

UNDERSTANDING HERRING BEHAVIOR IS CRITICAL FOR SUSTAINABILITY

“Once herring lost the elders, they lost their way to their spawning grounds.”

Guujaaw

HERRING FOLLOW THEIR ELDERS

Through traditional and tribal knowledge we know herring migration is learned. Particular herring stocks breed at known sites, and juvenile herring learn spawning behaviors like migration routes to these spawning sites from older, more experienced fish.

Fishery quotas for herring, however, are often calculated based on regional information, aggregating across multiple individual sub-stocks. What are the consequences of making management decisions that do not account for this learned migration behavior? The **Ocean Modeling Forum** recently explored the impact of omitting these learned spawning behaviors from fisheries models.

LEARNED MIGRATION AND FISHERIES

The Ocean Modeling Forum ran two experimental models:

- A **standard population model**, where fish migrate back to their natal (birth) spawning grounds, or areas nearby, whether or not older fish guide them.
- A **“Go With the Older Fish” model**, where younger fish learn spawning behavior from older, more experienced fish.

As fishing mortality increases, the first model showed fish evenly spread across all spawning sites. A positive result, but one that does not accurately reflect herring fisheries.

In contrast, the second, “Go With the Older Fish,” model revealed some highly productive spawning sites and some sites that crashed under fishing pressure.

In the “Go With the Older Fish” model, easing fishing pressure did not lead to an immediate return of herring at crashed sites; re-establishment at former spawning sites may take a considerably long time.



RECOMMENDATIONS

Fisheries management decisions are often rooted in models aimed at closely mimicking the biology of the fish. To reduce unintended depletions or even extinctions of herring, fisheries models should account for learned migration to spawning grounds.

MacCall, A.D., et al. 2018. “A heuristic model of socially learned migration behaviour exhibits distinctive spatial and reproductive dynamics.” *ICES Journal of Marine Science*. doi:10.1093/icesjms/fsy091