Mooring Vandalism Summary

Christian Meinig NOAA/PMEL

Problem:

Intentional aggression and unintentional interaction with moorings cause data, equipment and capability losses.

Solution:

A multi-faceted approach is required to 1)understand the type(s) of mooring aggression; 2)potential mitigation and impact to sensors from hardening; 3)Telemeter high-res data; 4)monitoring via AIS & cameras

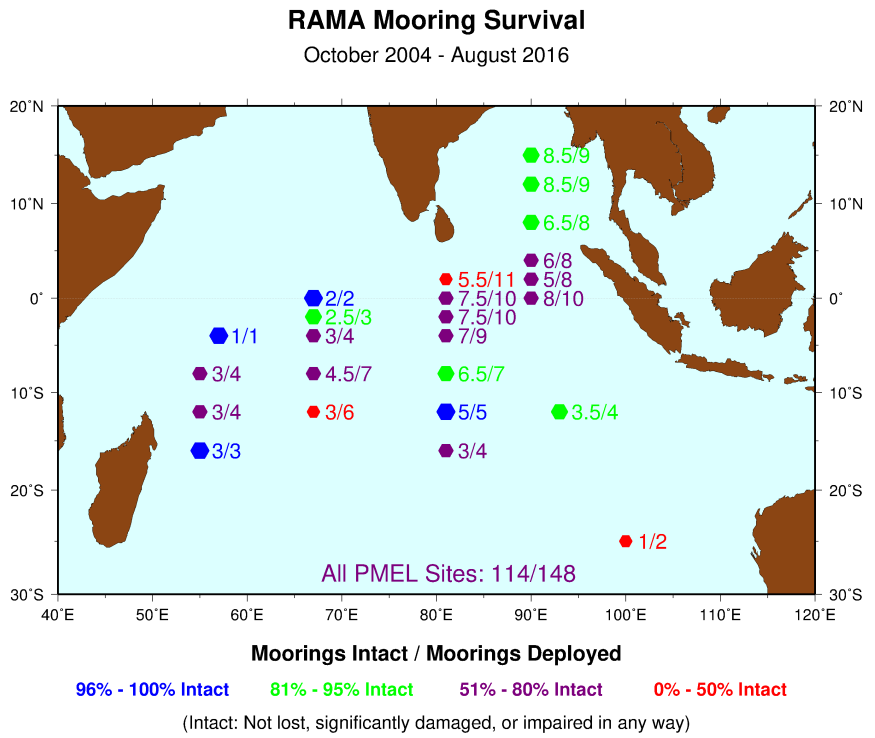
Description:

There are many types of possible aggression to mooring system. Just understanding what is causing the problems/failures is a challenge, but most are fishing related, some using very clever techniques.

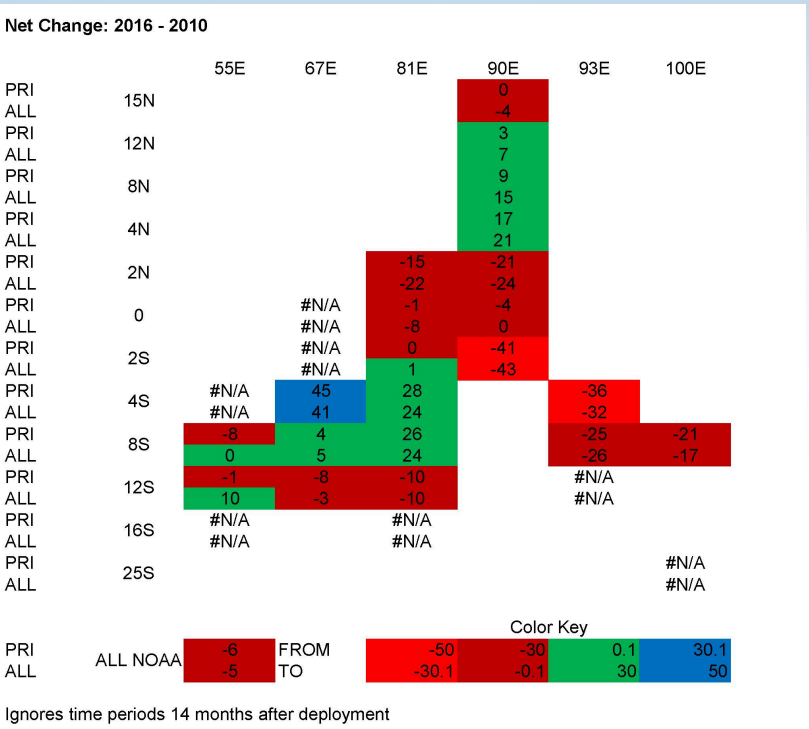
Lesson learned:

Determining the aggression type is very challenging from remote observation of data return. While not conclusive, making buoys difficult to board may prolong endurance and telemetering data is cheap insurance. AIS & camera systems have been used with some success.

