

Adult Lobsters and Benthic Connectivity in the Gulf of Maine



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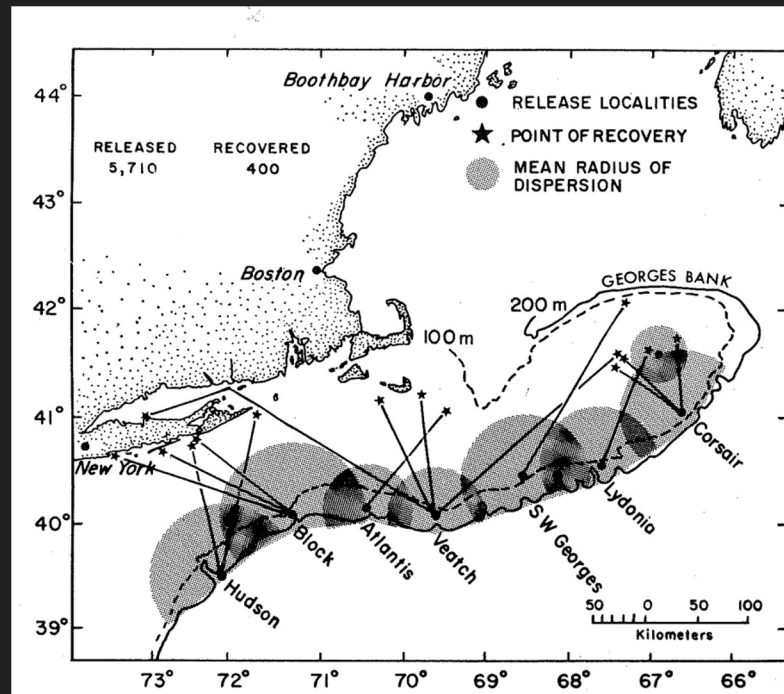
1. Darling Marine Center, ME Center for
Sustainable Coastal Resources, 2. ME Dept.
Marine Resources 3. New Hampshire Fish &
Game, 4. Atlantic Offshore Lobstermen's
Association



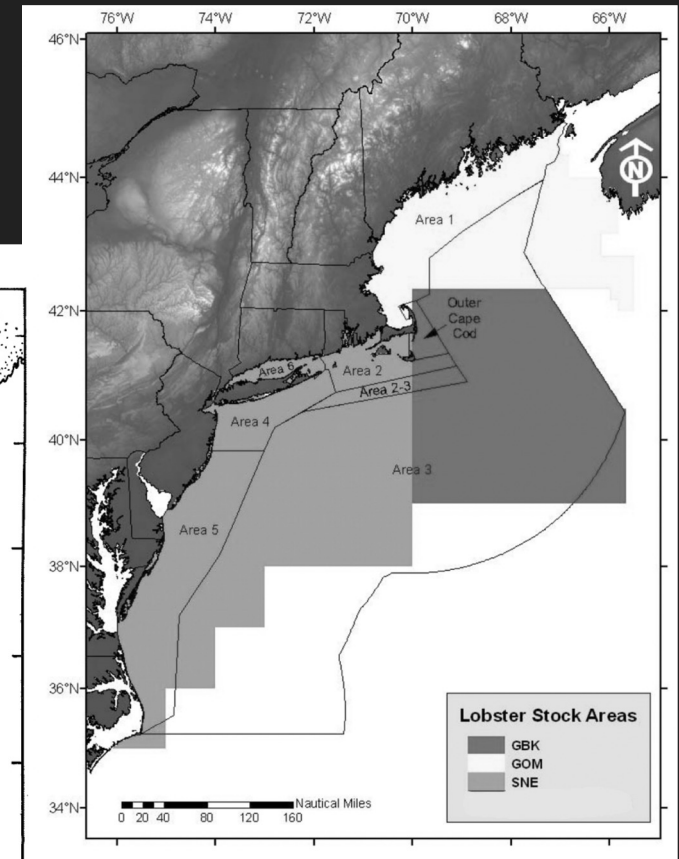
Historic Stock Unit Boundaries of American Lobster

In the past, the resource was managed as 3 stocks:
SNE, GBK and GOM.

Connectivity observed
between offshore and
onshore habitat.



