

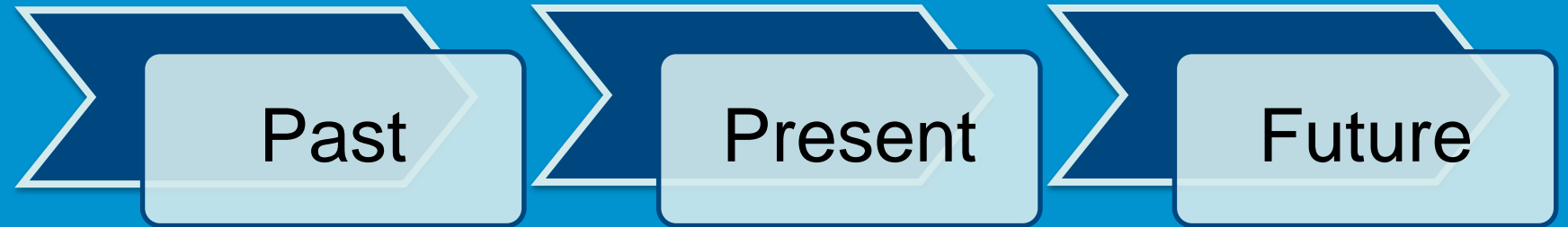


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February 9, 2022



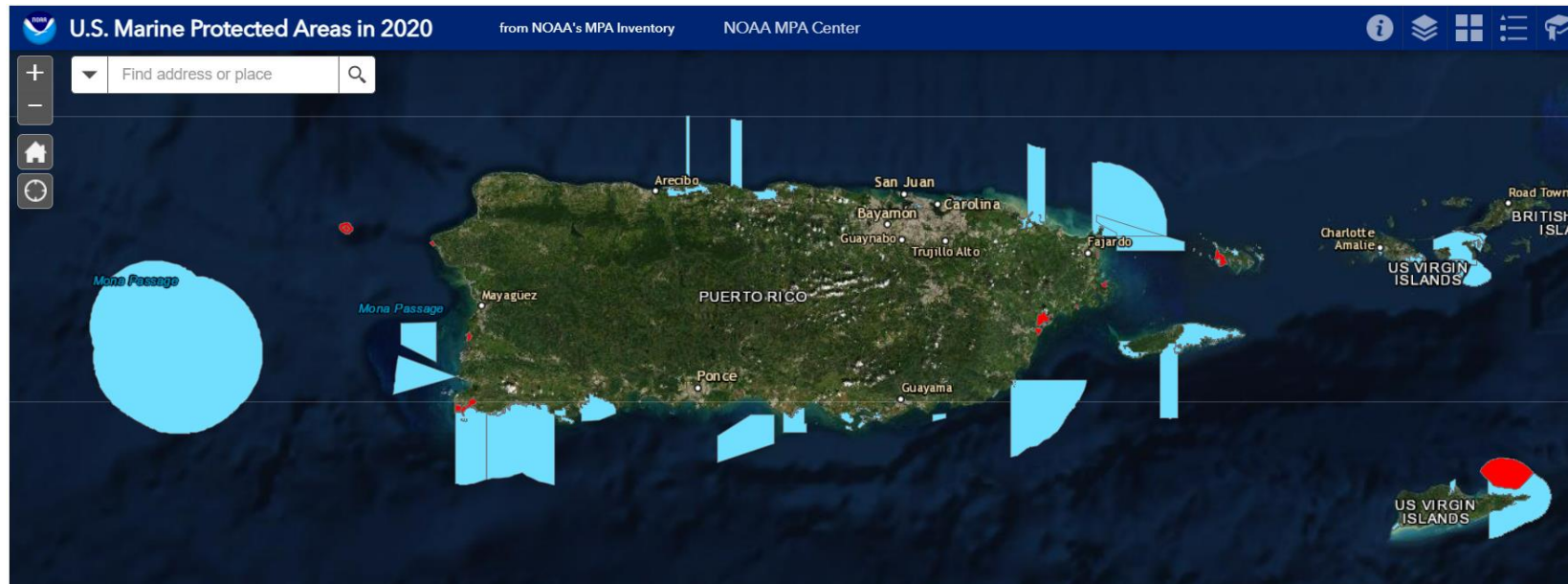
Studies of MPAs in the US Caribbean

Managed Areas of the US Caribbean

MPAs according to the IUCN, not under CFMC authority

- 48 areas, 1,972 sq mi marine area
 - NT – Buck Island Reef National Monument
 - National Park Service authority
 - NA – Desecheo National Wildlife Refuge
 - US Fish and Wildlife Service authority

