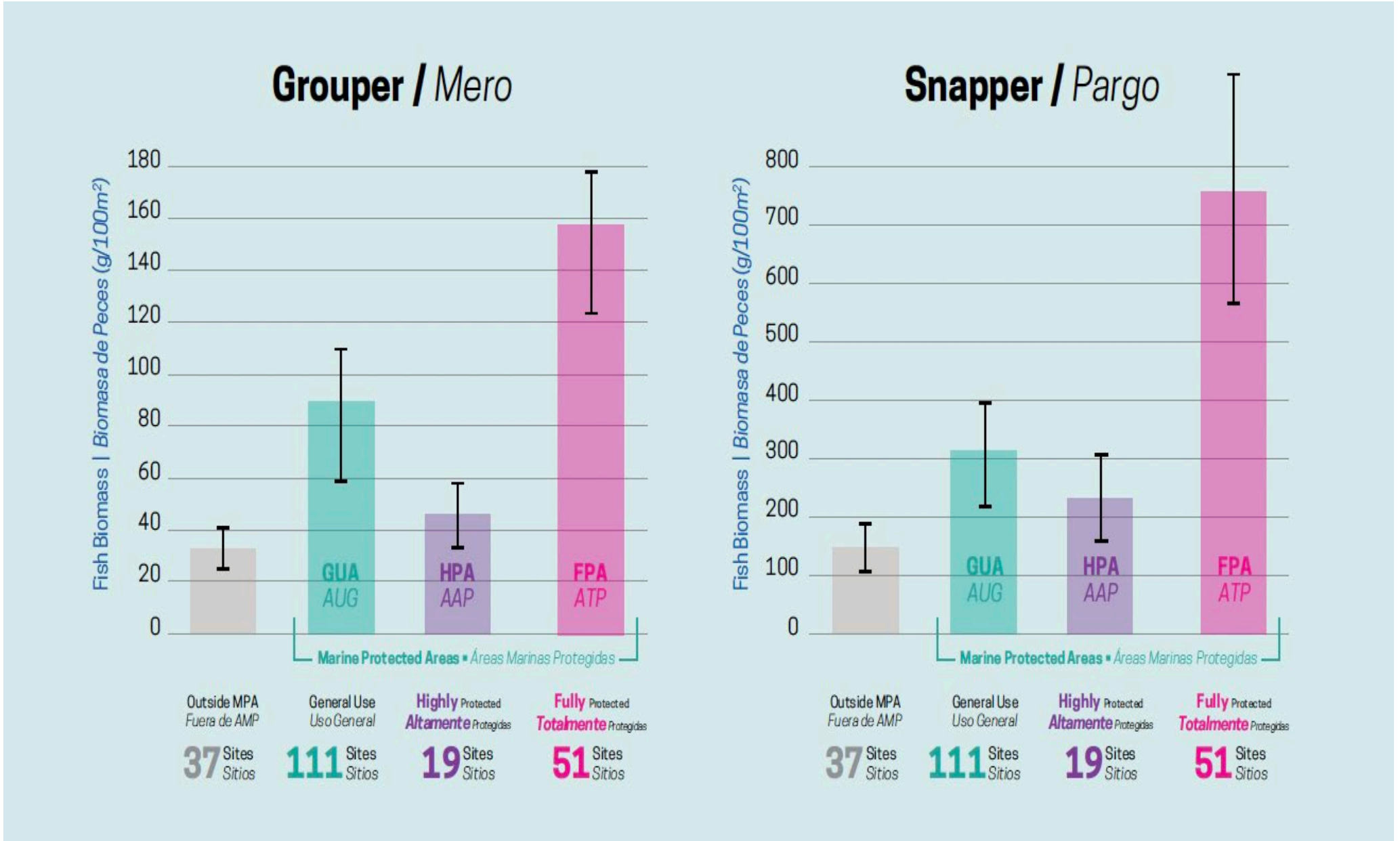
Belize Reef Health Over Time



330

Healthy Reefs
for healthy people

Only Fully Protected Zones Have Higher Fish Biomass



218 sites

Most fish that were counted were immature

Nassau Grouper
Epinephelus striatus

48cm **24%** Mature Maduro

29 fish ▪ Avg 35 cm
29 peces ▪ Prom 35 cm

Black Grouper