Right: Connectivity between canyons and nearshore habitat from tag data (Cooper and Uzmam, 1971).



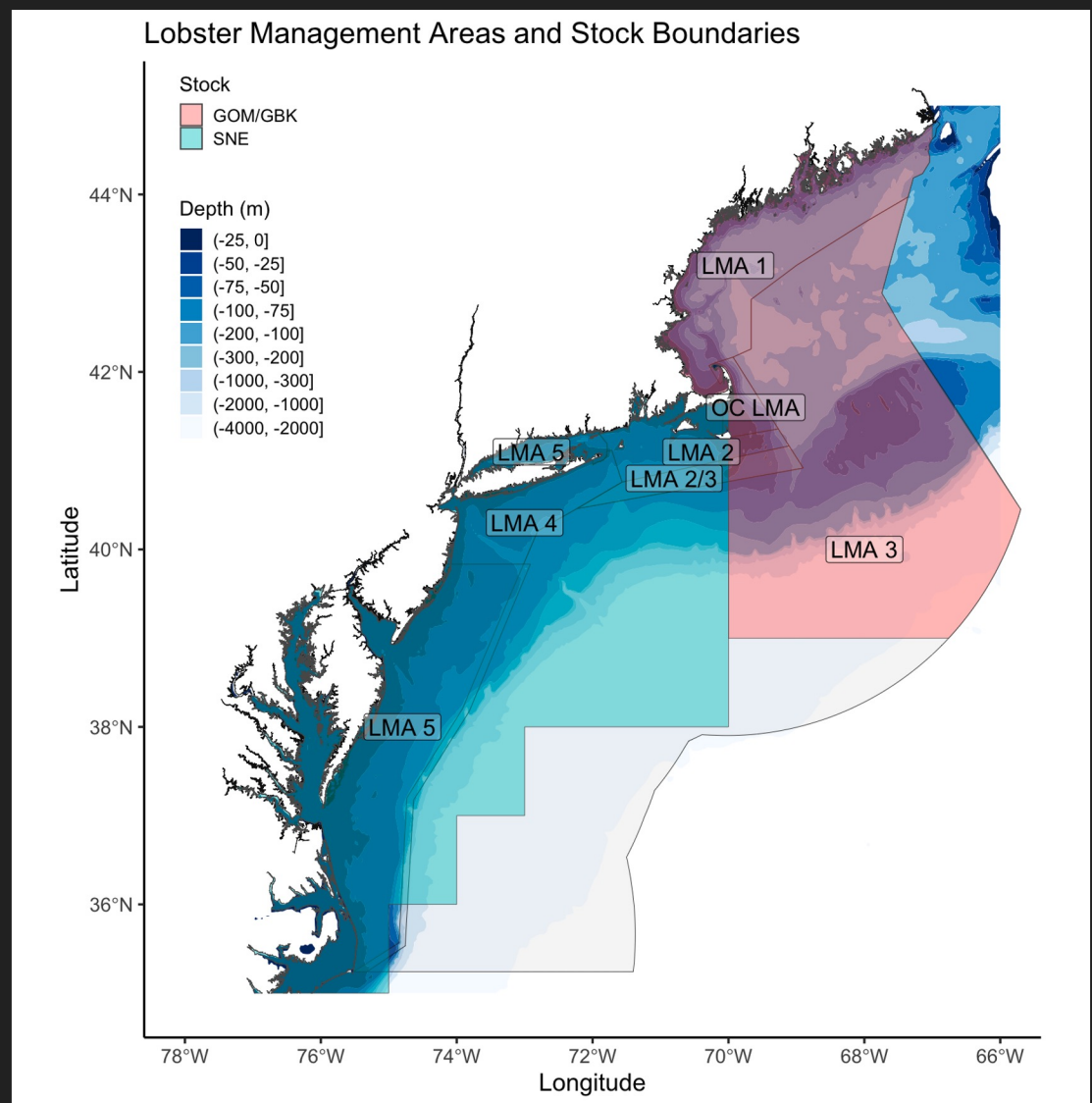
Above: Stock Unit boundaries from 2009
Stock Assessment

Current assessment

Stock Units were changed in 2015 Stock Assessment due to issues modeling NEFSC trawl survey data.

Management boundaries and Stock Units do not line up.

