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**Evaluating an alternative stratification  
for the  
NEFSC bottom trawl survey  
-  
Tables and Figures Handout**

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**Table 1. Great South Channel:** split stratum 23 according to winter flounder biology (growth rates).

Stratum	Area (nm <sup>2</sup> )		New stratum	New area (nm <sup>2</sup> )
01230	1,016	→	01231	368
			01232	648

**Table 2. Georges Bank / Gulf of Maine:** split offshore strata 16, 17, 18, 21, 22, 29 and 36 along the Hague Line.

Stratum	Area (nm <sup>2</sup> )		New stratum	New area (nm <sup>2</sup> )
01160	2,980	→	01161	1,452
			01162	1,528
01170	360	→	01171	78
			01172	282
01180	172	→	01181	47
			01182	125
01210	424	→	01211	216
			01212	208
01220	454	→	01221	329
			01222	125
01290	3,245	→	01291	1,730
			01292	1,515
01360	4,069	→	01361	2,422
			01362	1,647

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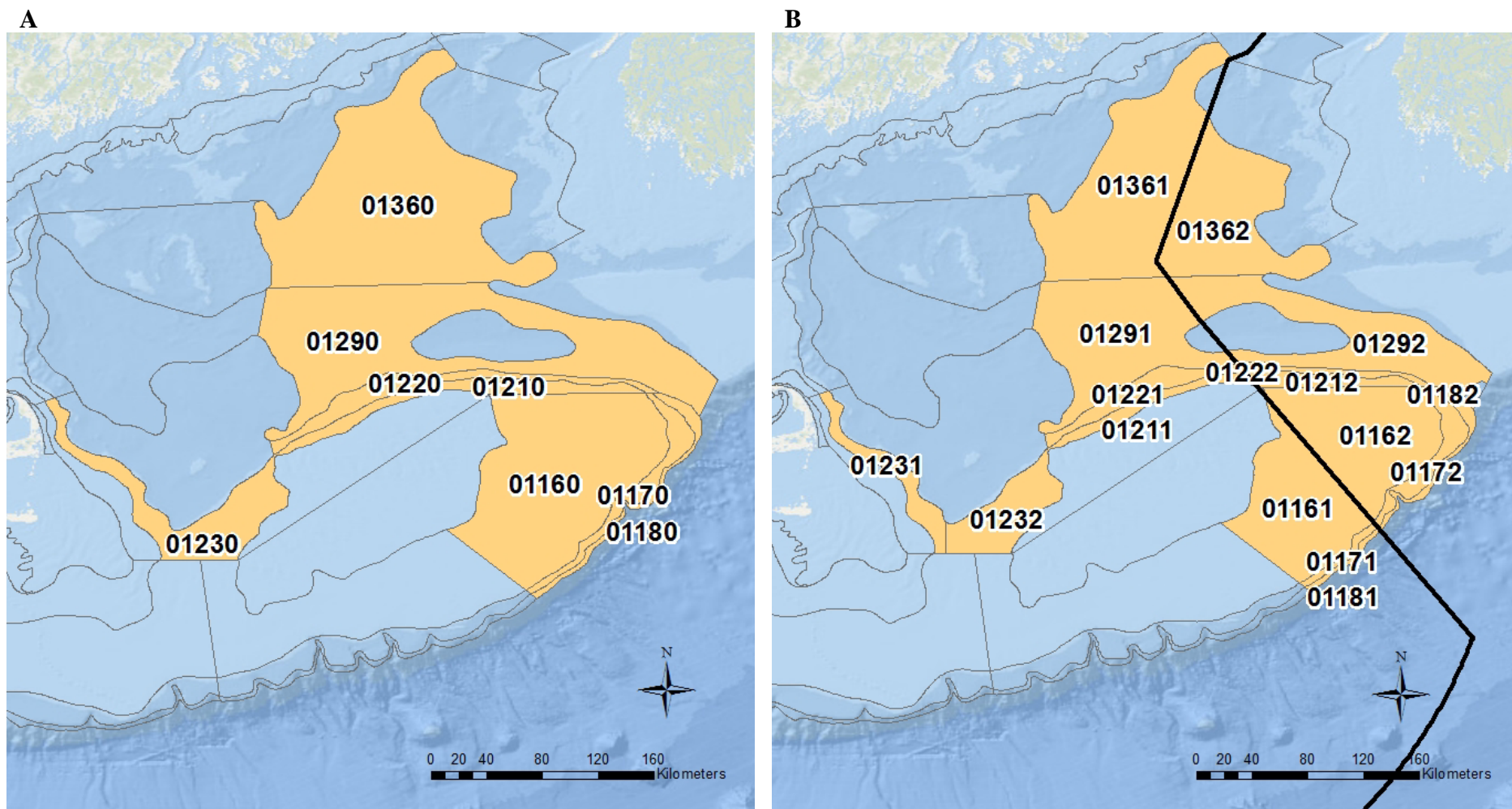


Figure 1. NEFSC bottom trawl survey strata in the Gulf of Maine, on Georges Bank, and in the Great South Channel: current stratification (A), and proposed re-stratified scenario (B).

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**Table 3. Cape Hatteras to Long Island:** combine several inshore strata.

Stratum	Area (nm <sup>2</sup> )		New stratum	New area (nm <sup>2</sup> )
03020	62			
03050	62	→	03080	274
03080	150			
03110	242			
03140	110	→	03140	352
03170	238			
03200	356	→	03200	594
03230	167			
03260	154	→	03290	506
03290	185			
03320	106			
03350	88	→	03380	418
03380	224			
03410	383			
03440	304	→	03440	687

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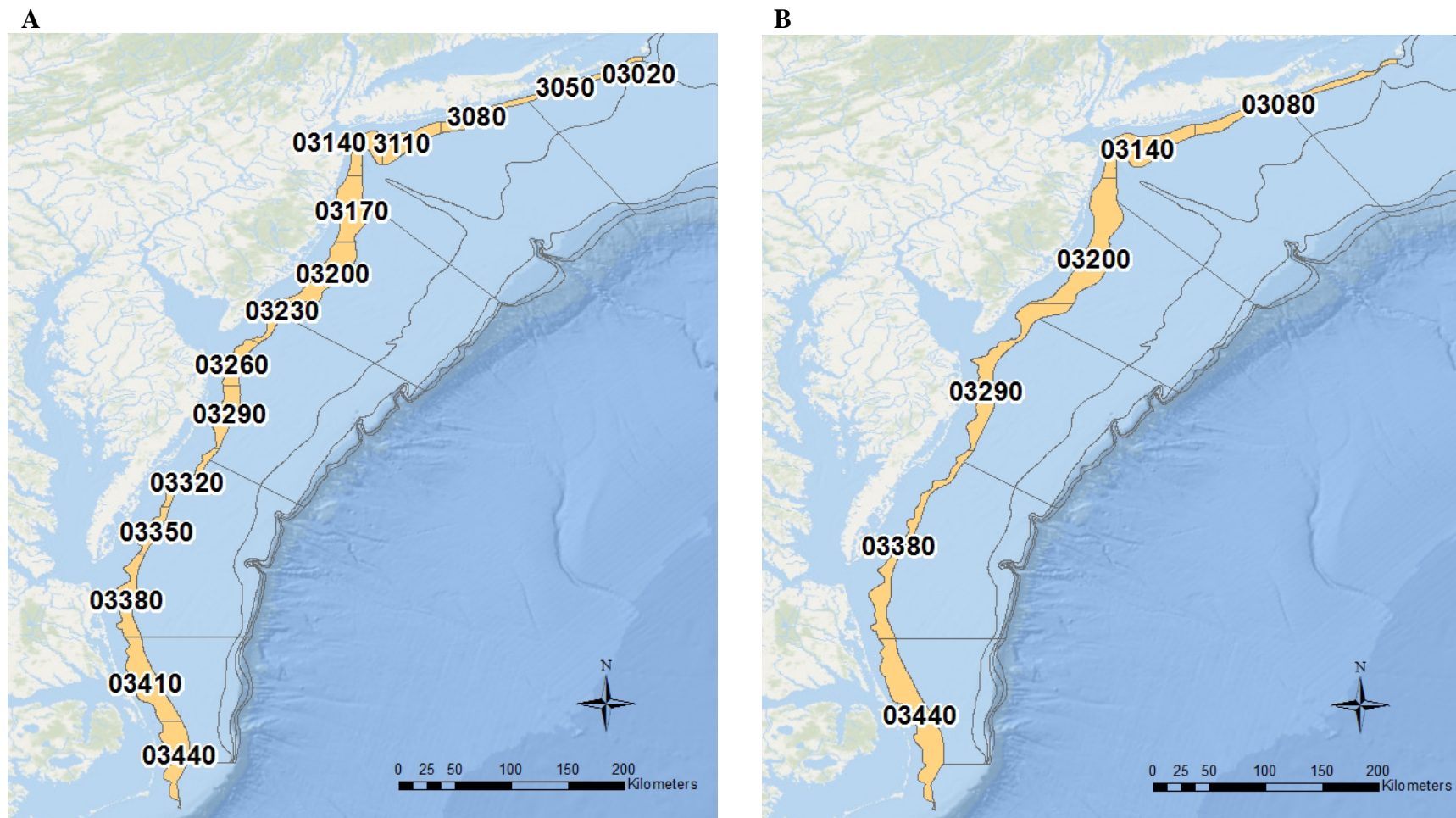


Figure 2. NEFSC bottom trawl survey strata from Cape Hatteras to Long Island: current stratification (A), and proposed re-stratified scenario (B).

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Table 4. NEFSC bottom trawl survey strata sampled by the FSV *Henry B. Bigelow*, strata areas, minimum, maximum, and mean number of stations (N) per stratum during the 2009-2015 time period, and number of allocated stations per stratum using a minimum of 3 or 2 stations per strata (N3 and N2, respectively), using the current stratification (c) and proposed re-stratification scenario (r); the three columns on the far right indicate the differences in N3 and N2 between scenarios. Highlighted strata indicated split (orange) or combined (yellow) strata. See Appendix Figure 1 for a map of the current strata.

CURRENT STRATIFICATION (C)							PROPOSED RESTRATIFICATION (R)						Differences			
Stratum	Area	2009-2015 N stations			Allocation		Stratum	Area	2009-2015 N stations			Allocation		Nr3-Nc3	Nr2-Nc2	Nr2-Nc3
		min	max	mean	Nc3	Nc2			min	max	mean	Nr3	Nr2			
01010	2,516	7	9	7.50	9	11						9	11	0	0	2
01020	2,078	8	10	8.50	7	9						8	9	1	0	2
01030	566	4	5	4.29	3	3						3	3	0	0	0
01040	188	3	5	3.21	3	2						3	2	0	0	-1
01050	1,475	5	9	6.00	5	7						6	7	1	0	2
01060	2,554	7	12	8.57	9	11						9	11	0	0	2
01070	514	4	6	4.14	3	3						3	3	0	0	0
01080	230	3	3	3.00	3	2						3	2	0	0	-1
01090	1,522	5	23	6.64	6	7						6	7	0	0	1
01100	2,722	7	17	9.93	9	12						10	12	1	0	3
01110	622	4	5	4.14	3	3						3	3	0	0	0
01120	176	2	3	2.86	3	2						3	2	0	0	-1
01130	2,374	8	15	10.50	8	10						9	10	1	0	2
01140	656	3	6	4.14	3	3						3	3	0	0	0
01150	230	2	4	3.21	3	2						3	2	0	0	-1
01160	2,980	12	16	13.86	10	13	01161	1,452	4	8	6.57	6	7	2	1	4
							01162	1,528	6	10	7.29	6	7			
01170	360	3	6	4.14	3	2	01171	78	1	3	1.93	3	2	3	2	1
							01172	282	1	5	2.21	3	2			
01180	172	2	8	4.64	3	2	01181	47	1	3	1.86	3	2	3	2	1
							01182	125	1	6	2.71	3	2			
01190	2,454	8	12	9.64	9	11						9	11	0	0	2
01200	1,221	5	8	6.50	5	5						5	6	0	1	1
01210	424	4	5	4.14	3	2	01211	216	2	3	2.07	3	2	3	2	1
							01212	208	1	3	2.00	3	2			
01220	454	3	5	4.07	3	2	01221	329	2	3	2.08	3	2	3	2	1
							01222	125	1	4	2.14	3	2			
01230	1,016	5	11	7.00	4	5	01231	368	1	4	3.14	3	2	2	0	1
							01232	648	3	7	3.86	3	3			
01240	2,569	7	9	8.14	9	11						10	11	1	0	2
01250	390	4	9	6.07	3	2						3	2	0	0	-1
01260	1,014	5	14	8.36	4	5						4	5	0	0	1
01270	720	4	10	5.29	3	3						3	4	0	1	1
01280	2,249	6	7	6.86	8	10						8	10	0	0	2
01290	3,245	7	13	10.00	11	14	01291	1,730	2	7	4.43	7	8	2	1	4
							01292	1,515	2	9	5.57	6	7			
01300	619	2	4	3.14	3	3						3	3	0	0	0
01340	1,766	4	9	6.79	6	8						7	8	1	0	2
01351	533	2	5	3.93	3	3						3	3	0	0	0
01360	4,069	4	13	9.93	14	17	01361	2,422	1	10	6.14	9	11	1	1	4
							01362	1,647	2	8	3.79	6	7			

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Table 4, continued.

CURRENT STRATIFICATION (C)							PROPOSED RESTRATIFICATION (R)						Differences			
Stratum	Area	2009-2015 N stations			Allocation		Stratum	Area	2009-2015 N stations			Allocation		Nr3-Nc3	Nr2-Nc2	Nr2-Nc3
		min	max	mean	Nc3	Nc2			min	max	mean	Nr3	Nr2			
01370	2,108	5	8	6.64	7	9					8	9	1	0	2	
01380	2,560	7	9	7.93	9	11					9	11	0	0	2	
01390	730	2	6	4.43	3	3					3	4	0	1	1	
01400	578	3	6	3.50	3	3					3	3	0	0	0	
01610	1,318	5	7	5.38	5	6					5	6	0	0	1	
01620	243	3	5	3.15	3	2					3	2	0	0	-1	
01630	86	2	3	2.92	3	2					3	2	0	0	-1	
01640	60	2	5	3.00	3	2					3	2	0	0	-1	
01650	2,832	6	9	7.62	10	12					10	12	0	0	2	
01660	555	3	4	3.08	3	3					3	3	0	0	0	
01670	86	2	4	3.00	3	2					3	2	0	0	-1	
01680	52	2	4	3.08	3	2					3	2	0	0	-1	
01690	2,433	6	10	7.36	8	10					9	11	1	1	3	
01700	1,024	5	6	5.14	4	5					4	5	0	0	1	
01710	281	3	5	3.21	3	2					3	2	0	0	-1	
01720	105	2	6	3.29	3	2					3	2	0	0	-1	
01730	2,145	5	8	6.36	8	9					8	9	0	0	1	
01740	1,273	5	7	5.57	5	6					5	6	0	0	1	
01750	139	2	4	3.00	3	2					3	2	0	0	-1	
01760	60	3	4	3.14	3	2					3	2	0	0	-1	
03020	62	2	4	3.07	3	2										
03050	62	3	7	3.36	3	2										
03080	150	3	4	3.07	3	2	03080	274	9	12	9.50	3	2	-6	-4	-7
03110	242	3	4	3.07	3	2										
03140	110	2	5	3.14	3	2	03140	352	5	8	6.21	3	2	-3	-2	-4
03170	238	3	3	3.00	3	2										
03200	356	4	5	4.14	3	2	03200	594	7	8	7.14	3	3	-3	-1	-3
03230	167	3	3	3.00	3	2										
03260	154	2	4	3.00	3	2										
03290	185	3	3	3.00	3	2	03290	506	8	10	9.00	3	3	-6	-3	-6
03320	106	2	4	2.92	3	2										
03350	88	2	4	2.92	3	2										
03380	224	3	3	3.00	3	2	03380	418	7	10	8.85	3	2	-6	-4	-7
03410	383	4	6	5.00	3	2										
03440	304	3	6	4.15	3	2	03440	687	8	11	9.15	3	3	-3	-1	-3
03450	170	3	5	3.43	3	2					3	2	0	0	-1	
03460	273	4	6	4.50	3	2					3	2	0	0	-1	
03560	57	2	5	3.29	3	2					3	2	0	0	-1	
03590	93	2	5	3.15	3	2					3	2	0	0	-1	
03600	126	3	4	3.31	3	2					3	2	0	0	-1	
03610	133	3	6	3.77	3	2					3	2	0	0	-1	
03640	90	2	5	3.00	3	2					3	2	0	0	-1	
03650	75	2	5	3.36	3	2					3	2	0	0	-1	
03660	151	3	5	3.36	3	2					3	2	0	0	-1	
07520	163	2	3	2.33	3	2					3	2	0	0	-1	
08500	796	3	4	3.58	3	4					3	4	0	0	1	
08510	268	2	4	3.31	3	2					3	2	0	0	-1	
08520	216	2	4	3.00	3	2					3	2	0	0	-1	
08530	150	2	4	2.78	3	2					3	2	0	0	-1	

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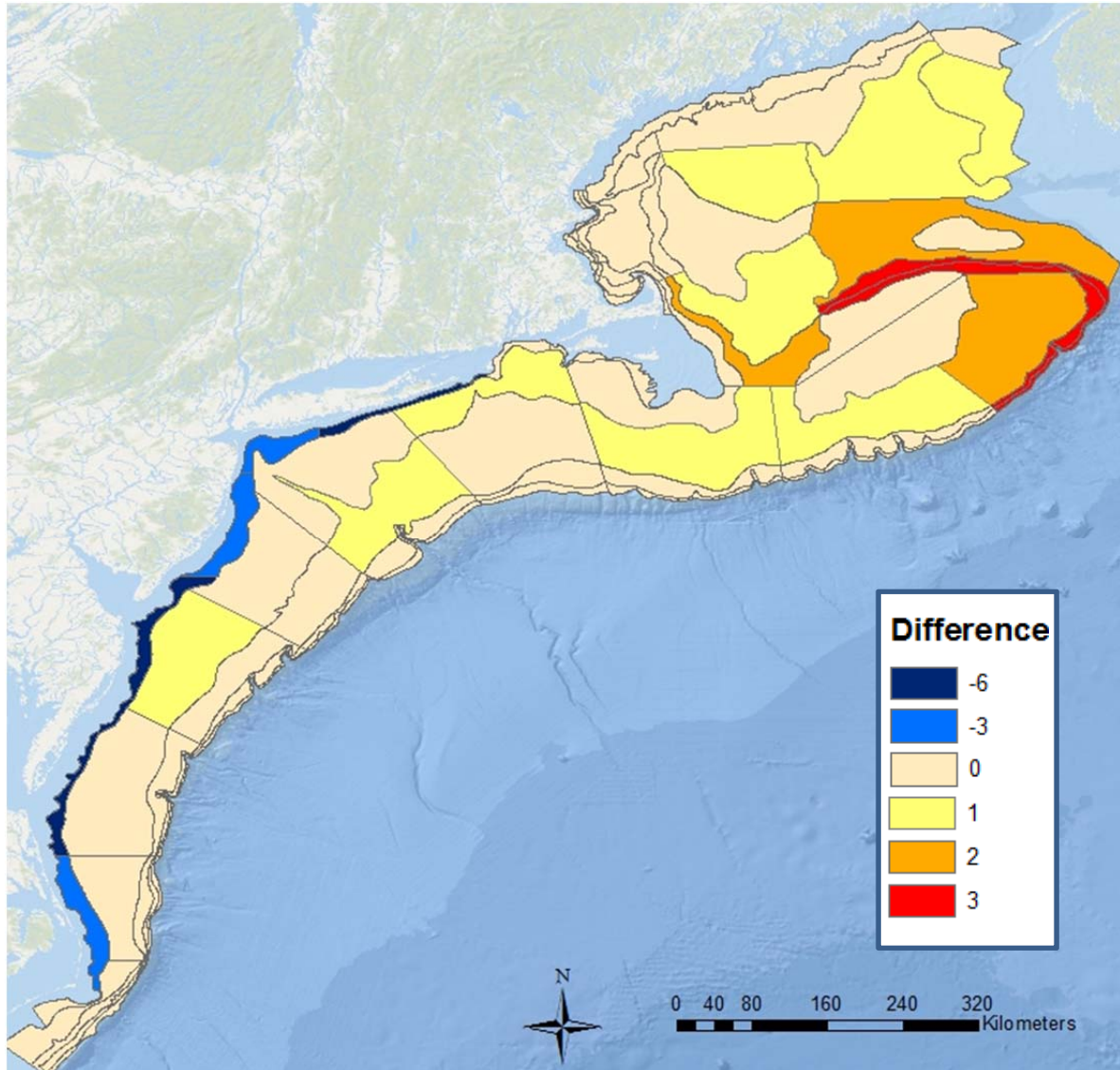


Figure 3. Difference in the number of stations allocated to each stratum between the current stratification and proposed re-stratification scenario, for the allocation of 360 stations with a **minimum of 3 stations per stratum** and the remainder allocated relative to area; difference = (number of stations allocated using the proposed re-stratification) - (number of stations allocated using the current stratification).



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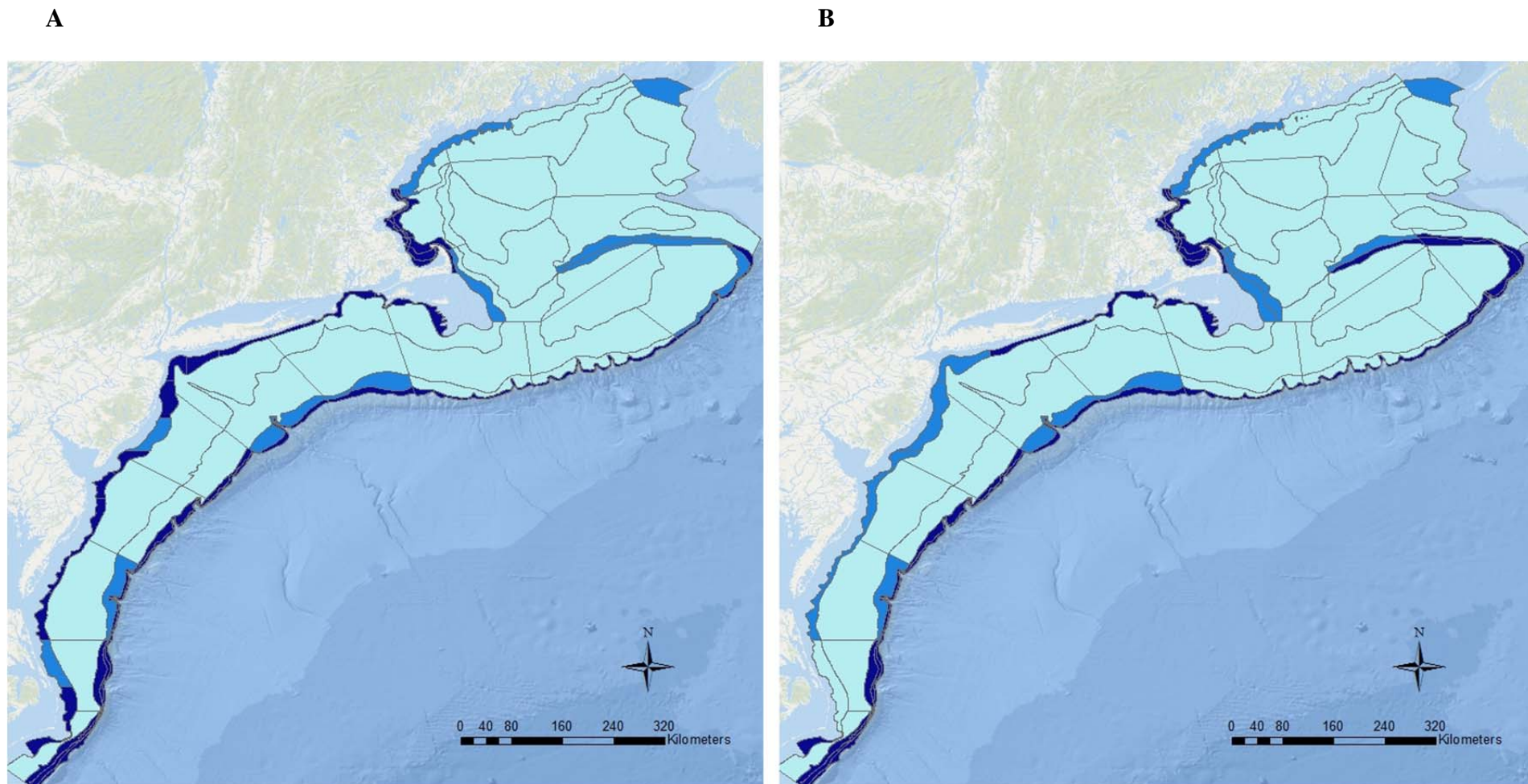


