

NOAA
FISHERIES

**Southeast
Regional
Office**

Evaluation of Black Sea Bass Trap Gear Closure Alternatives in South Atlantic Snapper-Grouper Regulatory Amendment 16

NMFS-SERO SFD-LAPP/DM,
PRD-ESA-Sea Turtle and Fisheries,
and PRD-Marine Mammal Branches

SAFMC SSC Meeting
Charleston, SC
October 2014

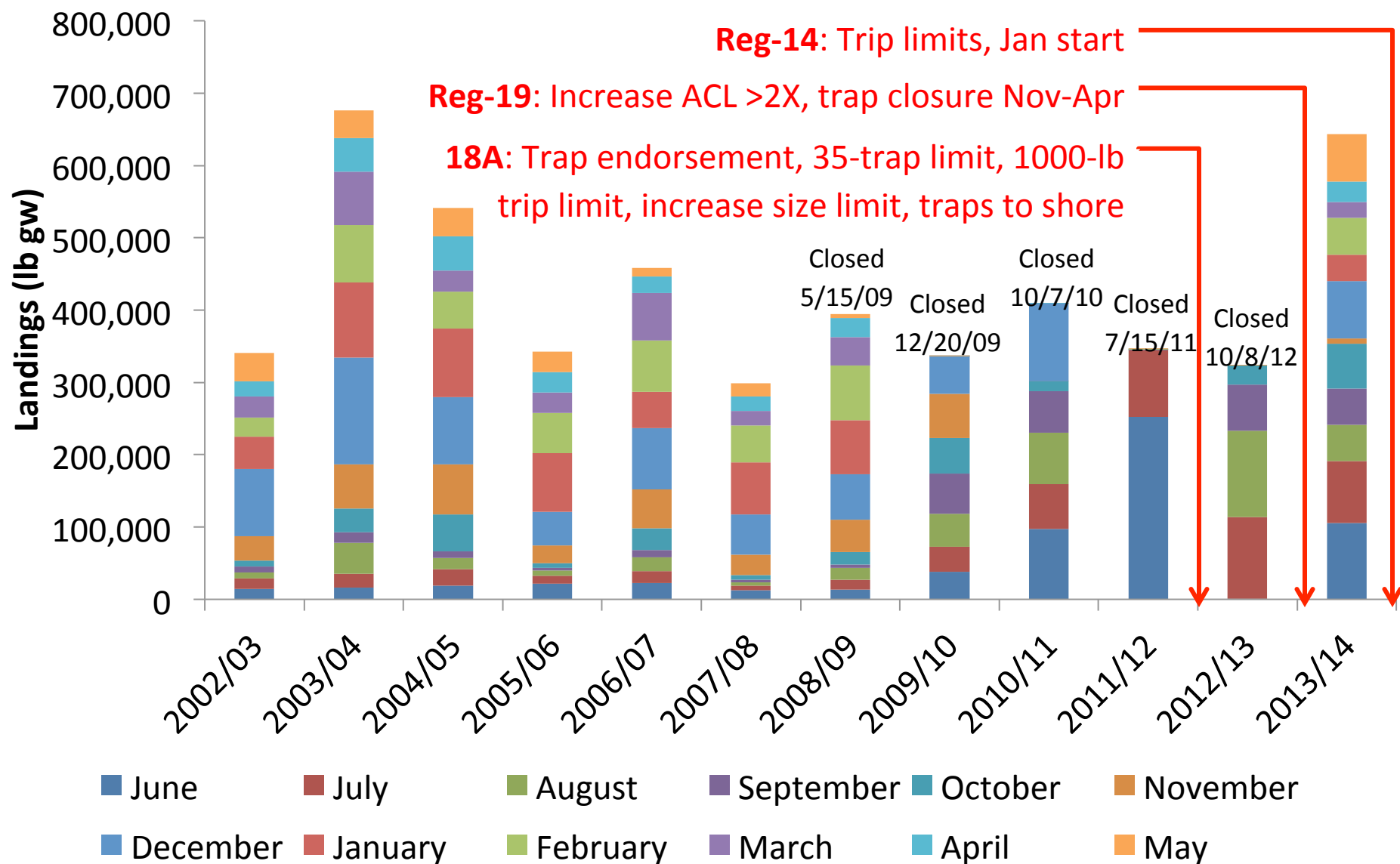
OBJECTIVES for Reg-16 Analysis

1. Simulate the potential landings of black sea bass trap endorsement holders under each proposed alternative.
2. Factoring in landings by other gears, predict when the ACL would be met.
3. Consider the seasonal distribution of black sea bass trap gear and NARW to compare the relative risk of right whale entanglements under each proposed alternative.

