



# **Atlantic States Marine Fisheries Commission**

## **NEWS RELEASE**

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*Sustainable and Cooperative Management of Atlantic Coastal Fisheries*

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### **American Lobster Benchmark Stock Assessment Finds GOM/GBK Stock Not Overfished nor Experiencing Overfishing & SNE Stock Significantly Depleted Assessment Introduces Regime Shift Methodology to Address Changing Environmental Conditions**

The 2020 American Lobster Benchmark Stock Assessment presents contrasting results for the two American lobster stock units, with record high abundance and recruitment in the Gulf of Maine and Georges Bank stock (GOM/GBK) and record low abundance and recruitment in the Southern New England stock (SNE) in recent years. The GOM/GBK stock is not overfished nor experiencing overfishing. Conversely, the SNE stock is significantly depleted with poor prospects of recovery. Stock status was assessed using the University of Maine Stock Assessment Model for American Lobster (UMM, Chen et al. 2005), a statistical catch-at-length model that tracks the population of lobster by sex, size and season over time.

“On behalf of the American Lobster Board, I want to applaud the members of the Technical Committee and Stock Assessment Subcommittee for their exceptional work on the 2020 Benchmark Stock Assessment Report,” stated Board Chair Dan McKiernan from Massachusetts. “This assessment made a notable advancement in considering the impact of changing environmental conditions on lobster population dynamics.”

Extensive research has highlighted the influence of the environment on American lobster life history and population dynamics. Among the critical environmental variables, temperature stands out as the primary influence. Further, its range is experiencing changing environmental conditions at some of the fastest rates in the world. Therefore, considering these environmental influences is vital when assessing the lobster stocks and was a focal point of this stock assessment. Environmental data time series included water temperatures at several fixed monitoring stations throughout the lobster’s range, average water temperatures over large areas such as those sampled by fishery-independent surveys, oceanographic processes affecting the environment, and other environmental indicators such as lobster prey abundance.

Environmental time series were analyzed for regime shifts, which indicate a significant difference in the lobster’s environment and population dynamics from one time period to another. Regime shifts can change a stock’s productivity, impacting the stock’s level of recruitment and its ability to support different levels of catch. Temperature time series were also analyzed to quantify the effect of temperature on survey catchability of lobster and correct trends in abundance estimated from surveys by accounting for temperature-driven changes in catchability through time.

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The Atlantic States Marine Fisheries Commission was formed by the 15 Atlantic coastal states in 1942 for the promotion and protection of coastal fishery resources. The Commission serves as a deliberative body of the Atlantic coastal states, coordinating the conservation and management of nearshore fishery resources, including marine, shell and diadromous species.

Model-estimated abundance time series were also analyzed for shifts that may be attributed to changing environmental conditions and new baselines for stock productivity. Shifts were detected for the GOM/GBK stock in 1996 and 2009 and one shift was detected for the SNE stock in 2003. The GOM/GBK stock shifted from a low abundance regime during the early 1980s through 1995 to a moderate abundance regime during 1996-2008, and shifted once again to a high abundance regime during 2009-2018 (Figure 1). Conversely, the SNE stock shifted from a high abundance regime during the early 1980s through 2002 to a low abundance regime during 2003-2018 (Figure 2). New reference points were developed to account for the changing regimes.

