

Monitoring anthropogenic debris at backshores and coastal dunes of sandy beaches along São Paulo Coast - Brazil

Authors: Lucas Barbosa, Fabiana T. Moreira, Andréa Oliveira, Marina F. M. Santana, Rita Camargo, Alexander Turra

Oceanographic Institute, University of São Paulo, 05508-120, São Paulo, SP, Brazil

Introduction

- Accumulation of anthropogenic debris in the ocean and coastal habitats is a worldwide problem (Rochman et al., 2013).
- Most of the current information about patterns of debris accumulation in coastal areas comes from monitoring sandy beaches, usually sampling the beach profile from low water level to backshore (e.g. Schulz and Matthies, 2014, Terzi and Seyhan, 2017).
- Scarce information is available about the accumulation of debris on coastal dunes, a habitat that provides important ecosystem services and can be a sinking area for debris.

Sampling area and Methods

- The composition, abundance and recomposition rates of debris debris between the backshore and coastal dunes of sandy beaches were evaluated at six beaches.

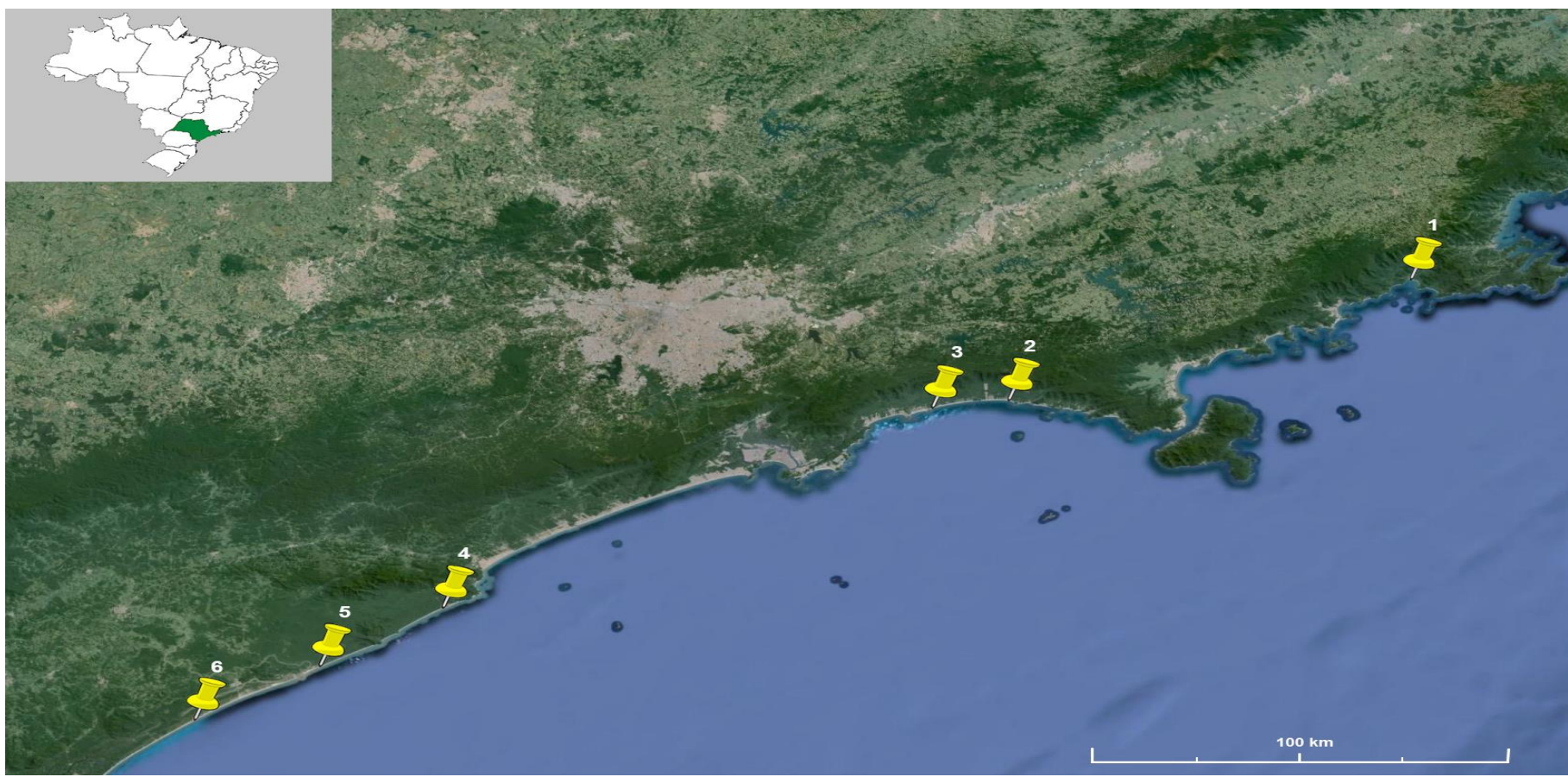


Fig.1 Sampled beaches (1.Ubatumirim; 2. Boracéia; 3. Itaguapé; 4. Una; 5. Juréia; 6. Ilha Comprida) located in the São Paulo state (Brazil).

- An initial beach clearance was done in all sampled sites on July 2012. Thereafter, a first sampling was done on October 2012 (spring season) and was repeated every three months for five times.

