Sargassum Landing Trends and Cost Forecasts as Functions of North Atlantic Oscillation Differentials and Ph Variations

Tendencias de Aterrizaje en *Sargassum* y Pronósticos de Costos como Funciones de las Diferencias de pH Y Oscilaciones del Atlántico Norte

Tendances D'atterrissage et Prévisions de Coûts pour le *Sargasse* en Fonction des Différentiels D'oscillation Nord-Atlantique et des Variations de pH

MARIAH MCBRIDE
Texas A&M University at Galveston — The Center for Texas Beaches and Shores
1019 33rd Street, Lower Galveston, Texas 77550 USA.
Mariah@MariahMcBride.com

EXTENDED ABSTRACT

A relationship seems to subsist between positive variations of the North Atlantic Oscillation (NAO) and above average levels of *Sargassum* landings along the Gulf of Mexico. The NAO is measured via positive and negative indicators that vary across a standard of zero. A positive point on the index designates intensified sea level pressure towards the equatorial region of the Atlantic Ocean with unusually low sea level pressure found in the northern Atlantic Ocean (NOAA 2018) Moreover, there exists an indirect interrelationship between the factors that encourage a positive placement on the NAO index (i.e. CO_2 absorption rates, surface water temperatures, and atmospheric pressure) and the average pH level of the Atlantic Ocean. Higher atmospheric pressure systems are correlated with high CO_2 absorption rates (Salt et al. 2013). Surface waters become warmer when CO_2 is absorbed, inducing thermal expansion that increases atmospheric pressure at sea level. As the ocean absorbs CO_2, it becomes more chemically acidic producing a decrease in regular pH level. Though the implication of pH is secondary to oceanic carbon dioxide absorption and thermal expansion, it can be deduced such factors can be measured as they relate indirectly in terms of pH level and the positioning of the NAO. By utilizing the valuation generated by the Intergovernmental Panel on Climate Change that projects an average oceanic pH level decline by 0.4 before the year 2100 (Meehl et al. 2007), the average NAO Index level and pH level decrease recorded between the years 1982 to 2015 were used as intensification factors to estimate a hypothetical projection of NAO trends by 2100 (Figure 1. Based on these controls, it seems that the regularity of NAO positive phases could enhance, under certain conditions, by a

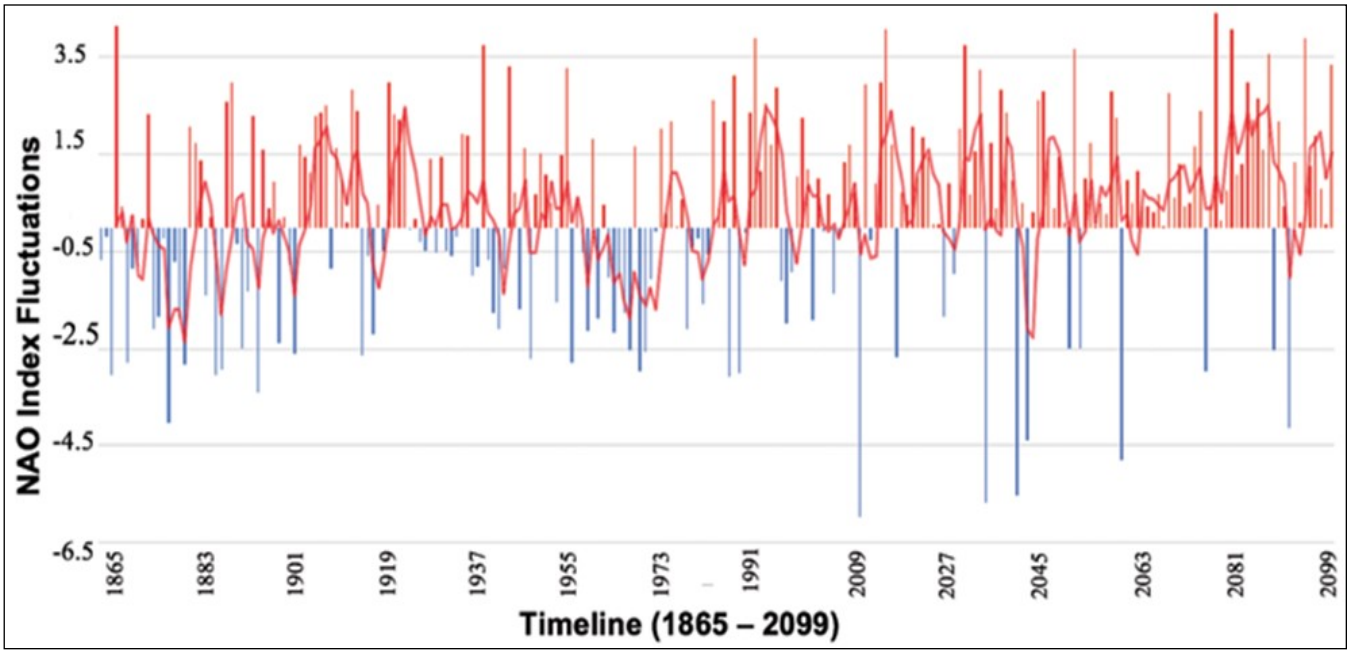

Figure 1. Historic dataset transitioned to hypothetical forecast based on historic mean and estimated mean values portraying amplification in the positive direction by a function of eight.

factor of eight. Under these settings, it is conceivable that the resulting positive phase augmentation could be matched with volumetric increases of *Sargassum* landings along the Gulf of Mexico shoreline at a comparable proportion. In addition to the scientific examination presented, this study also proposes recommendations for future research, provides a case study budget and cost analysis based on *Sargassum* landing projections, and postulates possible suggestions for *Sargassum* management and policy.

KEYWORDS: *Sargassum*, North Atlantic Oscillation, climate change

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