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The FUTURE of PICES: Science for Sustainability in 2030

BENTHIC MARINE LITTER IN THE HAWAIIAN ARCHIPELAGO: EVIDENCE FROM A CITIZEN SCIENCE INITIATIVE

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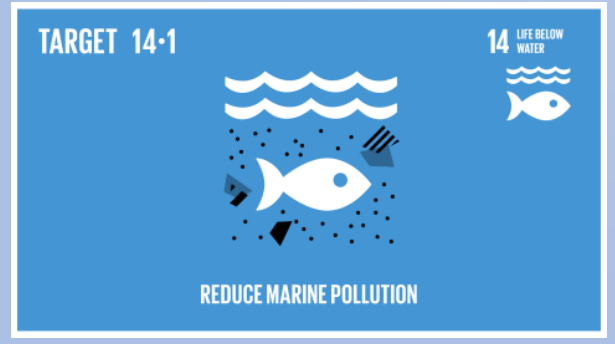


INDIRECT IMPACTS

loss of ecosystem services and goods

human health

economy

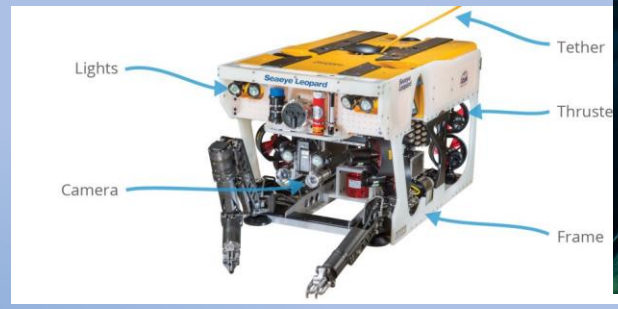
DIRECT IMPACTS

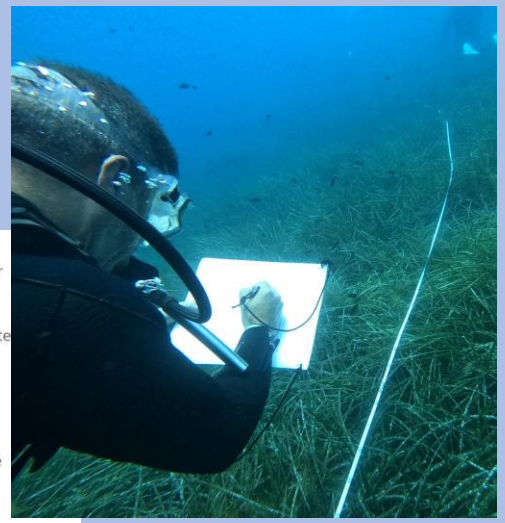
The seafloor represents the ultimate site of litter accumulation