NT = No Take
NA = No Access
SNT = Seasonal No Take

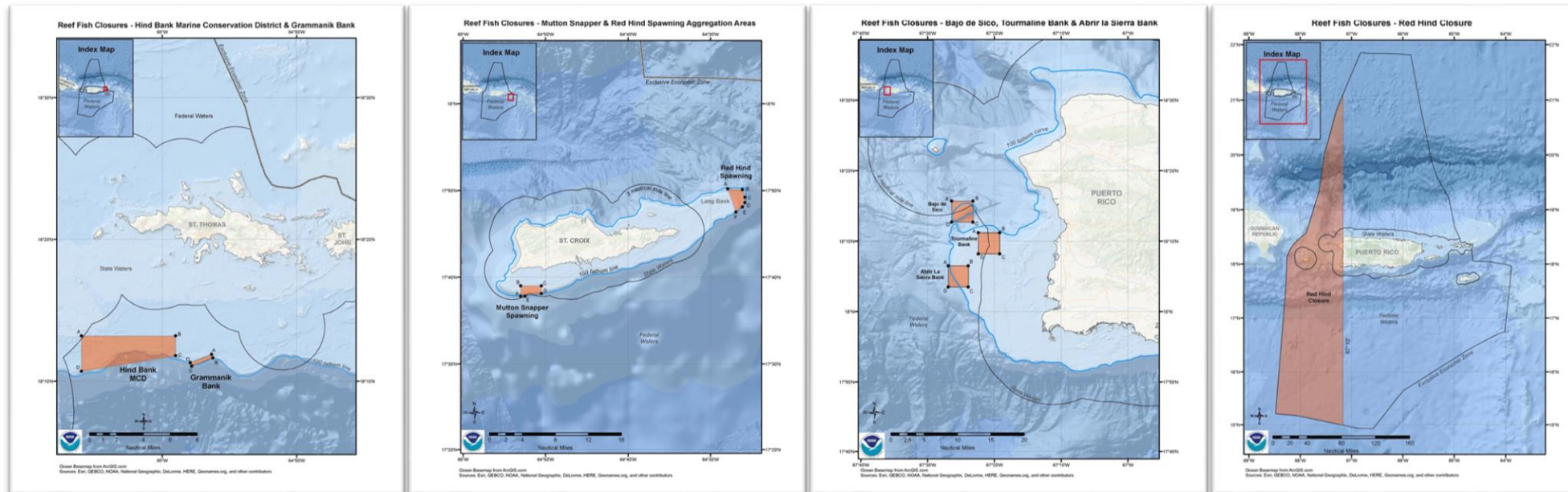


Managed Areas of the US Caribbean

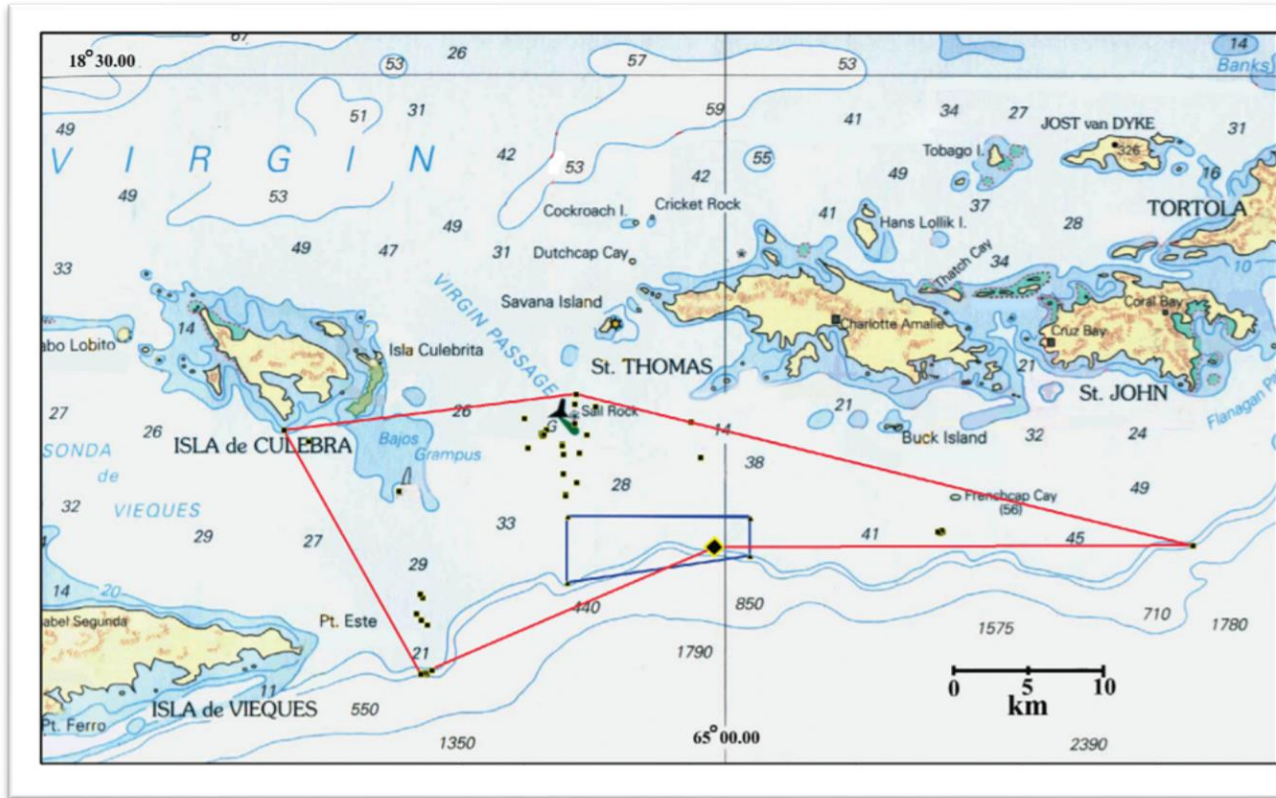
MPAs under MSA (CFMC Authority)

- 7 time-area closures + other seasonal species closures
