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EDF ENVIRONMENTAL DEFENSE FUND
Finding the ways that work

Quota Baskets:

Exploring alternative groupings for fisheries management

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The Environmental Defense Fund
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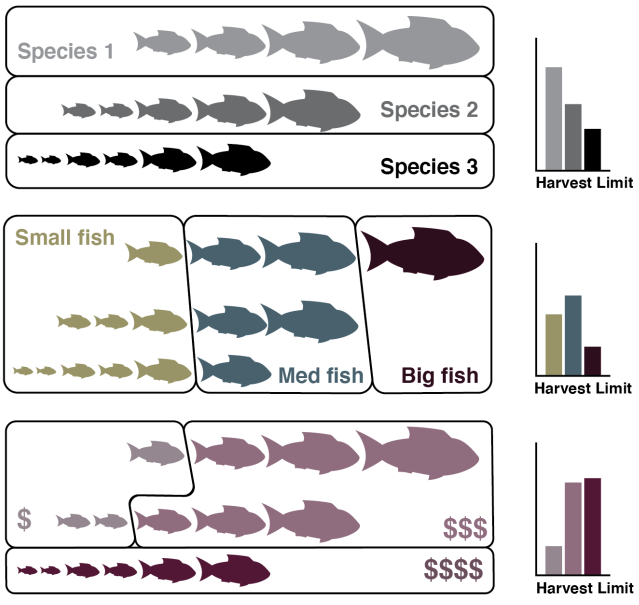
Fisheries management strategies range from simple (i.e. unregulated, open-access) to incredibly complex (i.e. ecosystem-based management). Simple schemes often result in stock collapse and poor economic outcomes (Grébovalc & Munro, 1999), while well-managed fisheries maintain or rebuild stocks, are resilient to disturbance, and maximize economic returns (Hillborn, et al., 2020). Because proper management usually necessitates extensive monitoring and enforcement, many fisheries employ a "middle ground" approach, managing some aspects of the fishery but inadequately. As a consequence of inadequate monitoring, enforcement, data, stakeholder engagement, and/or institutional structure; as of 2020, at least 34.2% of the world's documented fisheries are overfished, and up to $83 billion is lost annually to mismanagement (Arnason 2017).

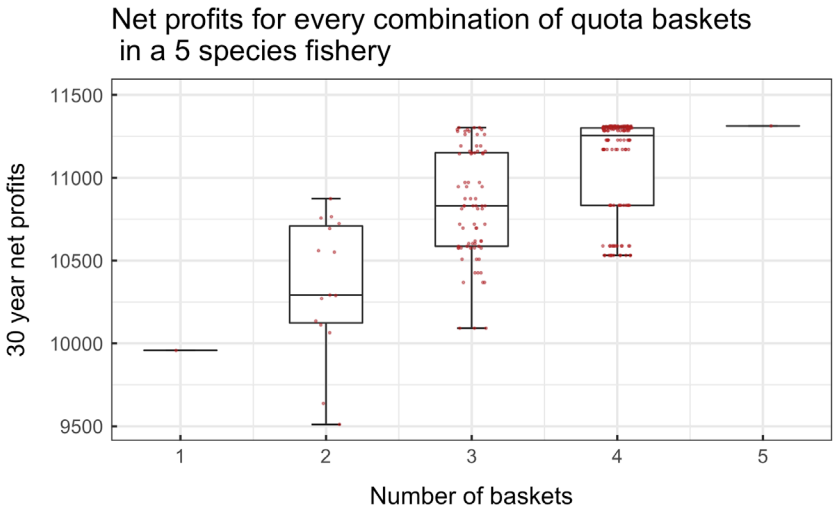


Three example quota basket groupings for a target fishery, with baskets indicated by color.

Quota baskets as a potential solution:

In this project, we propose quota baskets to improve upon these "middle ground" strategies. Quota baskets group fish by common traits, applying a single quota on each basket. Fish can be grouped by traits in many different ways such as size, market value, trophic level, growth rate, location, etc. We hypothesize that well-designed quota baskets can improve fishery outcomes while potentially being easier and cheaper to implement and enforce. Thus, the quota basket concept—better outcomes with fewer management units—could help fisheries that want to improve, but cannot implement complicated and expensive schemes.

Our project is the first to explore how quota baskets affect fisheries outcomes, when they can succeed, and when they can fail. To do this, we use a modified surplus production model to determine how different quota basket groupings affect profits and stock levels in a hypothetical profit-maximizing fishery. Then, we corroborate our theoretical results by comparing two similar groundfish fisheries, one managed with a quota basket scheme and the other more traditionally managed. Finally, we provide guidelines for implementing quota baskets to improve fishery outcomes.



In a five species fishery model, adding additional baskets generally improves fishery outcomes but with declining marginal returns. However, additional baskets do not guarantee improvement. This underscores that basket design is more important than basket number.

Main findings

1. Well-designed quota baskets have the potential to maximize fishery profits and improve stock health, outperforming open access and management with a global quota.
2. Poorly designed quota basket schemes can exacerbate overfishing and deliver lower economic returns than even simpler management schemes.
3. Quota baskets can result in highly varied fisheries outcomes because they alter fisher behavior. Fishery outcomes mainly depend on fish biological and market traits, basket construction, and the harvest limit set for each basket.
4. The design of a quota basket tends to be more important than the number of baskets applied, and quota baskets are most successful when designed with a specific fishery and objective in mind.

Quota Baskets in real-world applications

Several fisheries currently employ quota basket management, but refer to the management strategy by another name. To support our model findings, we compare a fishery managed with quota baskets to a similar, single-species managed fishery. These case studies show that quota baskets implemented in real fisheries can outperform single species management, a result not predicted by our model. This is because in the real world, species-specific quotas are often set at suboptimal levels due to uncertainty, politics, or lack of information. In our case studies, poorly set single species quotas in the Pacific enabled the fishing of weak groundfish stocks well below sustainable levels. In contrast, a quota basket in the Bering Sea allowed sustainable fishing of valuable groundfish stocks while preventing overfishing of weak stocks.

This report demonstrates that relatively simple yet well-thought-out quota baskets have the potential to improve fisheries outcomes, but poorly designed quota baskets could exacerbate fishery problems. Consequently, a clear understanding of the target fishery and desired outcome is essential for successful quota basket management.

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