Mycteroperca bonaci

67.7cm **14%** Mature Maduro

7 fish ▪ Avg 33 cm
7 peces ▪ Prom 33 cm

Yellowtail
Ocyurus chrysurus

15cm **24%** Mature Maduro

1046 fish ▪ Avg 17 cm
1046 peces ▪ Prom 17 cm

Cubera
Lutjanus cyanopterus

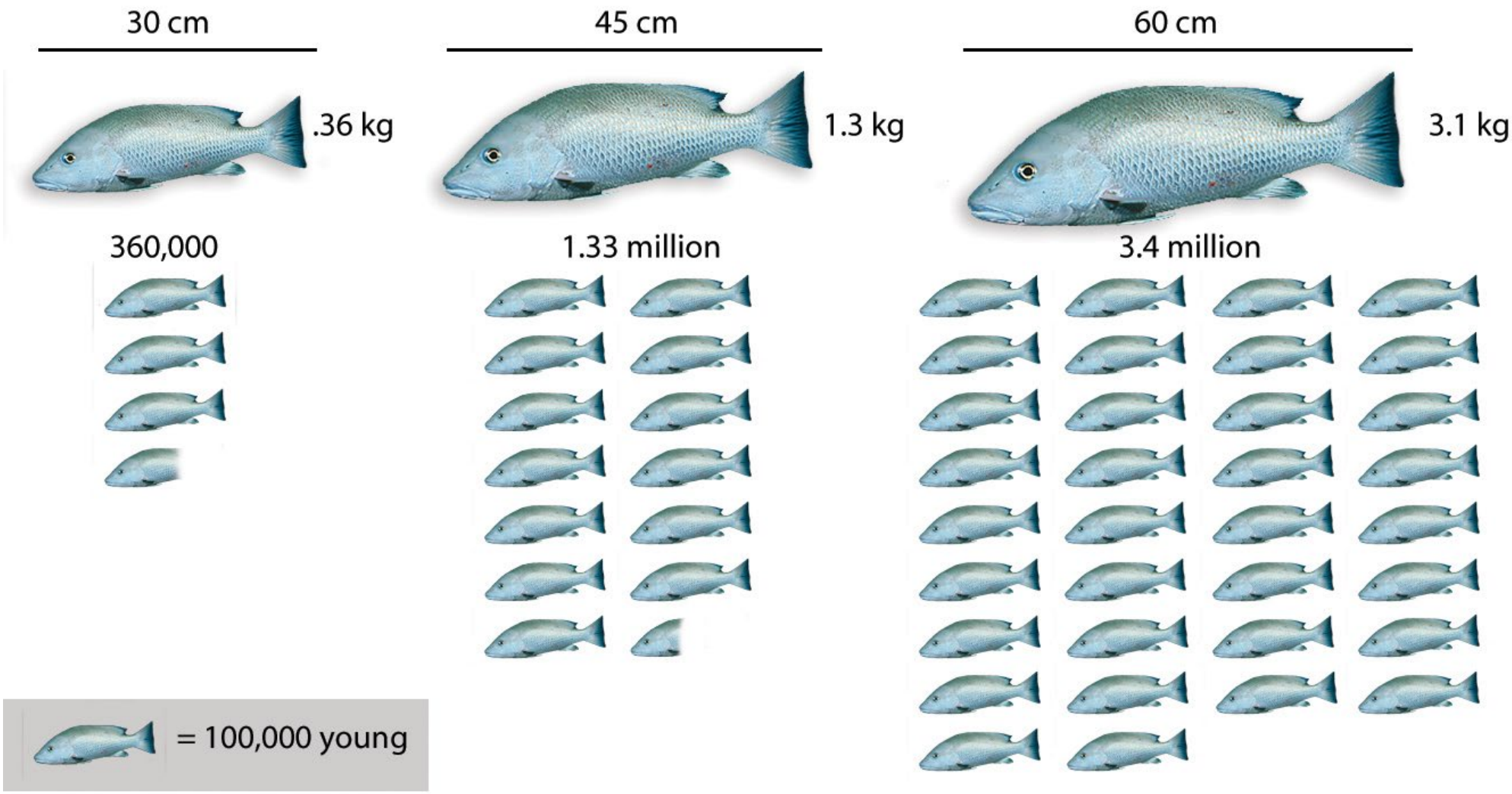
65cm **25%** Mature Maduro

4 fish ▪ Avg 34 cm
4 peces ▪ Prom 34 cm

