

MARine Ecosystem goal Setting (MARES)

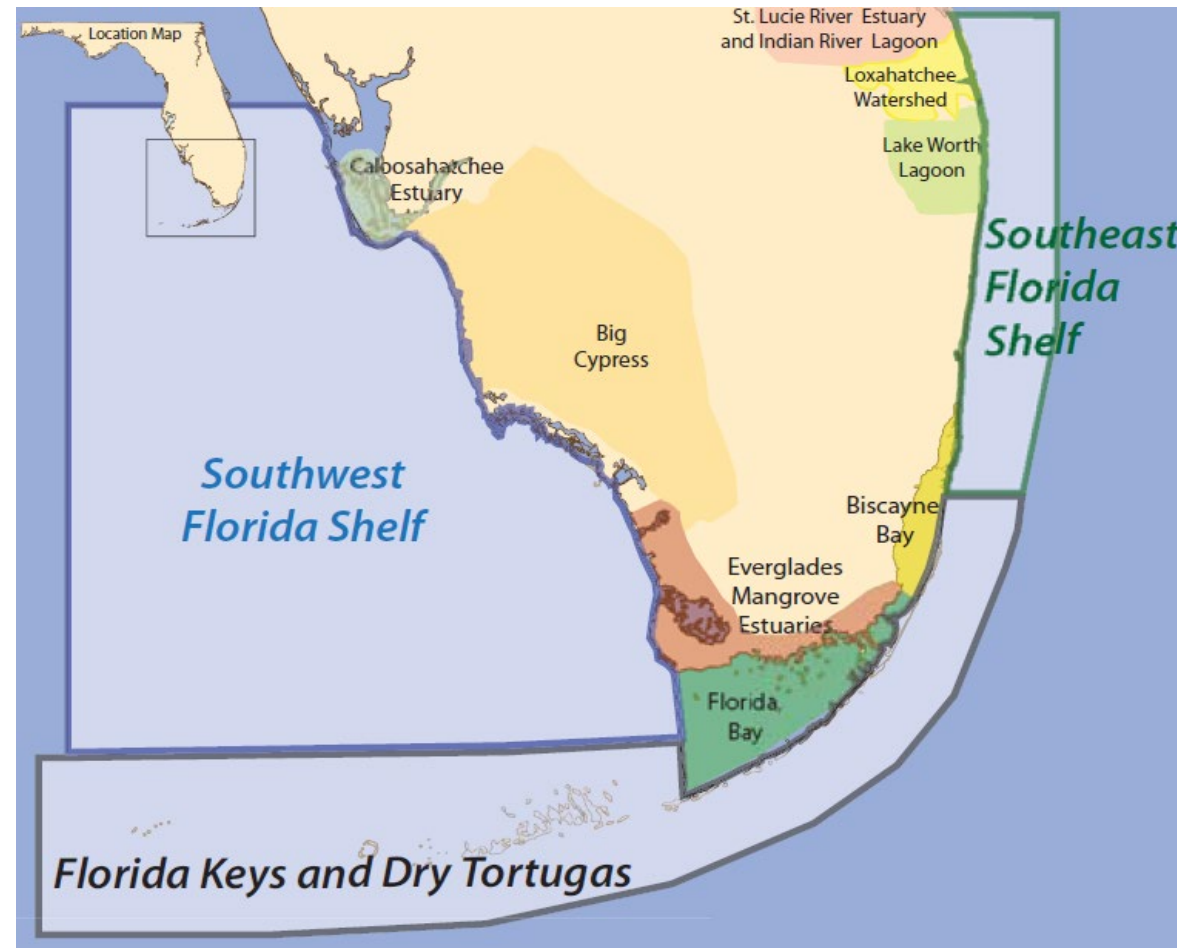
FCRCT Meeting 11/29/23
Chris Kelble, NOAA



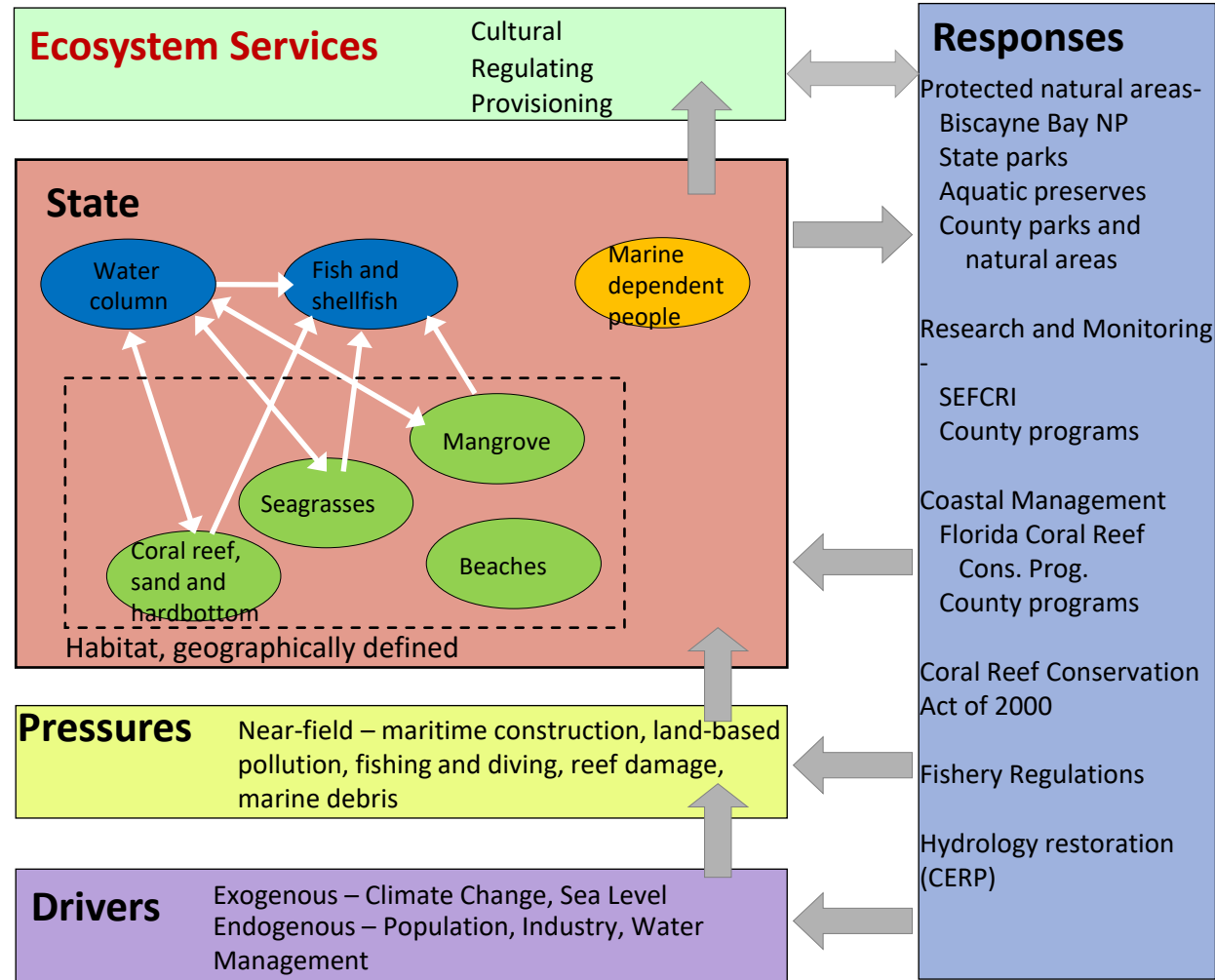
MARES – 2009-2012

“reach a science-based consensus about the defining characteristics and fundamental regulating processes of a South Florida coastal marine ecosystem that is both sustainable and capable of providing the diverse ecosystem services upon which our society depends”

- Who?
 - >100 participants
 - >40 authors
- What? Consensus!
 1. Conceptual diagrams
 2. iCEMs > EBM-DPSER
 3. Indicators > Indices
 4. Risk & Trade-off analysis
- Where?
 - 3 “new” marine regions
 - + CERP estuaries

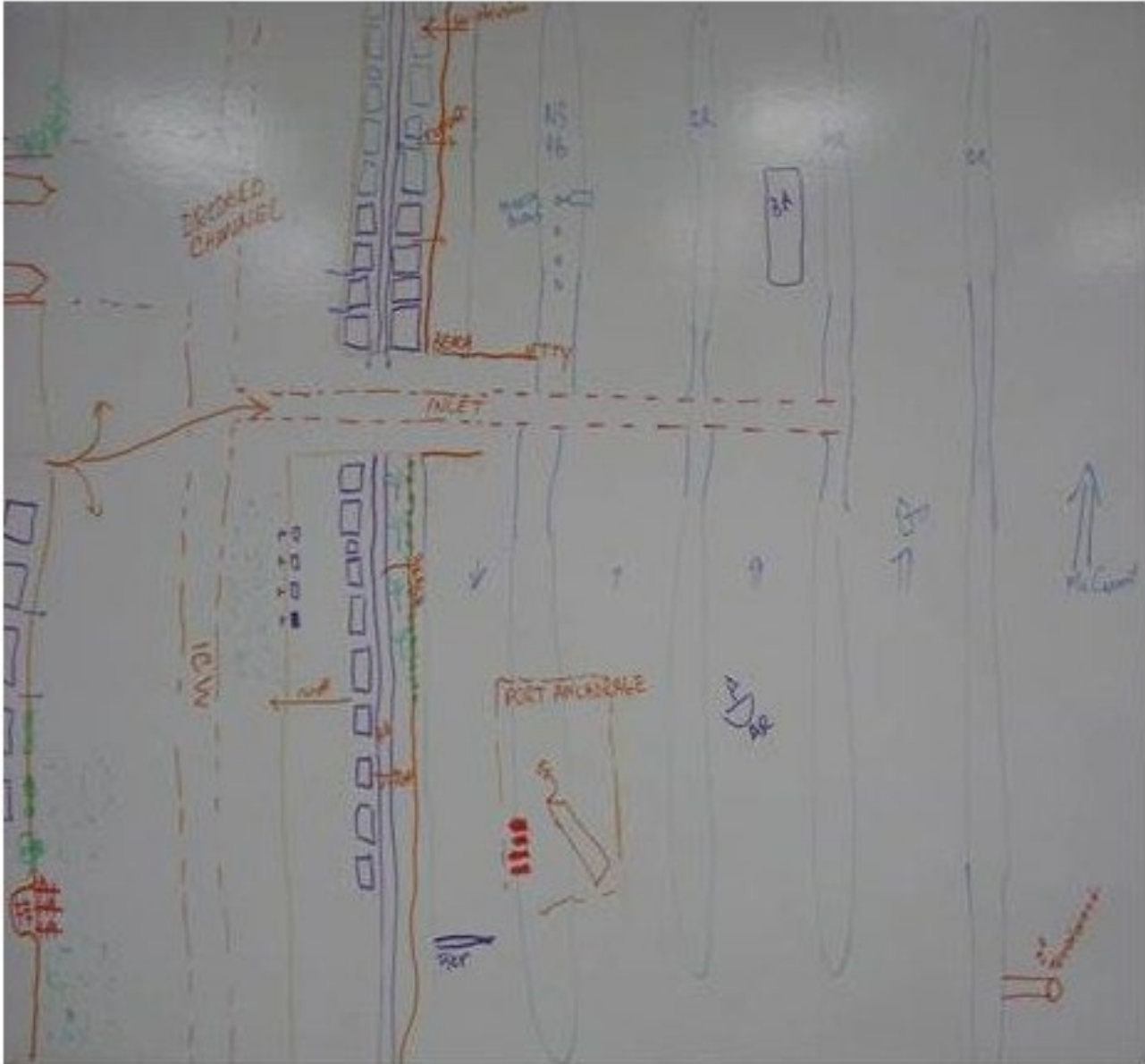


