

Belize Fisheries Project

The Fisheries of Belize: Pathways to Sustainability

Presentation to Fishers | December 4 and 6, 2023



Belize Fisheries Project: Project Summary

Dr. Rebecca Kihslinger
Environmental Law Institute

Project Goal

- The Belize Fisheries Project seeks to support Belize in the long-term conservation, management, and sustainable use of its fisheries resources.
- Our objectives are to:
 - Share international best practices for fisheries management;
 - Engage stakeholders in conversations about the state of fishery resources, including the latest technical analyses of Belizean fisheries;
 - Facilitate discussions to support stakeholders having the information they need for effective decision-making; and
 - Provide a forum for discussion of potential approaches to achieve healthy and sustainable fisheries.

The Belize Fisheries Project Team

- International experts in sustainable fisheries, fisheries science, fisheries governance, and stakeholder engagement
- Project partners have worked:
 - In Belize;
 - On the Mesoamerican Reef;
 - In the Caribbean and Central America; and
 - Internationally

BFP Team – COBI



- An NGO with 25 years experience supporting fisher participation for healthy fisheries and resilient coastal communities in Mexico.
- COBI's mission is to promote the conservation of marine biodiversity and the establishment of sustainable fisheries through effective participation.

BFP Team – Environmental Law Institute



**ENVIRONMENTAL
LAW • INSTITUTE®**

- An NGO with expertise in sustainable small-scale fisheries and ocean governance;
- Author of the [Law and Governance Toolkit for Sustainable Small-Scale Fisheries](#);
- Trained convener and facilitator;
- Has worked with governments, communities, and other stakeholders throughout the world (in over 100 countries).

BFP Team – Healthy Reefs for Healthy People Initiative



Healthy Reefs
for healthy people

- An NGO dedicated to safeguarding the Mesoamerican reef and working in Belize for over a decade;
- Publishes the [Mesoamerican Reef Report Card](#)

BFP Team – MRAG Americas



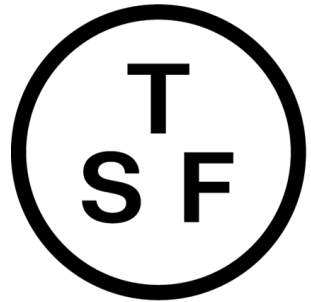
- A private consulting and auditing company focused on activities to support the conservation of marine and freshwater ecosystems and fisheries.
- Over 25 years of experience in fisheries science and management, including sustainability analyses of conch and lobster in the Caribbean.
- Conformance Assessment Body for multiple independent sustainability certification standards, including MSC and RFM.

BFP Team – The Sea Around Us



- A UBC research initiative that focuses on fisheries stocks assessments;
- Conducted 1,300 stock assessments worldwide; using methodology applied for all maritime countries of the world
- Has worked with governments in over 20 countries;
- Daniel Pauly is the author or co-author of over 1,000 publications;
- Daniel Pauly is the recipient of various international awards, including the 2023 Tyler Prize for Environmental Achievement, described as the “Nobel Prize for the Environment”

BFP Team – The Summit Foundation



The Summit Foundation

- A small family foundation based in Washington, DC, seeking to promote the health and well-being of the planet and its people, recognizing the interdependence of people and nature
- Since 2000, our Mesoamerican Reef Program has focused on securing a healthy and resilient ecosystem to provide for present and future generations

Recap of June Workshops

- Held three workshops with fishers in Belize on June 13-15, 2023
 - Workshops in Dangriga, Belize City, and Corozal
 - 72 fishers from 14 different communities
- Presented findings about fisheries stock assessments in Belize
 - 20 key commercial stocks, including queen conch and lobster
- Asked fishers about their perceptions and experience on the water
- Asked fishers about priority actions and ways to improve the fisheries

Why are we here?

- Fishing is part of Belize's identity.
- We all need fisheries in the future.
- Change does not occur unless all stakeholders are at the table and onboard.
- We want to empower women and men from fishing communities to achieve resilient communities and healthy oceans.



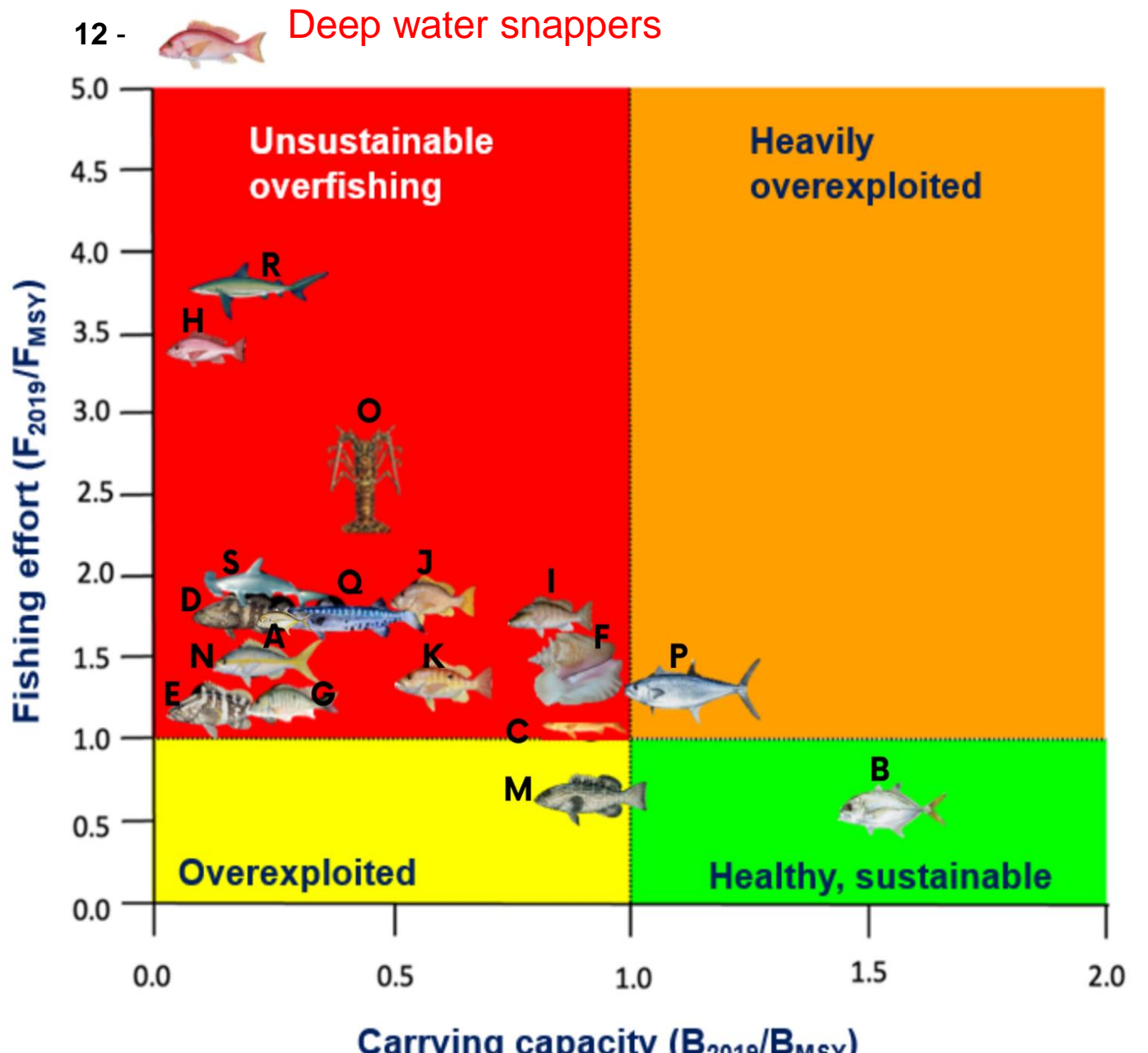
Stock Assessments

Dr. M.L. “Deng” Palomares and Dr. Daniel Pauly

Sea Around Us Research Initiative, University of British Columbia

Summary of result

- A. Crevalle jack
- B. Horse-eye jack
- C. Common snook
- D. Atlantic goliath grouper
- E. Nassau grouper
- F. Queen conch
- G. Mutton snapper
- H. Southern & Northern red snapper
- I. Grey snapper
- J. Dog snapper
- K. Lane snapper
- L. Silk snapper
- M. Black grouper
- N. Yellowtail snapper
- O. Caribbean spiny lobster
- P. King mackerel
- Q. Great barracuda
- R. Caribbean reef shark
- S. Scalloped hammerhead



Main findings

Seventeen of 20 species taken in Belize's fisheries, including the queen conch and Caribbean spiny lobster, are "in the red", meaning they are overexploited. For these species, the fishing pressure is too high, which implies that their biomass - already too low to support maximum sustainable yields - will decrease further.