THESE DATA COME FROM 2,160 FISH TRANSECTS

COVERING 129,600m² AND COUNTING 64,447 FISH IN 2021*

Size Matters – Bigger fish make more young



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

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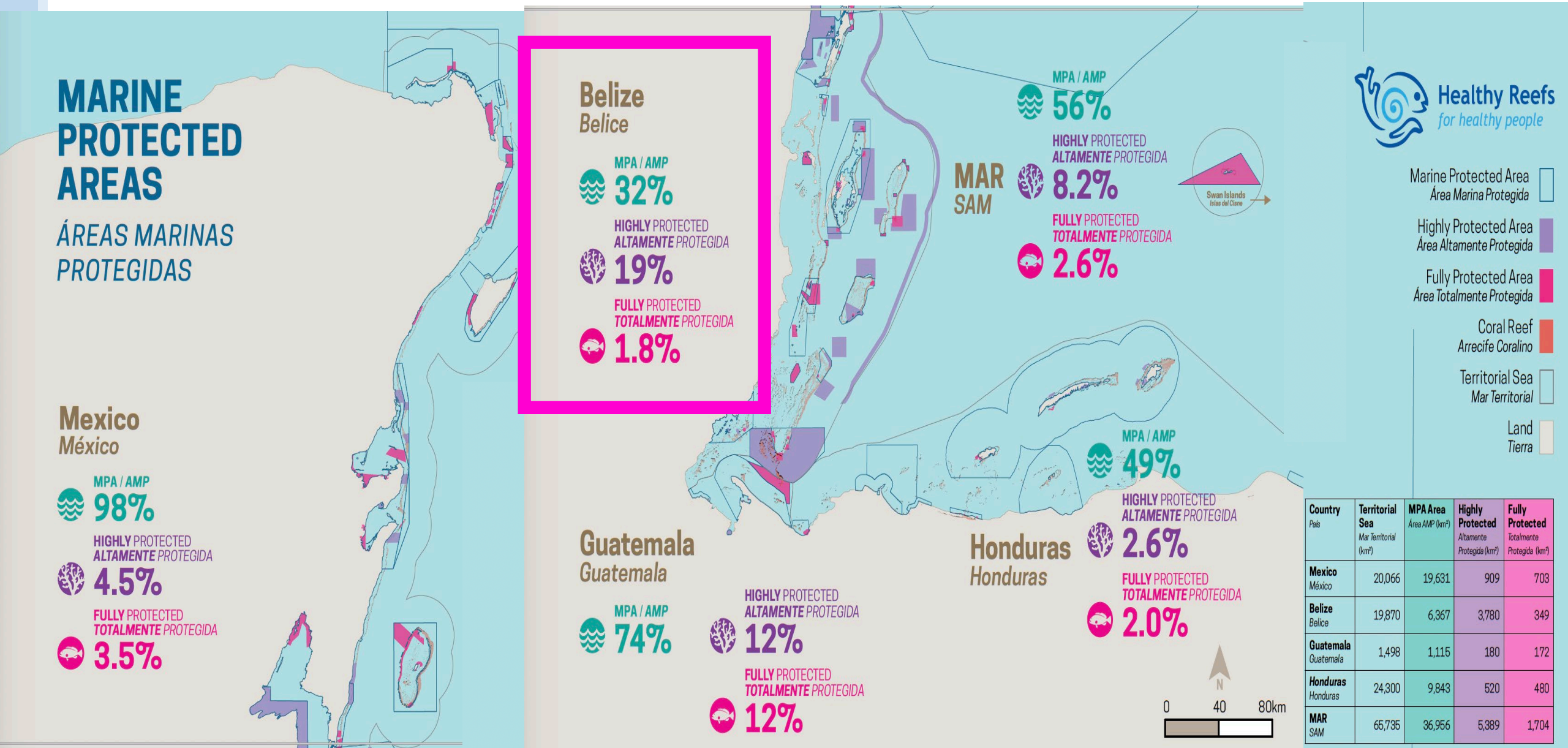
Big Fish are in the FULLY PROTECTED zones of MPAs

