

Caribbean Fishery
Management Council

February 4th , 2021

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DAPs ECOSYSTEM CONCEPTUAL MODELS



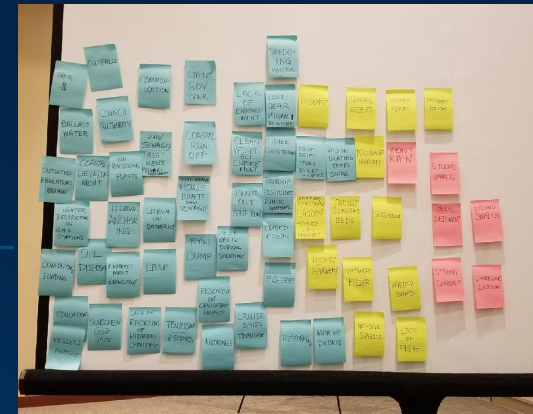
Caribbean EBFM

- May 23, 2016 : NOAA Fisheries supports implementation of Ecosystem Based Fisheries Management (EBFM)
- November 16, 2017: NOAA Fisheries release EBFM Roadmap
- March 22, 2019 : Release of *Ecosystem Based Fishery Management in the U.S. Caribbean Region: Roadmap Implementation Plan*

March 26-27, 2019

Joint DAP & SCC meeting

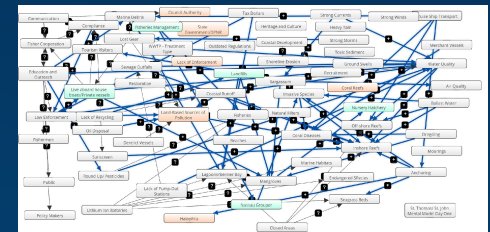
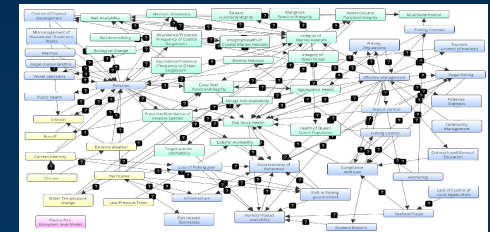
- DAPs STT/STJ, StX and PR identified most influential ecosystem components
- DAPs STT/STJ revisited cleaned up versions of the models for final refinement
- DAPs STT/STJ asked the group where sub-models may need to be developed in the future



April 23, 2019

165th CFMC Meeting

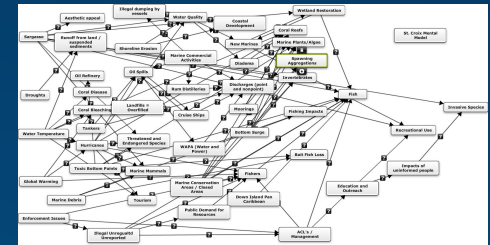
- DAP report on Conceptual Models in an Ecosystem-based fishery management framework meeting
- DAP STT/STJ, StX and PR presented ECM created in March 26-27, 2019 to CFMC



Jul 30-31, 2019

DAP STT/STJ, PR and StX Meeting

- STT/STJ DAP identified top ten priorities, addresses agencies needed at the table for this meeting, and added components to Fisheries sub-model.
- DAP PR, StX reviewed directions of the arrows and the impact one had on the other and discussed positive/negative impact on affected component



August 20, 2019

166th CFMC meeting

- DAPs report to CFMC: Presents latest ECM.
 - Established connections and their magnitude.
- DAP STT/StJ Presents top 11 components.
 - Presents request letter for STT/STJ DAP symposium integrating local agencies.
 - Presented “Fisheries Management Component”.

October 23, 2019

167th CFMC meeting

- Establishment of the EBFM Technical Advisory Panel

December 10-11,
2019

168th CFMC meeting

- EBFM FEP update
- EBFM TAP membership established

June 23, 2020

169th CFMC meeting

- Report on local fisheries affected by COVID-19
- EBFM FEP update

August 11, 2020

170th CFMC meeting

- EBFM FEP update
- DAPs report to the CFMC

2020

DAP Virtual Meetings

June 9:

- How the fishing industry is coping with COVID-19 impacts.
- Info passed to TAP and SSC.
- TAP is waiting for SSC to finalize ECM to incorporate in FEP.

August 24:

- Ecosystem Elements Discussion.
- Scored pending connections within the Ecosystem Conceptual Model. DAP requested discussion with local agencies to address connections.

February 2021: EBFM TAP update

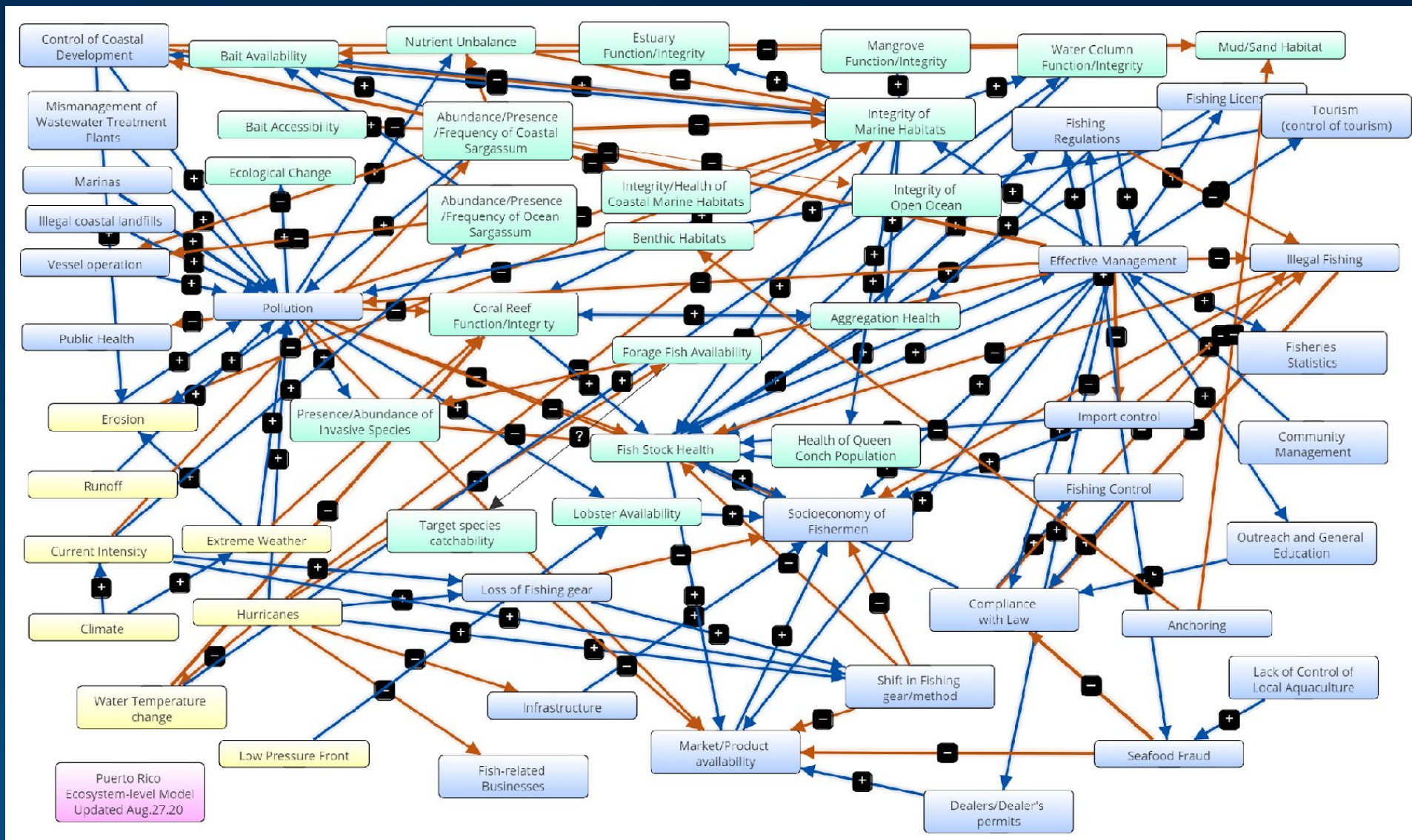
Q#	Driving Component	Affected Component	Strength
1a	Aggregations ←	Coral Reef	(H) M L +
1b	Aggregations ←	Fishing regulations	(H) M L +
1c	Aggregations →	Fishing stocks	(H) M L +
1d			H M L
1e			H M L
2a	Anchoring →	Coral Reef Benthic	(H) M L -
2b	Anchoring →	Mid - Sand Bank	(H) M L -
2c			H M L
3a	Climate →	Extreme Weather	H M L -
3b	Climate →	Currents Intensity	(H) M L -
3c	Coastal Development →	Marine Habitats	(H) M L -
4a	Coastal Development	Bait Scarcity	(H) M L -
4b	Coastal Development	Erosion	(H) M L -
4c	Coastal Development	Marine Habitats	(H) M L -
4d	Coastal Development	Pollution	(H) M L -
4e	Coastal Development	Coastal Disruption	H M L -
4f			H M L

