The Science of Marine Debris

OFFICE OF RESPONSE AND RESTORATION • NOAA's NATIONAL OCEAN SERVICE

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Stemming the Flow of Marine Debris

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NOAA Marine Debris Program

www.MarineDebris.noaa.gov

Marine Debris

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What is Marine Debris?

- *Any persistent solid material that is manufactured or processed and directly or indirectly disposed of or abandoned into the marine environment and the Great Lakes.*

- Marine debris enters the water in many ways.

- One of the most harmful form of debris - ***Ghostnets*** - lost or abandoned fishing gear that continues to trap fish and other marine resources.

- The rising concern of **microplastics** has grown over the last couple of years.

What we know about…
SOURCES

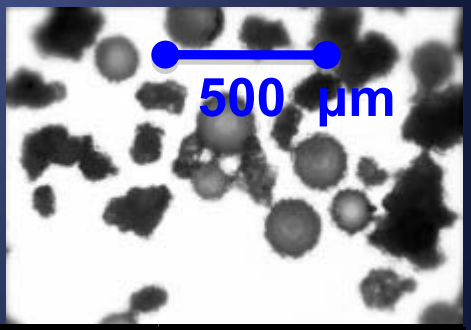
- Difficult to determine original source
  - Land vs. ocean source
    - Benthic debris – relatively unknown
    - Microplastics

- Development of shoreline, benthic, pelagic monitoring program – densities, sources, and land use correlations

