

New insights from sediment cores into the environmental history of a *Phragmites*-invaded coastal wetland in Douglas Manor, Queens, NY

Bennington, J Bret¹, Weaver, Emily², LaBarca, Marisa L³., and Finkbeiner, John⁴

¹Department of Geology, Environment, and Sustainability, Hofstra University, ²Department of Earth Sciences, Syracuse University, ³Syosset High School, ⁴Paul D. Schreiber High School

Corresponding author: J Bret Bennington – j.b.bennington@hofstra.edu

We are reporting on an ongoing investigation into the environmental history of a 6-acre parcel of invasive *Phragmites australis*-covered coastal land in Udalls Cove in Douglas Manor, Queens, NY. This investigation was commenced in 2015 at the request of the Douglas Manor Environmental Association (DMEA) to provide documentation of the recent history of the site essential to planning the restoration of the wetland to a native species assemblage. Historical aerial photos show an open landscape for the site, but the exact nature of the vegetation and substrate are ambiguous. To determine what kind of environment existed on the parcel prior to invasion by *Phragmites*, transects were surveyed from the road bordering the site to the shoreline and six sediment cores were collected along the transects, along with salinity readings from the subsurface water. Elevation transects reveal a relatively level surface across the *Phragmites*-dominated area of the parcel, gently sloping down to a fringe of *Spartina alterniflora* marsh and estuarine mudflats. Preliminary analysis of the sediment cores reveals a 30 cm *Phragmites* rhizomal mat underlain by approximately 1.5 meters of grey clay interpenetrated with abundant plant material, overlying pebbly glacial outwash. Analysis of foraminifera assemblages downsection in one core collected at the bayward edge of the wetland revealed four species of agglutinated forams typical of coastal marshes bordering Long Island Sound (*Trochammina inflata*, *Milliammina fusca*, *Trochammina. macrescens*, and *Tiphotrocha comprimata*). Forams are abundant in the upper 25 cm of the core, but become scarce and disappear from samples below 50 cm depth. Forams typical of a low marsh environment (*T. inflata*, *M. fusca*) are numerically dominant at the top of the core and are present through the upper 50 cm where they are mixed with species typical of the middle and high marsh (*T. macrescens*, *T. comprimata*). Trace metal analysis of core samples show relatively low levels of lead-Pb, copper-Cu, and zinc-Zn from the lower section of the core (140 cm to 90 cm). Pb levels rise steadily from 90 cm to a peak at 25 cm depth, and then drop near the top of the core. Cu and Zn show a similar trend with different peaks and drop-offs. Using Pb as a proxy for age, we can infer that core below 90 cm predates the mid-1800s (industrial revolution – increasing production of tetraethyl lead) and that the Pb peak near the base of the *Phragmites* root mat marks the late 20th Century before lead began to be phased out of gasoline and manufactured products. Combining the data from foraminifera and trace metals, our preliminary conclusion is that the wetland was predominantly a freshwater wetland prior to the late 1800s before transitioning to a high marsh and middle marsh environment, with the *Phragmites* invasion beginning in the late 1900s.