Sampling methods

Trawl net

UVC techniques



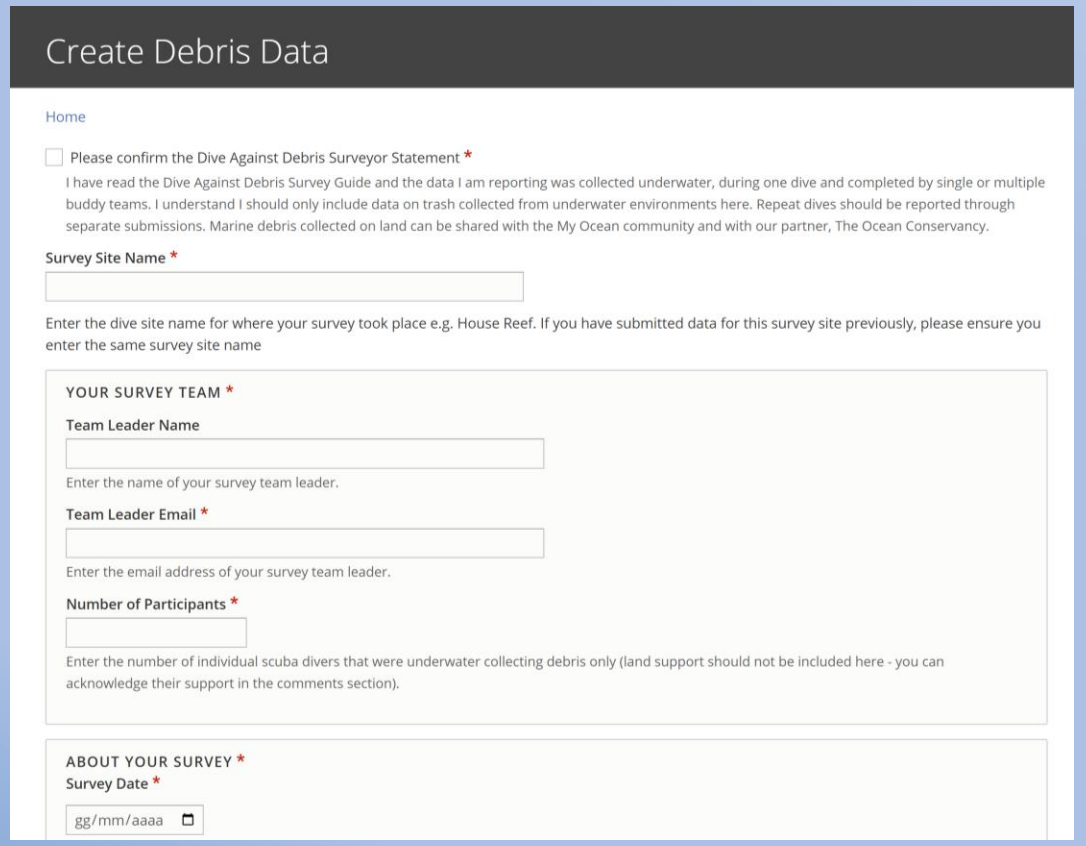


CITIZEN SCIENCE INITIATIVES

100 debris items

Plastic Materials	SUP/Fishing gear
01. bags: grocery/retail (plastic)	SUP
02. bags: trash (plastic)	SUP
03. bait containers/packaging	FG
04. balloons	
05. balls	
06. baskets, crates	
07. beverage bottles: less than 2 litres (plastic)	SUP
08. beverage bottles: 2 litres or more (plastic)	SUP
09. bottles: bleach, cleaner	
10. bottles: oil/lube	
11. buckets, drums & jerry cans: 2 litres or more	
12. buoys & fl oats (plastic & foamed)	
13. caps & lids (plastic)	SUP
14. carpet (synthetic)	
15. cigarette fi lters	SUP
16. cigarette lighters	
17. cigar tips	SUP
18. containers: fast food, lunch boxes & similar	SUP
19. cotton bud sticks	SUP
20. cups, plates, forks, knives, spoons (plastic)	SUP
21. diapers/nappies	SUP
22. fishing: line	FG
23. fishing: lures, rods/poles	FG
24. fishing: nets & pieces of nets	FG
25. fishing: traps & pots	FG
26. foam insulation & packaging	
27. food wrappers (plastic)	SUP
28. furnishings (plastic)	
29. gloves (latex)	
30. light sticks/cyalumes	FG
31. mesh bags: fruit, vegetable, shellfi sh	FG
32. pipes (plastic/PVC)	
33. rope (plastic/nylon)	
34. scuba & snorkel gear, masks, snorkels, fi ns	
35. sheeting: tarpaulin, plastic sheets, palette wrap	
36. six-pack rings, ring carriers	SUP
37. strapping bands (plastic)	
38. straws, stirrers	SUP
39. syringes (plastic)	SUP
40. tampon applicators	SUP
41. tobacco packaging & wrappers	
42. toothbrushes	
43. plastic fragments	
Glass & Ceramic Materials	
44. beverage bottles (glass)	
45. buoys (glass)	FG
46. cups, plates, tableware, dishes (glass & ceramic)	
47. fluorescent light tubes	
48. jars: food (glass)	
49. light globes: bulbs, etc	
50. syringes (glass)	
51. glass & ceramic fragments	

