# FINDING A PLACE FOR CONSERVATION

# A bioeconomic analysis to inform the rezoning of the Galapagos Marine Reserve

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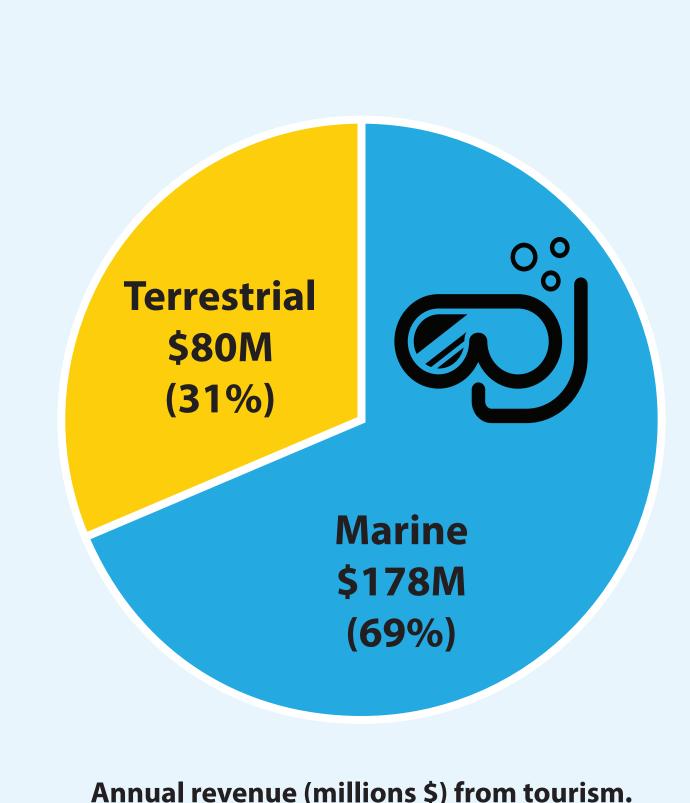
### The Galapagos Islands

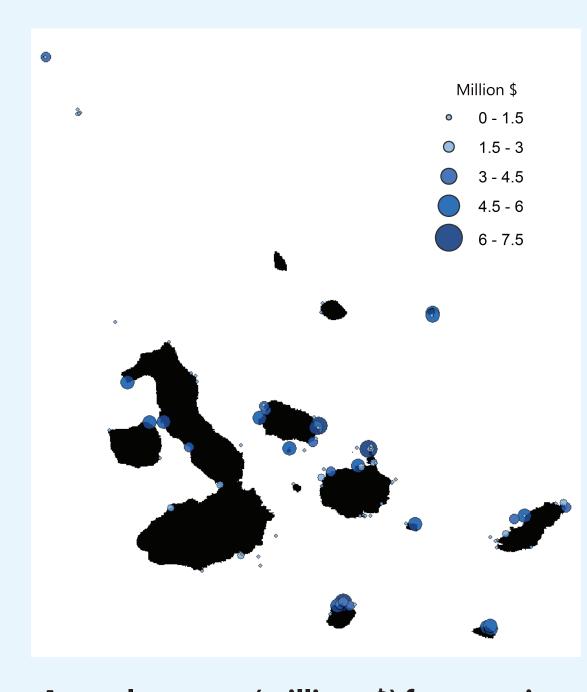
More than 200,000 tourists visit Galapagos each year to experience its distinct geography and unique assemblage of creatures (1). The islands are also home to a rapidly growing local population of over 20,000 that works primarily in tourism or the public sector. Fishing comprises a much smaller, but significant, component of the overall economy and is an important source of food for locals and visitors (2).

### How important is marine-based tourism to the Galapagos economy?

We used tour operator permits, personal interviews, and dive logbooks to investigate the spatial distribution of revenue across the GMR.

The GMR experiences over 839,000 tourist site visits annually, generating \$178 million. 97% of which is generated by three types of marine-based tour operators: cruise ships, diving cruises, and daily diving.





Annual revenue (millions \$) from marine tourism sites in the GMR.

Both sites visits and revenues are unevenly distributed across the GMR.

What influences this?