 - NT – Hind Bank Marine Conservation District
 - SNT – Bajo de Sico (Oct. 1 - Mar. 31)
 - Red Hind Closure (Dec. 1 - last day of Feb.)

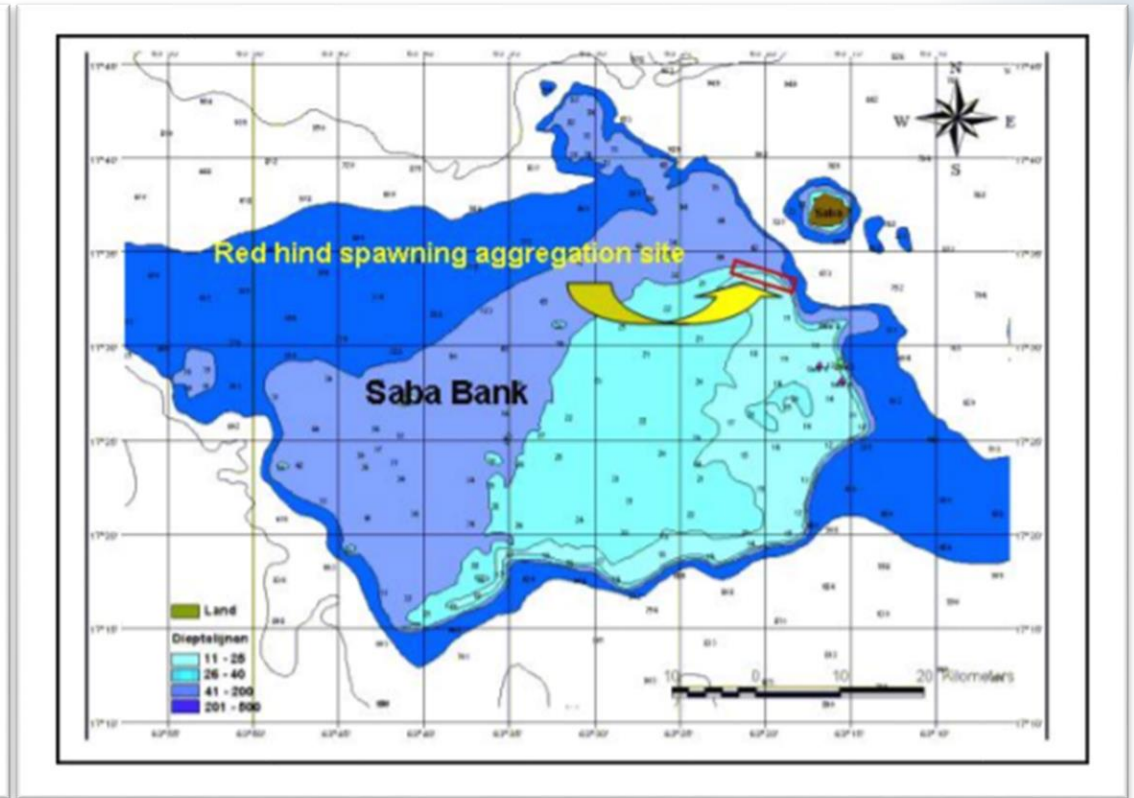
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Effectiveness of Managed Areas: Abundance and Fish Size