Metal Materials	SUP/Fishing gear
52. aerosol/spray cans	
53. appliances: household	
54. batteries: AA, AAA, C & D, 6V, 9V, etc	
55. batteries: car or boat	
56. beverage cans (aluminium)	
57. cans: food, juice, other (tin)	
58. caps & lids (metal)	
59. cars & car parts	
60. cups, plates, tableware, dishes (metal)	
61. drums: 55 gallon	
62. fishing: sinkers, lures, hooks	FG
63. fishing: traps & pots	FG
64. forks, knives, spoons (cutlery)	
65. gas bottles/cylinder, drums: more than 4 litres	
66. pipes & rebar	
67. pull tabs: beverages	
68. scuba weights	
69. strapping bands (metal)	
70. wire, wire mesh, barbed wire	
71. wrappers (foil/metal)	
72. metal fragments	
Rubber Materials	
73. condoms	
74. gloves (rubber)	
75. inner-tubes & rubber sheets	
76. rubber bands	
77. tires/tyres	
78. rubber fragments	
Wood Materials	
79. fishing: traps & pots	FG
80. furnishings (wood)	
81. lumber (processed or cut/milled wood)	
82. pallets	
83. wood fragments	
Cloth Materials	
84. bags (burlap/hessian)	
85. bags (cloth)	
86. gloves (cloth)	
87. rope & string (cloth)	
88. towels, rags	
89. cloth fragments	
Paper/Cardboard Materials	
90. bags (paper)	
91. cardboard: packaging & cartons	
92. paper: books, newspapers, magazines, etc	
93. paper/cardboard fragments	
Mixed Materials	
94. bricks, cinderblocks, chunks of cement	
95. clothing	
96. computer equipment & other electronic devices	
97. fi reworks	
98. shoes, fl ip fl ops, sandals, tennis, etc	
99. tampons	
100. toys	



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Dive Against Debris®

Survey Guide

A Survey of Underwater Marine Debris
For Scuba Divers

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Marine Debris Identification Guide

A Resource for Scuba Divers Completing
Dive Against Debris® Surveys

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Contents lists available at ScienceDirect

Journal of Hazardous Materials

journal homepage: www.elsevier.com/locate/jhazmat

Synthetic polymers: A global threat to aquatic benthic environments

Pierpaolo Consoli [a,*,1], Valentina Costa [b,1], Valentina Sciutteri [a], Danilo Malara [a], Cristina Pedà [b], Fabio Figurella [c], Ian Campbell [d], Emily Deery [d], Teresa Romeo [a], Franco Andaloro [e]

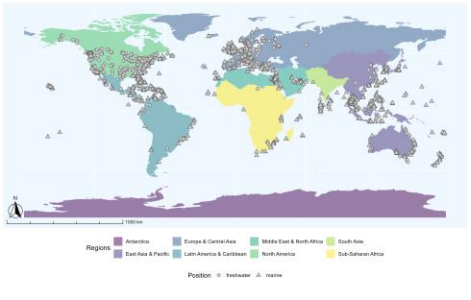
Contents lists available at ScienceDirect

Marine Pollution Bulletin

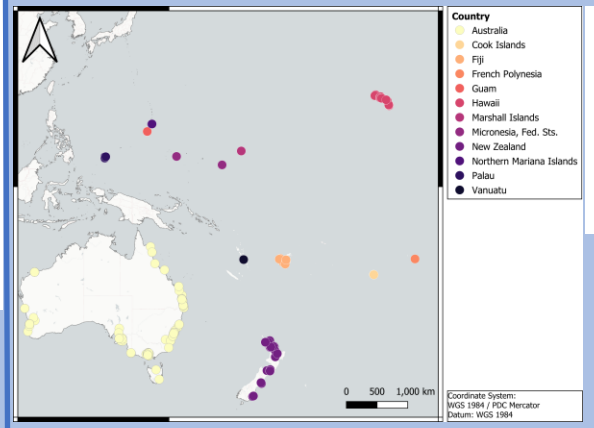
journal homepage: www.elsevier.com/locate/marpolbul

Citizen science through a recreational underwater diving project supports the collection of large-scale marine litter data: The Oceania case study

V. Sciutteri [a,1], V. Costa [b], D. Malara [b], F. Figurella [c], I. Campbell [d], E. Deery [d], T. Romeo [a], F. Andaloro [e], P. Consoli [a,*,1]

