Improved herring stock assessment aids sustainable management

Policy brief of the EMFAF project Improving the science basis of the fisheries management of the Gulf of Bothnia herring (ImproFish)

Herring is a central species in the northern Baltic Sea fishery both in terms of landing weight and economic value. Herring is also a key species in the ecosystem, and an important food item to seals, birds, and predatory fish.

During the last decades, the Gulf of Bothnia herring stock has undergone major changes in biomass, as well as in individual growth, weight-at-age, and maturity-at-age, but the causes of these changes are poorly understood. Consequently, the herring fisheries management can not properly account for these changes, their causes and consequences.

To ensure good management of this important resource, improvements in the knowledge base are needed. ImproFish proposes three changes to the stock assessment. These changes could significantly improve the herring stock assessment, and hence support sustainable fisheries management.

1. Improve abundance indices
2. Consider fish size and growth
3. Identify sub-stocks

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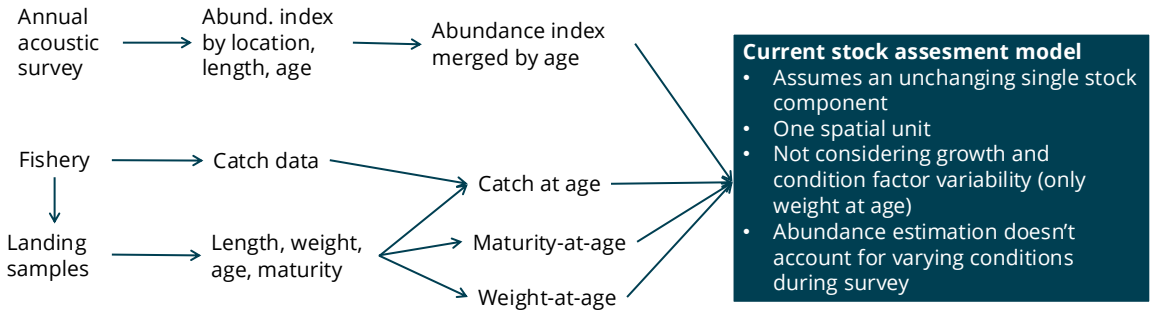
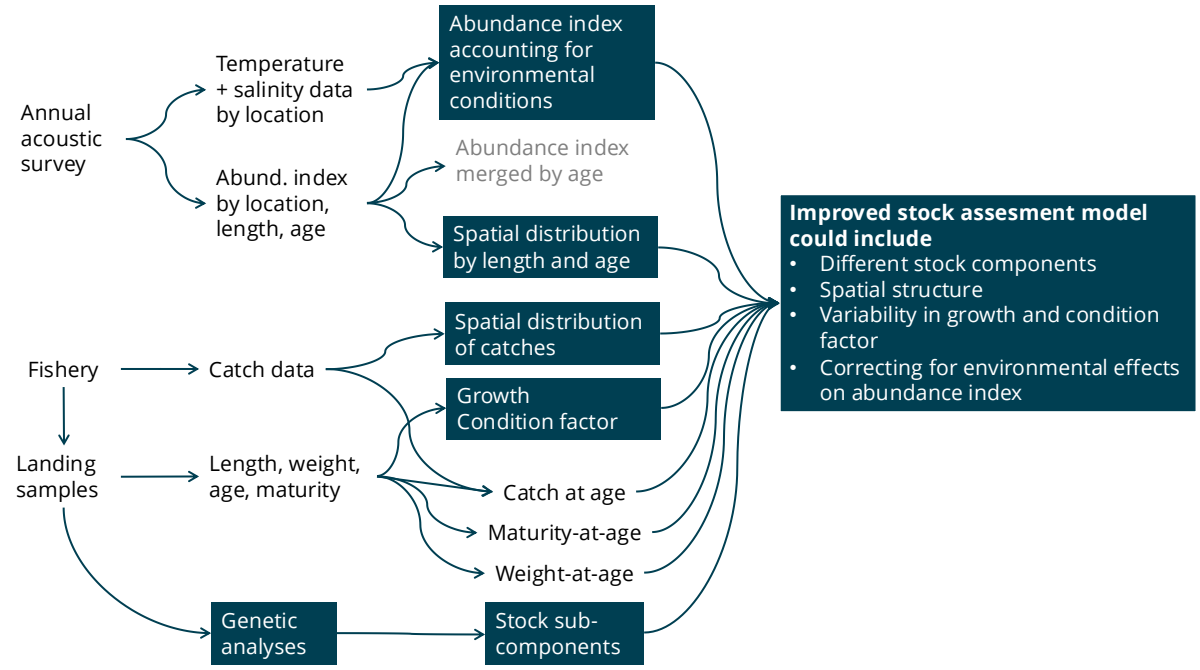
The proposed enhancements would make the herring stock assessment more biologically realistic, aligning it more closely with the principles of ecosystem-based management. These advancements are achievable with moderate research investments and could be integrated into the official stock assessment process. The key improvements are outlined in the two images below:

Current stock assessment



Improved stock assessment



Recommendation 1
Improve abundance indices

The current fishery-independent index of herring abundance in the Bothnian Sea, based on acoustic data from the Baltic International Acoustic Survey, has inconsistencies especially when it comes to juvenile fish (ages 0-2 years). The assessment could be improved through two means: Extending the acoustic surveys closer to the shoreline, and including information on oceanographic factors, such as the depth and strength of the thermocline and halocline, into the abundance index. These changes would enhance the reliability of stock assessments and support better predictions of the future health of the herring population.

Recommendation 2
Consider fish size and growth

Gaps in our understanding of what influences herring growth result in less accurate assessments of spawning stock biomass and fishing mortality. This also creates uncertainty about reference points that don't account for ecosystem changes. To better support fisheries management, we need to deepen our understanding of the factors affecting recruitment, weight and size at age, and overall growth. Incorporating this knowledge into the assessment framework and reference point calculations will improve the accuracy and relevance of these tools.

Recommendation 3
Identify sub-stocks

Initial findings suggest that herring in the Gulf of Bothnia have a complex population structure with locally adapted groups. To ensure biologically sound management and assessment, it is essential to thoroughly map their population structure.

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ICES. 2024. Workshop on establishing a roadmap for possible conservation measures for herring in the Baltic (WKHERBAL). ICES Scientific Reports. 6:14. 46 pp. https://doi.org/10.17895/ices.pub.25310959

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