Figure 4. Sampling density ( $\text{nm}^2$  per station) for the current NEFSC bottom trawl strata (A) and proposed re-stratified scenario (B) determined by the allocation of 360 stations, with a **minimum of 3 stations per stratum** and the remainder allocated relative to area. Light blue represents strata with a number of allocated stations resulting in a sampling area of 0 to 102  $\text{nm}^2$  per station, medium blue represents strata with a sampling area of 103 to 204  $\text{nm}^2$  per station, and dark blue represents strata with a sampling area of 205 to 306  $\text{nm}^2$  per station.

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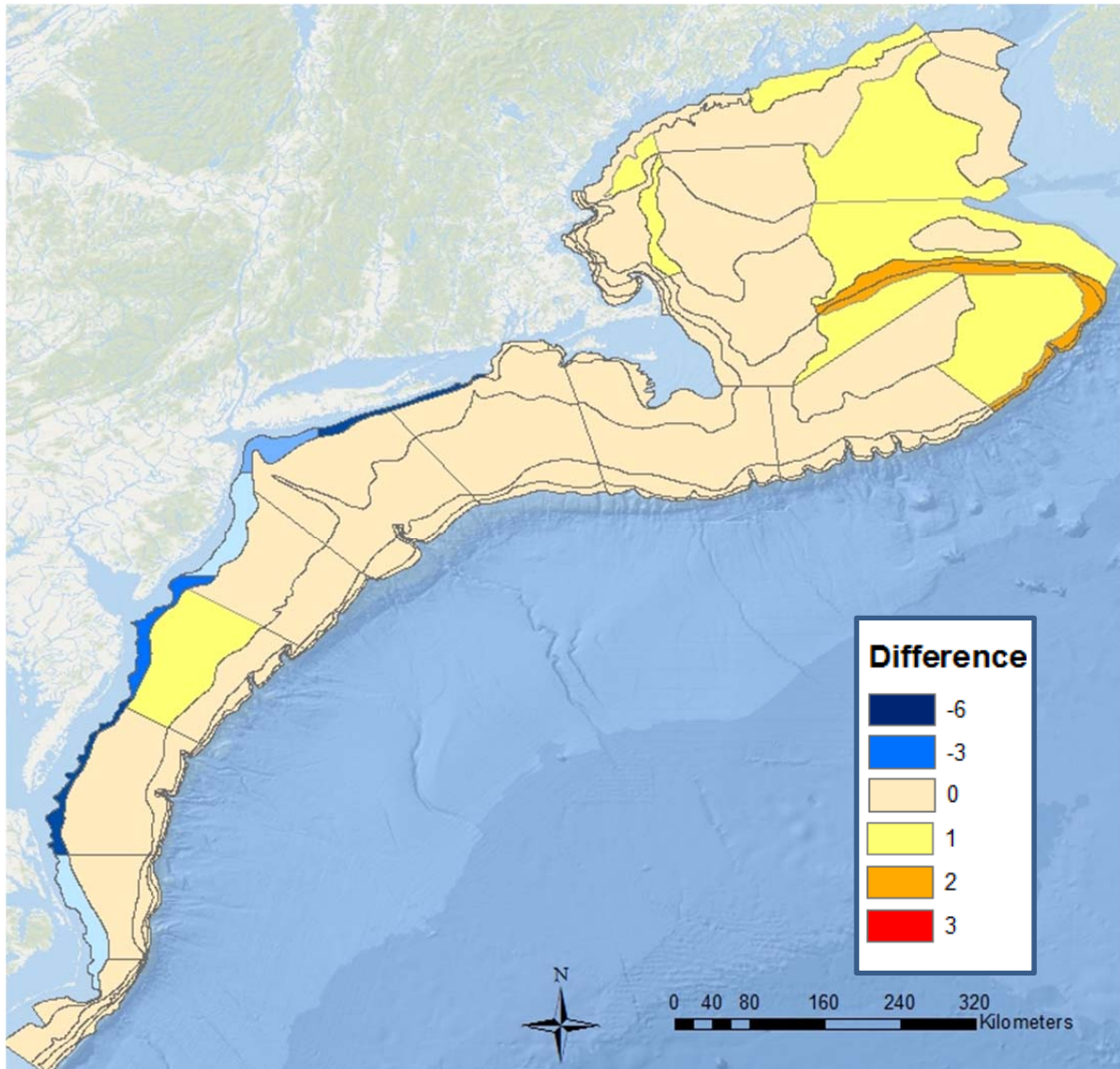


Figure 5. Difference in the number of stations allocated to each stratum between the current stratification and proposed re-stratification scenario, for the allocation of 360 stations with a **minimum of 2 stations per stratum** and the remainder allocated relative to area; difference = (number of stations allocated using the proposed re-stratification) - (number of stations allocated using the current stratification).