Now only <2% of Belize Sea; ~ 7% of the coral reef area



Country / País	Territorial Sea / Mar Territorial (km²)	MPA Area / Área AMP (km²)	Highly Protected / Altamente Protegida (km²)	Fully Protected / Totalmente Protegida (km²)
Mexico / México	20,066	19,631	909	703
Belize / Belice	19,870	6,367	3,780	349
Guatemala / Guatemala	1,498	1,115	180	172
Honduras / Honduras	24,300	9,843	520	480
MAR / SAM	65,735	36,956	5,389	1,704

Management Responses and Examples of Successes

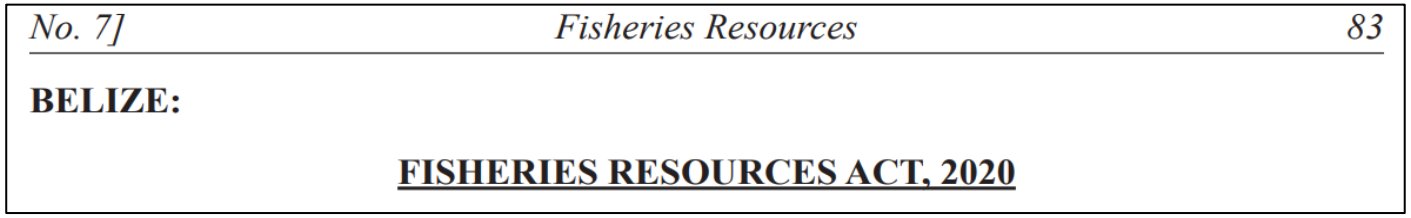
Dr. Andrew Rosenberg

MRAG Americas, Inc.

Governance Analysis

POLICY

- **Policy Mandate**



No. 7] *Fisheries Resources* *83*

BELIZE:

FISHERIES RESOURCES ACT, 2020

  - Coastal Zone Management Act, National Protected Areas System Act, Trade in Endangered Species (CITES) Act, High Seas Fishing Act, Environmental Protection Act

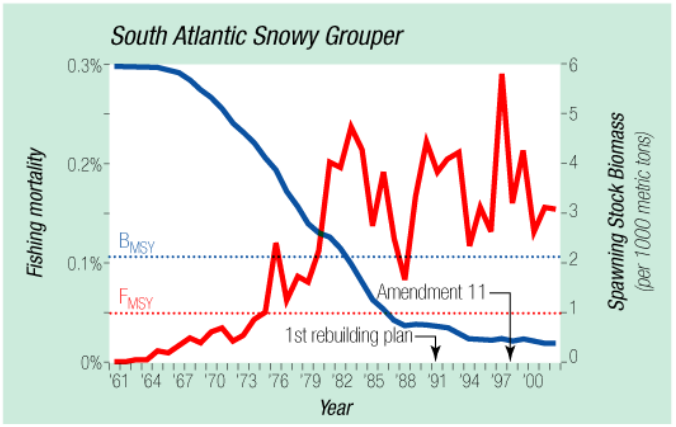
- **Policy Implementation**
  - laws, regulations, decrees, orders, and guidance.