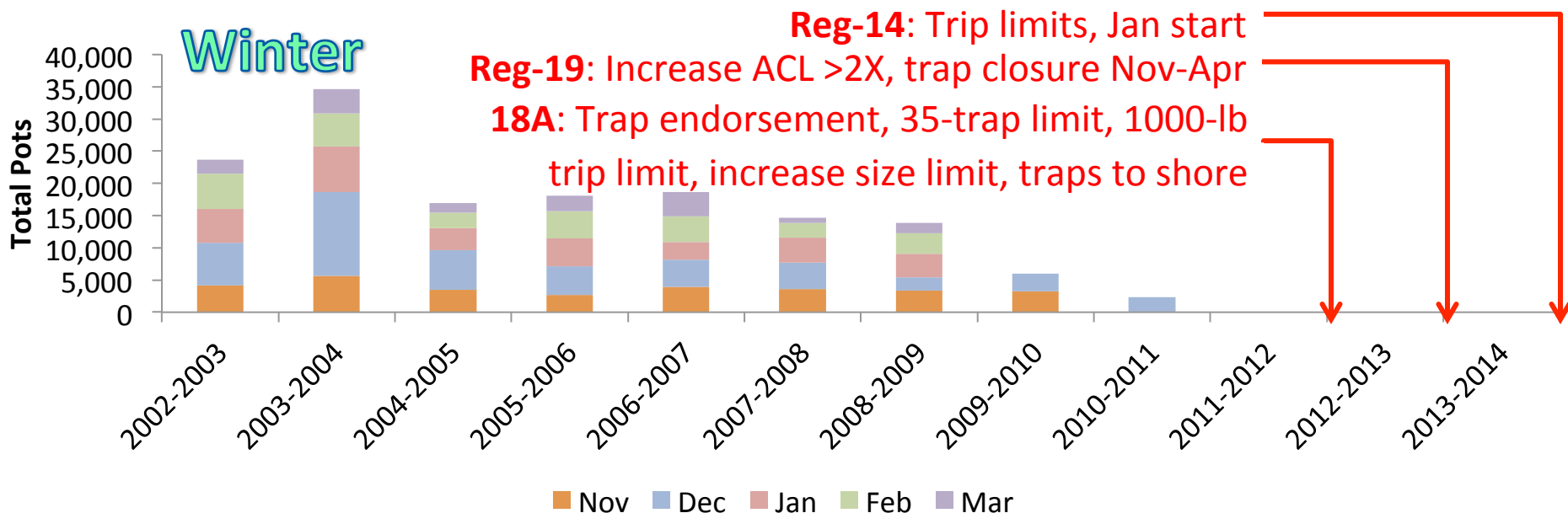
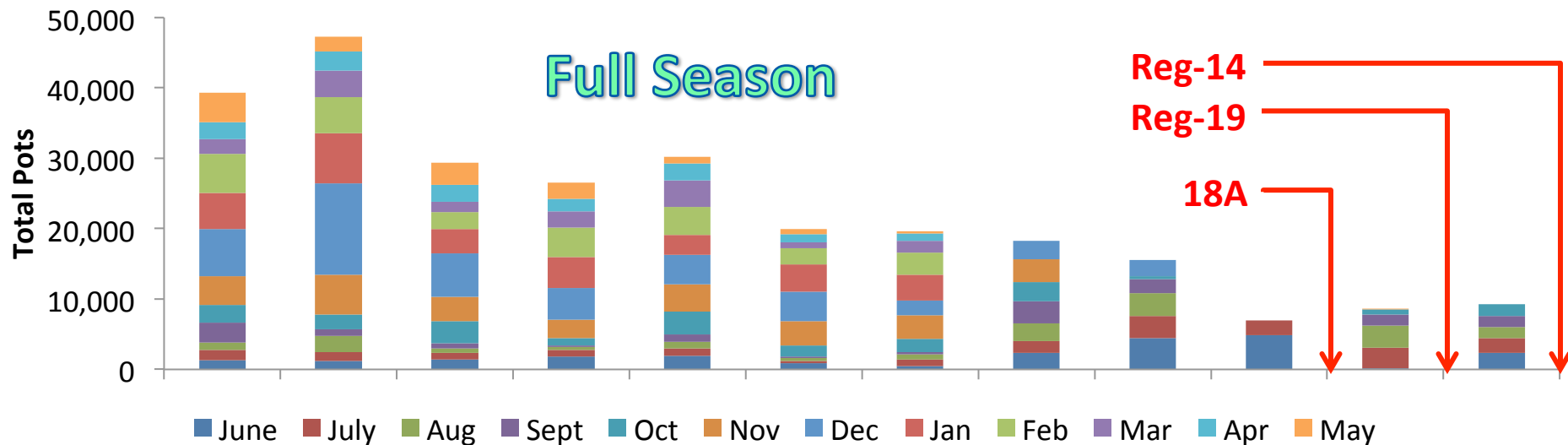
SSC Review

