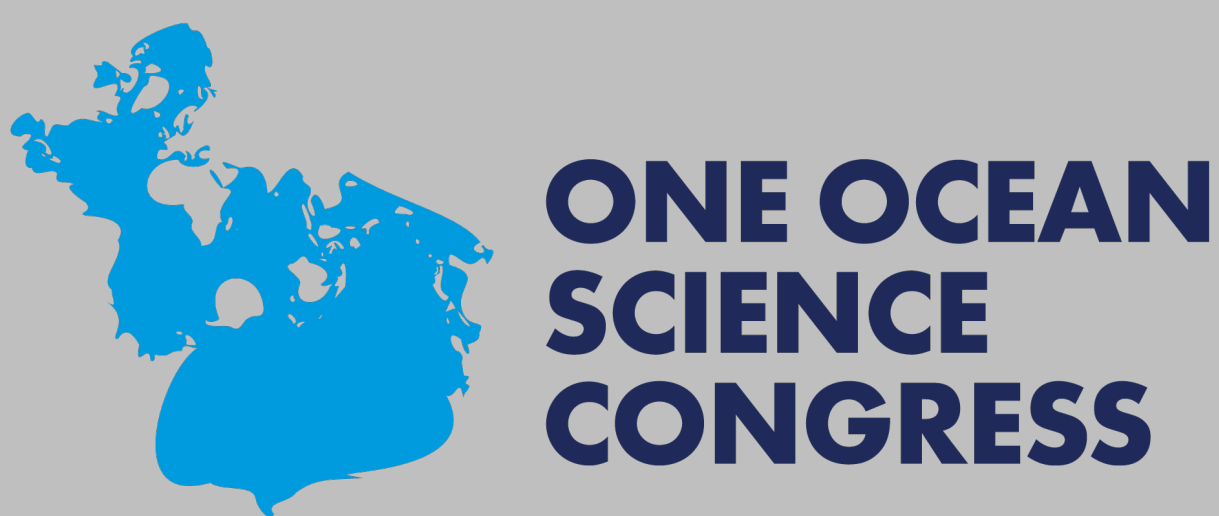


# Balanced Sustainability to Support Future Blue Food Systems



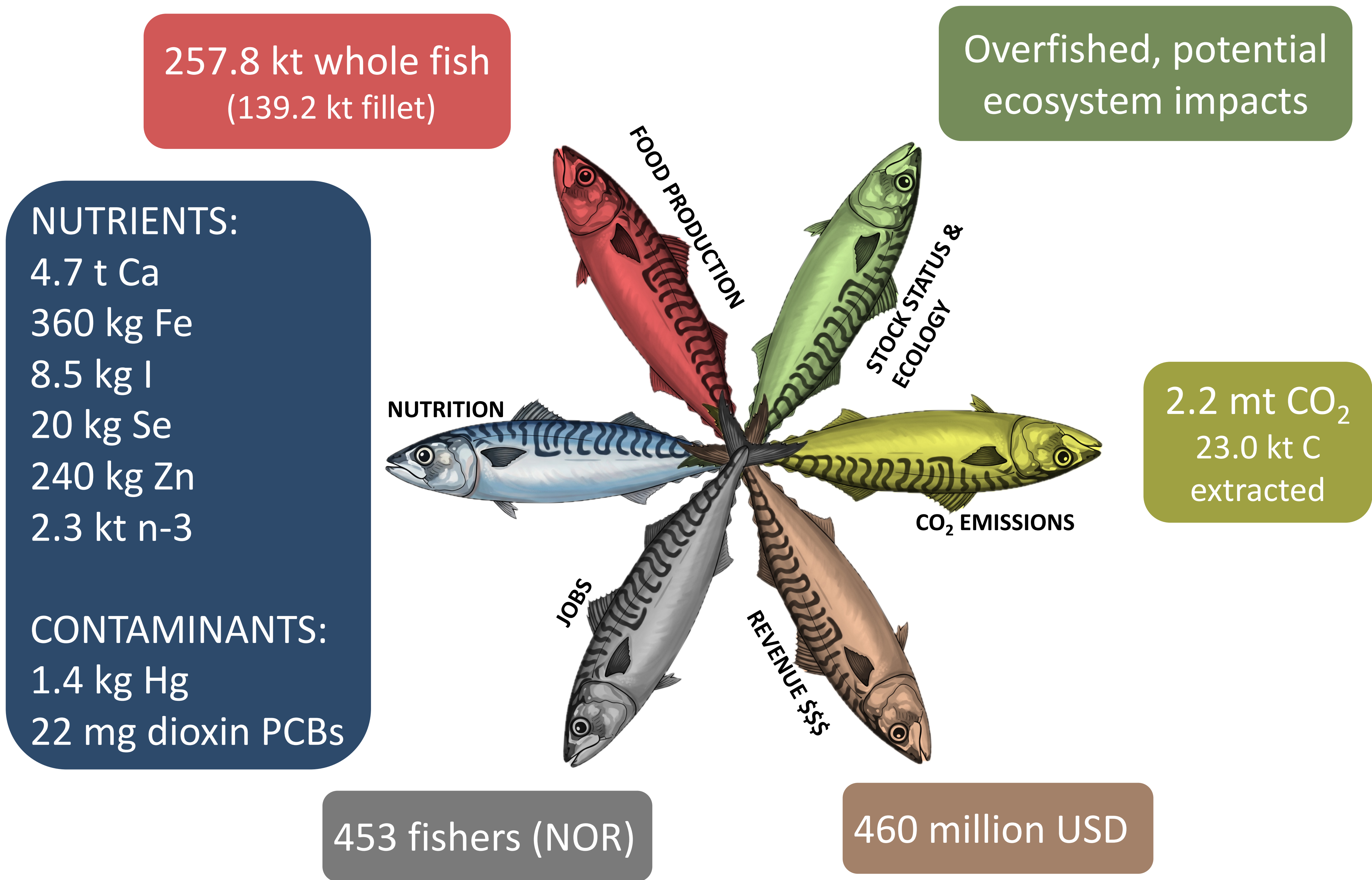
