AREA-BASED MANAGEMENT OF BLUE WATER FISHERIES: CURRENT KNOWLEDGE AND RESEARCH NEEDS

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ORIGINAL ARTICLE

Area-based management of blue water fisheries: Current knowledge and research needs

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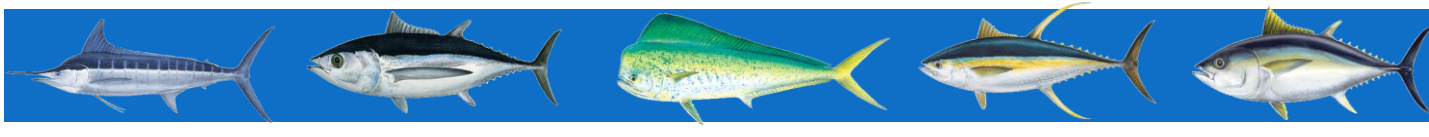
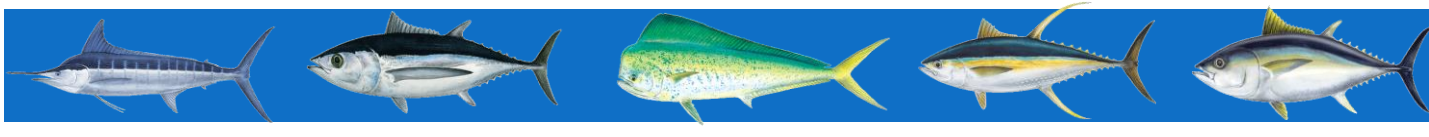
WP Council Workshop – June 2020

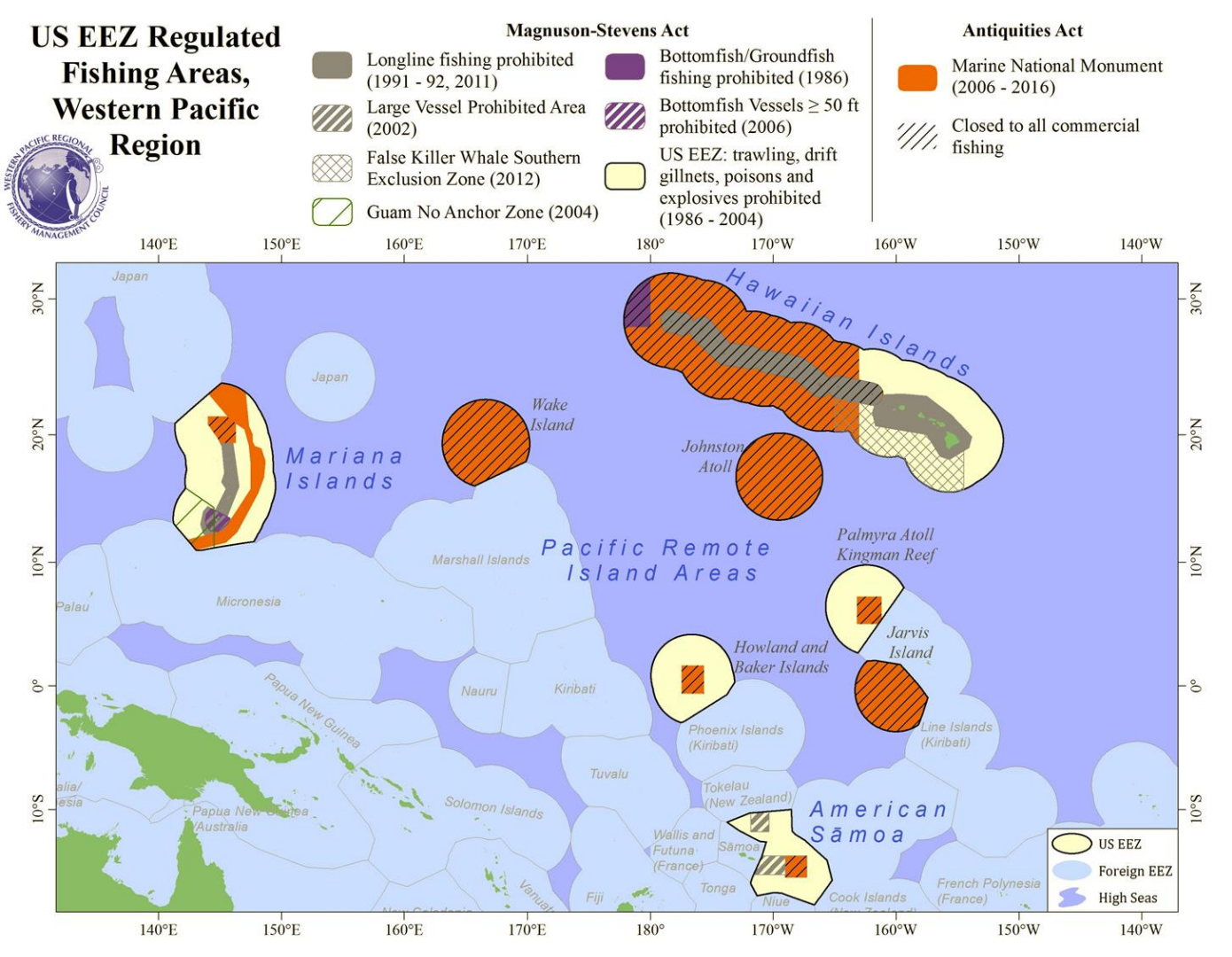
- Co-chaired by Ray Hilborn (UW-SAFS) & Vera Agostini (FAO)
- 30+ participants – NGOs, RFMOs, academics
- Participants invited to co-author the manuscript
- Develop a consensus of "best practices" to pair ABMTs and stated management objectives in blue water ecosystems
- Blue water ecosystems – areas beyond continental shelf, inside and outside, mostly pelagic/migratory
- Much of our conventional wisdom on MPAs/ABMTs based on nearshore ecosystems with habitat stationarity



