

# Belize Fisheries Project

## *The Fisheries of Belize: Pathways to Sustainability*

Presentation to Fishers | December 7, 2023



# Belize Fisheries Project: Project Summary

## Resumen del proyecto

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.
- El Proyecto de Pesca de Belice busca apoyar a Belice en la conservación, manejo y uso sostenible a largo plazo de sus recursos pesqueros.
- Nuestros objetivos son:
  - Compartir las mejores prácticas internacionales para el manejo pesquero.
  - Involucrar a todos los actores claves en discusiones sobre el estado de los recursos pesqueros, incluidos los últimos análisis técnicos de las pesquerías.
  - Facilitar discusiones para asegurar que los actores claves tengan la información que necesitan para una toma de decisiones eficaz.
  - Proporcionar un foro para la discusión de enfoques potenciales para lograr pesquerías saludables y sostenibles.

# 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
- Expertos internacionales en la pesca sostenible, ciencia pesquera, gobernanza pesquera y participación efectiva de actores claves.
- Los socios del proyecto han trabajado:
  - En Belice;
  - En el Arrecife Mesoamericano;
  - En el Caribe y Centroamérica; e
  - Internacionalmente

# 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

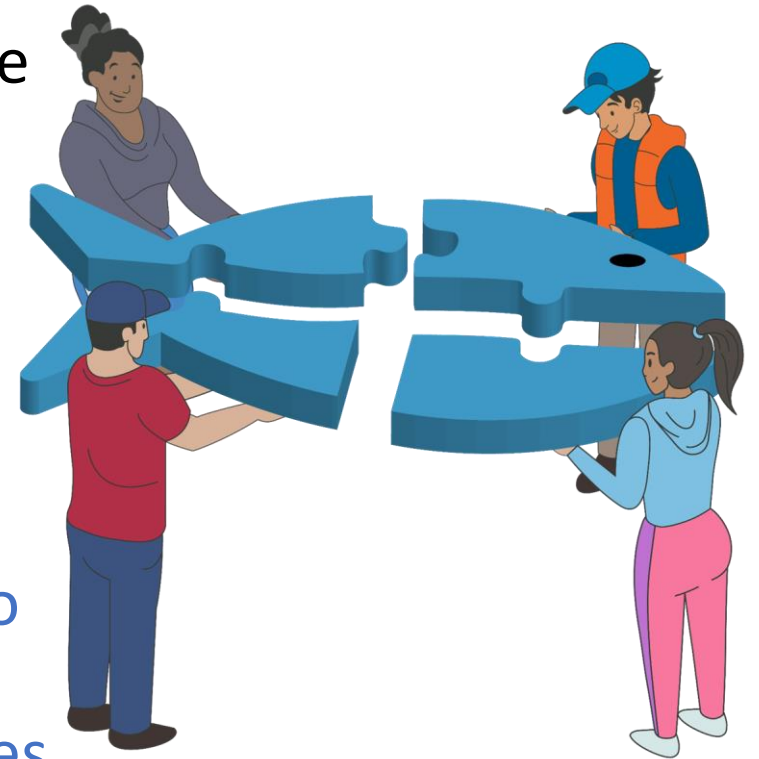
- Held three workshops with fishers in Belize on June 13-15, 2023
    - Workshops in Dangriga, Belize City, and Corozal
    - 72 fishers from 14 different communities
  - Presented findings about fisheries stock assessments in Belize
    - 20 key commercial stocks, including queen conch and lobster
  - Asked fishers about their perceptions and experience on the water
  - Asked fishers about priority actions and ways to improve the fisheries
- 
- Tres talleres con el sector pesquero en junio 2023
    - Dangriga, Belize City, Corozal
    - 72 pescadores de 14 comunidades
  - Compartimos información sobre las poblaciones pesqueras
    - 20 especies principales, incluyendo caracol y langosta
  - Solicitamos información de los pescadores sobre percepciones
  - Solicitamos información de los pescadores sobre acciones prioritarias

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# 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.
- La pesca es parte de la identidad de Belice.
- Todos necesitamos pesquerías en el future.
- El cambio no ocurre si todos los actores claves no están en la mesa y participando.
- Queremos empoderar a las mujeres y los hombres de las comunidades costeras para lograr comunidades resilientes y océanos saludables.



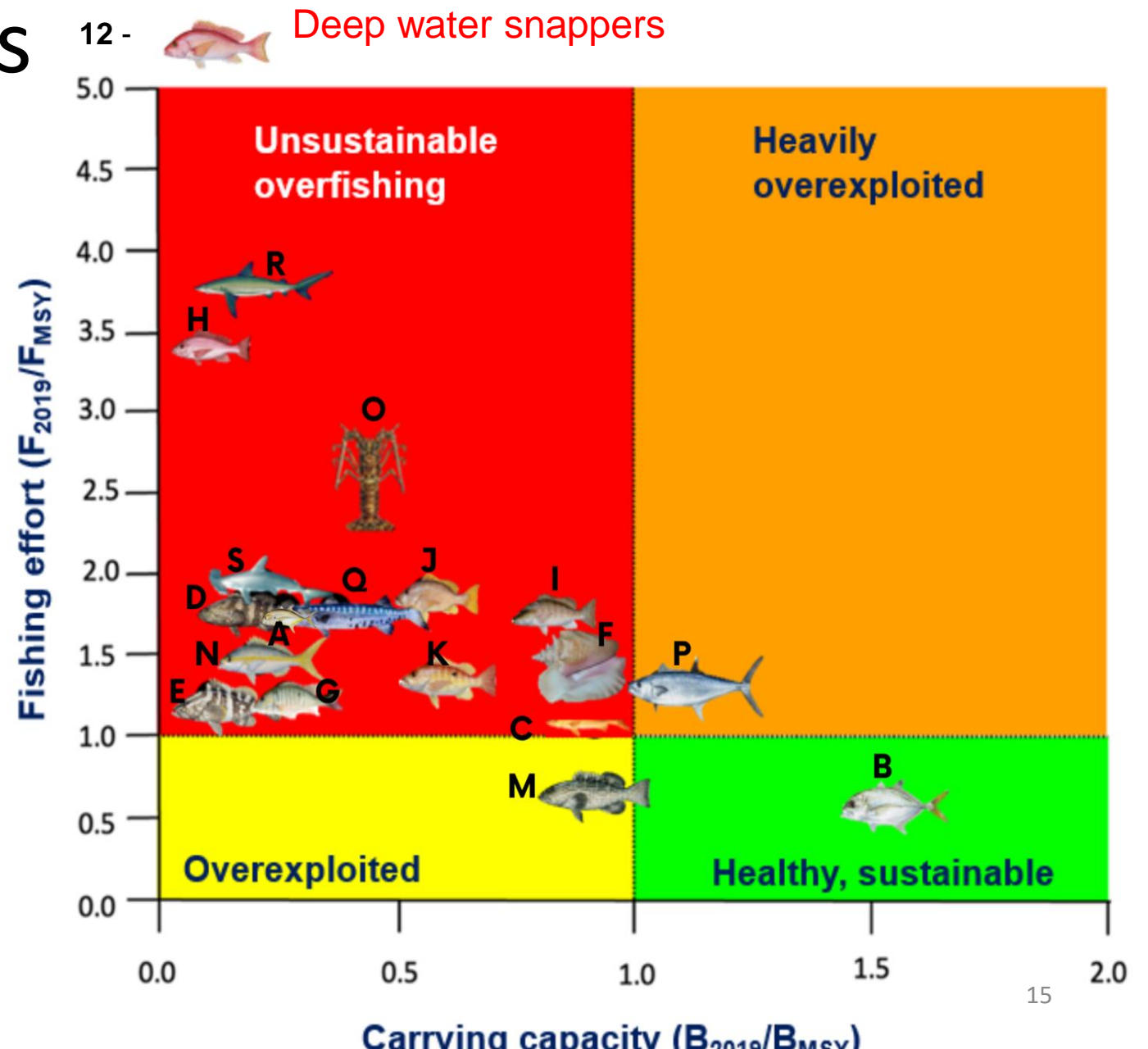
# Stock Assessments

## Evaluaciones de poblaciones

Dr. M.L. “Deng” Palomares and Dr. Daniel Pauly  
*Sea Around Us* Research Initiative, University of British Columbia

# Summary of results

- 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.