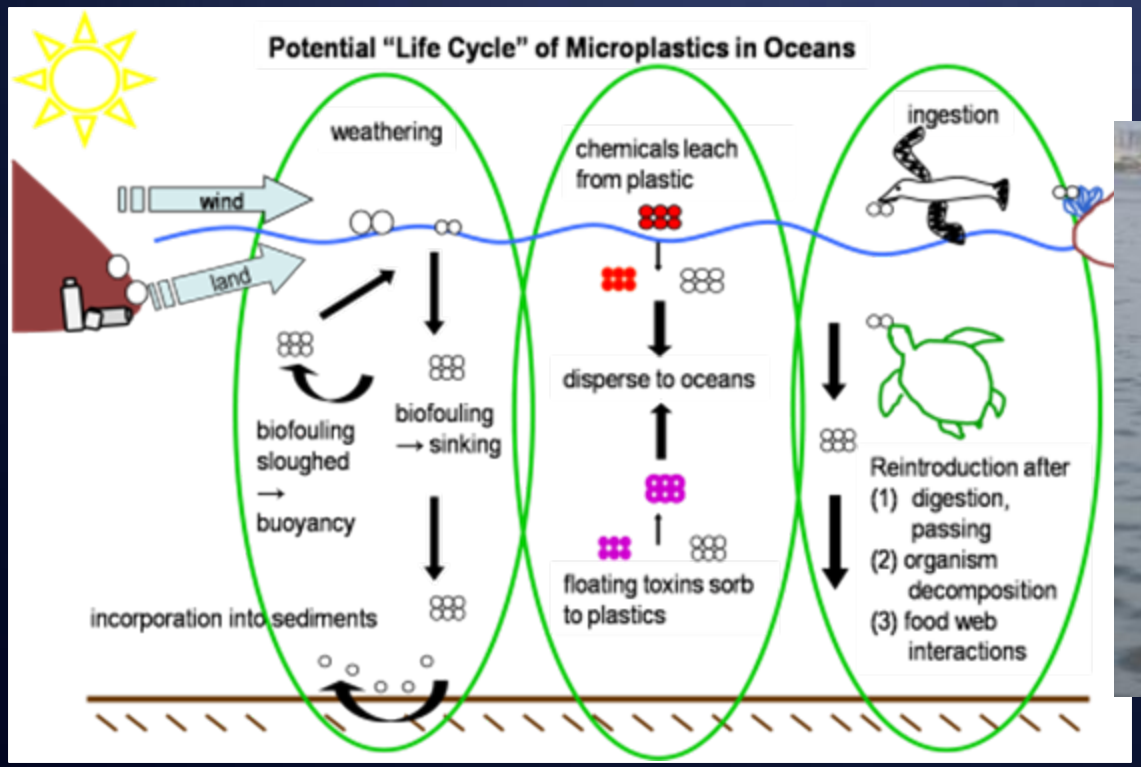
www.marinedebris.noaa.gov/info/

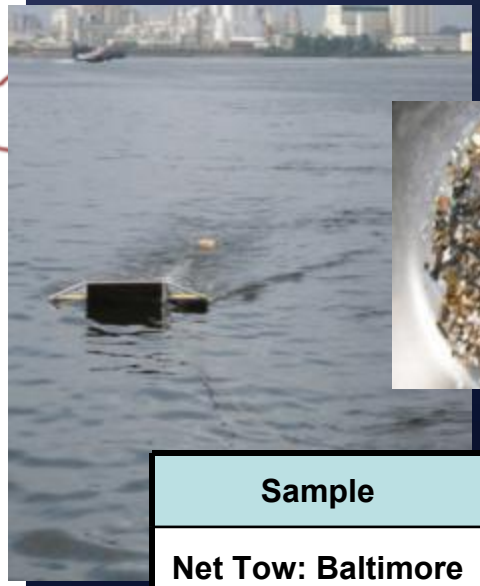
Microplastics

- Developing methods to quantify microplastics: personal care products and pelagic trawl samples



Sample	[Particle] mg/g
PCP 1 (n = 4)	24 ± 4
PCP 2 (n = 4)	9 ± 2
PCP 3 (n = 1)	27





Sample	[Particle] mg/g
Net Tow: Baltimore Harbor Solids (n = 1)	142

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What we know about…
IMPACTS

- Aesthetics, economy, entanglement, ingestion, navigation hazard, habitat degradation, alien spp. transport, human health

- Conducting research to better understand the impacts

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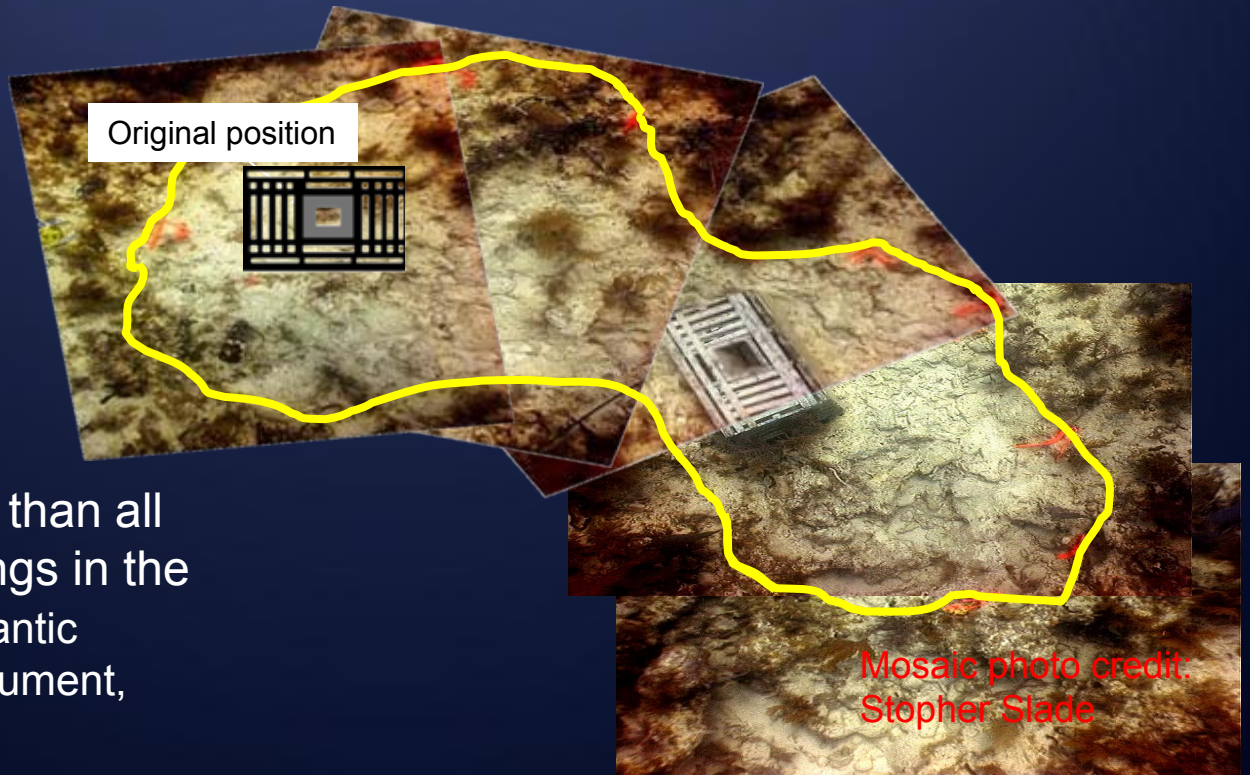
Economic Impacts of Marine Debris

