Analysis of Plastic Pellet Distribution in the Environment Using Citizen Science Nurdle Patrol Data and Batch Identification to Differentiate Spills

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Microplastics in the environment are a source of emerging pollution with proposed negative impacts across all ecosystems. Plastic preproduction pellets called nurdles are a form of microplastics that are becoming increasingly present in beaches and waterways across the globe. In this study, citizen science data from the organization Nurdle Patrol was analyzed in relation to plastic manufacturers and railroad crossings in three, 50 square-mile regions along the Texas Gulf Coast. Results of this analysis indicate that the proximity of plastic manufacturers and railroad crossings to nurdle collection sites are important factors to be considered in predicting plastic pellet concentrations, yet must also be observed in conjunction with other environmental variables. Batch identification of polymer types with Fourier-transform infrared spectroscopy (FTIR) showed an abundance of polymers and polymer additives in the spectra of samples of nurdles that were analyzed. In all, 89 different production batches were identified across the 355 plastic pellets analyzed, indicating significant release of nurdles into the environment after production from a variety of sources. By identifying nurdle distributions and production batches in this study, the research highlights the need for establishing guidelines to classify nurdles as an environmental pollutant. In addition, state and federal regulations need to be established to prevent accidental spills of nurdles during all stages of production, handling and transport.

Awards Won:
National Oceanic and Atmospheric Administration - NOAA: First Award of $1500.00