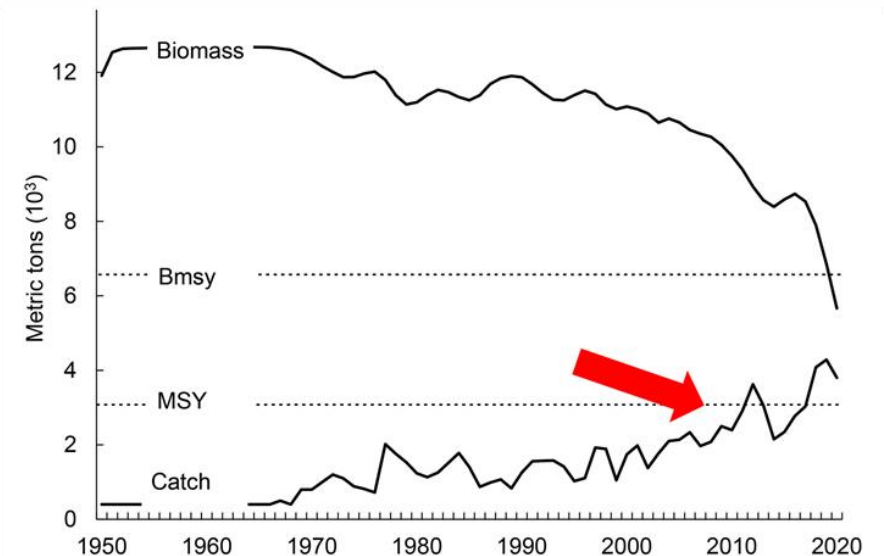
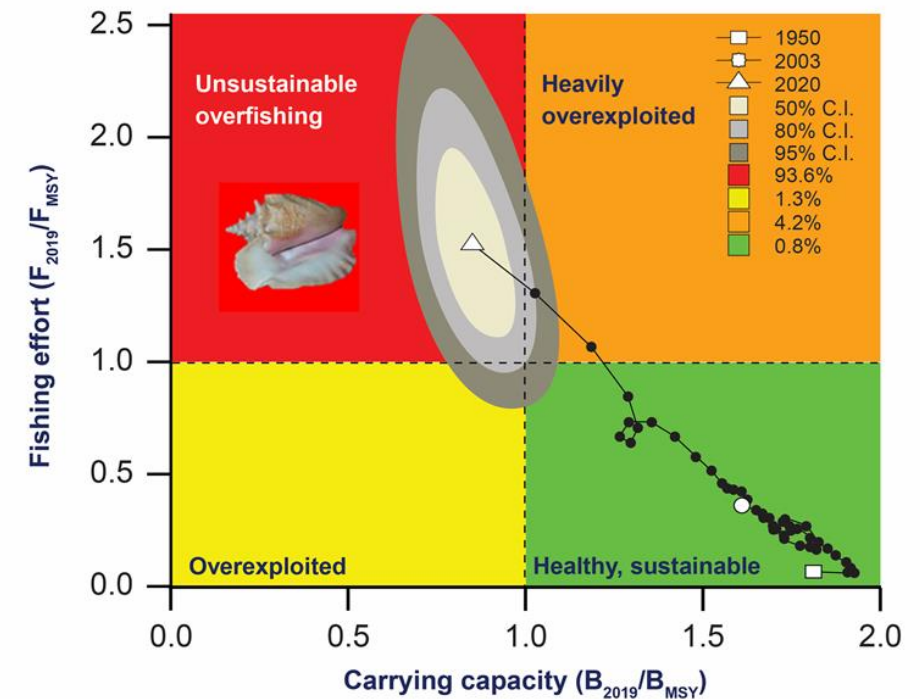
Management changes are needed to get these species, as well as the two in the yellow and orange zones, back into the green zone with the goal of enabling sustainable fishing and supporting fishers' livelihoods.

Results for the queen conch

Top: evolution of the queen conch fishery, from start year (1950; white square) in the green zone to the most recent year (2020, white triangle) in the red zone in the last few years.

Bottom top line: evolution of the biomass of queen conch left in the water with respect to the healthy biomass indicator (B_{msy})

Bottom lower line: evolution of the catch extracted from the queen conch population with respect to MSY (maximum sustainable yield) with red arrow indicating catches surpassing this sustainable limit.

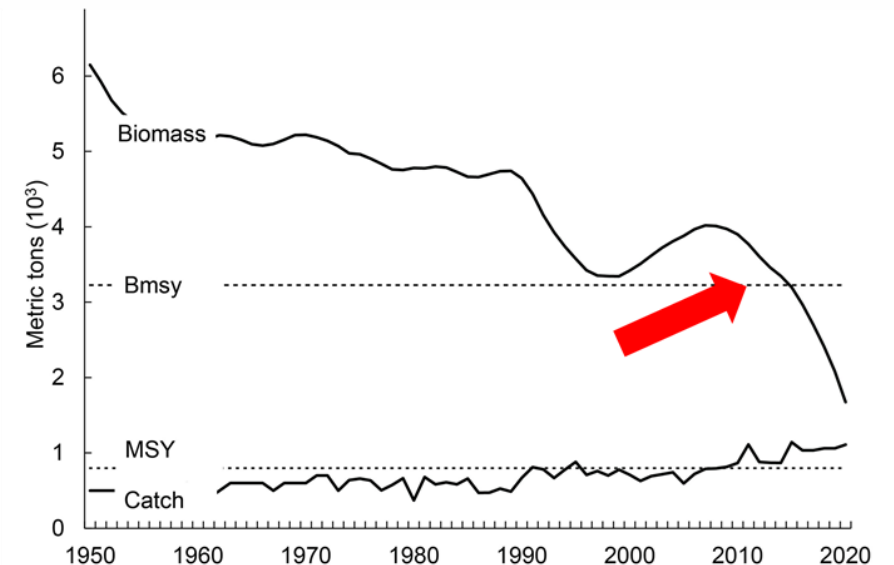
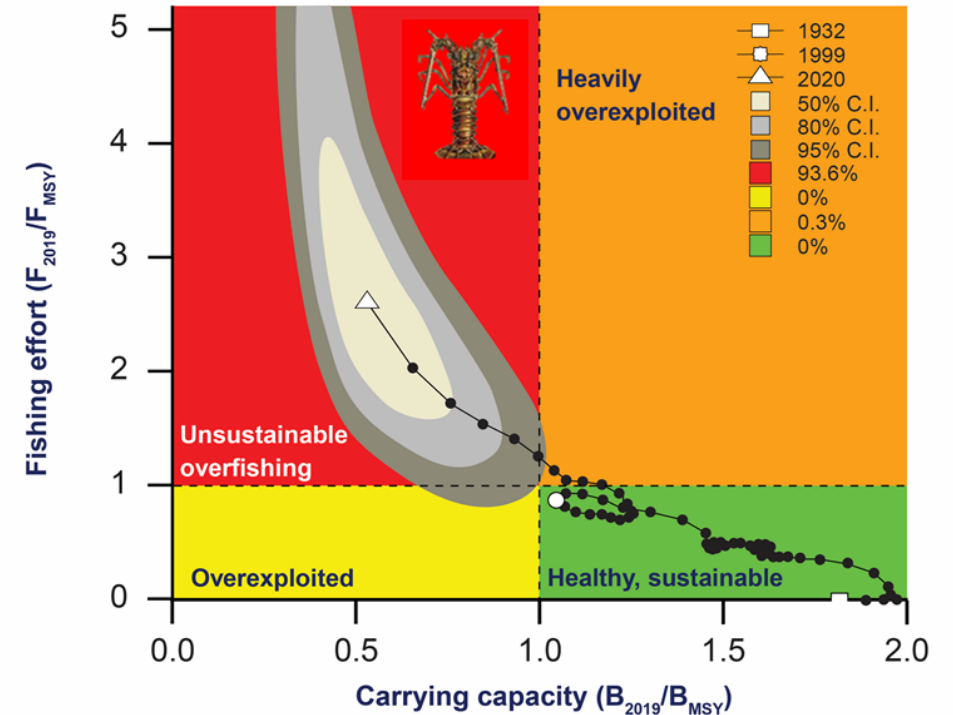


