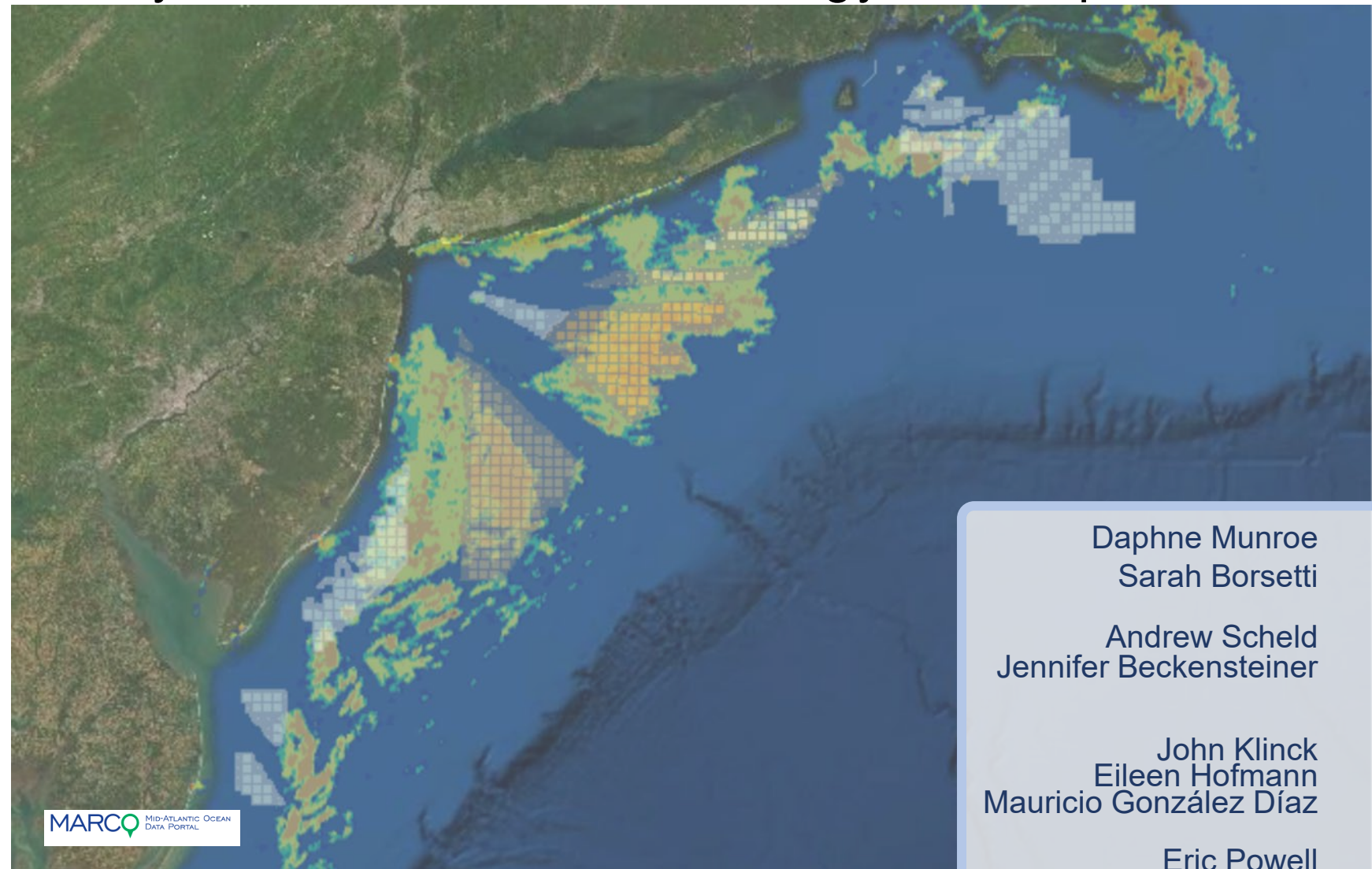


Assessing economic impacts to the US commercial surfclam fishing industry from offshore wind energy development



MAFMC SSC Meeting September 7-8, 2021
Preliminary Model Results

Daphne Munroe
Sarah Borsetti

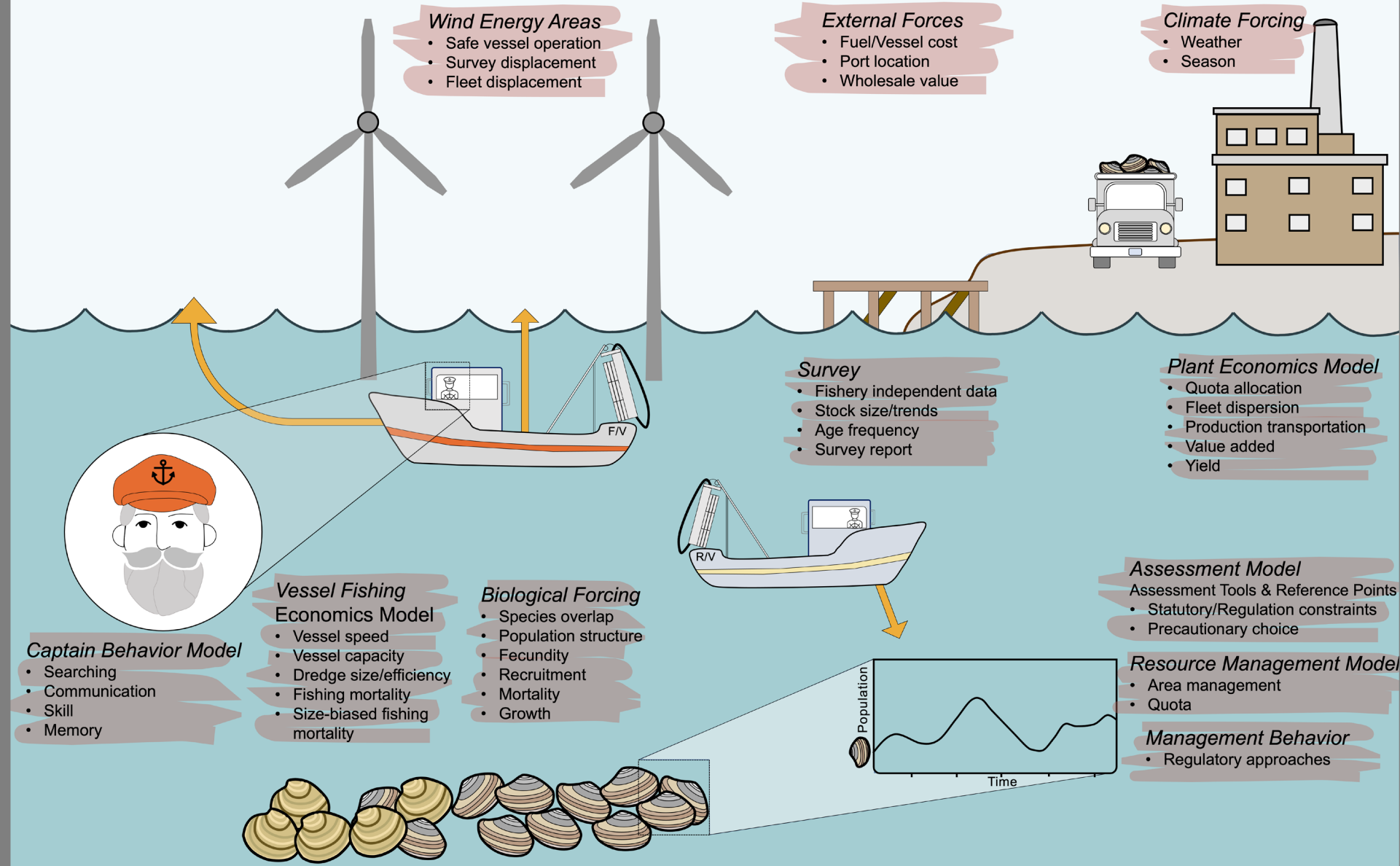
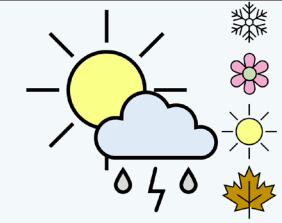
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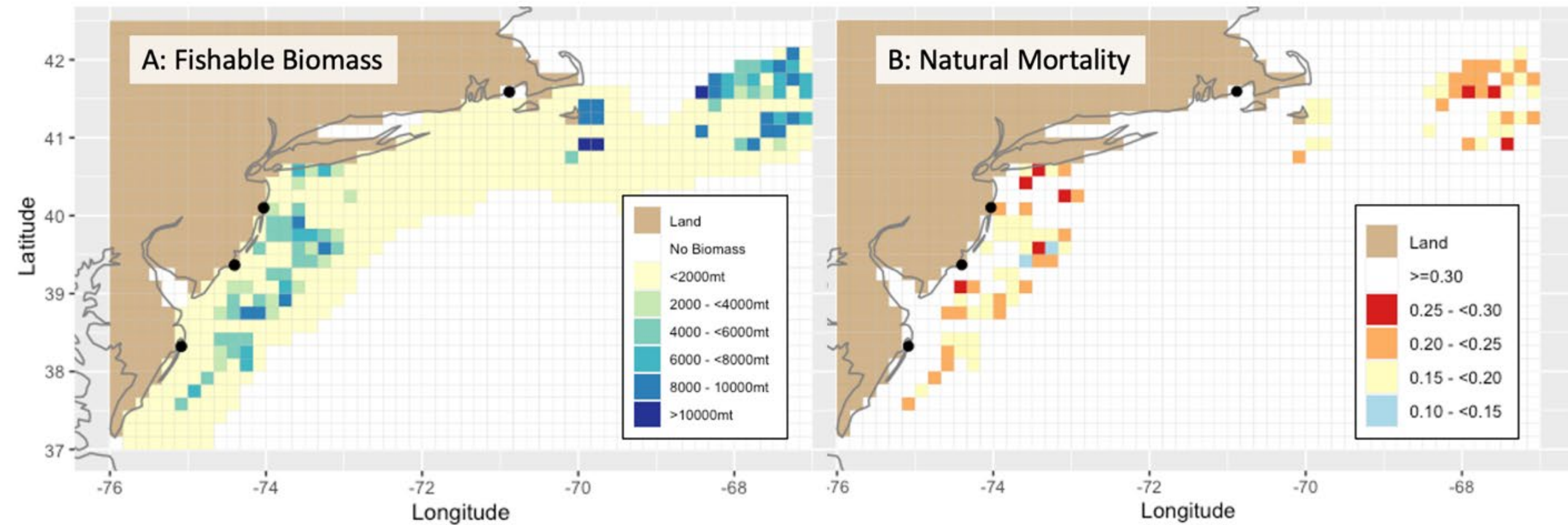
John Klinck
Eileen Hofmann
Mauricio González Díaz

Eric Powell
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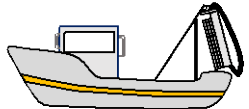
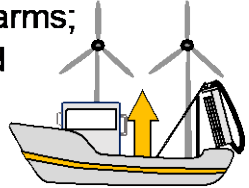
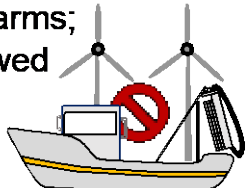
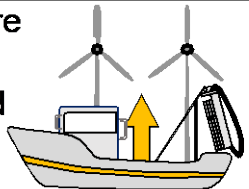
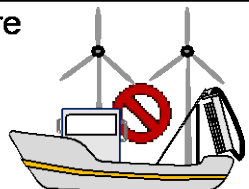
Spatially Explicit Fisheries Economic Simulator

