

## Declining profitability of fisheries in the Galapagos Marine Reserve

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Although management decisions for the Galapagos Marine Reserve (GMR) have often been based on perceptions related to socioeconomic aspects of fisheries, there has been a historical void of good socioeconomic information related to Galapagos fisheries. To begin to fill this void, expenses and gross earnings for Galapagos fisheries over several seasons have been estimated through the use of logbooks of fishery observers and surveys of fishers at the home docks<sup>1</sup>. Annual fisheries reports, produced by the Charles Darwin Foundation and the Galapagos National Park, include information on price trends for the most important products. This article presents this information and compares the gross income per fishery for 1997-2006. It also presents an analysis of the net income from the lobster fishery, as a case study, taking into account the associated operational costs.

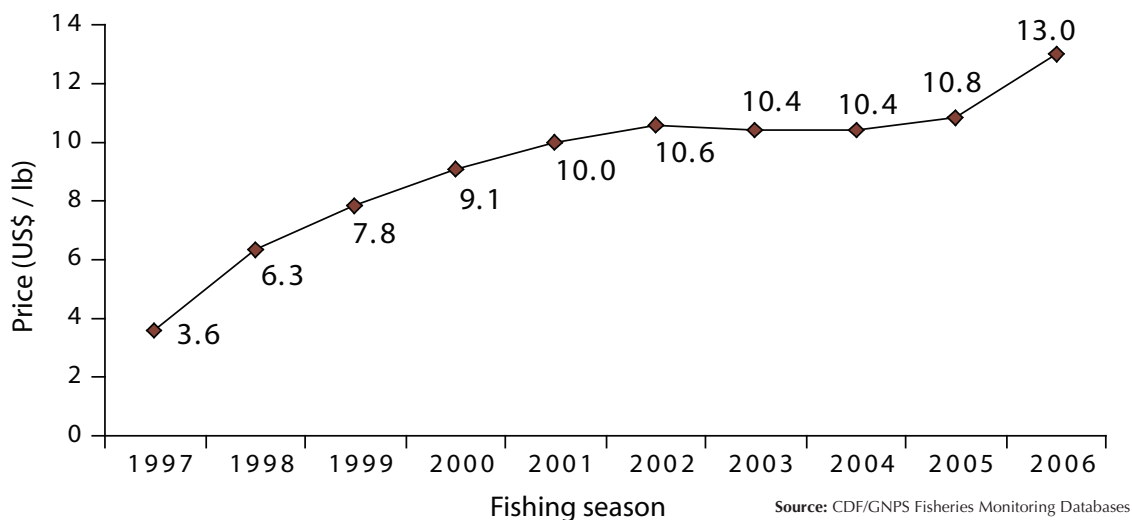
### Price Trends

In 1997, the average price per pound of lobster tails was US\$ 3.60. Since then, the price has steadily increased, nearly tripling in value by 2001 (Fig. 1). After that it remained relatively stable during 2002 to 2005, oscillating between US\$ 10.40 and US\$ 10.80 per pound. In 2006, the price reached its historical peak at US\$ 14.00 per pound, while the average price was US\$ 13.00.

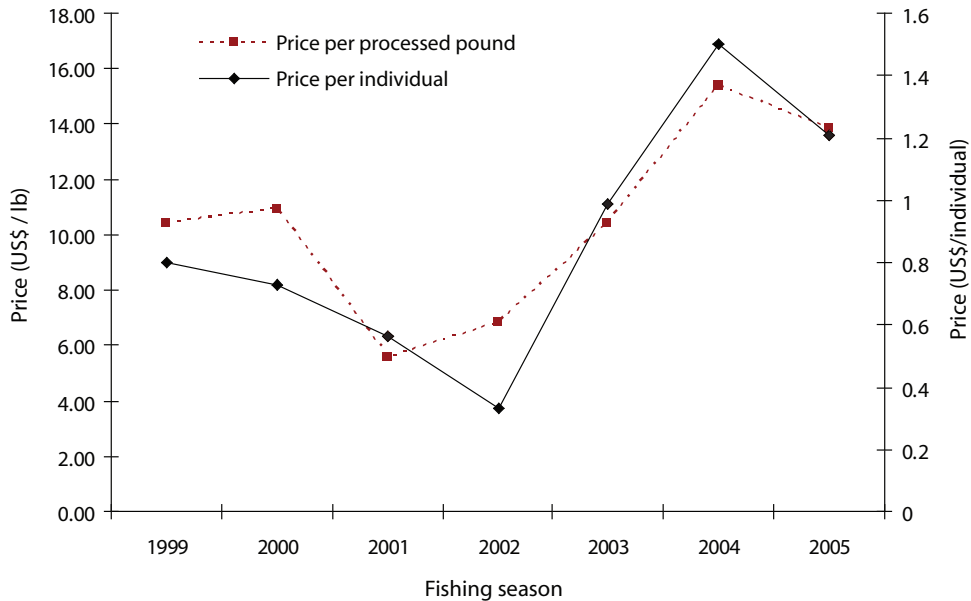
During the same period, the price of sea cucumbers first declined then increased by a factor of five between 2002 and 2004 (from US\$ 0.33 per individual to US\$ 1.50 per individual) (Fig. 2), a much more rapid increase than that recorded for lobster tails. Due to the scarcity of the resource, the fishery was closed in 2006.