Results for the Caribbean lobster

Top: evolution of the Caribbean lobster fishery, from start year (1932; white square) in the green zone to the most recent year (2020, white triangle) in the red zone for almost a decade.

Bottom top line: evolution of the biomass of lobster left in the water with respect to the healthy biomass indicator (B_{MSY}) with the red arrow indicating rapid decline to near collapsed biomass.

Bottom lower line: evolution of the catch extracted from the lobster population with respect to MSY (maximum sustainable yield).



Fishery Management Fundamentals

Dr. Andrew Rosenberg
MRAG Americas, Inc.

Goal: Ensure the fishery is sustainable in yield (catch) and provides sustainable livelihoods

Keep fishing pressure controlled so that the stock can at least replace itself year after year.

- Manage the fraction of the stock removed each year
 - Limit the catch or the effort or the area that can be fished
- Ensure there are sufficient spawners and spawning habitat for reproduction
 - Make sure enough young grow to spawning age and beyond before capture
 - Protect larger highly productive females that produce the most young
 - Prevent destructive fishing practices that harm habitat

Maximize catches by balancing growth, spawning potential and fishing pressure

Most common tools and what they do

(in Belize and everywhere else!)

- Control the number of boats or fishers or trips to control fishing pressure
- Control the catch directly such as with a quota
- Implement closed seasons to limit fishing pressure or catch
- Gear restrictions to limit fishing, control harvest size, reduce waste or limit habitat impacts
- Implement MPAs to protect certain parts of the stock (mega spawners) or to protect key habitat
- Control the sizes or sex of animals that can be landed
- Limit the catch per trip (bag limits) to reduce fishing pressure

Belize Fisheries Regulations 1978-2022

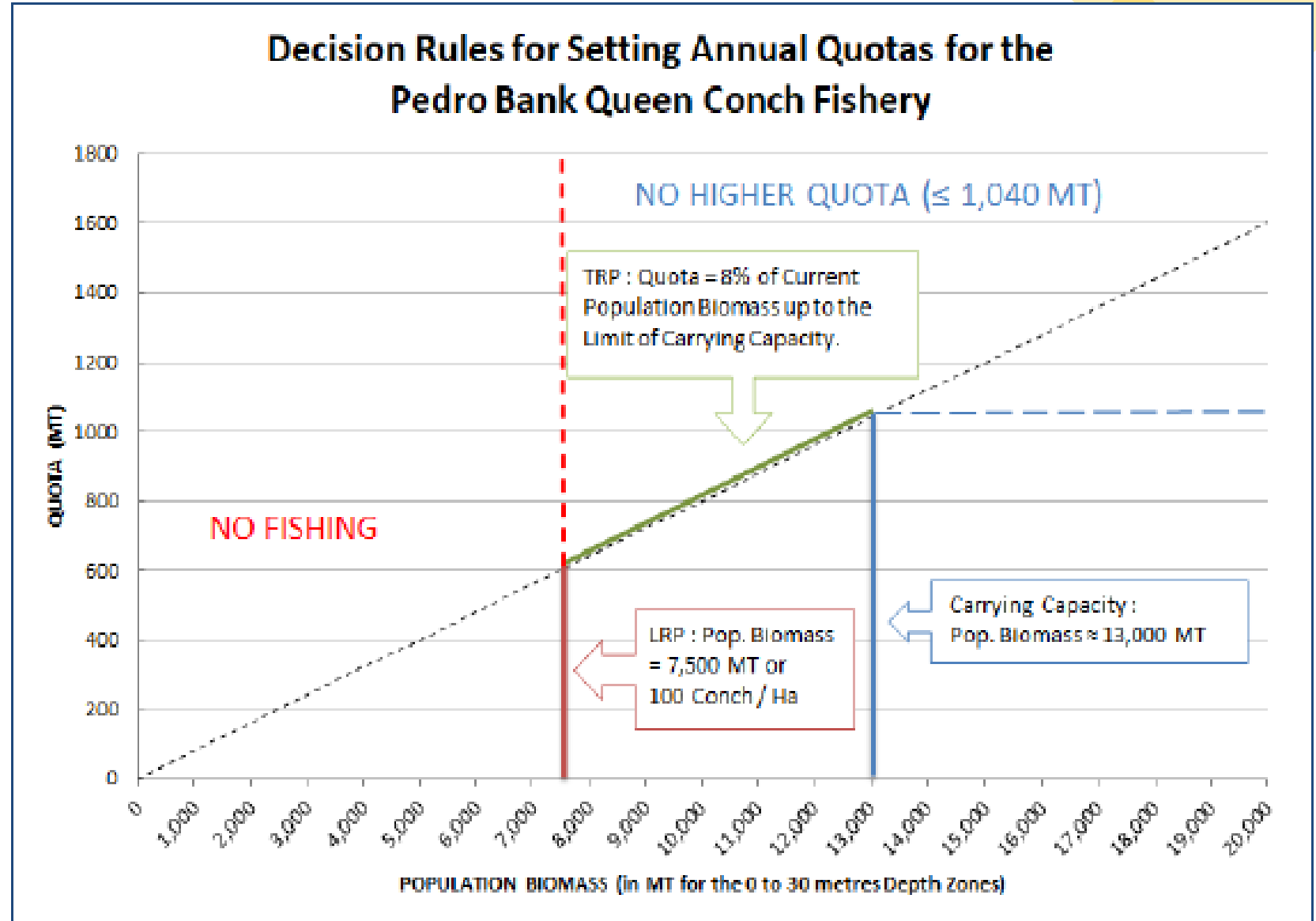
Fishery	Gear	Season	Catch Limit	Size	Comment
General	Ban on trawls (2010), scuba (2011), spearfishing in MPAs (2009), gillnets (2020)				Establishment of MPAs (Fully Protected, Highly Protected)
Conch		Closed 1 July – 30 September	Quota set by BFD	>7 inches shell length, >3 ounces market meat mass (1978)	1978
Lobster	Trap limit	Closed 15 February – 14 June		>3 inches carapace length, > tail mass, No females bearing eggs	2021
Finfish		Closed Dec-April for Nassau Grouper	Ban on parrotfishes and other herbivorous spp. , some sharks	Nassau Grouper Land whole, 22.7 to 34.5 inches TL	

Jamaica conch

Harvesting of immature conch illegal, (shell length less than 22 cm or does not have a flared lip).

