The Effect of Different Conservation Strategies on Leopard Sharks

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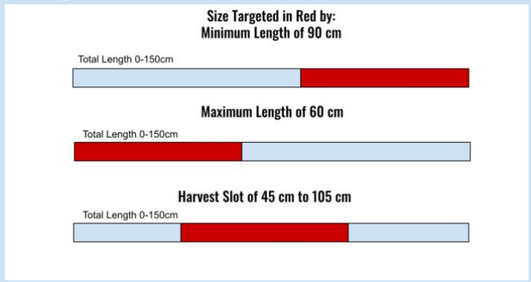
INTRODUCTION

The leopard shark is one of the most common sharks in San Francisco Bay, however it is still extremely vulnerable due to its low reproductive rate, late maturation, and slow growth rate (Stevens 2000). The effectiveness of three different types of conservation measures (Fig 1) have been tested in this paper to help the sustainability of the species:

- A minimum length requirement, which is currently in place
- A maximum length requirement
- A harvest slot, which allows for a window of set lengths to be targeted.

Figure 1: Conservation Measure Visualization



RESEARCH METHODOLOGIES

Determining effectiveness: Estimated population growth rate needed, calculated using a Leslie growth matrix (Fig. 2, Cailliet 1992).

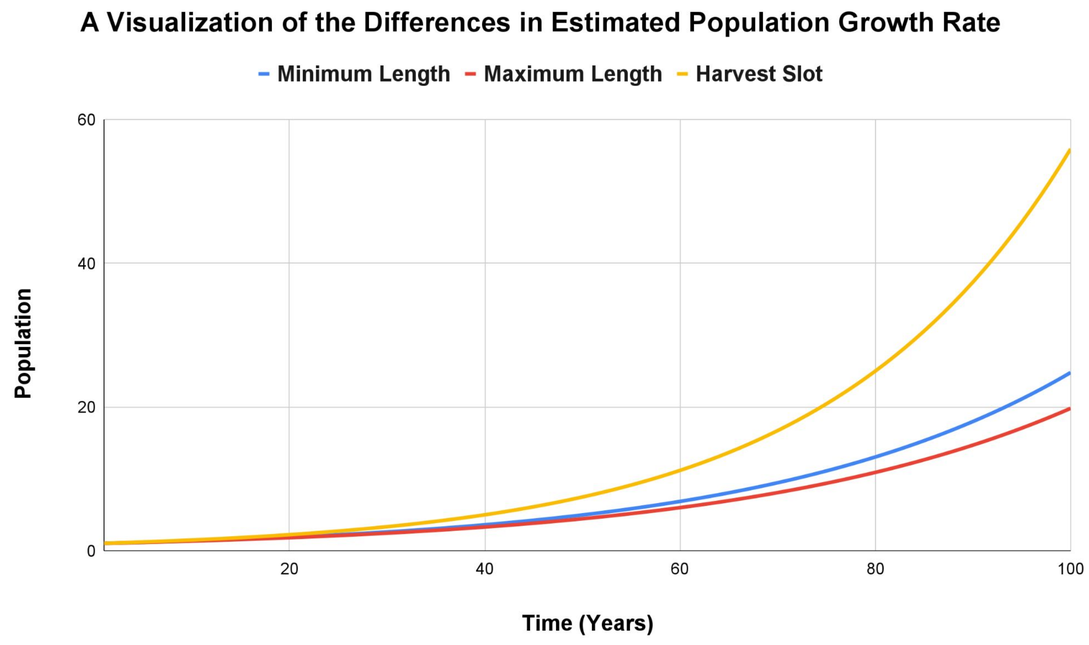
I. For the inquiry approach, an evaluative research method was used to most effectively determine the viability of different conservation strategies.
II. The data collection tool used were concrete values for different demographic traits were used, which were taken from verified research papers and existing data.
III. The analysis technique used was the evaluative assessment of the findings of the matrix.

Figure 2: Leslie Matrix Template

$$\begin{bmatrix} f_0 & f_1 & f_2 & f_3 & \dots & f_a \\ S_0 & 0 & 0 & 0 & \dots & 0 \\ 0 & S_1 & 0 & 0 & \dots & 0 \\ 0 & 0 & S_2 & 0 & \dots & 0 \\ \dots & \dots & \dots & \dots & \dots & 0 \\ 0 & 0 & 0 & 0 & S_{a-1} & 0 \end{bmatrix}$$

DATA AND FINDINGS

Figure 3: Population Growth Rate Visualization



CONCLUSIONS AND ANALYSIS

According to the findings of this paper, the harvest slot is the most effective conservation measure for leopard sharks. This differs from the current policy in place, a 36 inch minimum length. The implementation of a harvest slot was estimated to be a significant improvement over the current regulation, thus, this research proposes a harvest slot be implemented for leopard sharks.

IMPLICATIONS, AND NEXT STEPS

1. **Verify Data**
   If data is verified and accurate, it can inform conservation strategies in individual fisheries and legislation.
2. **Small-Scale Adoption**
   Population growth rate are currently only estimates. The real-world testing of this conclusion could provide the evidence needed to greenlight further implementation of a harvest slot for leopard sharks.
3. **Widespread Use**
   If the adoption of a harvest slot proved effective for the conservation of leopard sharks, this method could be adopted as a set regulation for fisheries through policy makng and legislation, helping to protect this threatened species.

ACKNOWLEDGEMENTS / REFERENCES

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Works Cited:

Cailliet, Gregor. (1992). Demography of the central california population of the Leopard Shark (Triakis semifasciata). Marine and Freshwater Research - MAR FRESHWATER RES. 43. 10.1071/MF9920183.

Stevens, J. D., Bonfil, R., Dulvy, N. K., & Walker, P. A. (2000). The effects of fishing on sharks, rays, and chimaeras (chondrichthyans), and the implications for marine ecosystems. ICES Journal of Marine Science, 57(3), 476-494.

Supplementary Data, Tables, and Figures: