Report of the Scientific and Statistical Committee

June 22, 2020

Major emphasis on two items

SEDAR 57

(Spiny Lobster)

Conceptual Ecosystem Model

SSC Recommendations to CFMC

SEDAR 57: Spiny Lobster

ABC Control Rules

3 Tiers based on sources of information available

1. Catch Data
2. Size/age Composition
3. Index of Abundance

Tier 1 – Data Rich: All 3 sources available
Tier 2 – Data Moderate: 2 of the 3 sources available
Tier 3 – Data Limited: Only one source available

The spiny lobster stock assessment technically qualifies as a data moderate Tier 2 assessment based on the types of input data.

However, from discussion between the SEFSC and the SSC, it is agreed that in the current form the data made this more of a Tier 3 Assessment due to uncertainty in the reliability of the catch data, but with the hope that with on-going improvements in the data (e.g., correction factors, random sampling of length composition) it will move this into a Tier 2 Assessment in the future.

Tier 3 "Data Limited Quantitative Assessments"

Condition for Use	Relatively data-limited or out-of-date assessments
MSY	MSY proxy* = long-term yield at proxy for FMSY
SDC	MFMT = F_{MSY} proxy MSST = 0.75* SSB MFMT or proxy OFL = Catch at MFMT
ABC	ABC determined from OFL as reduced (buffered) by **scientific uncertainty** and reflecting the acceptable **probability of overfishing** Where the buffer is applied to the PDF of OFL when the PDF is determined from the assessment (with $\sigma \geq 2\sigma_{min}$) **OR** Where ABC = buffer * **OFL**, where buffer must be ≤ 0.9

*MSY proxy = 30% SPR (Spawning Potential Ratio)

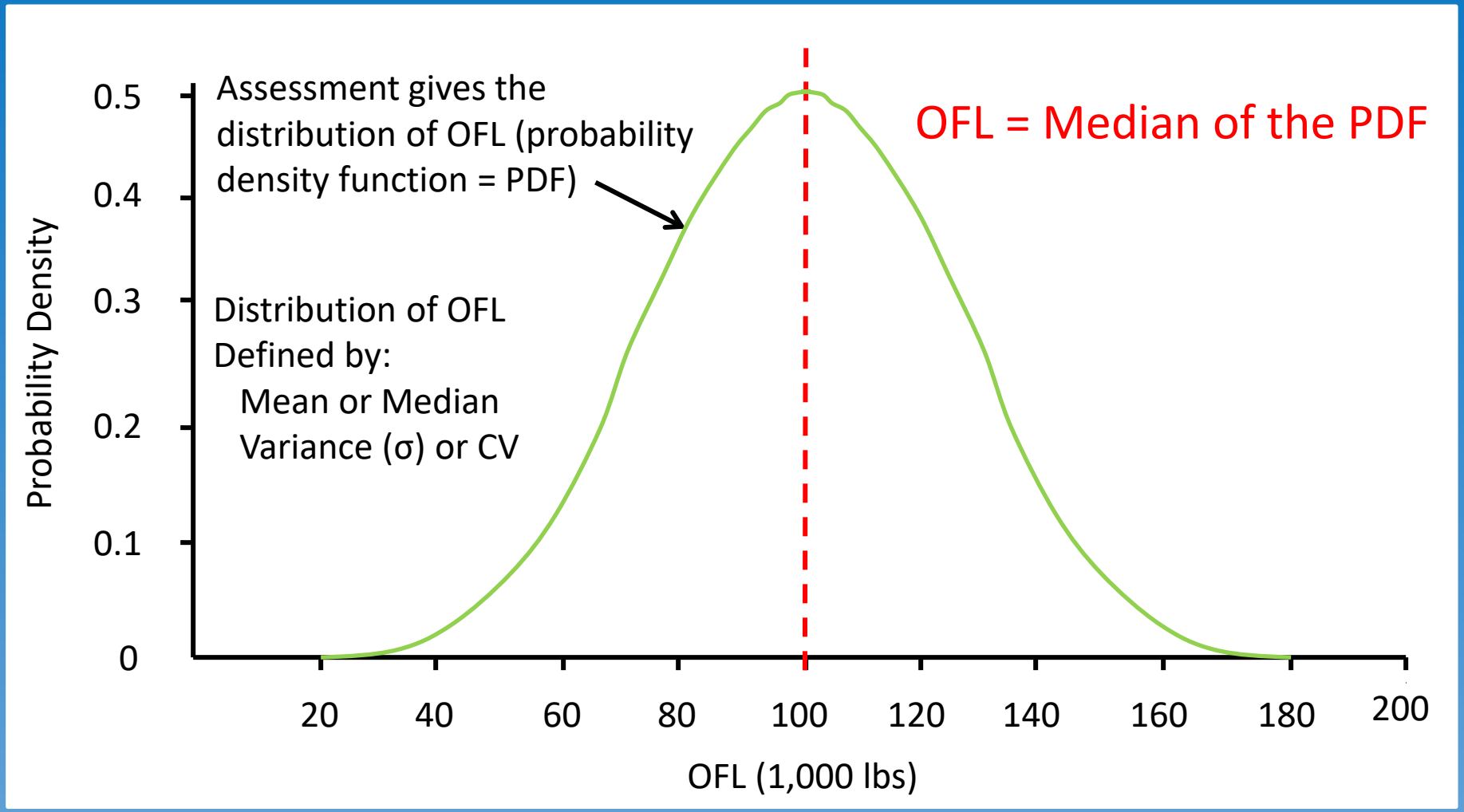
ABC = Scientific Uncertainty x Risk of Overfishing x OFL

Buffer

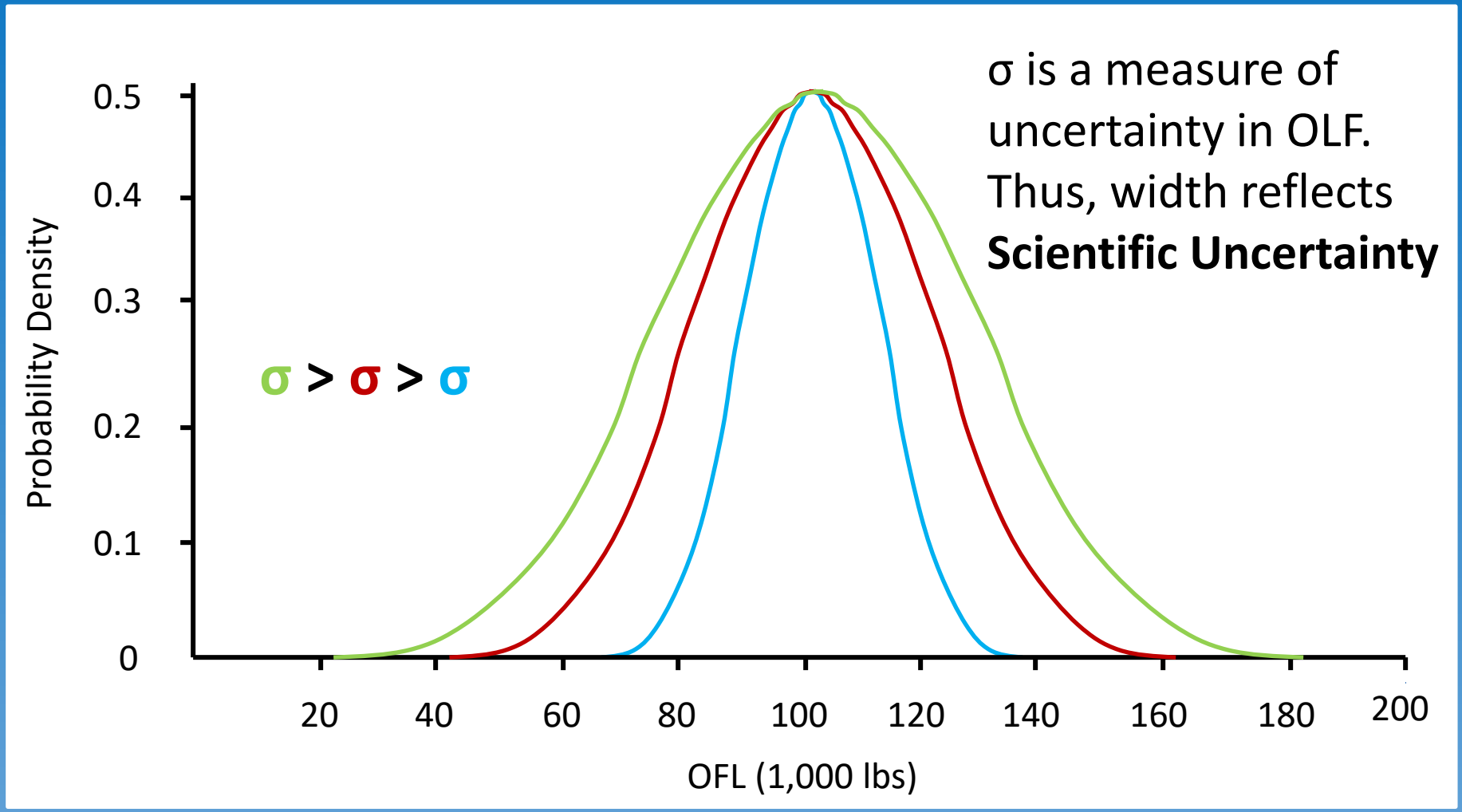
OR

ABC = SU x P* x OFL

Setting OFL


Assessment gives the distribution of OFL (probability density function = PDF)
Distribution of OFL Defined by:
Mean or Median
Variance (σ) or CV
OFL = Median of the PDF
Probability Density
0.5
0.4
0.3
0.2
0.1
0
20
40
60
80
100
120
140
160
180
200
OFL (1,000 lbs)

Setting Scientific Uncertainty



Scientific Uncertainty is dependent on σ_{min} and a multiplier where for Tier 3: $\sigma \geq 2\sigma_{min}$

(Note: σ must increase as scientific uncertainty increases, i.e., Tier 1 < Tier 2 < Tier 3)

Sigma min (σ_{min}) recommendation:

Starting with Ralston et al. (2011) and improved on by Privitera-Johnson and Punt (2020), the SSC agrees to use $\sigma_{min} = 0.5$.

(See discussion on the record: best estimate, includes uncertainty.)

There are similar amounts of scientific uncertainty in the 3 Island Platforms.

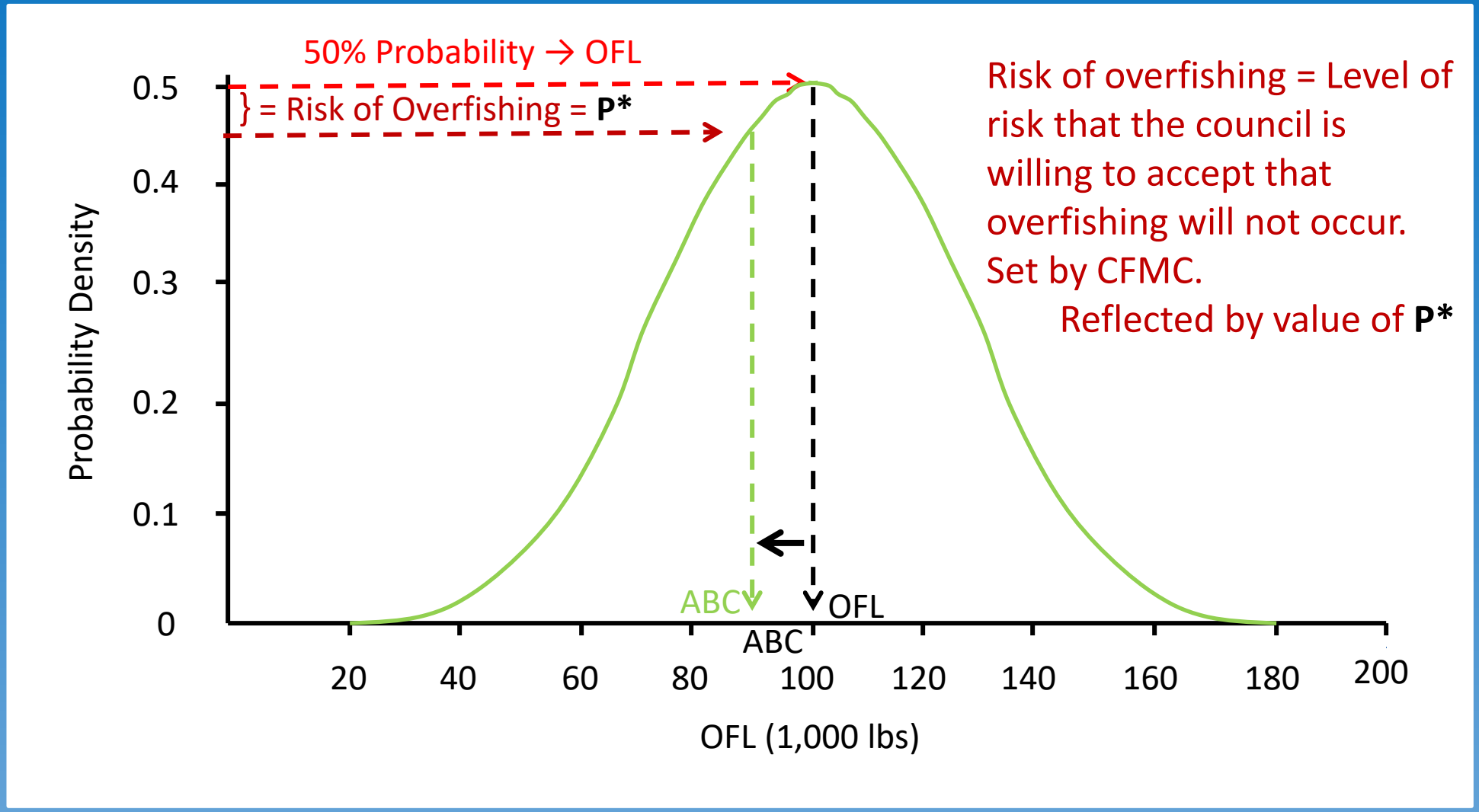
Multiplier:

The multiplier, as per the Tier 3 ABC CR, has to be greater than or equal to 2.

