



NOAA
FISHERIES



Gulf of Maine
Research Institute



Dolphin Wahoo Participatory Workshop Update

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NOAA Fisheries Southeast Fisheries Science Center

SAFMC SEP meeting

April 13 2021



Project Overview

GOAL: Increase information flow between scientists, managers, and fishermen in support of improved fishery resources in the Atlantic

Develop a conceptual model of the Dolphin Wahoo fishery in NC/VA & FL Keys

- *Major factors affecting the fishery*
- *Where risks in fishery lie*
- *What targeted research needed*
- *What is valued in the ecosystem*
- *How changes in ecosystem affect businesses & communities*
- *How environmental factors affect the fishery*

Collaborators

- *SEFSC (lead): Mandy Karnauskas & Matt McPherson*
- *SAFMC*
- *MREP & Gulf of Maine Research Institute*
- *All of the fishermen & community participants!*



Workshop Locations & Timing

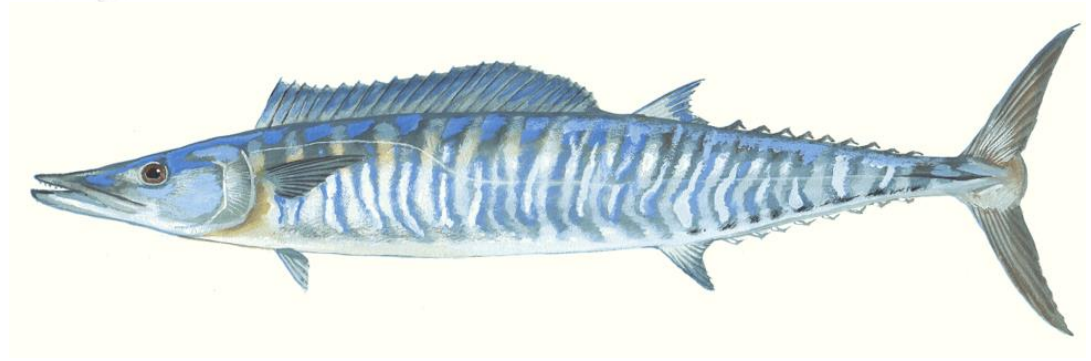
NC/VA Workshops - 2020

- *March 9: Beaufort, NC*
- *March 10: Wanchese, NC*
- *March 11: Virginia Beach, VA*



FL Keys Workshops - 2021

- *Originally scheduled for Summer 2020*
- *COVID-19 impacted planning; postponed and then decision to move to virtual format*
- *One-one-one phone calls to gather initial input (March 2021)*
- *April: Group webinar*





Participant Overview

Beaufort, NC

7 industry participants

Primarily for-hire & limited recreational



Wanchese, NC

14 industry participants

Primarily commercial & for-hire



Virginia Beach, VA

4 industry participants

Primarily for-hire & recreational

South Florida

11 industry participants (to date)

Primarily for-hire & recreational

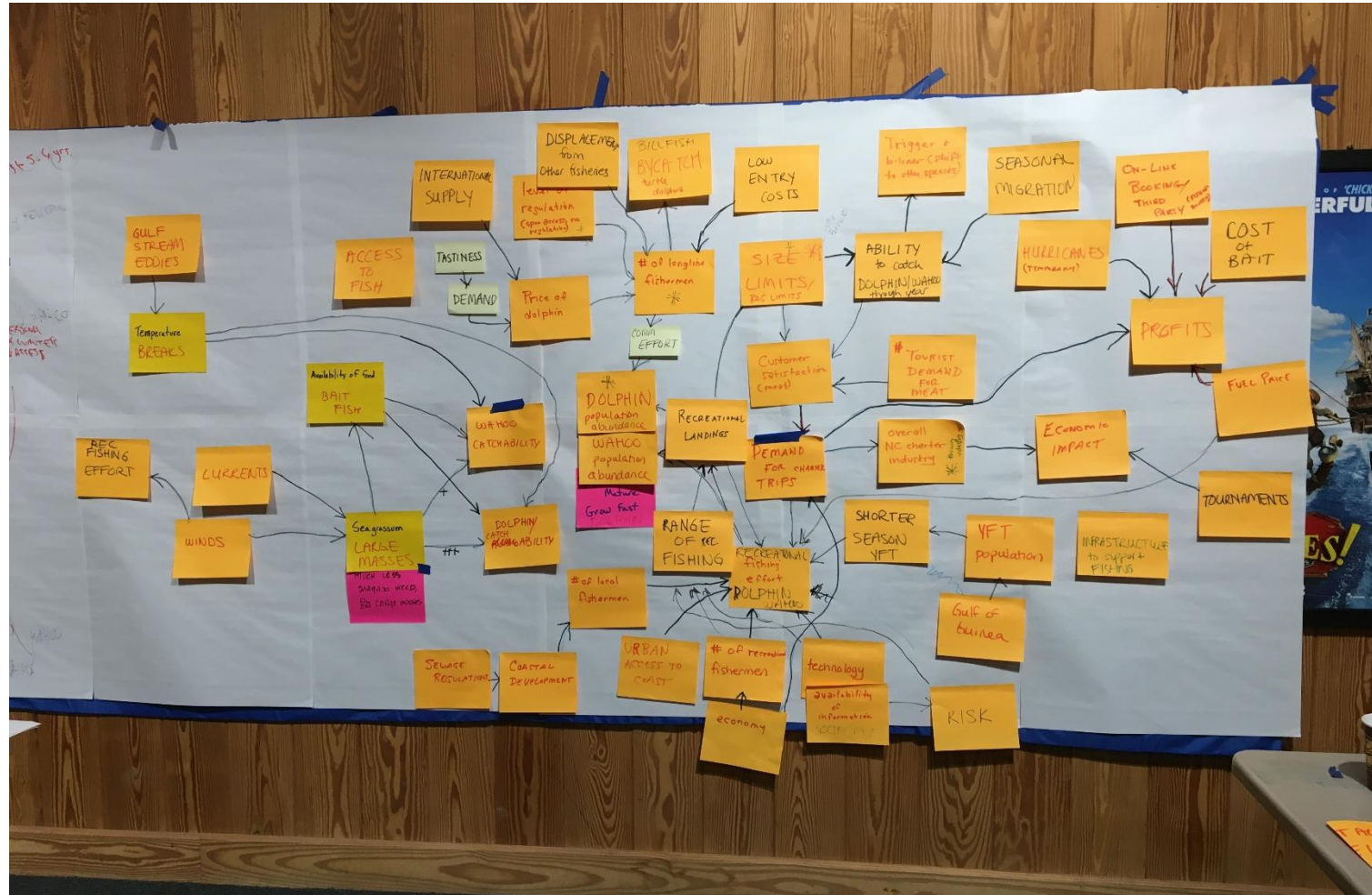
Workshop Process: Starting Point



Workshop Process: Underway



Workshop Process: End Products

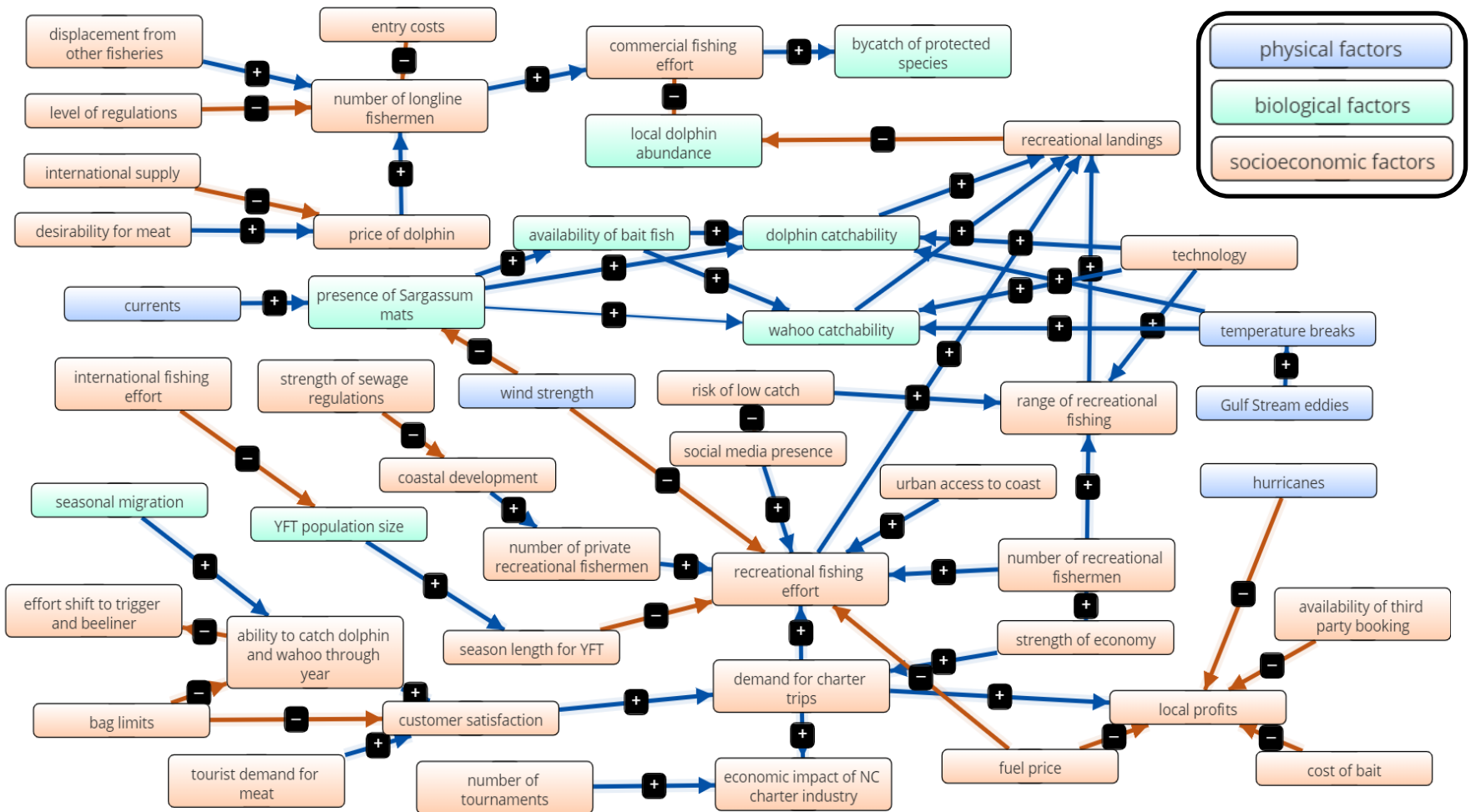


COVID-altered approach

- Phone calls with individual fishermen to discuss observations about the fisheries
- Convert into draft conceptual model
- Group webinar to finalize conceptual model



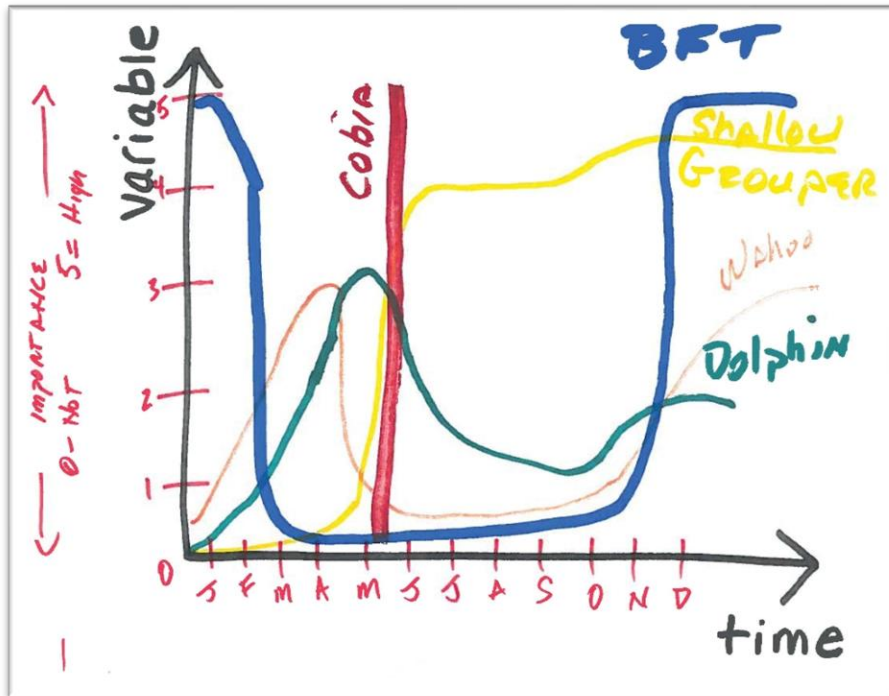
End Result: Conceptual models



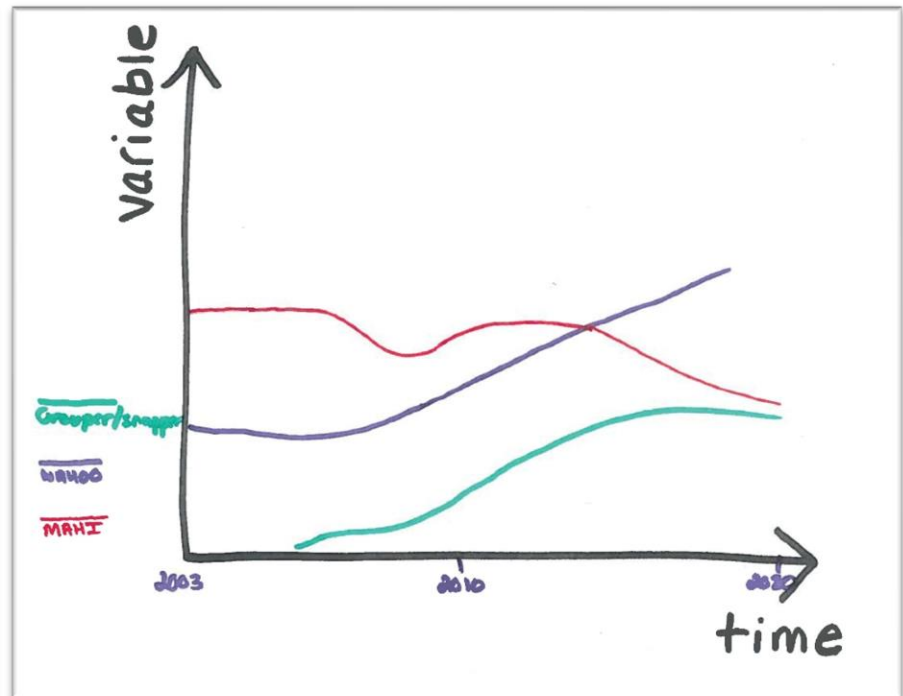
Digitized model from Beaufort workshop



Graphs provide further insight*



Participants plotted the importance of different species to their fishing operations throughout the year



