

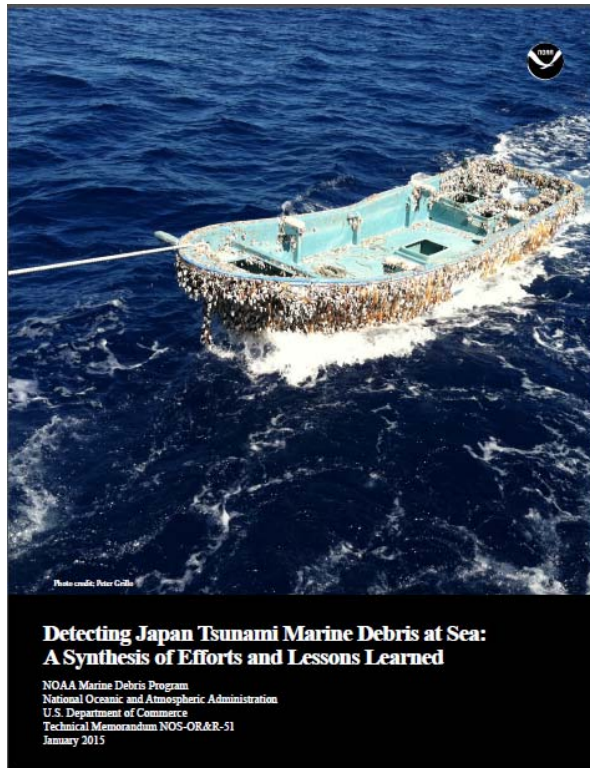
# Overall Detection Challenges/ Needs



## Review / Addition

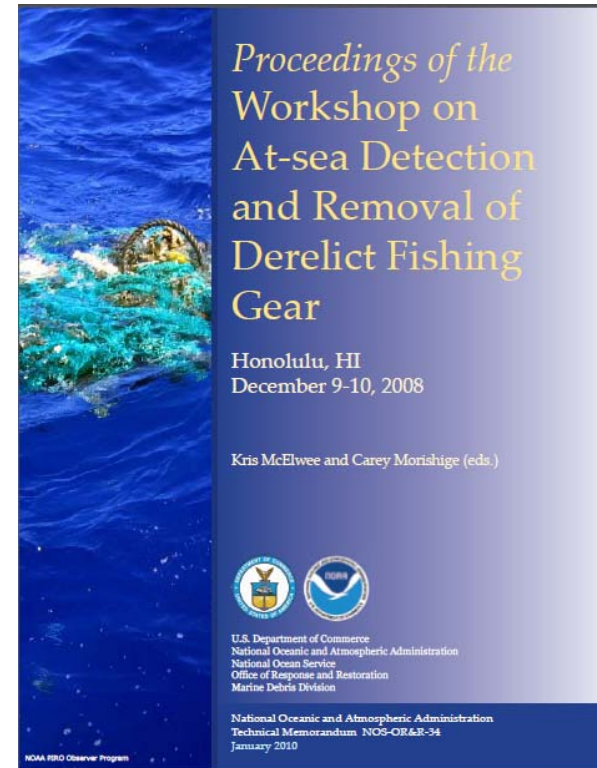
- 1. Encounter Rate** – Debris concentration is often unpredictable and variable, particularly at-sea
- 2. Debris Size** – Most debris is relatively small (<1m in long dimension, often <0.3m)
- 3. Debris Visibility** – Debris often awash or partially sub-surface, reducing target size. Many platforms and sensors are weather dependent.
- 4. Detection v. Identification** – Noting the presence of “something” versus identifying what the anomaly is
  - Challenge increases as resolution decreases
- 5. Resolution v. Coverage** – Trade-off between detail of imagery versus coverage of imagery
  - Post-processing is often labor intensive
- 6. Cost** – Test deployments of sensing platforms, sensing targets, and data processing can be expensive, even with subsidized resources.

# Previous Efforts / Resources



**JTMD Detection Report – 2015**  
*Focused on detection efforts and lessons learned during the response to debris generated by the tsunami of 2011.*

[http://marinedebris.noaa.gov/sites/default/files/JTMD\\_Detection\\_Report.pdf](http://marinedebris.noaa.gov/sites/default/files/JTMD_Detection_Report.pdf)



**At Sea Detection of DFG Workshop - 2008**  
*Outputs of 2008 workshop (pub. 2010), primarily focused on derelict fishing nets, including elements of removal.*

<http://marinedebris.noaa.gov/proceedings-workshop-sea-detection-and-removal-derelict-fishing-gear>