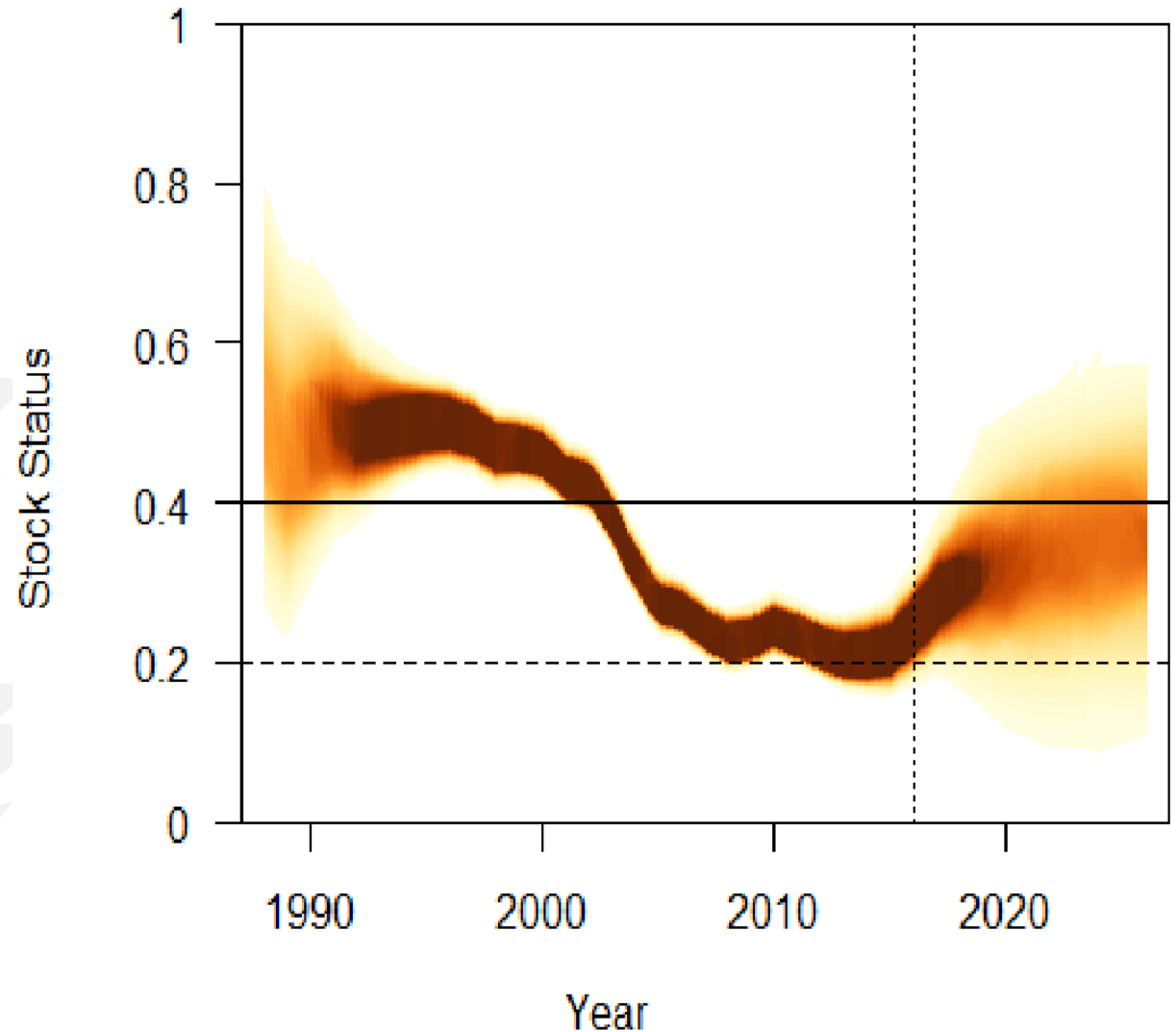
Stock declines in 2016-2018 resulted in seasonal closure in 2019 and 2020, with a real **recovery and a reopened fishery in 2021**

Now under assessment for MSC Certification



Bahamian Lobster Fishery

- The minimum legal size for landing lobster is 5.5 inches ~5 oz. tail and carapace at least 3 ¼ inches
- No catching of berried females
- No SCUBA
- Direct limit on exports that is based on the assessment of stock abundance each year
- **Now MSC Certified**



Summary

- Conch and lobster respond really quickly to reduced fishing pressure
 - Fast growth and reproduction
 - Resilient stocks with wide distributions
 - Highly vulnerable to very rapid decline, but also to rapid recovery
- Reducing catch of small animals and allowing more to reach spawning is critically important
- Management measures have to be responsive to condition of the stock
- The management “tools” are well tested across a lot of similar fisheries

Management Options for Conch and Lobster

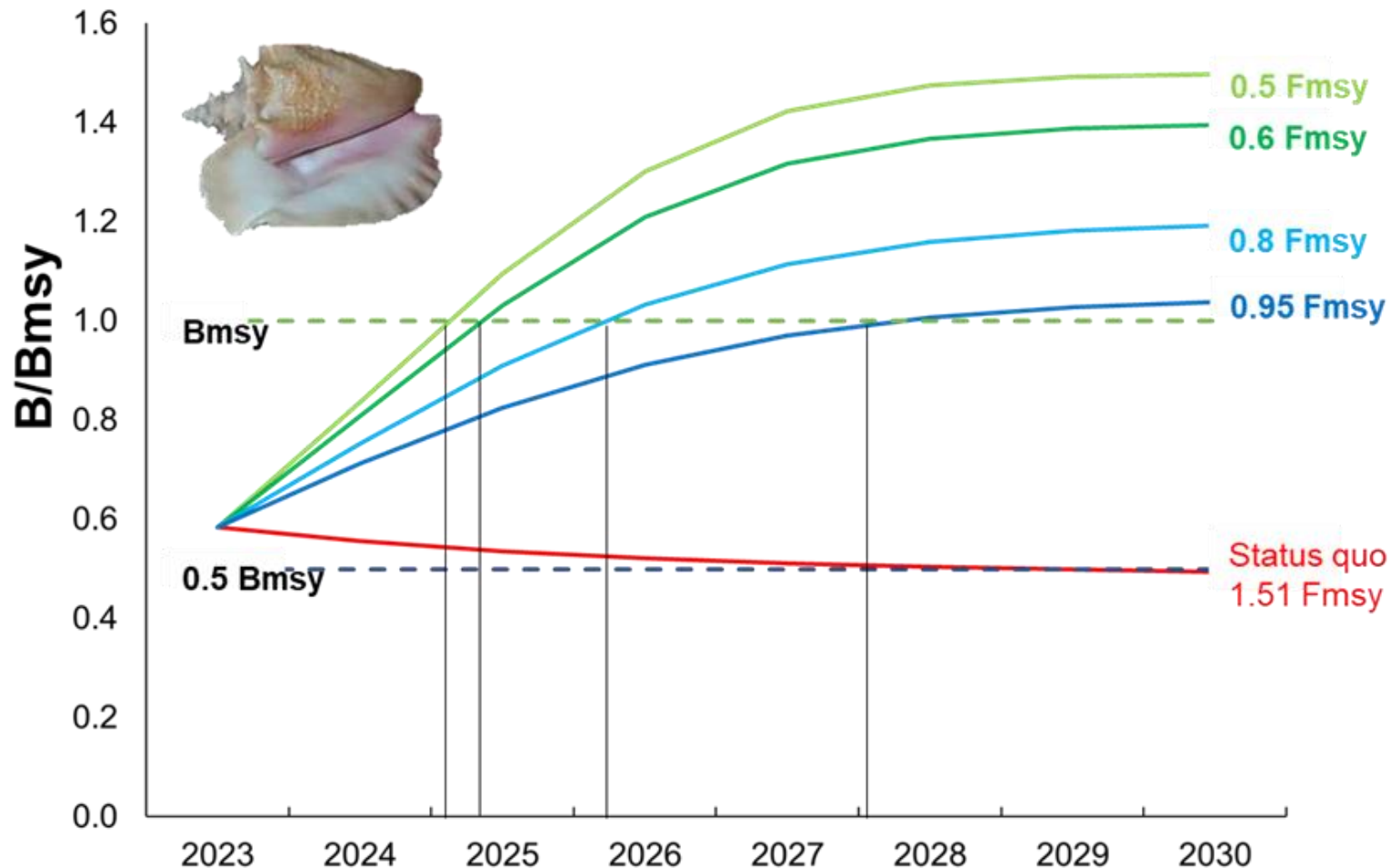
Dr. Graeme Parkes
MRAG Americas, Inc.