- Impacts to the Economy
  - In 1987, estimated between $380M and $1.60B lost as a result of medical debris wash-ups in New Jersey.
  - Studies show lost crab pots kill ~744,000 pounds of Dungeness crab per year in Puget Sound worth approximately $1.2M.
  - Estimated debris created by Hurricane Katrina 100 million yds^3

Habitat Impacts from Marine Debris

- Traps/Pots: Florida
  - Lobster fishery ~100,000 traps lost annually
  - Each trap moves during wind events (winds >17 knots for ≥3 days) resulting in 3.4meters^2 (Lewis et al., 2009 and Pers comm. Tom Matthews)
  - ~340,000 meters^2 of habitat of damaged each wind event



10x more habitat damage than all large ship vessel groundings in the Keys from 1973-2004 (Atlantic Acropora Status Review Document, 2005)

NOAA's MD Mandates

- Coastal Zone Management Act, as amended 1990
- Marine Plastic Pollution Research and Control Act
- Coral Reef Conservation Act of 2000

- Marine Debris Research, Prevention, and Reduction Act of 2006
  - Established the NOAA Marine Debris Program
    - ***Non-Regulatory, focus on research and prevention***
    - MAPPING, IDENTIFICATION, IMPACT ASSESSMENT, REMOVAL, AND PREVENTION
    - ***REDUCING AND PREVENTING LOSS OF GEAR***
    - OUTREACH TO STAKEHOLDERS
    - GRANTS, COOPERATIVE AGREEMENTS, AND CONTRACTS
  - Establishment of Interagency Marine Debris Coordinating Committee

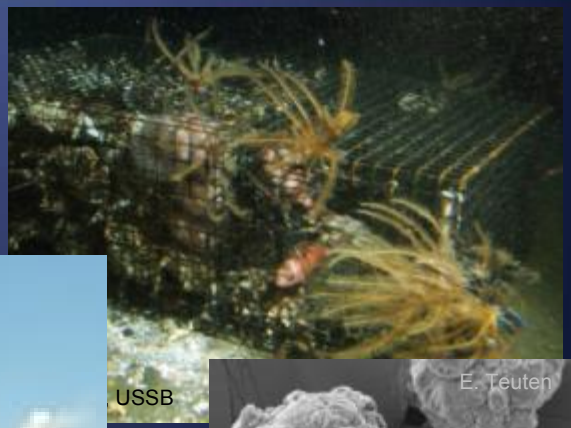



NOAA Marine Debris Program

- Established in 2005
  - Marine Debris Research, Prevention and Reduction Act
- Program Staff
  - Director and 9 full-time staff
- Regional coordination
  - NOAA research and monitoring
  - Partnerships
  - Workshops and regional planning
- National and international efforts focused on research, reduction, and prevention

