Metadata Across the Plastic Continuum: Lessons from Marine Debris Characterization in Hawai‘i



Jennifer Lynch
CMDR students and staff

HAWAI‘I PACIFIC UNIVERSITY

CMDR

BECAUSE PLASTIC POLLUTION PERSISTS, WE DO TOO.

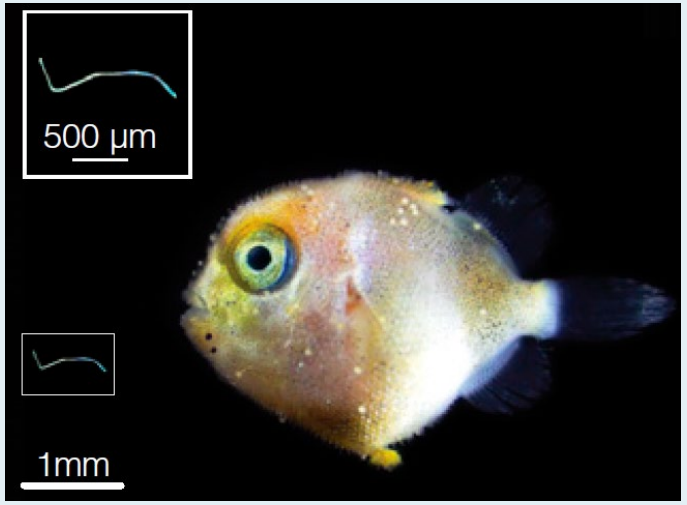
WHY STANDARDIZE METADATA *NOW*?

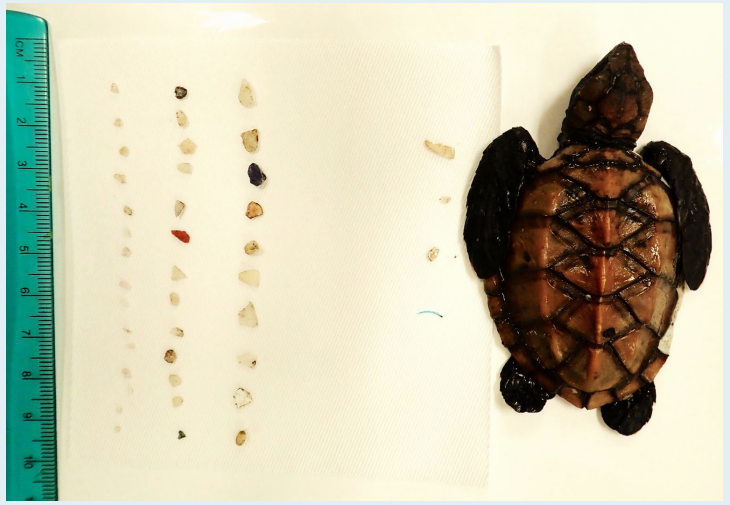


IPRC INTERNATIONAL PACIFIC RESEARCH CENTER
IN THE SCHOOL OF OCEAN AND EARTH SCIENCE AND TECHNOLOGY AT THE UNIVERSITY OF HAWAI'I AT MĀNOA