Driving Component	Affected Component	MM Value	Variance
Aggregations (health of)	Coral Reef	0.75	0.00
Aggregations (health of)	Fish stocks (health of/abundance)	0.75	0.00
Anchoring	Benthic habitat (eg seagrass)	-0.75	0.00
Anchoring	mud, sand (eg. red grouper-mud)	-0.53	0.06
Climate	Extreme Weather	0.71	0.01
Climate	Current intensity	0.75	0.00
Coastal Development	Erosion	0.72	0.01
Coastal Development	Marine Habitats (physical impact/integrity (function))	-0.75	0.00
Coastal Development	Pollution	0.72	0.01
Coastal Development (Control of)	mud/sand habitat	-0.71	0.01
Community Management	Effective Management	0.71	0.01
Compliance with Law	Fish Stocks (health of/abundance)	0.75	0.00
Compliance with law	fishing control	0.72	0.01
Compliance with law	illegal fishing	-0.75	0.00

July 30th 2019

DAP Score Results

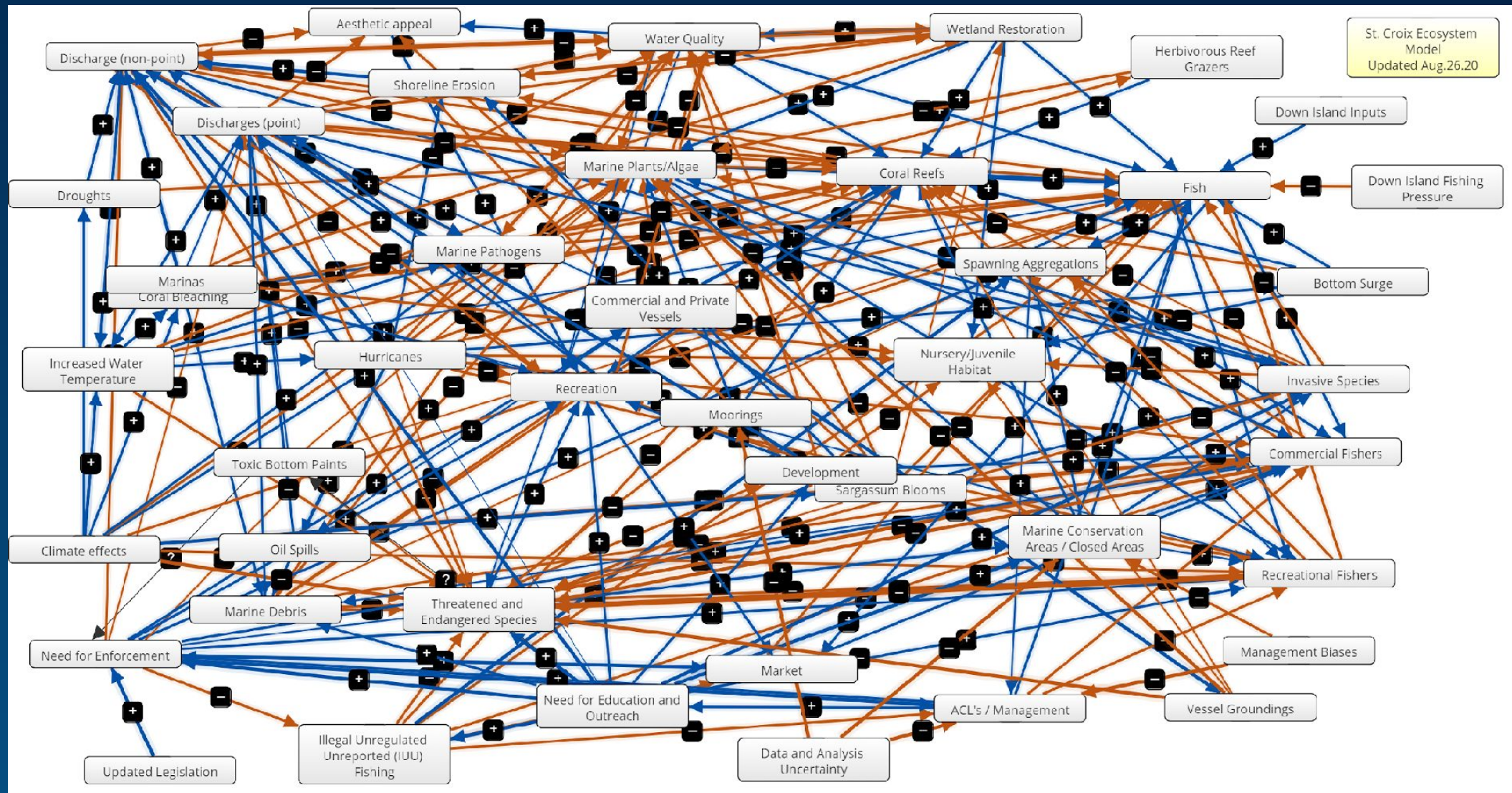
DAP PR Concept Model
August 27, 2020



DAP PR Conceptual Model / August 27, 2020

	Driving Component	Affected Component	Effect (pos/neg)	Magnitude (mean based on H/M/L scores)	MM Value	Variance
1						
2	Development	Shoreline Erosion	pos	0.75	0.75	0.0000
3	Development	Commercial Fishers	pos	0.75	0.75	0.0000
4	Development	Threatened and Endangered Species	neg	0.75	-0.75	
5	Development	Recreation	pos	0.75	0.75	0.0000
6	Need for Education and Outreach	Development	pos	0.75	0.75	0.0000
7	Need for Education and Outreach	Recreational Fishers	pos	0.75	0.75	0.0000
8	Need for Education and Outreach	Commercial Fishers	pos	0.75	0.75	0.0000
9	Commercial Fishers	Spawning Aggregations	neg	0.75	-0.75	
10	Hurricanes	Coral Reefs	neg	0.75	-0.75	0.0000
11	Hurricanes	Water Quality	neg	0.75	-0.75	0.0000
12	Hurricanes	Fish	neg	0.75	-0.75	0.0000
13	Hurricanes	Shoreline Erosion	pos	0.75	0.75	0.0000
14	Hurricanes	Nursery/Juvenile Habitats	neg	0.75	-0.75	0.0000
15	Moorings	Coral Reefs	pos	0.75	0.75	0.0000
16	Market	Fish	neg	0.75	-0.75	0.0000
17	Increased Water Temperature	Coral Bleaching	pos	0.75	0.75	0.0000
18	Increased Water Temperature	Marine Pathogens	pos	0.75	0.75	0.0000
19	Wetland Restoration	Nursery/Juvenile Habitats	pos	0.75	0.75	0.0000