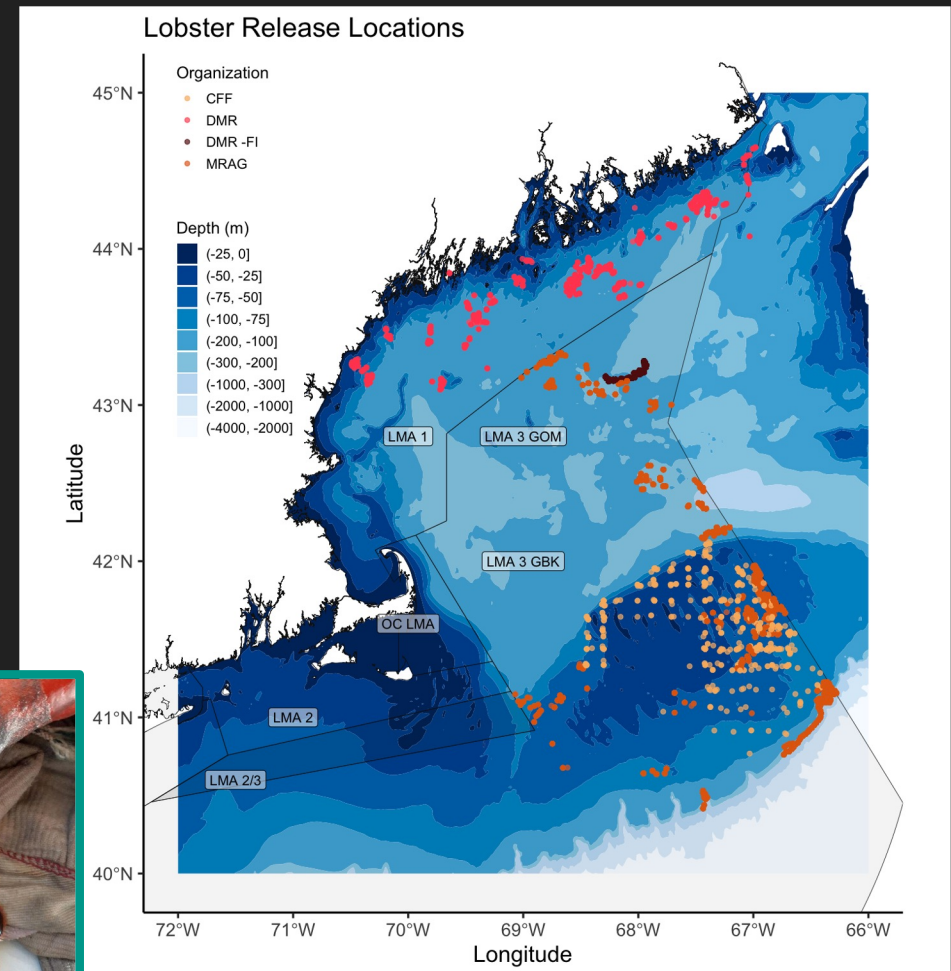
Map of NOAA Lobster Conservation Management Areas and current Stock Boundaries.



AOLA data collection

Project addressed 2015 ASMFC Stock Assessment research priorities.

1. “Examine stock connectivity between GOM and GBK”
2. “Update information on growth and maturity”