Ideas for…..
SOLUTIONS

- Fishing gear modifications to reduce impact (e.g., rot chord on traps)
- Truly biodegradable polymers
  - Polyhydroxyalkanoates (PHA)
- Source control and prevention
  - Fishing for Energy
- Regional coordination & cooperation
- Outreach – Behavioral change
- Science & technology: At-sea detection of derelict fishing gear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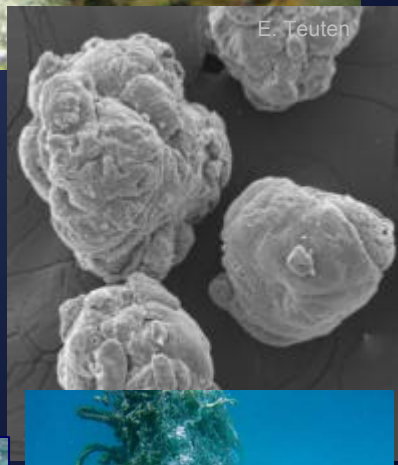
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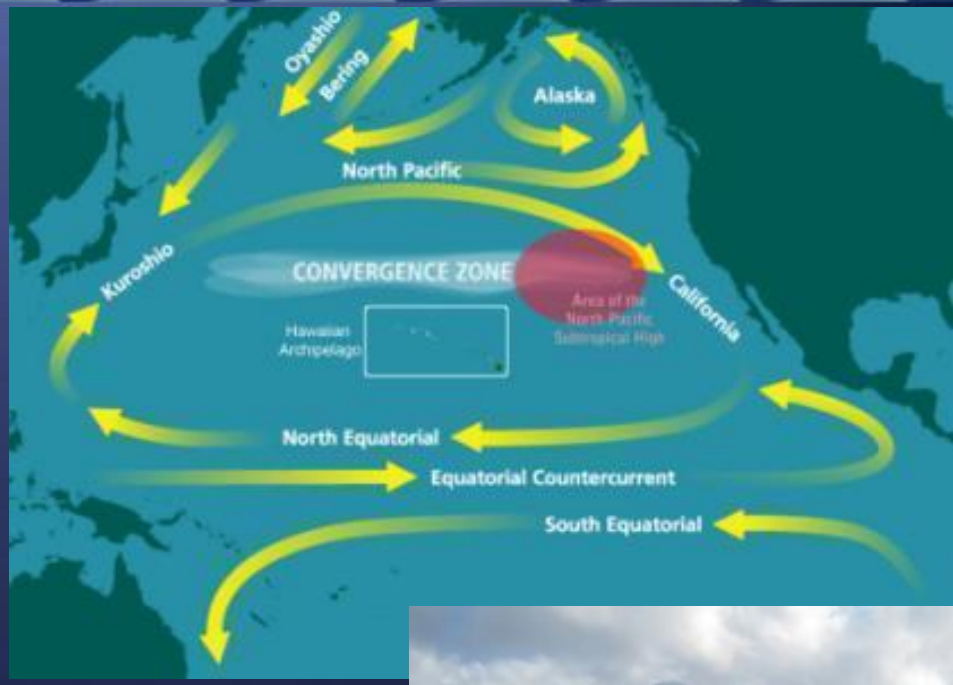
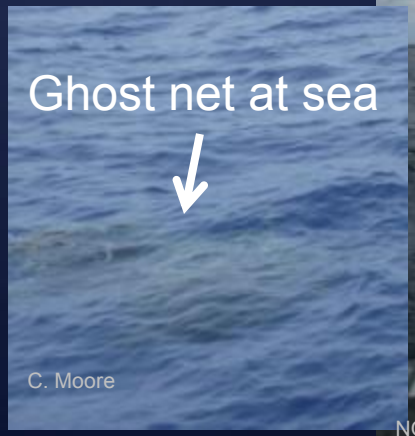
Solutions
At-sea Detection

- **Goal:** Remove marine debris at sea, before it has the opportunity to do more damage as it nears land.

- Workshop: December 8-9, 2008
  - 3 disciplines
  - State of knowledge, gaps, and actions

  - Special Issue: Marine Pollution Bulletin (2010 publication)





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NOAA PMNM

Solutions
What you can do

- Learn about and understand the issue
  - Reliable and accurate sources
- Legal & policy aspects
  - Bills, laws, management plans
- Be an advocate for these issues – help ensure that they don't "fall off the table"