17 de 20 especies "en rojo", que quiere decir sobreexplotado. La presión pesquera es demasiada alta, y su abundancia demasiada baja.

Se requiere cambios en manejo para regresar a la zona verde y asegurar el bienestar de los pescadores y futuro de la pesca

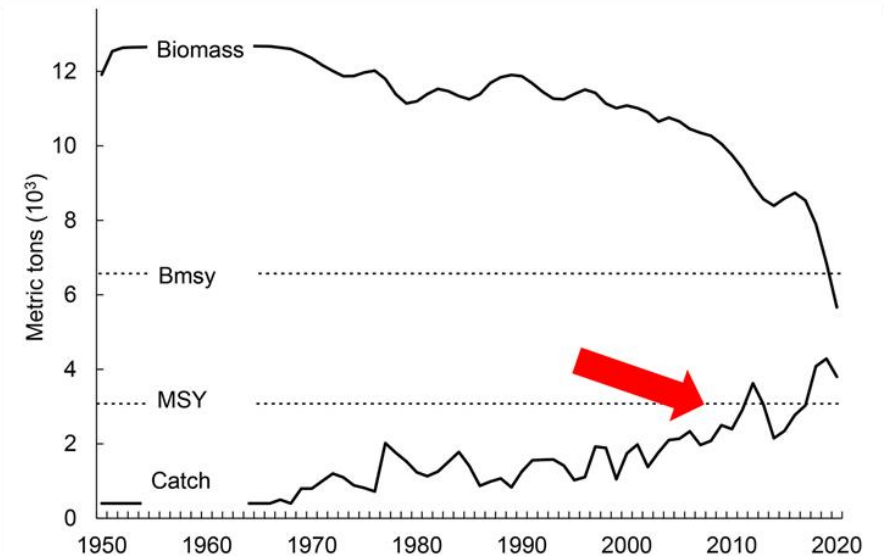
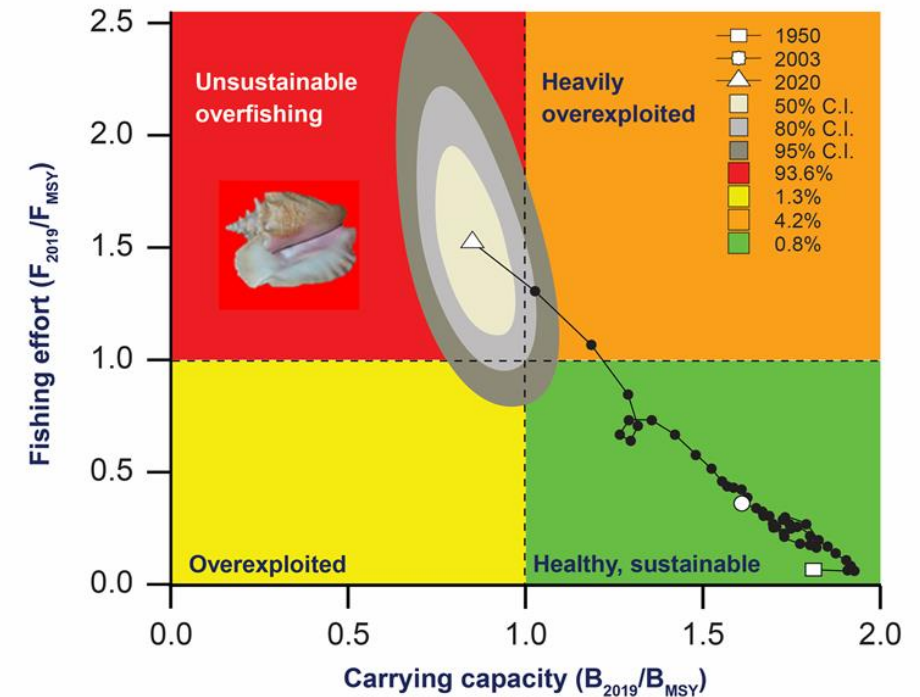


# Results for the queen conch

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.

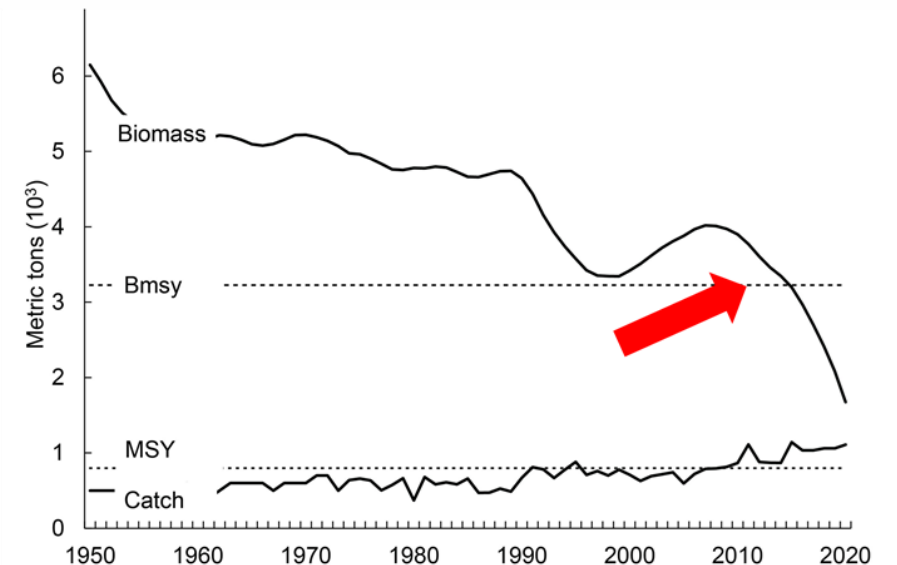
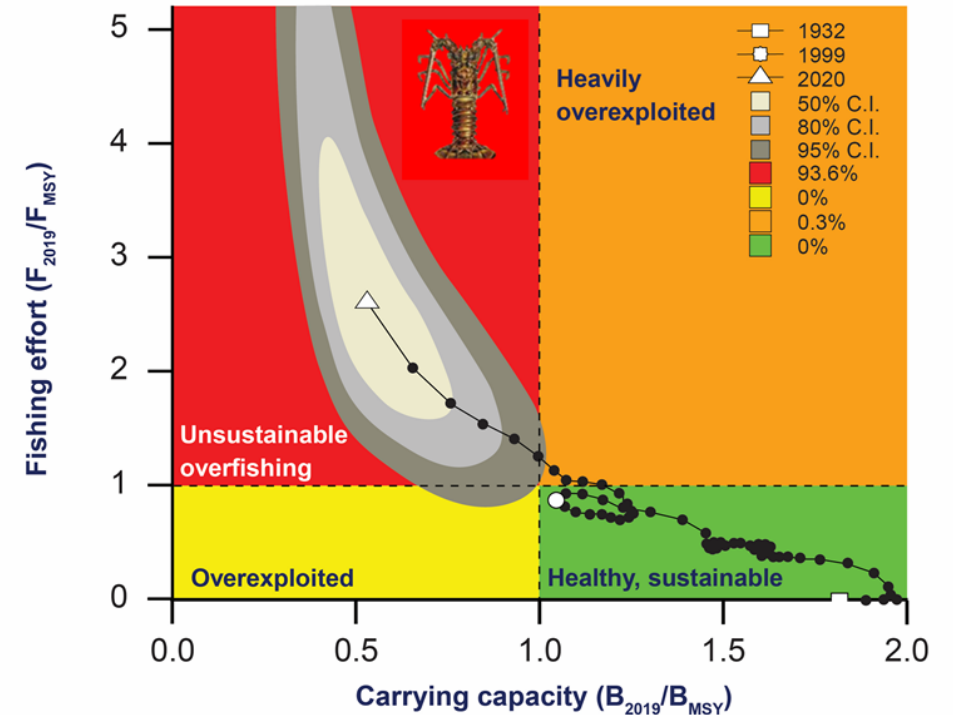


# Results for the Caribbean lobster

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

## Herramientas de manejo pesquero

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**

Objetivo: asegurar una pesca sostenible que proporciona el bienestar de las comunidades pesqueras.