Key Issues: ABMTs & Blue Water Ecosystems

- Governance
- UN negotiations on Intergovernmental Conference on Marine Biodiversity Beyond National Jurisdiction (BBNJ)
- UN Sustainable Development Goal 14 (SDG14)
- High-level/large-scale use of ABMTs in RFMOs
- Overarching aspirations – Proportion of waters for purposes of conservation and/or closures of any time
  - BBNJ (high seas) and US '30 x 30' (America the Beautiful)



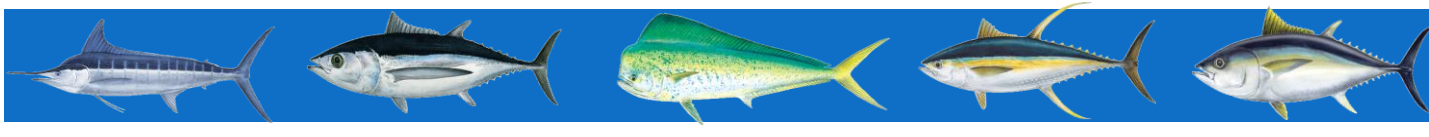


51% of the US EEZ of the WP Region have been designated as marine national monuments via proclamations

Up to 83% of Hawaii EEZ closed to longline fishery

ABMT Types: Static vs Dynamic

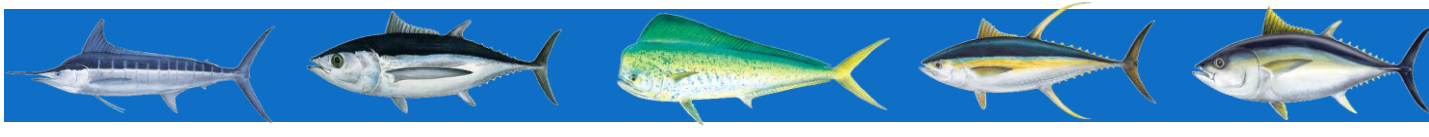
- Each have associated costs
  - Monitoring/enforcement costs: range from basic catch/effort reporting to VMS
  - Scientific/Technical needs: range from basic species occupancy to near-real time multi-species relationships
- Potential Benefits: optimizing fishing while achieving stated objectives