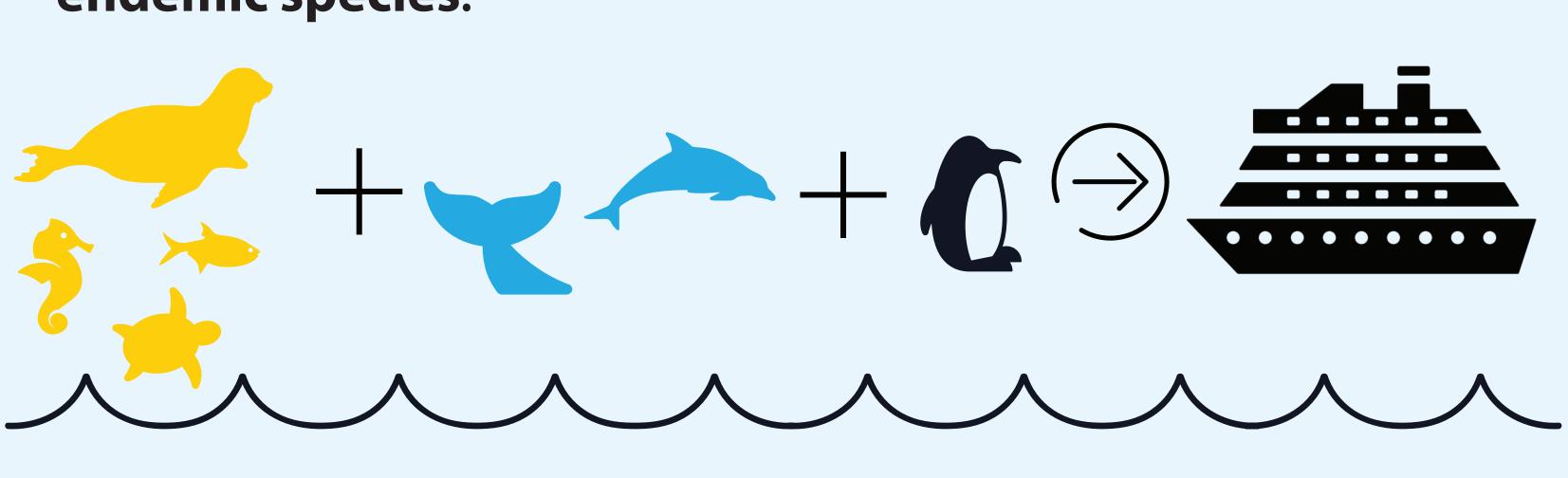
Humans have significantly impacted the state of Galapagos marine resources. Overfishing has caused the collapse of the sea cucumber fishery and drastic declines in spiny lobster. In addition, the high abundance of sharks in Galapagos, coupled with weak enforcement, has ensured that Galapagos remains a hotspot of illegal shark fishing (3). 138,000 km<sup>2</sup> of water surrounding the islands have been designated a marine reserve, but, until recently, less than 1% of the Galapagos Marine Reserve (GMR) was protected from fishing.

**Marine Resources in Trouble** 

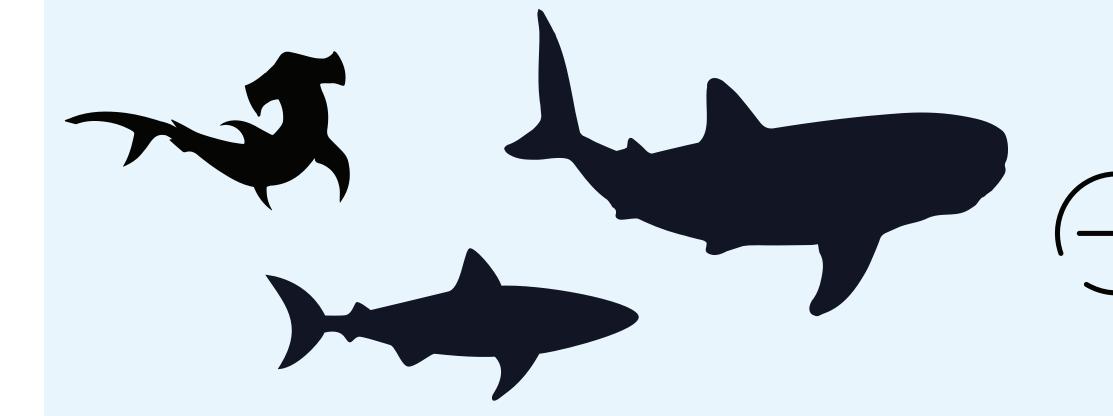
### Which ecological resources are important to marine-based tourists?