- Buscar como controlar el esfuerzo pesquero para asegurar la reproducción y reproducción.
- Maximizar las capturas equilibrando el crecimiento, el potencial de reproducción y la presión pesquera.

# 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 (controlar numero de embarcaciones o pescadores)
- Control the catch directly such as with a quota (controlar captura – cuota)
- Implement closed seasons to limit fishing pressure or catch (vedas)
- Gear restrictions to limit fishing, control harvest size, reduce waste or limit habitat impacts (limitar artes de pesca o tallas de captura)
- Implement MPAs to protect certain parts of the stock (mega spawners) or to protect key habitat (proteger poblaciones con areas de no pesca)
- Control the sizes or sex of animals that can be landed (controlar tallas o sexo de animals capturadas)
- Limit the catch per trip (bag limits) to reduce fishing pressure (limitar captura por viaje)

# Belize Fisheries Regulations 1978-2022

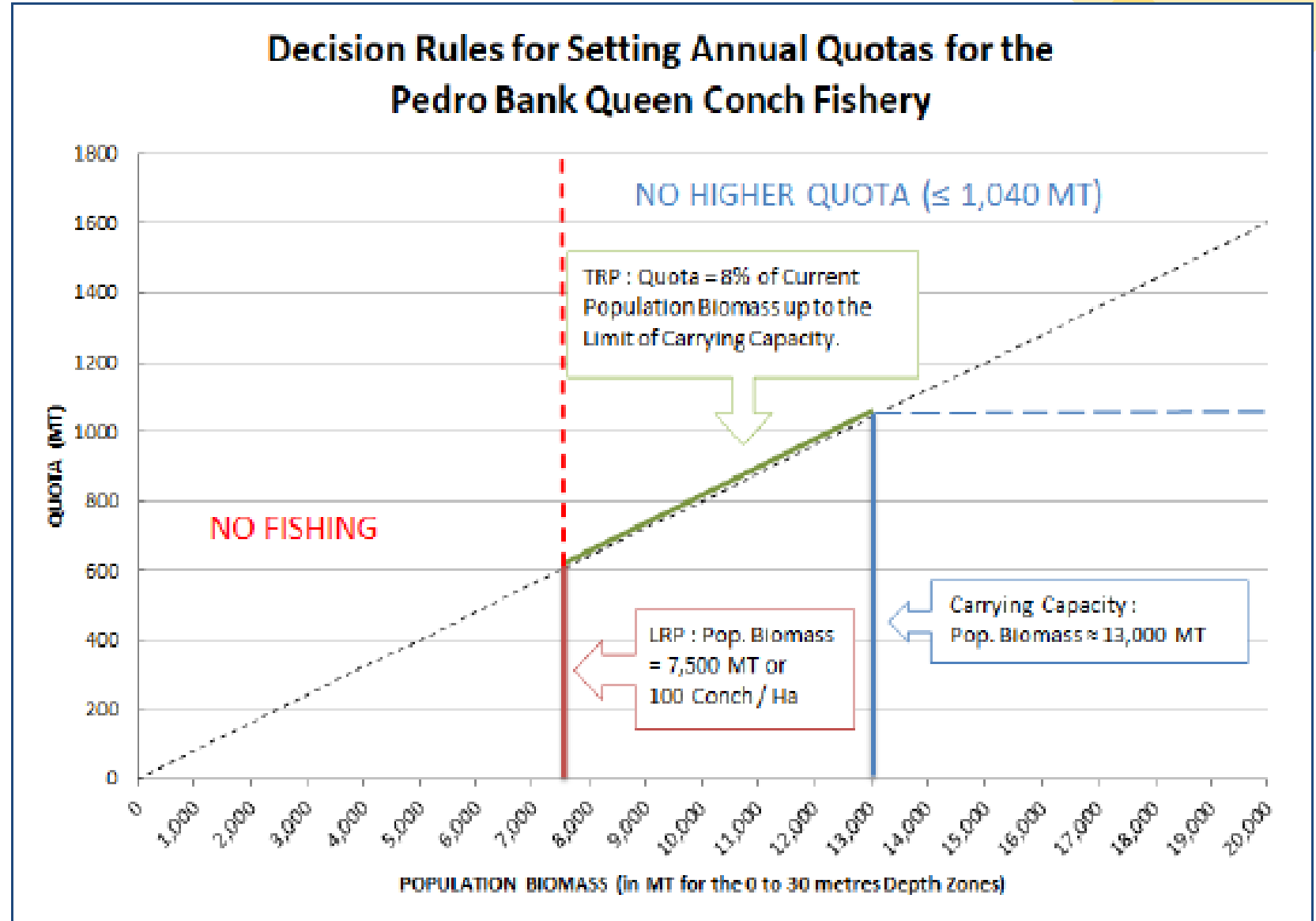
Fishery	Gear	Season	Catch Limit	Size	Comment
General	Ban on trawls (2010), scuba (2011), spearfishing in MPAs (2009), gillnets (2020)				Establishment of MPAs (Fully Protected, Highly Protected)
Conch		Closed 1 July – 30 September	Quota set by BFD	>7 inches shell length, >3 ounces market meat mass (1978)	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).