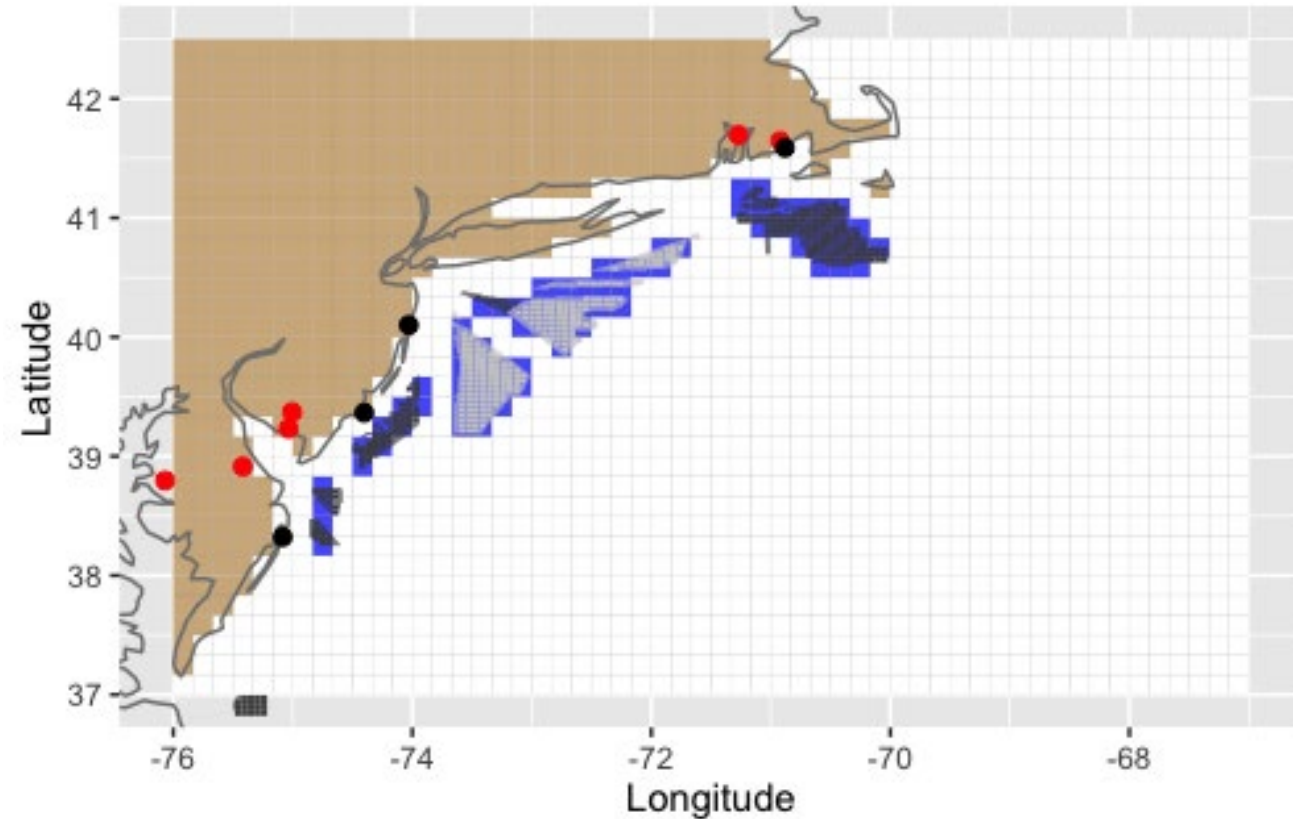
SEFES





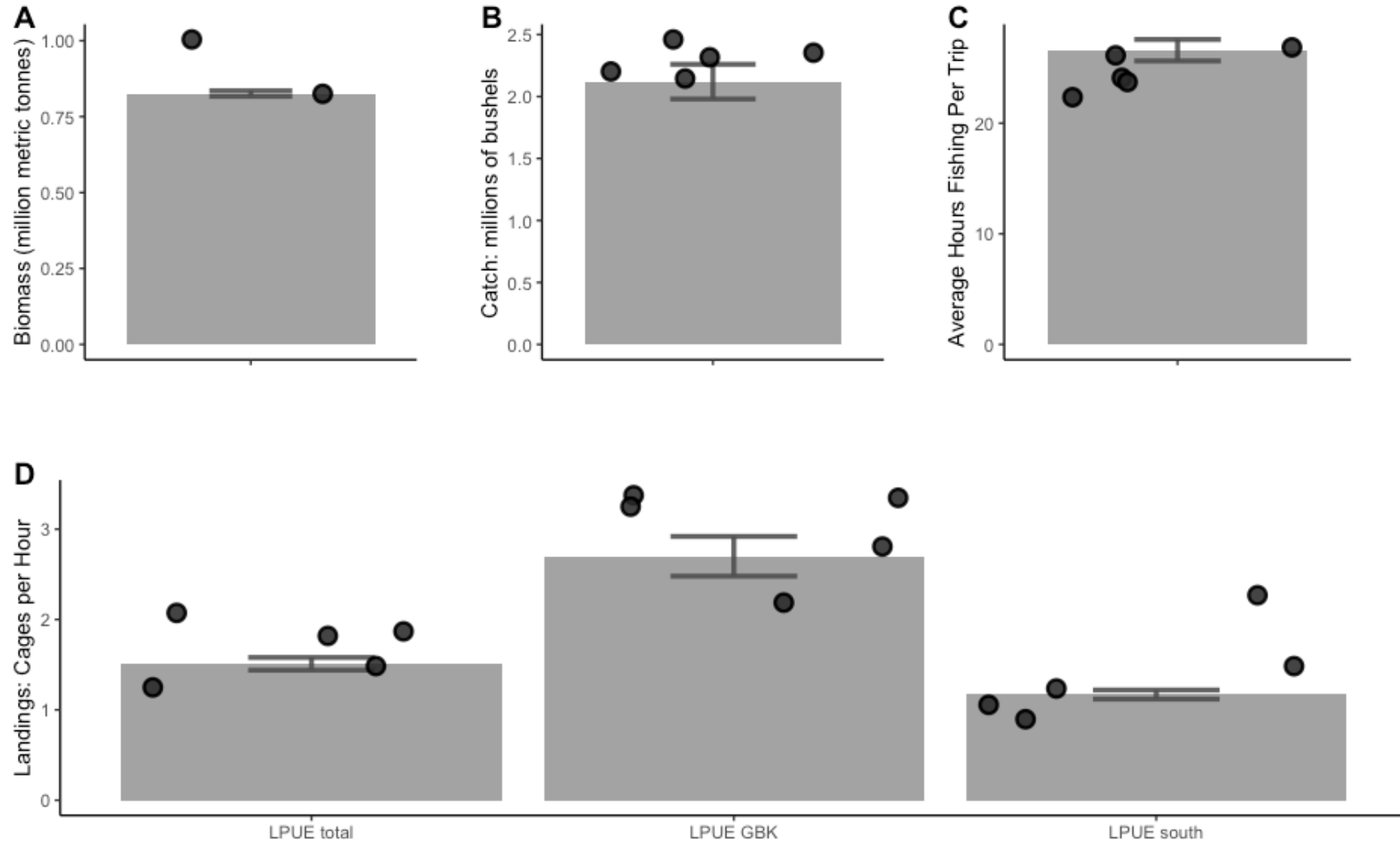
Model Description

<i>Wind energy scenario</i>	<i>Description</i>
W00	Status quo; no wind farms 
W1T	Current wind farms; Transit allowed  <div style="border: 1px solid black; padding: 2px; display: inline-block;">CURRENT LEASES</div>
W1N	Current wind farms; No transit allowed  <div style="border: 1px solid black; padding: 2px; display: inline-block;">CURRENT LEASES</div>
W2T	Current & future wind farms; Transit allowed  <div style="border: 1px solid black; padding: 2px; display: inline-block;">CURRENT LEASES</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">FUTURE LEASES</div>
W2N	Current & future wind farms; No transit allowed  <div style="border: 1px solid black; padding: 2px; display: inline-block;">CURRENT LEASES</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">FUTURE LEASES</div>



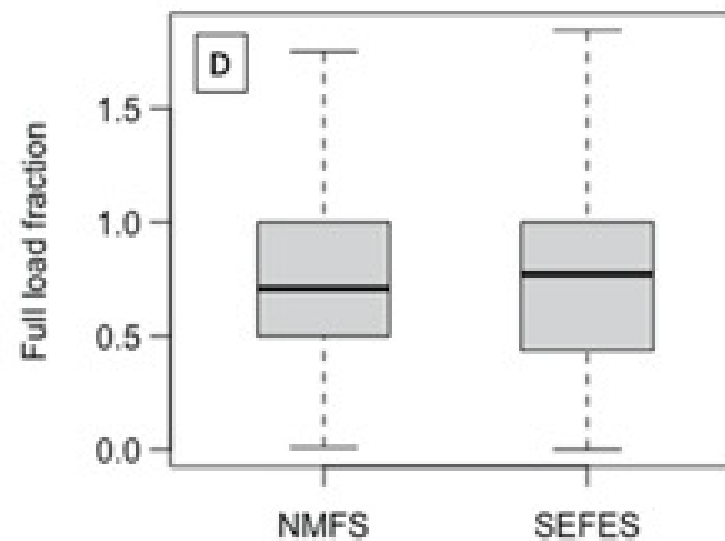
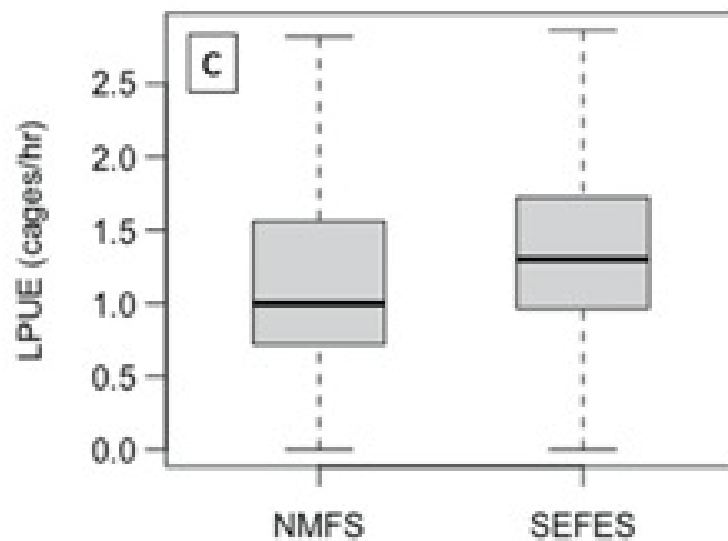
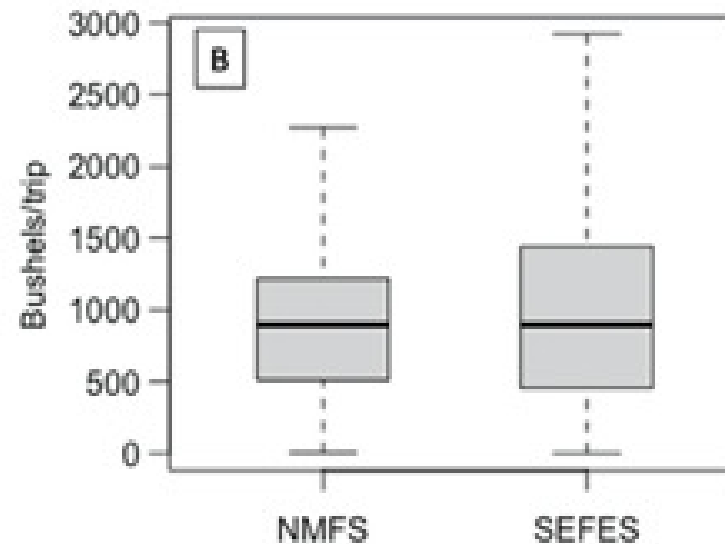
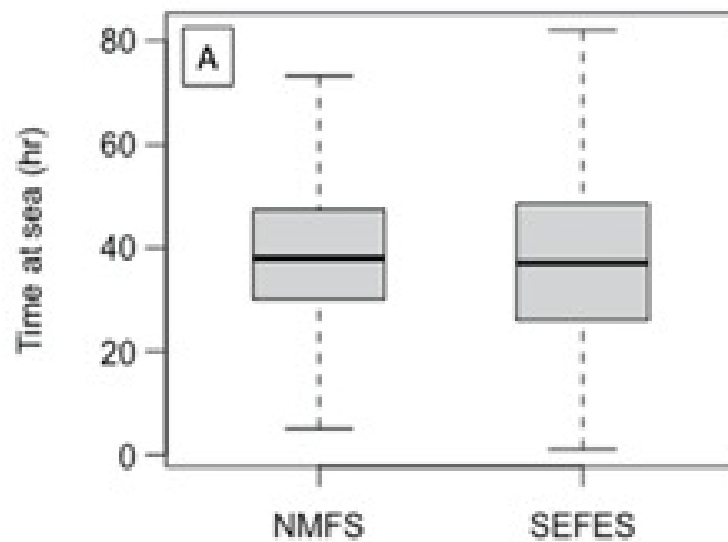
Base Case Validation