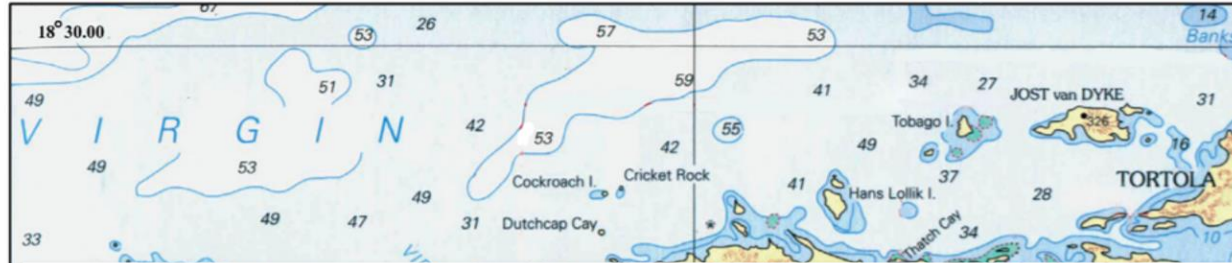


Blue shape: Hind Bank Marine Conservation District
Nemeth, 2005

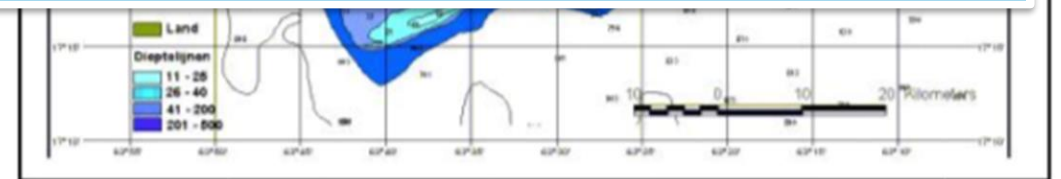
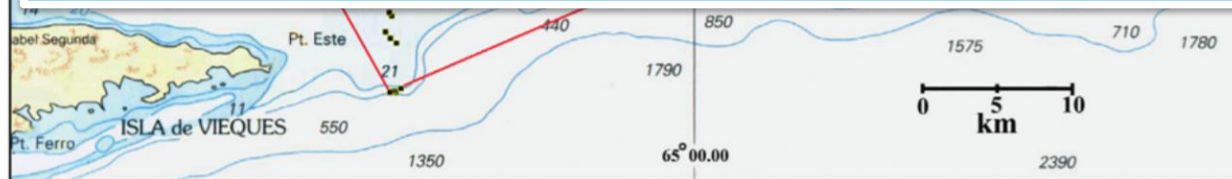


