Popular science summary of the PhD thesis

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Title of the PhD thesis	Improving harvesting patterns in demersal trawls: An investigation on the impact of mesh variability and geometry on codend size selection
PhD school/Department	DTU Aqua

Science summary

Demersal trawling often results in catching unwanted fish along with the target species, posing sustainability challenges. Improving the selection process in trawls can help reduce these unwanted catches. The rear end of the trawl, where the catch accumulates, is called the codend. The codend is where the majority of the sorting between wanted and unwanted species and sizes occurs. Most codends are made of flexible netting. The meshes in netting are subjected to different forces, stretching or loosening the bars in the meshes, creating variation in the openness. This variation might have an influence on the sizes or shapes of fish that can pass through the mesh openings. For instance, a flatfish might be able to penetrate a semi-closed mesh, whereas a roundfish might end up caught in the netting.

Normally to ensure that fishing gear does not catch and retain all fish, a minimum mesh size is mandated by law. This mesh size is intended to keep the target-sized fish in the netting while enabling escape for the small fish. However, if the meshes changes during fishing, the small fish might be retained, and the larger, valuable sized fish might be released. Therefore, this thesis investigates a codend design with constant and uniform mesh geometry to determine how much this variation affects the catch and release of different species.

Main findings:
1. Variability in mesh openness affects the sizes of cod and flatfish that are retained and released.
2. The angle at which fish contact the meshes during escape attempts is crucial, while wiggling movements have limited effects.
3. Square-mesh codends tend to retain more undersized flatfish compared to diamond-mesh codends.
4. Cod and flounder do not use the escape openings available to them

A new rigid codend design was developed to better retain target-sized flatfish and release undersized ones. This proof-of-concept design performed better than traditional methods but requires further research to maximize its effectiveness and commercial readiness.