The SSC felt that with Spiny Lobster the multiplier should be set fairly low

Therefore, the SSC chose the minimum value of the multiplier (= 2) allowed under the Tier 3 ABC CR

Setting ABC


50% Probability → OFL
} = Risk of Overfishing = P*
Probability Density
0.5
0.4
0.3
0.2
0.1
0
ABC
OFL
ABC
20
40
60
80
100
120
140
160
180
200
OFL (1,000 lbs)
Risk of overfishing = Level of risk that the council is willing to accept that overfishing will not occur.
Set by CFMC.
Reflected by value of P*

P*

P* is set by the Council. Final value has not been decided and is needed before the SSC can set the ABC. However, the CFMC has presented a range of P* values

The SSC agrees that the range of the P* (0.4-0.45) is reasonable for the Council to consider. The SSC suggests the Council consider:

(1) time to next assessment (longer time: P* → down)

(2) other mgt regs (e.g., min size, closed seasons/areas) (more mgt: P* → up)

(3) the life history of each species

(4) other factors

Updated projections from SEFSC provided to SSC

The SSC agreed to use the 3-year average of the most recent landings (PR 2017-2018-2019; STT/STX 2016-2017-2018)* to estimate landings for 2020 (PR) and 2019-2020 (USVI) to project potential future OFLs for spiny lobster for each Island platform.

Using those OFLs, the SSC developed a Table of ABCs over the range of P* values as provided by the CFMC (0.4-0.45).

*In Puerto Rico, the landings are complete through 2018 and 99% complete in 2019. For 2017, the 2016 correction factor was used and for 2019, the 2018 correction factor was used.

In St. Thomas/St. John and St. Croix, landings are complete through 2018 and 2019. Data include records through early September 2019. For Puerto Rico (PR), 2020 values were set equal to the average landings from 2017-2019.

For St. Thomas/St. John (STT) and St. Croix (STX), 2019 and 2020 values were set equal to the average landings from 2016-2018.

Puerto Rico - Updated Projections Using 2*sigma_min with sigma_min = 0.5 (lbs)							
Year	OFL	ABC P* = 0.40	ABC P* = 0.41	ABC P* = 0.42	ABC P* = 0.43	ABC P* = 0.44	ABC P* = 0.45
2021	406,257	315,336	323,578	331,986	340,567	349,330	358,283
2022	425,164	330,011	338,637	347,436	356,417	365,587	374,958
2023	430,109	333,850	342,576	351,477	360,562	369,839	379,319
2024	431,140	334,651	343,398	352,320	361,427	370,727	380,229
2025	431,566	334,981	343,736	352,668	361,784	371,092	380,604
2026	431,905	335,244	344,007	352,945	362,068	371,384	380,903
%	Reduction	12.0	9.7	7.3	4.9	2.5	

St. Thomas/St. John - Updated Projections Using 2*sigma_min with sigma_min = 0.5 (lbs)

Year	Avg_OFL	ABC P* = 0.40	ABC P* = 0.41	ABC P* = 0.42	ABC P* = 0.43	ABC P* = 0.44	ABC P* = 0.45
2021	186,341	144,638	148,418	152,275	156,211	160,230	164,337
2022	160,714	124,746	128,006	131,332	134,727	138,194	141,736
2023	148,335	115,137	118,147	121,217	124,350	127,549	130,819
2024	142,313	110,463	113,351	116,296	119,302	122,371	125,508
2025	139,044	107,926	110,747	113,624	116,561	119,560	122,625
2026	137,056	106,383	109,163	112,000	114,895	117,851	120,872

St. Croix - Updaed Projections Using 2*sigma_min with sigma_min = 0.5 (lbs)

Year	Avg_OFL	ABC P* = 0.40	ABC P* = 0.41	ABC P* = 0.42	ABC P* = 0.43	ABC P* = 0.44	ABC P* = 0.45
2021	197,709	153,462	157,473	161,565	165,741	170,005	174,363
2022	158,538	123,057	126,273	129,554	132,903	136,322	139,817
2023	143,801	111,618	114,536	117,512	120,549	123,651	126,820
2024	137,668	106,858	109,651	112,500	115,408	118,377	121,411
2025	134,529	104,421	107,151	109,935	112,776	115,678	118,643
2026	132,599	102,923	105,614	108,358	111,159	114,019	116,941