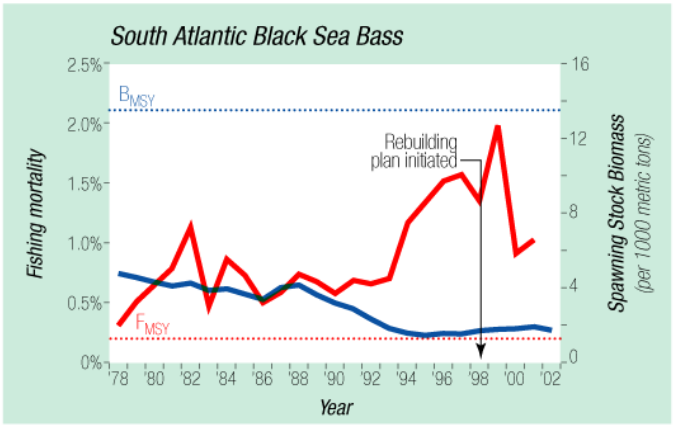
Fishery Policy Key Lessons

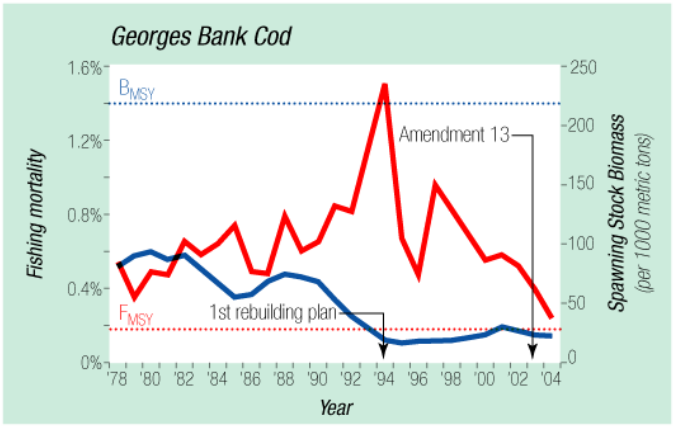
- Policies must change as the fishery and environment changes
    - Holding regulations constant doesn't work
    - Responding to new evidence is essential
- Fishing Pressure and Catch size, age, sex, maturity is fundamental
    - If exploitation is too high stock and yields will decline
    - If exploitation pattern doesn't allow sufficient reproduction, stock and yields will decline

LENFEST OCEAN PROGRAM

Figure 4:
Examples Of Stocks Showing Little Or No Rebuilding Progress



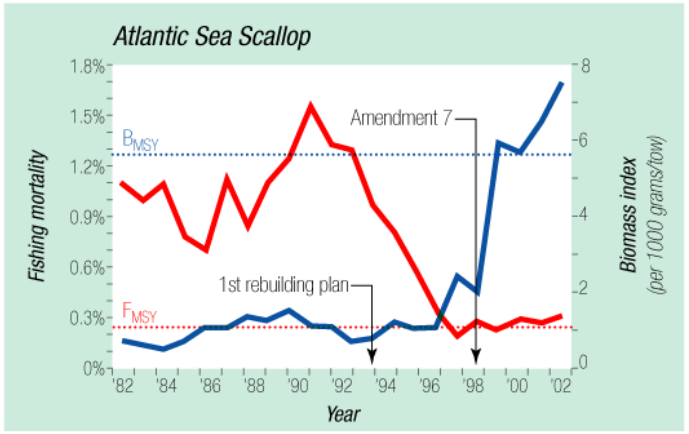


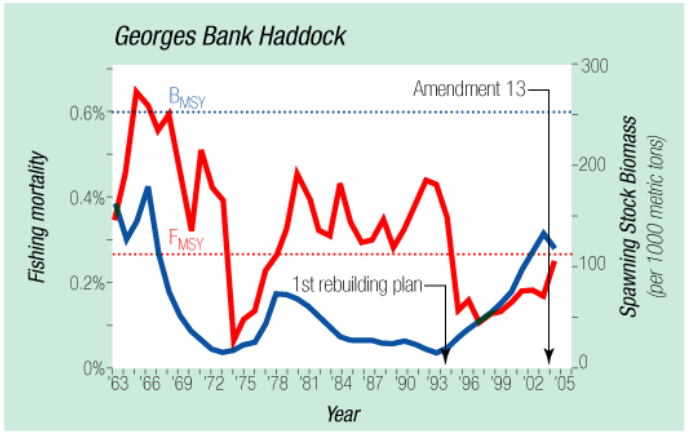


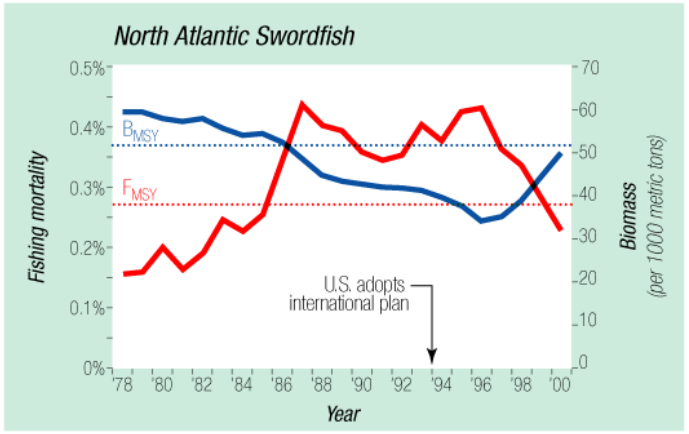
When fishing pressure remains high, stocks show little recovery

