Objective 3: Local Lobster Market

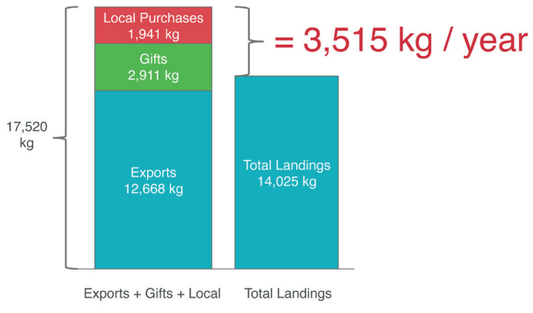
Objectives

We sought to determine the potential to increase demand for lobster within the local market. Because fishermen can achieve a higher price when selling locally, transitioning sales to the local market has the potential to offset short-term losses in income associated with a reduction in the quota for the lobster fishery.

Results

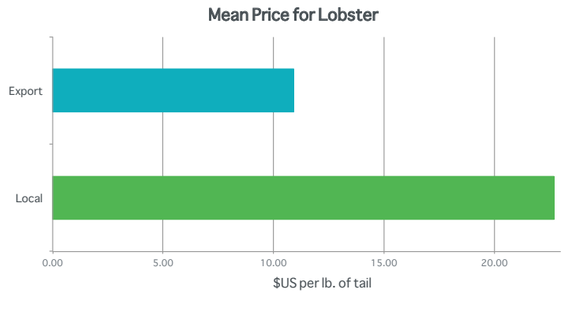
1 Discrepancy in Lobster Sales

Sales through various channels are documented in different GNP databases for 2012. As you can see below, the total amount of lobster sales was larger than the total reported landings by 3,515 kg or 25%.



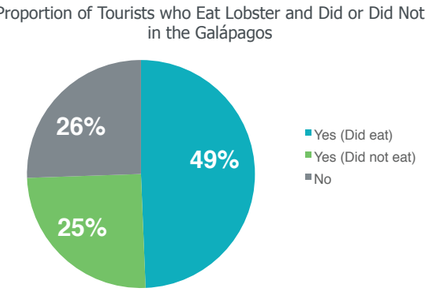
2 Local Versus Export Price

Fishermen can get almost $23/lb when they sell to the local market as opposed to $10/lb when exporting. We then assessed the potential to increase local demand.



3 Social & Educational Marketing

Increases in local sales can be achieved by convincing more people to purchase lobster and increasing the average number of lobsters eaten. Marketing campaigns can be an effective means of achieving this goal. By convincing all potential lobster eaters (25%) to consume lobster, and by increasing the average number of lobsters eaten by 20% (to 2.27 per trip), the GNP can decrease catch by 13.1% while maintaining the current revenue in the fishery. For example, if the GNP determines a 19% reduction in catch is necessary, which is the respective value to achieve a F/M of 1.25, fishermen would only experience a loss in income of 5.9% as opposed to 19%.



Recommendations

A marketing campaign to increase demand in the local market has the potential to offset some of the losses fishermen would experience if the GNP reduces the quota. However, issues with monitoring and enforcement must be addressed first to ensure proper documentation of all lobster landed in the islands.

Summary/Future of the Lobster Fishery

Through our research, we have gained important insights to help in the sustainable management of the lobster fishery. We suggest:

1. Based on the model output, determine an appropriate target and adjust current fishing pressure to attain targets
2. Implement a small-scale TURF pilot project
3. Improve the enforcement and monitoring of lobster landings
4. Build on sustainability improvements through a marketing campaign to increase local consumption of lobster

http://www2.bren.ucsb.edu/~galapagos/ Spring 2014

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Introduction to the Lobster Fishery

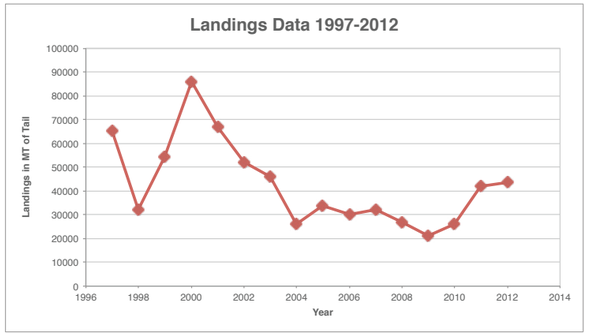
The Galápagos Islands are located 1,000 km off the mainland coast of Ecuador. Made famous by Darwin's early visit there, these islands are known for their unparalleled biodiversity and large number of endemic species. In 1978, the UN named the Galápagos a World Heritage Site.