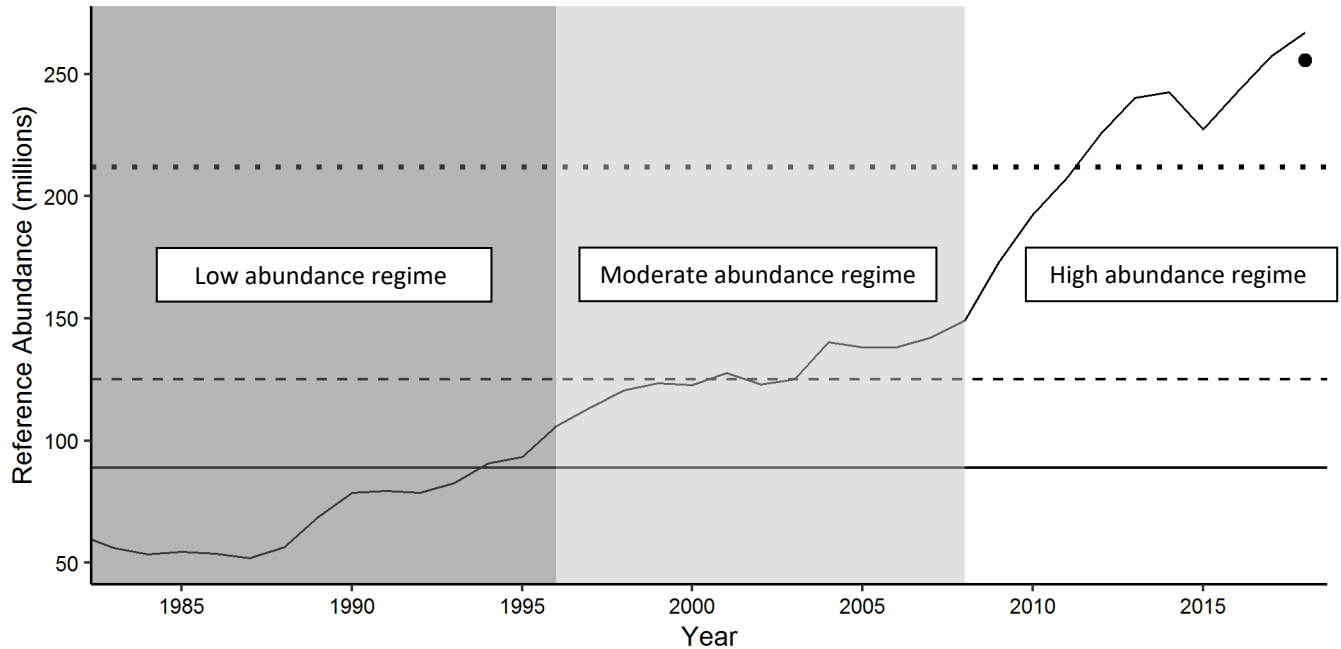


Figure 1. GOM/GBK stock abundance compared to the fishery/industry target (dotted black line), abundance limit (dashed black line), and abundance threshold (solid black line) reference points based on detected low (dark grey period), moderate (light grey period), and high (white period) abundance regimes. The circle is the three-year (2016-2018) average reference abundance.

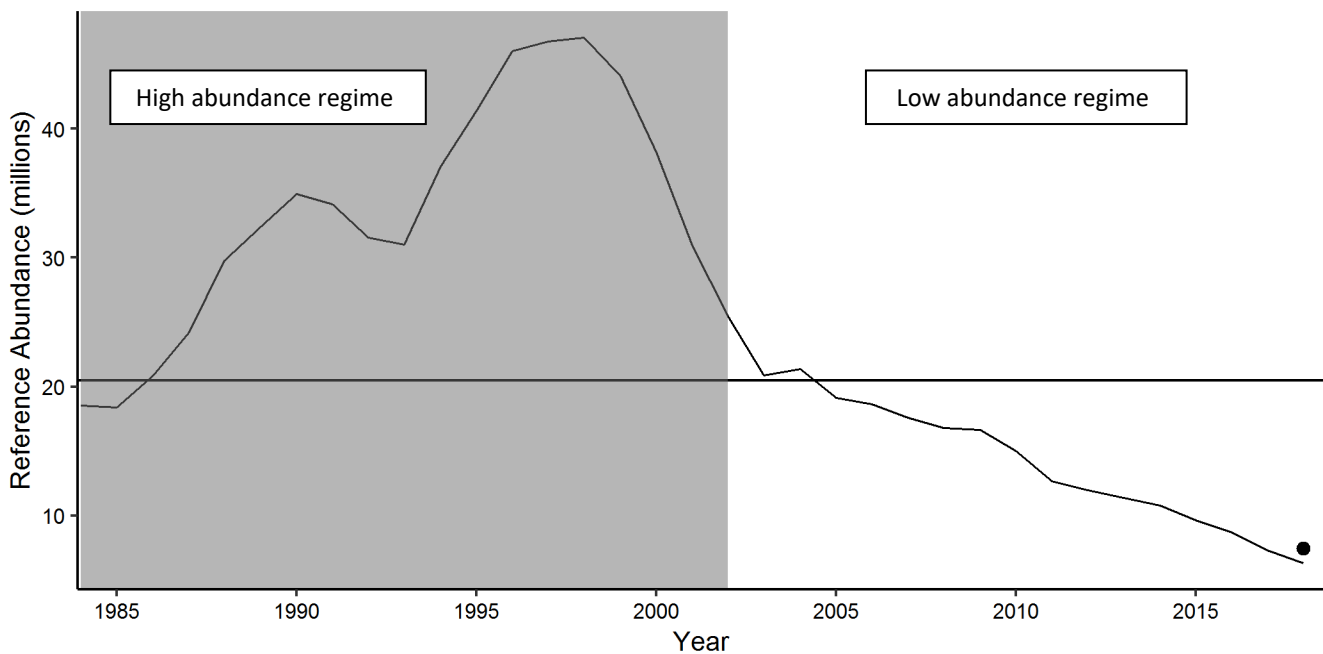


Figure 2. SNE stock abundance compared to the abundance threshold (solid black line) reference point based on detected high (grey period) and low (white period) abundance regimes. The circle is the three-year (2016-2018) average reference abundance.