LENFEST OCEAN PROGRAM

Figure 5: Examples Of Stocks Showing Rebuilding Progress







When fishing pressure is reduced, stocks can recover

:tps://www.eli.org/belize-fisheries-project

- Warning signs of unsustainability are well known
    - Continuing declines in average size
    - Continuing loss of range/fishing grounds
    - Continuing loss of yield
- A control/enforcement strategy is essential

Plummeting Bering Sea crab populations

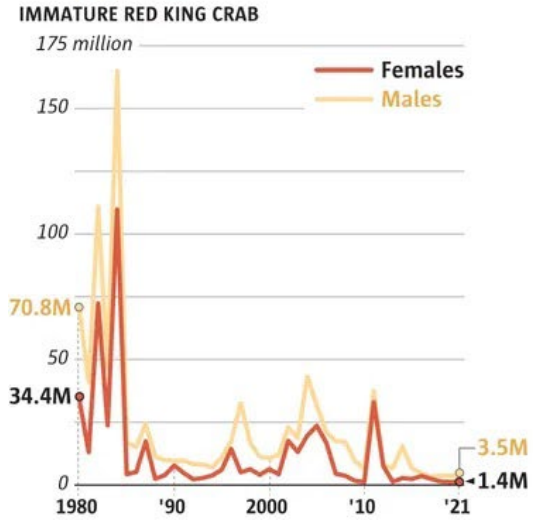
Snow crab and king crab have long been mainstays of commercial harvests.

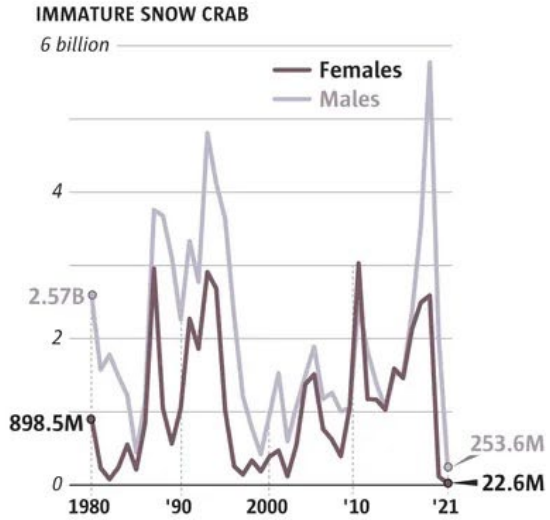
Red king crab
Paralithodes camtschaticus

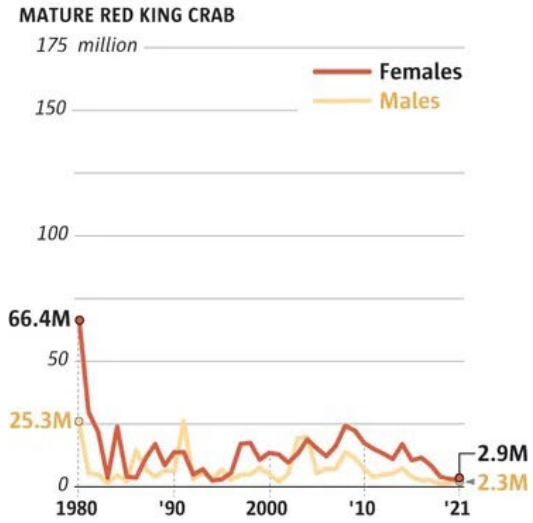
Long-term decline in mature red king crab populations
(for Bristol Bay District)

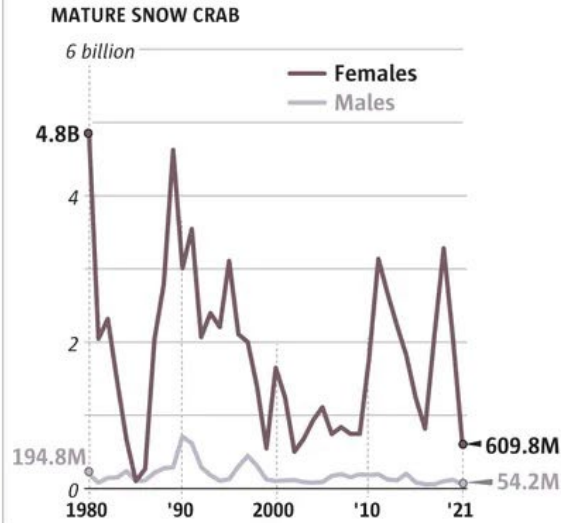
Snow crab
Chionoecetes opilio

Sharp drops in snow crab populations
(all districts)