ABMT Class	Requirements/Costs	Benefits/Capabilities
Static	*Monitoring:* Seasonal/annual, catch/effort limits or gear restrictions by general area; VMS; basic in-season accountability measures; basic surveillance and enforcement *Scientific Needs:* Species displacement information; species habitation by area, time, or ontogeny	• Ease of enforcement and compliance monitoring • Can be commensurate with political boundaries or have simple spatial delineations • Protection of biomass in statically-defined habitat • Reduce stakeholder conflicts by area via limited access (fleet, gear, etc.)
Dynamic	*Monitoring:* Continuous, near-real time reporting of catch and effort through ER; VMS or near real-time surveillance; quick response time for in-season accountability measures; continuous and precise enforcement capability; sufficient fishery observer coverages or EM *Scientific Needs:* Robust scientific knowledge base of how target, non-target, and avoided species' vulnerabilities correspond to oceanographic or ecosystem features; predictive capabilities of species demographics and/or life history dynamics; access/processing capabilities of near-real time ecosystem products; temporal economic information	• Minimizing catch of non-target or avoided species without compromising yield of target species in fisheries • "Move on rules" can be implemented for vessels at-risk of reaching catch limits by area or at-risk of encountering species of concern • Potential reduced costs or increased profits to fishing vessels while achieving management objectives • Reduce stakeholder conflicts by reduced direct competition • Dynamic rules are agreed by stakeholders ahead of time promoting acceptance and collaborations • Have been implemented in some fisheries by fishing cooperatives themselves

ABMT Objectives in Blue Water Systems

- Maintain and enhance sustainable food production
- Protect non-target species
- Protect critical habitats
- Maintain ecosystem structure and function
- Maintain or increase ecosystem resilience to climate change
- Provide employment
- Facilitate economic benefits
- Support communities and culture

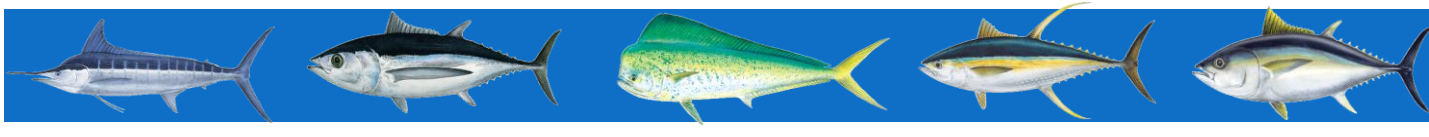


Performance Metrics Paired with Objectives

Objective	Performance Metric	Evaluation methods
Maintain and enhance sustainable food production	Harvest of fish, stock abundance and fishing mortality in relation to reference points	Fisheries stock assessments, harvest control rules and management strategy evaluation
Protect non-target species	Bycatch trends of endangered, threatened or protected species and the status of these species. Status of non-target fish species.	Bycatch trends from observers or electronic monitoring, Data poor stock assessment models, Fishery indicators (e.g., catch per unit effort (CPUE)), Population studies of the species
Protect critical habitats	Status relative to undisturbed Proportion of habitats protected from fishing	Ecological surveys Ecosystem modelling
Maintain or increase ecosystem resilience to climate change	Change in habitat distribution of species, displacement of species, ecosystem structure changes, Surveys of abundance of species	Habitat modelling Ecosystem modelling