Model Output Compared to NMFS Survey Data (W00)



Base Case Validation

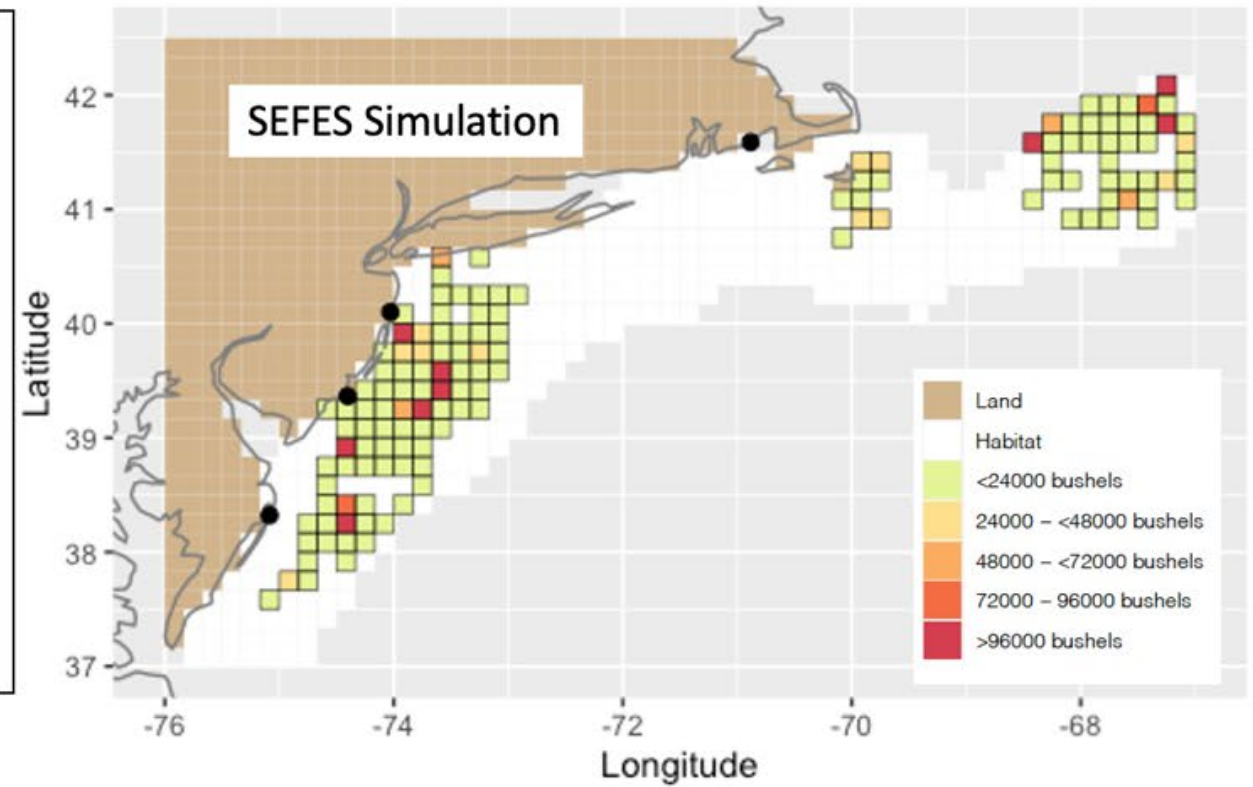
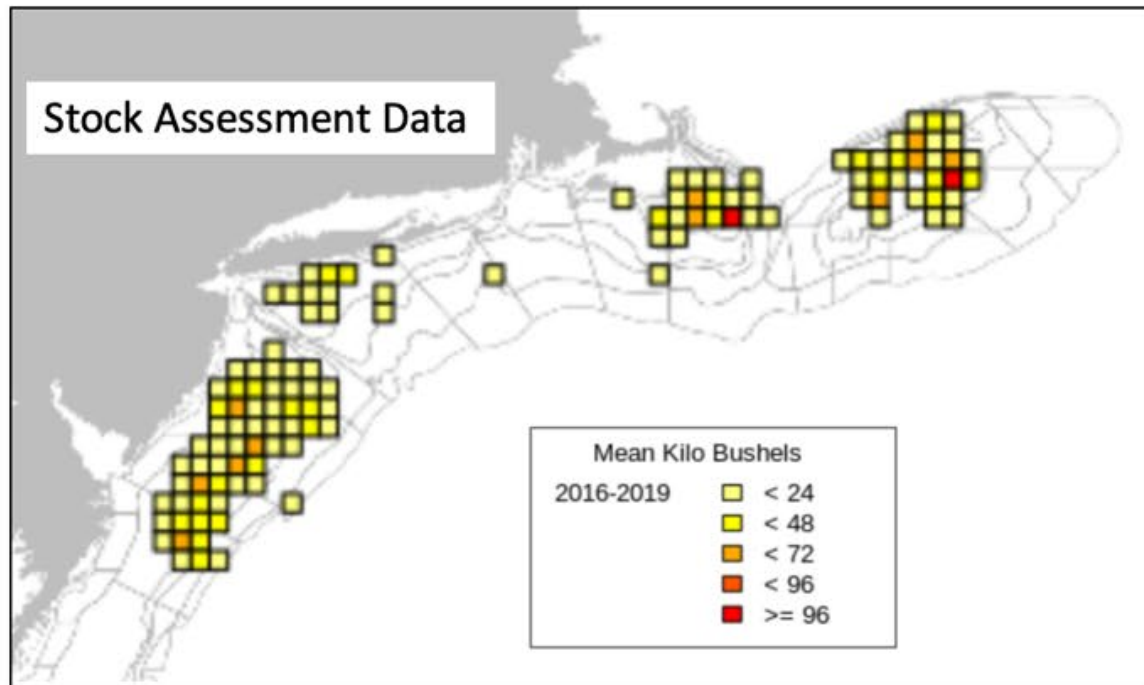
Model Output Compared to NMFS Fishery Data (W00)



Base Case Validation

Model Output Compared to NMFS Survey Data (W00)

Average Bushels Caught by TMS per Year



— Biological & Fishery Measures

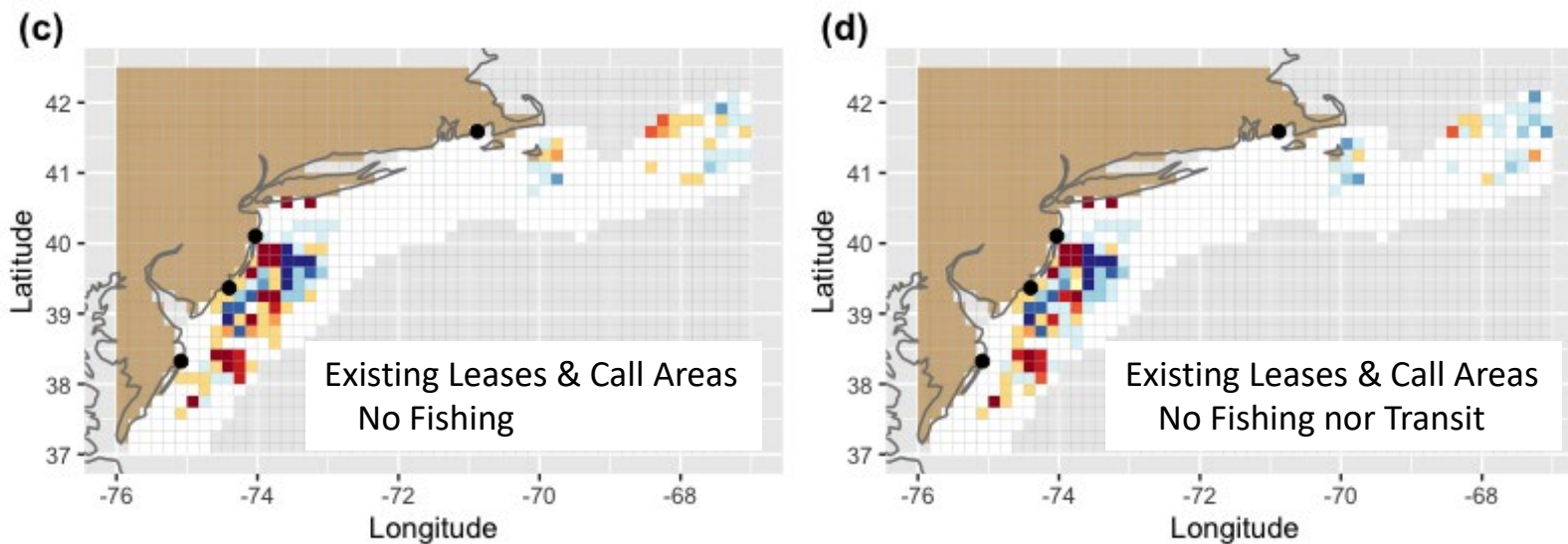
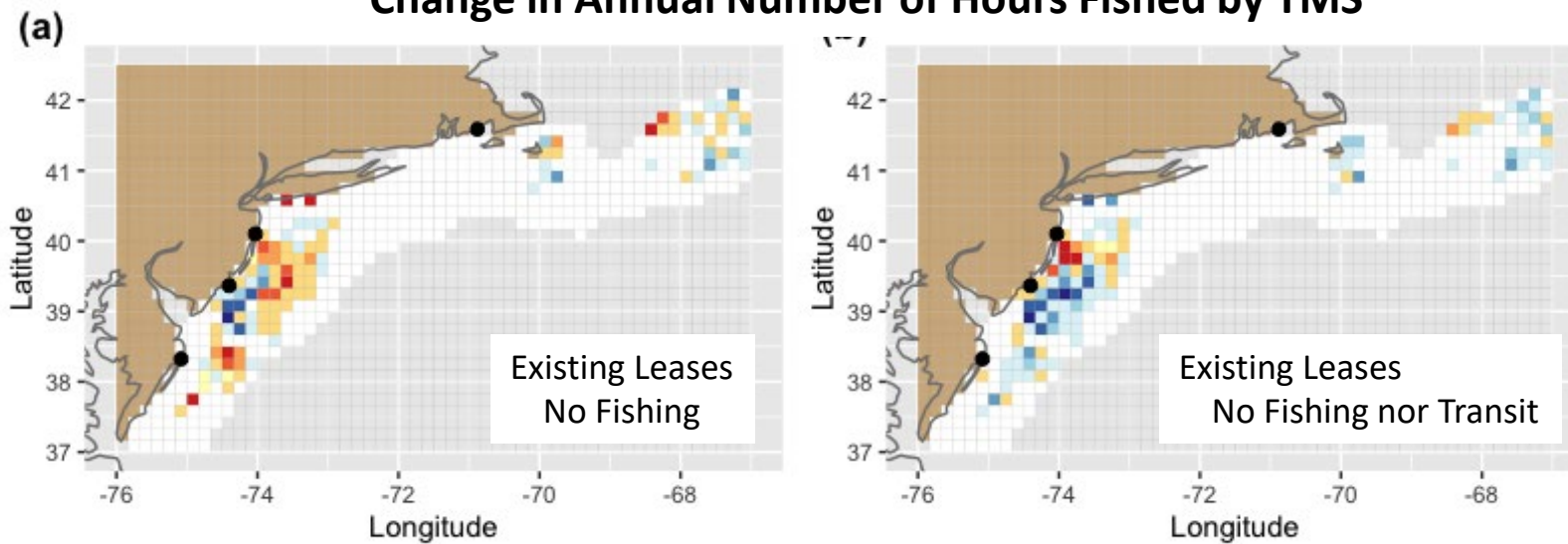
Percent change from status quo (W00)