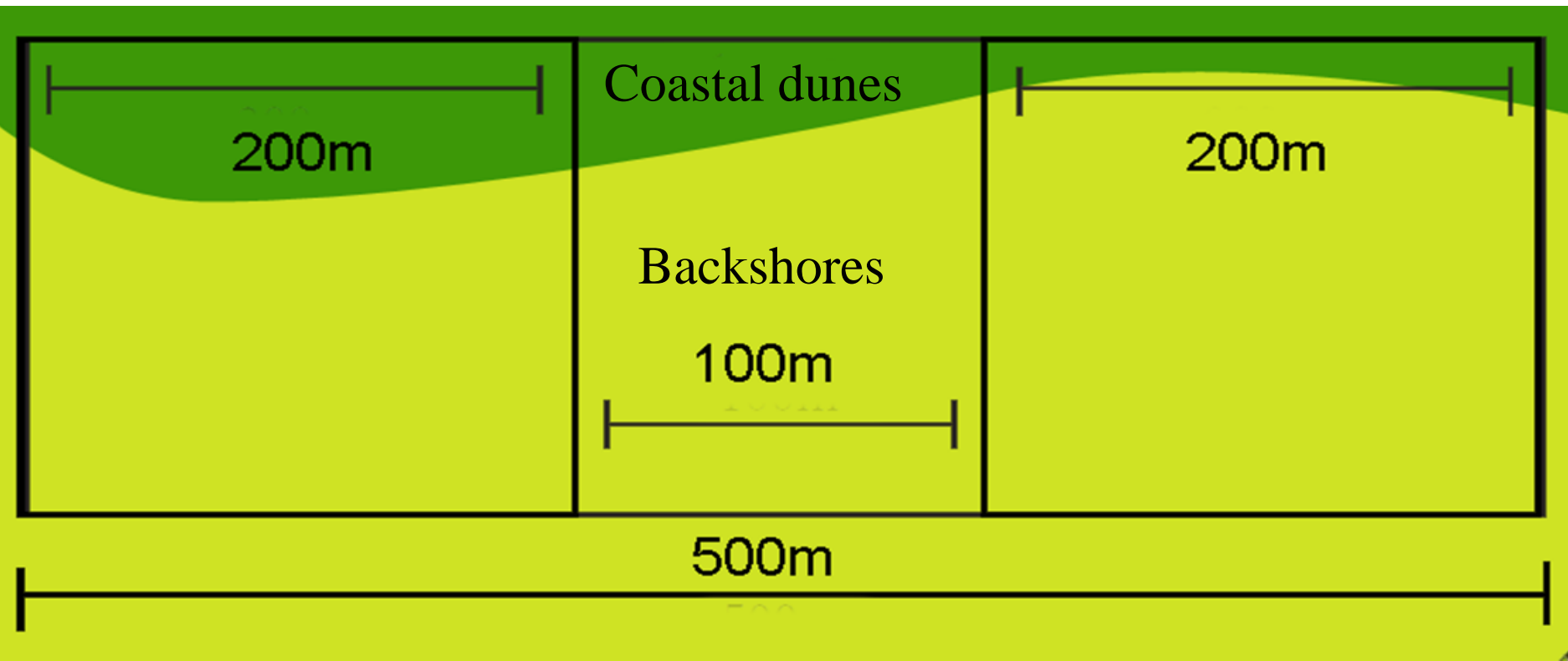


Fig. 2 On each beach, a stretch (500 metres in length parallel to the waterline) was delimited, in the backshore and the adjacent dune. Samples were taken in the 100 central meters of the stretch (100 meters