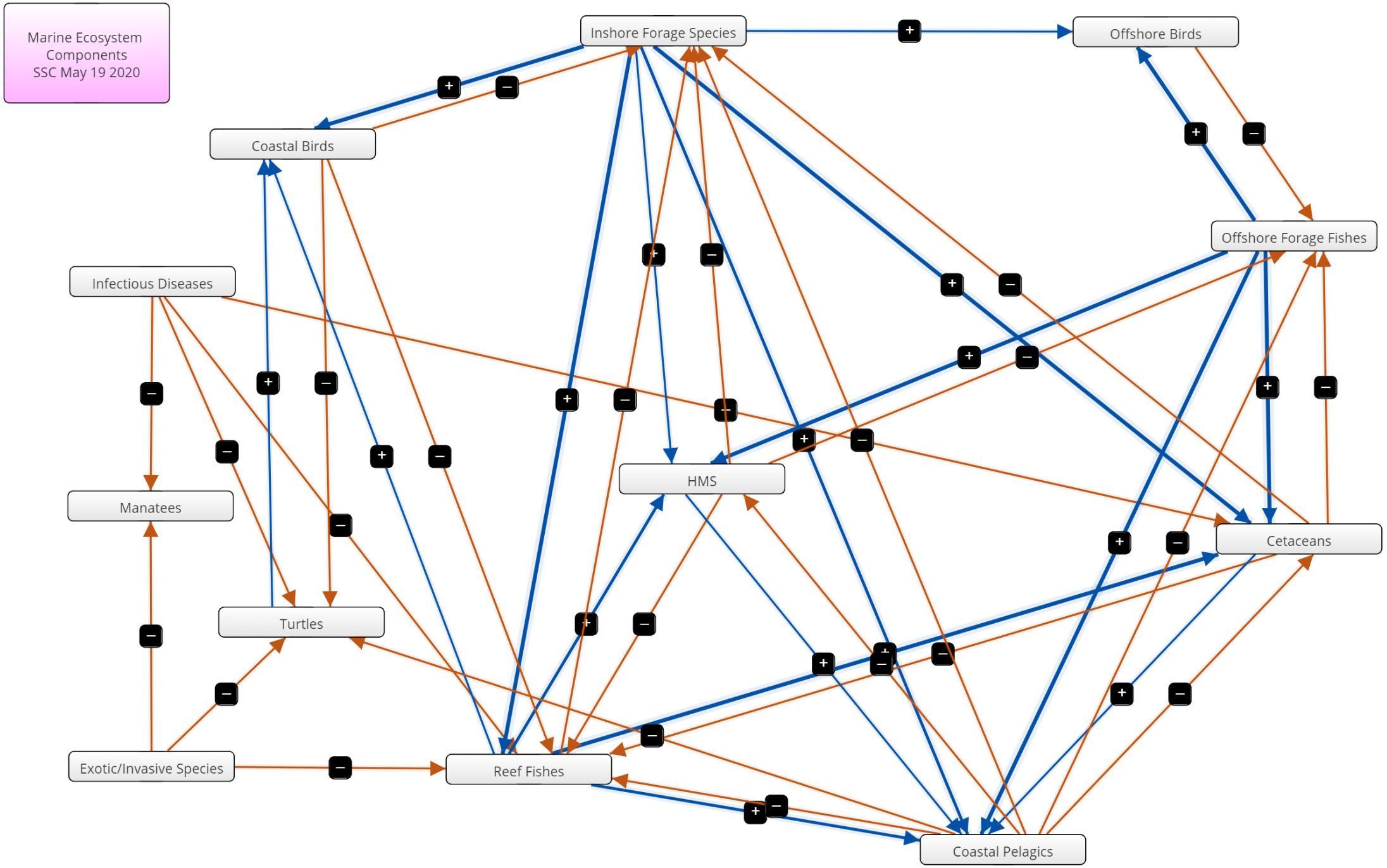
Recommendation:

The SSC recommends to the CFMC, based on comments provided by the fishing sector stating that 2020 will be different due to pandemic, to have updated projections for spiny lobster for all three Islands using 2020 data as soon as possible. This will also allow for the use of the final 2019 PR data due to questions concerning the availability of the correction factors for that year.

SSC Ecosystem Conceptual Model

Model has 8 Submodels
Submodels have variable number of components

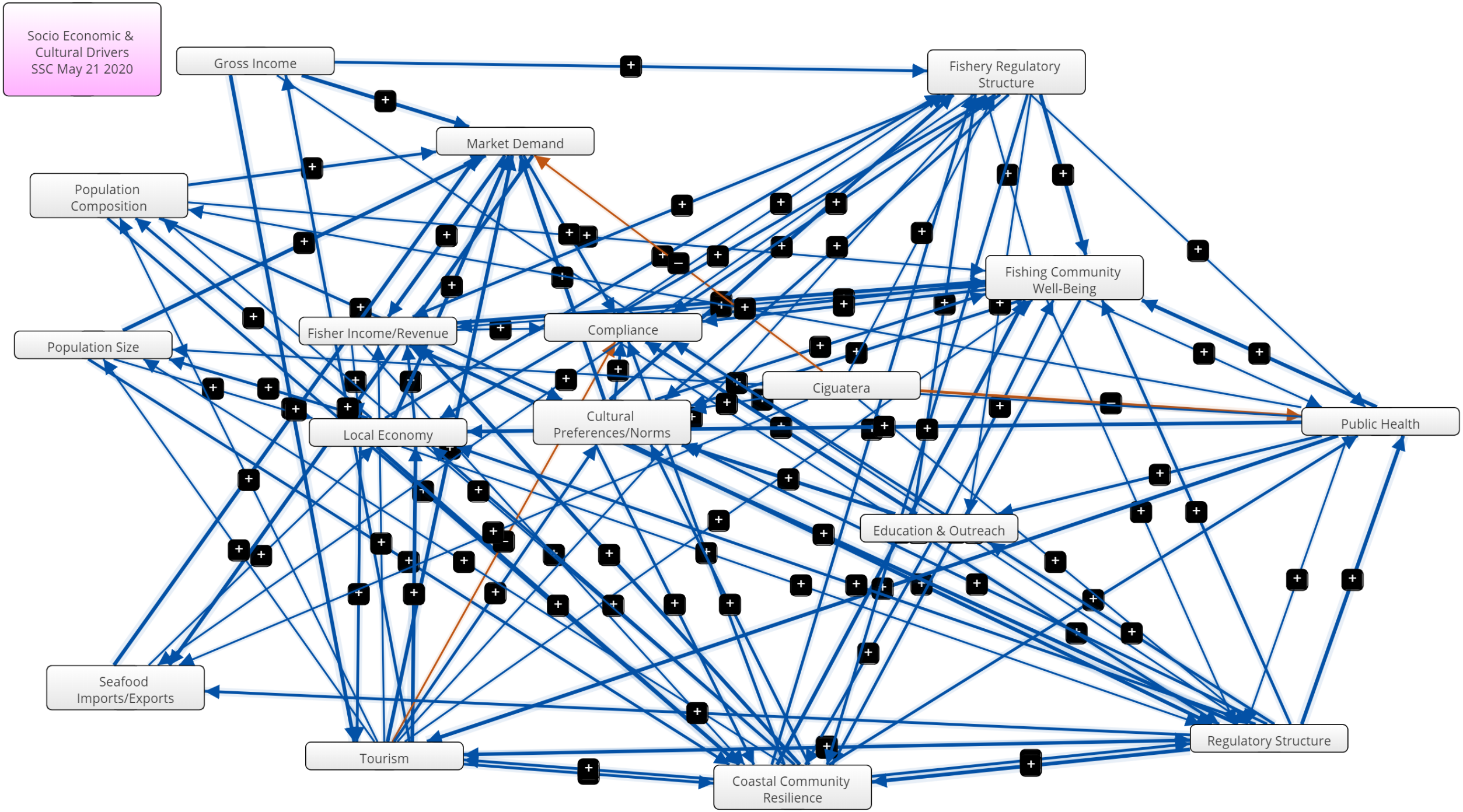
- **Marine Ecosystem Components (12)**
- **Competing Use of Resources (15)**
- **Socio-economic and Cultural Drivers (16)**
- **Land-Based Uses (8)**
- **Fishing (10)**
- **Water Quality** (6)
- **Habitat (5)**
- **Abiotic Factors (9)**


Marine Ecosystem Components
SSC May 19 2020
Inshore Forage Species
Offshore Birds
Coastal Birds
Offshore Forage Fishes
Infectious Diseases
HMS
Manatees
Cetaceans
Turtles
Exotic/Invasive Species
Reef Fishes
Coastal Pelagics