	Existing leases – No fishing	Existing leases – No fishing or transit	Existing leases & Call areas – No fishing	Existing leases & Call areas – No fishing or transit
Catch	-2.88	-7.27	-11.24	-14.22
LPUE (All)	0.86	1.71	-0.66	-0.20
LPUE (Georges Bank)	0.11	0.40	-0.04	0.37
LPUE (Southern grounds)	0.77	1.71	-6.60	-5.91
Time at Sea (All)	0.91	7.24	4.32	10.69
Time at Sea (Small vessels)	1.49	10.04	3.14	12.87
Time at Sea (Medium vessels)	0.66	8.42	4.33	11.98
Time at Sea (Large vessels)	0.70	11.37	7.92	16.74
Time at Sea (Jumbo vessels)	0.91	4.29	3.38	7.20
Time Fishing (All)	-0.41	-1.99	1.10	-0.10
Time Fishing (Small vessels)	0.05	-3.52	1.12	-0.96
Time Fishing (Medium vessels)	-0.91	-2.91	1.47	0.31
Time Fishing (Large vessels)	0.02	-0.40	0.90	0.42
Time Fishing (Jumbo vessels)	0.02	-0.40	0.90	0.42

Table 1: Percent change in fishing measures for each wind energy scenario as compared to status quo. Catch in millions of bushels. Landings per unit effort (LPUE) – cages per hour. Both time at sea and time fishing in hours. Vessel sizes: Small ≤ 79 ft.; Medium: 80-94 ft.; Large: 95-110 ft.; Jumbo: >110 ft.

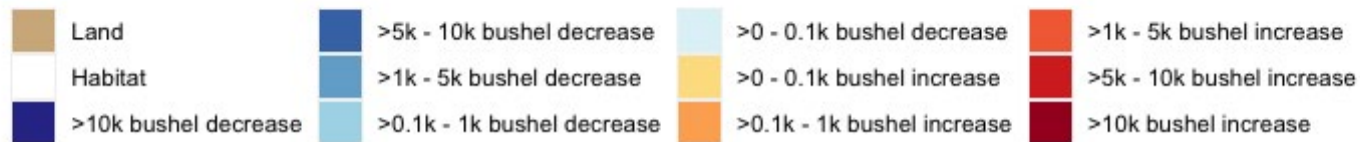
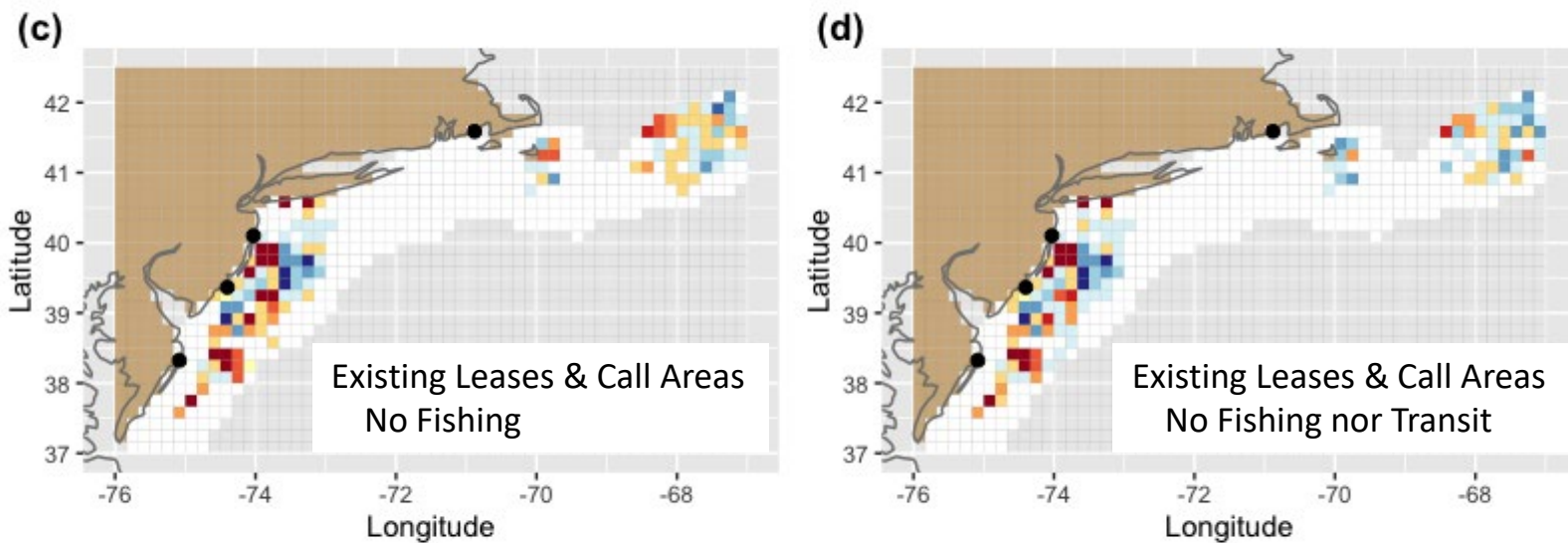
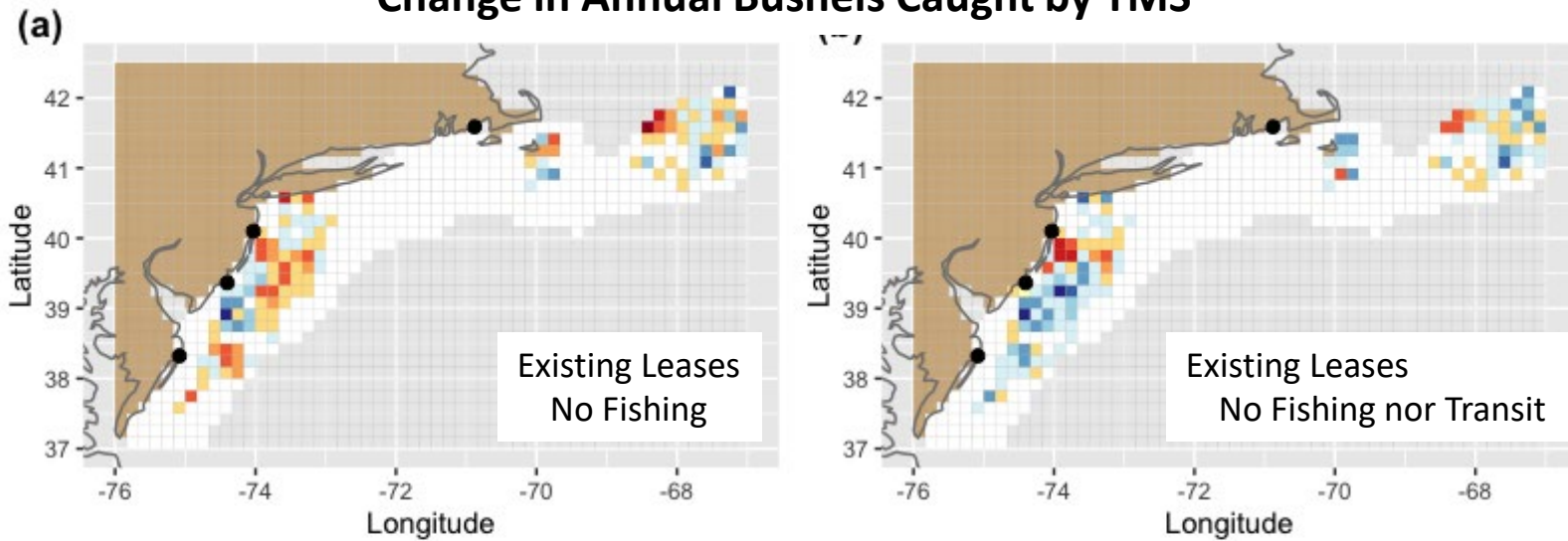
Change in Effort

Change in Annual Number of Hours Fished by TMS



Change in Catch

Change in Annual Bushels Caught by TMS



— Economic measures —
Percent change from status quo (W00)

	Existing leases – No fishing	Existing leases – No fishing or transit	Existing leases & Call areas – No fishing	Existing leases & Call areas – No fishing or transit
Profit (fleet)	2.49	-7.04	-4.09	-11.25
Average Total Costs (fleet)	0.07	2.34	2.92	4.93
Average Fuel Costs (fleet)	-0.06	5.56	4.93	9.92
Average Transportation Costs (processors)	0.76	1.25	3.26	4.09
Total Revenues (processors)	-2.88	-6.61	-12.27	-15.30

Table 2: Percent change in economic measures for each wind energy scenario as compared to status quo

— Economic measures —

Percent change from status quo (W00)

Atlantic City v. New Bedford

Atlantic City, NJ

	W1T	W1N	W2T	W2N
Total Costs (fleet)	-4.93	-7.53	-16.02	-18.24
Total Revenues (fleet)	-5.52	-10.92	-21.52	-25.55
Profits (fleet)	2.48	-6.49	-6.74	-12.02
Average Total Costs (fleet)	0.65	3.82	7.08	9.96
Average Fuel Costs (fleet)	0.41	7.96	10.80	17.44

Percent change in economic measures for each scenarios as compared to status quo (W00) for Atlantic City, NJ fleet