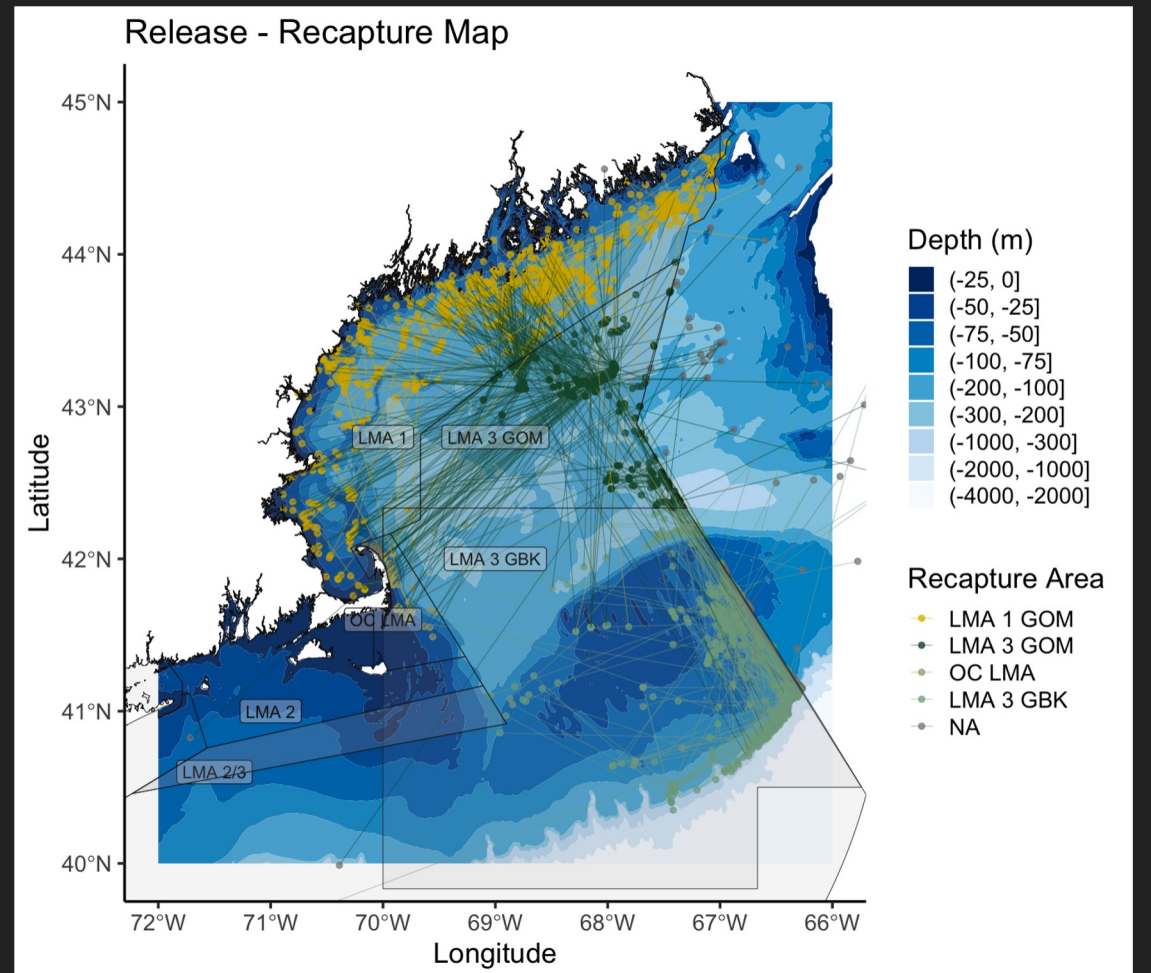
Above: Lobster release locations by different organizations; Right: Example image used in industry outreach to fishermen.

AOLA tag movement

Old Stock Unit and current Mgmt. Units are used to define large study areas within the Gulf of Maine.

Long distance movement occurs within groups and to a lesser degree between groups.

Note exchange from Central LMA 3 (GOM) to OC LMA (GBK)