Lobster is the most economically important species harvested in Galápagos. The majority of fishermen rely on the stability of this resource as a primary source of income. In addition to its importance in the local economy, lobster plays an integral role in the marine ecosystem. Studies show that lobster help to maintain the health of marine ecosystems around the world.

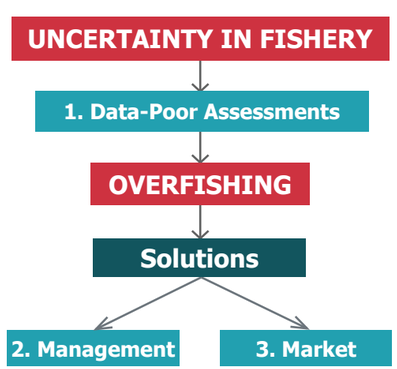
Panulirus penicillatus

Problem Statement

Despite the importance of this fishery, there is uncertainty about the biological health of the stock. The amount of lobster caught has declined for the last decade, with a slight increase in the last three years. It is unclear whether this is the result of a rebound in the stock or the result of increased fishing effort. An understanding of the status of the stock will determine whether current fishing pressure needs to be adjusted. Additionally, the current management strategies promote a race-to-fish scenario, with fishermen harvesting as much as possible to avoid being outcompeted by others.



Project Objectives



To address the issue of the decline in landings of spiny lobster and uncertainty surrounding the population:

1. Use data-poor assessments to evaluate the historical fishing levels and provide a tool for the Galápagos National Park (GNP) to self-manage in the future

To address the hypothesis that lobster is being overfished in the Galápagos, we looked at two potential solutions:

2. Analyze the feasibility of a Territorial User Rights Fishery (TURF) to change fishermen's incentives to long-term stewardship
3. Determine the potential for increased sales within the local market to gain support from fishermen for catch reductions, while maintaining revenue in the fishery

Objective 1: Data-Poor Assessments

Data-Poor Assessments

A data-poor assessment uses less data than a traditional stock assessment. These models provide indicators of the health of the stock as opposed to an approximation of biomass. From these indicators, fishing pressure can be reduced or increased, and the quota can be adjusted accordingly.

Objectives for the Tool

- Easy to use
- Cost effective
- Annual evaluation
- Efficient data collection

Model Selection

We developed criteria for selecting an appropriate model. From this we narrowed 12 of the available DPAs to three: LBAR, LBSPR, and Catch Curve.

12 DATA-POOR ASSESSMENTS

CRITERIA
- Reliability
- Biases
- Inputs
- Cost
- Output

3 DATA-POOR ASSESSMENTS

LBAR

Translates length-based data into a length frequency histogram. The model uses the frequency at the mode and at Linf (length at asymptote) to determine an average between the two values. A line is then fit to these data points with the slope representing total mortality (Z), from which natural mortality is subtracted to yield fishing mortality (F).

LBSPR

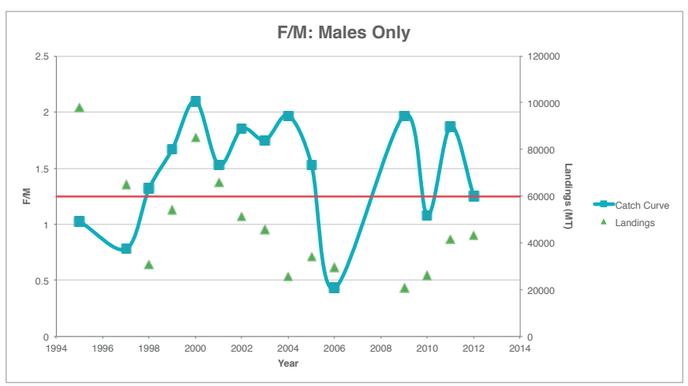
LBSPR builds on the Catch Curve model. With age frequency data, it uses fecundity and weight at maturity as parameters to calculate the number of eggs produced by the 'fished' or current population in relation to the number of eggs that would be produced in an 'unfished' population. The output is the spawning potential ratio (SPR), the average fecundity of a recruit over its lifetime.