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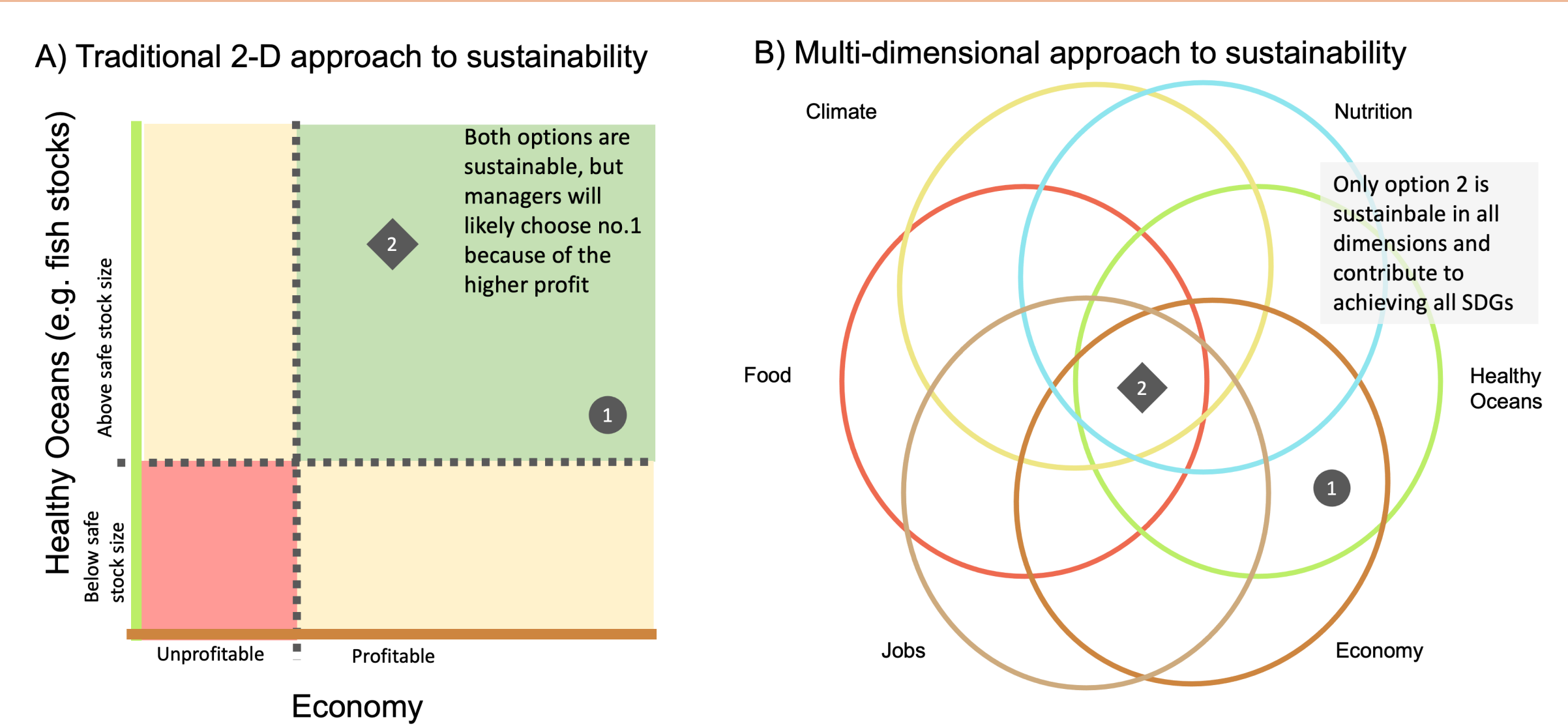
## Definition of Balanced Sustainability