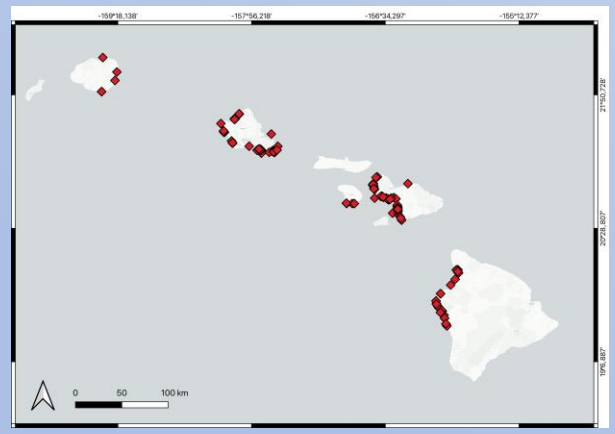


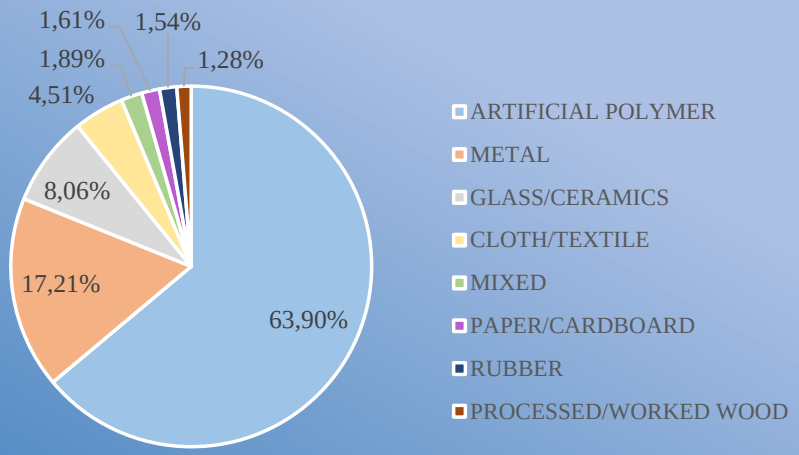
DATASET
- World
- 12,373 dives
- 2011-2021



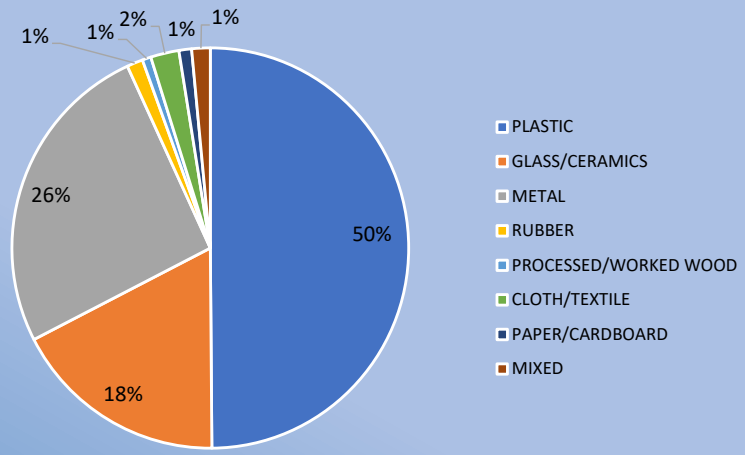
DATASET
- Oceania
- 862 dives
- 2011 - 2021