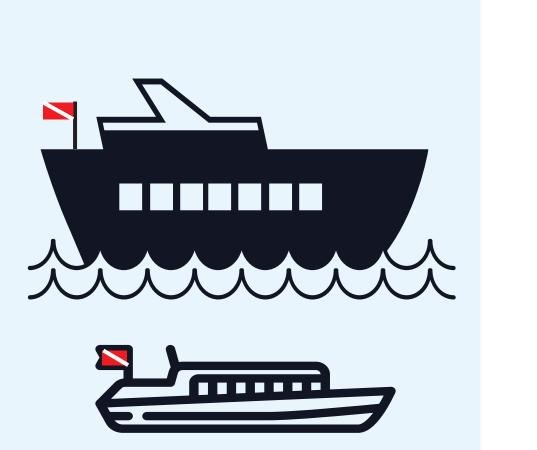
We used linear models to investigate what influences tourists' decision to visit a marine site. In doing so, we examined how price per visit, distance from port, and a collection of ecological attributes determine the number of visits to a site per year.

We found that tourists in the cruise ship category are disproportionately visiting sites with high 5, high occurrence of Cetaceans, and high incidence of endemic species.



We found that the relative abundance of **SharkS** is positively and significantly correlated with the number of visits from tourists in the dive cruise and daily dive categories.





### Rezoning of the Galapagos Marine Reserve

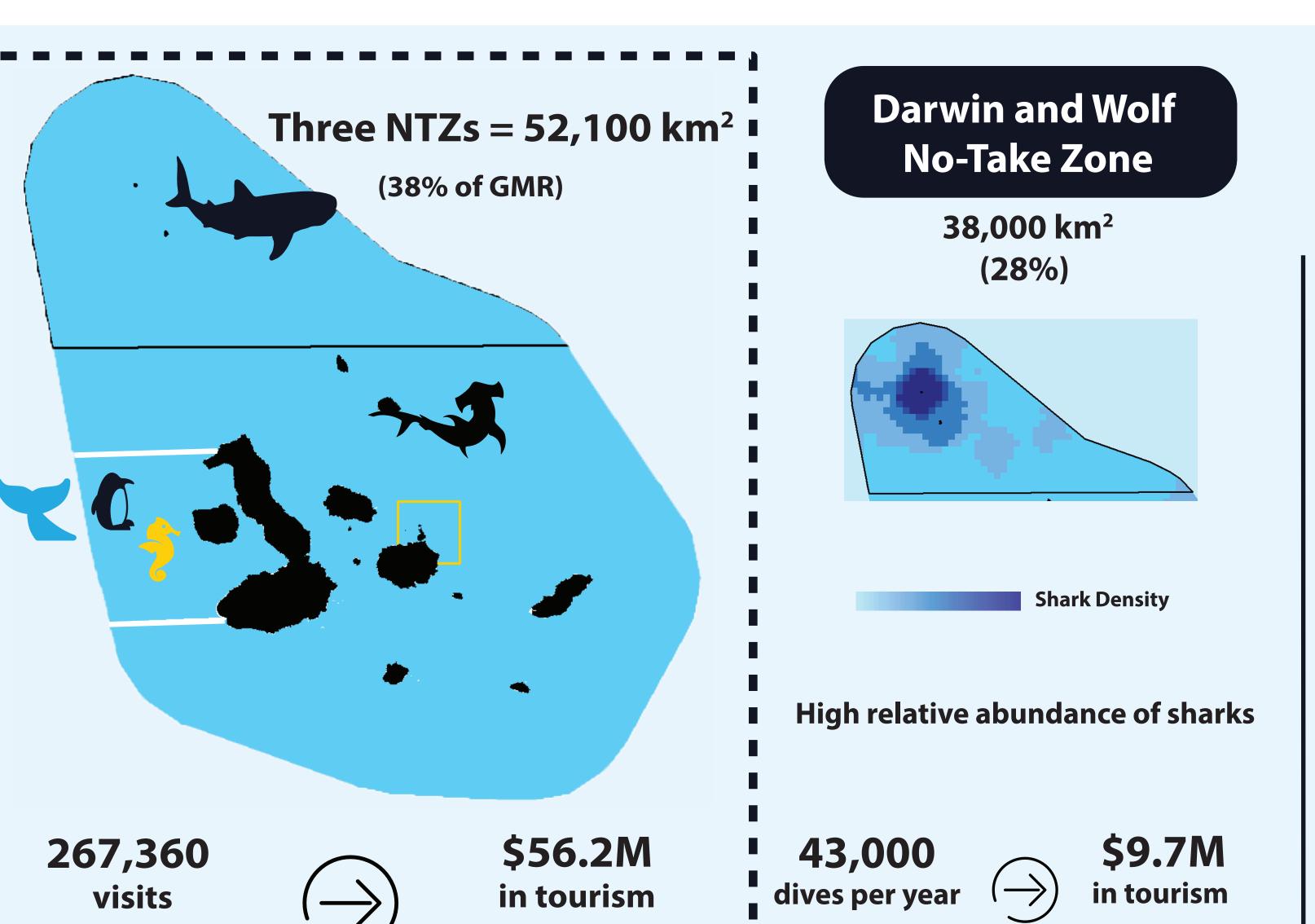
**No-take zones** (NTZs) are areas where fishing is prohibited and marine life can flourish. They are important tools for the long-term sustainability of marine resources (4). The patchy nature of the no-take zones in the GMR have also made them difficult to monitor and enforce. In 2015, the Galapagos National Park began the process of rezoning the GMR to improve protection of marine resources (5).