MSY – Maximum Sustainable Yield

F_{msy}

B_{msy}

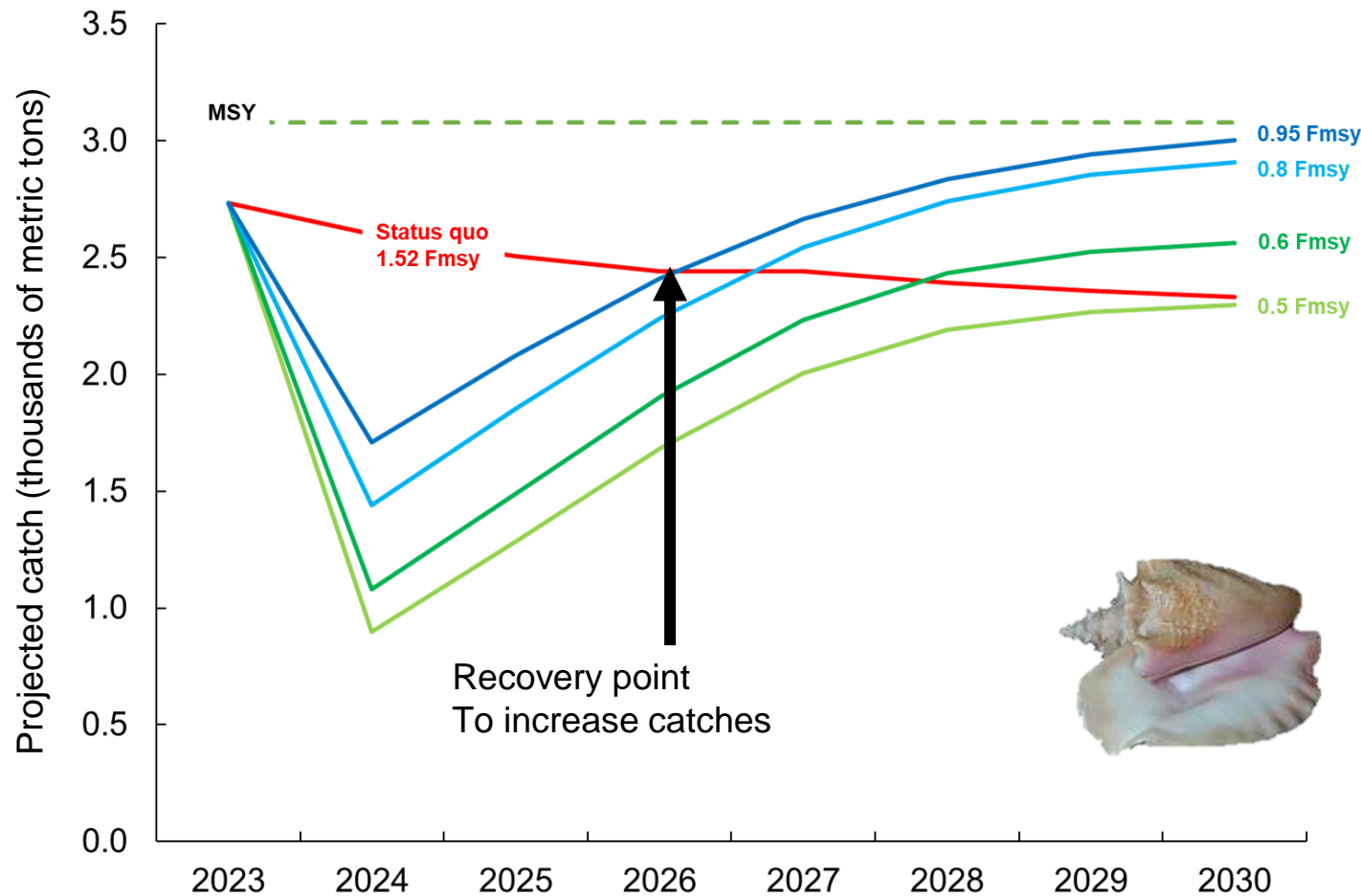
Projected impacts of the proposed changes



Reducing exploitation rates to 0.5 times of the sustainable fishing level will lead to stock recovery in just over one year

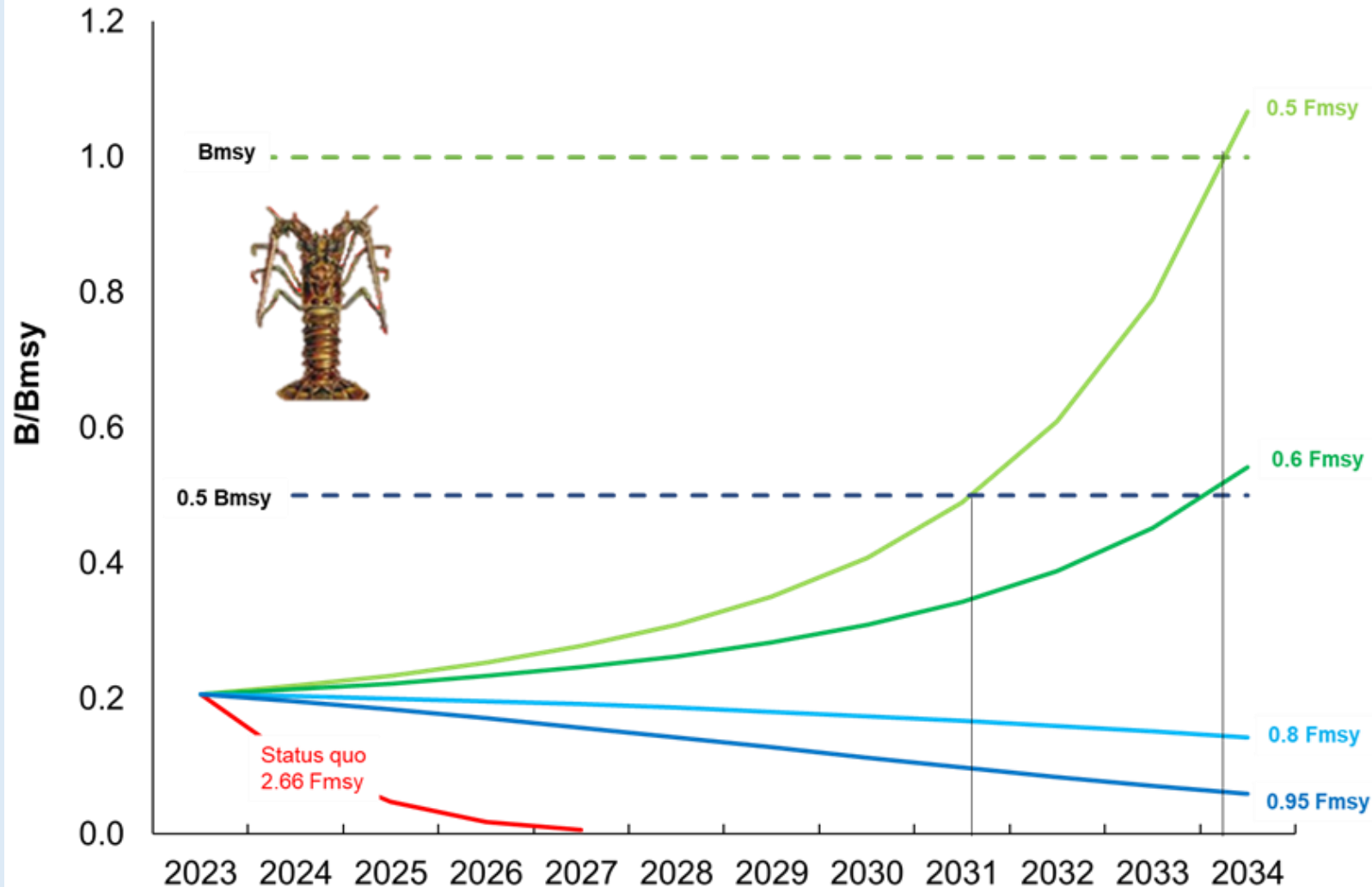
Within 4 years current exploitation rates drive the stock to the critical biological limit and will likely hinder reproduction and recruitment

Catch projections with reduced exploitation rates for conch in Belize



- Reducing fishing pressure means that the catch that can be allowed on the first year of implementation is less;
- Catch levels can be increased if annual assessments show population recovery;
- Red line: Fishing at the current level drives catches down progressively.

