

# PLASTIC INGESTION BY SOUTH PACIFIC FISH

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## Introduction

The issue of marine plastic pollution has raised a great deal of concern in the recent years, plastic ingestion by commercial fish species in particular. In a review of plastic ingestion by marine fish in the wild (Markic *et al.*, in prep.), we found that out of 370 examined species, 251 (68 %) contained plastic, of which 205 (82 %) species were of commercial value. The global plastic ingestion rate, or the frequency of occurrence of plastic ingestion per species, is 27.2 %. However, our analysis suggests that these values are most likely underestimates, and that the detection would be greater with increased sample size and more exhaustive analytical methods.

There is little information on the issue of plastic ingestion by fish in the South Pacific region, especially the Pacific Island countries where sea food is an important food source (Gillett, 2011).

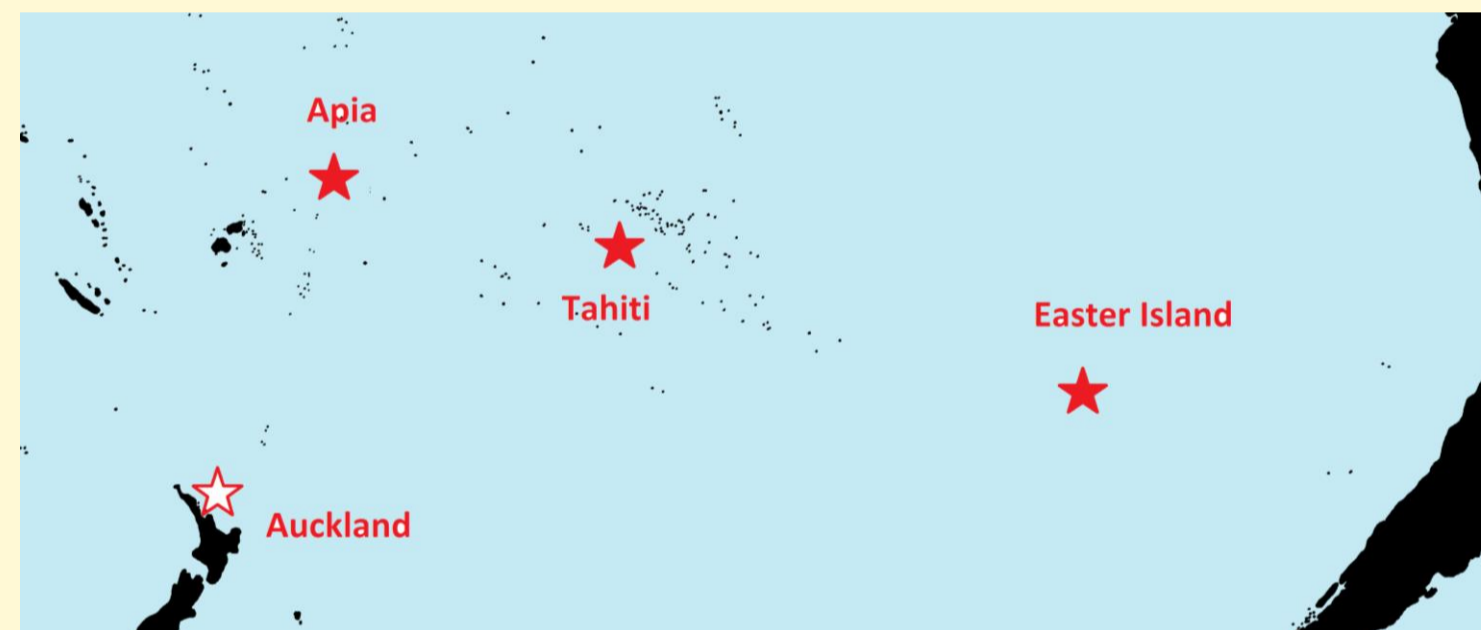
The aim of our observational study was to examine the occurrence of plastic ingestion in fish species commonly present in the diet of Pacific Islanders. We looked at a range of species covering different sizes, habitats and trophic levels. The questions we aimed to answer were:

1. Which common commercial fish species in the South Pacific eat plastic and in which quantities?
2. Do fish from four distant locations in the South Pacific eat plastic in different frequencies (ingestion rate % - percentage of fish with plastic per species) and amounts (plastic load - number of pieces of plastic per fish)?
3. Is there an evidence of trophic transfer of plastic via secondary ingestion?