Red shape: Saba Bank, Netherlands Antilles
Nemeth et al., 2006

Effectiveness of Managed Areas: Abundance and Fish Size



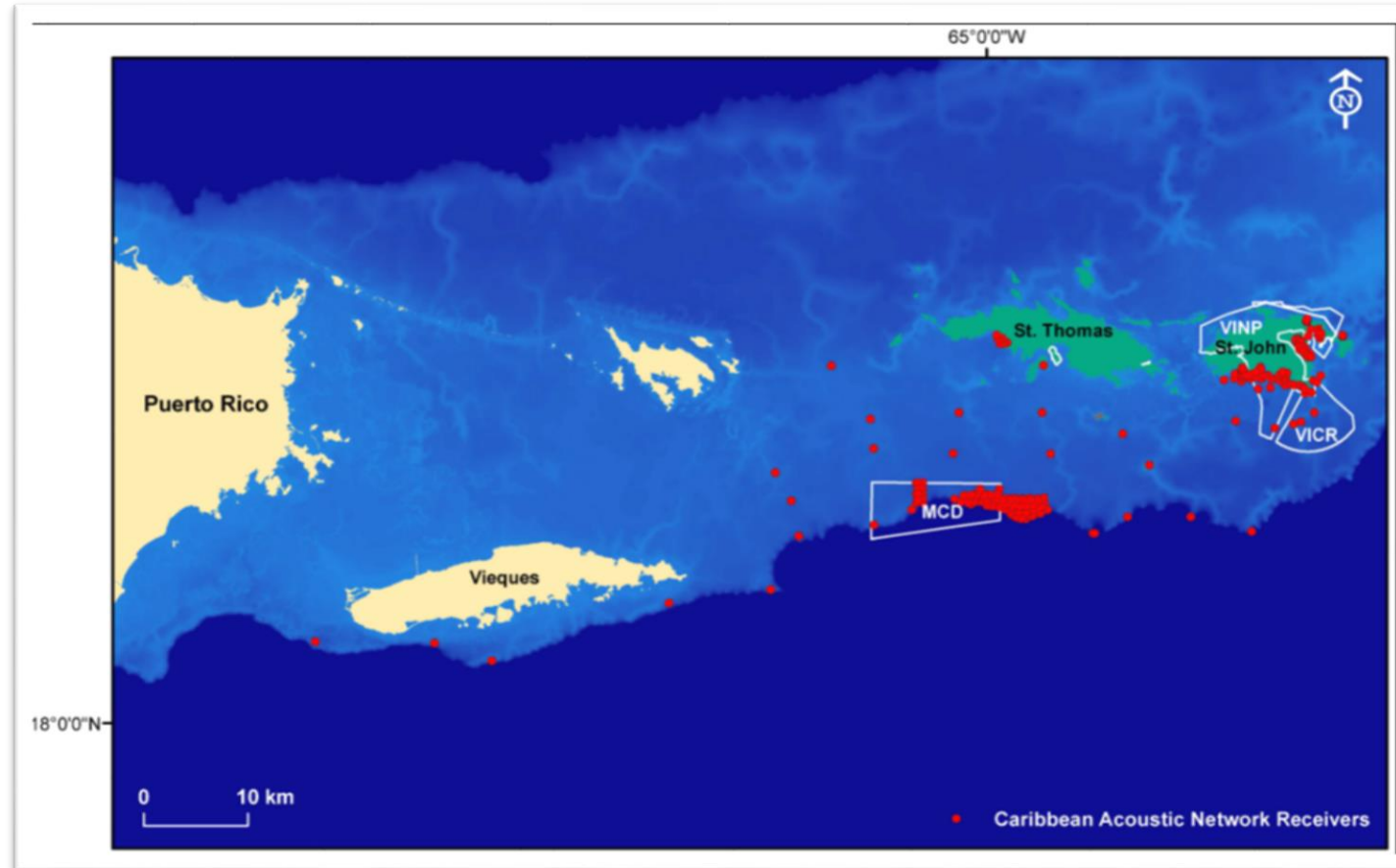
STATISTICAL DIFFERENCE \neq BIOLOGICAL DIFFERENCE



Blue shape: Hind Bank Marine Conservation District
Nemeth, 2005

Red shape: Saba Bank, Netherland Antilles
Nemeth et al., 2006

Effectiveness of Managed Areas: Connectivity and Fish Movement



Red dots: locations of underwater acoustic receivers near Virgin Islands National Park (VINP), Virgin Islands Coral Reef Monument (VICR), and Hind Bank Marine Conservation District (MCD)

Pittman et al., 2014

Monitoring of Managed Areas: Ongoing Studies

Are the Two Largest Marine Protected Areas in the United States Virgin Islands Working?