#### **OUR PROJECT**

We investigated the economic implications of spatial zoning in the GMR to help guide decision-makers involved in the rezoning process. Through a series of bioeconomic analyses, we clarified the economic importance, costs, and feasibility of expanding no-take zones to increase protection of the marine

Based on tourist preferences, what areas of the GMR should be prioritized for conservation using no-take zones?

By mapping ecological data across the GMR, we identified three areas that support the resources that attract tourists and contribute most substantially to marine-based tourism.



revenue



High relative abundance of sharks

126,000

\$20.8M



Western Isabela

No-Take Zone

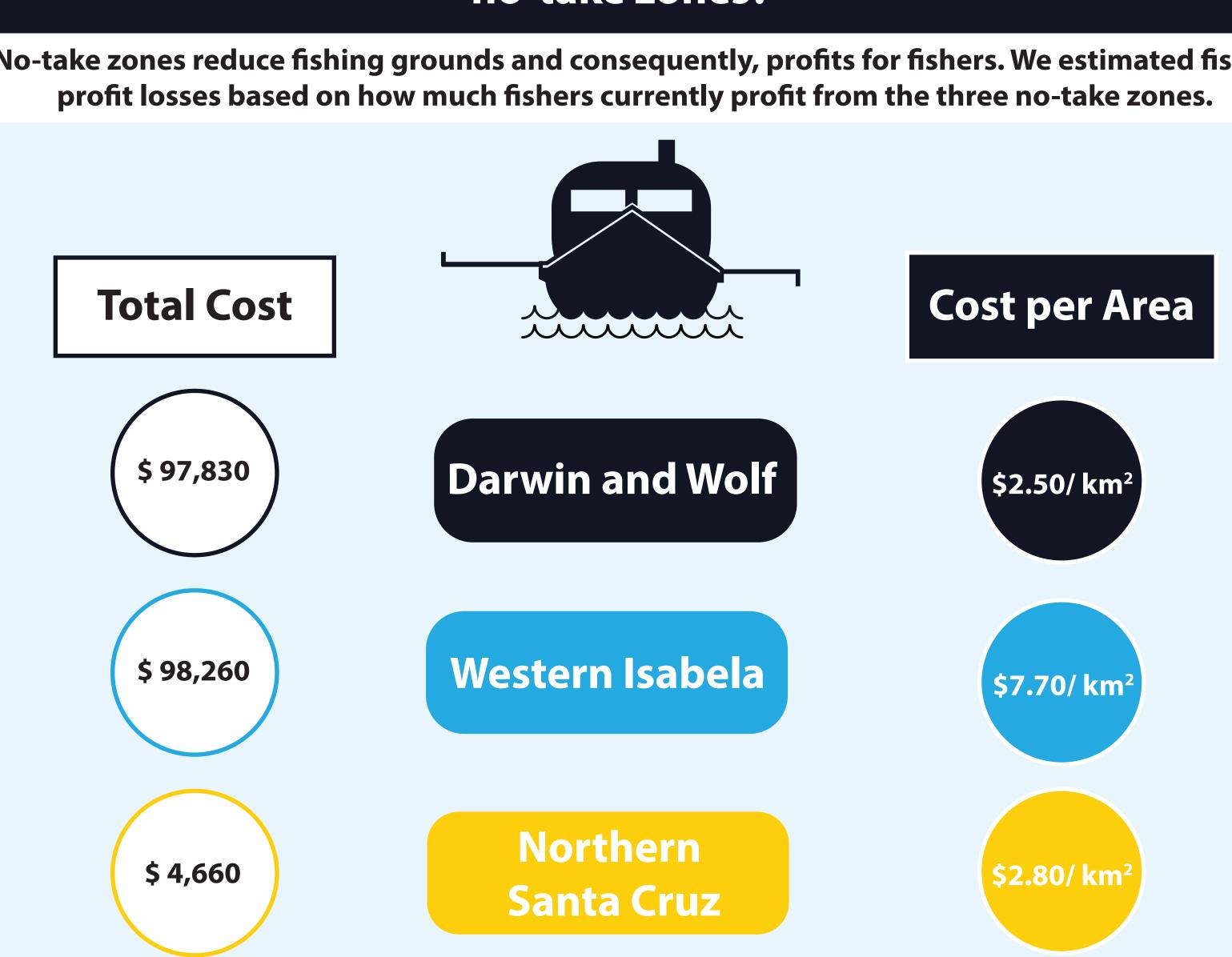
12,500 km<sup>2</sup>

cetaceans, species richness, and incidence of endemic species