Improving Communication DPSER – ICEM not CEM Framework



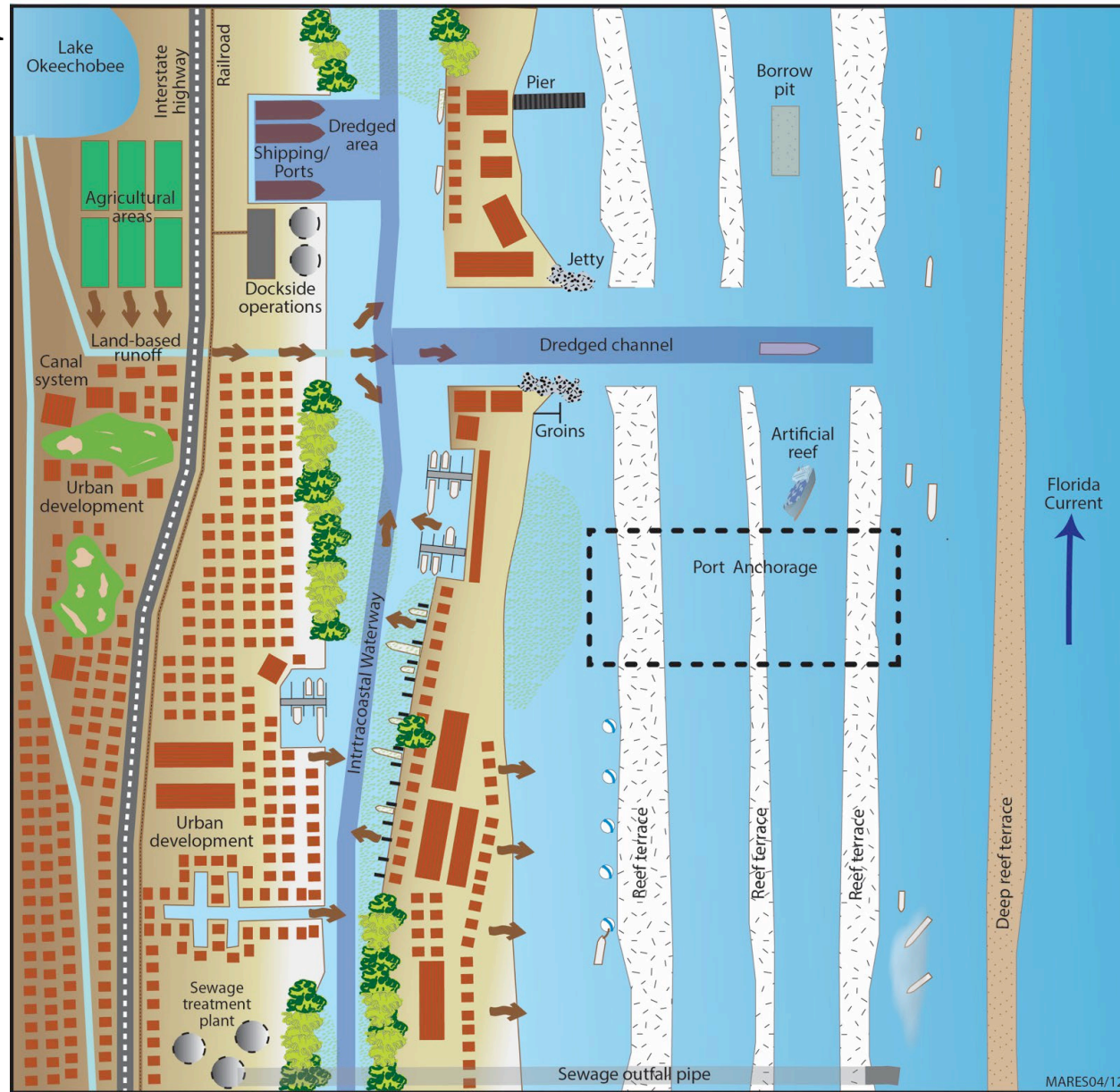
SE coast example

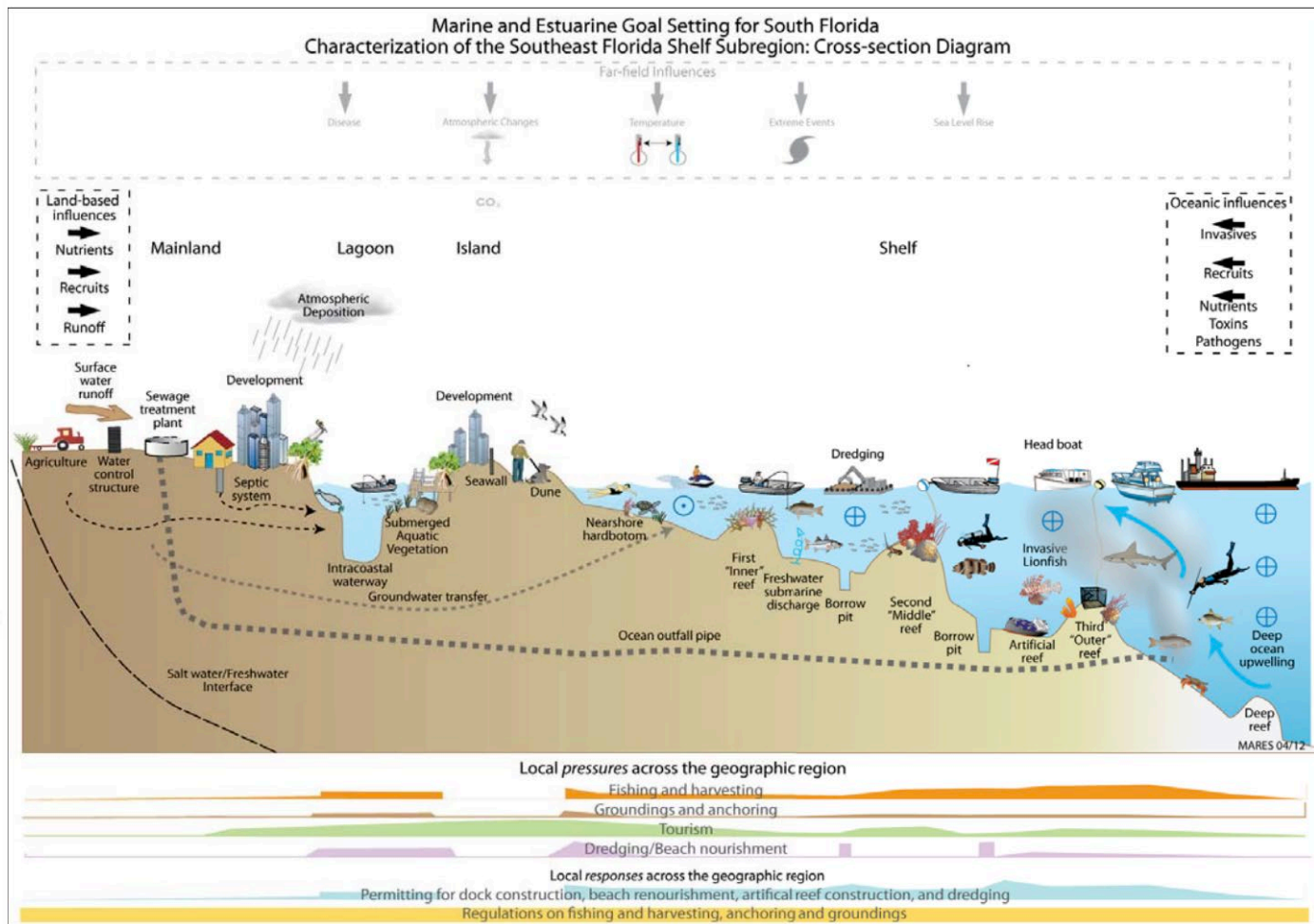
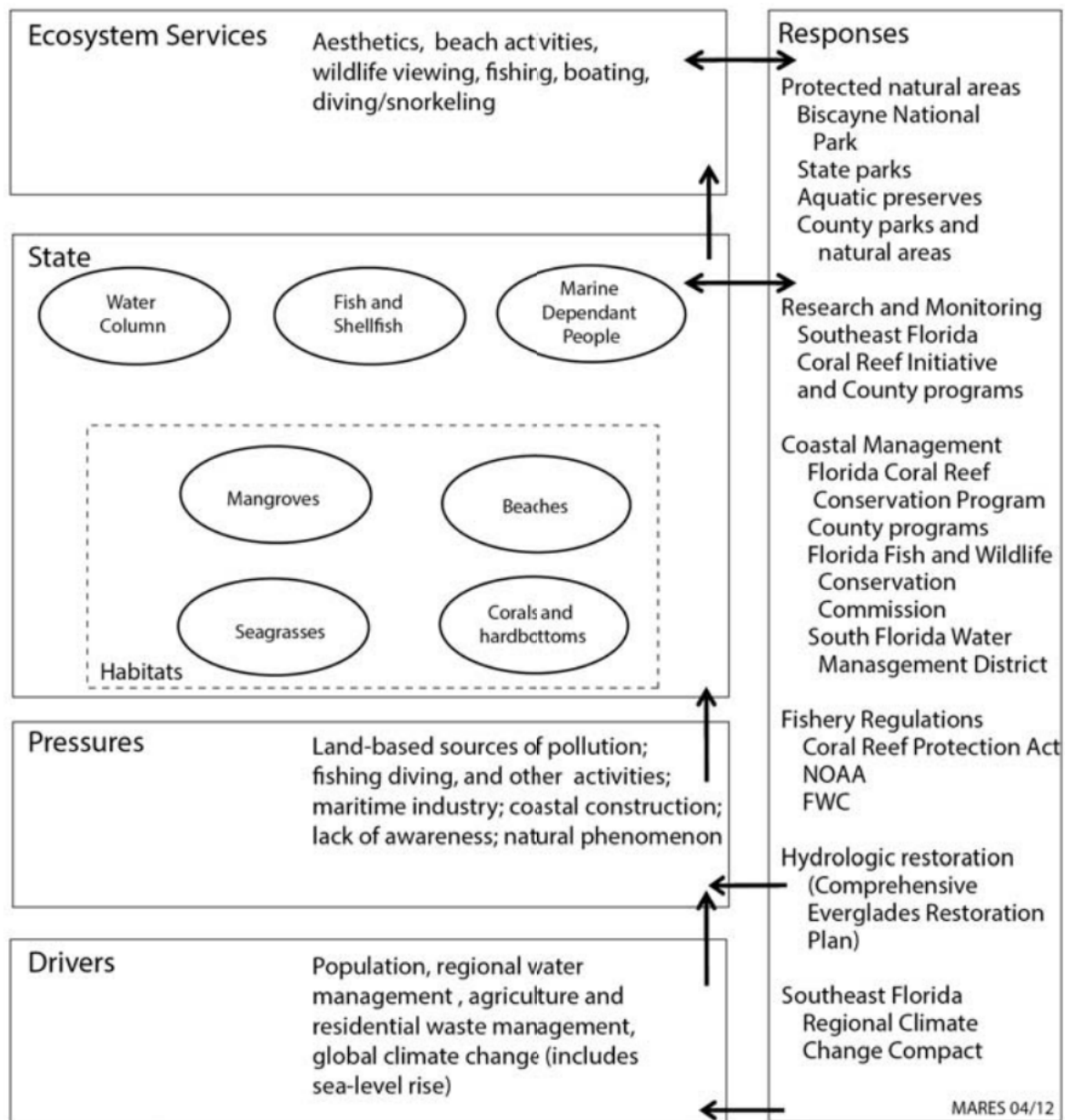
Communication and Consensus-Building