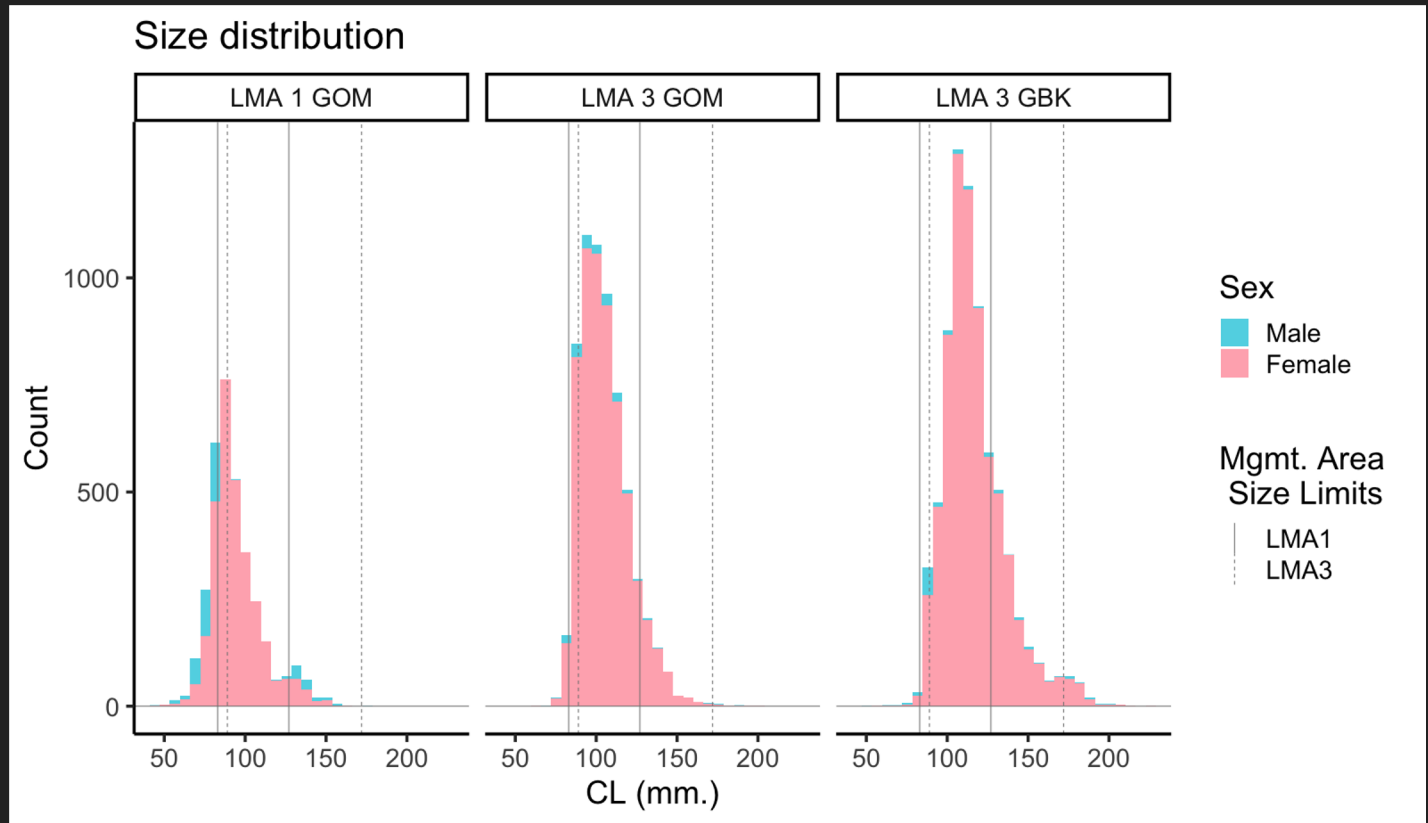


Map of release locations colored by tagging organization, study area geometry overlain.

Size comparisons between study areas

Comparing size distribution between study regions reveals demographic heterogeneity.

This observation is impacted by trap selectivity differences between Mgmt. Areas.