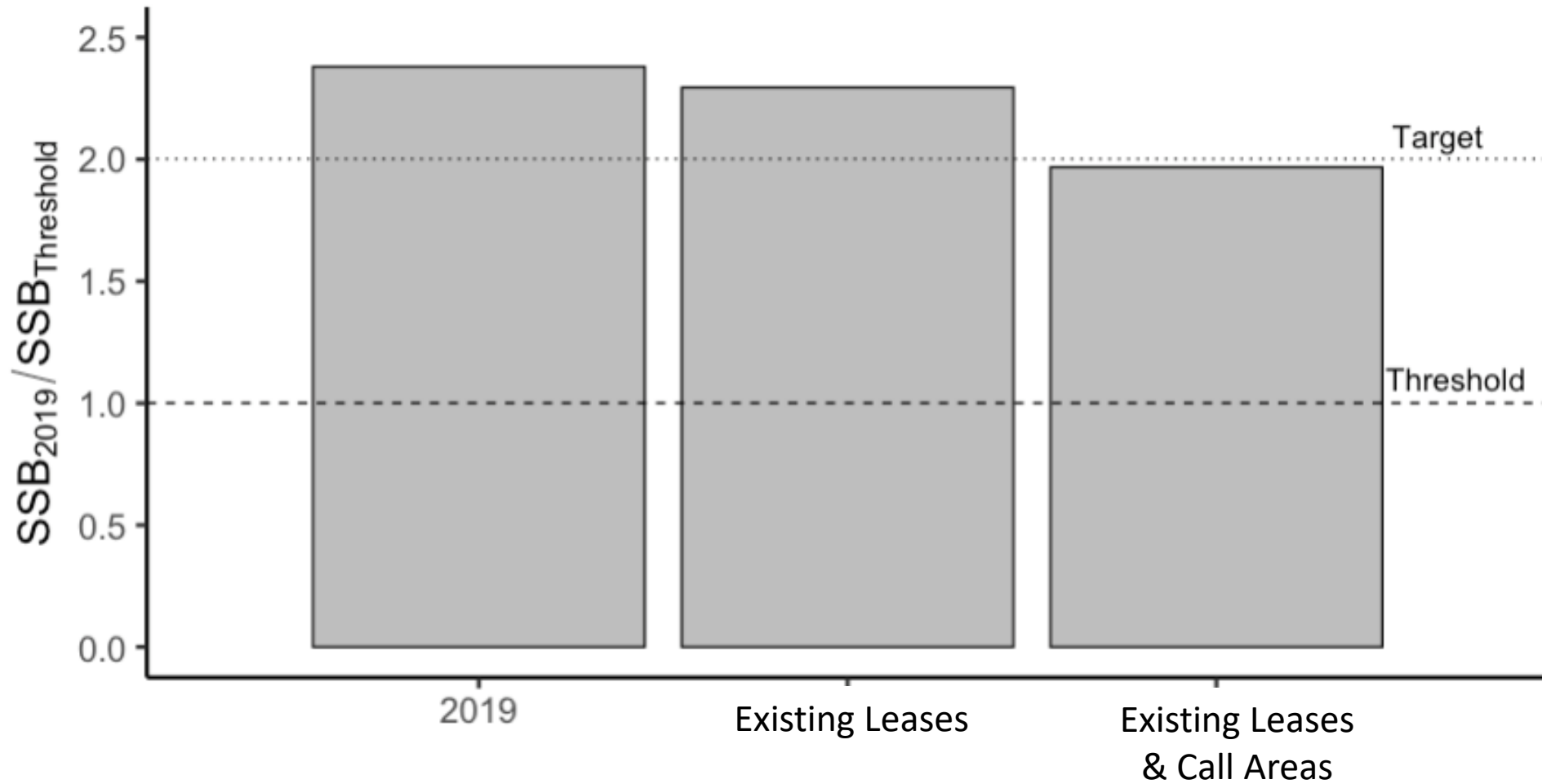
New Bedford, MA

	W1T	W1N	W2T	W2N
Total Costs (fleet)	-0.07	-0.51	-0.10	-0.50
Total Revenues (fleet)	0.21	-1.67	0.15	-1.69
Profits (fleet)	2.46	-9.09	2.15	-9.38
Average Total Costs (fleet)	-0.29	1.21	-0.25	1.26
Average Fuel Costs (fleet)	-0.40	3.20	-0.33	3.37

Percent change in economic measures for each scenarios as compared to status quo (W00) for New Bedford, MA fleet

Scenario	Description
W00	Status quo; No wind farms
W1T	Current leases; Transit allowed
W1N	Current leases; No transit allowed
W2T	Current & future leases; Transit allowed
W2N	Current & future leases; No transit allowed

Biomass



Change in spawning stock biomass of Atlantic surf clam from 2019 with two windfarm conditions

SSB₂₀₁₉ was estimated to be 1,222 ('000 mt) which is 119% of the biomass target

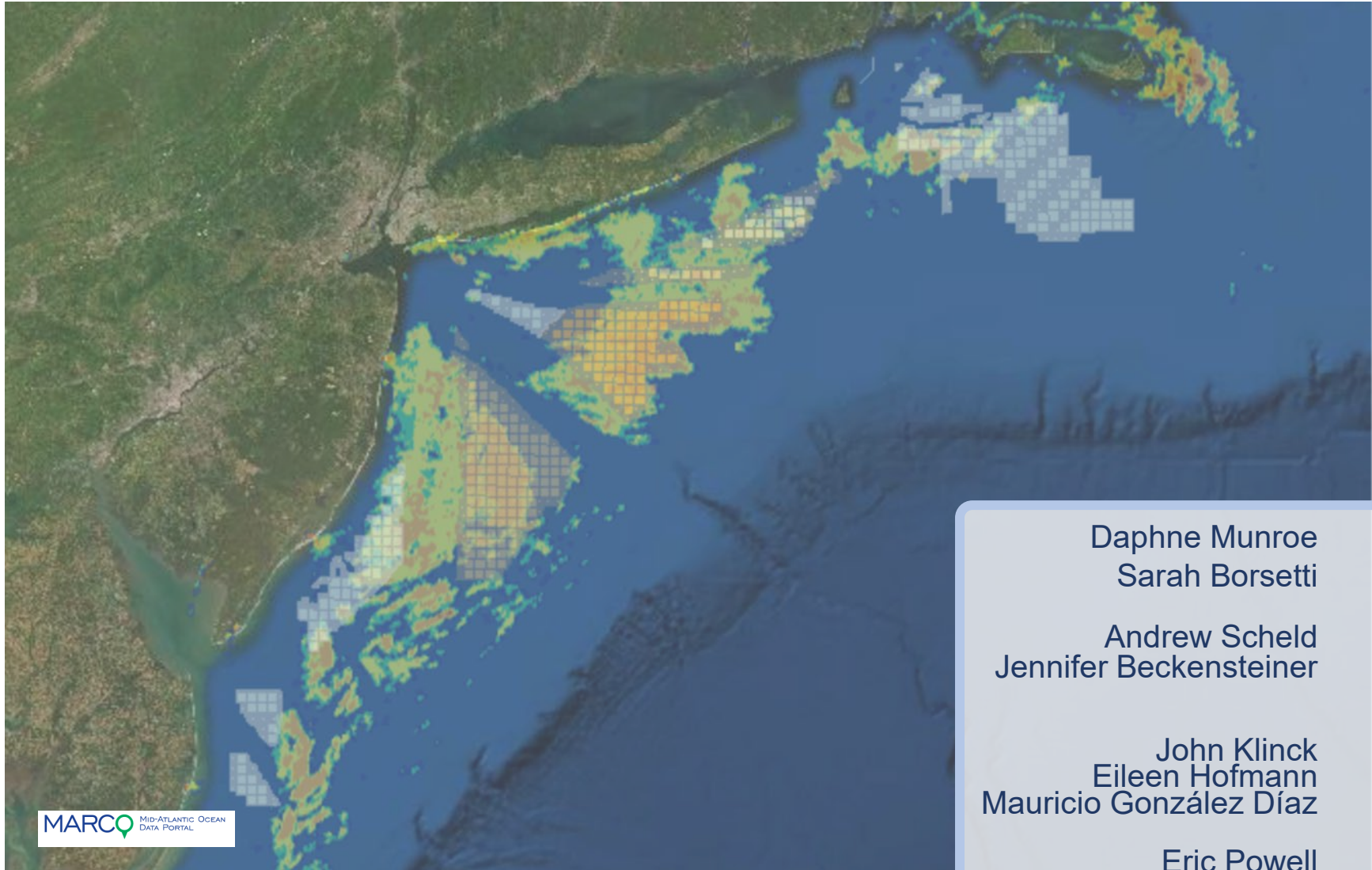
SSB_{2019W1} was estimated to be 3.53% lower than SSB₂₀₁₉ 1179 ('000 mt) which is 114.8% of the biomass target

SSB_{2019W2} was estimated to be 17.30% lower than SSB₂₀₁₉ 1011 ('000 mt) which is 1.6% below the biomass target