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**A**

**B**

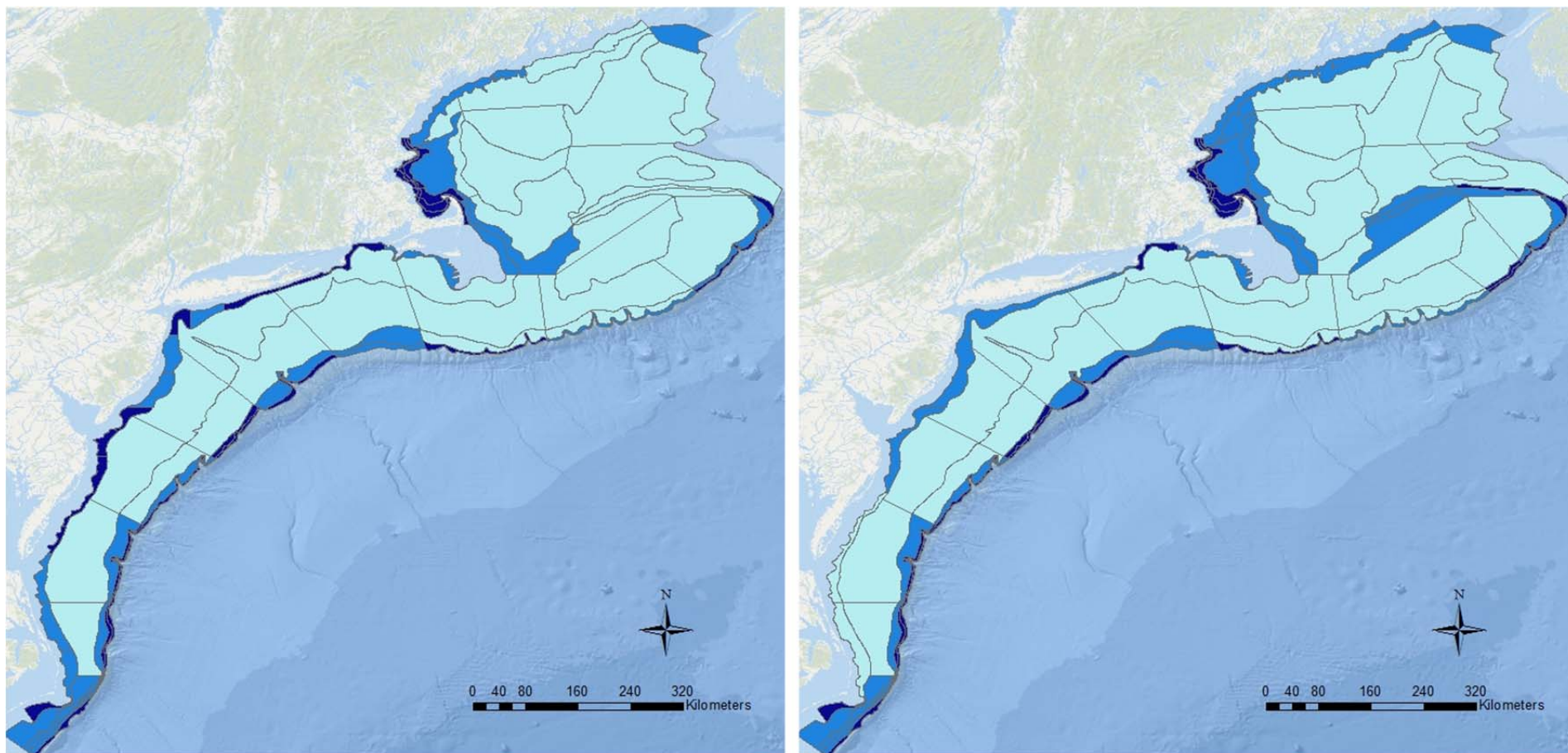


Figure 6. Sampling density (nm<sup>2</sup> per station) for the current NEFSC bottom trawl strata (A) and proposed re-stratified scenario (B) determined by the allocation of 360 stations, with a **minimum of 2 stations per stratum** and the remainder allocated relative to area. Light blue represents strata with a number of allocated stations resulting in a sampling area of 0 to 102 nm<sup>2</sup> per station, medium blue represents strata with a sampling area of 103 to 204 nm<sup>2</sup> per station, and dark blue represents strata with a sampling area of 205 to 306 nm<sup>2</sup> per station.