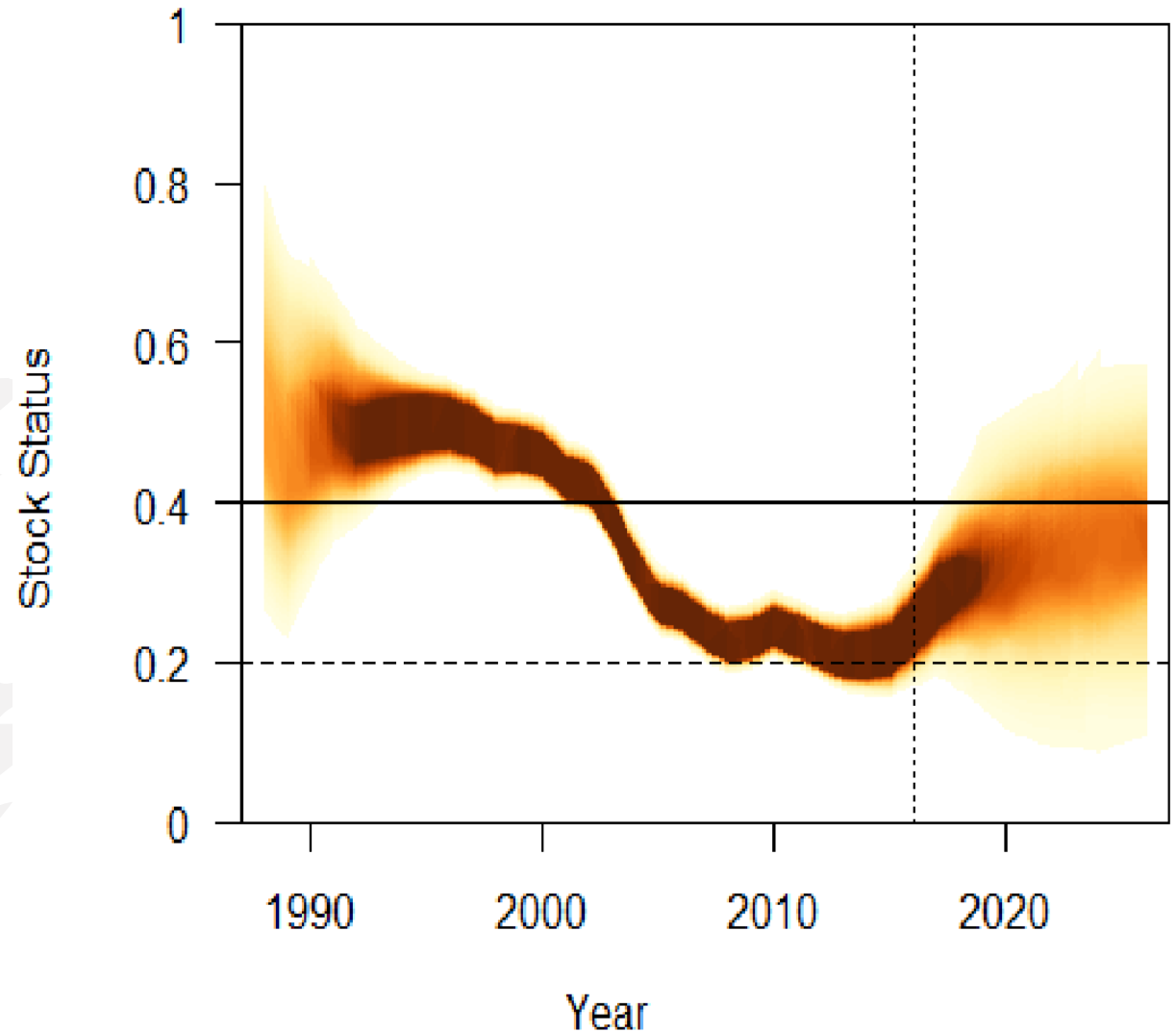
Stock declines in 2016-2018 resulted in seasonal closure in 2019 and 2020, with a real **recovery and a reopened fishery in 2021**

**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 Marine Stewardship Council 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
- Caracol y langosta pueden responder rápido a una reducción en la presión pesquera.
  - Crecimiento rápido, resiliente, vulnerable a la sobrepesca, pero se recuperan rápido.
- Hay que reducir captura de animales pequeñas y permitir que más lleguen a tallas de reproducción.
- Debe haber un manejo que adapte a la situación pesquera.
- Hay muchas herramientas de manejo que se ha implementado en todo el mundo

# Management Options for Conch and Lobster

## Opciones de manejo para caracol y langosta

Dr. Graeme Parkes  
MRAG Americas, Inc.