BOEM

BUREAU OF OCEAN ENERGY MANAGEMENT

M19AC00016



MARCO MID-ATLANTIC OCEAN DATA PORTAL

Daphne Munroe
Sarah Borsetti

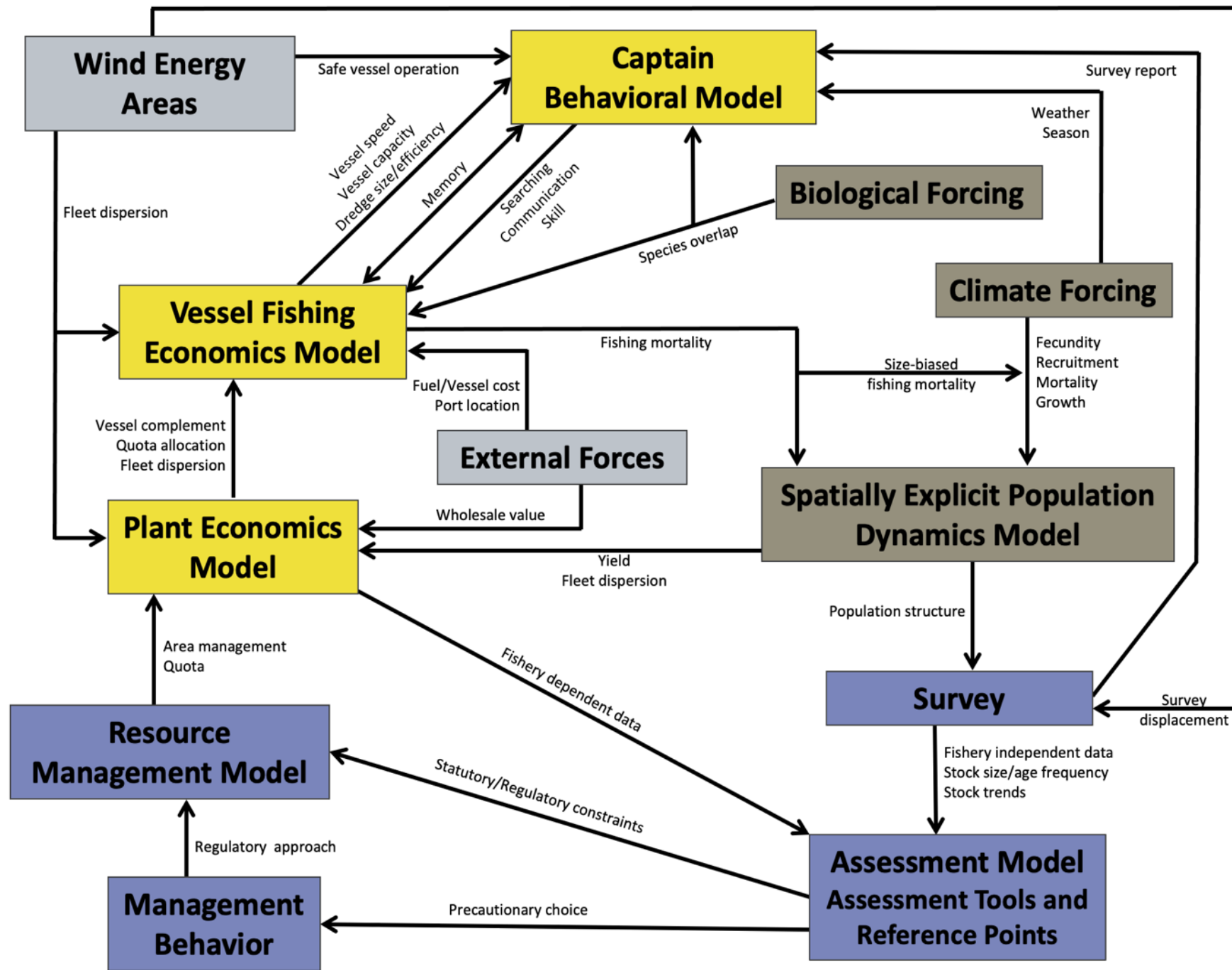
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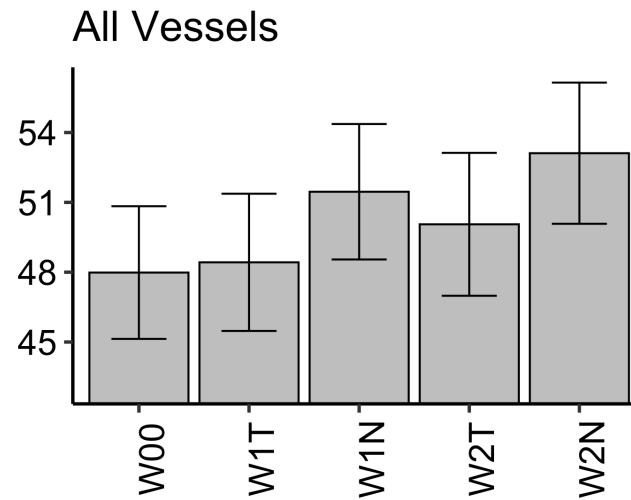
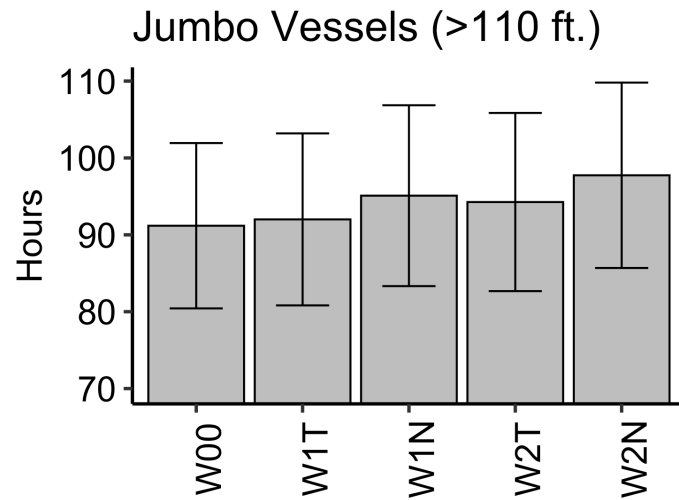
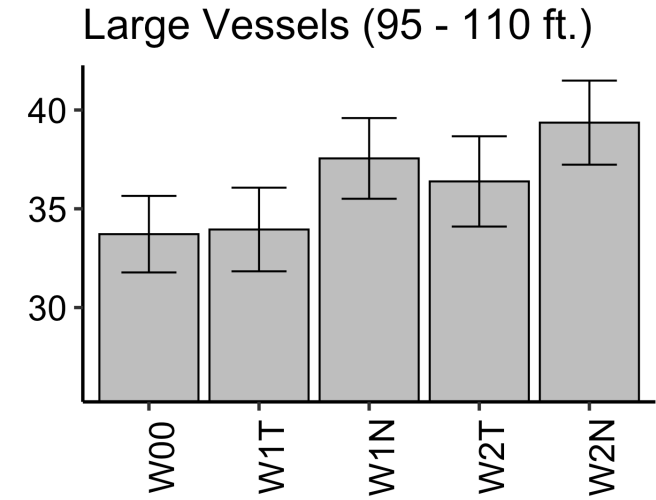
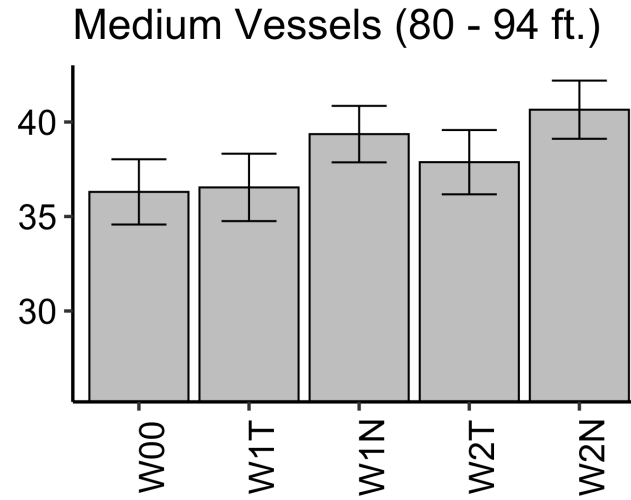
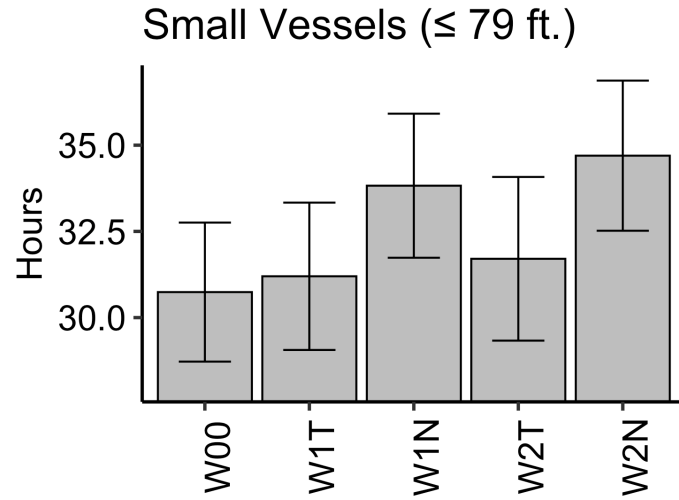
Eric Powell
Laura Solinger



dmunroe@hsrl.rutgers.edu

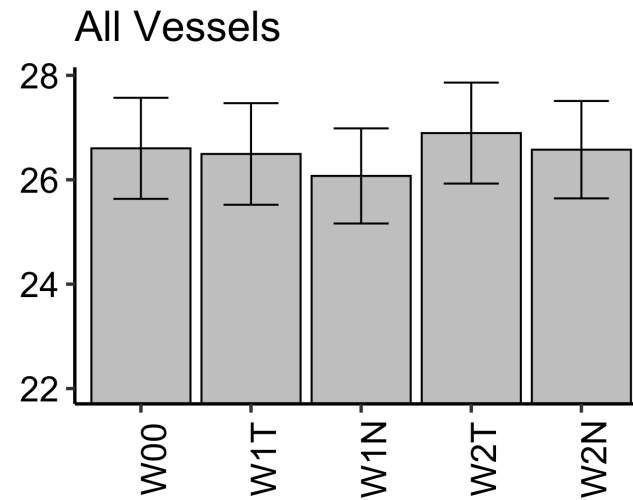
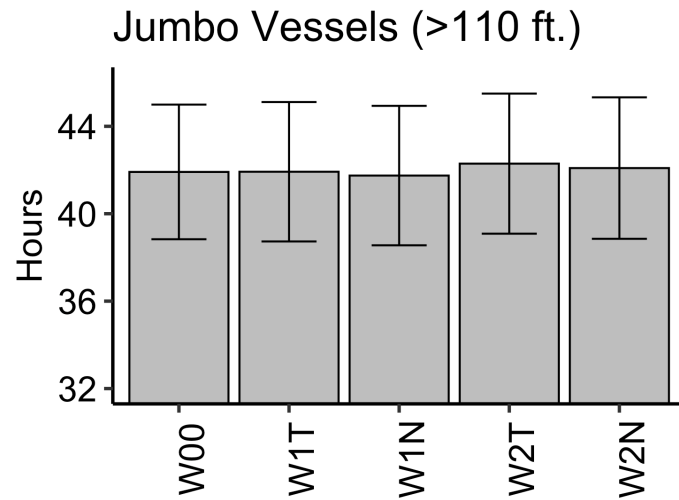
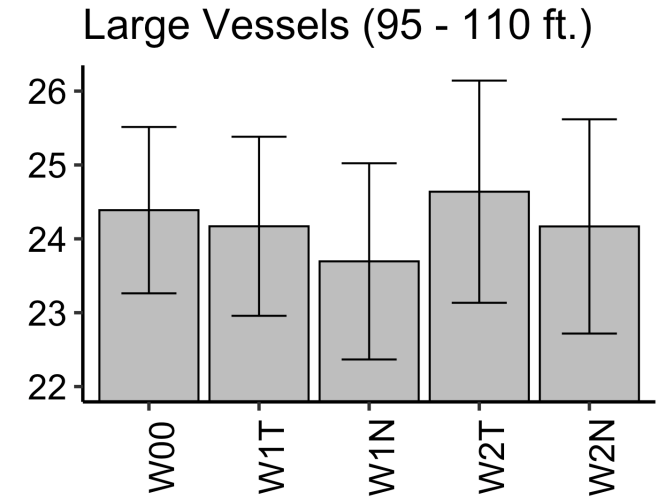
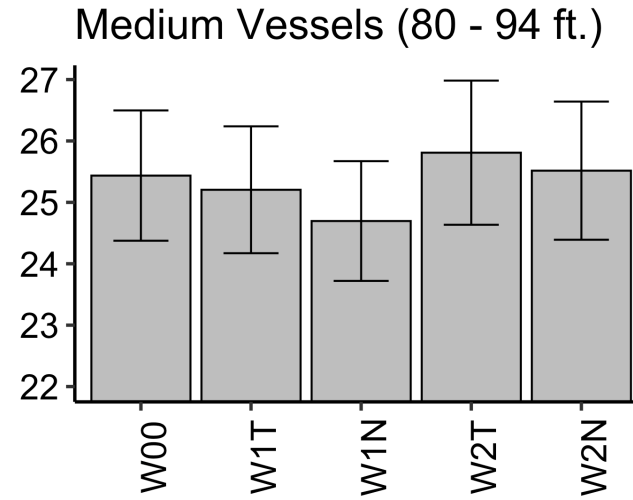
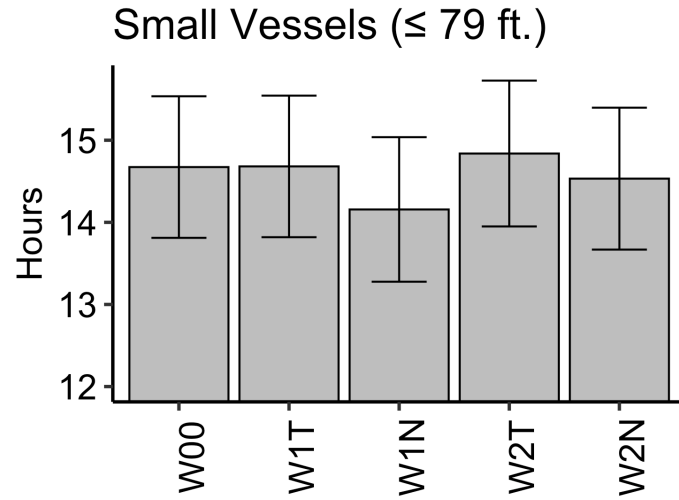