CMDR

ONE CENTER – MANY DATASETS

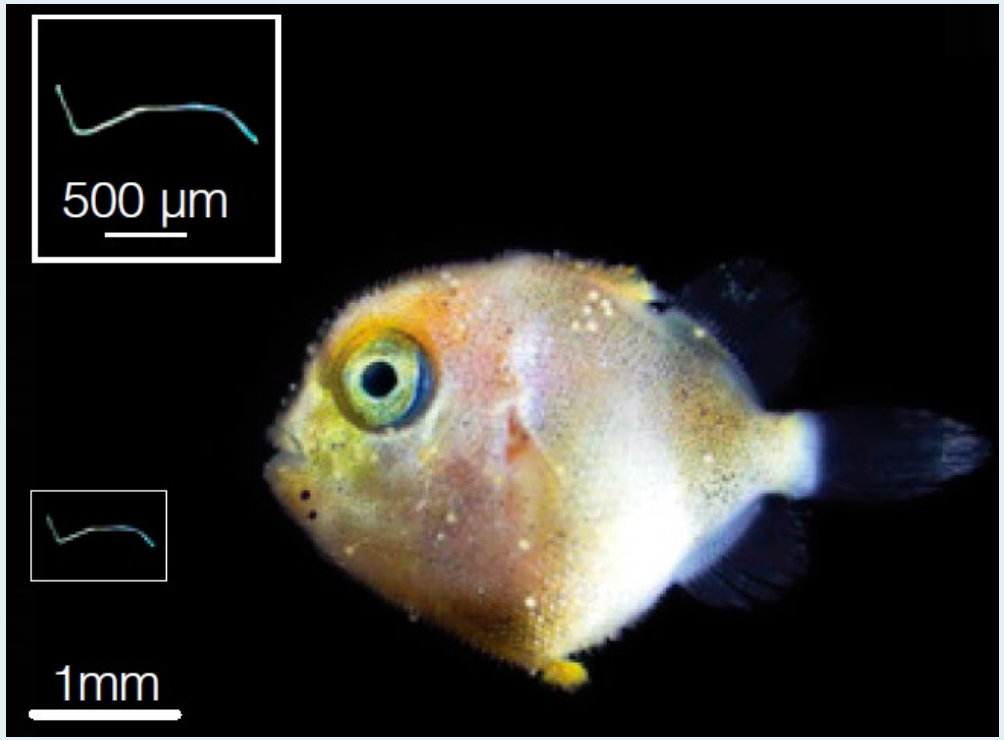






CMDR

PROJECT GOALS & DURATION MATTER



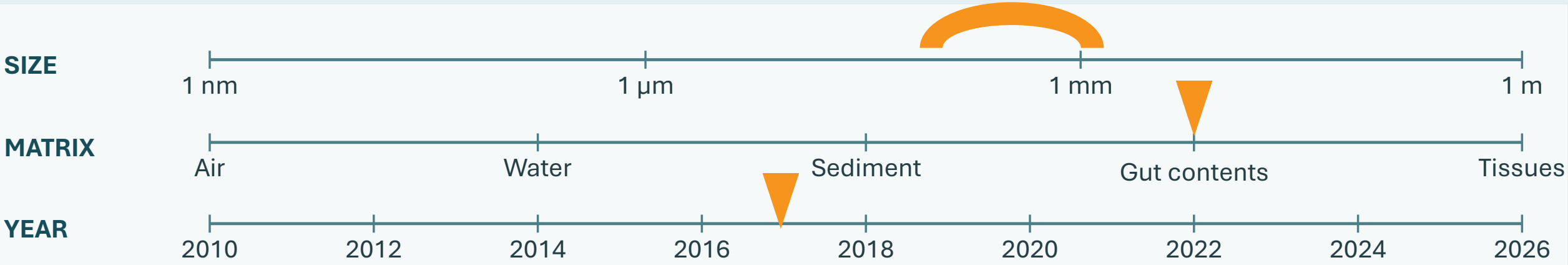
Goal

Quantify and characterize ingested plastics

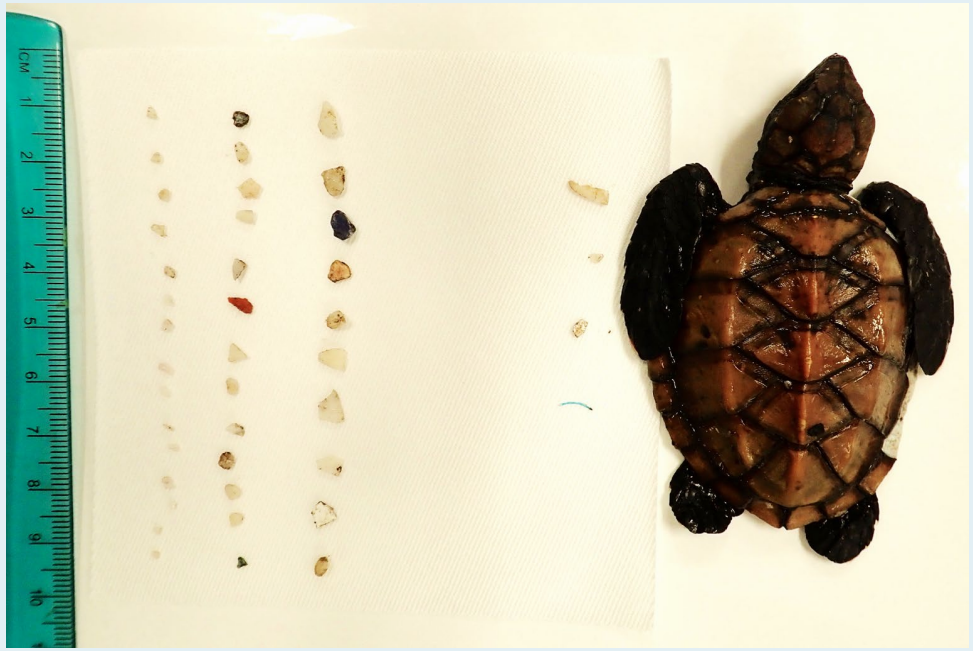
Units

% of fish with ingested plastics
 # particles/fish
Microfiber polymer composition