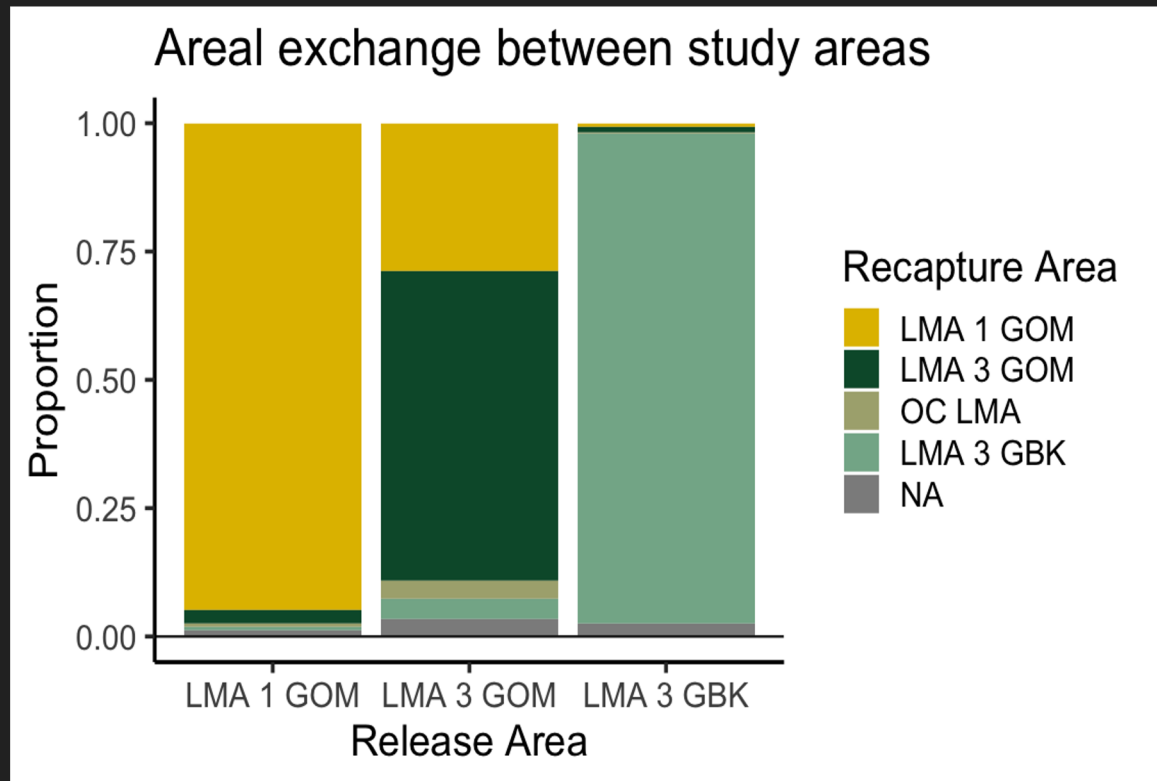


Size distribution of released lobsters in each study region.

Comparison of areal exchange

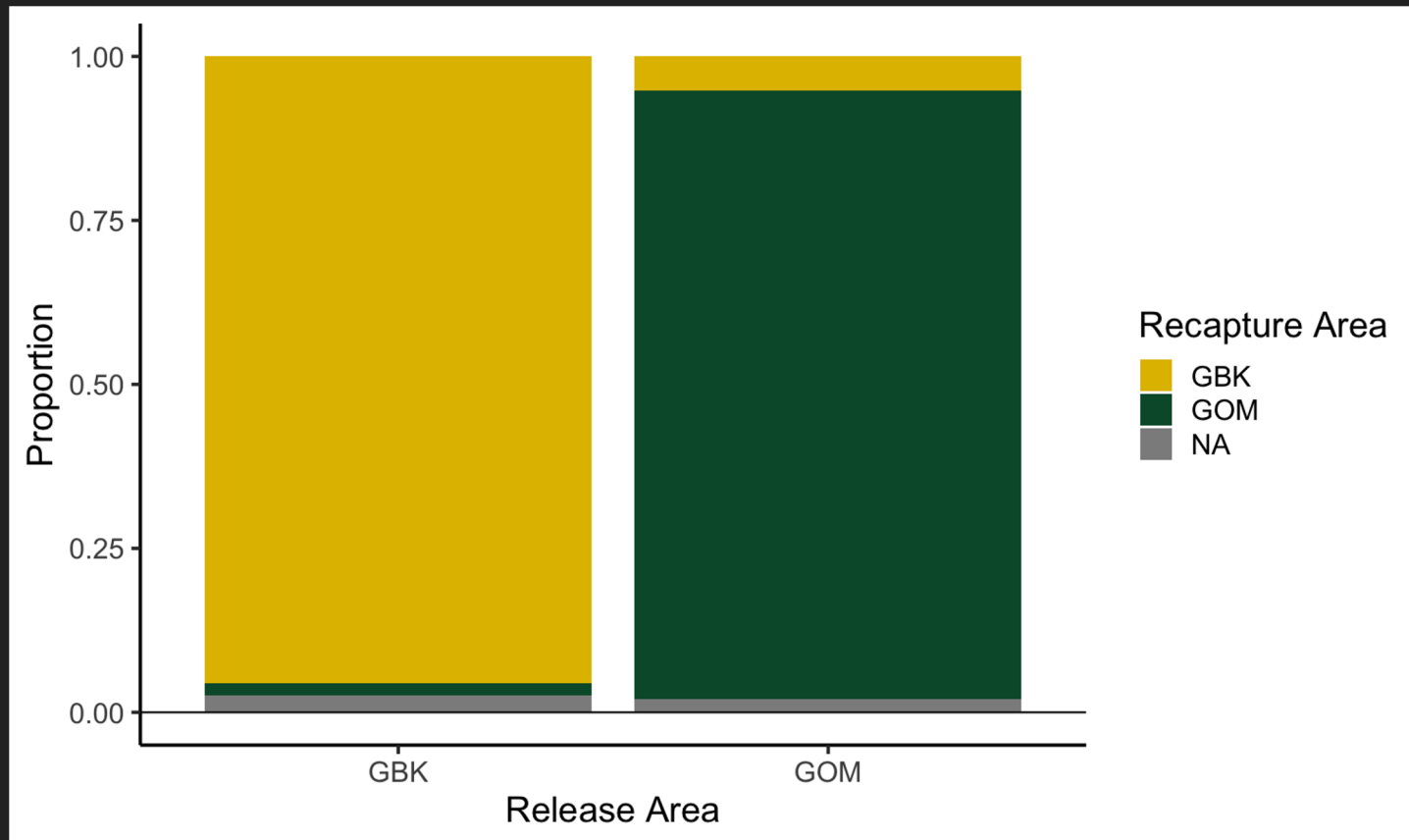
Lobsters in LMA 1 and on GBK generally remain within their study unit.