Participants plotted perceived local abundance trends over time for dolphin, wahoo and other species

*(NC/VA only)



Outline - Results

- Overall population trends and model structure
- Summary of North Carolina / Virginia results
- Summary of South Florida results
- Social media analysis
- Summary: themes emerging from results compiled to date

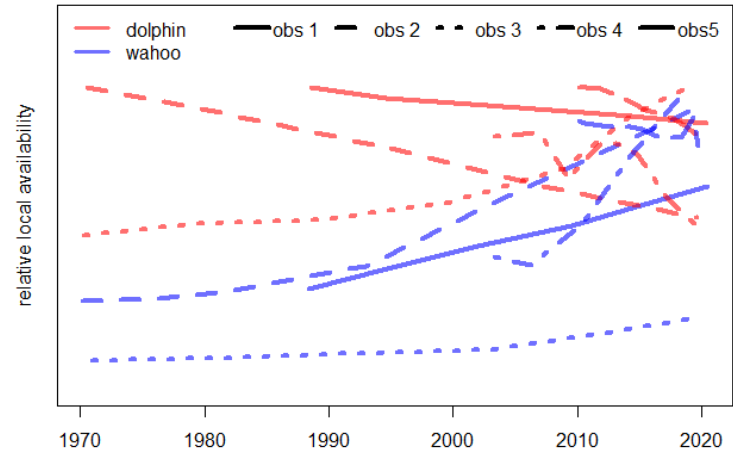
Caveats:

- Results represent workshop participant perspectives (e.g., issues that warrant further investigation)
- Perspectives are regionally specific (do not necessarily represent the average over management area)



Perceived abundance trends

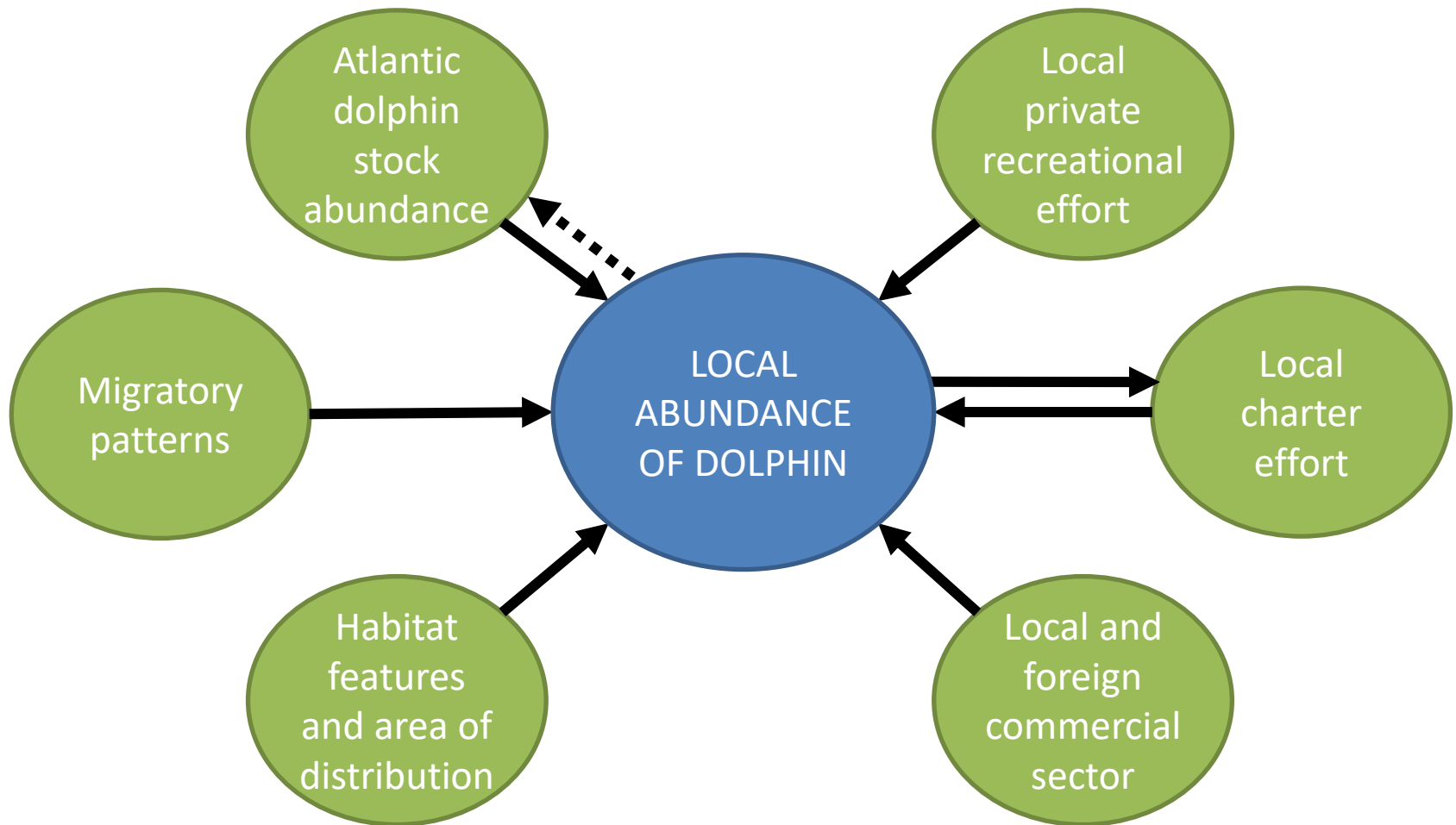
Observations were largely attuned to local abundance. Few insights on overall stock abundance.



Area	Dolphin	Wahoo
Virginia Beach	No change	No change
Beaufort	Gradual decrease	Increasing
South FL	Major decrease in abundance and size starting 5-10 years ago	No change
FL Keys	Major decrease in abundance and size starting 5-10 years ago	No change



Overall model structure



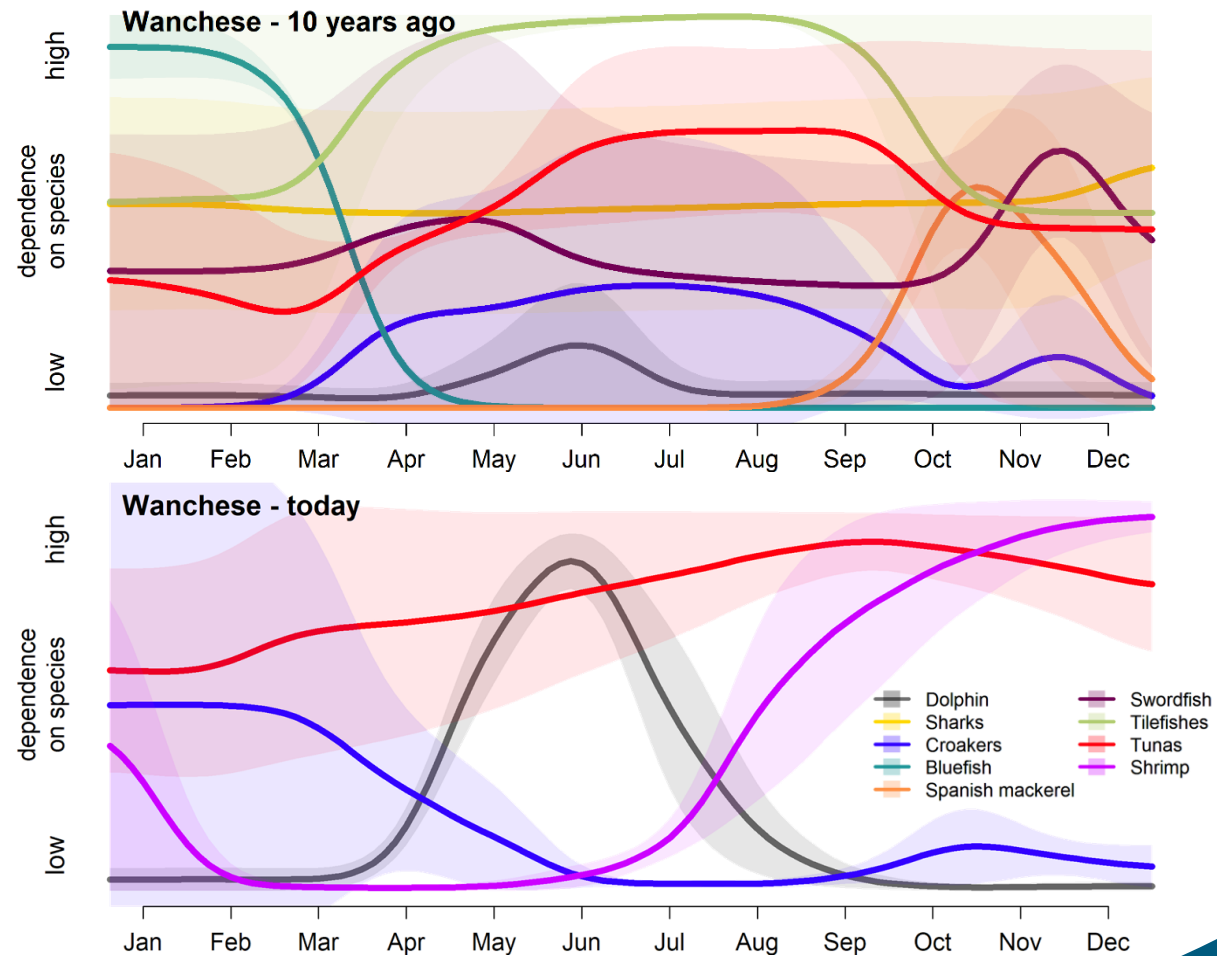
Summary of North Carolina / Virginia results



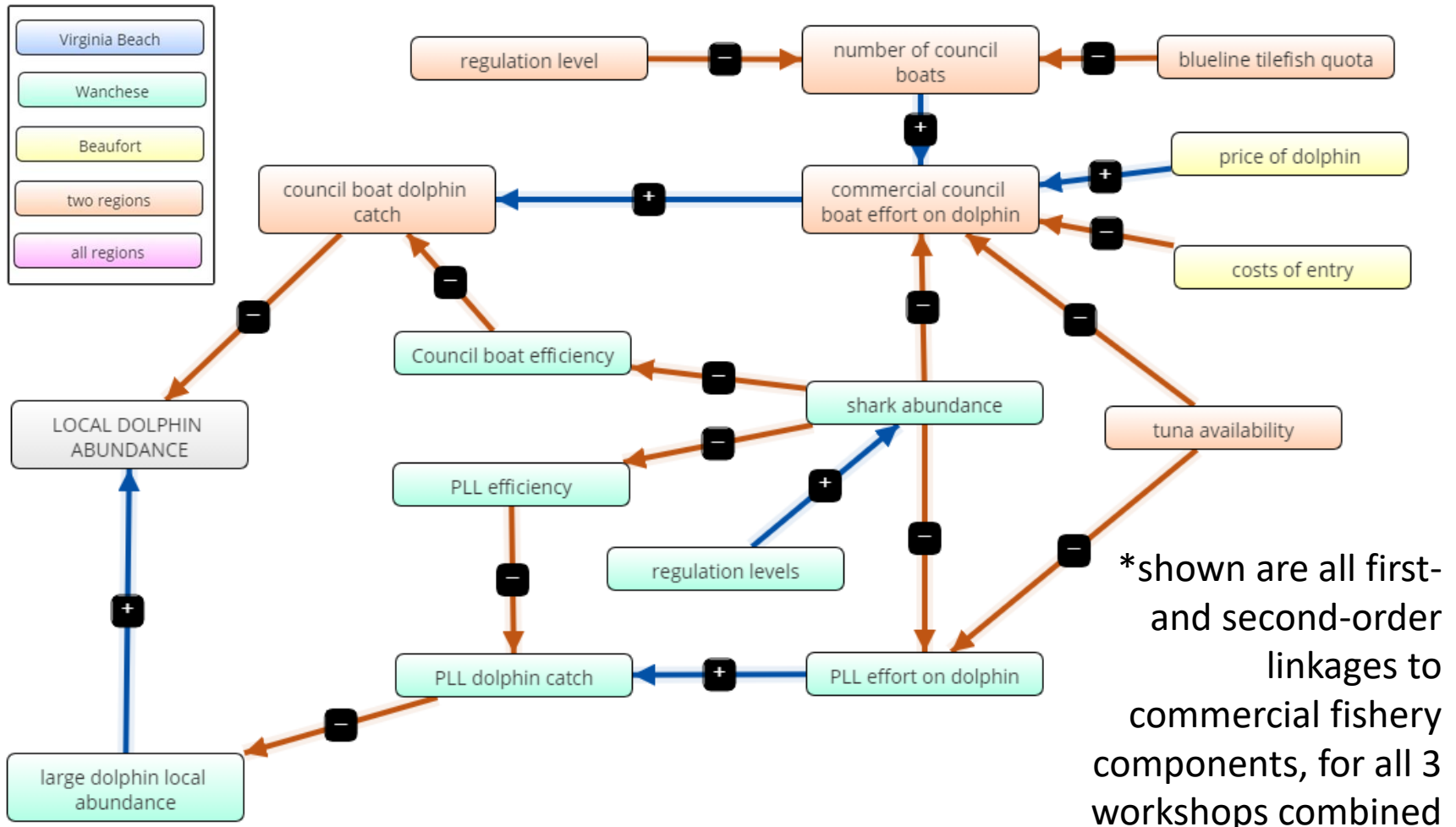
Which species do your businesses depend on throughout the year?

Commercial fleet

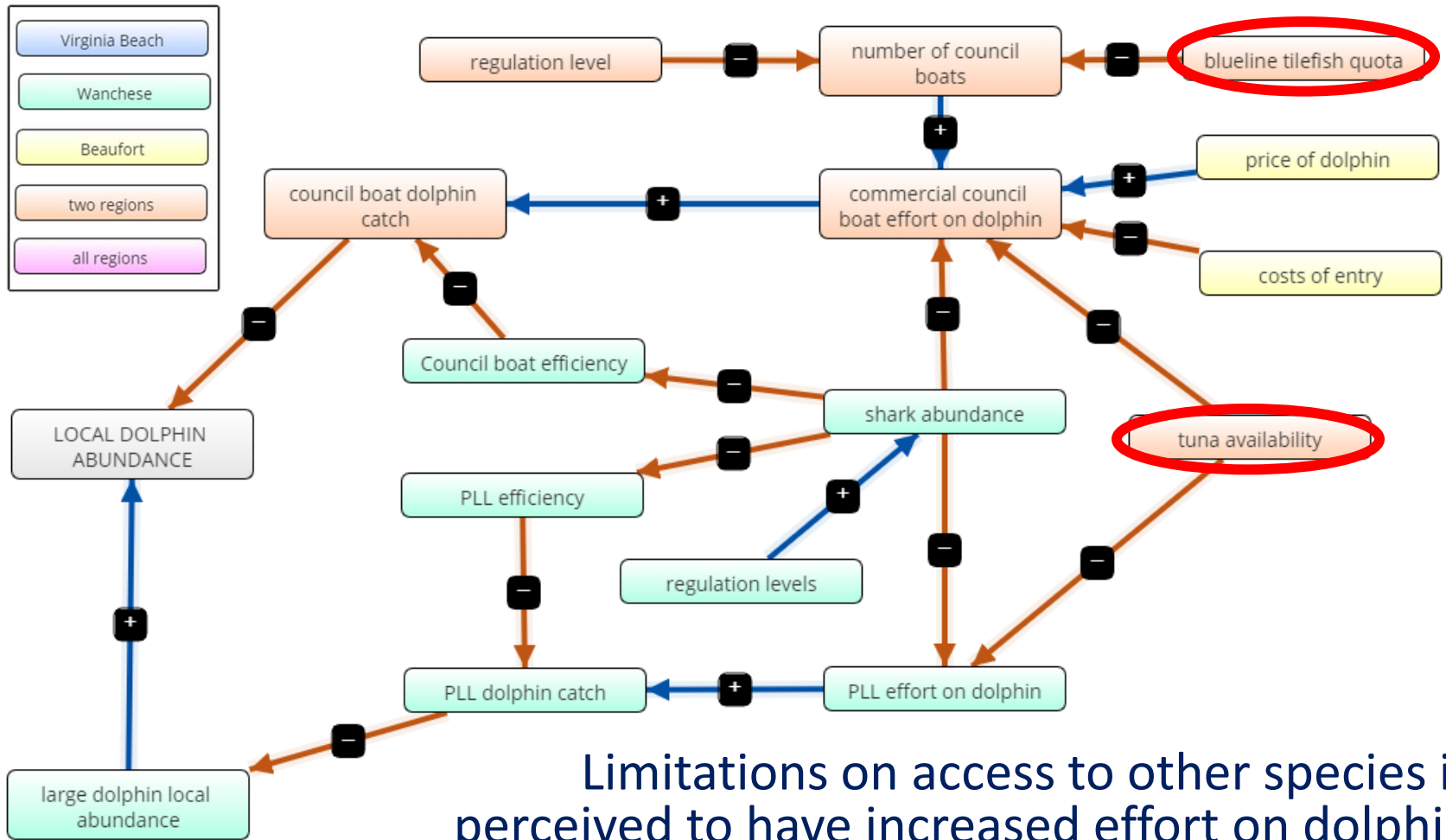
- Substantial shifts occurred in last 10 years
- Historical reliance on tilefishes, tunas, sharks, but low dependence on dolphin
- Present dependence on dolphin increased in summer, shrimp in fall
- *Charts represent value to businesses, not landings*



Commercial conceptual model



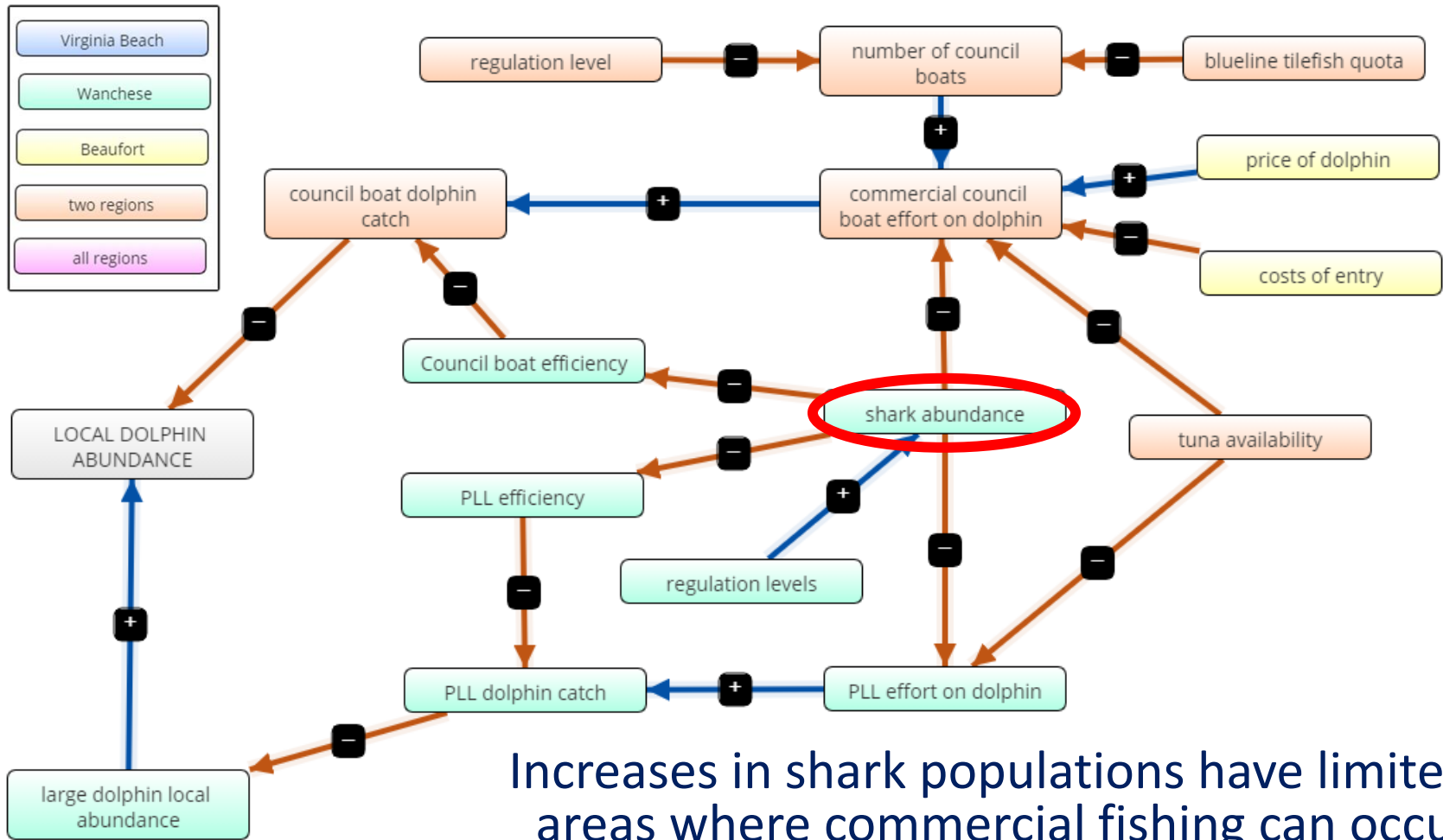
Commercial conceptual model



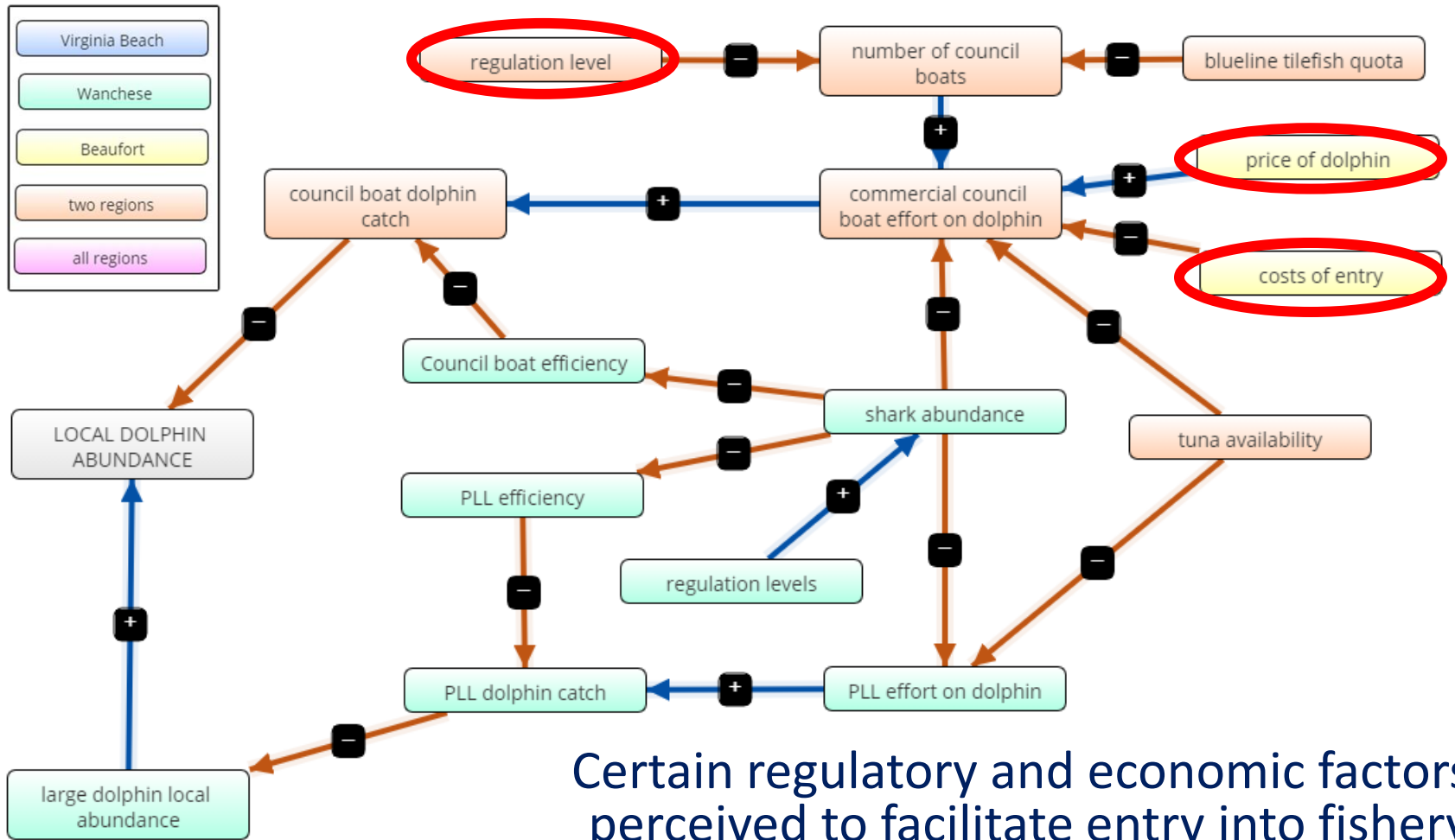
Limitations on access to other species is perceived to have increased effort on dolphin