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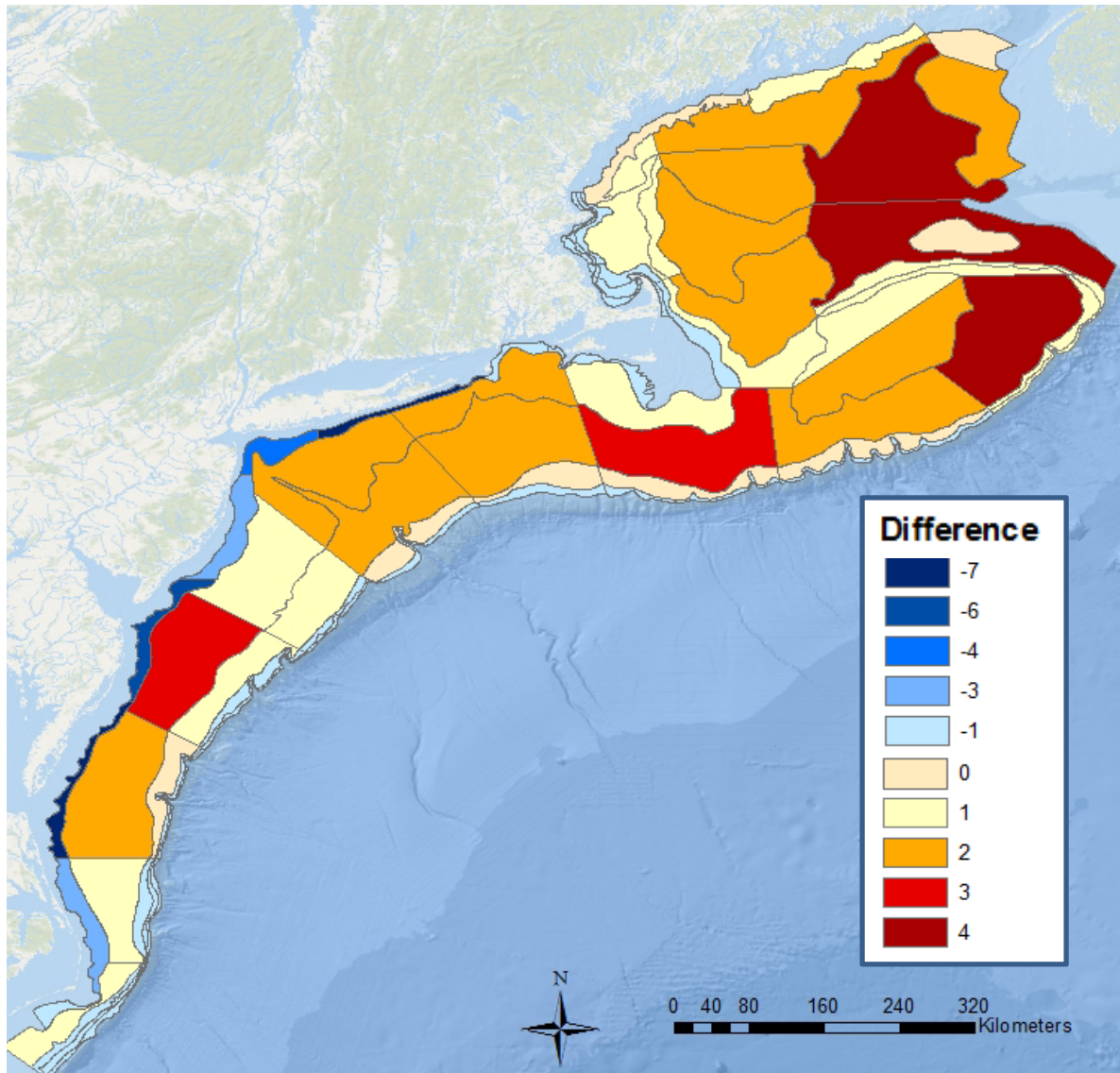


Figure 7. Difference in the number of stations allocated to each stratum between the allocation of 360 stations using the **current stratification with a minimum of 3 stations per stratum** and the **proposed re-stratification scenario with a minimum of 2 stations per stratum**. Once the minimum number of stations is allocated the remaining stations are allocated relative to area; difference = (number of stations allocated using the proposed re-stratification with 2 stations minimum) - (number of stations allocated using the current stratification with 3 stations minimum).