## Methods

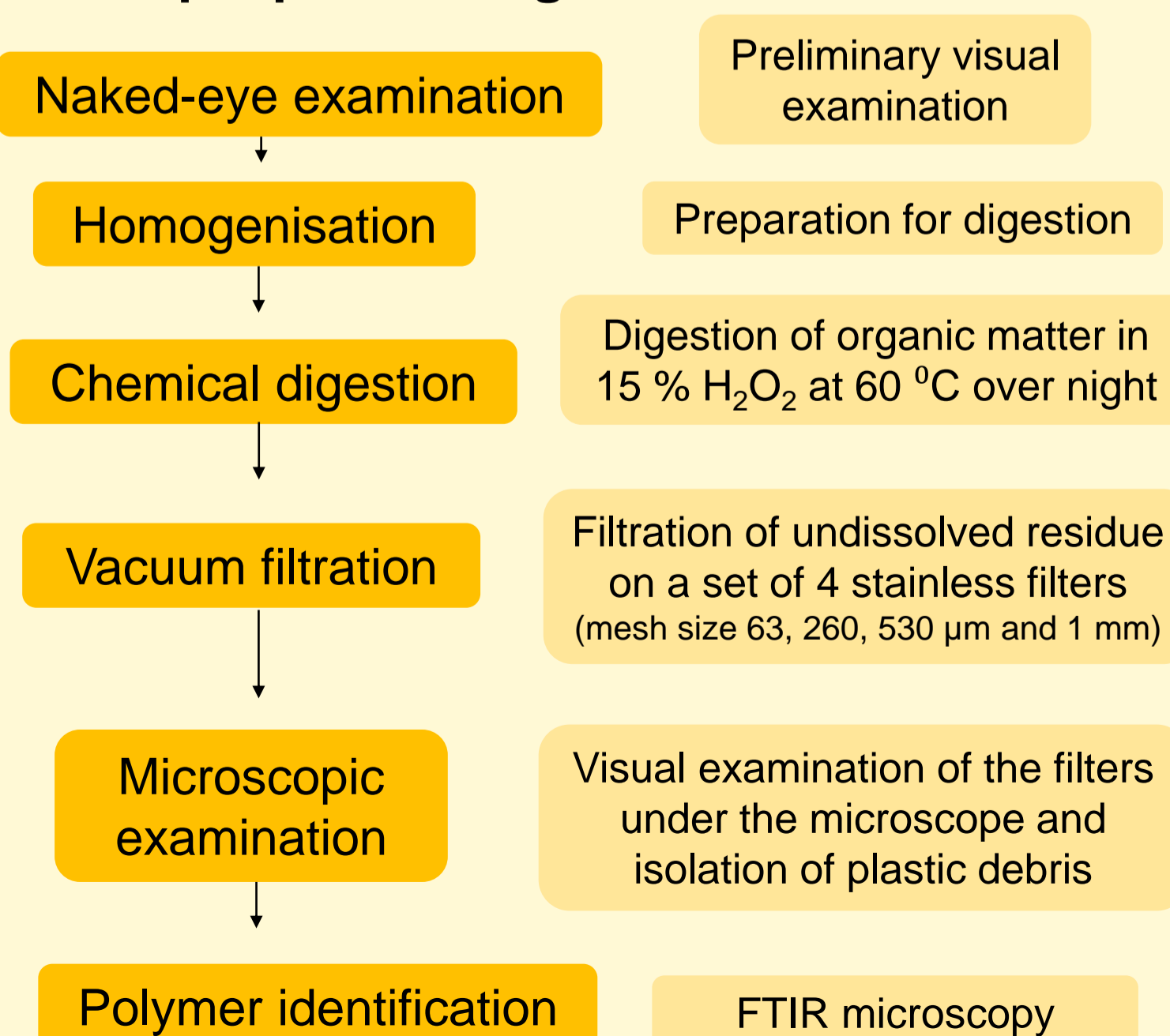
### Sample collection

Samples of gastrointestinal (GI) tracts of 34 marine fish species were collected from four locations in the South Pacific region (Auckland, Apia, Tahiti, Easter Island) between September 2015 and October 2016. Samples were collected either from fish markets or directly from fishermen.