along-shore X across-shore length of the backshore and coastal dune). All items larger than 2.5cm were recovered and classified according to their composition and use (Cheshire et al., 2009). To prevent contamination, all items larger than 2.5cm found within the 200m (buffer zone) to the right and left of the central area were also removed.

Results

- Coastal dunes had greater abundance than backshores of all litter materials.

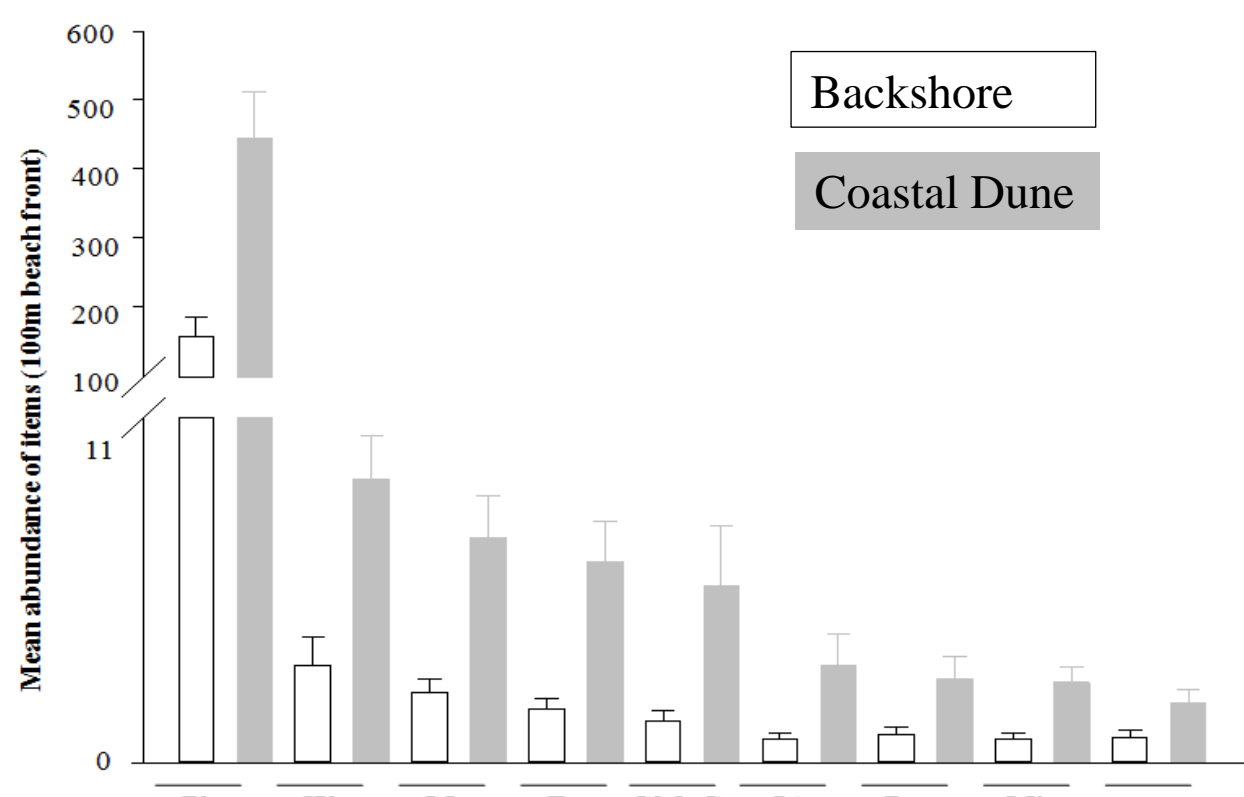
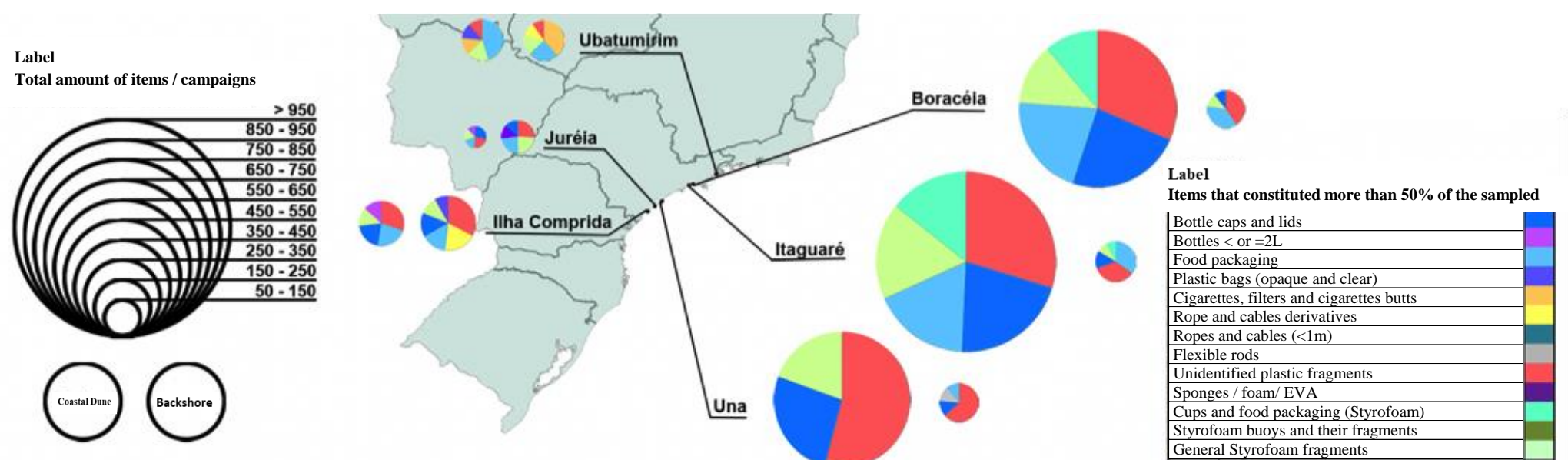