	Infectious Diseases	Exotic/Invasive Species	Manatees	Turtles	Inshore Forage Species	Reef Fishes	Coastal Birds	Offshore Forage Fishes	Offshore Birds	Cetaceans	HMS	Coastal Pelagics
Infectious Diseases			-1	-1		-1				-1		
Exotic/Invasive Species			-1	-1		-1						
Manatees												
Turtles							1					
Inshore Forage Species						3	3		1	3	1	2
Reef Fishes					-1		1			3	2	2
Coastal Birds				-1	-1	-1						
Offshore Forage Fishes									3	3	3	3
Offshore Birds								-1				
Cetaceans					-1	-1		-1				1
HMS					-1	-1		-1				1
Coastal Pelagics				-1	-1	-1		-1		-1	-1	

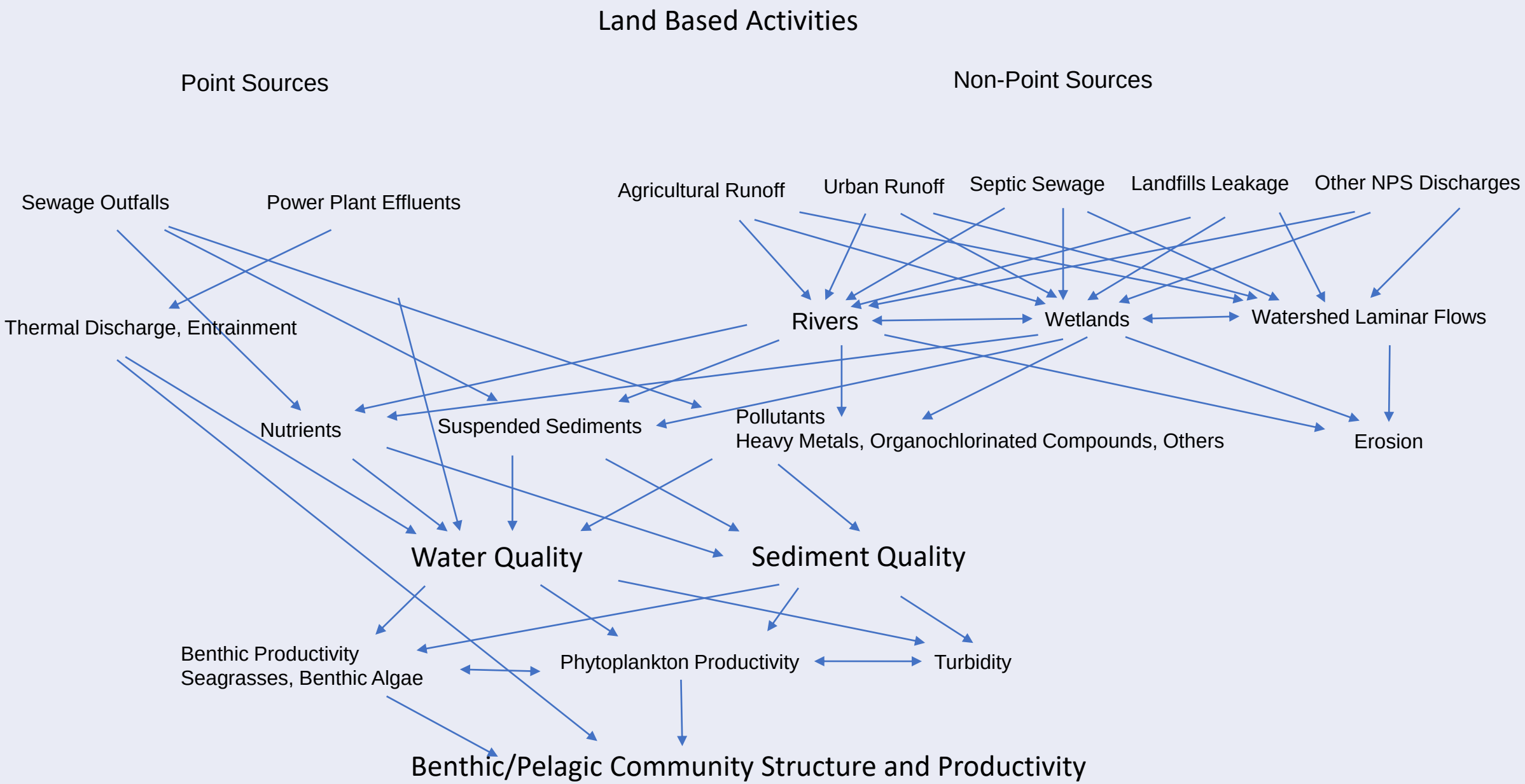
Black = Original 10.30.19

Red=Edited 05.19.2020


Socio Economic & Cultural Drivers SSC May 21 2020
Gross Income
Fishery Regulatory Structure
Market Demand
Population Composition
Fishing Community Well-Being
Fisher Income/Revenue
Compliance
Population Size
Ciguatera
Cultural Preferences/Norms
Public Health
Local Economy
Education & Outreach
Seafood Imports/Exports
Regulatory Structure
Tourism
Coastal Community Resilience