In this assessment, three reference points are used to characterize stock abundance. The **abundance threshold** is calculated as the average of the three highest abundance years during the low abundance regime. A stock abundance level below this threshold is considered significantly depleted and in danger of stock collapse. This was the only abundance reference point recommended for the SNE stock due to its record low abundance and low likelihood of reaching this threshold in the near future. The **abundance limit** is calculated as the median abundance during the moderate abundance regime. Stock abundance that falls below this limit is considered depleted because the stock's ability to replenish itself is diminished. The **fishery/industry target** is calculated as the 25<sup>th</sup> percentile of the abundance during the high abundance regime. In this case, when abundance falls below this target, the stock's ability to replenish itself is not jeopardized, but it may indicate a degrading of economic conditions for the lobster fishery.

Two reference points are used to evaluate the fishing mortality condition of the stocks. The **exploitation threshold** is calculated as the 75<sup>th</sup> percentile of exploitation during the current abundance regime. The stock is considered to be experiencing overfishing if exploitation exceeds the exploitation threshold. The **exploitation target** is calculated as the 25<sup>th</sup> percentile of exploitation during the current abundance regime.

Based on these reference points, the GOM/GBK stock is not depleted and overfishing is not occurring. The average abundance from 2016-2018 was 256 million lobster which is greater than the fishery/industry target of 212 million lobster. The average exploitation from 2016-2018 was 0.459, below the exploitation target of 0.461.

The SNE stock is significantly depleted and overfishing is not occurring. The average abundance from 2016-2018 was 7 million lobster, well below the abundance threshold of 20 million lobster. The average exploitation from 2016-2018 was 0.274, falling between the exploitation threshold of 0.290 and the exploitation target of 0.257.

Stock indicators were also used as an independent, model-free assessment of the lobster stocks. These indicators are based strictly on observed data and are free from inherent assumptions in the population dynamics models. GOM/GBK stock indicators showed similar results to the assessment model, with increasing abundance and distribution of recruits and larger-sized lobster over time. However, abundances of young-of-year (YOY) lobster have been negative or neutral since the 2015 stock assessment and YOY abundance appears particularly poor in the southwestern areas of the stock. Recent research has indicated lobster larvae may be settling in habitat outside that covered by current surveys, but these trends are concerning and need to be further researched. Exploitation generally declined through time to its lowest levels in recent years. Fishery performance indicators were generally positive in recent years with several shifting into positive conditions around 2010. New stress indicators were developed for this assessment, including shell disease prevalence and the number of annual days with temperature equal to or above 20° C. These indicators show relatively low stress, but indicate some increasingly stressful conditions through time, particularly in the southwest portion of the stock.

Indicators for the SNE stock also showed similar results to the assessment model, with decreasing abundance and distribution of all life stages to low levels in recent years. All indicators averaged below their time series medians since the 2015 assessment and many have averaged below the 25<sup>th</sup> percentile. Mortality indicators based on exploitation rates were variable across surveys, and fishery performance indicators have generally shown deteriorating performance in recent years. The stress indicators point toward similar negative conditions in the stock's environment, including unfavorably warm waters and the manifestation of a stressful environment through high shell disease prevalence. Combined, these indicators reflect the SNE stock's very poor condition and continuing recruitment failure.

The American Lobster Board accepted the Benchmark Stock Assessment and Peer Review Report for management use, adopted the new reference points as recommended by the assessment, and committed to considering management responses to the assessment findings at its next meeting in February 2021. In addition, the Board intends to continue development of Addendum XXVII, which was initiated in 2017 to proactively increase resilience of the GOM/GBK stock but stalled due to the prioritization of Atlantic right whale issues.

A more detailed overview of the stock assessment, as well as the Benchmark Stock Assessment will be available on the Commission website, [www.asmfc.org](http://www.asmfc.org), on the American Lobster webpage under stock assessment reports. For more information, please contact Caitlin Starks, Fishery Management Coordinator, at [cstarks@asmfc.org](mailto:cstarks@asmfc.org) or 703.842.0740.

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