Metadata: Gove and Whitney et al., 2019



PROJECT GOALS & DURATION MATTER



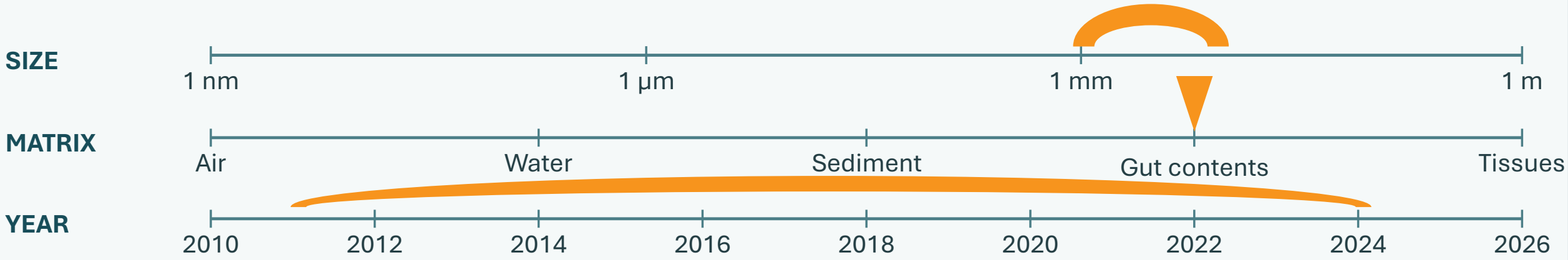
Goal

Long-term monitor quant/characterize ingested plastics

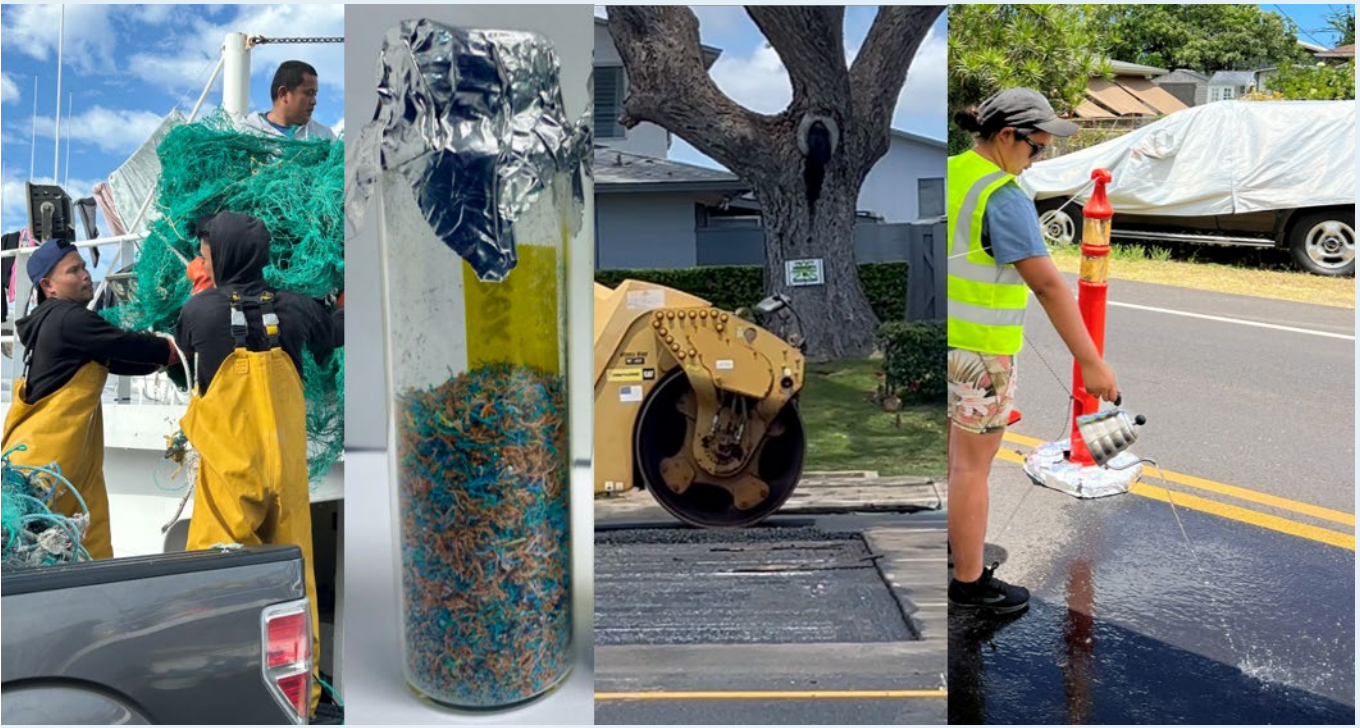
Units

% of turtles with ingested plastics
 # particles/turtle, volume of plastic/turtle
Mass of plastic/turtle; mass of plastic/turtle mass
Plastic type and polymer compositions