Designating these areas as NTZs is likely to provide the greatest benefits to human users while still achieving protection of the marine environment.

## What are the costs to fishers of implementing no-take zones?

No-take zones reduce fishing grounds and consequently, profits for fishers. We estimated fisher



The total cost to fishers for closing all three no-take zones is \$200,000.

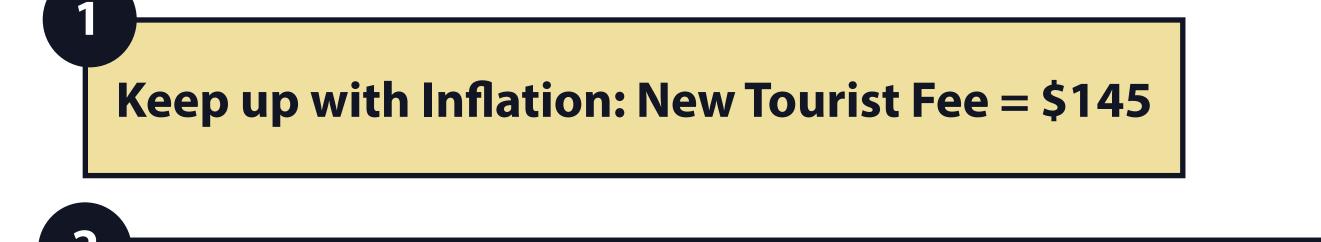
Galapagos pays an extra \$1 upon entry.

These profits can be completely compensated if each visitor to

# What policy options are available to compensate the costs of no-take zones and support conservation?

Revenue can be generated from policies that increase current tourist fees can be invested into programs that benefit fishers and the entire community.