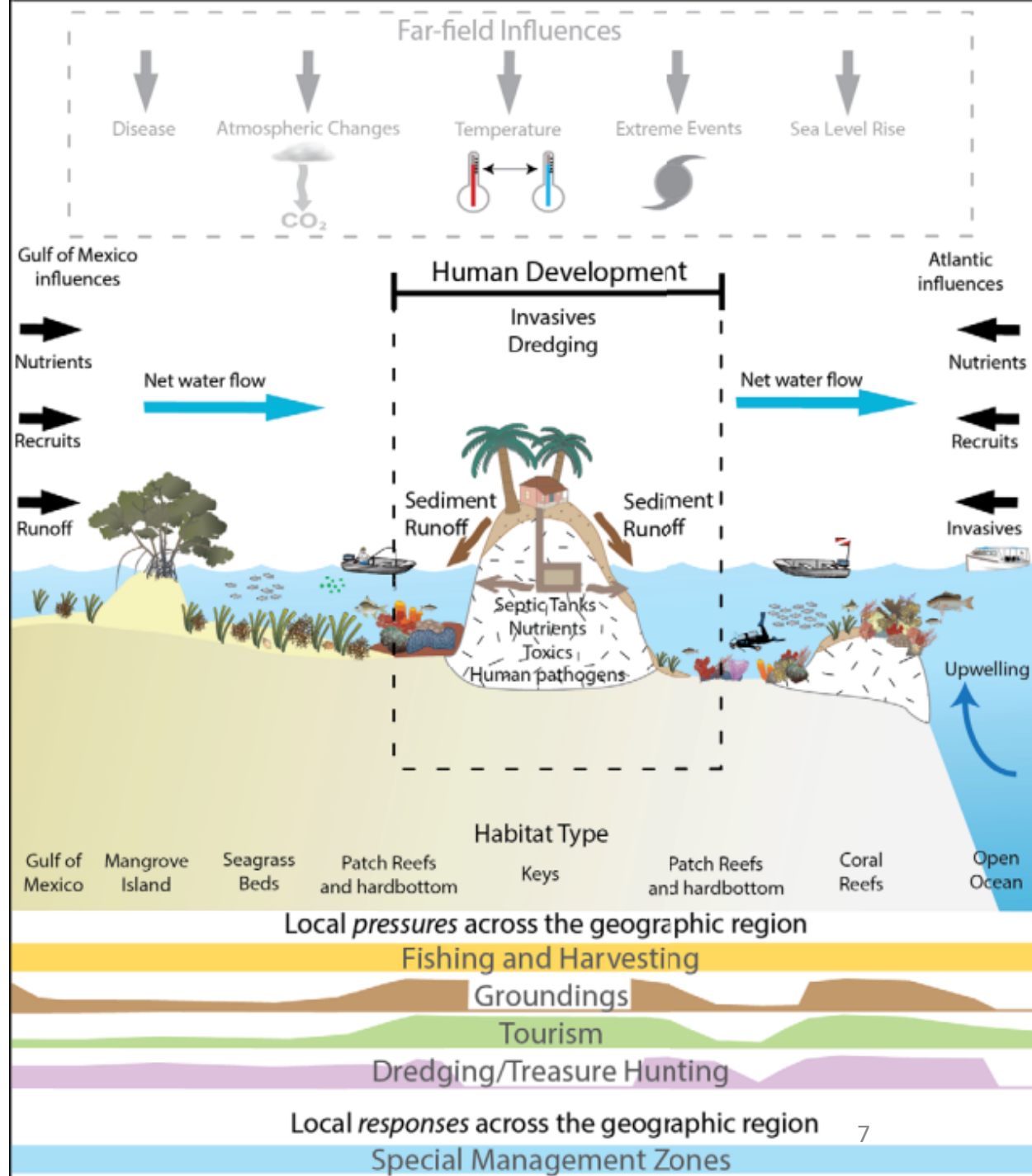
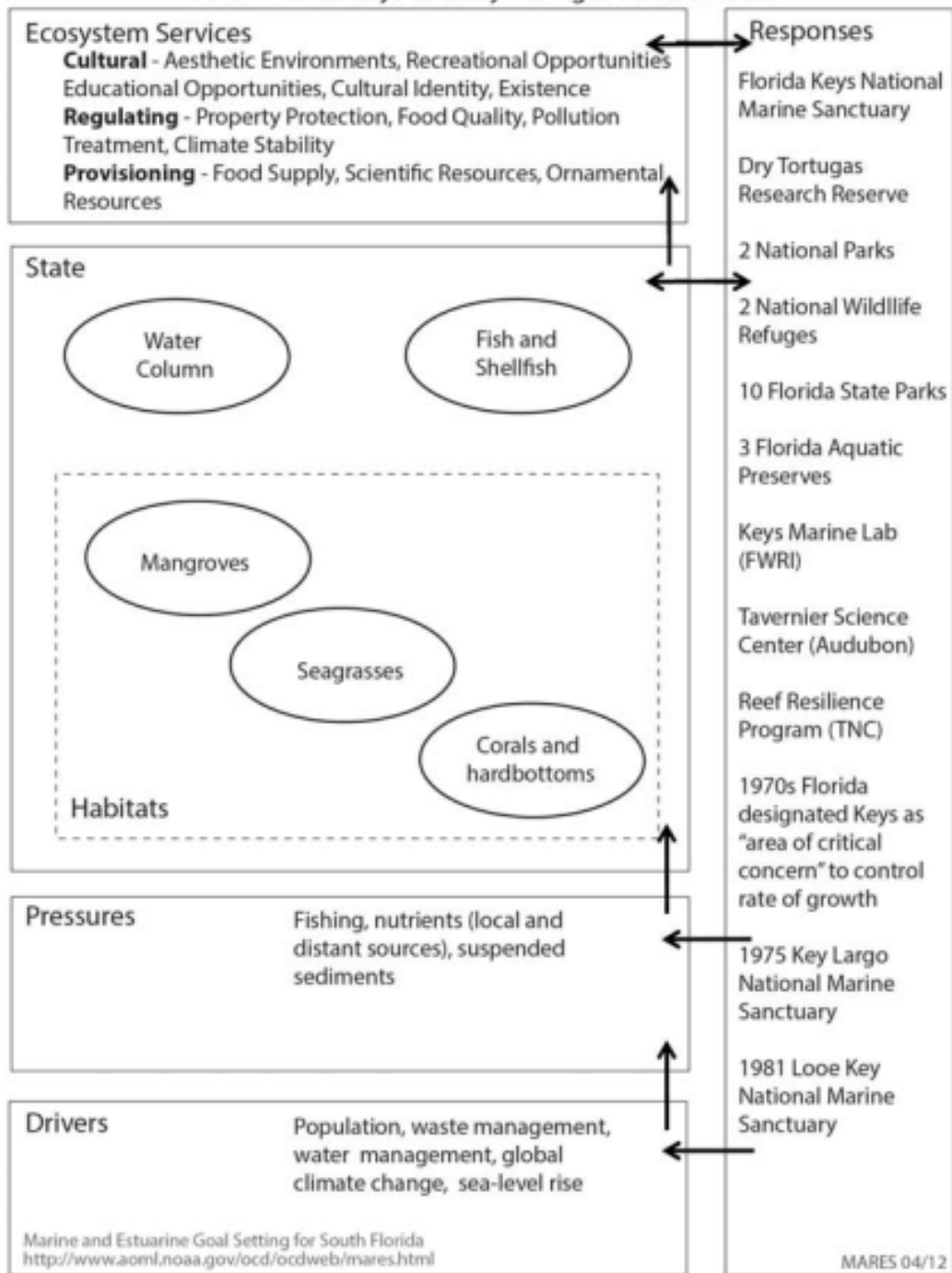
Communication and Consensus- Building