Metadata: Lynch et al., 2014; Clukey et al., 2019



PROJECT GOALS & DURATION MATTER



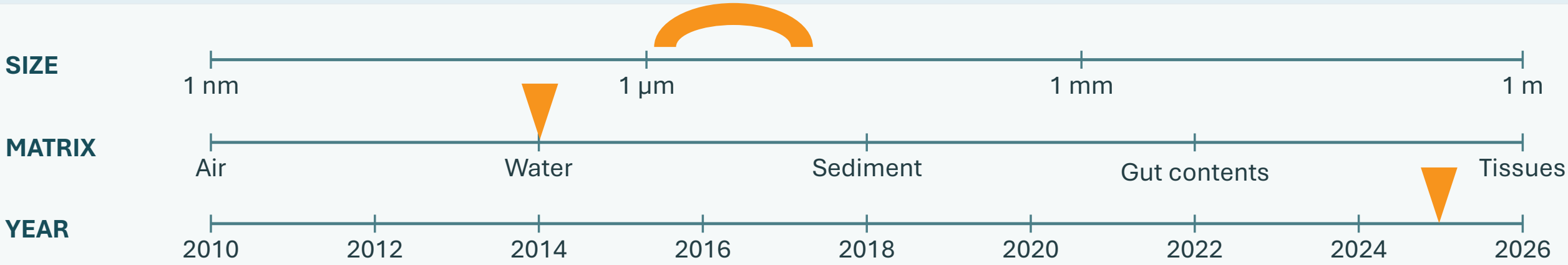
Goal

Quantify release of PE from plastic-modified asphalt road

Units

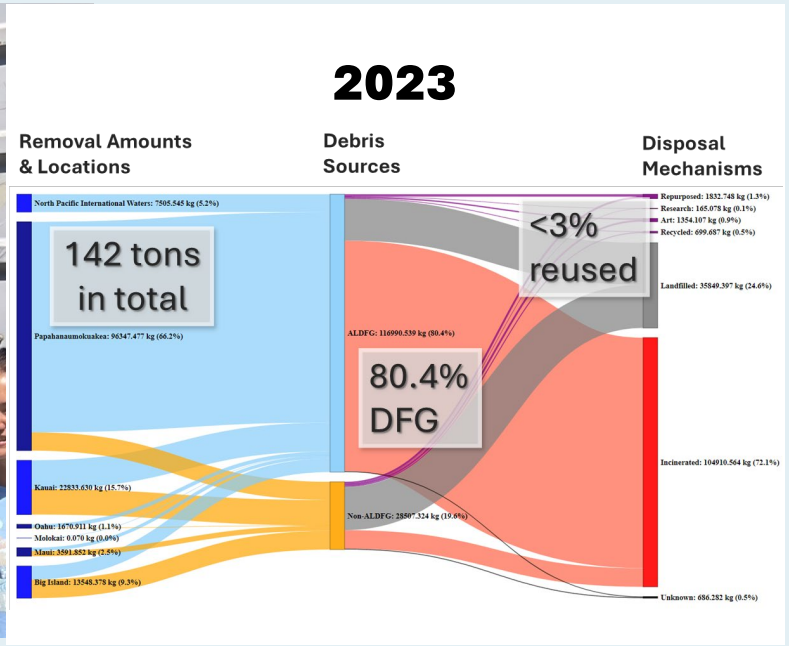
 # particles/L of water; µg PE/L of water
 # particles/m^2 of pavement; µg PE/m^2 of pavement; same numerators/g of pavement

Metadata: Lynch et al. in prep.