The **CUrrent** tourist fee to enter Galapagos is \$100, 5% of which goes straight to the GMR. This fee has not been adjusted since 1998. We present two hypothetical fee **policies** to generate additional revenue for the GMR:



**Keep up with Inflation + \$5 GMR Tax: New Tourist Fee = \$150** 

### **Funds Allocation Options:**

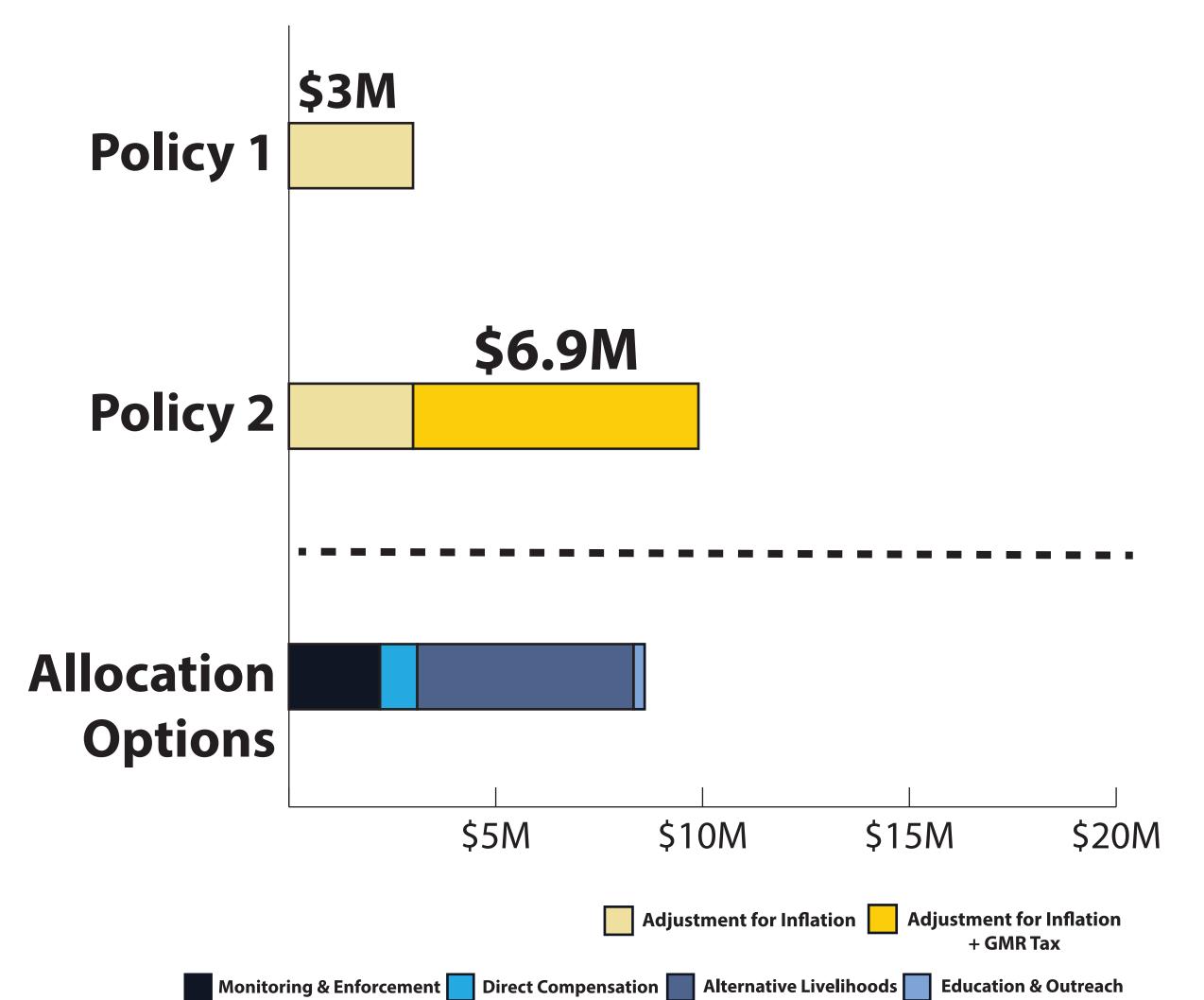
! Fishers can be directly compensated for losses in profits.

Increased monitoring and enforcement is necessary.

60% of fishers are willing to pursue alternative livelihoods. A tourism and hospitality program would give fishers the option to segue into the industry. Other alternative livelihoods include aquaculture and Territorial User Rights Fisheries (TURFs).

Community outreach and education promote the long-term success of NTZs.

# Policy Value Discounted Over 10 Years



### March 21st 2016: SUCCESS!



#### **New Protection:** 44,000 km<sup>2</sup> 1/3 of the Galapagos Marine Reserve

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