Average Time at Sea



Scenario	Description
W00	Statua quo; No wind farms
W1T	Current leases; Transit allowed
W1N	Current leases; No transit allowed
W2T	Current & future leases; Transit allowed
W2N	Current & future leases; No transit allowed

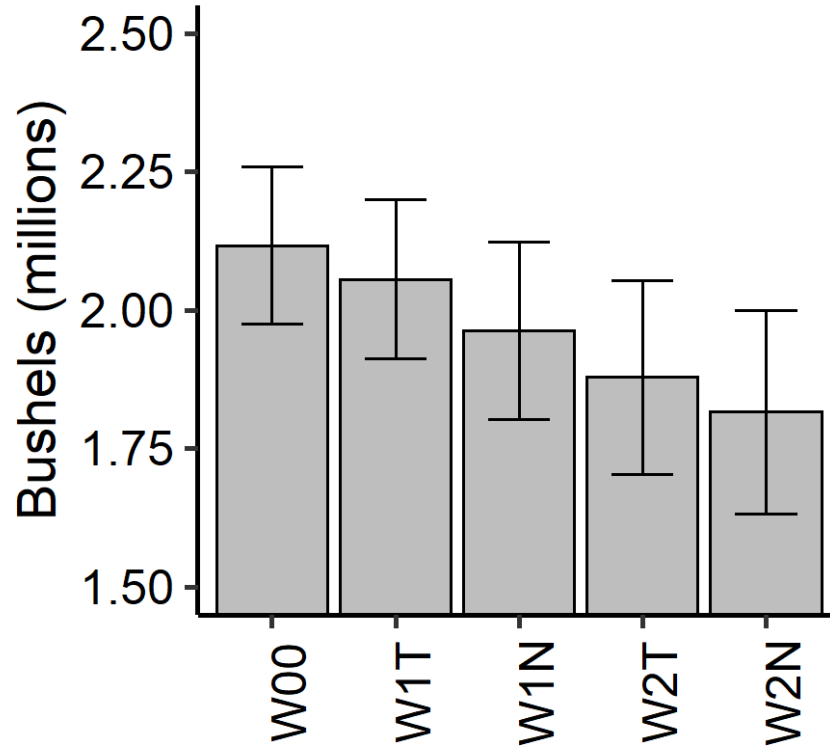
Average Time Fishing



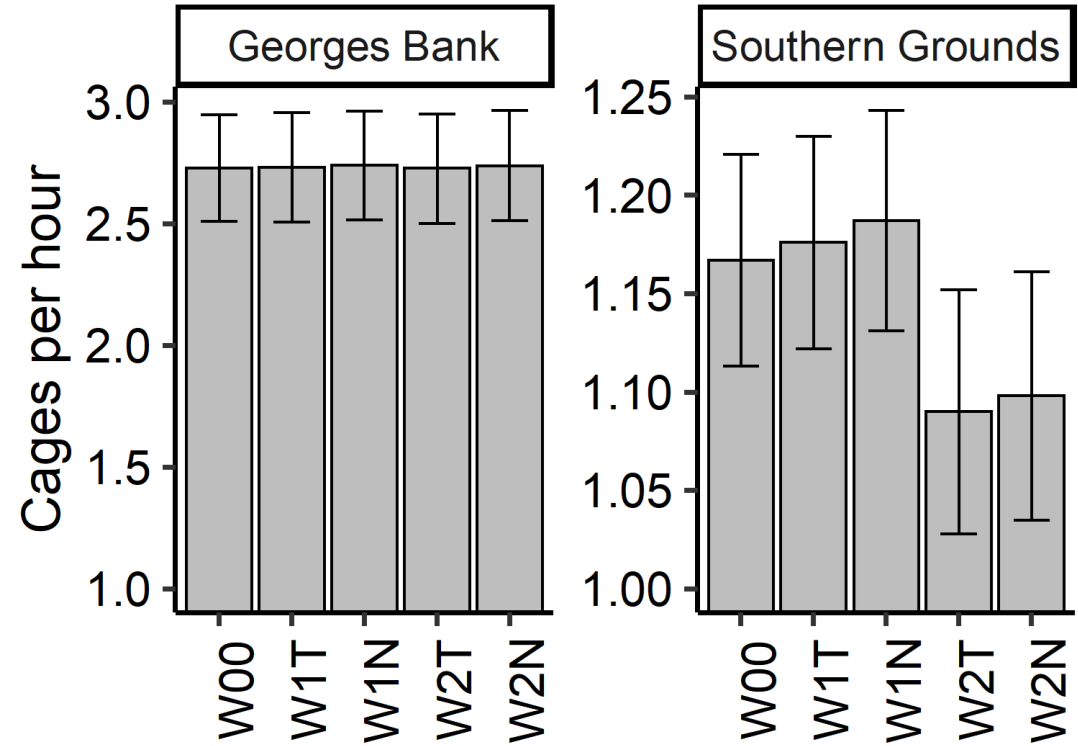
Scenario	Description
W00	Statua quo; No wind farms
W1T	Current leases; Transit allowed
W1N	Current leases; No transit allowed
W2T	Current & future leases; Transit allowed
W2N	Current & future leases; No transit allowed

Catch Details

Annual Average Catch



Annual Average LPUE

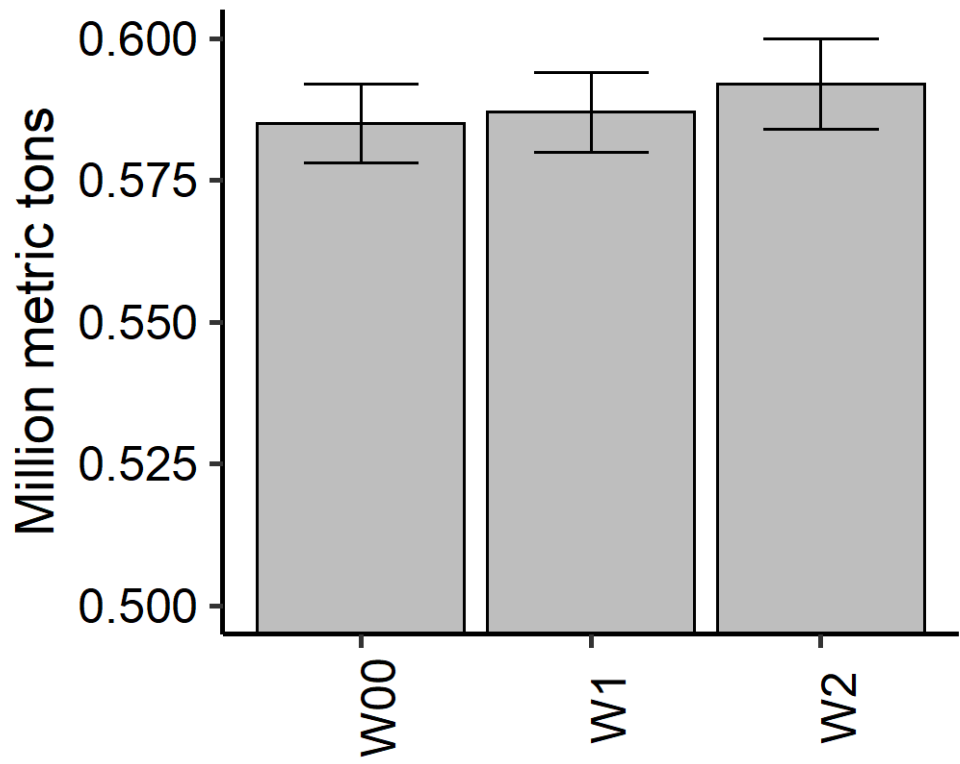


Scenario	Description
W00	Statua quo; No wind farms
W1T	Current leases; Transit allowed
W1N	Current leases; No transit allowed
W2T	Current & future leases; Transit allowed
W2N	Current & future leases; No transit allowed

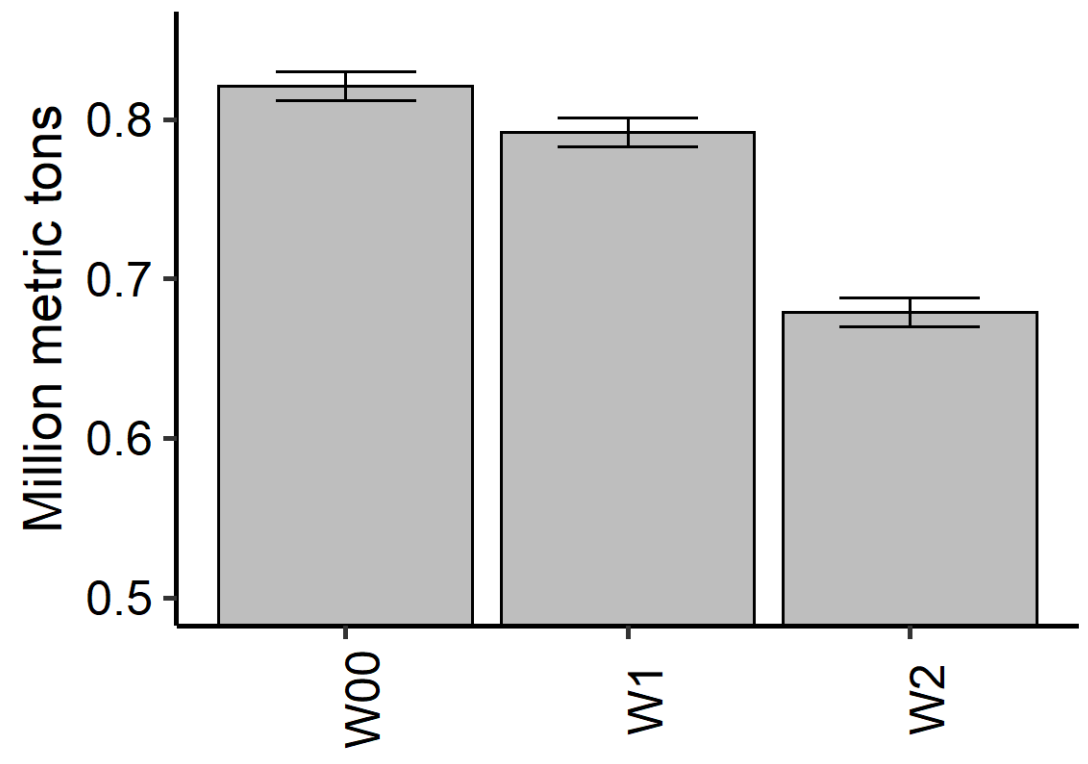
Biomass

Scenario	Description
W00	Statua quo; No wind farms
W1	W1T Current leases; Transit allowed
	W1N Current leases; No transit allowed
W2	W2T Current & future leases; Transit allowed
	W2N Current & future leases; No transit allowed