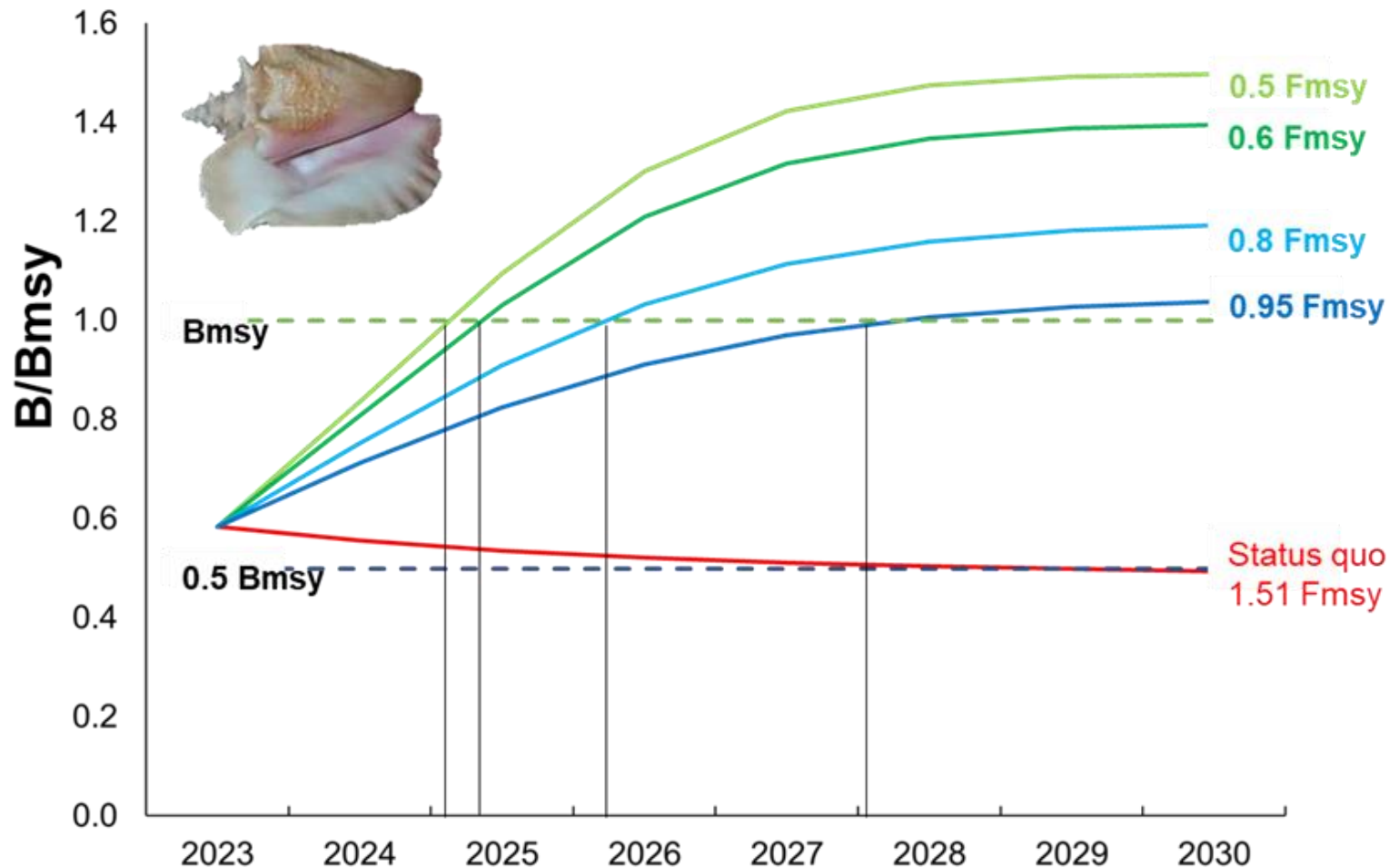
# MSY – Maximum Sustainable Yield

Rendimiento Máximo Sostenible

$F_{msy}$

$B_{msy}$

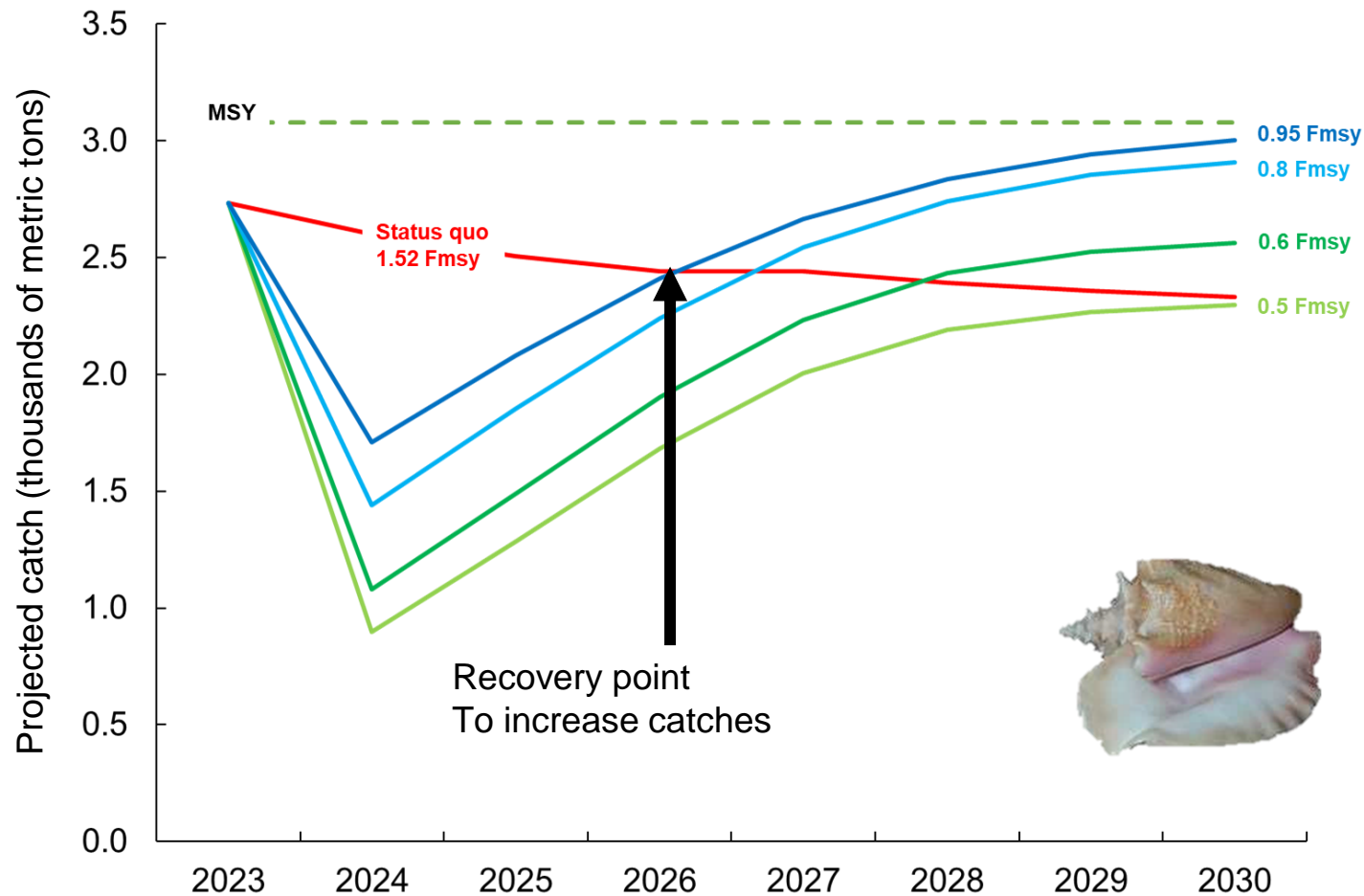
# Projected impacts of the proposed changes



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

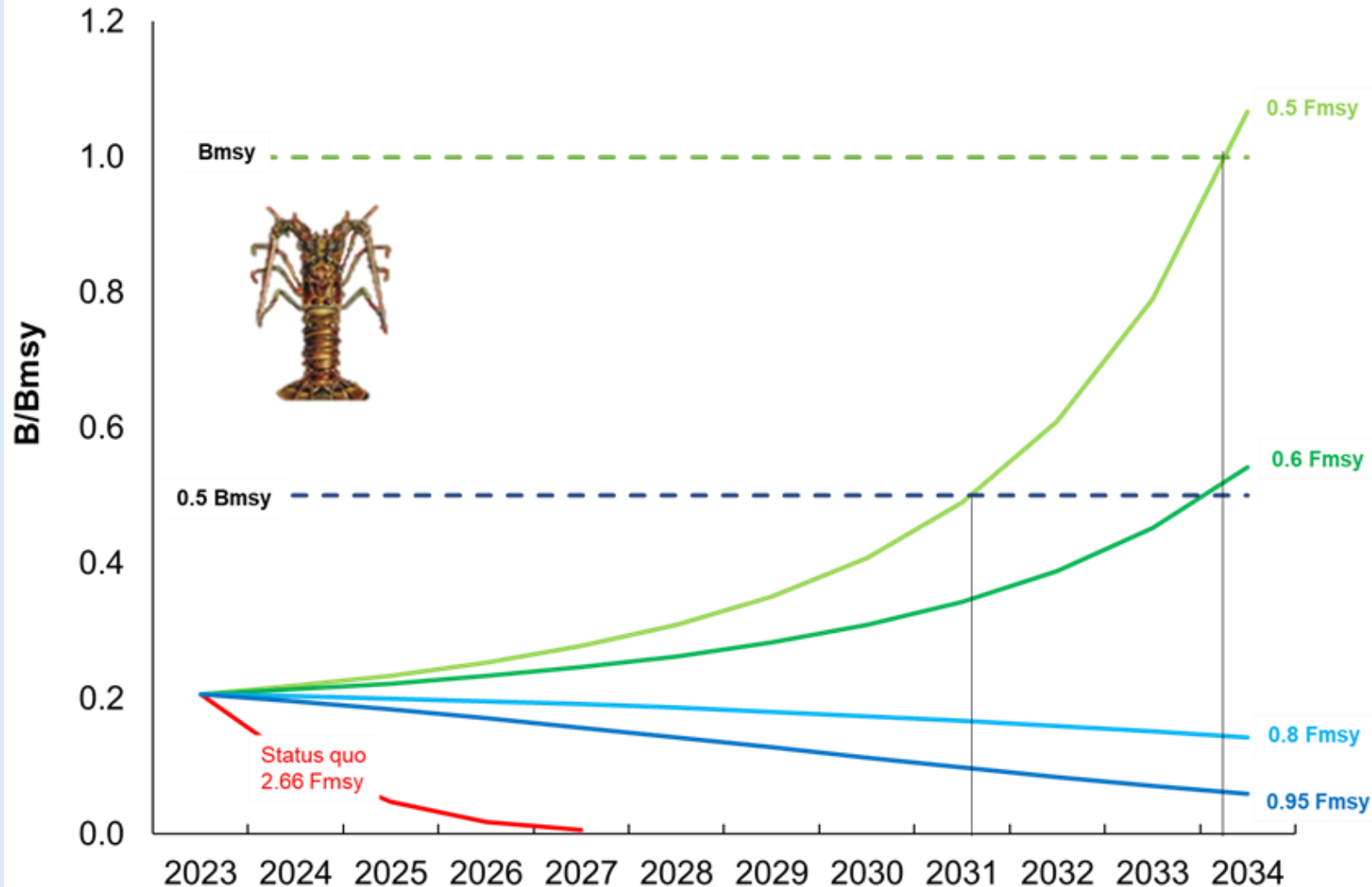
Within 4 years current exploitation rates drive the stock to the critical biological limit and will likely hinder reproduction and recruitment