For more information on marine debris and projects visit:

www.MarineDebris.noaa.gov

Pearl and Hermes Atoll, Northwestern Hawaiian Islands

Photos courtesy of NOAA PIFSC

Backup slides

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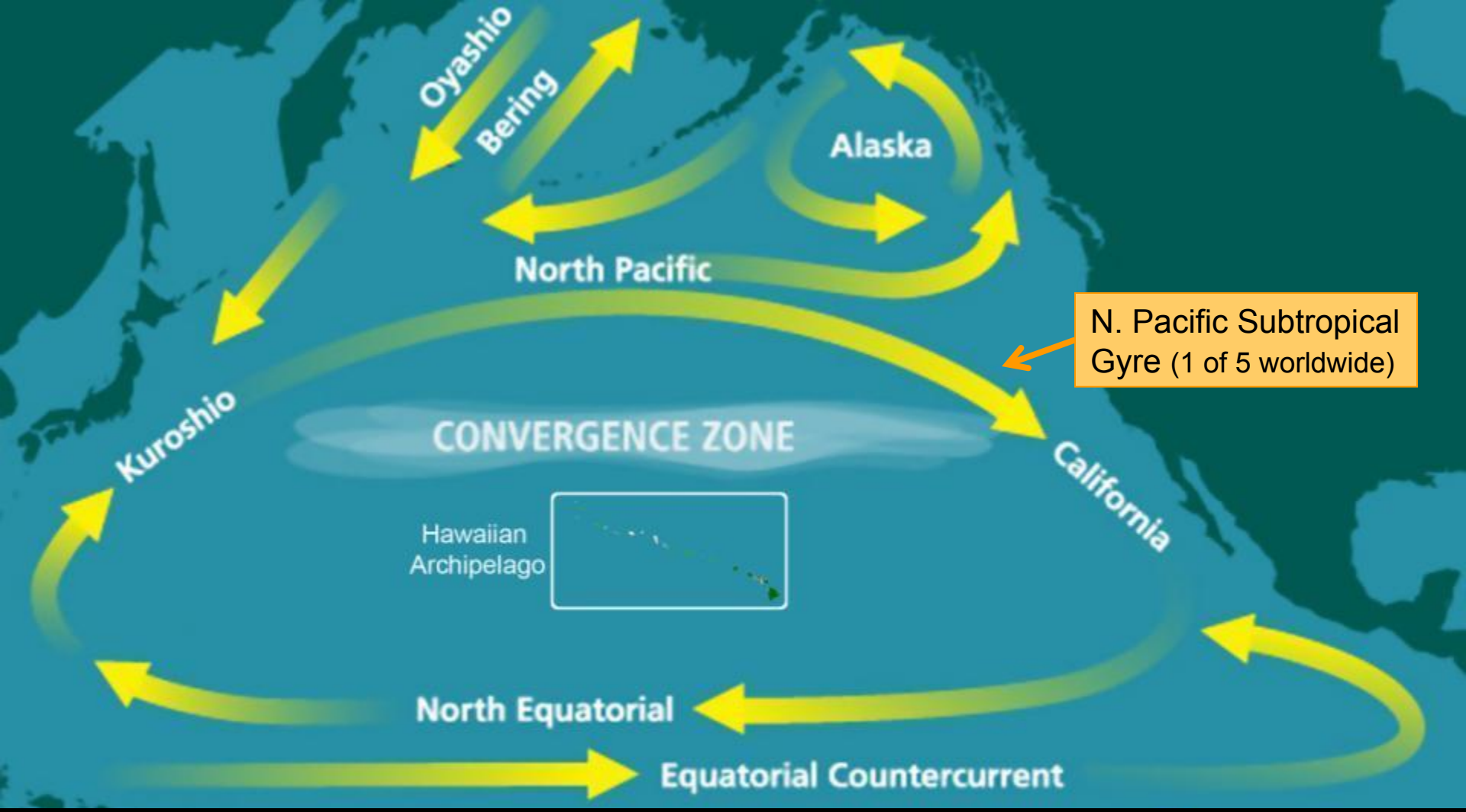
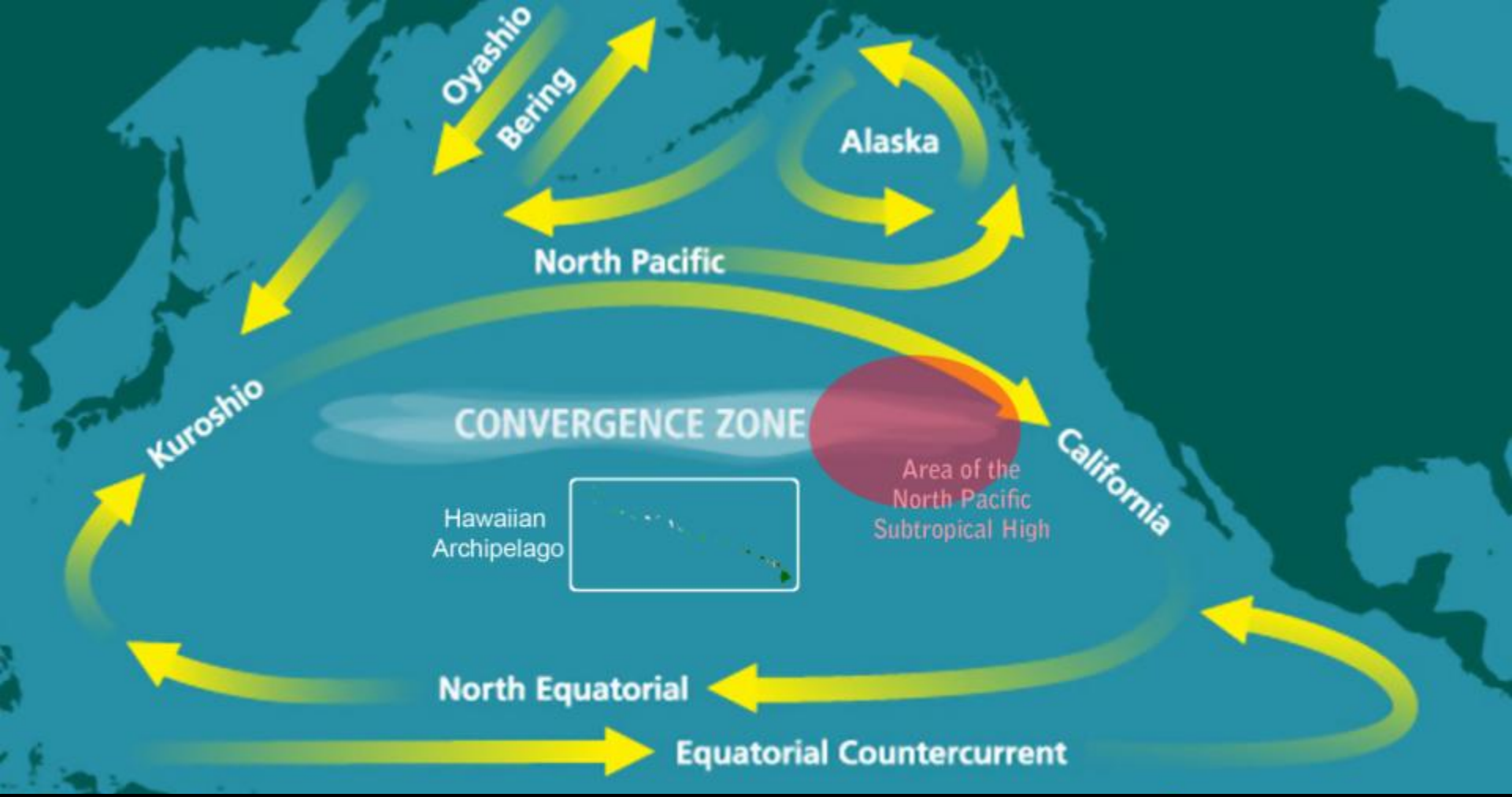
Source Identification



- Marine debris concentrates in various areas of the N. Pacific – not just the “garbage patch”
  - Eddies, windrows, convergence zones



The “garbage patch” lies within the North Pacific Subtropical High

- Higher concentrations of debris within the calm center (“doldrums”) of this high-pressure zone.
- NOT a blanket of trash visible with satellite or aerial photography.
- Size and mass are unknown – little scientific research in this area.