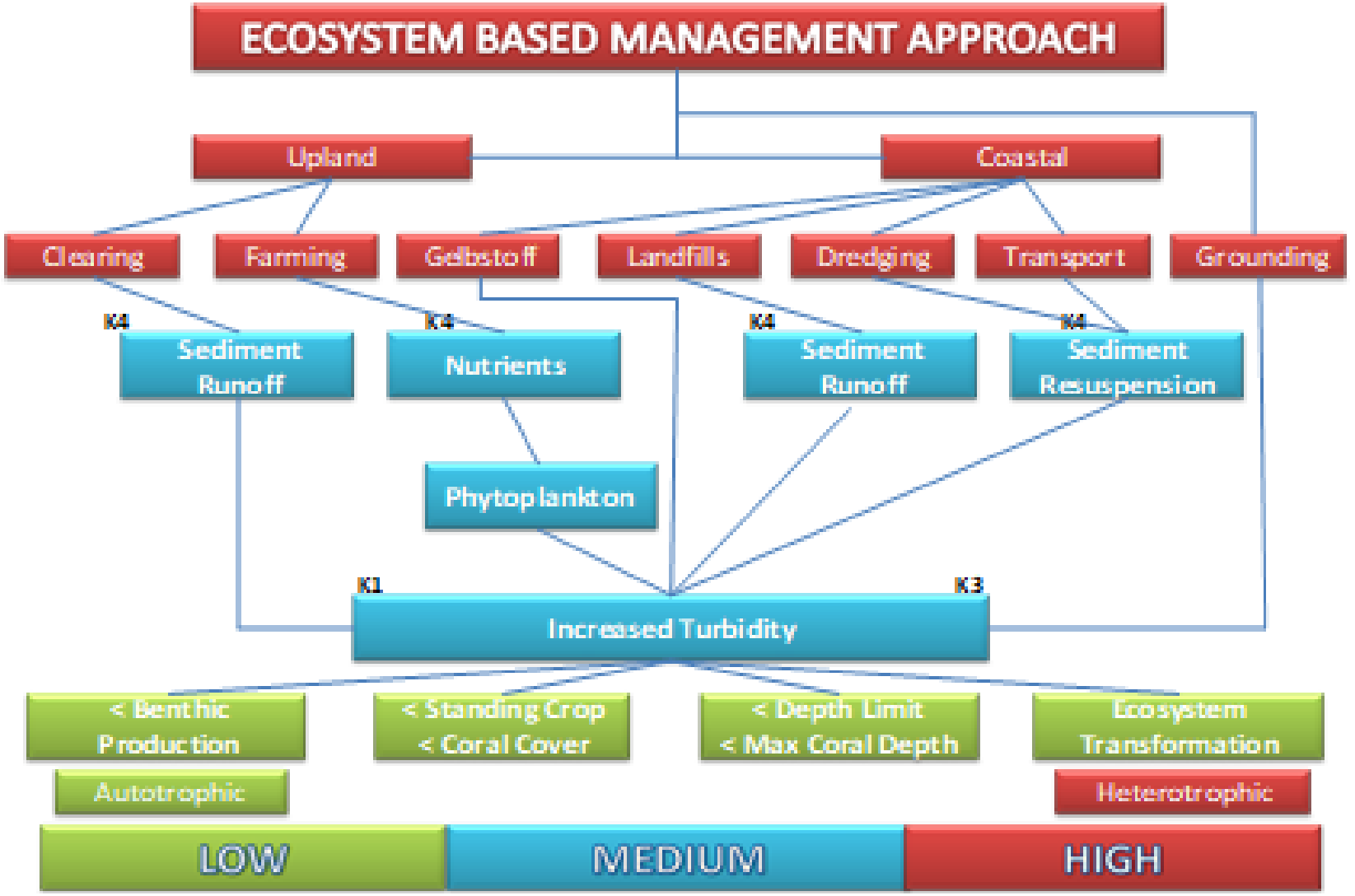
Socio-economic and Cultural Drivers

	Gross Income	Population Composition	Population Size	Seafood Imports/Exports	Market Demand	Fisher Income/Revenue	Local Economy	Tourism	Education & Outreach	Compliance	Cultural Preferences/Norms	Coastal Community Resilience	Fishing Community Well-Being	Ciguatera	Public Health	Regulatory Structure	Fishery Regulatory Structure
Gross Income					3			3								1	2
Population Composition					2						2	2	1				
Population Size					3		1					2					
Seafood Imports/Exports					3		1										
Market Demand				3		3				2							
Fisher Income/Revenue							1			1		1	3				
Local Economy		2	2		3	2		2				3				1	2
Tourism	2	1	1		3	1	3			-1	2	2	1			1	1
Education & Outreach										3	3	2	2			2	2
Compliance						1							2			1	1
Cultural Preferences/Norms					3					2		2	2			3	3
Coastal Community Resilience		1	1			3	2	2		2	2		3	2		2	2
Fishing Community Well-Being						1				2	2	2		1		1	1
Ciguatera				1	-1						1			-2		1	1
Public Health		1	1				3	3	2				3			1	
Regulatory Structure				2		3	2	2	1	2	2	3	2	3			
Fishery Regulatory Structure				1		2	2		1	2	2	2	3	1			