Fig 4 - Mean abundance (\pm SE) of litter types: Plastics (PI), Wood (Wo), Metal (Me), Rubber (Ru), Glass & Ceramic (Gl & Ce), Other (Ot), Paper (Pa), Mixtures (Mi), Cloth (Cl). Means refers to six beaches, sampled six different times.

- The composition and abundance of the types of plastics debris differ between compartments.



- Recomposition rates of litter were greater at Coastal Dunes

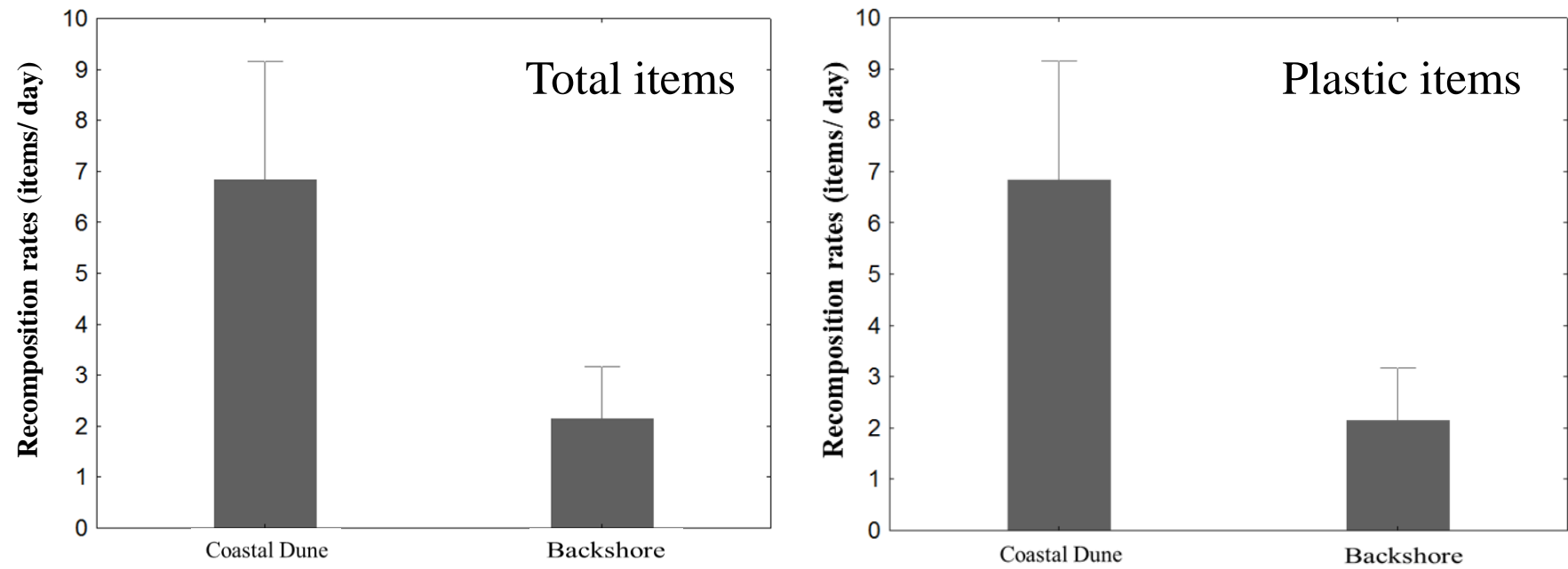


Fig. 6 Mean recomposition rates (\pm SE) of litter per day, calculated over 4 sampling periods at six beaches

Discussion / Conclusion

- The intertidal zone is very dynamic and seems to be transit areas for AD (Browne et al., 2015a)
- Thus sampling designs that include only the intertidal and backshore would miss debris accumulated higher in the shore (i.e. coastal dunes)
- Data obtained from backshores and coastal dunes can improve monitoring strategies
- Management strategies should be improved to periodically remove litter accumulated.

References

Browne, M.A., Chapman, M.G., Thompson, R.C., Amaral-Zettler, L.A., Jambeck, J., Mallos, N.J., 2015. Spatial and temporal patterns of stranded intertidal marine debris: is there a picture of global change? *Environmental Science & Technology* 49, 7082-7094.

Cheshire, A.C., Adler, E., Barbière, J., Cohen, Y., Evans, S., Jarayabhand, S., Jętko, L., Jung, R.T., Kinsey, S., Kusui, E.T., Lavine, I., Manyara, P., Oosterbaan, L., Pereira, M.A., Sheavly, S., Tkalin, A., Varadarajan, S., Wenneker, B., Westphalen, G., 2009. UNEP/IOC Guidelines on Survey and Monitoring of Marine Litter, in: *UNEP Regional Seas Reports and Studies*, N.I.T.S.N. (Ed.), p. xii + 120 pp.

Rochman, C.M., Browne, M.A., Halpern, B.S., Hentschel, B.T., Hoh, E., Karapanagioti, H.K., Rios-Mendoza, L.M., Takada, H., Teh, S., Thompson, R.C., 2013. Policy: Classify plastic waste as hazardous. *Nature* 494, 169-170.

Schulz, M., Matthies, M., 2014. Artificial neural networks for modeling time series of beach litter in the southern North Sea. *Marine Environmental Research* 98, 14-20.

Terzi, Y., Seyhan, K., 2017. Seasonal and spatial variations of marine litter on the south-eastern Black Sea coast. *Mar. Pollut. Bull.* 120, 154-158.