Marine and Estuarine Goal Setting for South Florida
Characterization of the Southeast Florida Shelf Subregion: Plan View Diagram





MARES Florida Keys and Dry Tortugas DPSER Model



Attributes that people care about



Attributes we measure

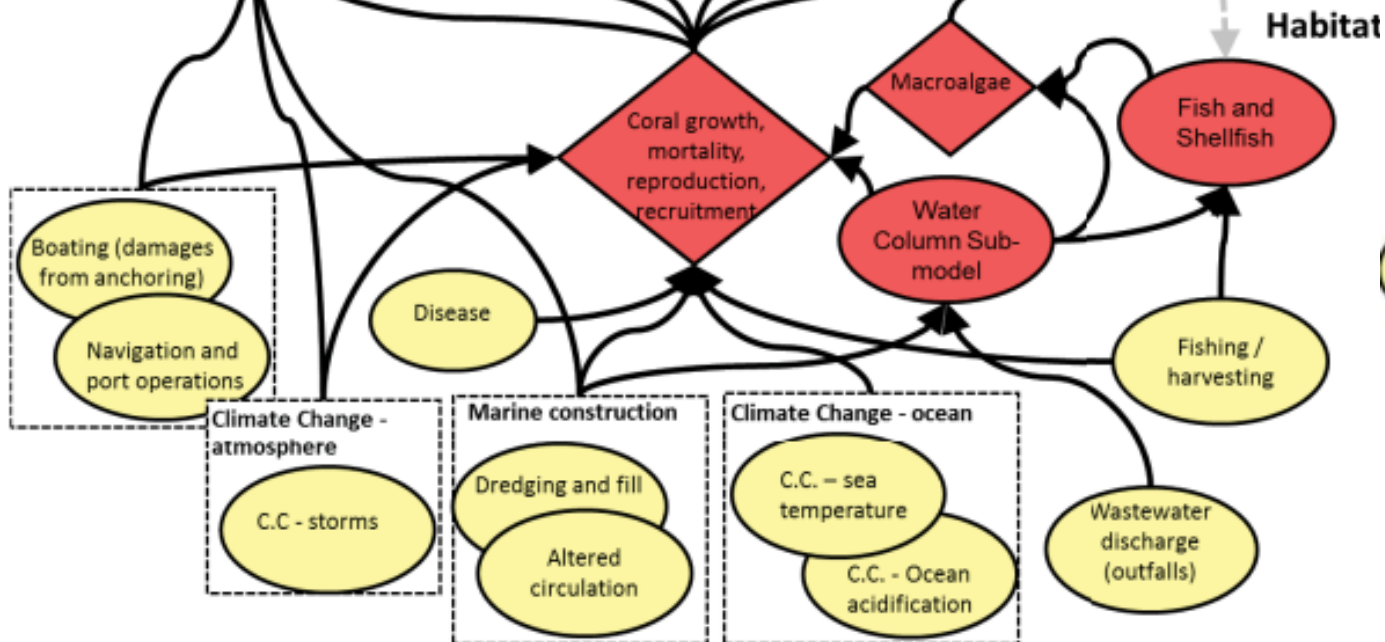
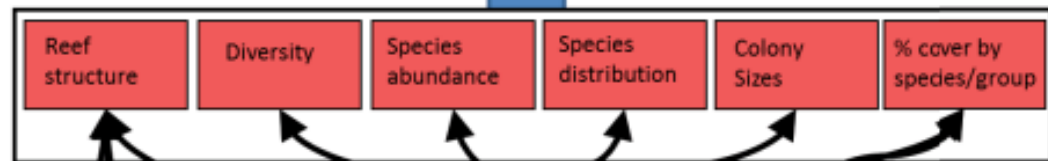


Figure 4. The coral and hardbottom conceptual ecological submodel for the southeast Florida coast.