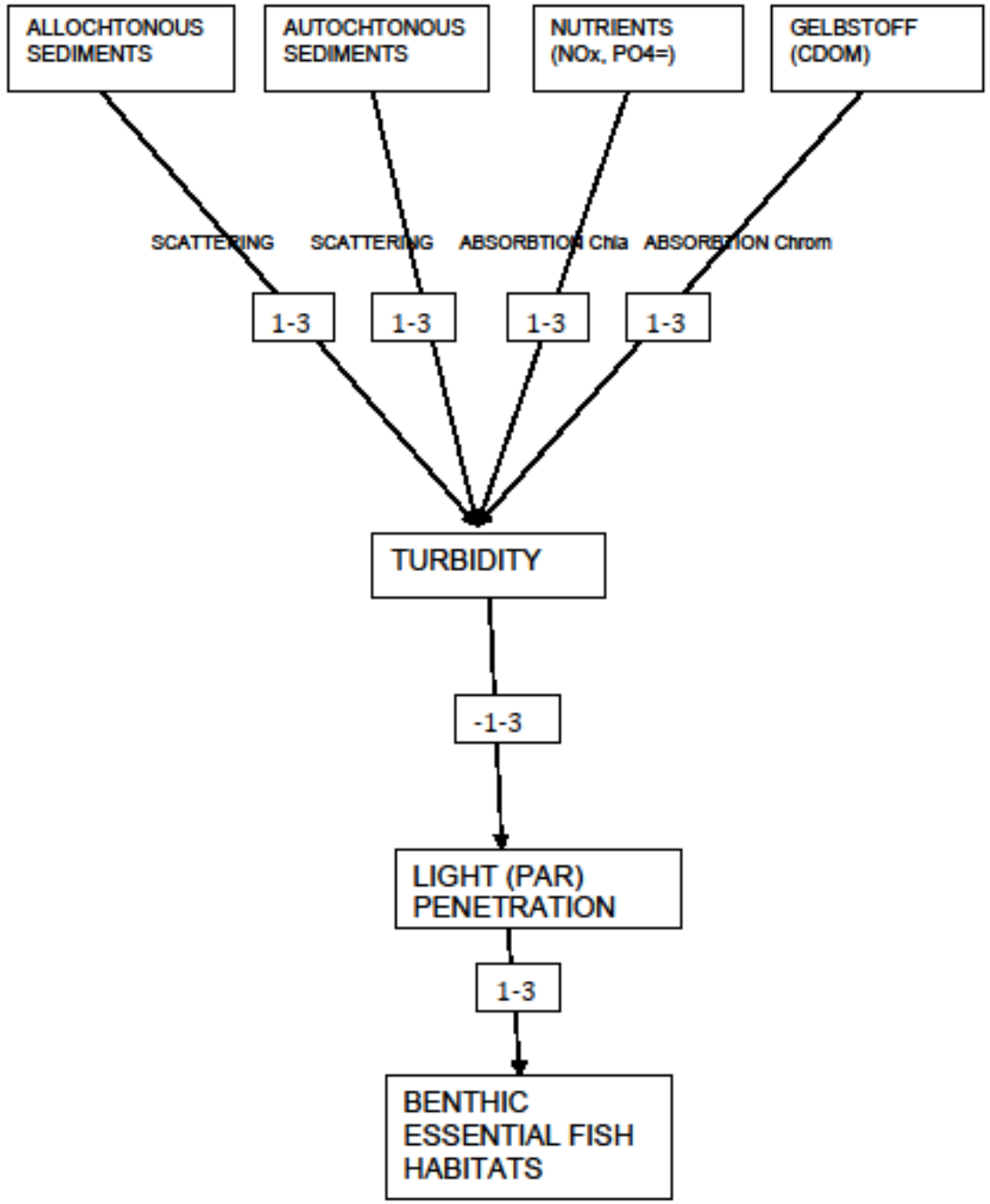

Land Based Activities
Point Sources
Non-Point Sources
Sewage Outfalls
Power Plant Effluents
Agricultural Runoff
Urban Runoff
Septic Sewage
Landfills Leakage
Other NPS Discharges
Thermal Discharge, Entrainment
Rivers
Wetlands
Watershed Laminar Flows
Nutrients
Suspended Sediments
Pollutants
Heavy Metals, Organochlorinated Compounds, Others
Erosion
Water Quality
Sediment Quality
Benthic Productivity
Seagrasses, Benthic Algae
Phytoplankton Productivity
Turbidity
Benthic/Pelagic Community Structure and Productivity

Model of Factors Affecting Turbidity

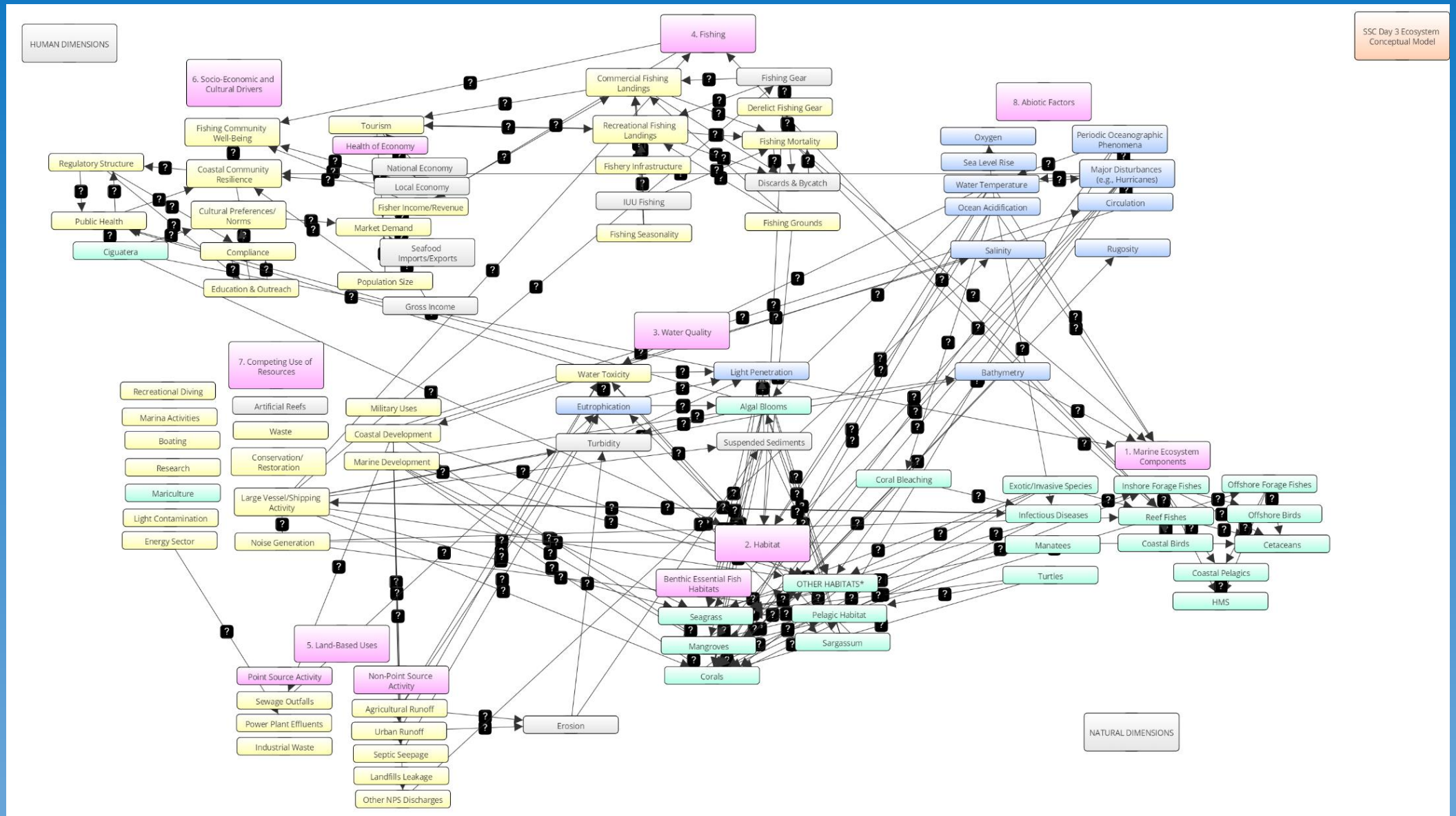
Type of inputs relate to both source and impacts