Between 2002 and 2005, the price of sea cucumbers increased by 354%, while the catch declined by 83%; the price of lobster increased by only 2% and the catch declined by 43%.

**Figure 1.** Average lobster tail prices, 1997-2006



**Figure 2.** Average sea cucumber prices per pound of processed catch and per individual, 1999-2005



Source: CDF/GNPS Fisheries Monitoring Databases

### Gross income

The maximum gross income generated by the fishing sector was a robust US\$ 7 million in 2003. Although there is no information on total catch of whitefish after 2003, the income from lobster and sea cucumber fisheries dropped to less than half that value by 2005 (Fig. 3). Assuming that prices and volumes of whitefish did not change significantly during this period, the gross income for 2005 would not have exceeded US\$ 4 million, indicating a critical decline in the profitability

of fishing in Galapagos. The economic situation of fishers in 2006 was probably even more precarious due to the closure of the sea cucumber fishery. That year, the lobster fishery grossed US\$ 900,000, which, when added to the estimated income from the whitefish fishery, totaled less than US\$ 2.5 million. As a consequence, many fishers are currently involved in other activities such as tourism, inter-island transport, and construction.

**Figure 3.** Gross income for the major fisheries in the GMR (1999-2006)



Source: CDF-GNP Fisheries Monitoring Databases

**Note**

There is no information on whitefish fisheries from 2004 to 2006.

## Net income and operational costs of the lobster fishery

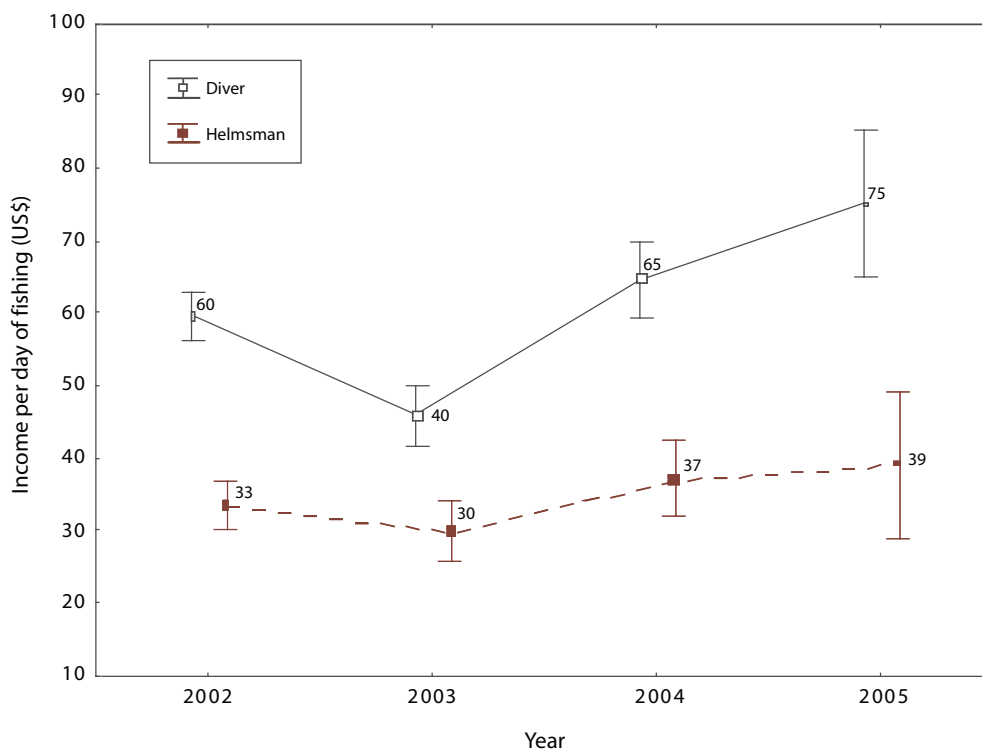
From 2002 to 2005, lobster divers earned US\$ 46-75 per fishing-day, while helmsmen earned between US\$ 30-39 per fishing-day (Fig. 4). The variations are primarily due to differences among the port islands, namely varying resource abundance and significant price fluctuations. In 2005, fishers obtained the highest gross income in Puerto Baquerizo Moreno (San Cristóbal), US\$ 244 per fishing-day, versus US\$ 153 in Puerto Ayora (Santa Cruz) and US\$ 104 in Puerto Villamil (Isabela). These differences are due to the Catch per Unit Effort (CPUE) being twice as high for San Cristóbal as for the other islands<sup>2</sup> and the price per pound of lobster tail also being higher. This was reflected in the earnings of crew members (helmsmen and divers) and the net income of boat owners.