Commercial conceptual model

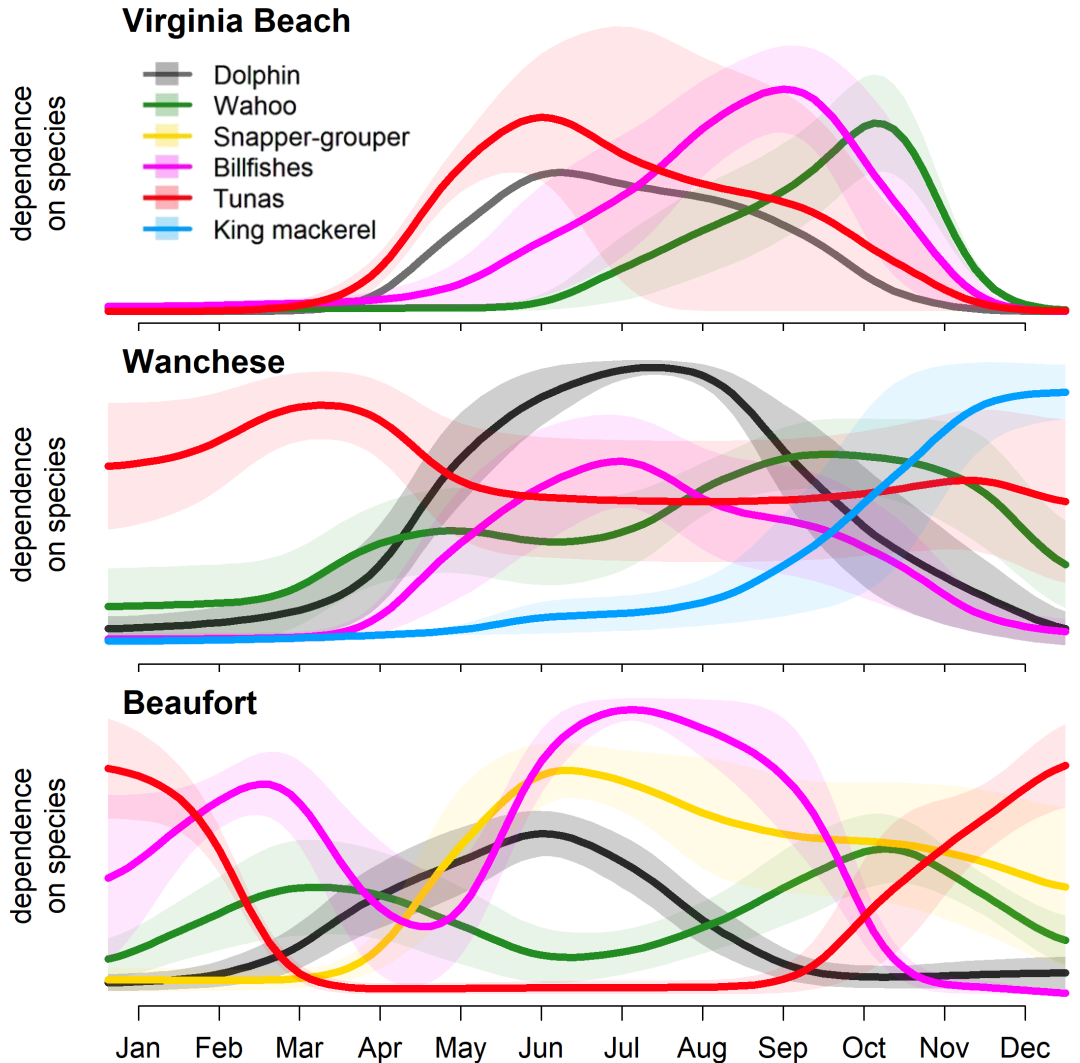


Commercial conceptual model

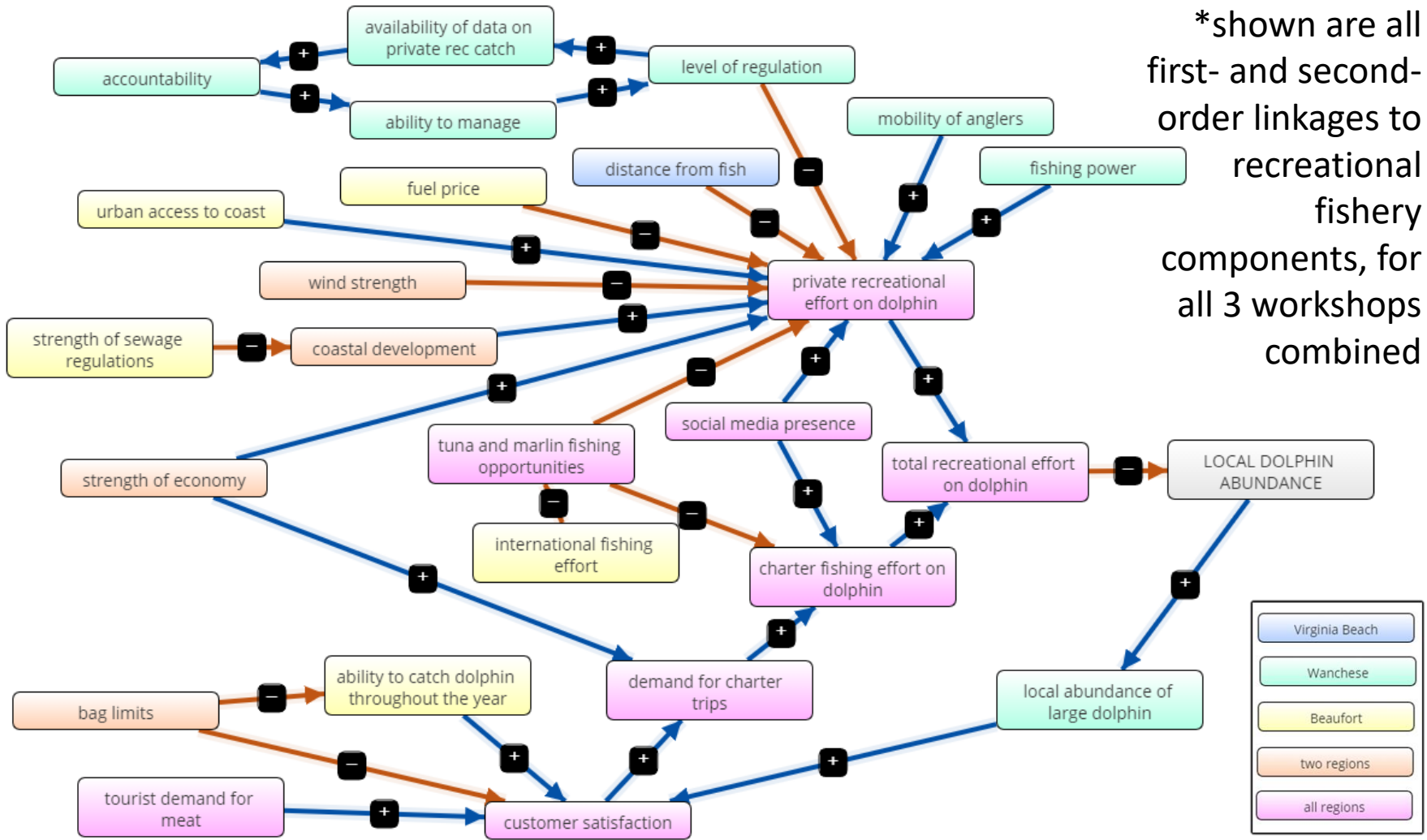


Which species do your businesses depend on throughout the year?

- High variation across regions
- Later arrival of dolphin and wahoo moving north
- High dependence on dolphin in Wanchese during summer months



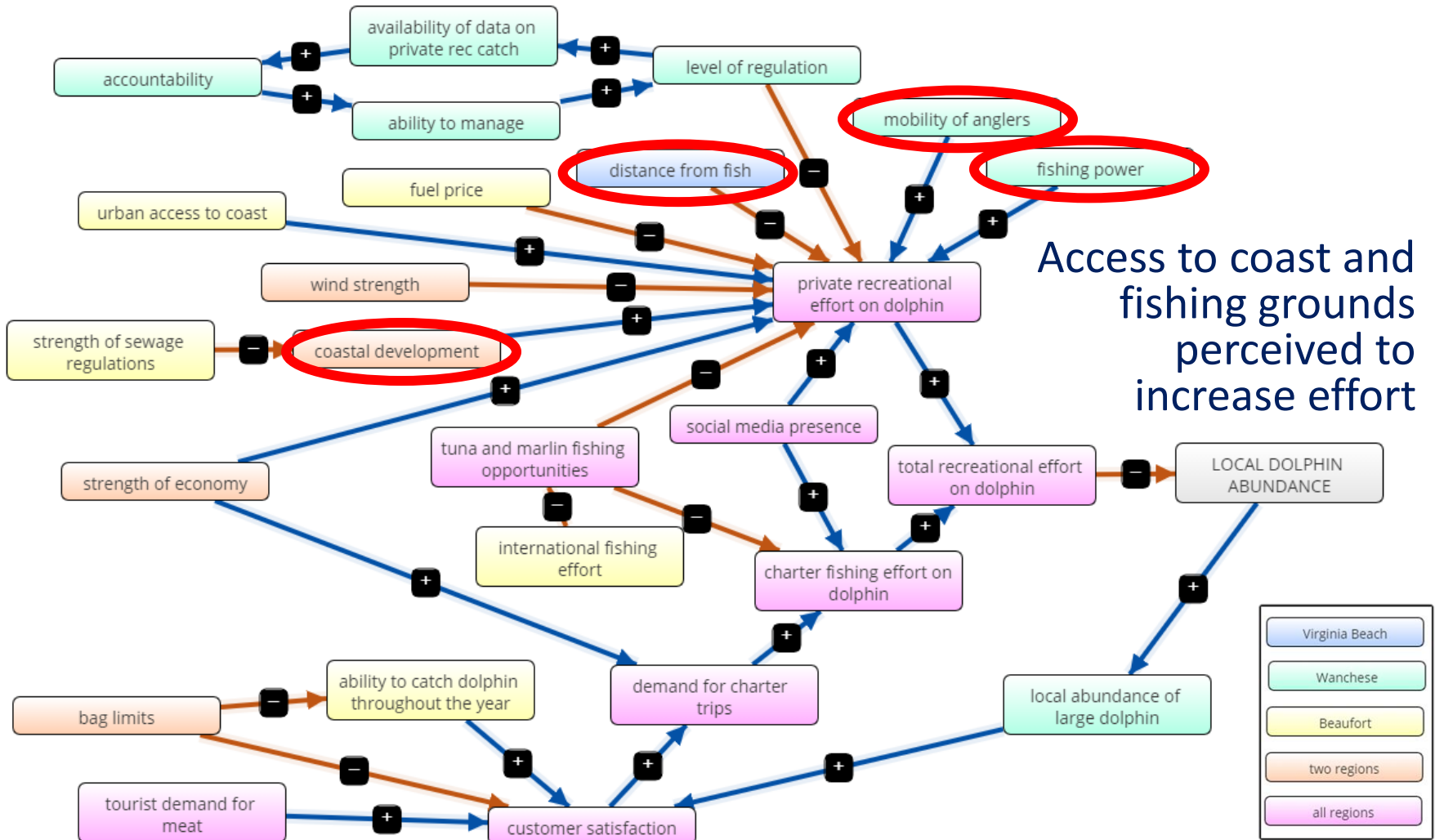
Recreational conceptual model



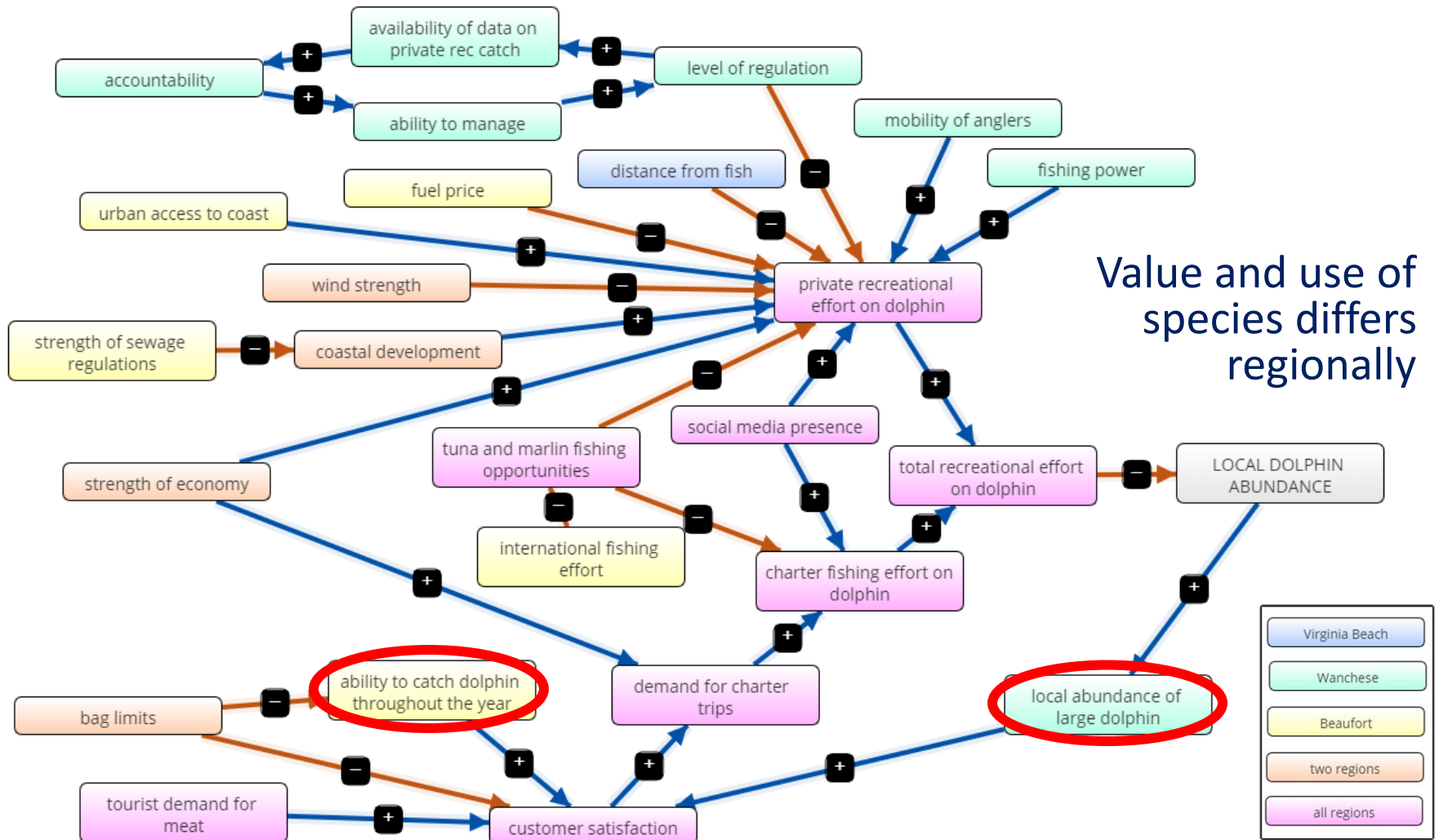
*shown are all first- and second-order linkages to recreational fishery components, for all 3 workshops combined