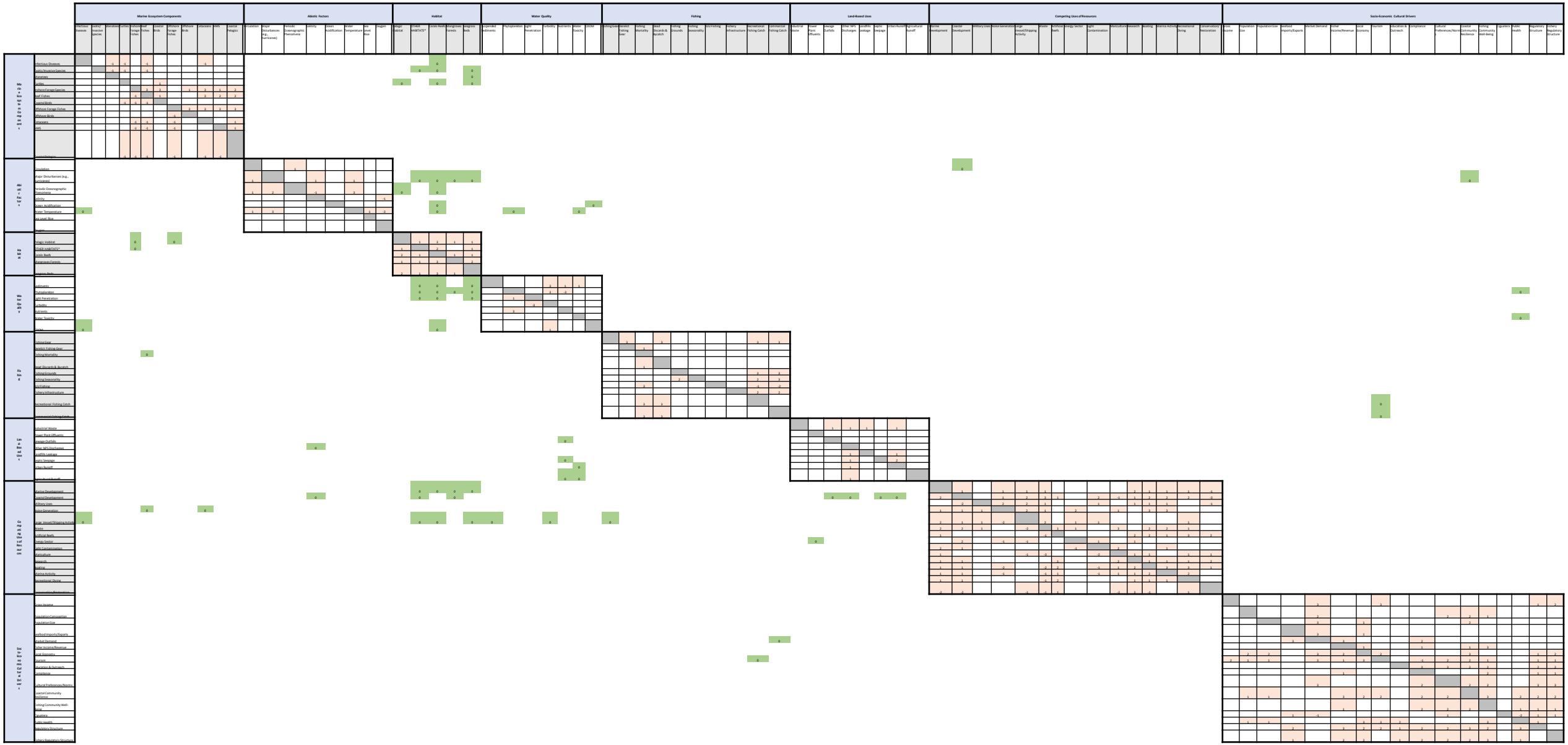
Simplified Model



Full Conceptual Model (2019)



Full Conceptual Model



Future SSC Assignment

	Fishing				S-E-C Drivers				Mar Eco Comp				Habitat				Land Base Sources				Abiotic				Water Quality				Competing Uses			
	Driver Component	Response Component	Direction (+/-)	Strength (L/M/H)	Driver Component	Response Component	Direction (+/-)	Strength (L/M/H)	Driver Component	Response Component	Direction (+/-)	Strength (L/M/H)	Driver Component	Response Component	Direction (+/-)	Strength (L/M/H)	Driver Component	Response Component	Direction (+/-)	Strength (L/M/H)	Driver Component	Response Component	Direction (+/-)	Strength (L/M/H)	Driver Component	Response Component	Direction (+/-)	Strength (L/M/H)	Driver Component	Response Component	Direction (+/-)	Strength (L/M/H)
Fishing																																
S-E																																
Mar Eco Comp																																
Habitat																																
Land Base Source																																
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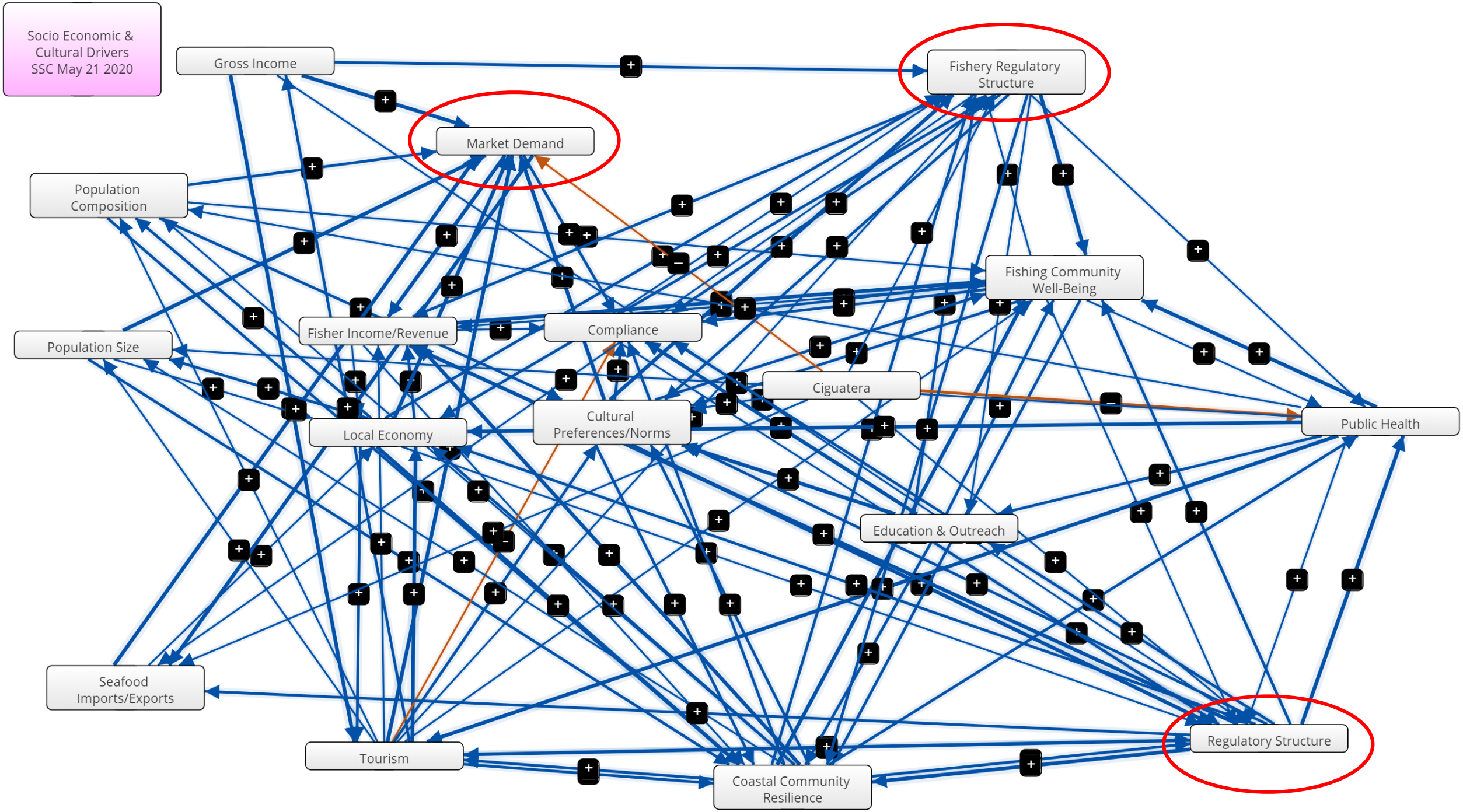
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