Quantifying the economic potential of small-scale fisheries in the Gulf of Nicoya, Costa Rica
Diana Flores, Wagner Quiros, Ignacia Rivera and Alex Smith
Advisors: Andrew Plantinga and Laura Urbisci
Client: Rare, FISH FOREVER

Overfishing in the Gulf of Nicoya

The Gulf of Nicoya is one of the largest gulfs in Central America and is home to dozens of communities that are highly dependent on fishing as their main economic activity.

Declining catch rates and a persistent low socio-economic development in the Gulf suggest current management is not generating optimal benefits for resource users. Fishery managers have not been able to regulate the exploitation of the resources in the Gulf in a sustainable way (1).

Both lack of compliance and poor scientific and economic criteria in the design of current regulations have been identified as important sources of ineffective management (2,3).

Project Goal

We applied a suite of length-based data limited assessment to the corvina reina fishery in the upper Gulf (Zone 203), based on data for 2012. We specifically looked into the FAME sustainability indicators (4), the fishing mortality rate and the spawning potential ratio.

We developed an age-structure model for corvina reina. Age-specific survival rate was estimated based on control fish data. Recruitment and adult death rate from the fishery are calculated separately. The model was calibrated on data from 1985 to 2012.

Status of the corvina reina fishery in the upper gulf

We projected the profits generated over 20 years for each optimal management approach and inferred the associated socio-economic impacts considering the context of the gulf.

Social and economic tradeoffs of optimal economic management over time

The optimal strategy that combines the different management approaches, follows a path almost identical to size selectivity and would involve all tradeoffs described for effort reduction and size selectivity. Including a long-term closure may increase profit levels but adds all the tradeoffs described above.

Recommendations

1. If necessary, current regulations are made to prioritize compliance with effort restrictions. A first step would be to conduct a census of fishing effort in the area.

2. The implementation of a minimum size of 67 cm for corvina reina will be the most effective regulation to increase profits. This estimate does not consider a reduction in the current effort due to the Gulf. Although, this measure may interfere with other fisheries.

3. Similar size limit regulations may favor other 13 fisheries that also present price premiums for larger individuals.

Acknowledgments

There are many people we would like to thank for the support and advice during our project: our faculty advisor Andrew Plantinga, our client Lindsey Larson, from Rare Fish Forever; our advisor Romel Marisa Nayas, the Ambassador of Costa Rica to the United States, our PhD mentor Laura Urbisci, our external advisors Gavin McDonald, Sebastian Tapias, our collaborators Juliana Herrera, Jose Francisco Huertas, Renato Molina, Berny Marín and Jorge López from INCOPESCA, and the Latin American Fisheries Fellowship for support during our fieldwork.

References


For further information visit http://nicoyafisheries.weebly.com

Research questions and key findings

1. What is the status of the corvina reina fishery in the region?
Corvina reina (Cynoscion albus) is the main fishery in the upper gulf, accounting for 51% of the catch in this region. It is caught with gillnet, handline, and bottom longline and sold in three main size categories, with a higher price per gram for larger fish.

2. What is the economic potential of the fishery under perfect compliance and improved design?
We developed an age-structure model for corvina reina. Age-specific survival rate was estimated based on control variables that represent different management approaches. We explored the net present value of two scenarios over 20 years, with a discount rate of 2%, perfect compliance with current regulations and a regulation that would maximize profits (5), holding the status quo to an open access equilibrium (6).

3. What are the socio-economic tradeoffs associated to the outcomes of the optimal policies?
Effort reduction shows consistent profits over time, while seasonal closure and size selectivity initially generate negative profits. In the long run selectivity outperforms all management approaches, but requires gear adaptation and investment to sustain the economic lag.

Economic potential of the fishery under perfect compliance and improved design

Scenario

Net Present Value (Thousands of 2012 USD)

Long-term closure

Seasonal closure

Effort reduction

Size selectivity

Combine

Depends on the scenarios. See Figures.

Social and economic tradeoffs of optimal economic management over time

Economic potential of the fishery for current management approaches under perfect compliance and improved design

Case Study: Corvina reina fishery in the upper gulf

Corvina reina (Cynoscion albus) is the main fishery in the upper gulf, accounting for 51% of the catch in this region. It is caught with gillnet, handline, and bottom longline and sold in three main size categories, with a higher price per gram for larger fish.