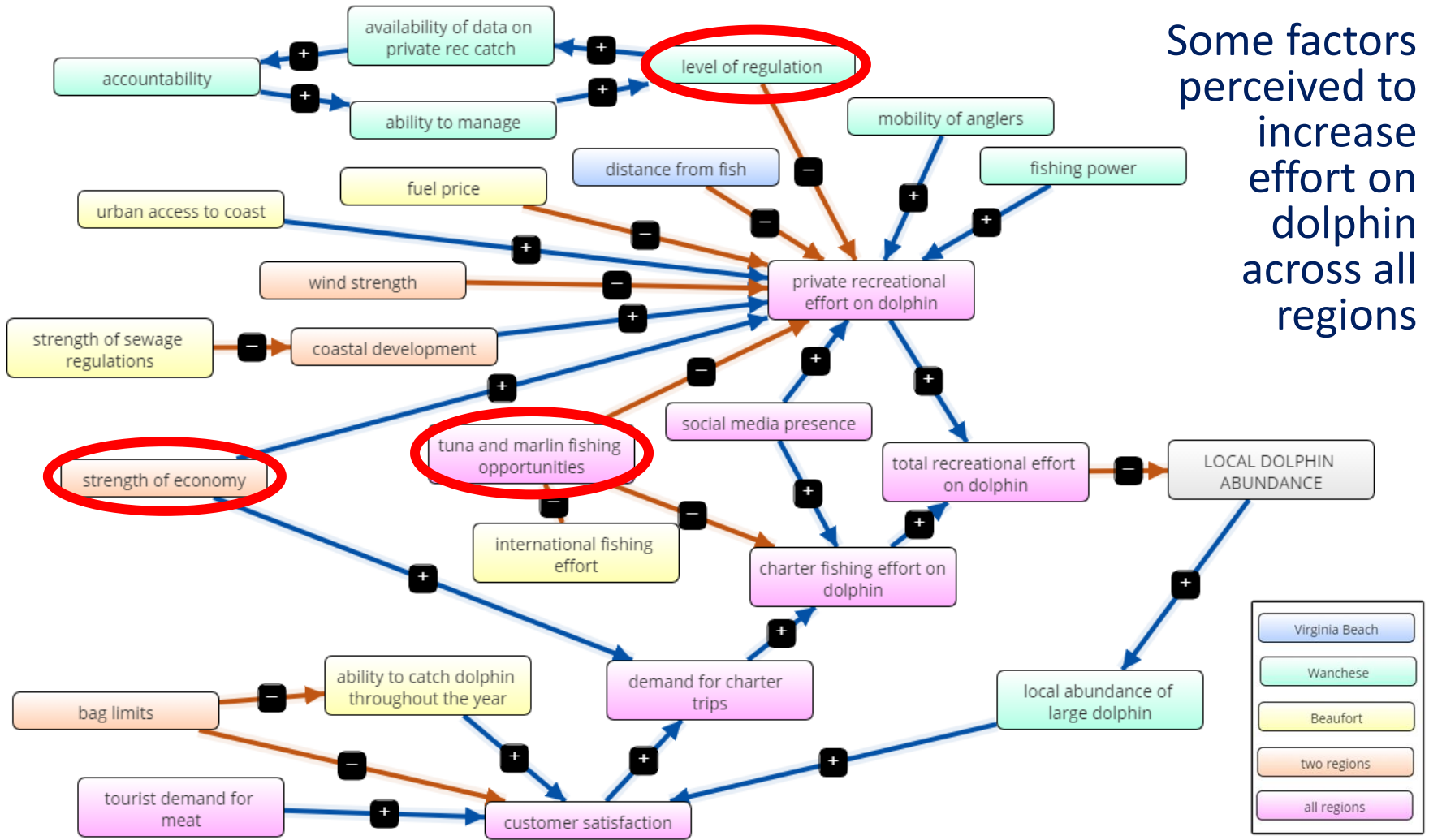
Recreational conceptual model



Recreational conceptual model



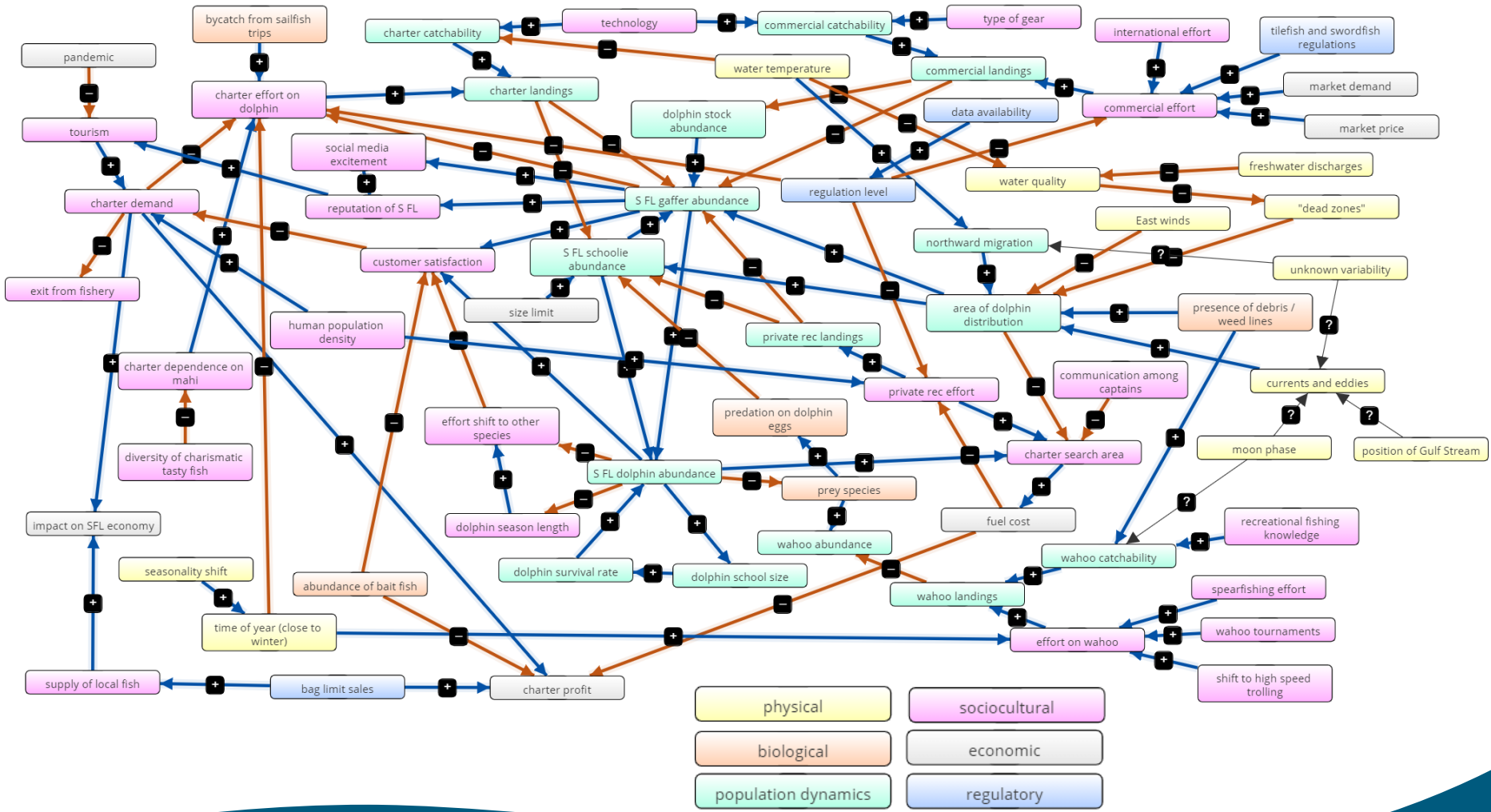
Recreational conceptual model



Summary of South Florida results



FL concept model

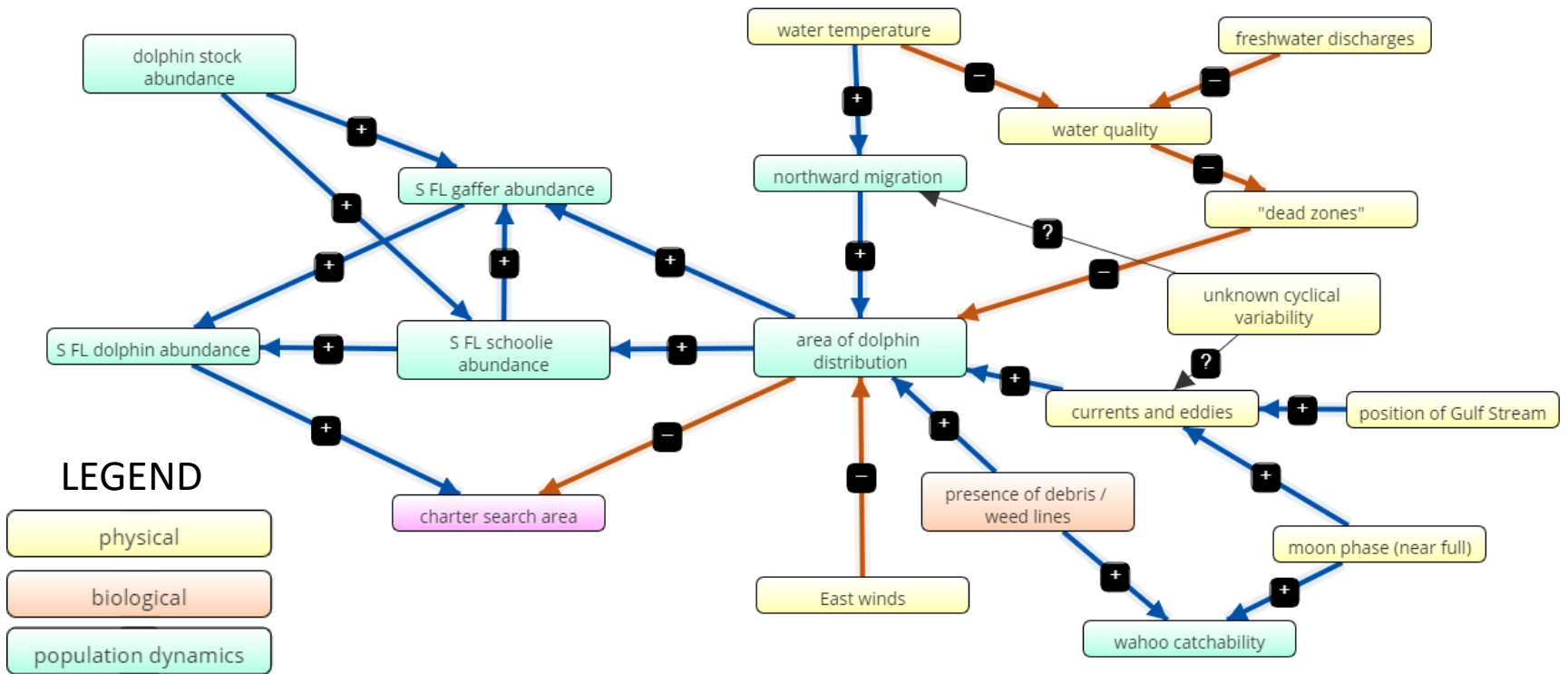


How SFL differed from NC/VA

- Major concern about local and regional depletion; support for stricter regulations
- Commercial fisheries (non-local) only mentioned in context of affecting larger stock abundance
- More homogeneity in drivers of recreational effort (distance from shore, coastal development less variable across region)
- Bigger emphasis on physical/biological drivers of dolphin distribution and areal extent
- Unique hypotheses regarding dolphin and wahoo biology (in relation to depletion)



Physical and biological drivers of dolphin distribution



- Wide range of factors perceived to be influencing area of dolphin distribution which drives realized availability in S FL



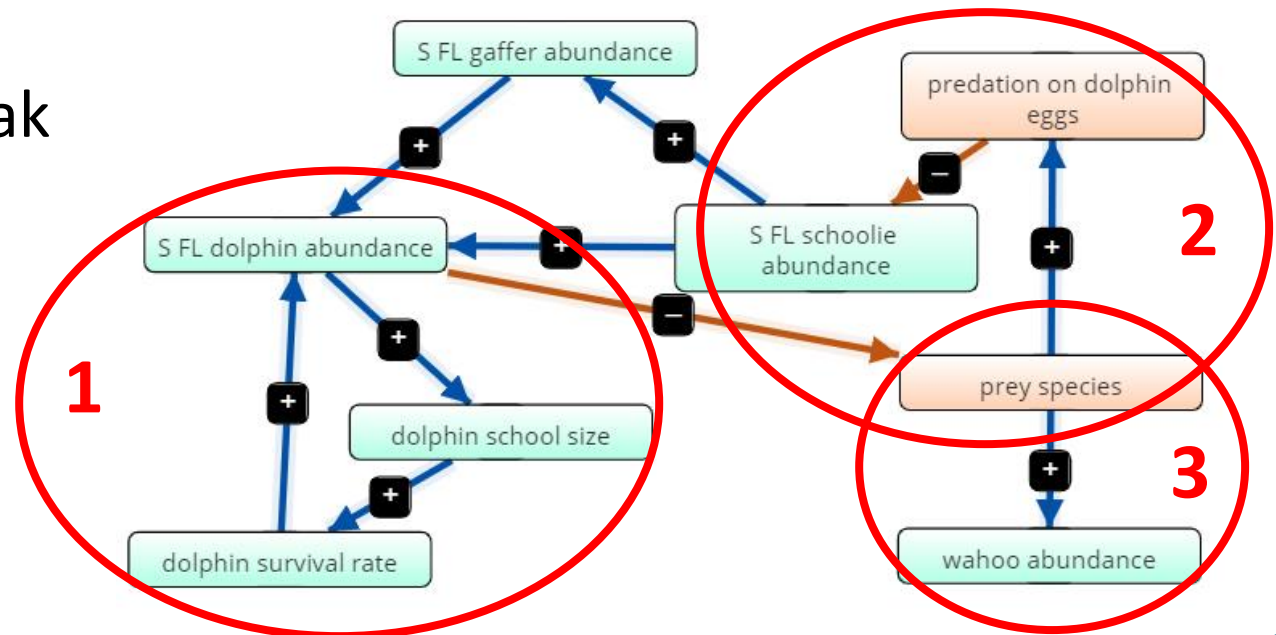
Biological hypotheses

Hypotheses on biological impacts of depletion:

1 - Reduced school size leads to lower survival

2 - Dolphin prey outbreak reduces survival of spawned dolphin eggs

3 - Prey outbreak has led to increasing wahoo populations



Social and economic findings

- Dolphin plays unique symbolic and economic role in local communities and recreational fisheries.
- Effort/cost to catch dolphin may be increasing.
- Type of charter clientele in SF is different than NC (affects customer satisfaction). Not meat fishery.
- Similar concerns regarding growth in number, power & efficiency of private anglers and spearfishing activities.
- Minor local commercial fishery. Increase in local imports related to restrictions of sales of dolphin charter trip “excess” to restaurants.