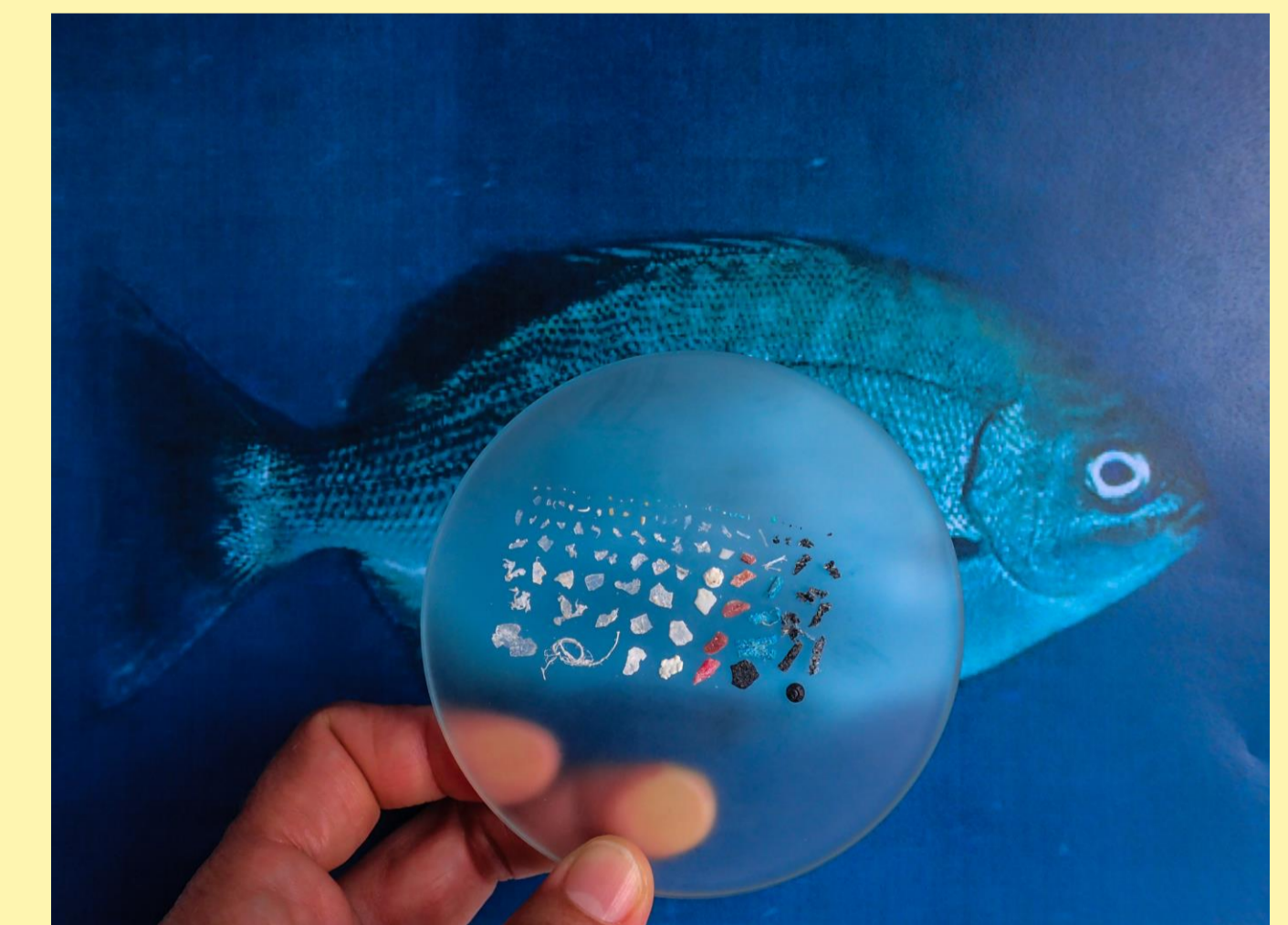
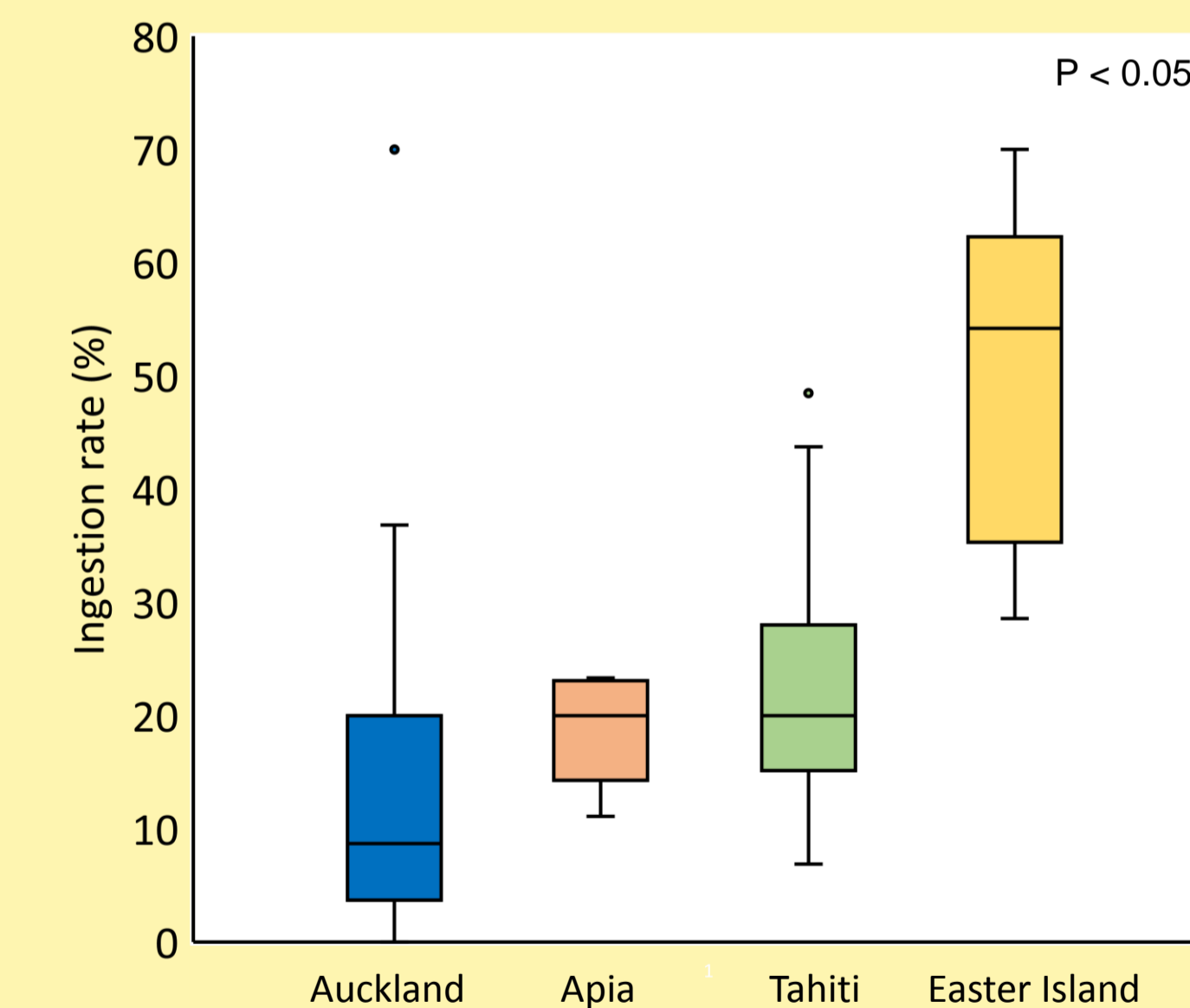
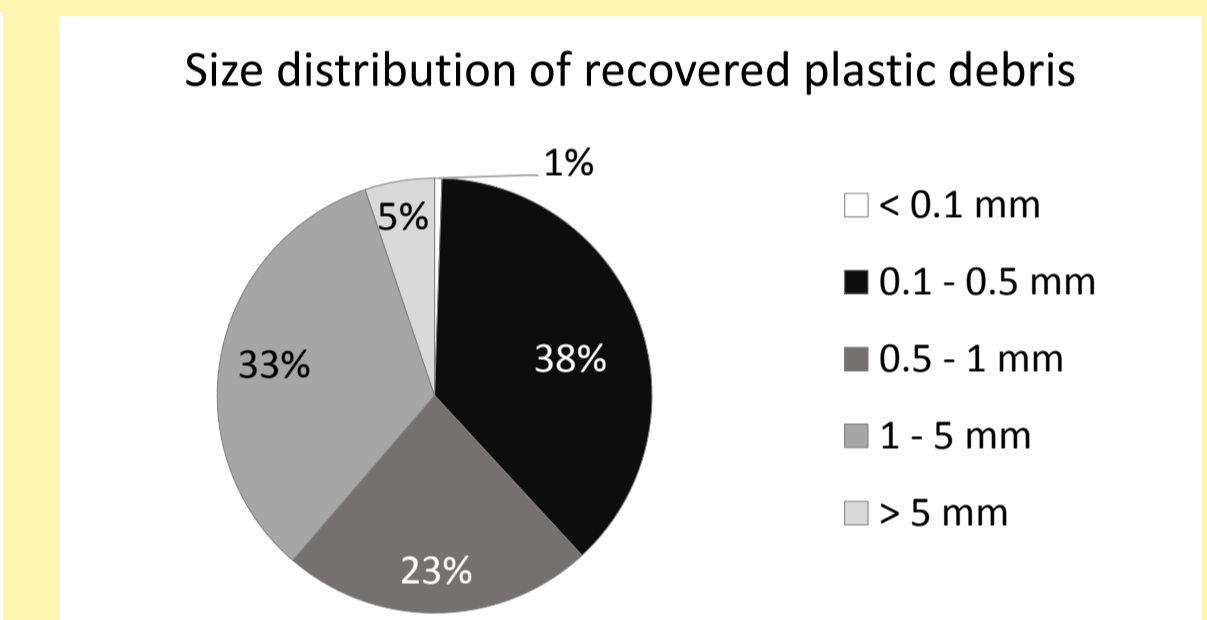