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**A**

**B**

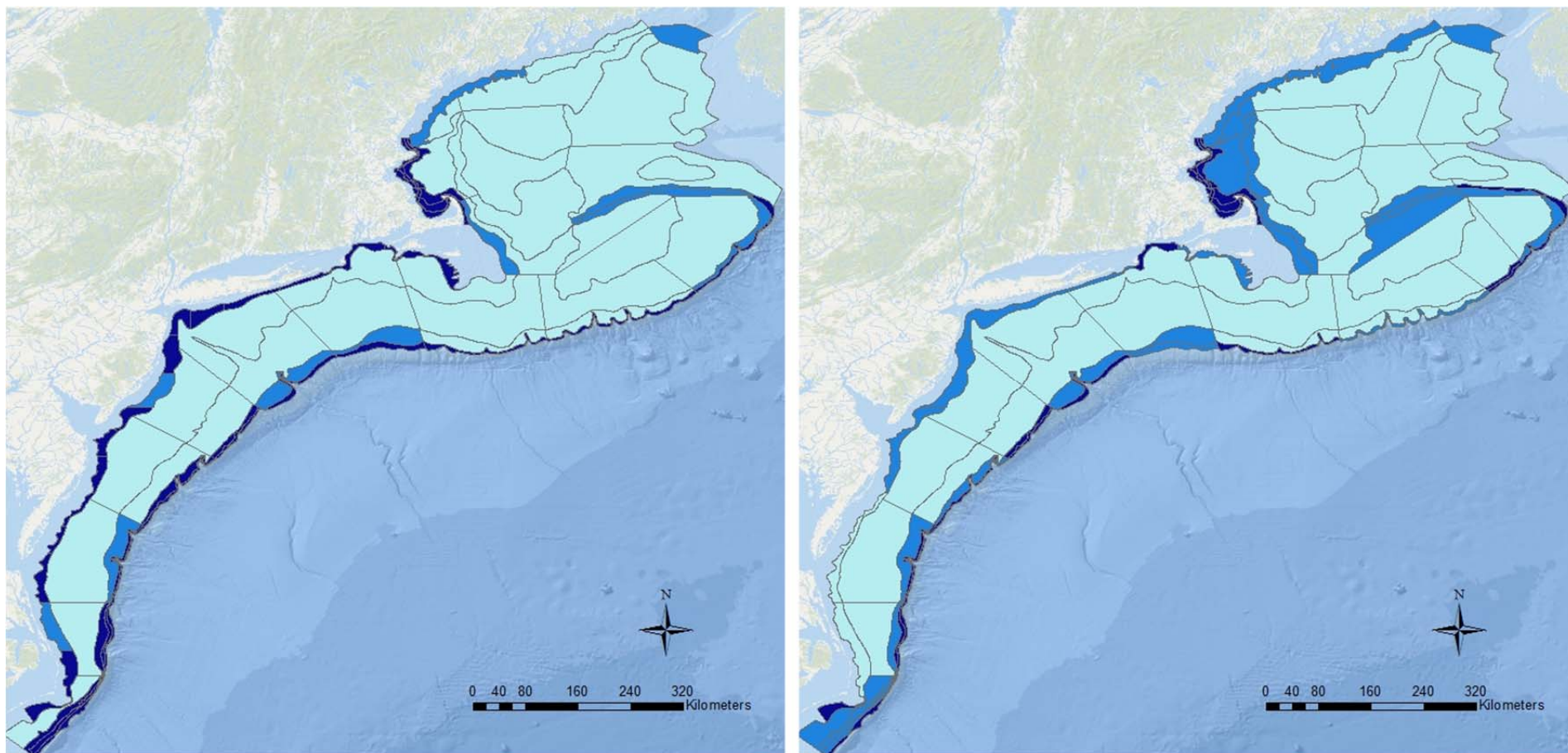
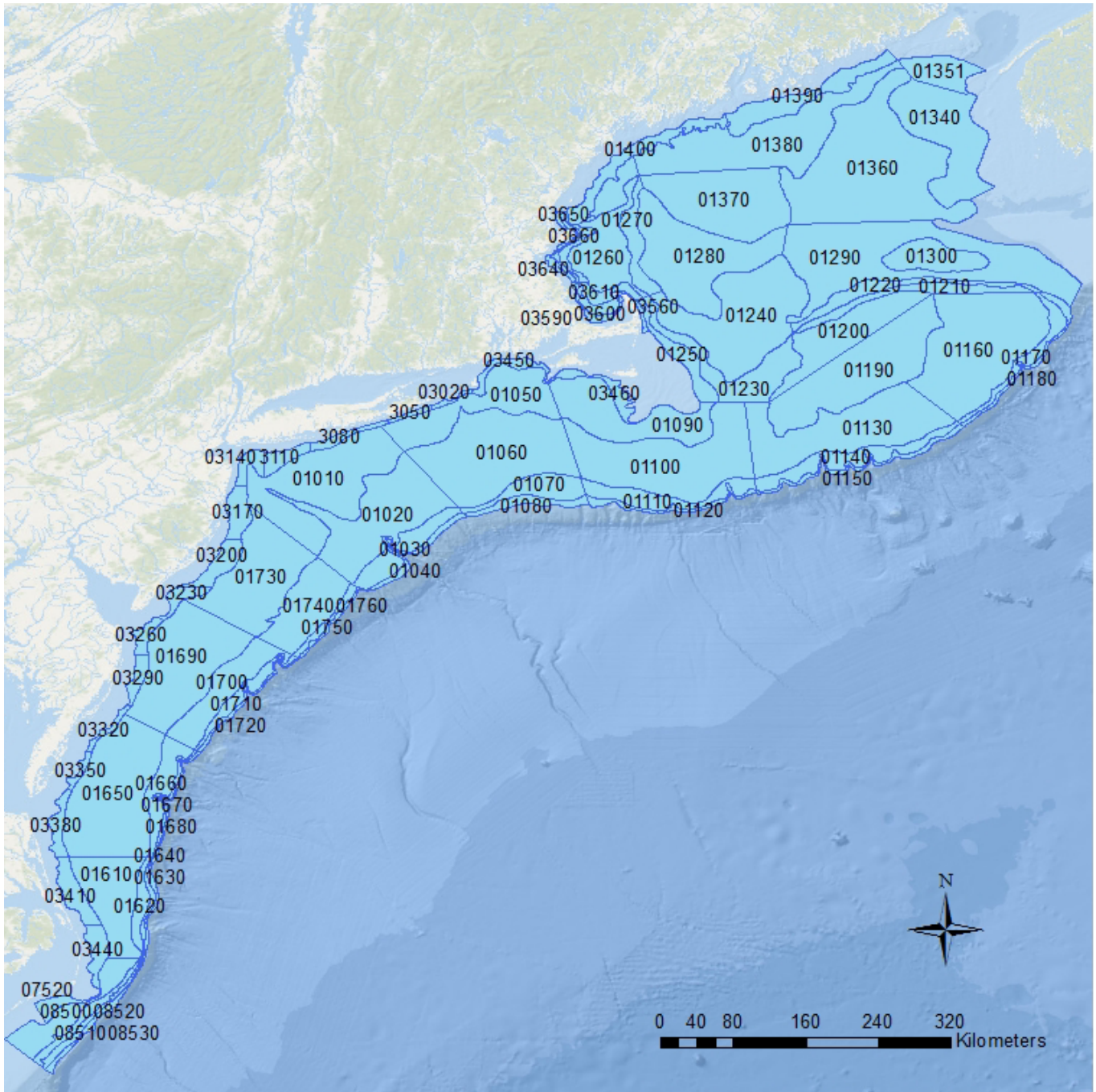


Figure 8. Sampling density ( $\text{nm}^2$  per station) for the current NEFSC bottom trawl strata (A) and proposed re-stratified scenario (B) determined by the allocation of 360 stations, with a **minimum of 2 stations per stratum** and the remainder allocated relative to area. Light blue represents strata with a number of allocated stations resulting in a sampling area of 0 to  $102 \text{ nm}^2$  per station, medium blue represents strata with a sampling area of 103 to  $204 \text{ nm}^2$  per station, and dark blue represents strata with a sampling area of 205 to  $306 \text{ nm}^2$  per station.

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Appendix Figure 1. NEFSC bottom trawl current strata sampled by the FSV *Henry B. Bigelow*.