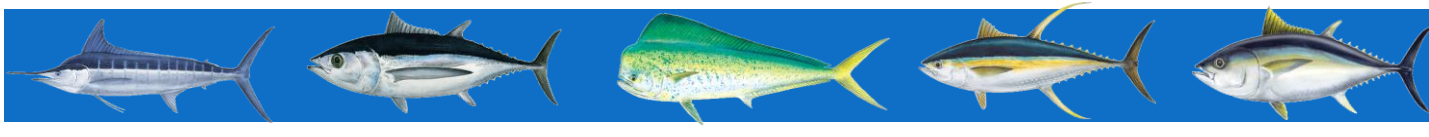
Inferring Causal Impacts of ABMTs

- Need a baseline condition to compare against and/or a 'control' group
- Counterfactual approach – developed to infer what would happen had there not been an intervention
- Compare post-intervention response to control
- Six "quasi-experimental approaches" identified
- *Performance metrics and evaluation need to be well-thought-out before management intervention*



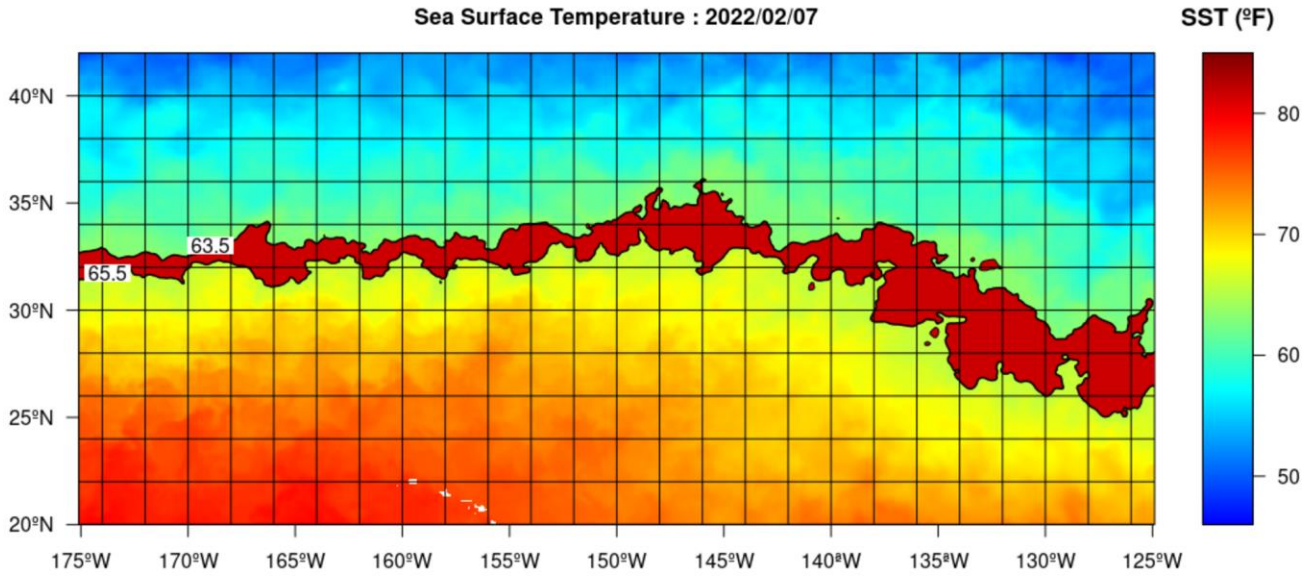
Evidence of Efficacy

- Gilman et al (2019) found evidence lacking for efficacy and proper evaluation
- Highly migratory species may have site-fidelity or natal homing to a particular area (predictable) otherwise areas of critical importance difficult to predict
- Dynamic spatial management measures could be designed to protect hotspots with high ratios of bycatch-to-target catch (Southern bluefin off Australia, Hawaii "Turtlewatch")
- Unintended consequences
- Input control better? – fishing effort goes elsewhere (Indian Ocean closure)
- Placement often made out of convenience and not related to threats (Kuempel et al, 2019)