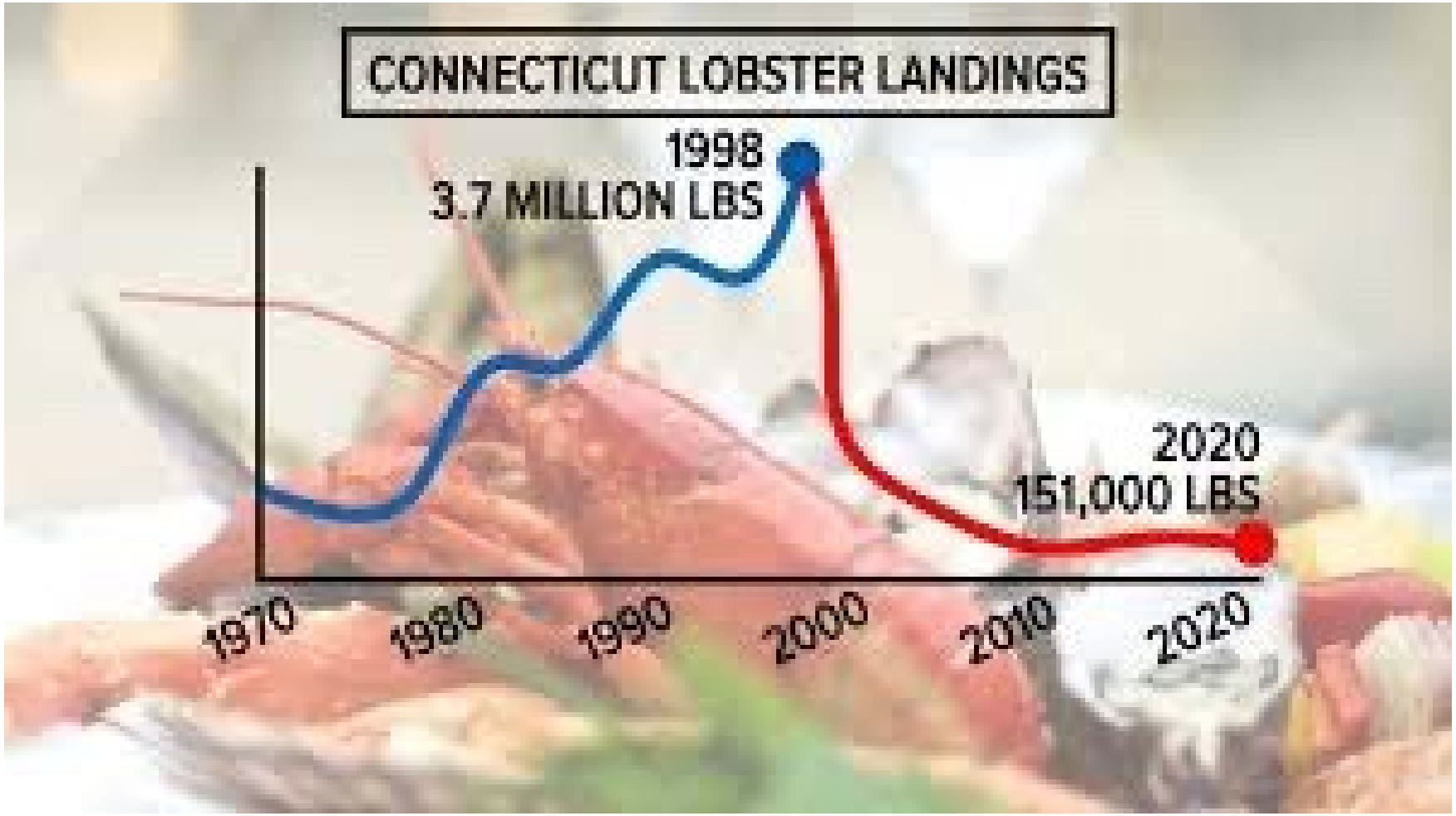






Source: Surveys conducted by NOAA Fisheries

MARK NOWLIN / THE SEATTLE TIMES


CONNECTICUT LOBSTER LANDINGS
1998
3.7 MILLION LBS
2020
151,000 LBS
1970
1980
1990
2000
2010
2020

Thank You

- Questions and discussion