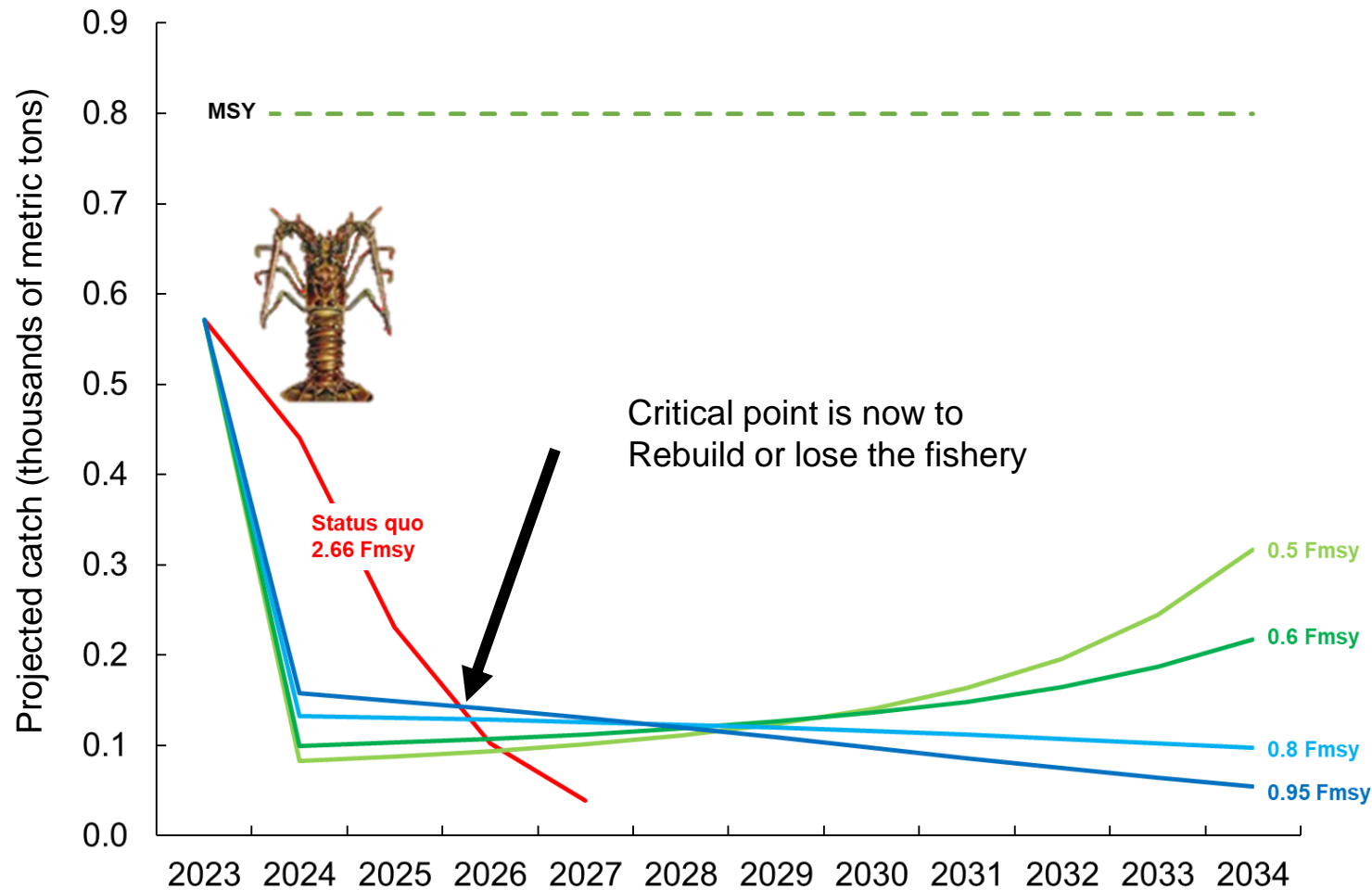
Projected impacts of the proposed changes



Reducing exploitation rates to 0.5 times of the sustainable fishing level will lead to stock recovery in ten years

Within 3 years current exploitation rates drive the stock to collapse

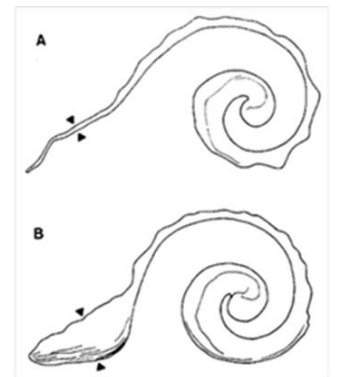
Catch projections with reduced exploitation rates for lobster in Belize



- Reducing fishing pressure by reducing the catch
- Fastest recovery happens after a closure
- Catch levels can be increased if annual assessments show population recovery;
- Red line: Fishing at the current level drives down catches rapidly.

Management options queen conch (*Aliger gigas*)

	Existing measures	Options for additional/changed measures
Effort Control	Managed access	Effective cap on licenses
Overall Catch Limits	Annual quota by BFD (1978)	Science based annual catch limit Harvest Control Rule
Quota allocation		
Catch per trip		
Closed seasons	Closed 1 July – 30 September (1978)	
Gear regulation	Scuba ban	
MPAs	Managed access	
Size limits	>7 inches shell length, >3 ounce market meat mass (1978)	Ideal: harvest only conch with flared lip of at least 0.4 inches thickness Presence of flared lip indicates maturity; first maturity 0.16 inches. 50% maturity 0,4 inch
		Alternative (less effective): Increased minimum size to 7.9 inches shell length. Using a shell length minimum size will not protect all juveniles and will not allow all adults to be harvested (some mature earlier).



