Large micro-, meso-, and macro-plastics distribution in the Bahía Blanca Estuary wetlands (Argentina): variations across and within salt marshes

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Abstract

The presence of plastic on marine coasts has been widely reported throughout the world. However, these materials have received little attention in coastal wetlands, particularly salt marshes. The abundance, size, type, color, and polymer distribution of large micro- (1-5mm), meso- (5-25mm), and macro-plastics (25-100mm) in eight salt marshes of the Bahia Blanca Estuary were analyzed in this study.

Plastics from mudflat, low-salt marsh, and high-salt marsh sediments, and plant-litter from the storm line were isolated by wet sieving and flotation with NaCl saturated solution. The shape, size and color were determined visually under a stereomicroscope and the polymeric composition was determined by FTIR-ATR. The concentrations always followed the same pattern: storm-line plant litter> high-salt marsh sediments> low-salt marsh sediments> mudflat sediments. The most contaminated salt marshes were those near the mouth of the Maldonado stream and an illegal landfill. The relative abundance of each type of plastic varied within the salt marsh, fragments and pellets followed the same pattern as concentrations. Furthermore, this percentage varied between salt marshes, owing primarily

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to the source to which they were exposed. Thus, those near dumps and sewage discharges had more films and fibers, respectively, while those near the main channel had more pellets. In terms of polymer distribution, 40.5% of the 1600 items analyzed were PELD, followed by 29% PEHD, 20.4% PP, and 4.1% EPS. The films were mostly PELD> PP> PEHD, the fragments were PEHD> PP> PELD and pellets were PEHD> PELD. At the spatial level, the relative abundance of each polymer depended on the relative abundance of each plastic shape/type. Finally, we highlight that this study is the first in salt marshes around the world and is focusing on management strategies to improve the coastal wetland quality.

Keywords: Salt marsh, Plastics, coastal wetlands, FTIR, ATR, PEHD, PELD, PP, plant, litter, Storm, line