Social media analysis



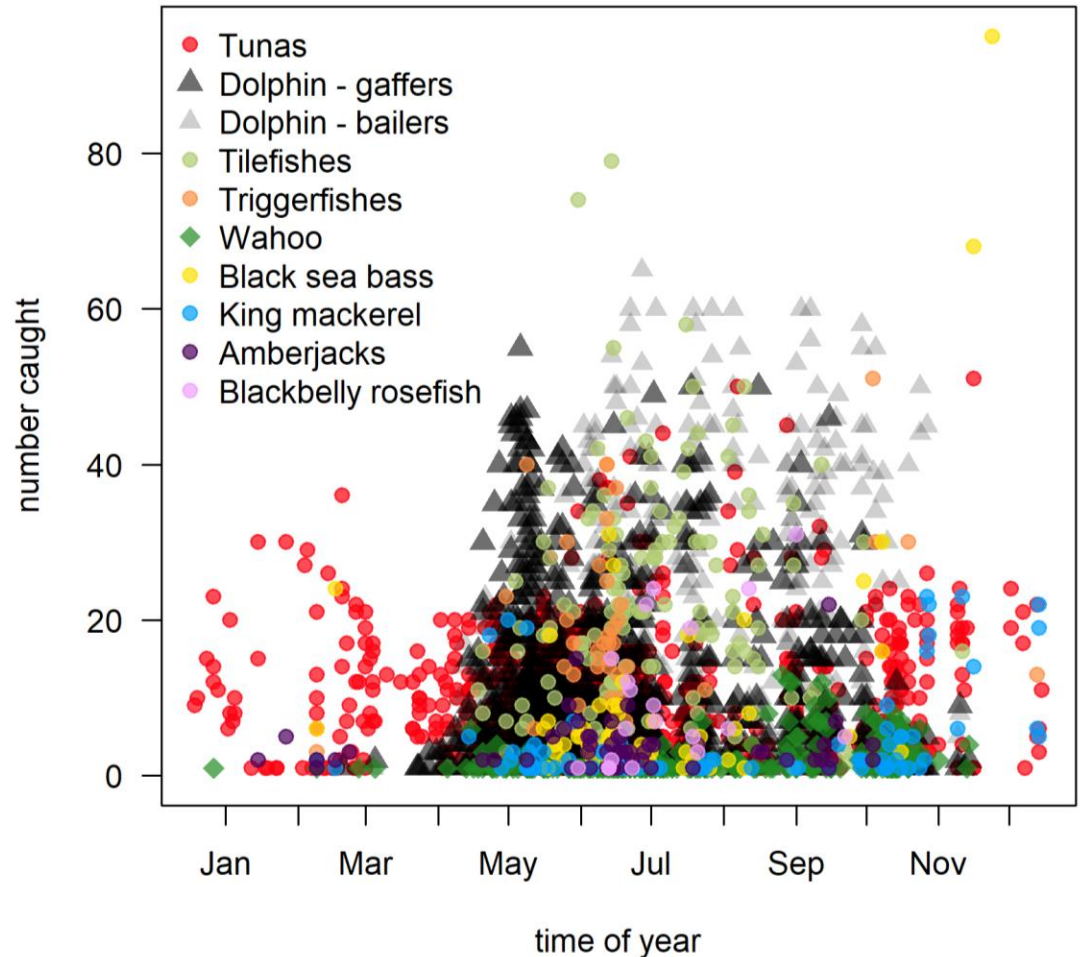
Analysis of social media photos

- How representative are the perspectives of the workshop participants?
- How do charter operations vary across the region?



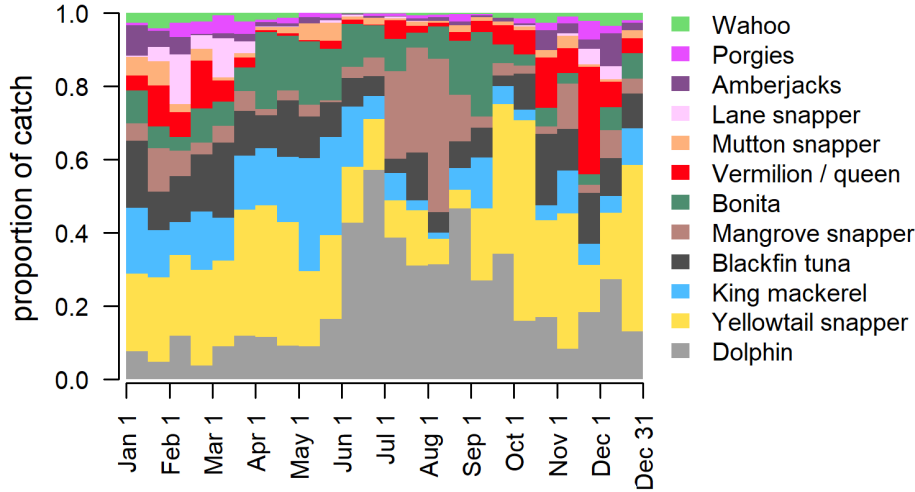
Analysis of social media photos

3,913 photos
– NC (1,591)
– Virginia (273)
– South FL (1,372)
– FL Keys (677)
65,372 fish
39 species or
species groups

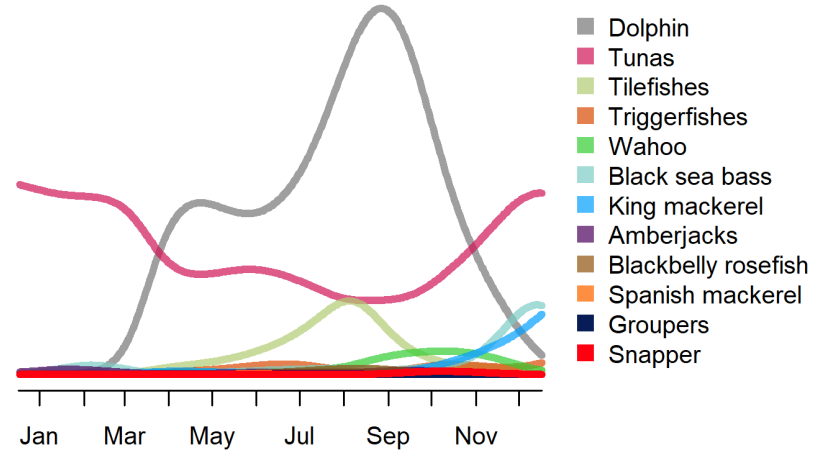
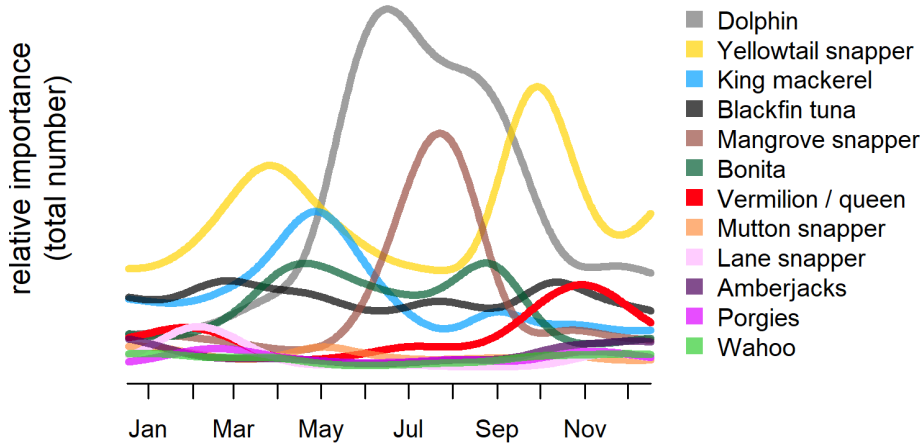
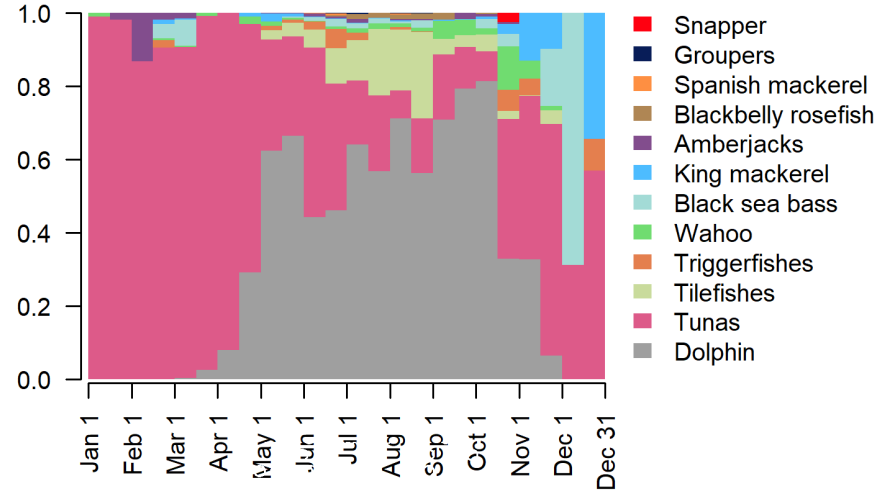


Seasonal trends - abundance

South Florida to Florida Keys



Morehead to Virginia Beach

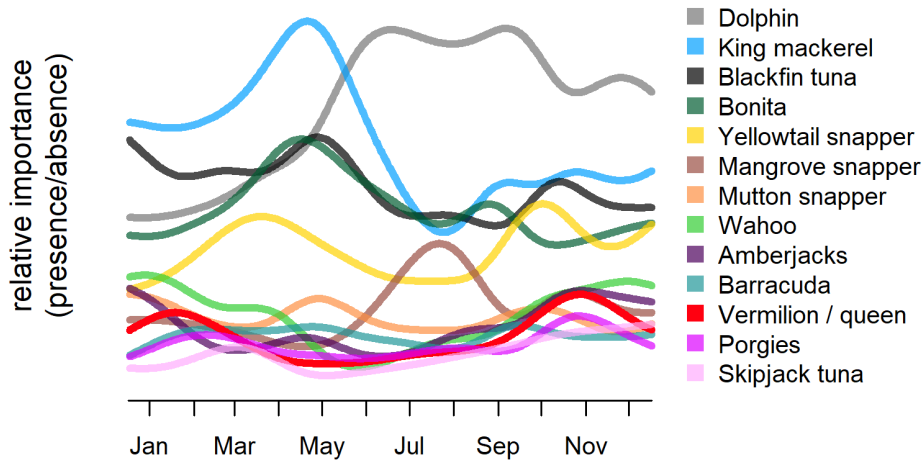
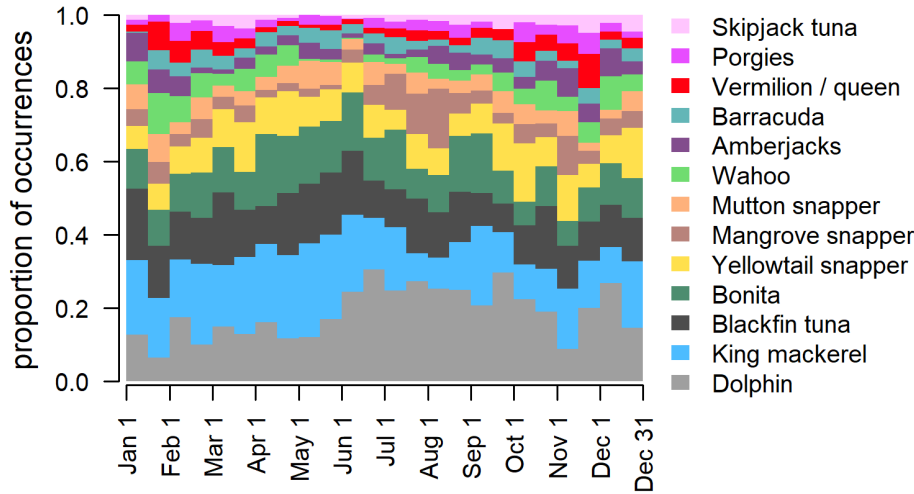