PROJECT GOALS & DURATION MATTER





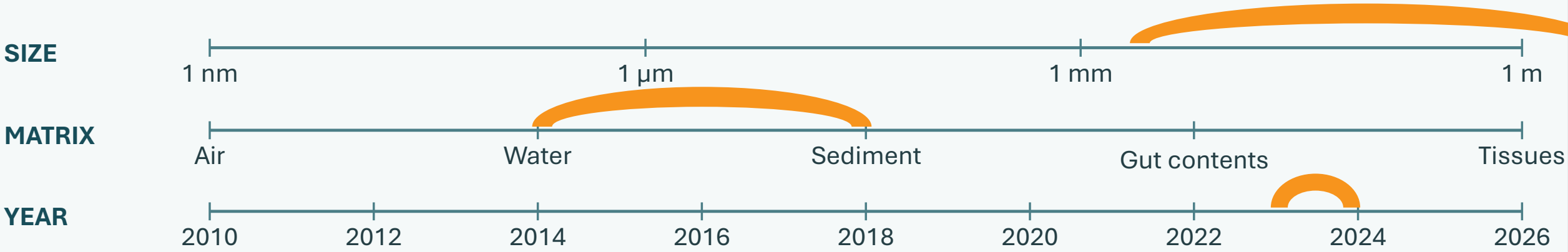
Goal

Inventory the material flow of marine debris in Hawaii

Units

Mass of marine debris removed
% of debris by type
% of debris by disposal option

Metadata: McWhirter 2022; Lynch et al., in prep.



THE MISSING PIECE: ACTUAL MONITORING



STANDARDIZATION WARNING

DO NOT STIFLE INNOVATION.

RAPID EVOLUTION IN:

- **NANO AND MICROPLASTIC ANALYTICAL METHODS**
- **AI QUANTIFICATION AND CHARACTERIZATION OF MARINE DEBRIS**

LOOK TO THE LIT

PICES WG42

SEAWATER

Environmental Pollution 311 (2022) 119911

Contents lists available at ScienceDirect

Environmental Pollution

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

Review

Toward a long-term monitoring program for seawater plastic pollution in the north Pacific Ocean: Review and global comparison☆

Won Joon Shim [a,b,*], Seung-Kyu Kim [c,d], Jongsu Lee [e], Soeun Eo [a,b], Ji-Su Kim [c], Chengjun Sun [f,g]

SEDIMENT

Environmental Pollution 310 (2022) 119862

Contents lists available at ScienceDirect

Environmental Pollution

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

Towards a North Pacific long-term monitoring program for ocean plastic pollution: A systematic review and recommendations for shorelines☆

Amy V. Uhrin [a,*], Sunwook Hong [b], Hillary K. Burgess [a,c], Sehan Lim [d], Kyle Dettloff [e]

GUT CONTENTS

Environmental Pollution 310 (2022) 119861

Contents lists available at ScienceDirect

Environmental Pollution

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

Towards a North Pacific Ocean long-term monitoring program for plastic pollution: A review and recommendations for plastic ingestion bioindicators☆

Matthew S. Savoca [a,*], Susanne Kühn [b], ChengJun Sun [c], Stephanie Avery-Gomm [d], C. Anela Choy [e], Sarah Dudas [f,g], Sang Hee Hong [h], K. David Hyrenbach [i], Tsung-Hsien Li [j,k,l], Connie Ka-yan Ng [m], Jennifer F. Provencher [d], Jennifer M. Lynch [i,n]

LITERATURE

Special Issue: Microplastics

Applied Spectroscopy

Applied Spectroscopy 2020, Vol. 74(9) 1066–1077

© The Author(s) 2020

Article reuse guidelines: sagepub.com/journals-permissions

DOI: 10.1177/0003702820930292

journals.sagepub.com/home/asp

SAGE

Reporting Guidelines to Increase the Reproducibility and Comparability of Research on Microplastics

Win Cowger[1], Andy M. Booth[2], Bonnie M. Hamilton[3], Clara Thaysen[3], Sebastian Primpke[4], Keenan Munno[3], Amy L. Lusher[5], Alexandre Dehaut[6], Vitor P. Vaz[7], Max Liboiron[8], Lisa I. Devriese[9], Ludovic Hermabessiere[3], Chelsea Rochman[3], Samantha N. Athey[3], Jennifer M. Lynch[10,11], Hannah De Frond[3], Andrew Gray[1], Oliver A.H. Jones[12], Susanne Brander[13], Clare Steele[14], Shelly Moore[15], Alterra Sanchez[16], and Holly Nel[17]

GESAMP

Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection

GUIDELINES FOR THE MONITORING AND ASSESSMENT OF PLASTIC LITTER IN THE OCEAN

STANDARDIZATION AUTHORITY

WHO IS THE AUTHORITY?