DATASET
- Hawaii
- 453 dives
- 2011 - 2024

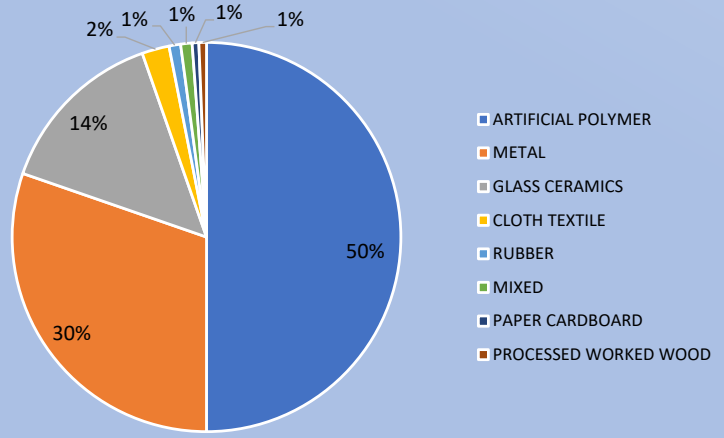




Mean litter density (n. items/100m^2)
= 53.23 ± 1.94
SUP = 30.70%
FG = 20.89%



Mean litter density (n. items/100m^2)
= 58.22 ± 7.55
SUP = 15.77%
FG = 35.66%



Mean litter density (n. items/100m^2)
= 236.98 ± 48.30
SUP = 6.06%
FG = 58.55%

TOP-10 litter items

83% of the overall litter

7.4%

33.8%

6.6%

3%

21.5%

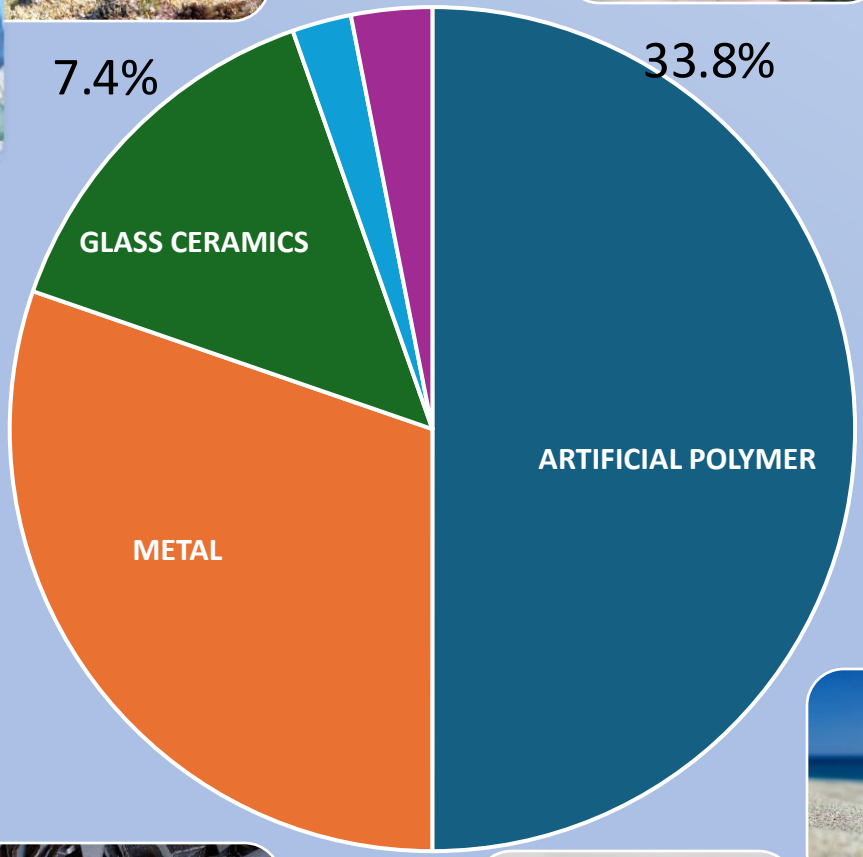
2%

3.3%

1.6%

2.3%

1.6%



CONCLUSIONS

- In the Hawaiian Archipelago, ALDFG represent the main source of seafloor litter.
- Most of these FG are likely lost by recreational fishermen since dives are carried out at shallow depths in popular tourist locations.
- This lost FG has adverse and direct effects on benthic ecosystems. Moreover, they represent a source of secondary microplastics and may leach hazardous monomers, additives, and chemical by-products into the marine environment.

HOW TO REDUCE ADLFG?

According to FAO, the specific actions to reduce ALDFG can be classified into three categories:

- measures to cure (removing ALDFG from the environment).
- measures to prevent (gear marking, on-board technology to locate gear, reception and/or payment for old/retrieved gear, spatial management, reducing fishing effort);
- measures to mitigate (use of biodegradable fishing gear);

Albeit the cost of removing lost FG may be prohibitive, clean-up initiatives by scuba divers may be cheap and useful for reducing the problem

education programs for fishermen, gear restrictions (limitations to the number of allowed fishing poles, fishing permits for a fee for recreational fishermen), and the identification of specific recreational fishing grounds.

There is still no solid evidence of the beneficial effects of bioplastics on the environment.

To reduce lost fishing gear, it is crucial to implement environmental awareness and education projects specifically aimed at fishermen.

THE POWER OF CITIZEN SCIENCE:

SUPPORTING SCIENCE WHILE IMPROVING ENVIRONMENTAL AWARENESS

THANKS
FOR
YOUR ATTENTION

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