- **Goal:** determine if protected areas are improving fish species abundance and diversity
- **Where:**
 1. Hind Bank Marine Conservation District
 2. Virgin Islands Coral Reef National Monument
- **How:** compare biological resources and habitat, RVC method
- **When:** February 2020 – January 2023
- **Contact:** Joshua Brown (NOAA), Richard Nemeth, Tyler Smith (University of the USVI)
- **Funding:** Puerto Rico Sea Grant



Monitoring of Managed Areas: Ongoing Studies

National Coral Reef Monitoring Program (NCRMP)

- **Goal:** monitor fish size, abundance, and species richness in MPAs to serve as baseline information
- **Where:** US Caribbean national parks (IUCN-categorized)
- **How:** belt transect, RVC
- **When:** 2000 – ongoing, biannual frequency
- **Contact:** Erica Towle, Jay Grove, Kim Edwards (NOAA)
- **Funding:** NOAA NRDD, OAR, CRCP, NMFS, SEFSC, NCCOS



Monitoring of Managed Areas: Ongoing Studies

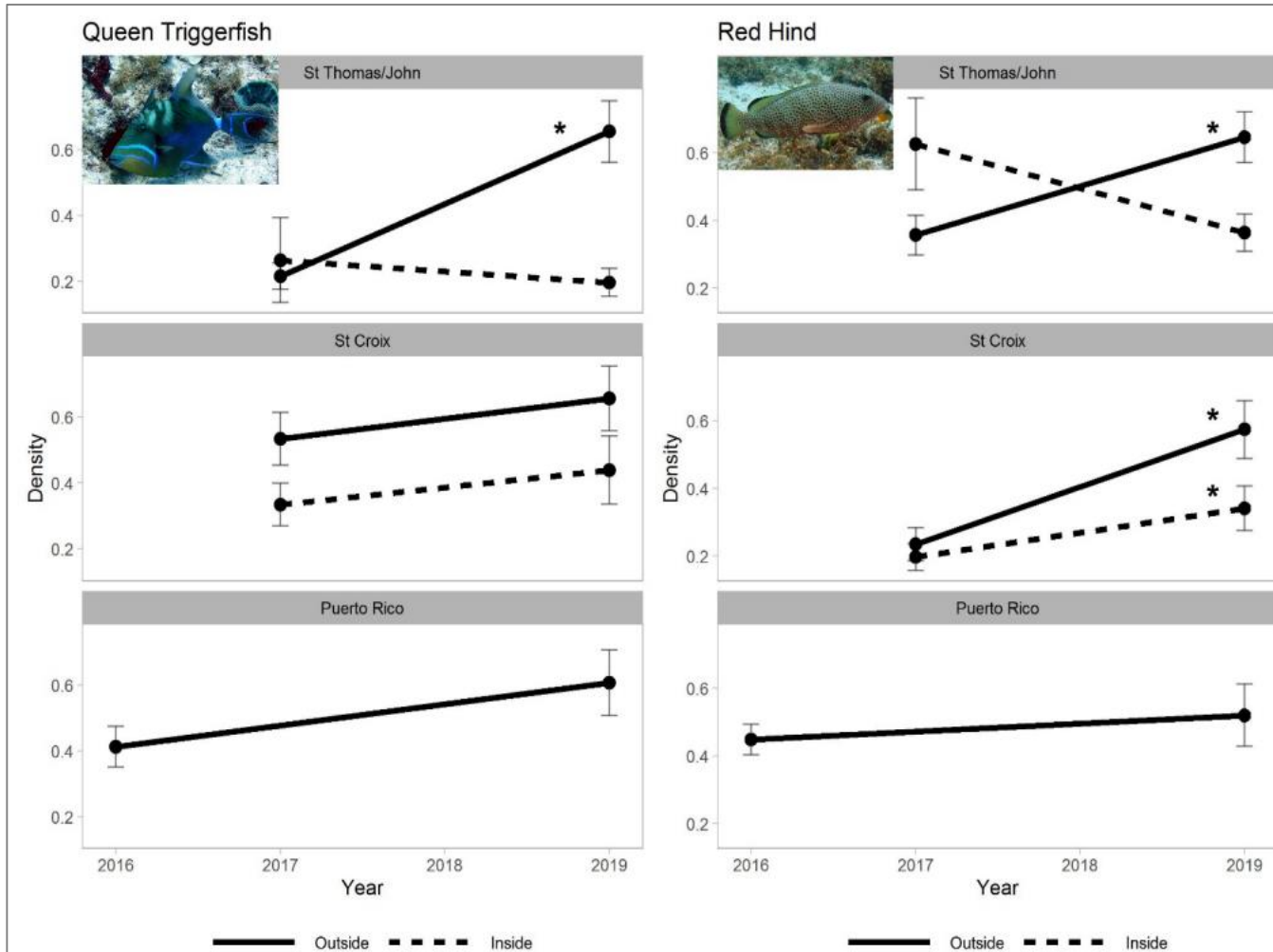


Figure 22. Density of queen triggerfish and red hind by region and year. Densities are reported as number of individuals per 177 m² ± SE and significance (Tukey's two-tailed t-test) is reported by year at p < 0.05 (*). Protected status refers to sites inside or outside of a USVI national park boundary. Photo credit: NOAA NCCOS

NCRMP recent results

- Significant density differences from 2017-2019
 - St. Thomas and St. John
 - Queen triggerfish – outside
 - Red hind – outside
 - St. Croix
 - Red hind – outside
 - Red hind - inside

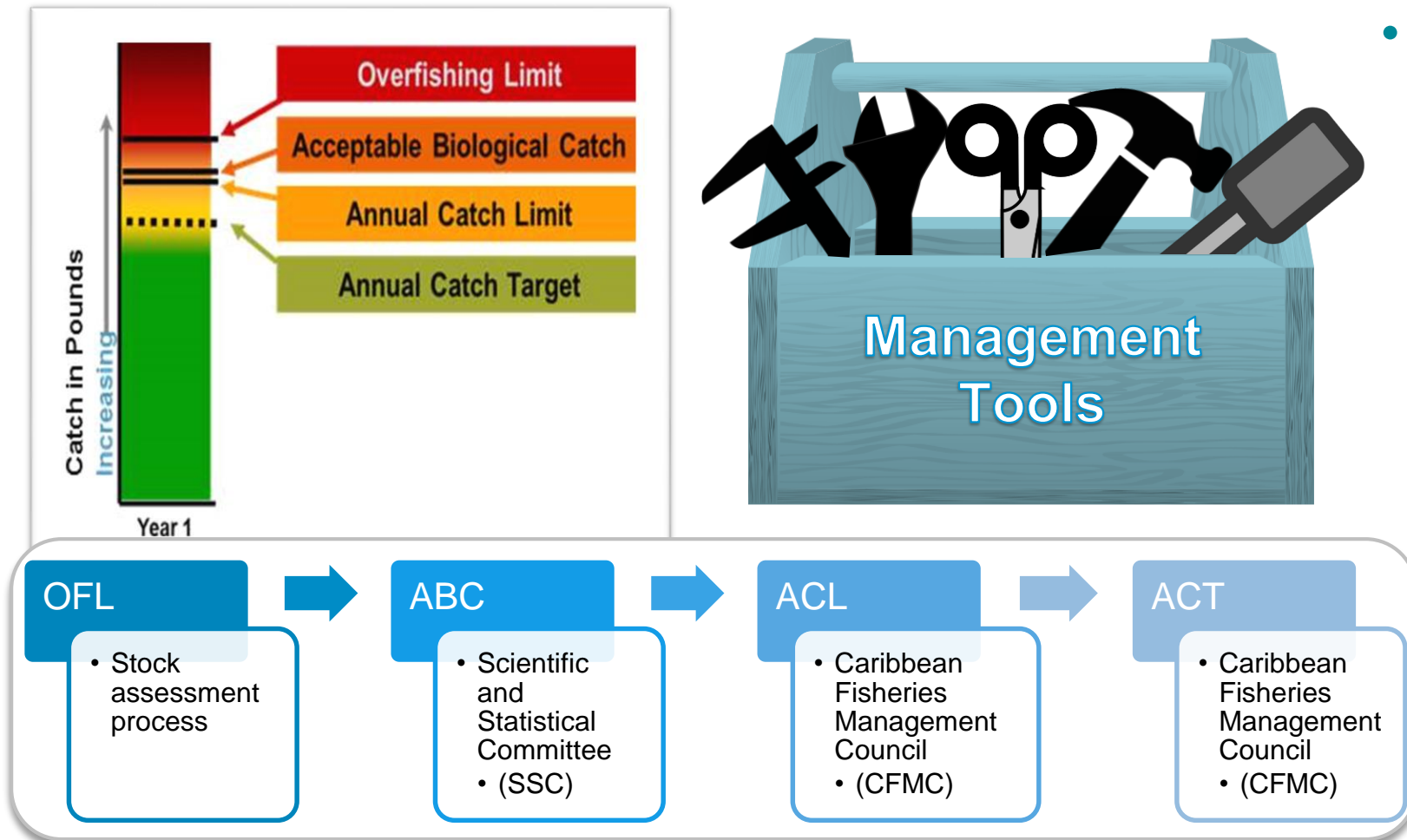
Monitoring of Managed Areas: Ongoing Studies