# 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.

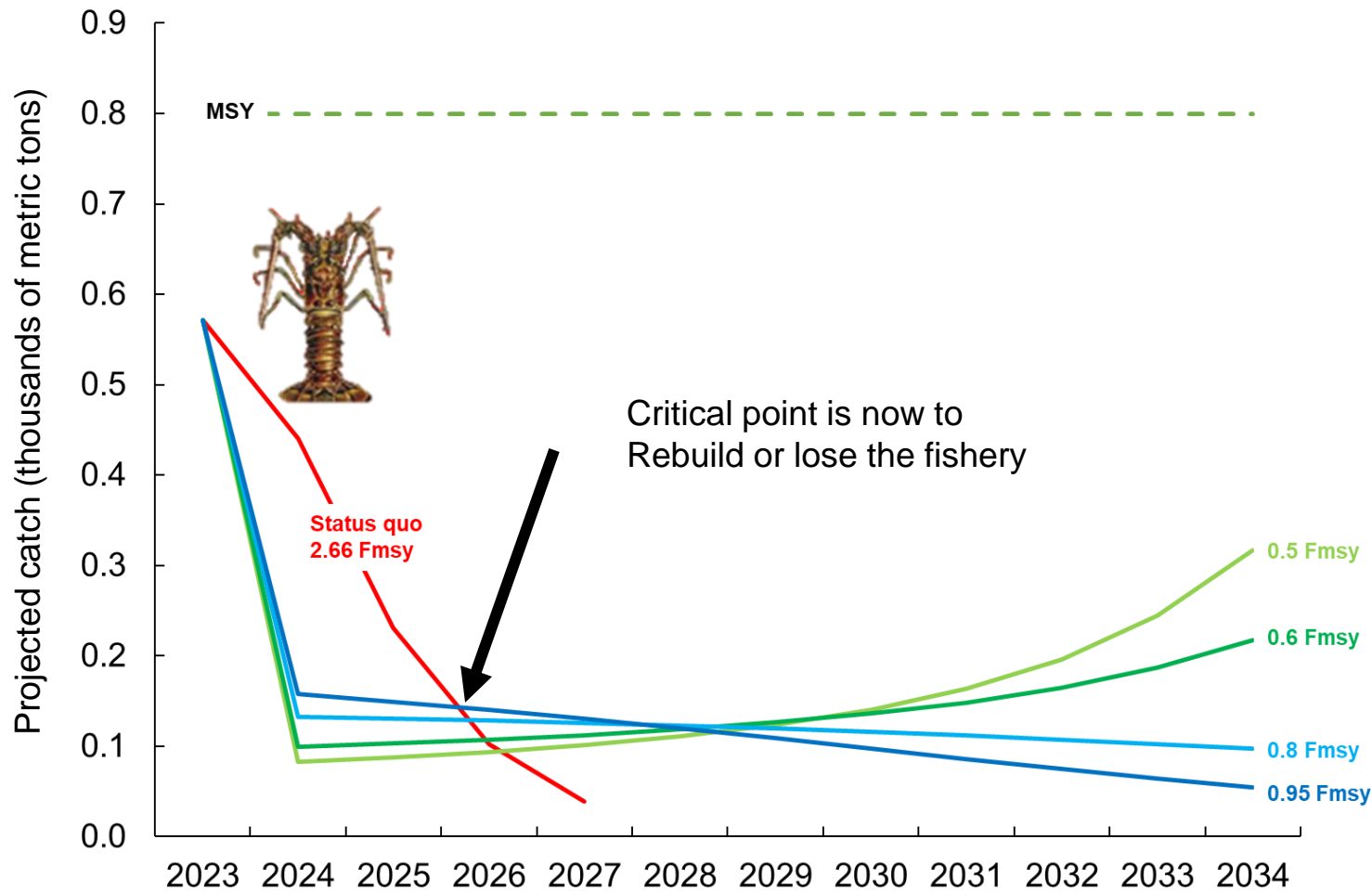
# Projected impacts of the proposed changes



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

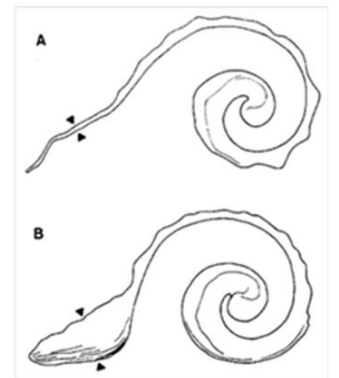
# Catch projections with reduced exploitation rates for lobster in Belize



- 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
<b>Effort Control</b> <b>Control de esfuerzo</b>	Managed access	Effective cap on licenses <b>Un limite efectivo de usuarios</b>
<b>Overall Catch Limits</b> <b>Limite de captura</b>	Annual quota by BFD (1978) <b>Cuota anual</b>	Science based annual catch limit – <b>limite anual</b> Harvest Control Rule
<b>Quota allocation</b> <b>Cuota individual</b>		
<b>Catch per trip</b> <b>Captura por viaje</b>		
<b>Closed seasons</b> <b>Veda</b>	Closed 1 July – 30 September (1978) <b>1 julio – 30 septiembre</b>	
<b>Gear regulation</b> <b>Artes de pesca</b>	Scuba ban <b>No buceo con SCUBA</b>	
<b>MPAs <b>reservas marinas</b></b>	Managed access	
<b>Size limits</b> <b>Limite de talla</b>	>7 inches shell length, >3 ounce market meat mass (1978)	Ideal: harvest only conch with flared lip of at least 0.4 inches thickness <b>solo caracol de labio 0.4 pulgadas</b> 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.

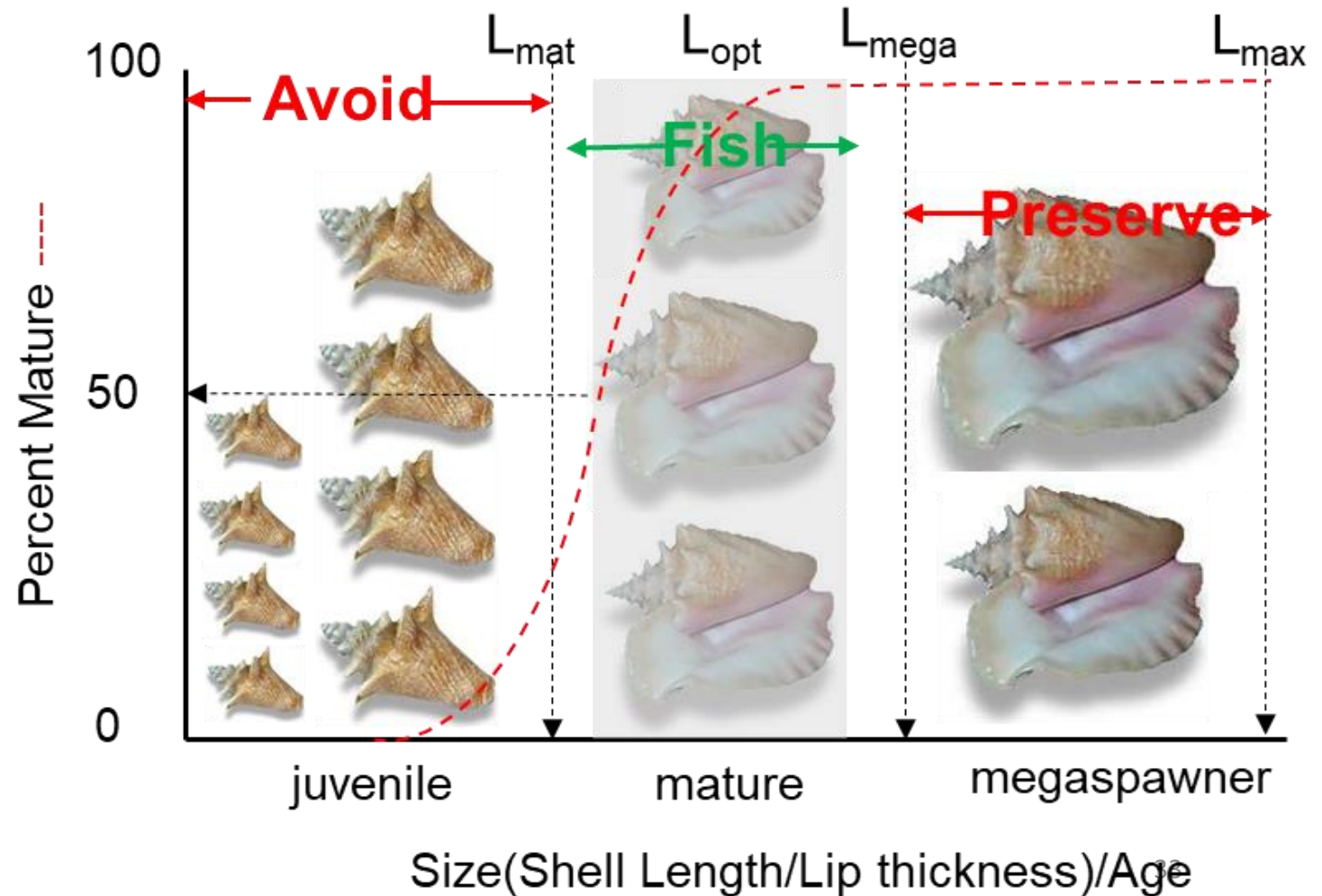
Leave large mega-spawners on the reef.