Attributes that people care about



Attributes we measure

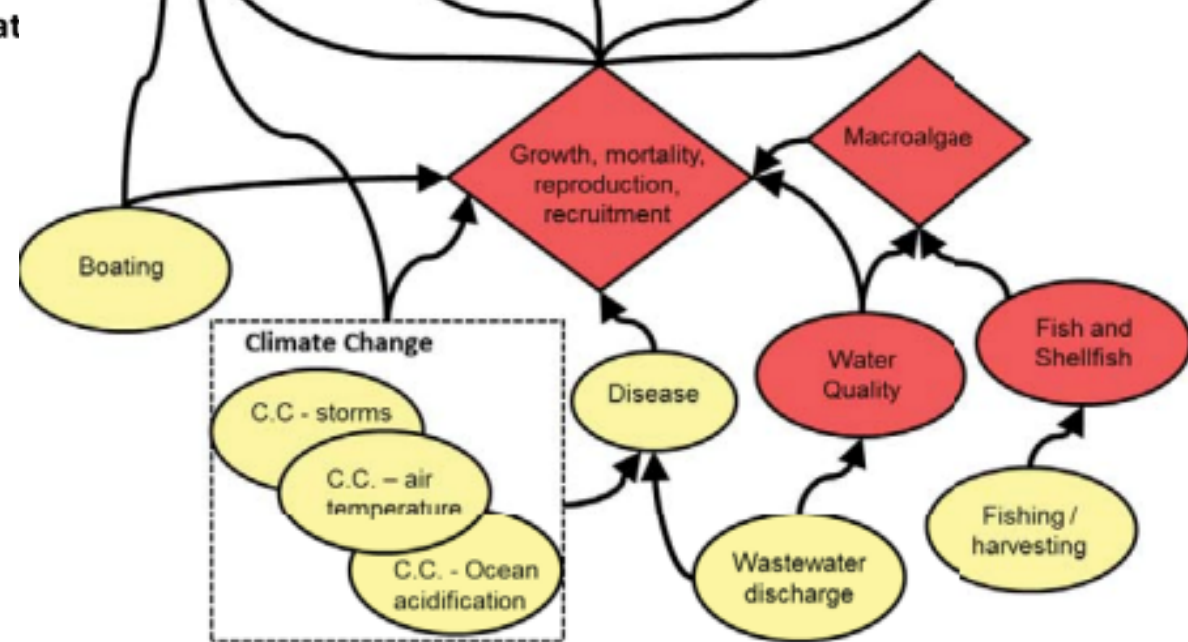
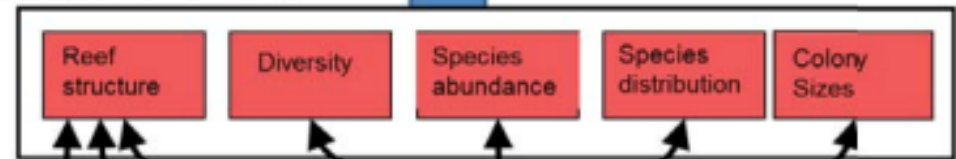
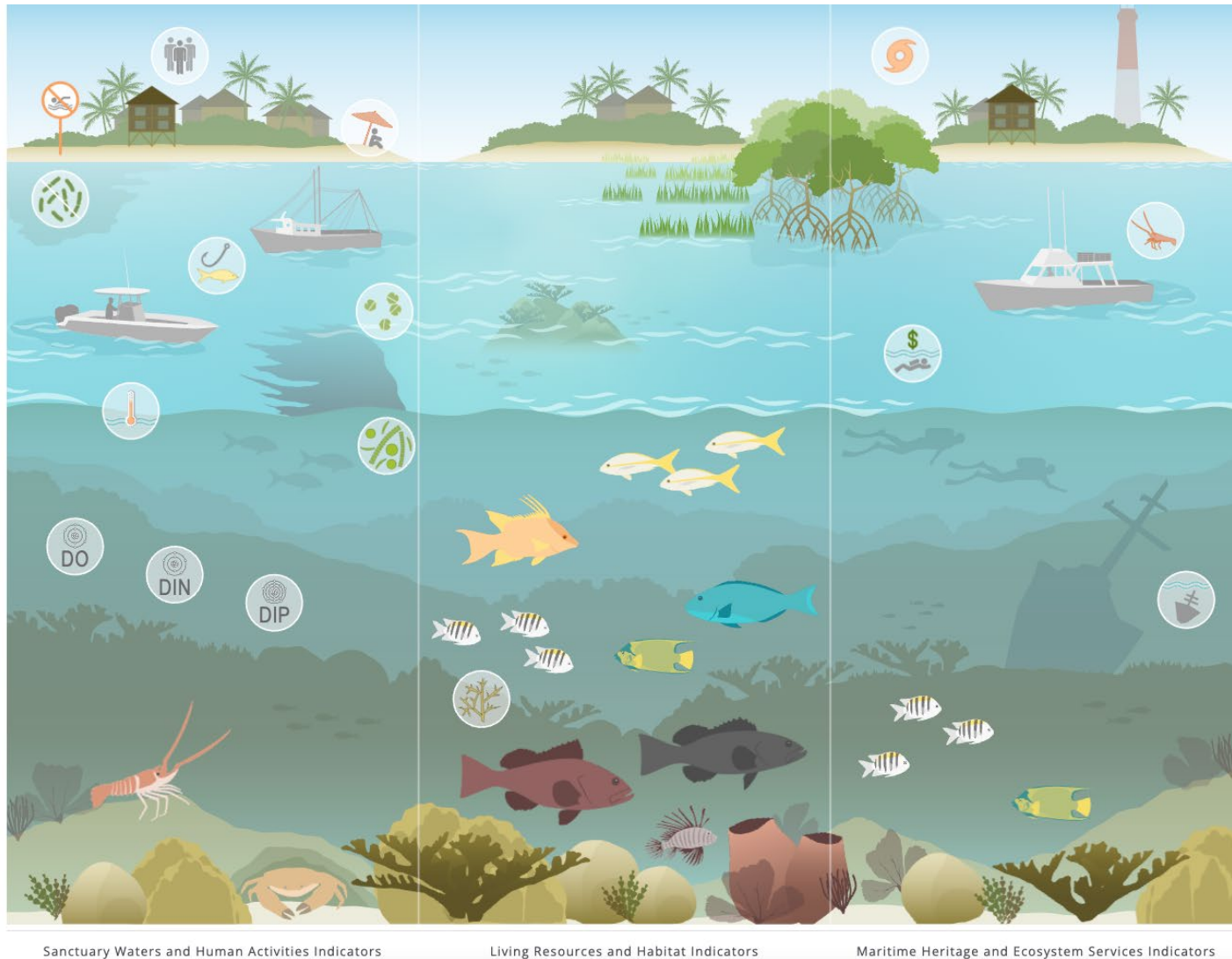


Figure 3. Coral and hardbottom submodel diagram for the Florida Keys/Dry Tortugas.

Sanctuary Watch (MARES Evolution)

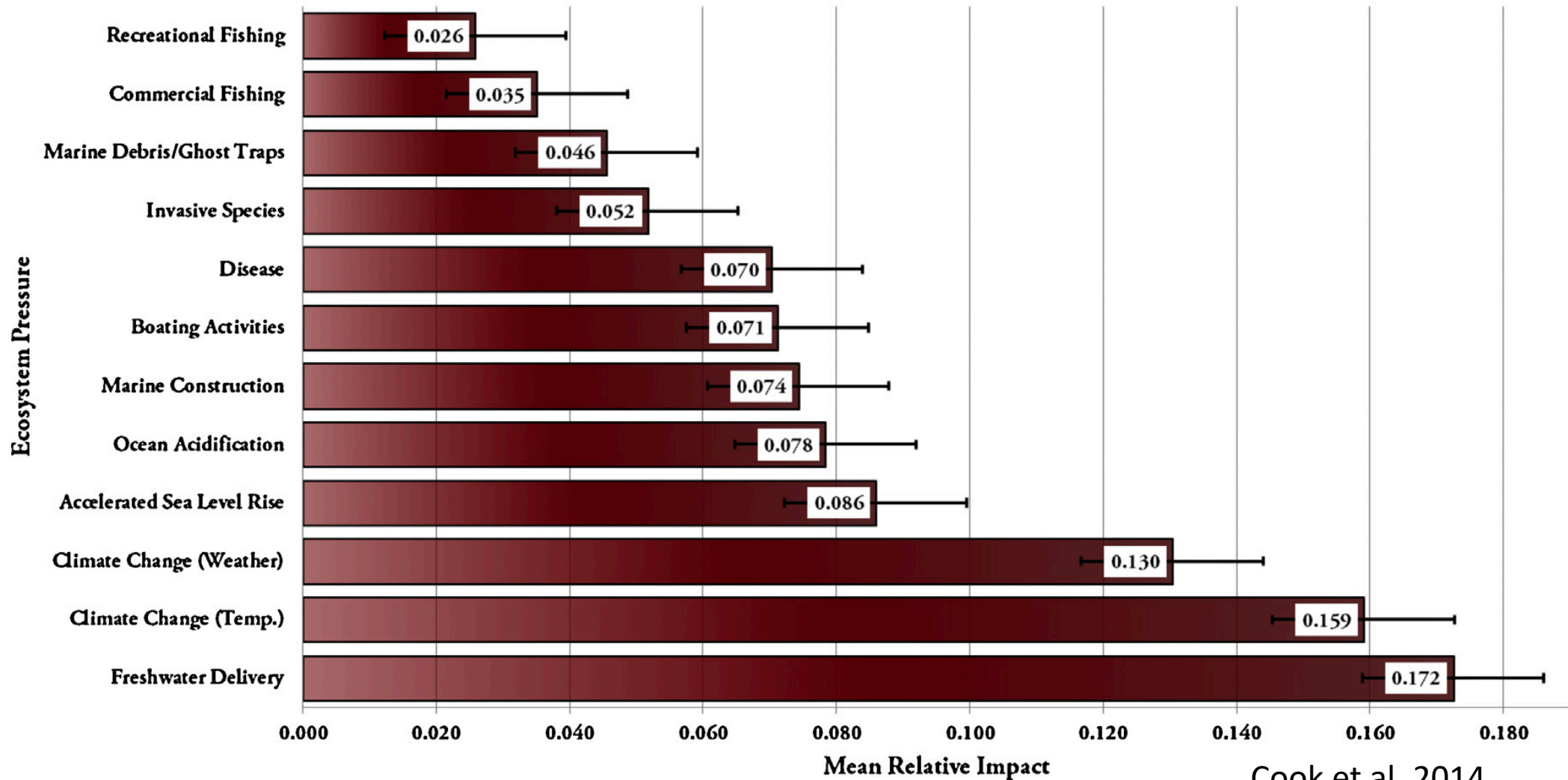


HABITAT
<ul style="list-style-type: none">Barrel sponges countCarbonate production at reef siteGreen macroalgae abundance on reef sitesMangrove shoreline spatial extentSeagrass abundanceStony coral living tissue areaStony coral species richness
HUMAN CONNECTIONS
LIVING RESOURCES
MARITIME HERITAGE
SANCTUARY WATERS