EXPERIMENTAL PRODUCT

Avoid fishing between solid black 63.5°F and 65.5°F lines to help reduce loggerhead sea turtle interactions



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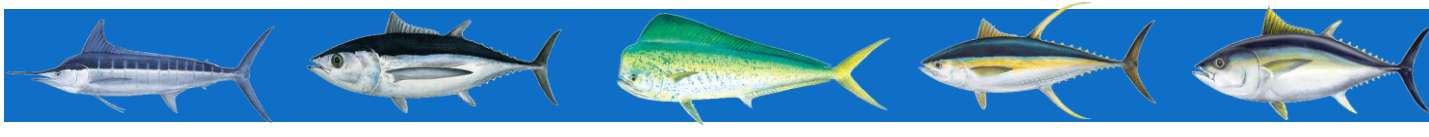
http://www.pifsc.noaa.gov/eod/turtlewatch.php
contact: melanie.abecassis@noaa.gov

Data provided by the OceanWatch - Central Pacific node

TurtleWatch

State of Knowledge

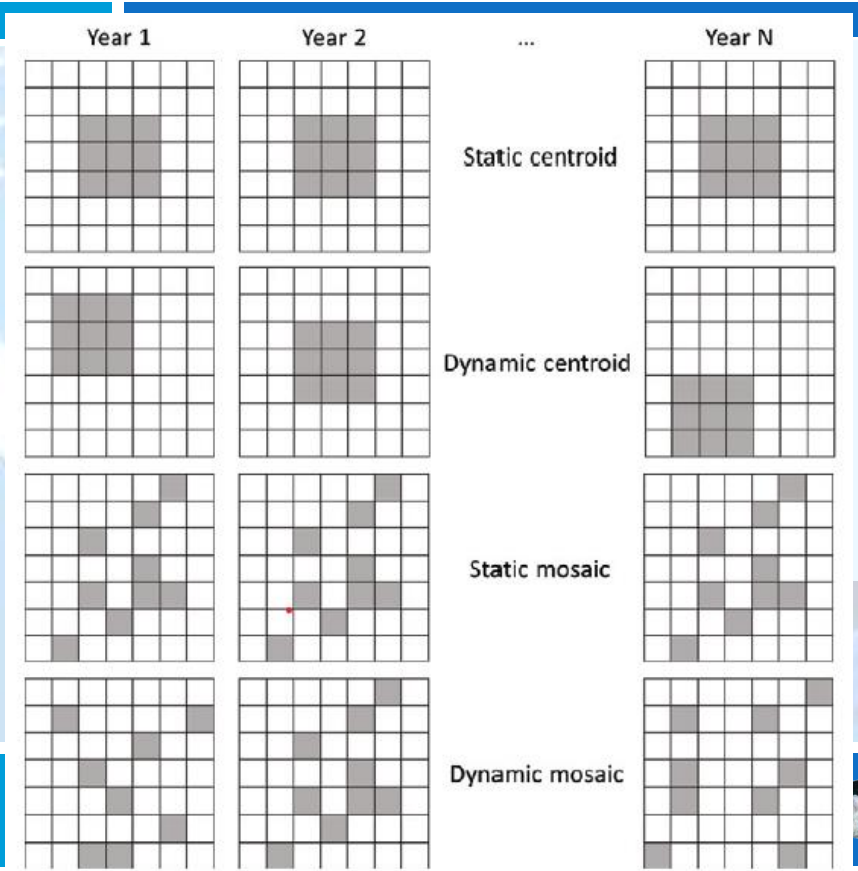
- The current evidence of blue water ecosystem responses to ABMTs is limited
- The effectiveness of different ABMT approaches for target species management depends on many factors.
- Discerning which ABMTs will best contribute to reducing bycatch and protecting habitat for critical life history stages is contingent on knowledge of biological characteristics
- The current evidence for socio-economic outcomes of blue water ABMTs is limited and inconclusive.
- Displaced effort can prevent achieving objectives of ABMTs and lead to unintended consequences.