Evitar la captura de caracoles sin labio

Capturar caracoles con grosor de labio de 0.4 pulgadas

Dejar los caracoles más grandes para permitir la reproducción

red dashed line: % mature individuals



# Management options spiny lobster (*Panulirus argus*)

	Existing measures	Options for additional/changed measures
<b>Effort Control</b> <b>Control de esfuerzo</b>	Managed access	Effective cap on licenses <b>Un limite efectivo de usuarios</b>
<b>Overall Catch Limits</b> <b>Limite de captura</b>		Science based annual catch limit; Harvest Control Rule
<b>Quota allocation</b> <b>Cuota individual</b>		
<b>Catch per trip</b> <b>Captura por viaje</b>		
<b>Closed seasons</b> <b>Veda</b>	Closed 15 February – 14 June. 2021	
<b>Gear regulation</b> <b>Artes de pesca</b>	Number of traps per fisher, per fishing vessel, by area. 2021	Only tail snares, no hook sticks, <b>Solo lazo, no gancho</b>
<b>MPAs</b> <b>Reservas marinas</b>	Managed access	Only tail snares, no hook sticks. Allows live release of prohibited catches (e.g. berried)
<b>Size limits</b> <b>Limites de tallas</b>	>3 inches carapace length, >4oz tail mass 2021 <b>Talla mínima de 3 pulgadas</b>	Minimum size increase to 3.35 in carapace length. <b>Talla mínima de 3.34 pulgadas</b> 50% female maturity (males mature at larger CL). Trap escape gaps need to correspond.
	No females bearing eggs <b>no langosta con hueva</b>	



# Proposed harvest rules of thumb

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

Harvest mature adults at 3.35 inches.

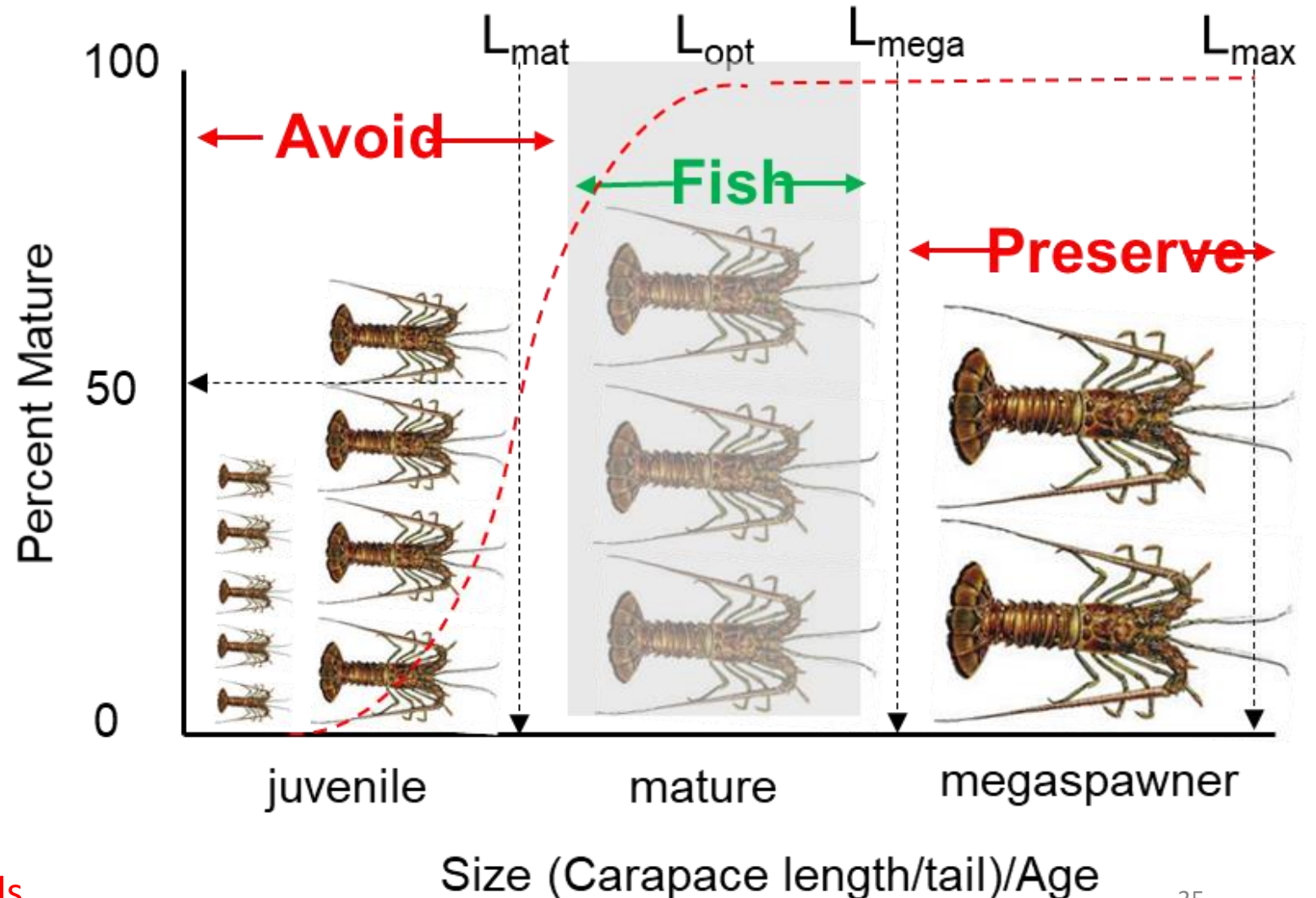
Leave mega spawners in their habitats.