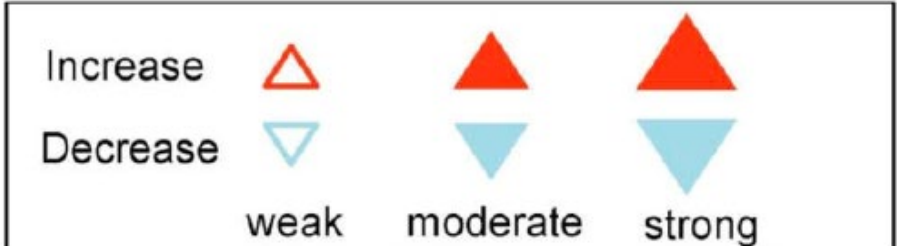
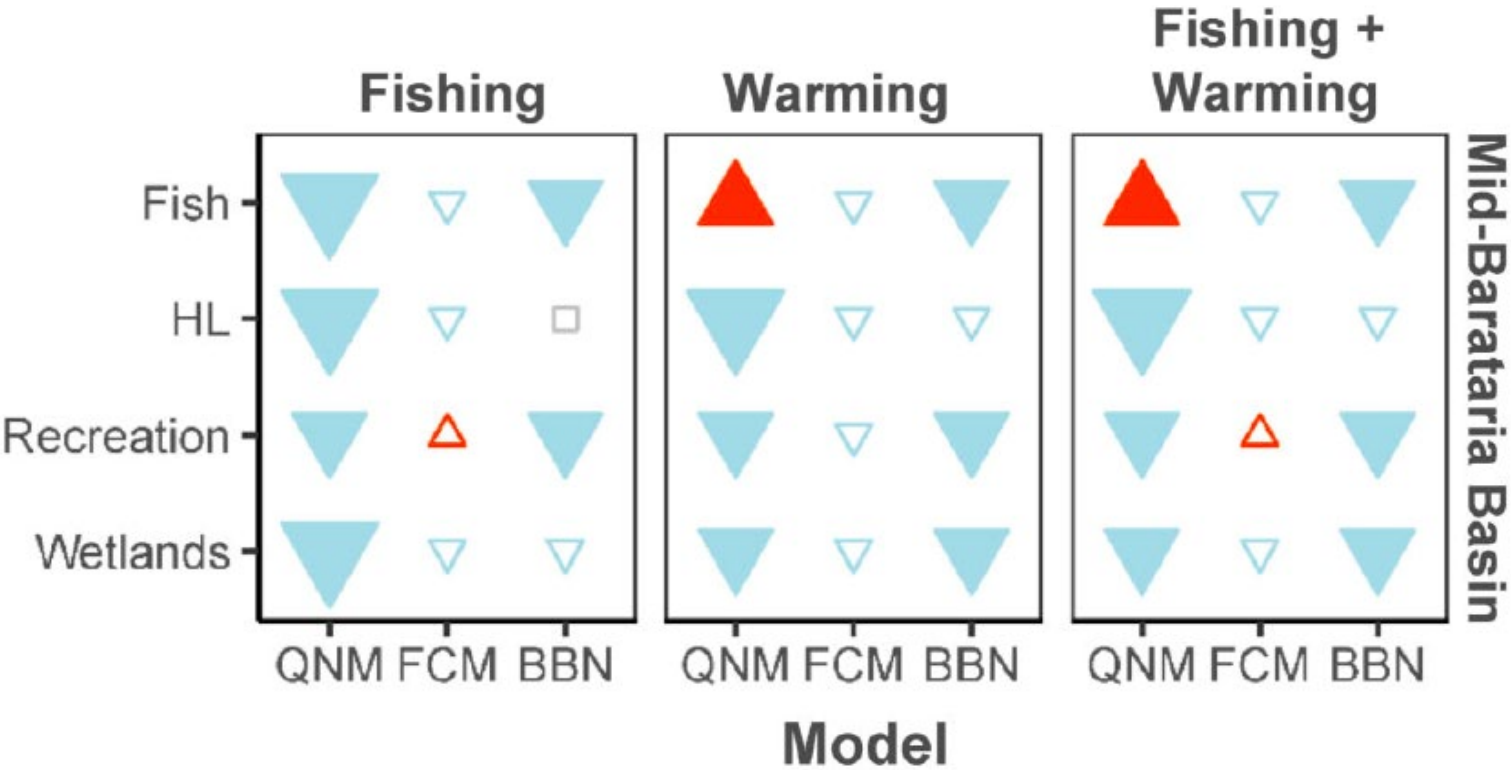
<https://sanctuarywatch.ioos.us/>

Conceptual Model Risk Assessment

Direct impact of ecosystem *Pressures* on *Ecosystem Services*



Evaluating Scenarios with conceptual models



DPSCR4 (Harwell et al. 2019)