Problem: Mooring Aggression



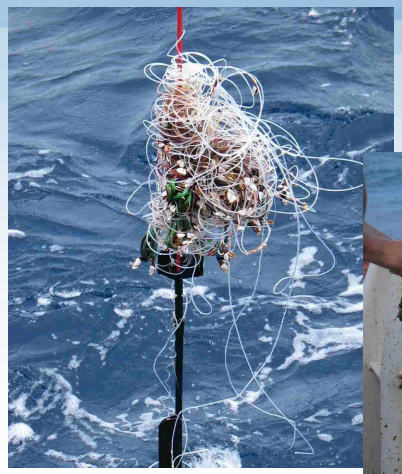
Overall Mooring Survival



Trend (2011 to2016)-(2005 to 2010)

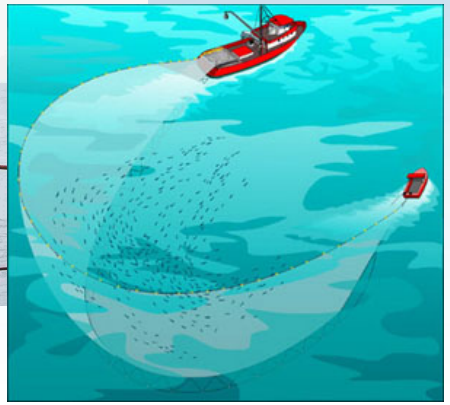
Survival Decreasing

Types of Aggression/Vandalism



Incidental Fishing

"Sling-shot Fishing"

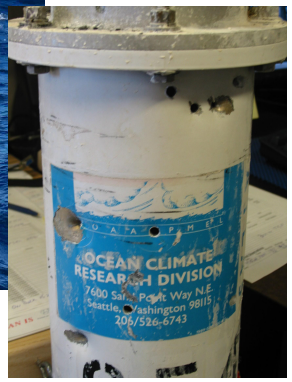


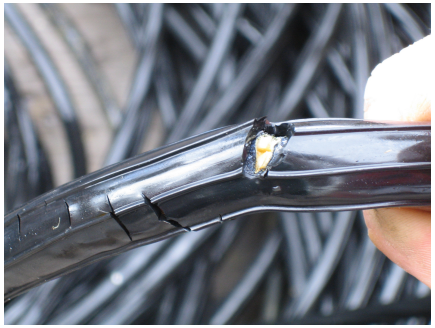
Intentional Fishing

"Hi There,
I believe you are wanting back an electronic tube that I have which I found drifting about 18 month ago. I am willing to give it back but need compensation – how much are you prepared to pay?"

Email from Palmerston Atoll

Malicious

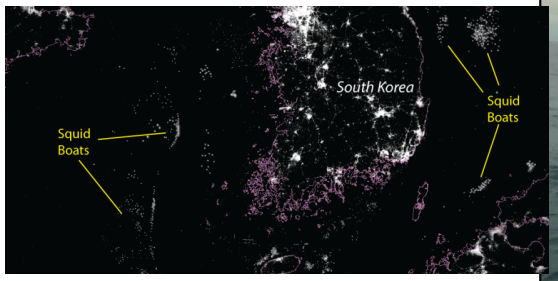


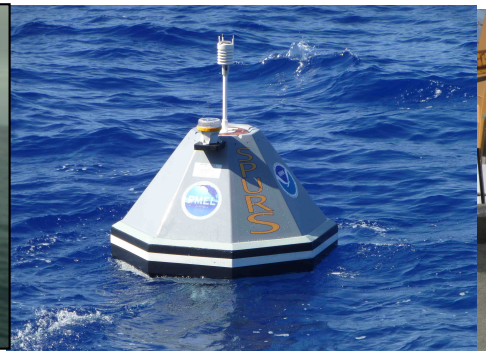


Biological-Fish bite

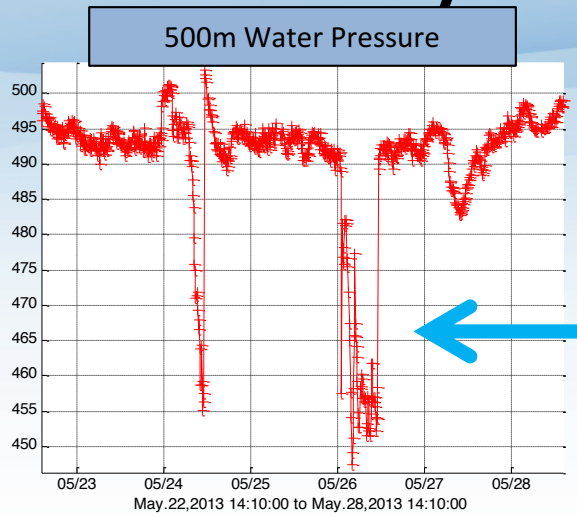
Solutions: Few..but multifaceted approach