Balanced sustainability evaluates multiple, socioecological dimensions (e.g., environmental, economic, and social) to identify sustainable management strategies.

## The Norwegian Northeast Atlantic (NEA) Mackerel food system in 2018<sup>1,2</sup>



## Balancing the multiple dimensions of sustainability



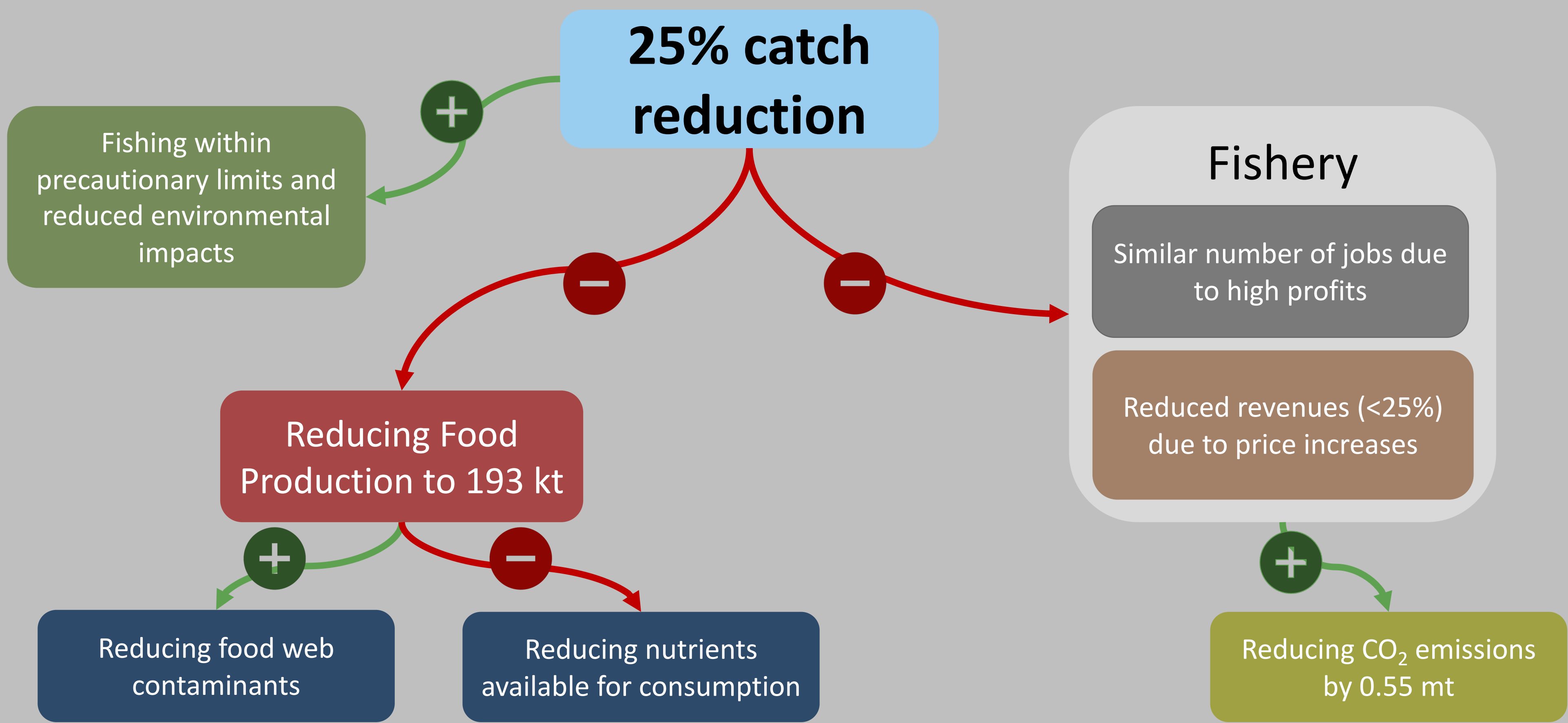
## Global Mackerel trade<sup>1,2</sup>



## Conclusions – Norwegian NEA Mackerel Food System:

- Significant contribution to food security: approximately 696 million meals
- Highly profitable fishery: >1.0 million USD per fisher
- Positive and negative nutritional impacts: e.g., 2.9 % of EPA & DHA needs of Japan
- Stock is currently overfished with several ecological and fishery impacts
- Substantial direct CO<sub>2</sub> emissions with unknown effects on the ocean's carbon pump dynamics (fish-carbon)
- Potential to optimize food and trade systems to maximize nutrition for those most in need, while reducing contaminant exposures
- The Balanced Sustainability Approach could be upscaled to other blue food systems (e.g., shellfish, mesopelagic fish, and algae)

## Trade-offs of a possible future Mackerel food system



## Abstract

Hunger and malnutrition are key challenges facing humanity, further exacerbated by the increasing effects of climate change, habitat degradation, and species loss. Aquatic foods are known for their high nutrient levels, lower carbon footprints, and importance as a source of livelihoods to millions of people globally. Ensuring access and availability for dependent communities, and that management of these resources is sustainable and resilient to impacts such as climate change are key components to ensuring continued delivery of a nutritious food source, and to achieving global development targets such as the UN SDGs of Zero Hunger and Good Health and well-being. Marine food systems (seafood systems) are currently hampered by fragmented governance and management that focuses more on economic short-term revenues than the ecological, social, nutritional or equity dimensions of sustainability. Taking a more balanced approach to sustainability, supported by integrated analyses that link fisheries, aquaculture, and nutritional research could help to highlight management options that are sustainable and that provide viable options for producing novel and affordable seafood products to meet growing demand across multiple sustainability dimensions. Here we illustrate what a 'balanced sustainability' approach entails and illustrate how private-public partnerships can act as catalysts to support necessary changes across fisheries and aquaculture management, nutrition, and development policy realms on local, national and global levels to effectuate change at a scale and duration that allows us to achieve the SDGs.

References <sup>1</sup>Zhu, Y. et al. 2025 *Nature Communications*. In review. <sup>2</sup>Bank, M.S. et al. 2025. *Cell Reports Sustainability*. In prep.



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