Stock Biomass >120mm

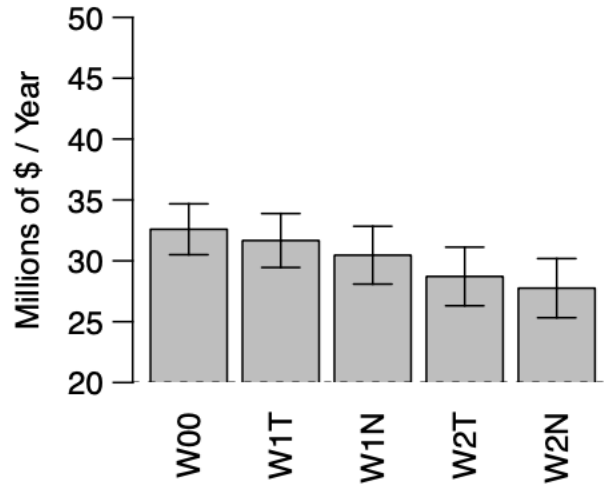


Stock Biomass (xWF)

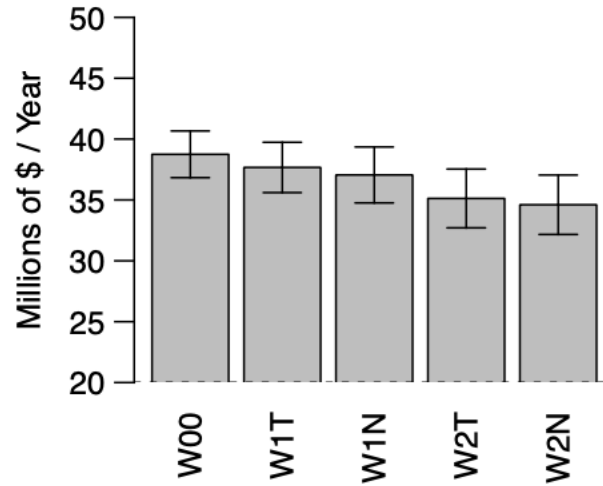


Economic measures

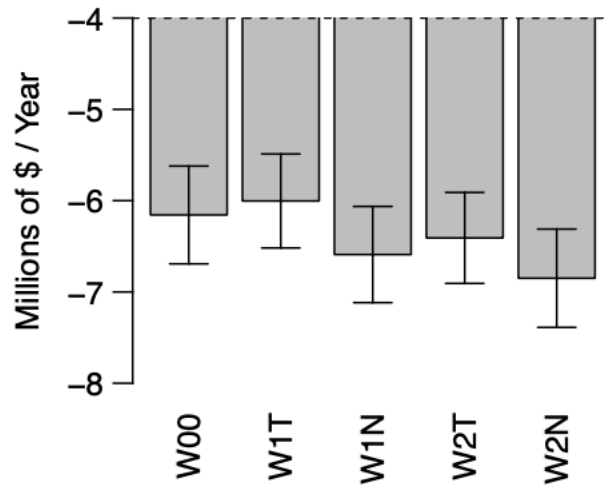
Total Revenues (fleet)



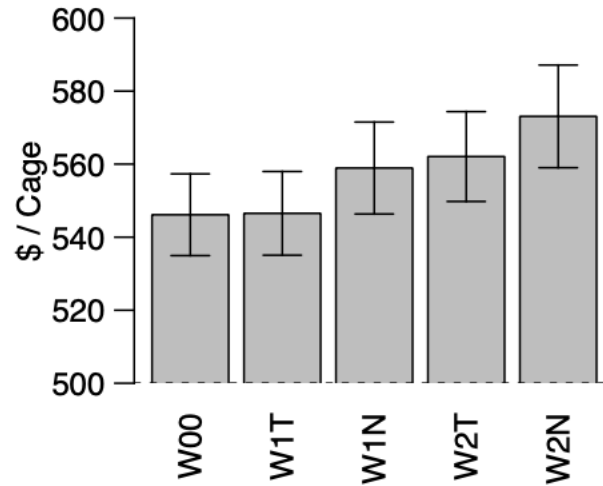
Total Costs (fleet)



Profits (fleet)

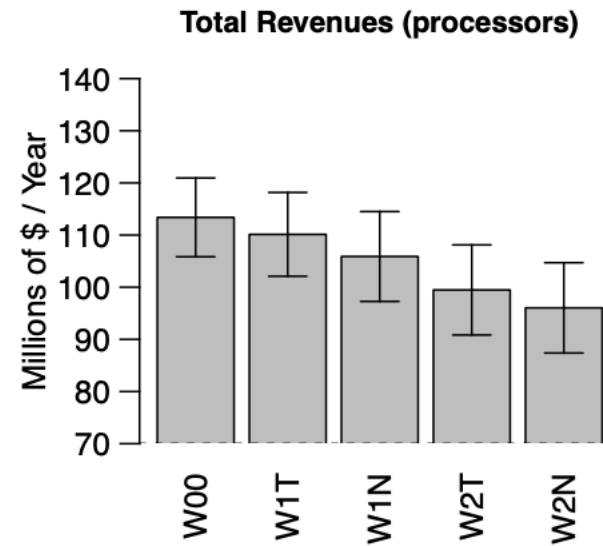
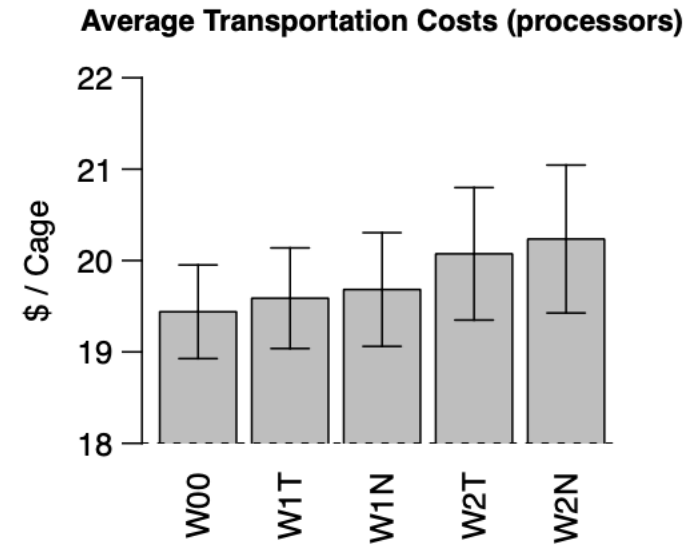
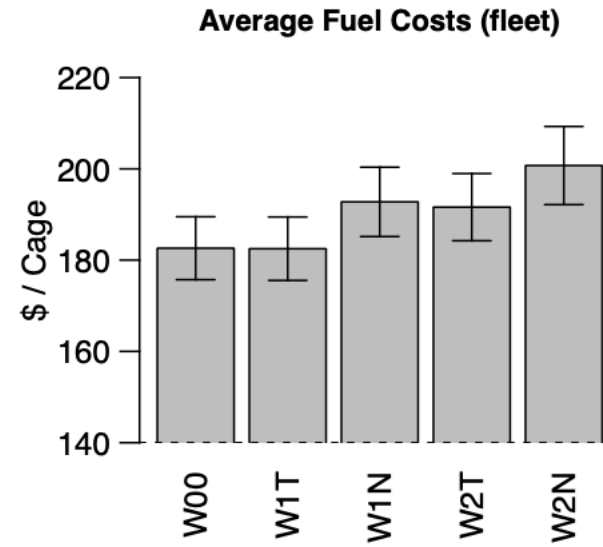


Average Total Costs (fleet)



Scenario	Description
W00	Statua quo; No wind farms
W1T	Current leases; Transit allowed
W1N	Current leases; No transit allowed
W2T	Current & future leases; Transit allowed
W2N	Current & future leases; No transit allowed

Economic measures



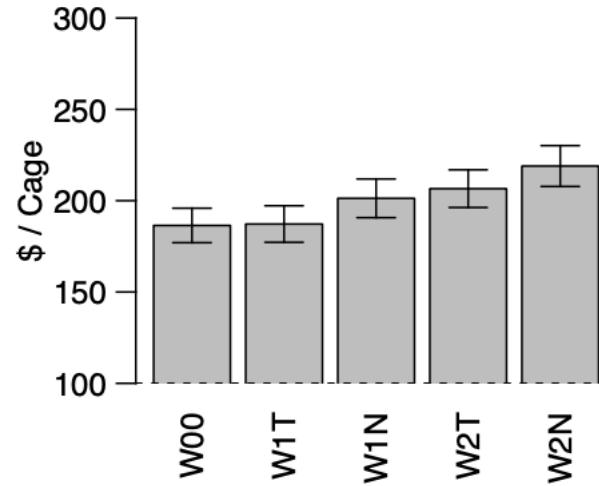
Scenario	Description
W00	Statua quo; No wind farms
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Economic measures

Atlantic City v. New Bedford

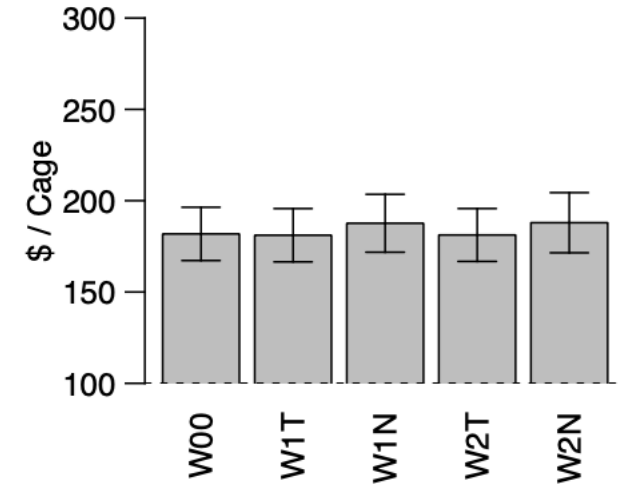
Atlantic City, NJ

Average Fuel Costs (fleet), Atlantic City



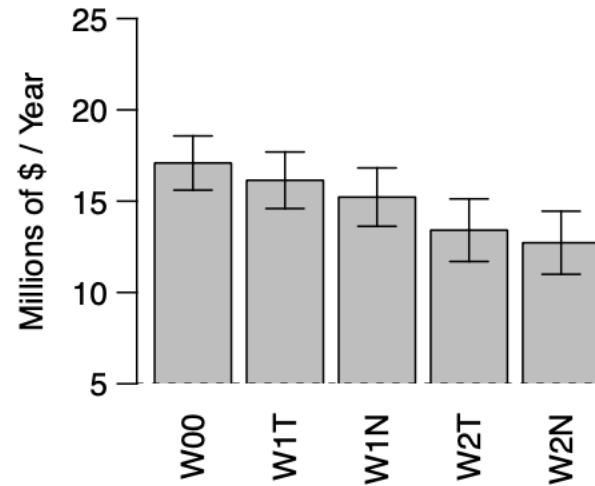
New Bedford, MA

Average Fuel Costs (fleet), New Bedford



Scenario	Description
W00	Statua quo; No wind farms
W1T	Current leases; Transit allowed
W1N	Current leases; No transit allowed
W2T	Current & future leases; Transit allowed
W2N	Current & future leases; No transit allowed

Total Revenues (fleet), Atlantic City



Total Revenues (fleet), New Bedford