Catch Curve

Converts length-based data into age class parameters. A linear model is fitted to the age-based data. From this, total mortality (Z) is calculated. The known natural mortality (M) is subtracted to obtain fishing mortality (F).

Results

The results of Catch Curve are shown to the right. F/M is the ratio of fishing mortality to the natural mortality. Many fisheries are managed at or below a F/M of 1. Lobster is a resilient species, and many lobster fisheries are managed at a higher ratio. We set a tentative target reference F/M point of 1.25. F/M values have historically been higher than this target, indicating overfishing. The recent increase in landings is also paired with high F/M values, which is not indicative of a rebound in the population. Additionally, our models show that the average length of lobster has declined through time. All of these are indicators of overfishing.



Recommendations

We recommend that the GNP use this tool on an annual basis to evaluate the status of the stock and to provide guidance in setting their quota. In the immediate future, we recommend determining an appropriate target based on the goals of the GNP and adjusting current fishing pressure to attain those targets.

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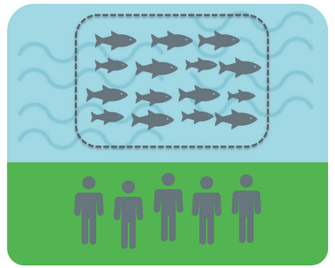
Objective 2: Territorial User Rights Fishery (TURFs)

Objective

In order to change fishermen's incentives and address overfishing, our objective was to assess the feasibility of implementing a TURF system in the Galápagos Islands.

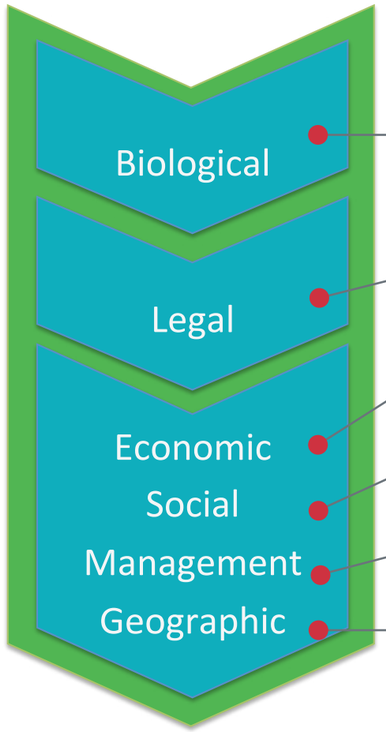
What is a TURF?

Territorial User Rights Fisheries (TURFs) give individuals or groups exclusive access to marine resources within a specific area. By assigning property rights to a resource to fishermen, they are incentivized to protect the resource. Exclusive access is key to ensuring that fishermen who practice good resource stewardship benefit from the future returns associated with sustainable fishing.



Example of a TURF system of a single species with access rights granted to a group. TURFs have been implemented in fisheries around the world and can take many forms.

Results



Lobster is conducive to spatial management because it is a benthic species with a small range and low mobility.

Legal precedence exists for TURFs in Ecuador, and a pathway to establish legal structure for a TURF is present.

The potential for both immediate and long-term increases in revenue outweigh the potential costs.

While there is some interest, the current level of social cohesion and desire to maintain status quo pose barriers.

The lack of organizational capacity of the fishing cooperative and institutional instability pose challenges.

Population centers and fishing grounds are disconnected geographically, posing complications for enforcement.

Recommendations

Our research shows that TURFs are feasible for the Galápagos lobster fishery. Social and management factors pose some challenges but could be addessed by starting with a small-scale pilot project to prove the benefits of TURFs to unwilling stakeholders. Geographic factors also present barriers to TURF implementation, and these barriers would have to be carefully considered in the design of a TURF system.