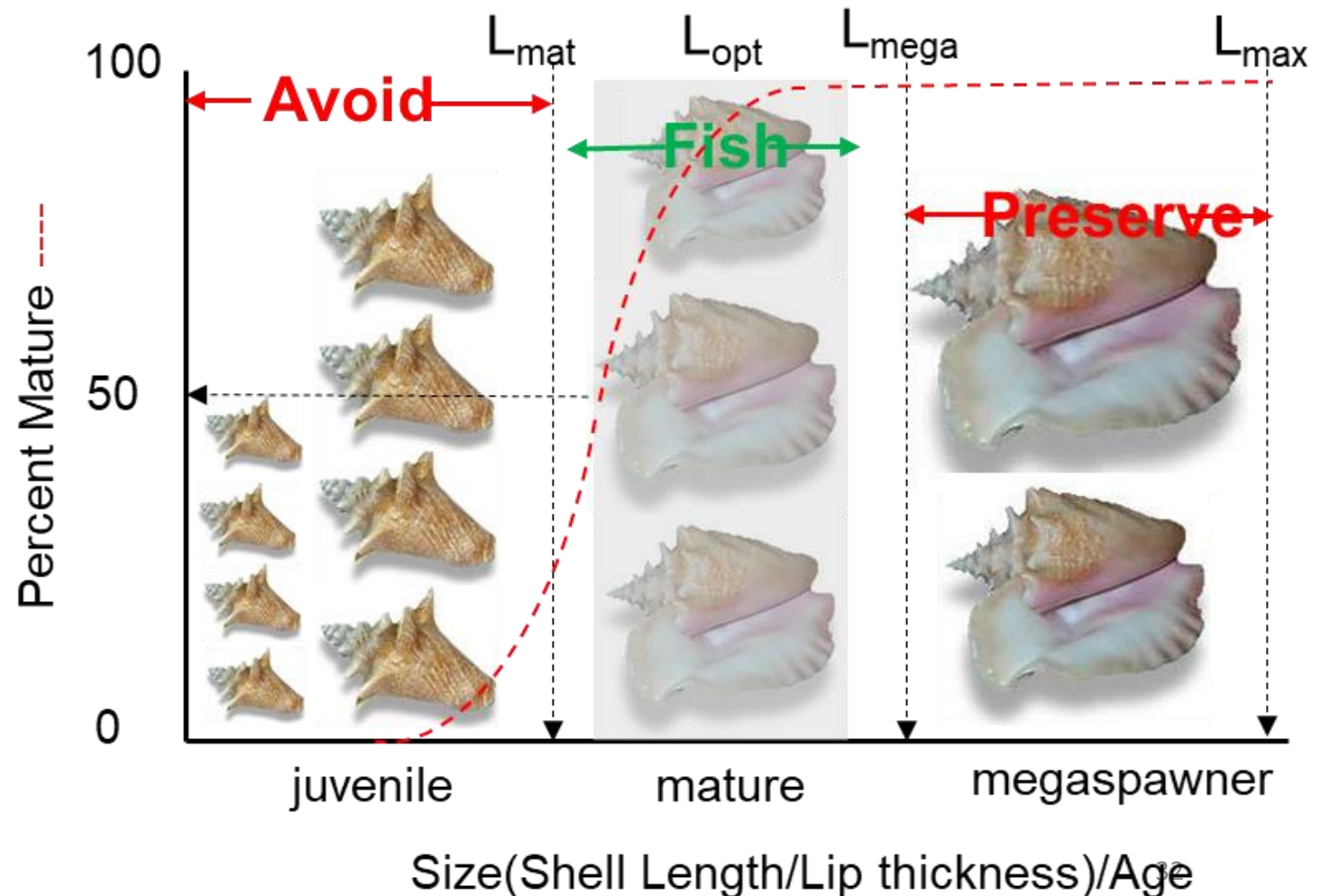
Proposed harvest rules of thumb

Avoid harvest of juvenile conch that have not yet developed the flared lip.

Harvest mature conch with flared lips of at least 0.4 inches.

Leave large mega-spawners on the reef.

red dashed line: % mature individuals



Management options spiny lobster (*Panulirus argus*)

	Existing measures	Options for additional/changed measures
Effort Control	Managed access	Effective Cap on licenses
Overall Catch Limits		Science based annual catch limit; Harvest Control Rule
Quota allocation		
Catch per trip		
Closed seasons	Closed 15 February – 14 June. 2021	
Gear regulation	Number of traps per fisher, per fishing vessel, by area. 2021	Only tail snares, no hook sticks,
MPAs	Managed access	Only tail snares, no hook sticks. Allows live release of prohibited catches (e.g. berried)
Size limits	>3 inches carapace length, >4oz tail mass 2021	Minimum size increase to 3.35 in carapace length. 50% female maturity (males mature at larger CL). Trap escape gaps need to correspond.
	No females bearing eggs	

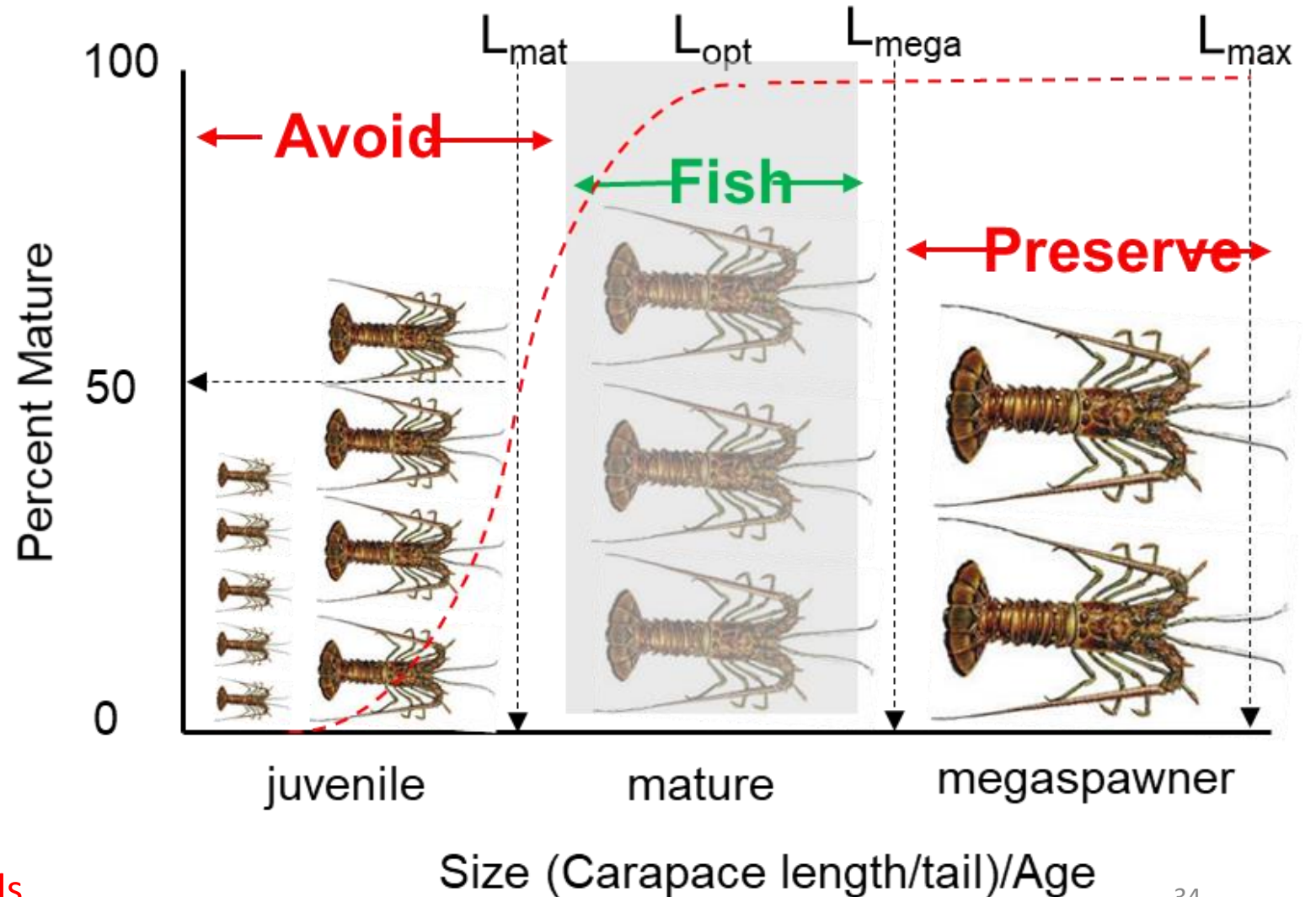


Proposed harvest rules of thumb

Avoid harvest of juveniles with carapace length less than 3.35 inches.

Harvest mature adults at 3.35 inches.

Leave mega spawners in their habitats.



red dashed line: % mature individuals

Pathways to Sustainability

Dr. Graeme Parkes
MRAG Americas, Inc.