DAP STX Score Results / August 26
2020

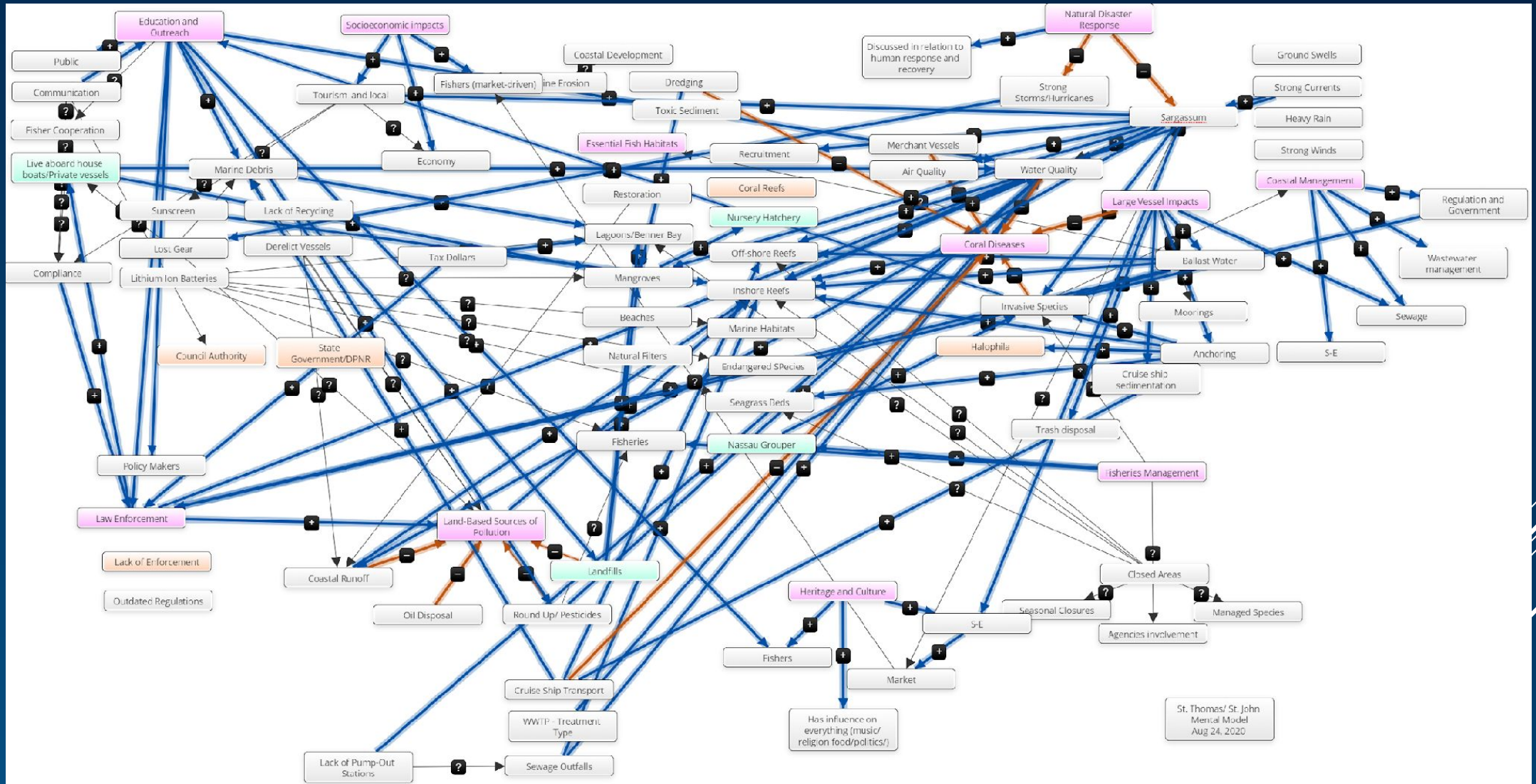


DAP StX Conceptual Model / August 26, 2020

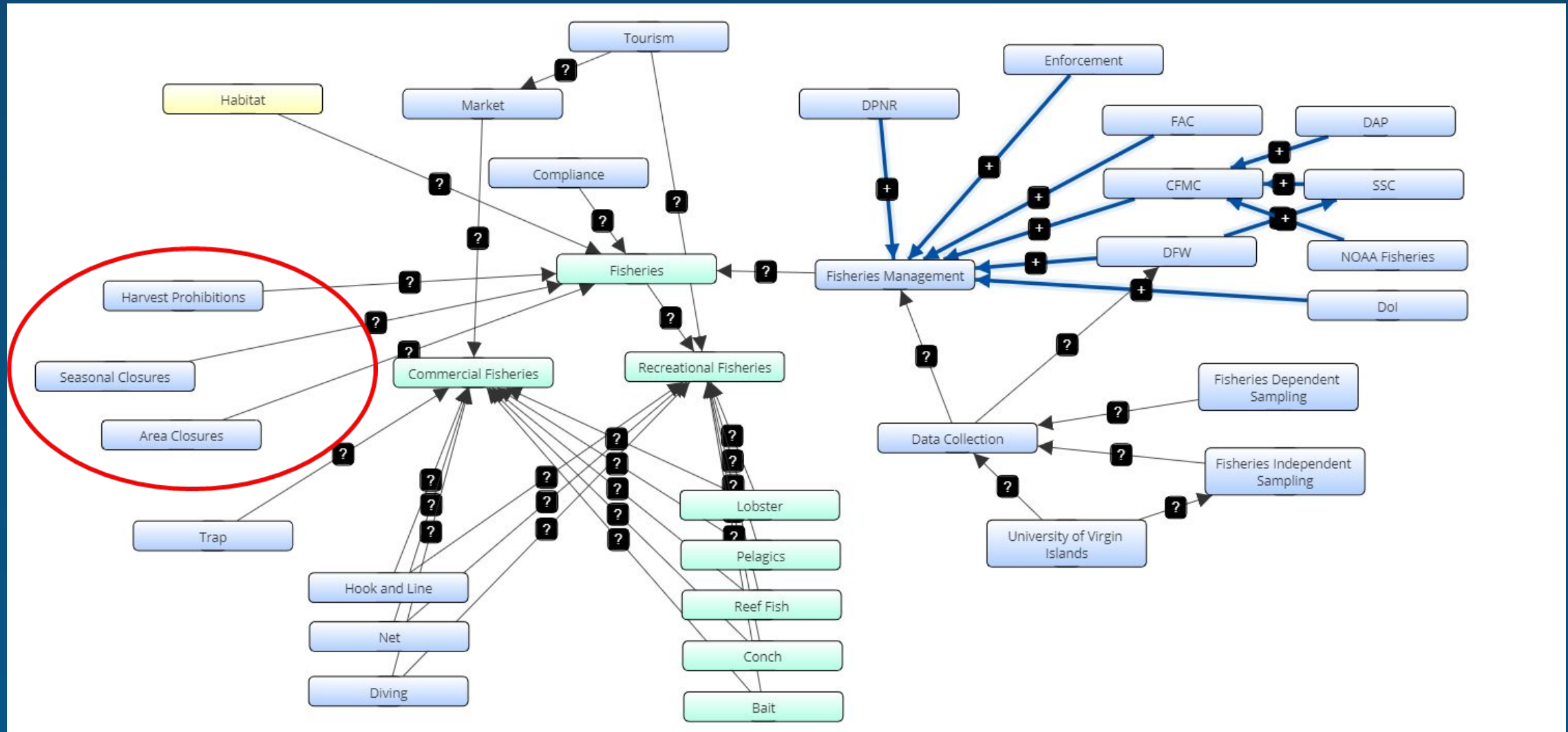
Driving Component	Affected Component	Effect (pos/neg)	H/M/L scores by consensus (Aug/25/20)	Magnitude (Mean based on H/M/L Scores)	MM value	Total number of Participants
Anchoring	Halophila	pos	H	0.75	0.75	10
Anchoring	Inshore Reefs	pos	H	0.75	0.75	10
Anchoring	Invasive Species	pos	H	0.75	0.75	10
Anchoring	Seagrass Beds	pos	H	0.75	0.75	10
Ballast Water	Inshore Reefs	pos	H	0.75	0.75	10
Ballast Water	Invasive Species	pos	H	0.75	0.75	10
Ballast Water	Offshore Reefs	pos	H	0.75	0.75	10
Ballast Water	Law Enforcement	pos	H	0.75	0.75	10
Ballast Water	Essential Fish Habitat	?	?			10