# 2008 Workshop – Goal Workflow



## Overall Goal:

Develop the capability for detection of derelict fishing gear at-sea

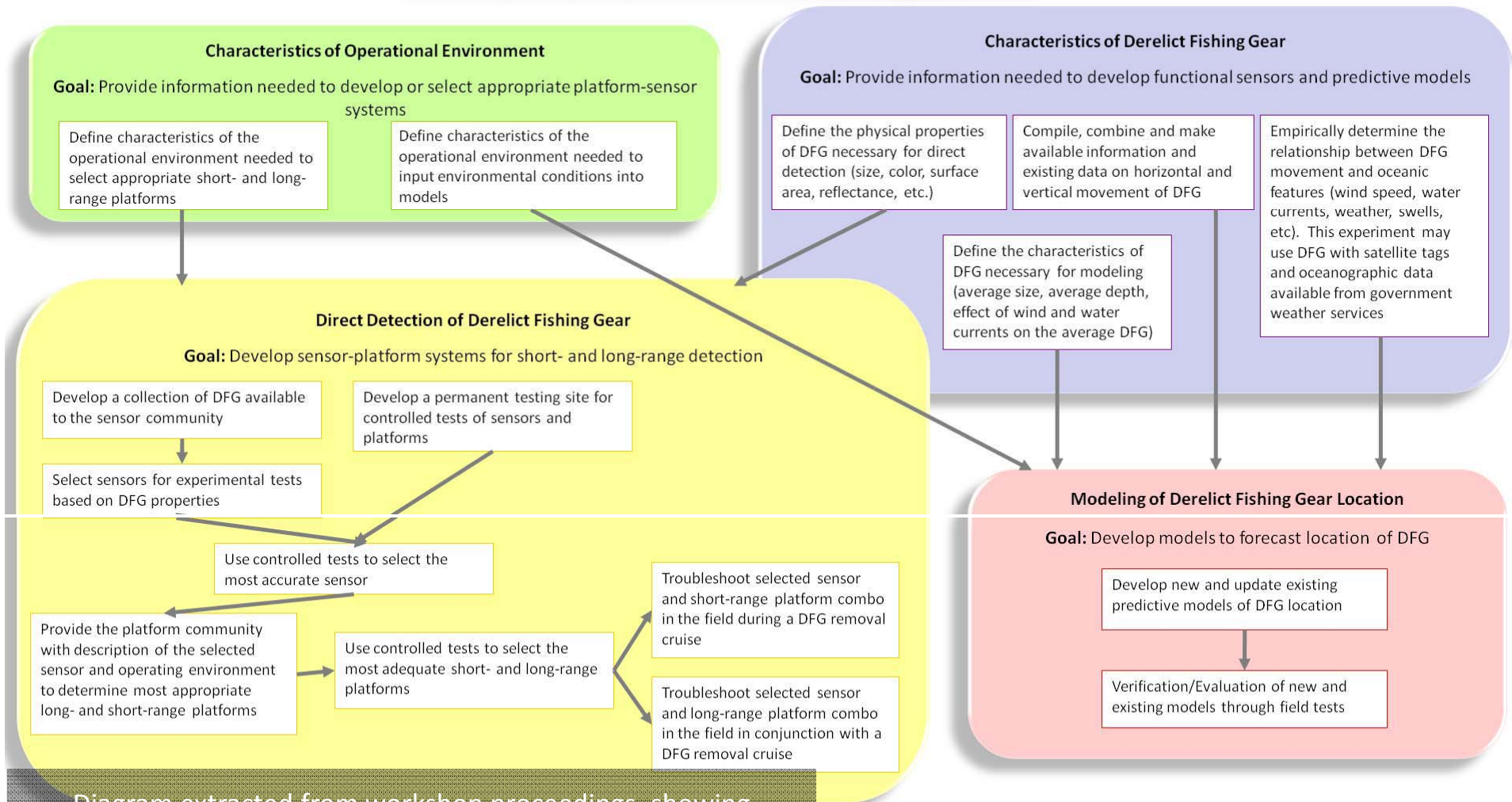


Diagram extracted from workshop proceedings, showing conceptual workflow and interrelation between understanding of debris lifecycle, modeling, and eventual detection.

# Potential Objective #1



## Open Ocean Macro Debris Survey

Ability to reliably detect individual pieces of macro debris at understood profile in terms of size, composition, and environment

- **Size** – 0.X m+ (with iterative improvement )
  - Final threshold dependent on what is a “realistic stretch” for remote sensing community. Potentially 0.5 m
- **Location** – Target areas of known concentration, expanding to broader search as capabilities are proven and better defined in real-world detection.
- **Overlap with Efforts Presented at Workshop**
  - Many
    - » Satellite detection – direct and indirect
    - » Aerial surveys – C-130, P3
    - » Visual vessel surveys
    - » Net tows (indicative of debris concentration of low windage objects?)
- **Benefits**

# Potential Objective #2



## Shoreline Debris Survey

Ability to provide relative measure of debris concentration on shoreline and/or in nearshore (shallow) environment

- **Size** – 0.2m+ (with iterative improvement ) AND/OR relative coverage of debris on shoreline
- **Location** – Target areas of known concentration, expanding to broader search as capabilities are proven and better defined in real-world detection.
- **Overlap with Efforts Presented at Workshop**
  - Shoreline aerial survey (AK, HI)
  - Shoreline debris identification analysis (BC, Japan)
  - Spectroscopy (CA, etc.)
- **Benefits**
  - Understanding of relative debris concentration
  - Inform/prioritize shoreline cleanups and increase effectiveness
  - With approach that counts individual objects → Count and size/frequency distribution data (augmenting shoreline monitoring)