*top 12 species in each region

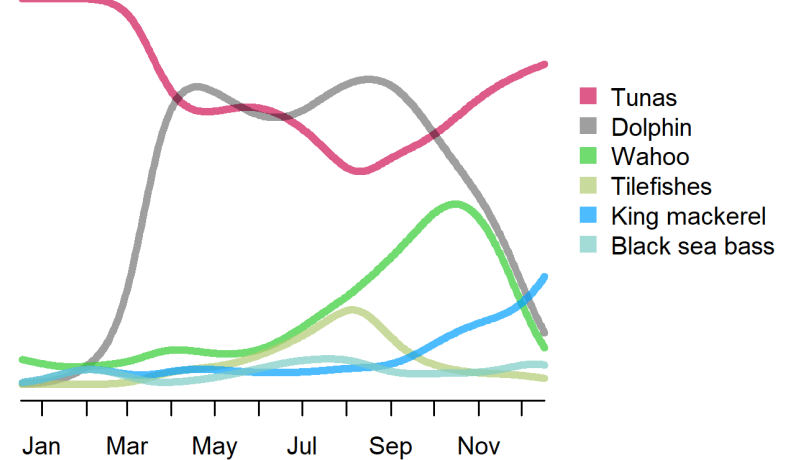
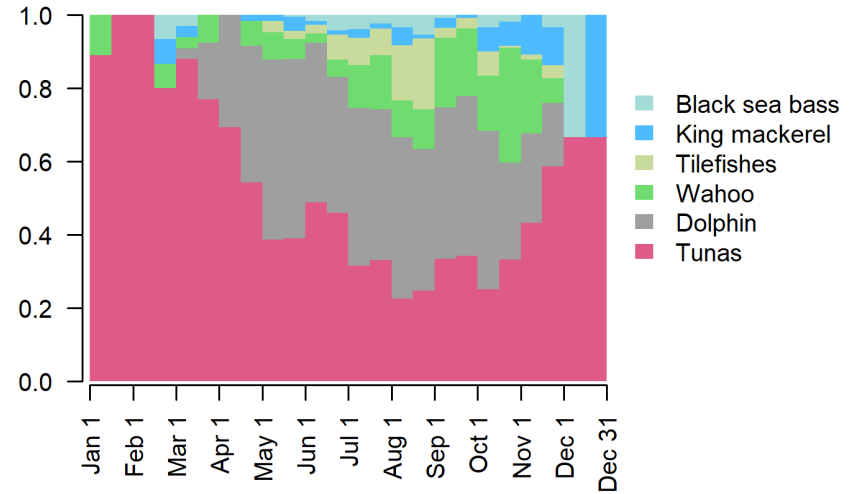


Seasonal trends - occurrence

South Florida to Florida Keys



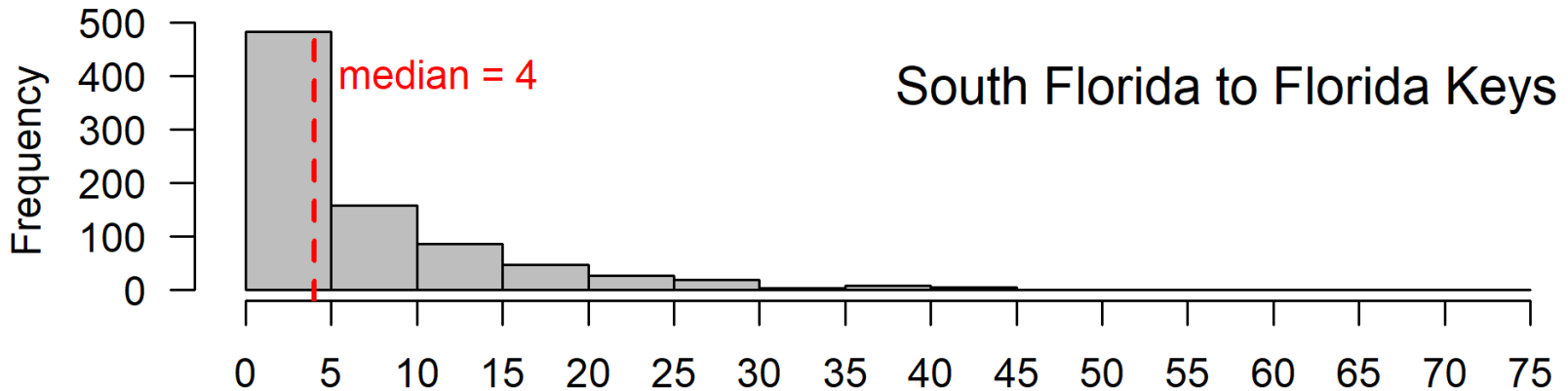
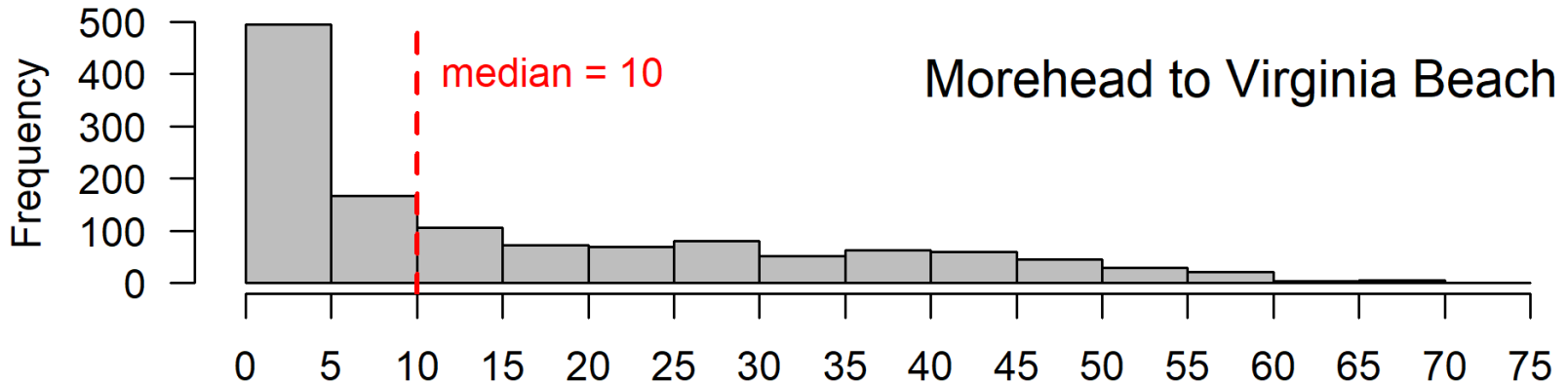
Morehead to Virginia Beach



*all species with occurrence > 4%



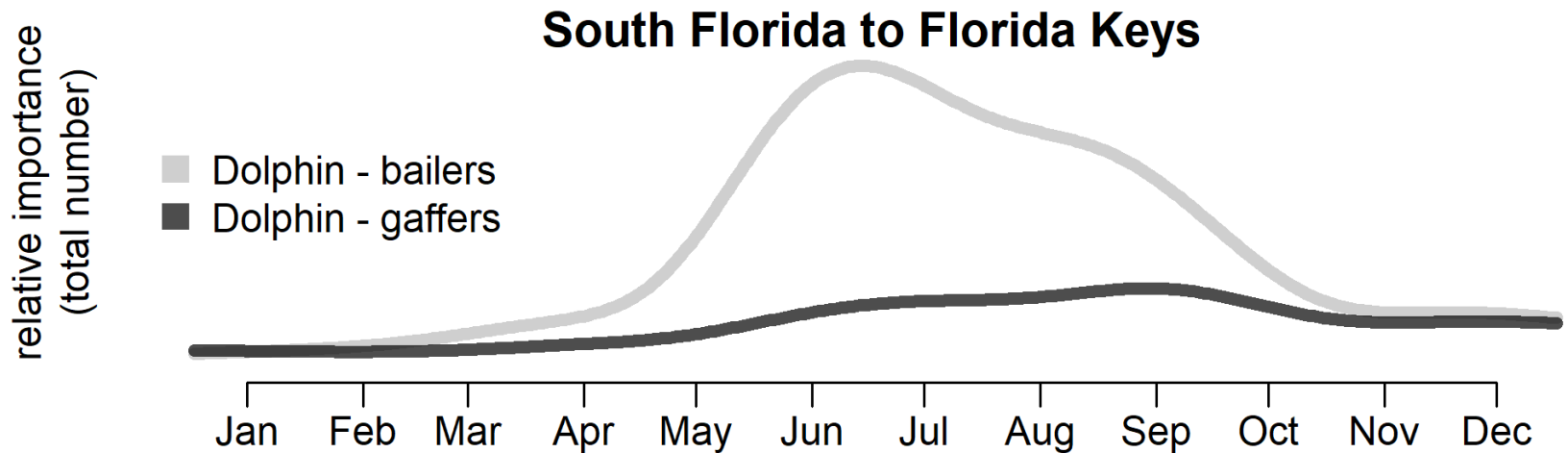
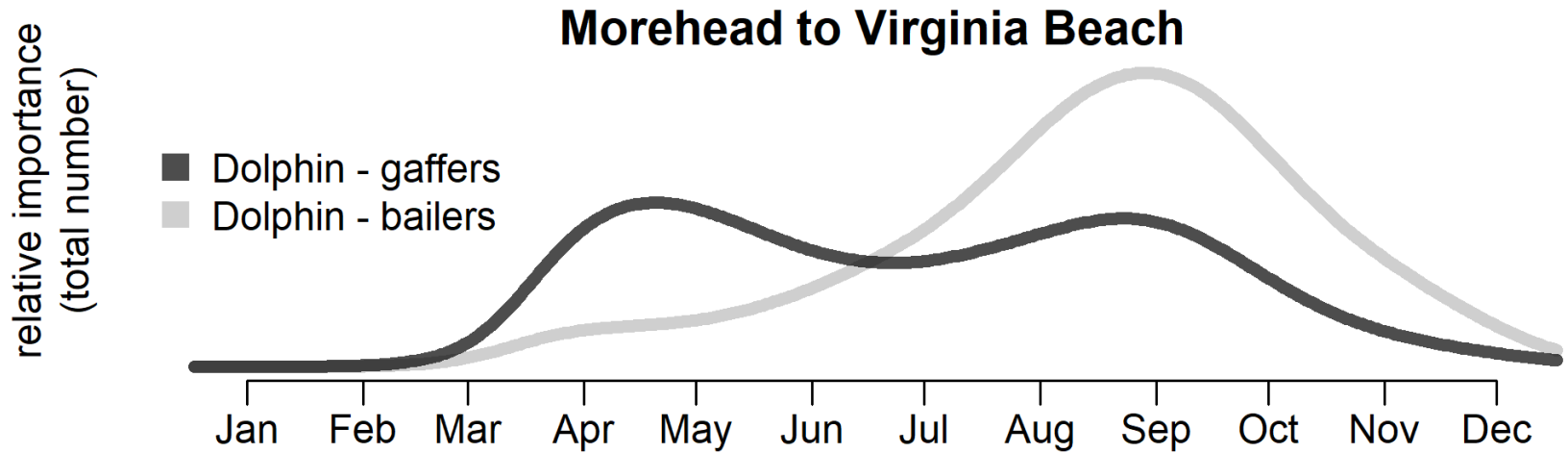
Dolphin catch per trip (when present)