For example, the mean net income of owners of small boats (dinghies and launches) in Villamil and Puerto Ayora was only US\$ 20 per fishing-day, whereas San Cristóbal boat owners earned more than triple that, approximately US\$ 67 per fishing-day.

During the 2003-05 fishing seasons, the operational costs for the small vessels that operate on a daily basis without depending on mother boats oscillated between US\$ 41-49 per fishing-day. The greatest cost was fuel, which represented 40% of total operational expenses (Table 1).

In conclusion, lobster prices have permitted the fishery to remain economically viable.

**Figure 4.** Average daily net income for divers and helmsmen during the spiny lobster fishery. (Bars show 95% Confidence Intervals)



The gross income per fisher per year from the two main fisheries has declined, from approximately \$8000 in 2002 to only \$3400 in 2006.

**Table 1.** Costs for a one-day fishing trip for spiny lobster, 2002-2005.

Item	2002		2003		2004		2005		TOTAL	
	N	Cost US\$	N	Cost US\$	N	Cost US\$	N	Cost US\$	N	Cost US\$
Motor oil	1097	4	1212	5	449	5	346	5	3104	4
Fuel	1138	15	1226	20	456	19	352	20	3172	18
Other	445	13	106	14	89	12	15	13	655	13
Transport	952	2	720	3	357	2	100	2	2129	3
Food	1097	7	697	7	295	6	122	8	2211	7
<b>Total cost per fishing day</b>		<b>41</b>		<b>49</b>		<b>44</b>		<b>48</b>		<b>45</b>

Source: CDF-GNP Fisheries Monitoring Databases

### What happened to the profitability of Galapagos fisheries?

The two most important fishery resources, sea cucumbers and spiny lobsters, have shown similar tendencies in recent years, with their prices increasing at the same time that the resources began to decline. This pattern was more rapid and accentuated in the sea cucumber fishery. However, both cases are typical of rapidly growing boom-and-bust fisheries, with strong international demand and overcapitalization. The difference between them is the growth rate of each fishery and its respective international prices.

It is evident that the annual injection of several million dollars from fisheries into the archipelago contributes to the economy of many local families. However, a comparison between the economic value of Galapagos fisheries to the archipelago and their ultimate value in the USA (in the case of lobsters) and the Far East (in the case of sea cucumbers) has not yet been quantified.

It is evident that gross income has declined considerably in recent years, reaching the point in 2006 when there was no sea cucumber fishery and the lobster catch was the lowest registered since 1997, with the exception of 2004 when the two fisheries overlapped for a period of six weeks. There is little information on the contribution of whitefish to the local economy. However, with new initiatives for small local enterprises, such as Pescado Azul in Isabela, which produces smoked tuna from legally caught yellow-fin and blue-eye tuna, and the development of agreements between fishers involved in micro-enterprises and the tourism industry to supply tour boats, it

is probable that the whitefish fishery is becoming more important for specific groups of fishers. For example, during the lobster fishing season of 2006, a large number of mother boats from San Cristóbal focused mainly on whitefish, indicating that this fishery is now sustaining the economy of part of the fishing sector for at least half the year.

Given the number of registered fishers (approximately 1000 since 2002), and the number actively involved in the sea cucumber and lobster fisheries (approximately 800 since 2002), you can estimate that the gross income per fisher from both resources has dropped from approximately US\$ 8000 in 2002 to US\$ 3400 in 2006. The current low cost-effectiveness of these fisheries leads to several important questions. How many fishers are carrying out other activities in order to supplement their income? What activities are these and how much money do they generate? While waiting for the implementation of new activities for fishers, such as demonstrational tourism fishing, sport fishing, diving, or other sustainable micro-enterprises, the greatest question remains: What role will fisheries play in Galapagos in the coming years?

The economic situation of the fishing sector worsened as the resources declined, and this in turn reduced their capacity to implement corrective measures in the fisheries.