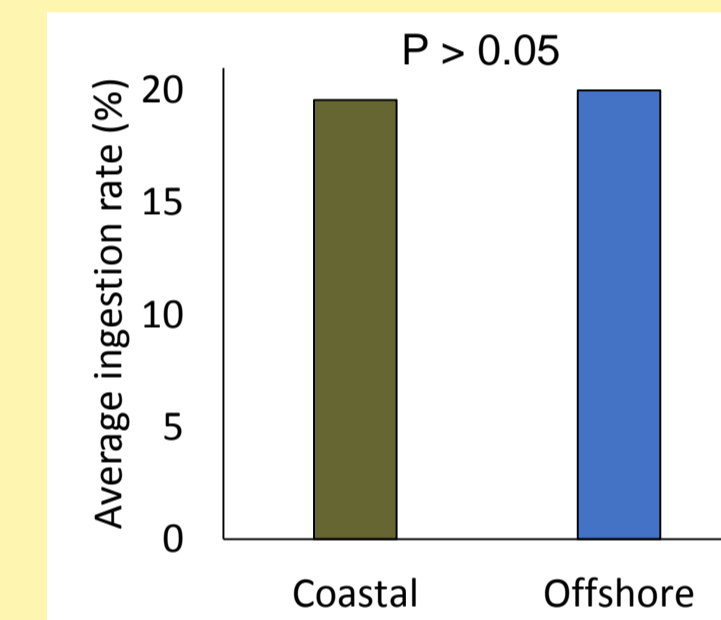
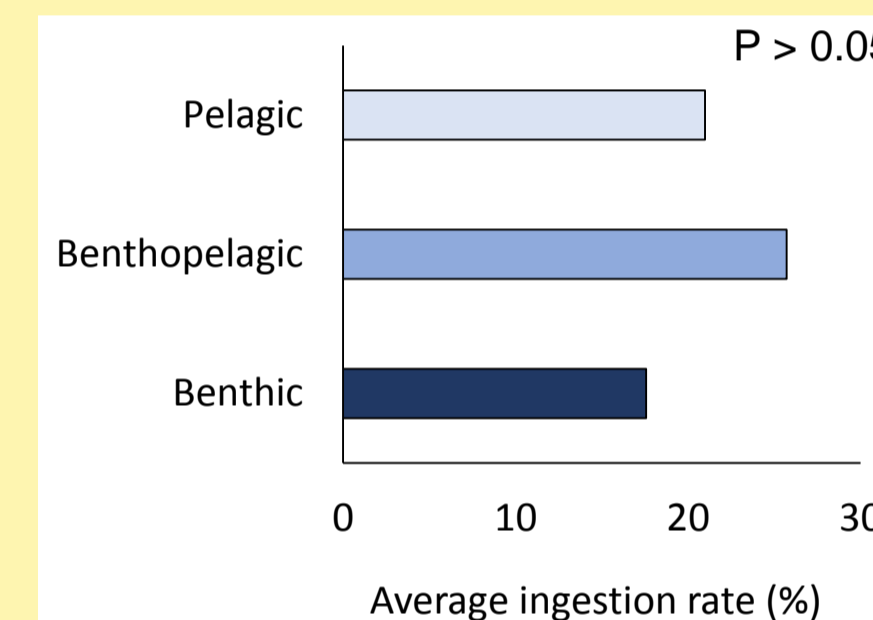
The sample size on all locations was 10 specimens and over (N ≥ 10) per species, averaging 25 specimens per species. Altogether, 933 specimens were examined.