Planning: Evaluate location, Soumi NPP Satellite (day/night band), AIS
Legal: 3 RFMOs (WCPFC, IATTC, and IOTC) have passed protective measures prohibiting fishing on or near data buoys in similar language. Awareness at IOC-Buoy Cooperation Panel of WMO. Public service bulletins, etc
Vandal Resistant Buoys: More difficult to see, board and attach to
Mooring Line: Use fishbite resistant line (more research needed on locations/depths)
Sensors: Theft Resistant Hardware
Systems: Reduce overall system costs, telemeter high res data, Alternatives (underwater gliders, floats, sub-sea moorings, etc)
Remote Monitoring (NDBC): Install camera systems, track via AIS. 24x7 ops center

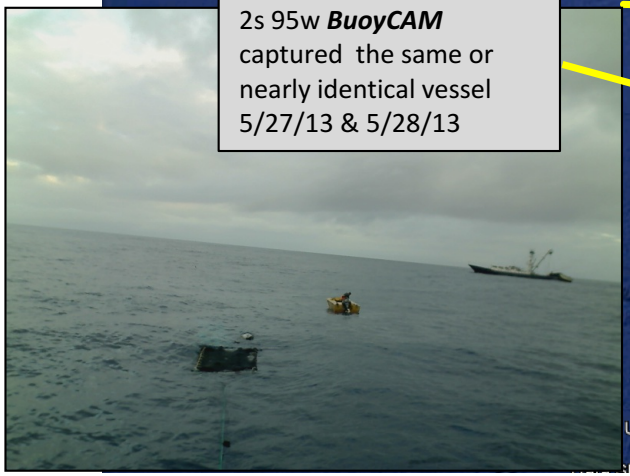




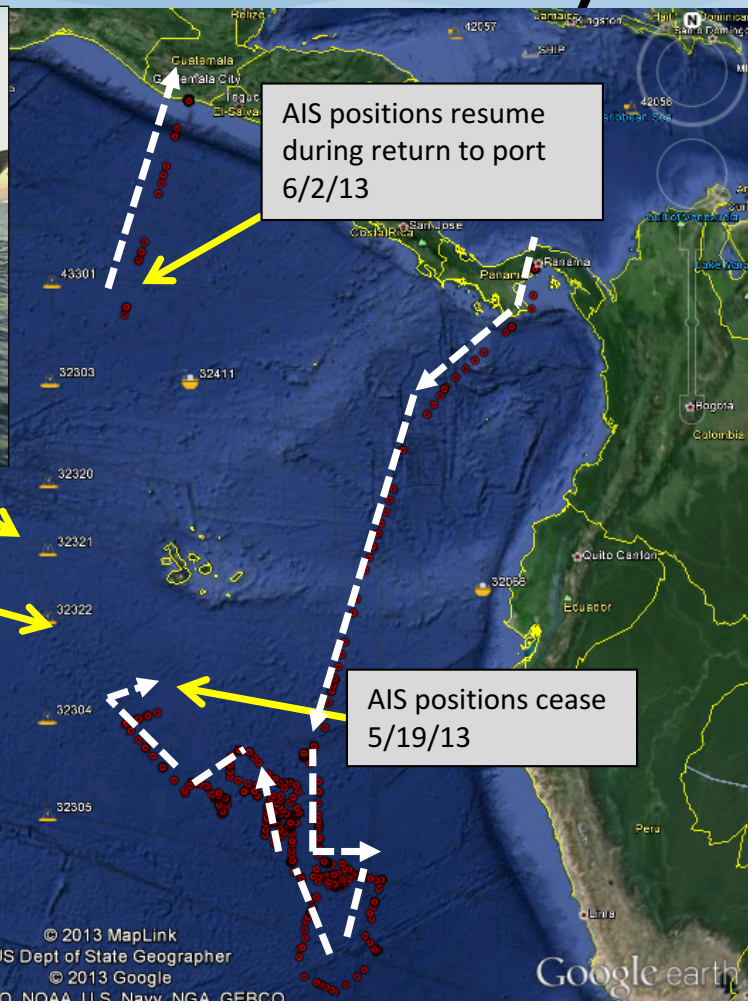
Camera/AIS tracking (NOAA-NDBC)



0 95w ***BuoyCAM*** captured events 5/23/13, 5/24/13 & 5/26/13



2s 95w ***BuoyCAM*** captured the same or nearly identical vessel 5/27/13 & 5/28/13



- AIS messages are conveniently missing during the buoy vandalism events, but resumed on their return to port

Raymond Beets (Oceans ‘14)

Best Practices: Few successes..but multifaceted approach

- Gather local knowledge to determine fishing pressure
- Harden the buoy and mooring line attachments
  - Streamline attachment points
  - Make buoy difficult to board or secure to
- Reduce costs of systems and telemeter as much data as possible
- Seek alternative to surface expression if possible
- Camera and global AIS tracking has been successfully used