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Assessing Secondary Plastics Contamination Pathways in Coastal Seabirds

Abstract:
Marine plastics are increasingly seen as a threat to many species. However, research to date has focused on primary ingestion of plastic pieces, such as albatross foraging in the Pacific Ocean. Recently, a NSU capstone project found microplastics in 59 of 60 seabird gastrointestinal tracts and identified the brown pelican as the species with the highest percentage of microplastics, most of them in the size of 2 mm or less. With their large bills, any plastic ingestion will not be from individual birds eating individual plastic fragments (as with albatross and gulls), but likely a secondary ingestion of plastic fragments through their prey items, which are often filter-feeding fishes. However, this "secondary ingestion" hypothesis has never been explored. Once within the body, microplastics cause effects ranging from gastrointestinal tract blockages and irritation to leaching of plastic-associated chemicals. A separate hypothesis has been suggested, based on these systemic effects, that there is a relationship between microplastics and endoparasite community compositions. Using existing collaborations between the PI and local wildlife centers, as well as expertise developed in the PI's lab regarding endoparasites, fishes, and local seabirds, this project is a proposed quantitative analysis of plastics found in the digestive tract of three large seabird species in southeastern Florida: Double Crested Cormorant, Brown Pelican, and Osprey. Carcasses from at least 20 individuals of each species will be obtained from collaborative wildlife rehabilitation centers. After taking morphometric measurements, any endoparasites will be removed. Then, each section will be dissolved, then the resulting liquid vacuum-filtered with 2 um glass filters. The filters will then be placed under a dissecting scope to assess microplastic particles via visual identification. The total number of plastic pieces present in each bird will be quantified by the type of the particle (fragment or fiber), the color, and the size of each particle, then compared across and between species. Additionally, three main forage fishes for these bird species will be collected in each of the two locations: Striped Mullet, Scaled Sardine, and Atlantic Needlefish. These forage fishes will be examined for endoparasites, then the whole fish (minus any parasites) homogenized, dissolved, and filtered for microplastics using the same methodology. The combined results of these microplastic and endoparasite surveys will provide additional evidence for (a) presence of a "secondary ingestion" intake pathway for microplastics in coastal seabirds, and (b) presence of a relationship between microplastics and endoparasite communities. Both hypotheses represent novel research explorations.