Pathways to Sustainability

- **How to implement management actions for Belize fisheries**
 - Community agreement on activities that are out of scope
 - Adjustments to regulations (size limits, effort control, catch limits, seasons etc.)
 - Area based actions (protected areas and associated special conditions of licensing)
 - Risks of deep-water fishing
 - Enhanced monitoring
- **Development of Fishery Management Plans**
 - Incorporate agreed actions
 - Procedures for review and revision

Pathways to Sustainability

Community Agreement on activities that should be avoided

- Government regulation takes time
- Community-based initiatives can be very effective
 - New measures, or compliance with existing measures
- Example activities:
 - smashing small conch for pearls
 - Fishing in no-take zones
 - Fishing in closed seasons
 - Fishing on severely depleted species (e.g. goliath and Nassau groupers)
 - Recreational take of conch
 - Taking of berried female lobsters and/or targeting soft-shelled lobsters

Pathways to Sustainability

Adjustments to Regulations

- Management options for conch and lobster (earlier slides)
- Happen routinely in a fisheries management regime
- Based on science
- Stakeholder input, particularly fishers
- Formalized in a Fishery Management Plan
- Subject to regular review
- Proper enforcement and monitoring

Pathways to Sustainability

Area Based Actions

- MPAs are a significant component of marine management in Belize
 - Protection of spawning sites
 - Creation of refuges
 - Habitat protection
- Multiple users (not just fishers)
- Fully Protected Areas
- Highly Protected Areas
- Proper definition, understanding and enforcement
 - IUCN Guidelines (2019) MPA Categories 1a, 1b, II and III
 - Belize's definition of No-Take Zone includes catch and release fishing
- Conditions for entry (track record, vessel tracking, record keeping, chain of custody)
- Regular Surveys and Good Enforcement

Pathways to Sustainability

Risks of deep-water fishing

- Proposed as a means of increasing catches
- Foreign fishing
- Minimal access for local fishers
- Safety at sea
- Uncertain resource abundance
- Refuge for mega-spawners

Pathways to Sustainability

Enhanced monitoring

- Enables more refined management controls
- Vessel location
- Catch and effort reporting
 - Daily/real time
 - Electronic Reporting
 - Electronic Monitoring (video)
- Surveys
- Fisher/community involvement; citizen/fisher scientists. e.g. conch condition factors & lobster CL vs. tail weight
- Key to sustainability and workability of regulatory controls

Questions?

The Role of Fishers in Creating Change

Stuart Fulton and Miriam Velazquez
COBI



- **Fishing communities are particularly vulnerable to global shocks and changes.**
- Fishing can be a solitary activity, with few opportunities for exchange and sharing.
- **Fishermen and fisherwomen are flexible and make daily decisions to adapt, using their experience and available information.**
- Some decisions promote sustainability and bring social benefits, others do not.
- **Across Latin America and the Caribbean, the management of small-scale fisheries continues to lack information and effective governance, but often also has low community participation.**

Knowledge transfer

Knowledge plays a key role in the adaptation capacity and participation of the next generations in the use and co-management of resources

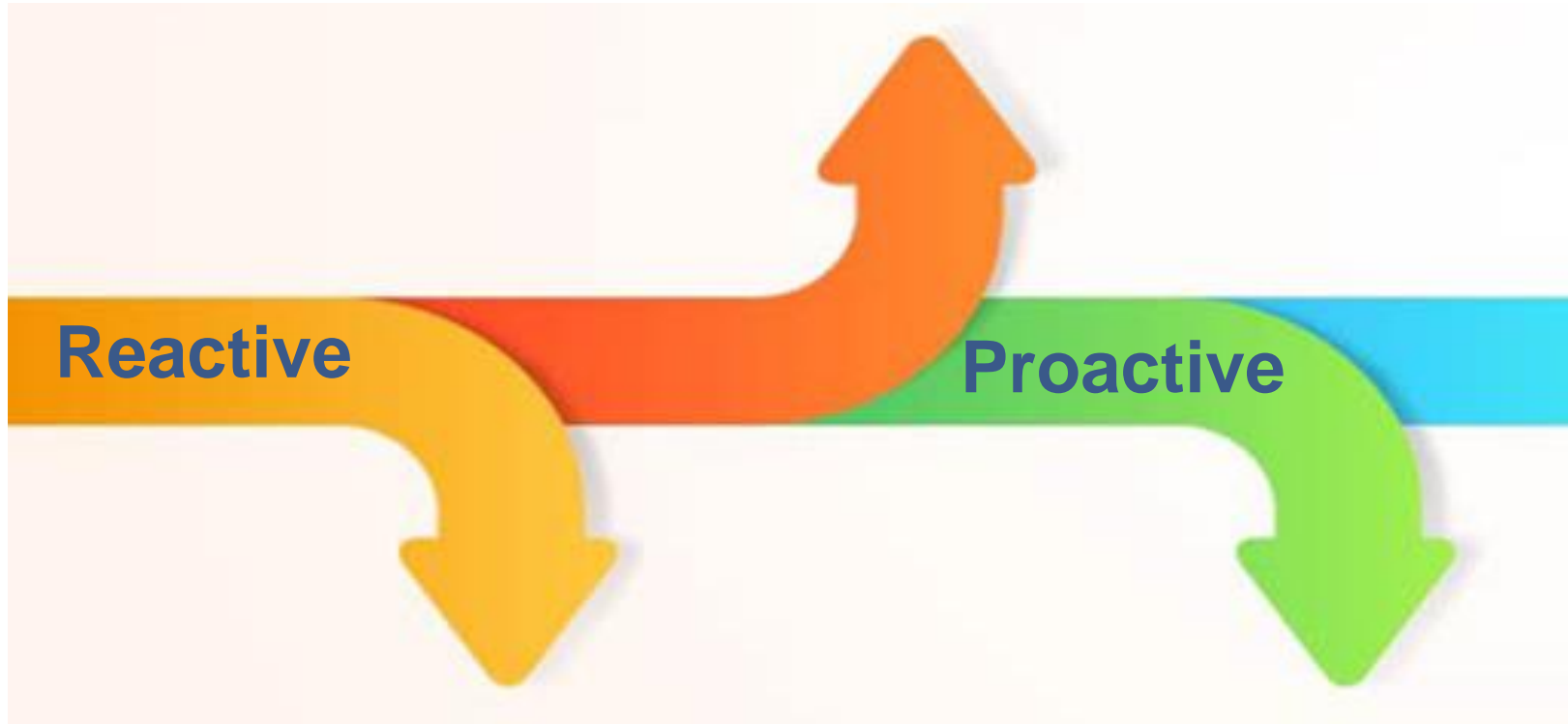
Local-traditional ecological knowledge
Scientific knowledge

Fishers for a Sustainable Future

Empower women and men from fishing communities to amplify their participation in Belizean fishery management and effectively participate in decision-making spaces.



Fishers for a sustainable future



Actions that strengthen social leadership and present an extraordinary opportunity for sustainable development

Topics



- **Fisheries management**: instruments that allow us to regulate and manage fishing activities.
- **Collaborations for sustainability**: Identify stakeholders who are involved in each step of decision-making, based on the fishing situation of their community.
- **Shifting baseline**: recognize the importance of generating historical information in communities.
- **Governance**: Define the formal and informal rules that exist in the community related to fishing.

Soft skills



- Strengthen soft skills to promote the effective participation of fishermen and fisherwomen in decision-making spaces.
- Effective communication
- Public speaking
- Teamwork



“I learned to be more confident in what I say, and in myself. I learned about how to deal with attention without shouting”.
Fisher from Sonora

“You gave us confidence and adapted the program to us. I used to not participate and now I do it regularly”.
Fisher from Baja California



Fisher talking about the importance of community no-take zones in the Mexican Caribbean during the closed season Festival. Yucatan.



Fishers from different coastal communities presenting sustainable fishing efforts in the Legislative chamber of the Senate

Project Next Steps

Dr. Andrew Rosenberg
MRAG Americas, Inc.