The LMA 3 GOM exchange rate would support genetic connectivity and may allow for demographic homogeneity.



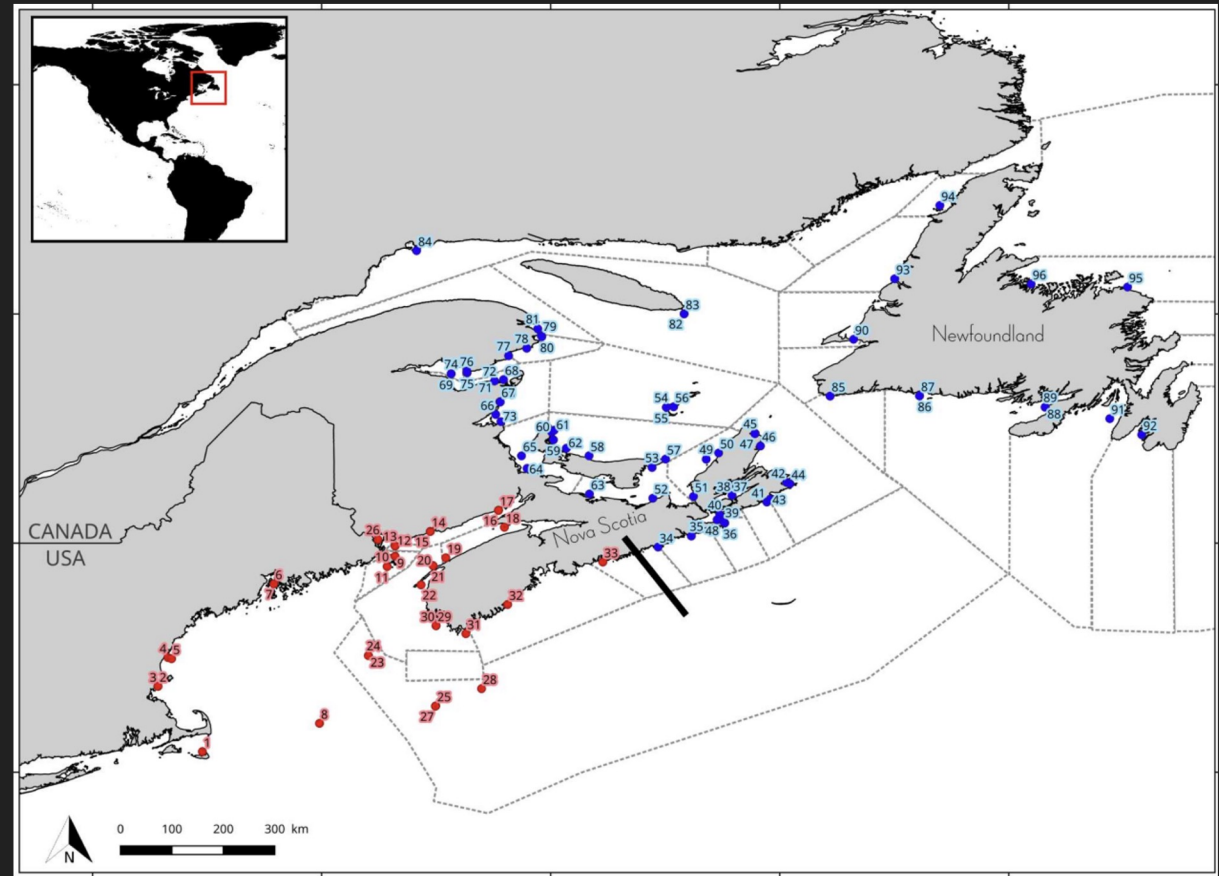
Bar chart describing exchange between old Stock Assessment and management units.