1. Express risk as units, not percentage → COMPLETED
2. Clarify risk is approximated by overlap between NARW and BSB effort → COMPLETED
3. Provide additional detail on history of BSB effort → COMPLETED
4. Provide additional detail on NARW entanglements and population status → COMPLETED
5. Provide additional detail on NARW distribution model → COMPLETED
6. Explore options for monthly model off NC → COMPLETED
7. Evaluate within-scenario uncertainty → ONGOING

Black Sea Bass: Landings



Black Sea Bass: Effort



METHODS: Data Sources

SEFSC Logbook

Federally-permitted commercial fishermen self-report landings by species, trip, gear, area, depth

SEFSC Commercial ACL Data

Aggregated dealer records of catch by gear and species, including landings from vessels with and without federal permits

ACCSP Trip Ticket

Assimilated dealer trip tickets provide catch by gear and species, including landings from vessels with/without federal permits through 2014

1998-2014

Endorsement holders only
Simulated 1,000-lb trip limit
Simulated 35-trap limit



Trap Gear Landings



Photo credit: NC Sea Grant

Simulated 300-lb trip limit (Jan-Apr)
Simulated 1000-lb trip limit (May-Dec)

2002-2013



2013-2014



Other Gear Landings



METHODS: Spatial Distribution of Fishing

A

Based on the spatial distribution of trap gear endorsement holder landings under simulated SG-18A regulations Nov-May 2008/09

B

Based on the spatial distribution of trap gear endorsement holder landings during June-Oct 2013/14

C

Based on the spatial distribution of trap gear endorsement holder landings under simulated SG-18A regulations averaged across Nov-May 2006/07- 2008/09.

SOAK-TIME

Only reliably reported 2013/14; applied to all scenarios in tiered approach

METHODS: Catch Rates

1

2008/09
under SG-18A
regulations

2

Seasonal pattern
2008/09 under
SG-18A
regulations
scaled up by
2013/14 catch
rates