Evitar captura de juveniles de menos de 3.35 pulgadas

Capturar adultos maduros de 3.35 pulgadas

Dejar grandes reproductores en el mar

red dashed line: % mature individuals



# Pathways to Sustainability

## El camino a la sustentabilidad

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 / [acuerdos comunitarios sobre malas practicas](#)
  - Adjustments to regulations (size limits, effort control, catch limits, seasons etc.) / [cambios a las regulaciones](#)
  - Area based actions (protected areas and associated special conditions of licensing) / [acciones basadas en areas, ej. reservas marinas](#)
    - Risks of deep-water fishing / [riesgos de pesca en agua profunda](#)
    - Enhanced monitoring / [mejor monitoreo](#)
- **Development of Fishery Management Plans / [desarrollo de planes de manejo pesquero](#)**
  - Incorporate agreed actions / [incluir acciones consenadas](#)
  - Procedures for review and revision / [procesos de revisión](#)

# Pathways to Sustainability

## Community Agreement on activities that should be avoided / acuerdos comunitarios sobre acciones negativas

- Government regulation takes time / *implementar leyes toma tiempo*
- Community-based initiatives can be very effective / *acuerdos comunitarios pueden ser muy efectivos*
  - New measures, or compliance with existing measures
- Example activities: *ejemplos:*
  - smashing small conch for pearls / *romper caracol buscando perlas*
  - Fishing in no-take zones / *pesca en zonas de no pesca*
  - Fishing in closed seasons / *pesca en veda*
  - Fishing on severely depleted species (e.g. goliath and Nassau groupers) / *pesca en especies en peligro ej mero Nassau/cherna*
  - Recreational take of conch / *captura recreacion de caracol*
  - Taking of berried female lobsters and/or targeting soft-shelled lobsters/*captura de langosta con hueva*

# Pathways to Sustainability

## Adjustments to Regulations

- Management options for conch and lobster (earlier slides)/**opciones de manejo presentado en laminas anteriores**
- Happen routinely in a fisheries management regime / **cambios son normales en un sistema de manejo pesquero**
- Based on science / **basado en la ciencia**
- Stakeholder input, particularly fishers / **con participacion del sector pesquero**
- Formalized in a Fishery Management Plan / **contar con plan de manejo pesquero**
- Subject to regular review / **plan revisado periodicamente**
- Proper enforcement and monitoring / **vigilancia y monitoreo**

# 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 / riesgos de la pesca en agua profunda

- Proposed as a means of increasing catches / ha sido propuesta como manera de aumentar la captura
- Foreign fishing / pesca de barcos extranjeros
- Minimal access for local fishers / falta de acceso para pescadores locales
- Safety at sea / seguridad en el mar
- Uncertain resource abundance / incertidumbre sobre abundancia
- Refuge for mega-spawners / refugio para grandes reproductores

# Pathways to Sustainability

## Enhanced monitoring – mejoras en el monitoreo

- Enables more refined management controls / **mas adaptativo**
- Vessel location / **ubicacion de barcos**
- Catch and effort reporting – **reportar capturas y esfuerzo**
  - Daily/real time
  - Electronic Reporting
  - Electronic Monitoring (video)
- Surveys / **encuestas**
- Fisher/community involvement; citizen/fisher scientists. e.g. conch condition factors & lobster CL vs. tail weight – **ciencia liderado por el sector pesquero**
- Key to sustainability and workability of regulatory controls **evaluación de sustentabilidad y viabilidad de las herramientas de manejo**

Questions?  
¿Preguntas?

# The Role of Fishers in Creating Change

## El rol de pescadores en lograr cambio

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 – transferir conocimiento

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

El conocimiento juega un papel clave en la capacidad de adaptación y participación de las próximas generaciones en la utilización y cogestión de los recursos

***Local-traditional ecological knowledge***

***Scientific knowledge***

**Conocimiento ecológico local/tradicional**

**Conocimiento científico**

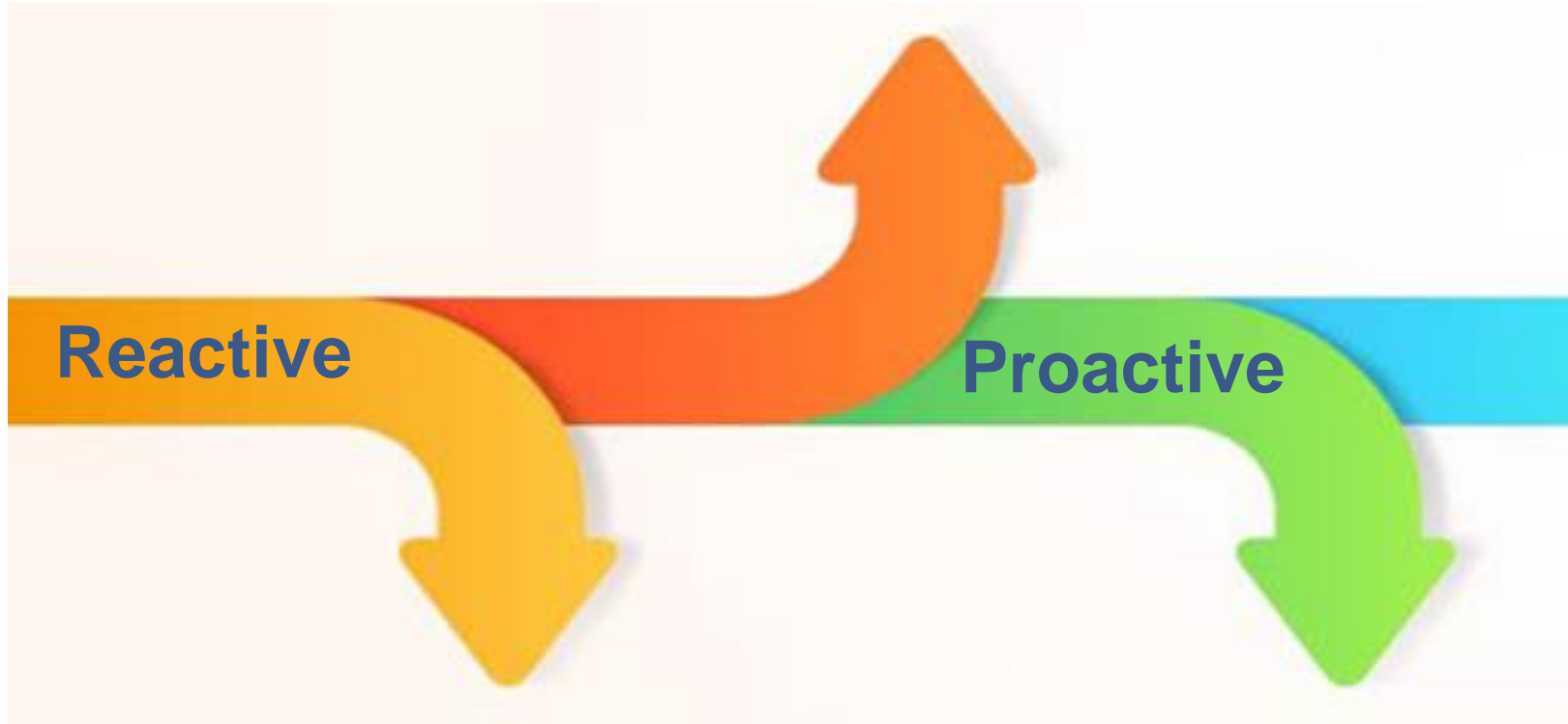
## ***Fishers for a Sustainable Future***

Empower women and men from fishing communities, who facilitate knowledge to new generations with the aim of achieving resilient communities and healthy oceans.

Empoderar mujeres y hombres (agentes de cambio) de comunidades pesqueras, que faciliten el conocimiento a las nuevas generaciones con la finalidad de logra comunidades resilientes y oceanos saludables.



## Fishers for a sustainable future



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

Las acciones que fortalecen el emprendimiento y liderazgo social presentan una extraordinaria oportunidad para el desarrollo sostenible

# 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.

*Manejo pesquero*

*Colaboraciones para la sostenibilidad*

*Perdida de la memoria histórica*

*Gobernanza*



# Soft skills



- Strengthen soft skills to promote the effective participation of fishermen and fisherwomen in decision-making spaces.
- Effective communication
- Public speaking
- Teamwork
- *Fortalecer las habilidades blandas para promover la participación efectiva de pescadores y pescadoras en los espacios de toma de decisiones.*
- *Comunicación efectiva.*
- *Hablar en público.*
- *Trabajo en equipo.*

*“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

*Aprendí a ser más seguro en mis palabras y de mi mismo, aprendí sobre cómo lidiar de que te pongan atención sin gritar.*



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

*“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

*Nos dieron la confianza y se adaptaron a nosotros, casi no participo y ahora lo hice.*



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

# Project Next Steps

## Siguientes pasos

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