Just GOM - GBK Areal Exchange



Genetic Perspective

Genetic differences aren't observed over neutral SNPs between GOM and GBK.

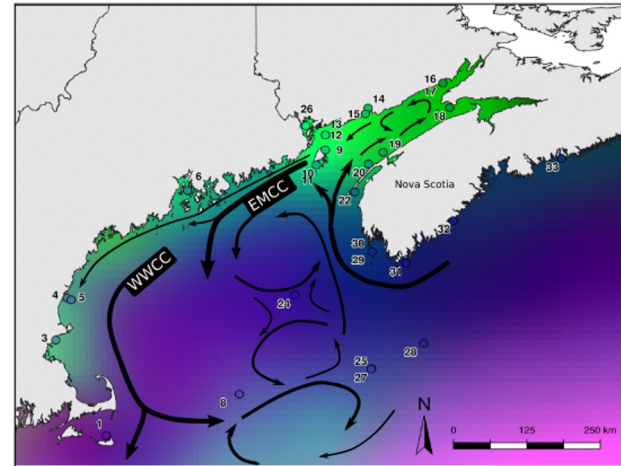


Genetic structure across American lobster populations from Dorant et al. 2022.

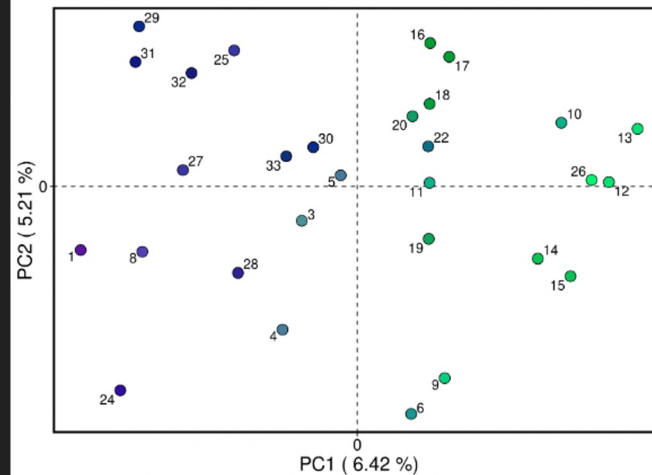
Genetic Perspective cont.

Adaptive SNPs do show a light structuring in the population with structure between Bay of Fundy and GBK.

(b)



(d)



Take home points

The level of exchange reinforces conclusions of Dorant et al. 2022 and tagging data has provided field support for the assumptions of the combined GOM/GBK stock.

GOM and GBK populations do not see a level of exchange to support demographic homogeneity but they are connected through largely one-way adult migration.

Differences in population segment, gear selectivity, fishing effort, and reporting rates between study regions may bias results.

Acknowledgments

This project was funded by NOAA but was made possible by fishermen who allowed research technicians to tag lobsters aboard their vessels, some over multi-day trips, and have continued to report recapture data to AOLA from the project's inception through the present.

This work is funded by:
ACCSP Award #NA15NMF4740253
NOAA Saltonstall-Kennedy Program
Award #NA17NMF4270201
DOE DE-EE0009426

Questions!



Egg Releases and Depth

Lobsters on GBK are releasing eggs in shoal water (on top of the bank).

ELS surveying has indicated that there is some level of recruitment on GBK.

Exchanging discard females from GOM to GBK can support genetic homogeneity.