3

Equal to Oct
2013/14
catch rates

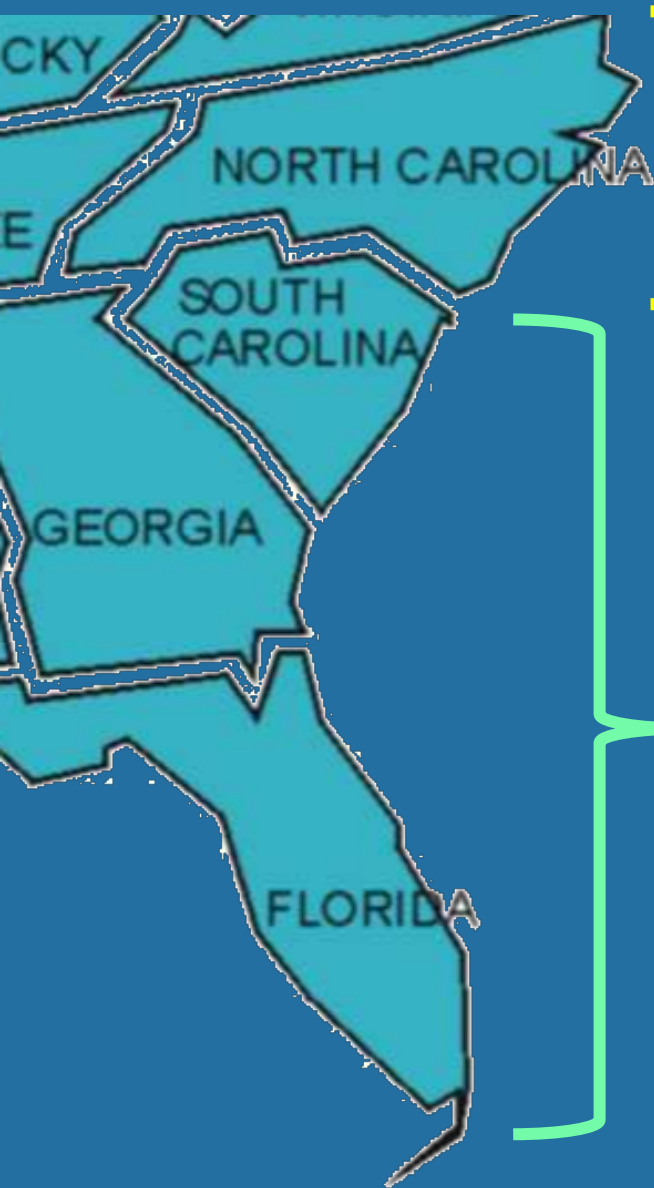
4

Equal to mean
2006/07-2008/09
catch rates under
SG-18A
regulations

OTHER GEARS/MONTHS:

Assumed equal to observed 2013/14 catch rates under Reg-14 regulations

METHODS: Right Whale Distribution



Gowan (pers. comm.)

Mean

2005-
2008

Based on UNCW Surveys

- Long-term average

Inputs:

- SST
- Depth
- Distance-to-shore
- Slope

*Model outputs not
directly comparable*

Gowan & Ortega-Ortiz (2014)

Mean

2003/04-
2012/13

Based on SEUS NARW Surveys

- Semi-monthly

Inputs:

- SST
- Depth
- Distance-to-shore
- Distance to 22° C
- Interaction terms

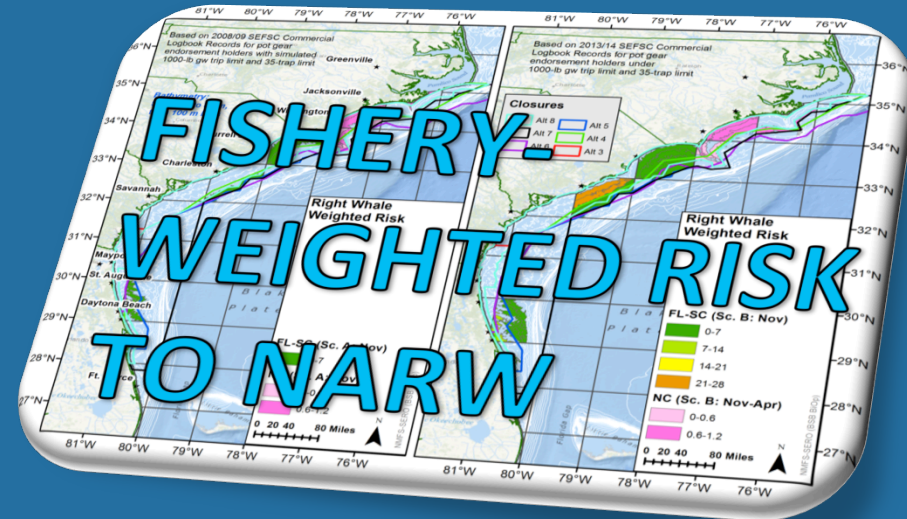
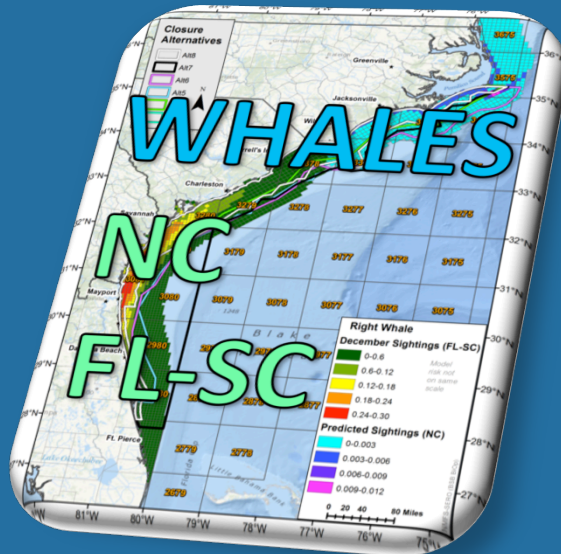
Warm