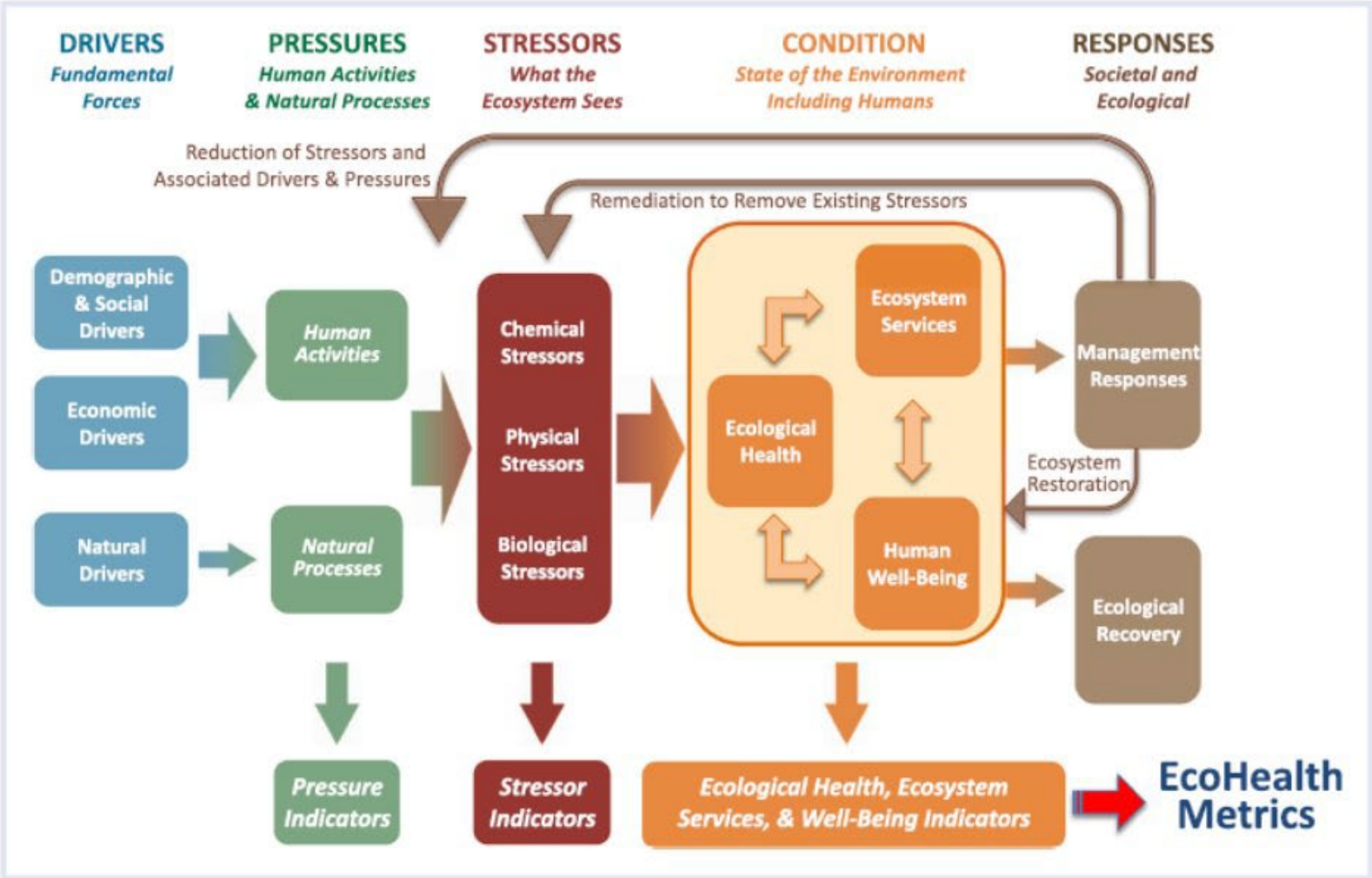
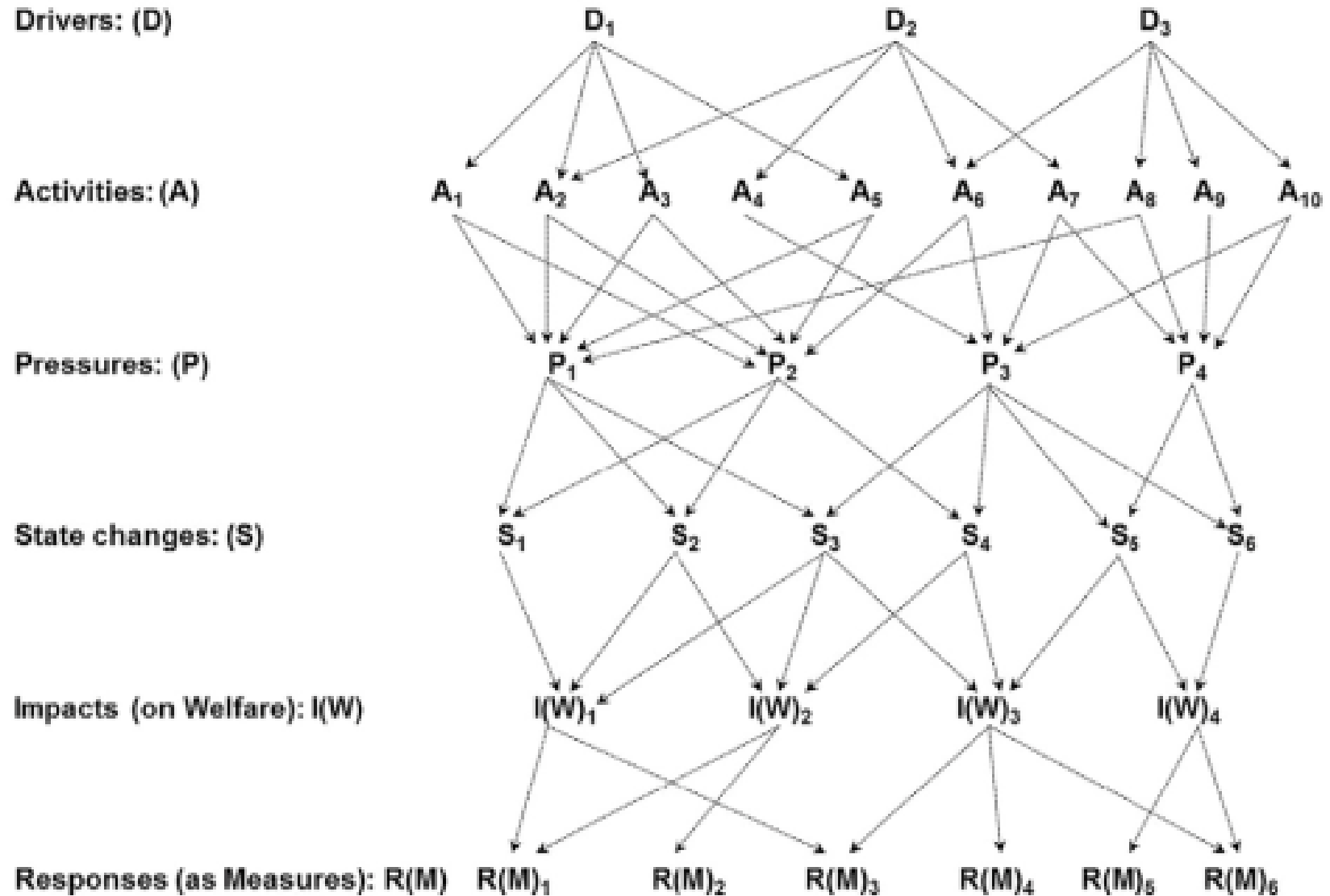


Figure 1. EcoHealth Conceptual Framework (DPSCR₄). DPSCR₄ = Drivers–Pressures–Stressors–Condition–Responses.

DAPSI(W)R(M) [Elliott et al. 2017]



CONCLUSIONS

- Conceptual Models need to include humans and should be graphical, if intended audience is beyond scientists
- Replacing Impacts with Ecosystem Services helped us to integrate with social sciences
- Conceptual Models have involved in the past decade since MARES and the best model framework depends on the project goals and purpose
- Conceptual Models are useful to select indicators, conduct risk assessments, and evaluate management scenarios

RESOURCES

<https://coastalscience.noaa.gov/project/goals-south-floridas-marine-estuarine-ecosystems-mares/>

- Kelble, C.R., D.K. Loomis, S. Lovelace, W.K. Nuttle, P.B. Ortner, P. Fletcher, G.S. Cook, J.J. Lorenz, and J.N. Boyer. 2013. The EBM-DPSEER conceptual model: integrating ecosystem services into the DPSIR framework. PLoS ONE, 8(8):e70766. doi:10.1371/journal.pone.0070766
- Cook, G.S., P.J. Fletcher, and C.R. Kelble. 2014. Towards marine ecosystem based management in South Florida: investigating the connections among ecosystem pressures, states, and services in a complex coastal system. Ecological Indicators, 44:26-39. doi:10.1016/j.ecolind.2013.10.026
- Lirman, D., N. Formel, S. Schopmeyer, J.S. Ault, S.G. Smith, D. Gilliam, and B. Riegl. 2014. Percent recent mortality (PRM) of stony corals as an ecological indicator of coral reef condition. Ecological Indicators, 44:120-127. doi:10.1016/j.ecolind.2013.10.021

“Great challenges are only overcome through effective collaboration”

Questions???

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INTEGRATED ECOSYSTEM ASSESSMENT