### Sample processing

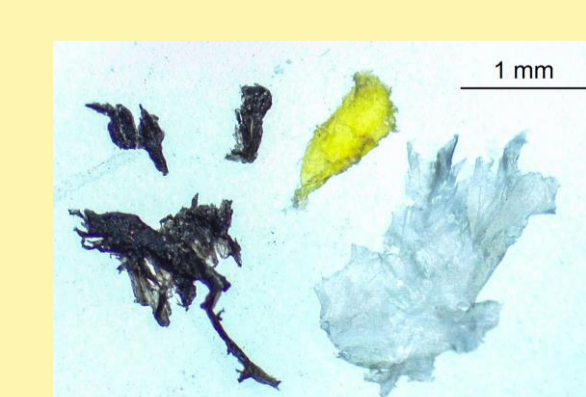


## Results

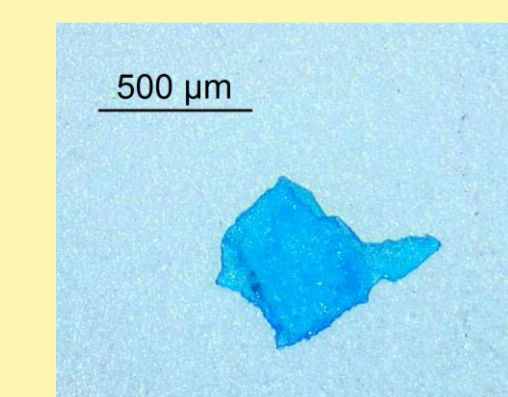
- 33 out of 34 examined species ingest plastic
- On average, **23.6 %** of fish contained plastic (220 out of 933 specimens) with an average plastic load of **1.9** plastic particles per individual fish
- **Easter Island** fish ingest significantly more plastic than the fish from other locations
- The majority of ingested particles were smaller than 5 mm – **microplastics**
- Secondary ingestion was found in **17.5 %** of examined individuals (9 out of 57 fish)



104 plastic particles from one *Kyphosus sandwicensis* from Easter Island



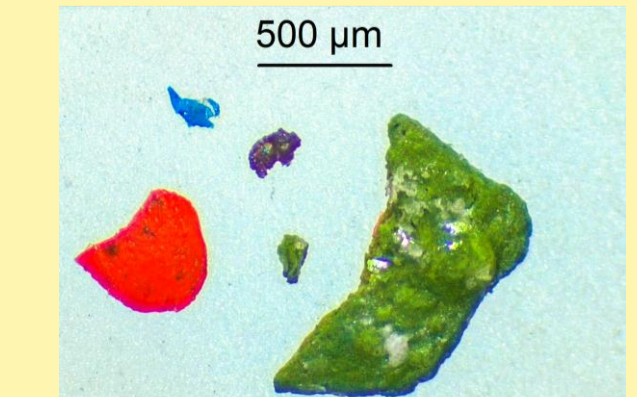
*Girella tricuspidata* (New Zealand)



*Thunnus albacares* (Samoa)



*Ellochelon vaigiensis* (Tahiti)



*Thunnus albacares* (Easter Island)

Plastic particles on each photo were recovered from a single fish