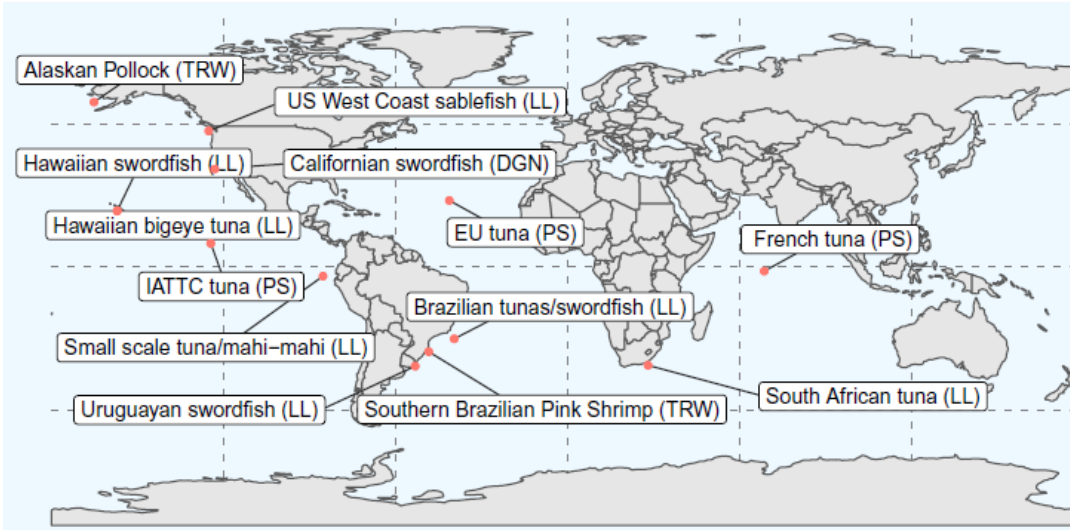


Take Home Messages

- Notable knowledge gaps exist on empirical and theoretical evidence
  - Need to advance monitoring capabilities
  - Costs associated to make ABMTs more effective
- Need adequate planning- identify performance metrics and methods sufficient to monitor and assess ABMTs with respect to stated objectives
- Few interventions have been exposed to rigorous evaluation and most lack testable pre-determined management objectives in the first place
- Dynamism and mobility – static 'set it and forget it' is not ideal
- *The high mobility of both target and bycatch species generally reduces the effectiveness of area-based management, and shifting distributions due to climate change suggest that adaptive rather than static approaches will be preferred.*

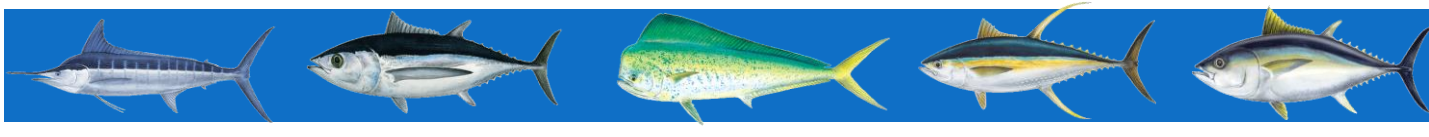
Static vs Dynamic – Pons et al 2022





Static vs Dynamic – Pons et al 2022

- Analyzed 15 different fisheries around the world
- Under static area management, such as classic no-take marine area closures, observed bycatch could be reduced by 16%.
- Under dynamic ocean management based on observed bycatch closing the same total area but fragmented in smaller areas that can move year to year, that reduction can increase up to 57% at minimal or no loss of target catch.



QUESTIONS AND DISCUSSION

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