WHAT IS PICES ROLE?

HOW DOES PICES INTEGRATE INTO OTHER PACIFIC ORGS?

WHY NORTH PACIFIC-CENTRIC; WHY NOT GLOBAL?

INTERNATIONAL OUTREACH AND COLLABORATION

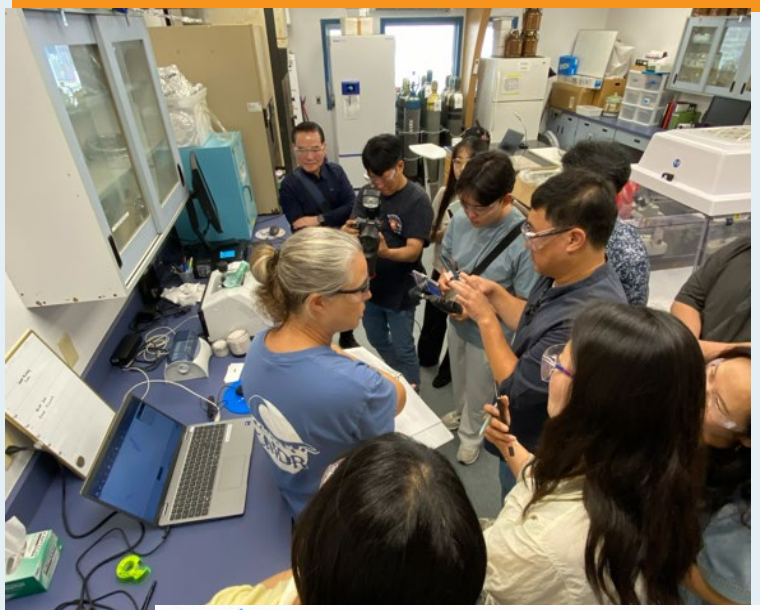
Nippon TV





INTERNATIONAL OUTREACH AND COLLABORATION

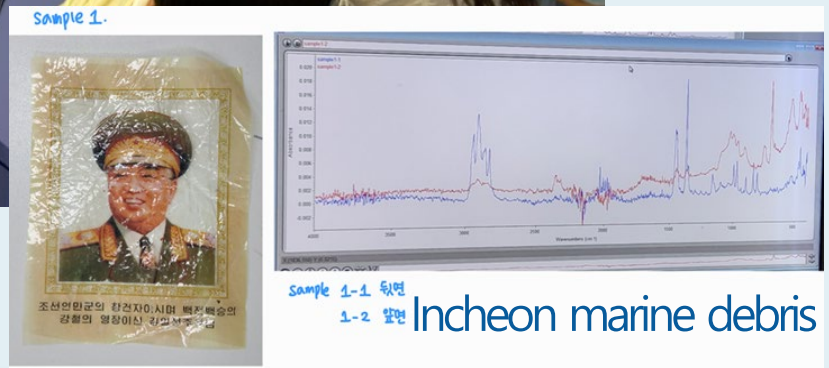
Korea Sea Grant











INTERNATIONAL OUTREACH AND COLLABORATION

Taiwan Ocean Conservation Administration





QUESTIONS

MONITOR

Is the goal to create a pan-Pacific long-term monitoring project?

Who should/can fund a long-term monitoring program?

Who will manage it?

STEWARD STANDARDS

How is the standards' authority selected?

Who becomes the standards' authority?

How will they update the standards as methods evolve?

NARROW SCOPE

Is the workshop focused on metadata only?

What very specific sizes of plastic particles are we discussing?

What matrix are we discussing?

MAHALO!

Travel support to PICES

- **National Science Foundation**
- **JPA of NOAA Sea Grant and Korea Sea Grant**

HAWAI'I PACIFIC UNIVERSITY

Center for Marine Debris Research

www.hpu.edu/cncs/cmdr

jmlynch@hpu.edu


cmdr@hpu.edu


@debrisresearch


@marinedebrisresearch


@company/center-for-marine-debris-research