DAP StT/StJ Concept Model

August 24-25, 2020



DAP STT/STJ Conceptual Model / August 24, 2020



DAP STT/STJ Fisheries Conceptual Model / August 24, 2020

SSC	DAP StX	DAP PR	DAP StT/StJ
Coral Reefs (6) Habitat>Competing Uses of Resources	Hurricanes (13) >Coral Reefs >Commercial Fishers >Oil Spills >Threatened and Endangered Species >Recreation >Water Quality >Fish >Recreational Fishers >Shoreline Erosion >Marine Debris >Marine Plants/Algae >Nursery/Juvenile Habitats >Bottom Surge	Sargassum Coastal (abundance of/presence/frequency of) (8) >Bait accessibility >Bait availability >Integrity of Marine Habitats >Integrity of Open Ocean >Marine coastal Habitats (health of/integrity of) >Nutrients unbalance >Pollution >Vessels (operation of) >Bait availability >Vessels (operation of)	Closed Areas (6) >Inshore Reefs >Lagoons/Benner Bay >Offshore Reefs >Seagrass Beds >Seasonal Closures >Managed Species

Top 10 Components PR DAP Ecosystem Conceptual Model:	Top 13 Components STX DAP Ecosystem Conceptual Model:	Top 11 Components STT/STJ DAP Conceptual Model:	8 Components SSC Conceptual Model:
1. Effective Management 2. Pollution 3. Hurricanes 4. Marine Habitats 5. Fish Stocks 6. Imports 7. Regulatory Agencies 8. Coastal Development 9. Sargassum 10. Extreme Weather	1. Development 2. Need for Education and Outreach 3. Commercial Fishers 4. Hurricanes 5. Moorings 6. Market 7. Increased Water Temperature 8. Wetland Restoration 9. Marine Pathogens 10. Discharges (point) 11. Fish 12. Recreational Fishers 13. Management Bias	1. Enforcement 2. Land-based Sources of Pollution 3. Essential Fish Habitat 4. Coral Disease 5. Education and Outreach 6. Fisheries Management 7. Coastal Management 8. Heritage and Culture 9. Natural Disaster Response 10. Large Vessel Impacts 11. Socioeconomic Impacts	1. Marine Ecosystem Components 2. Abiotic Factors 3. Habitat 4. Water Quality 5. Fishing 6. Land-Based 7. Competing Uses of Resources 8. Socio-Economic Cultural Drivers