Oceanographic Pathways and Hydrodynamic Connectivity between Marine Protected Areas in the US Virgin Islands and Eastern Puerto Rico

- **Goal:** generate connectivity matrices among the protected areas and the potential recruitment sites
- **Where:**
 1. Hind Bank Marine Conservation District
 2. Grammanik Bank
 3. Lang Bank
- **How:** current velocities, FVCOM model simulations
- **When:** 2017 – September 2022
- **Contact:** Miquel Canals (University of Texas at Dallas)
- **Funding:** NOAA CRCP grant to CFMC



Managed Areas and ACLs: ACL Determination



- Stock Assessment Process (Tiers 1-3)
 - Provides OFL and ABC
- Tier 4 – assessment not available
 - Productivity and Susceptibility Analysis (PSA)
 - Uses life history information
 - Takes managed areas and seasonal closures into consideration
 - Can provide relative stock-status
 - Uses benchmark landings to calculate SYL

Are Managed Areas Accounted For in Stock Assessments?

- Currently not fully accounted for in stock assessments due lack of spatial data
 - Current assessments are not spatial. If data come from within a managed area, then those data are included in the stock assessment; but, cannot be differentiated from data outside the protected area
- Two area stock assessment: managed area/outside managed area
 - Need:
 - Managed area size – known
 - Estimated reduction in fishing mortality (F) – can account for time-area closures
 - Size frequency – studies ongoing
 - Catch (landings) – need area-specific catch
 - Movement (adults and larvae) – studies ongoing (fish leaving protected area are fished)
 - Abundance – studies ongoing (need index of abundance inside and outside the protected areas)
 - Life history differences?
- Goal: protection of 30% or more of the unfished spawning potential (proxy for the spawning stock biomass that produces MSY)
 - By managing the catch and effort
 - Sufficient managed areas



Monitoring of Managed Areas: The Next 5 Years

- Define goals
 - Effective tool for fisheries management
 - Preservation of habitat
 - Something else?
- Define “effective”
 - Abundance
 - Diversity
 - Fish size
 - Other?
- *Goals and effectiveness metrics will determine the characteristics of managed areas (e.g., size/limits on activities/location)*
- Organization to optimize and coordinate projects
- Multiyear funding



Other Resources

- IUCN MPAs
 - <https://www.iucn.org/theme/protected-areas/about/protected-area-categories>
- Seasonal and Area Fishing Closures – US Caribbean
 - <https://www.fisheries.noaa.gov/southeast/rules-and-regulations/seasonal-and-area-fishing-closures-us-caribbean>
- The MPA Guide: A Framework to Achieve Global Goals for the Ocean
 - <https://www.science.org/doi/pdf/10.1126/science.abf0861>
- Marine Protected Areas as a Tool for Fisheries Management (MPAs)
 - <https://www.fao.org/fishery/en/mpas>
- The Ups and Downs of Marine Protected Areas: Examining the Evidence
 - <https://news.mongabay.com/2018/01/the-ups-and-downs-of-marine-protected-areas-examining-the-evidence/>
- Accounting for Marine Reserves Using Spatial Stock Assessments
 - <https://cdnsiencepub.com/doi/full/10.1139/cjfas-2013-0364>





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