number of dolphin per trip

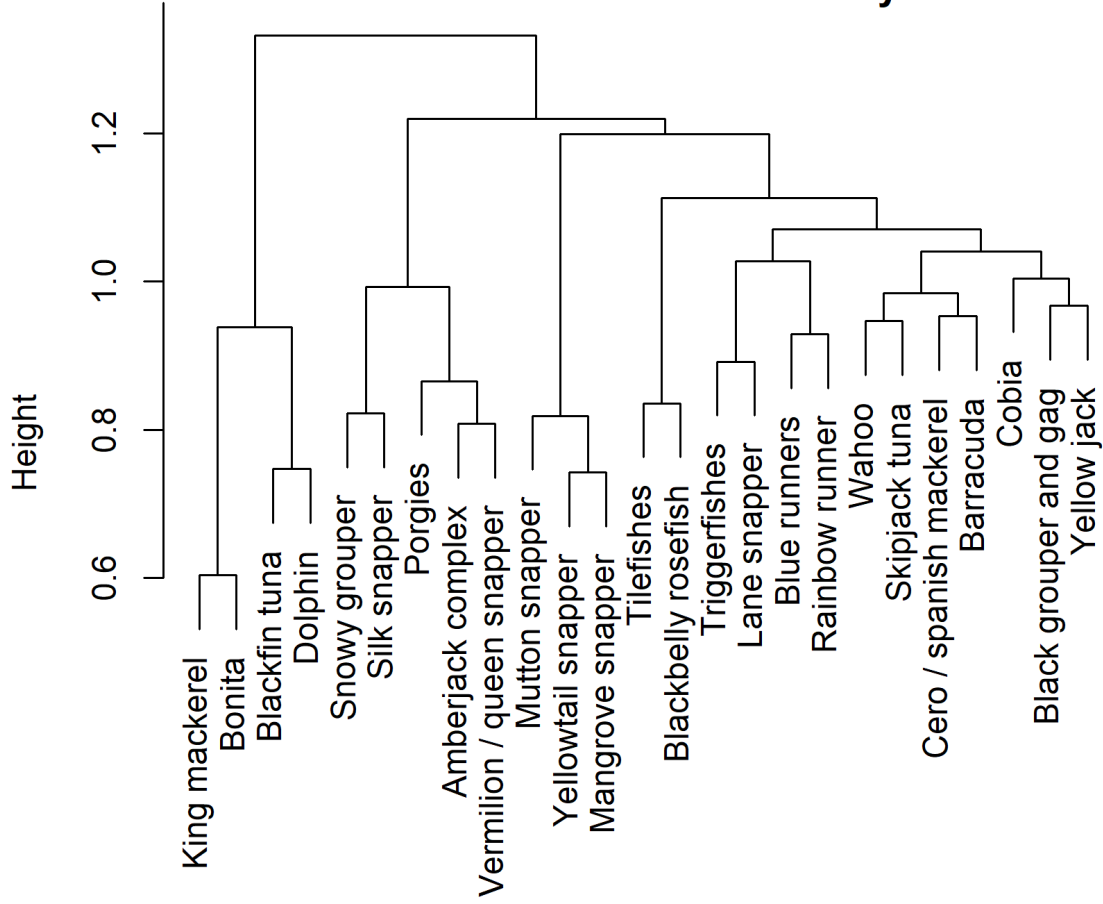


Seasonality of dolphin catch

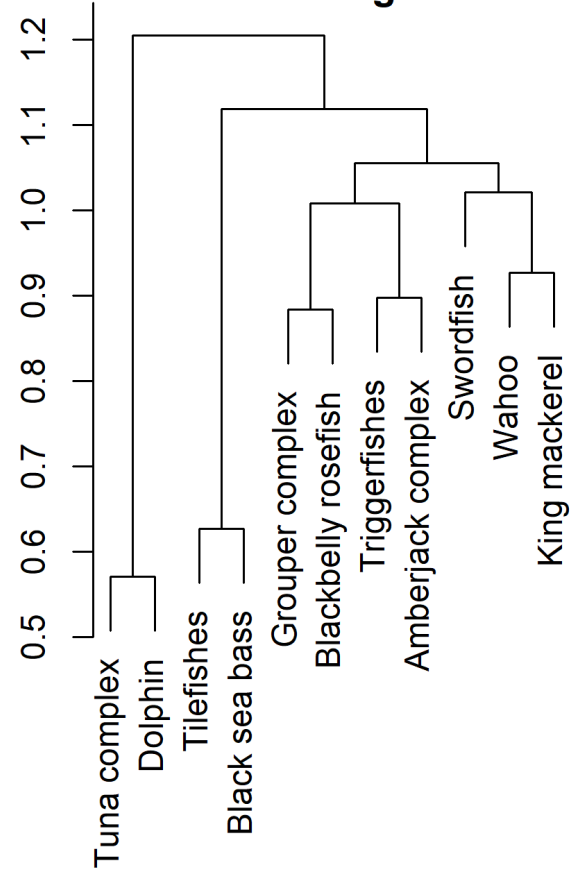


Catch composition

South Florida to Florida Keys



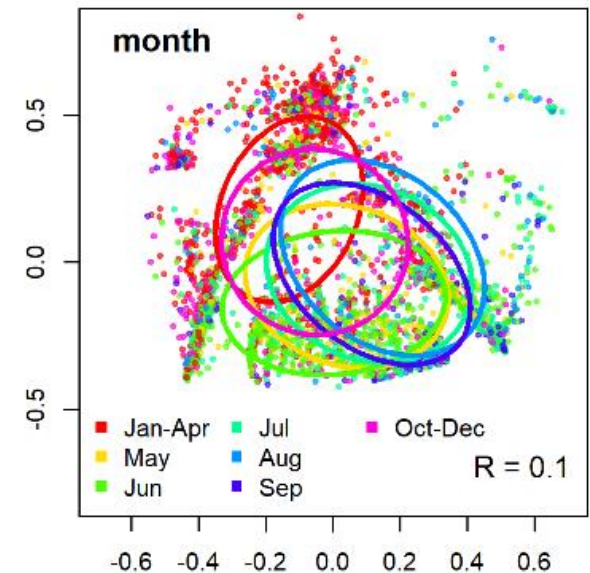
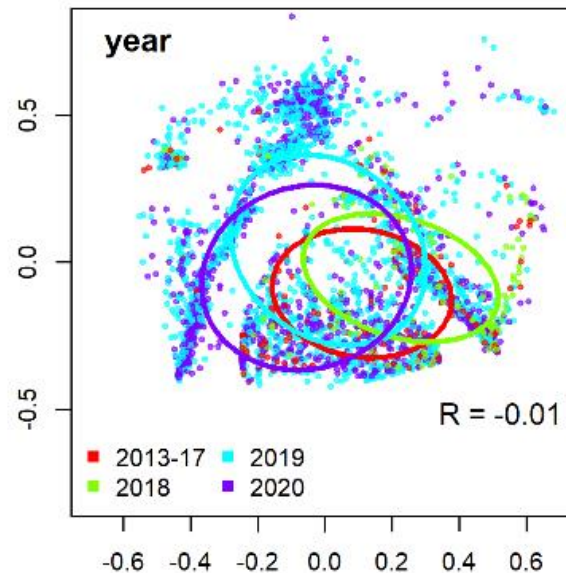
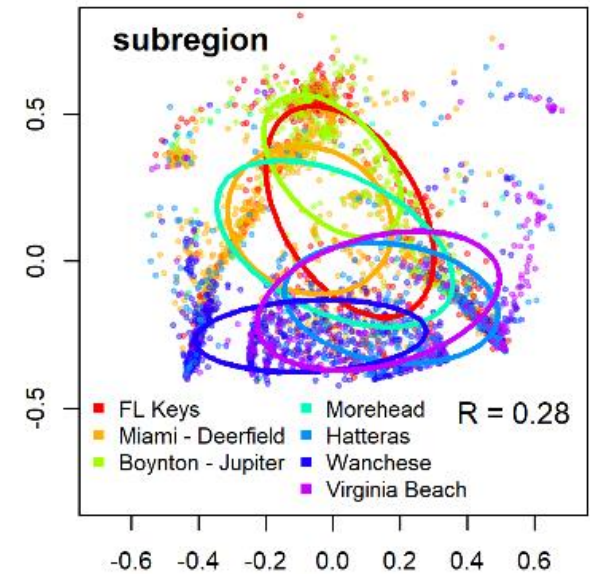
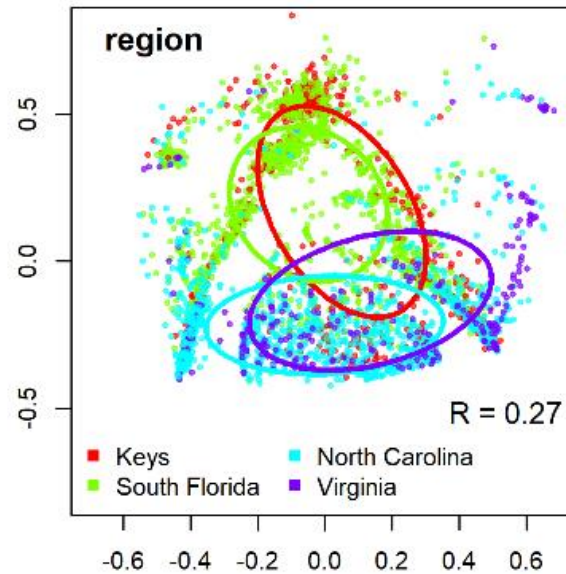
Morehead to Virginia Beach



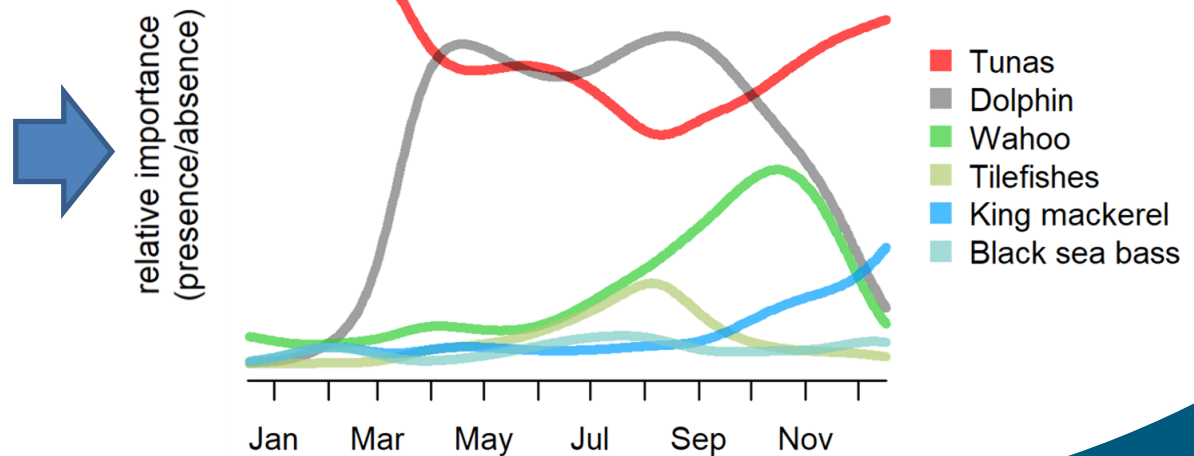
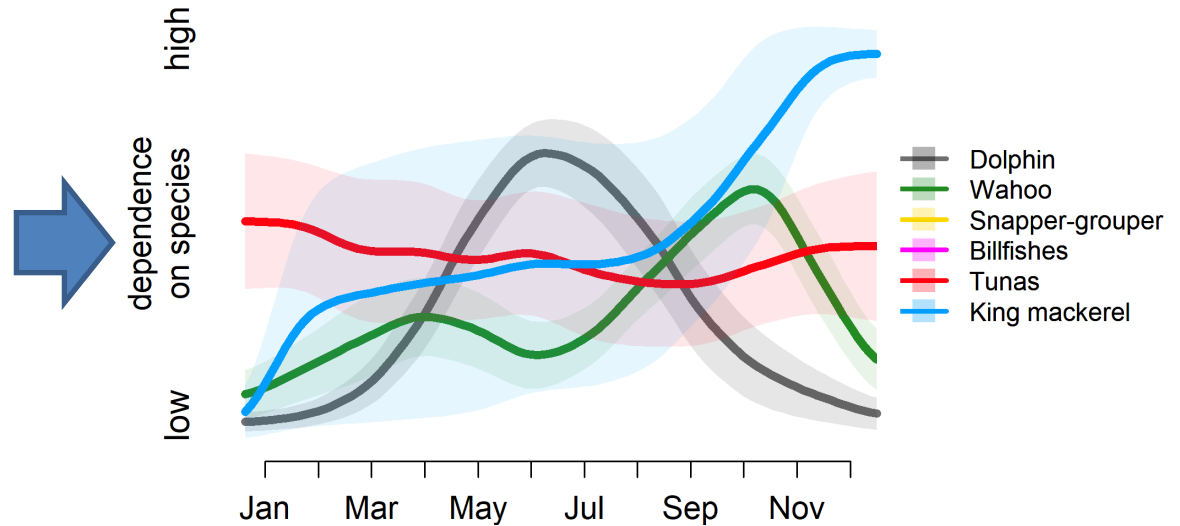
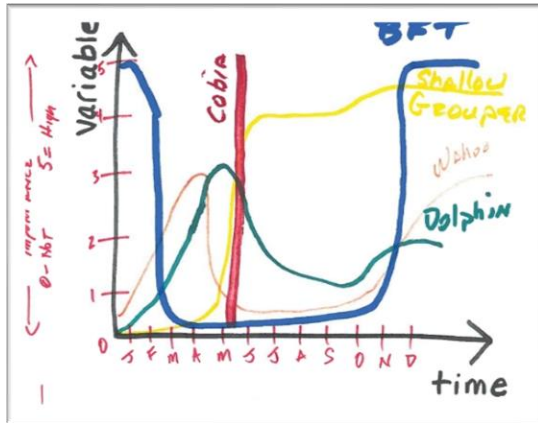
Ordination analysis

Non-metric multidimensional scaling (17 species or spp groups **common to both regions**; occurrence rate 1%)

- Each dot represents a photo
- Ellipses represent variation in catch composition by region, year, month
- R values describe variance explained by factor



Workshop input vs. social media



Summary



Summary of physical factors

Factors affecting dolphin and wahoo	S Florida	Beaufort	Wanchese	VB
Temperature breaks	X	X	X	
Gulf Stream position	X	X	X	
Currents and eddies	X	X		
Winds	X	X		
Weather / tropical weather systems			X	
Seasonal changes / water temperature	X		X	
Water clarity / quality / FW influences	X			
Moon phase	X			
“dead zones”	X			
Unknown seasonal shifts / cyclical trends	X			



Summary of regulatory impacts

	South Florida	North Carolina / Virginia
Bag limits	Individual bag limit OK, could live with reduction. Tend to support much smaller trip limit.	Reductions in bag/trip limit linked to reduced customer satisfaction and decrease in charter demand (Wanchese / Beaufort)
Size limits	Widespread support to increase size limit to increase spawning biomass (some individuals thought size limits would have no impact)	Size limits could shorten season because of availability of size classes and effort would shift to trigger and beeliners (Beaufort); no impacts noted in Wanchese or Virginia Beach
Level of regulation	Generally low regulation levels has allowed increasing effort in private, charter, and commercial sectors	Lack of data and few regulations have led to unconstrained effort increases in private and commercial sectors
Effort shifts – commercial	Decrease in local commercial sales of dolphin due to regulations restricting sales by charters.	Increase in pressure on dolphin due to blueline tilefish regulations and tuna availability
Effort shifts – recreational	Effort may be shifting to snappers, porgies, etc. due to declines in dolphin population, not regulations.	Reduction in season length for yellowfin tuna has increased pressure on dolphin and wahoo (Beaufort); availability of tunas reduces effort on dolphin (Wanchese / Virginia Beach)



Emerging Themes

North Carolina and Virginia

- Factors influencing commercial and recreational usage of dolphin and wahoo that are highly variable in space and time
- These factors lead to high concentration of effort and local depletion of dolphin at small scales, even if overall effort or catch has not increased
- “Meat fishery” – charter demand driven by tuna and dolphin
- Concerns about accountability, particularly regarding overall recreational effort, in all areas
- Overall, relatively little discussion of wahoo

South Florida and Keys

- Perceived decrease in abundance (particularly large gaffer dolphin), and decreasing school size
- Changes starting ~2010, marked change in ~2015
- Competing hypotheses surrounding dolphin depletion
- Tourism-driven fishery – dolphin plays unique role as tasty and charismatic species
- Concerns about impact of commercial fishing, both within SA jurisdiction and internationally
- More discussion of wahoo from private anglers; some concern about spearfishing and high speed trolling impacts



Next Steps

- Finalize South Florida analysis (following webinar)
- Explore some major hypotheses with data
- Final report for Council