2011/12

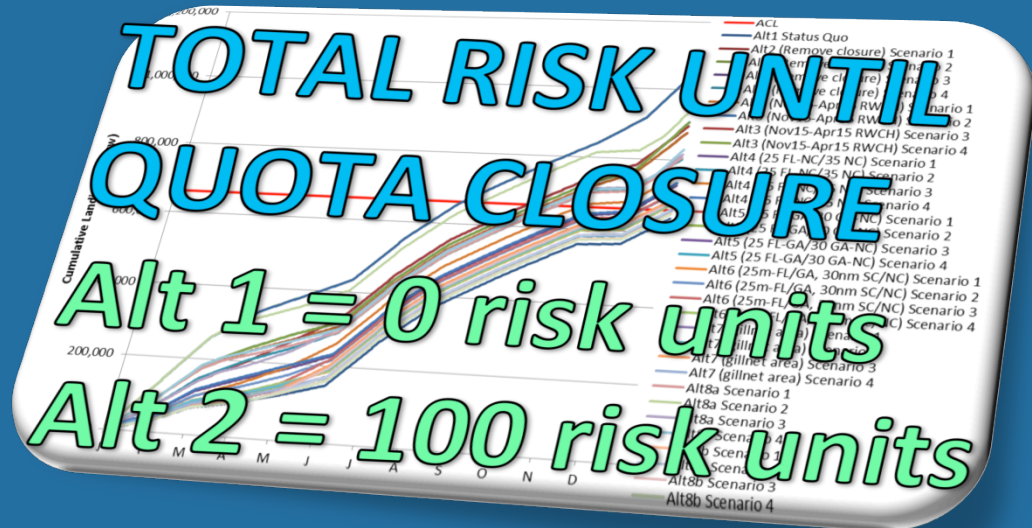
Cold

2009/10

Daily accounting based on monthly models:



X



RESULTS: Spatial Distribution of Landings and Effort

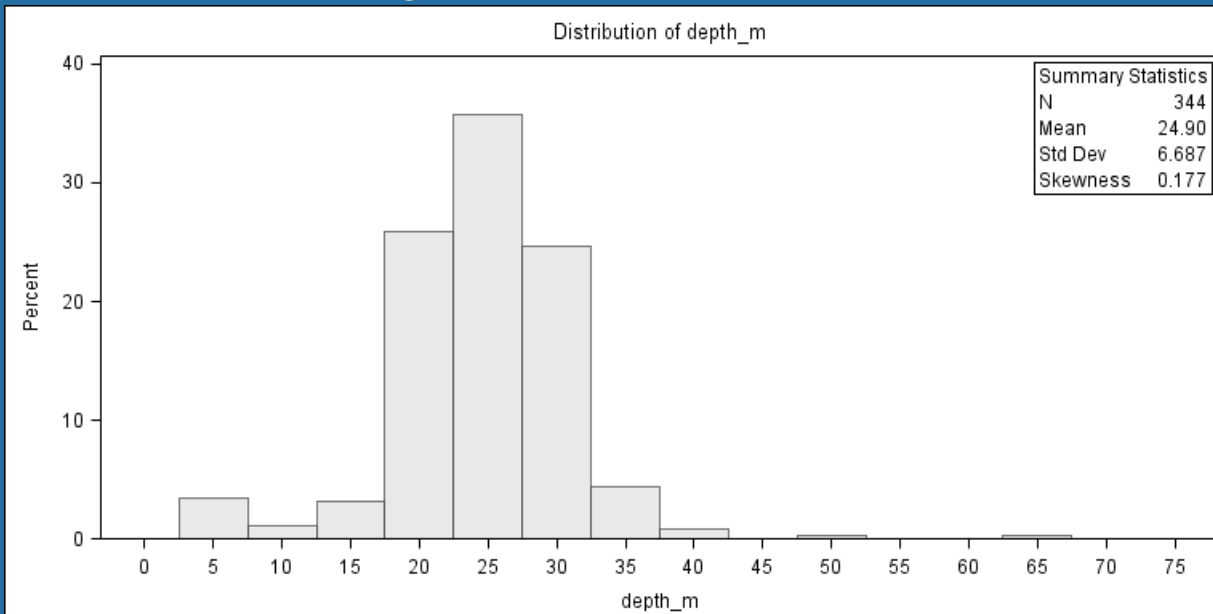


Figure 1. Histogram of reported depth of fishing (m) by commercial black sea bass trap gear endorsement holders for the 2012/13 and 2013/14 fishing seasons.

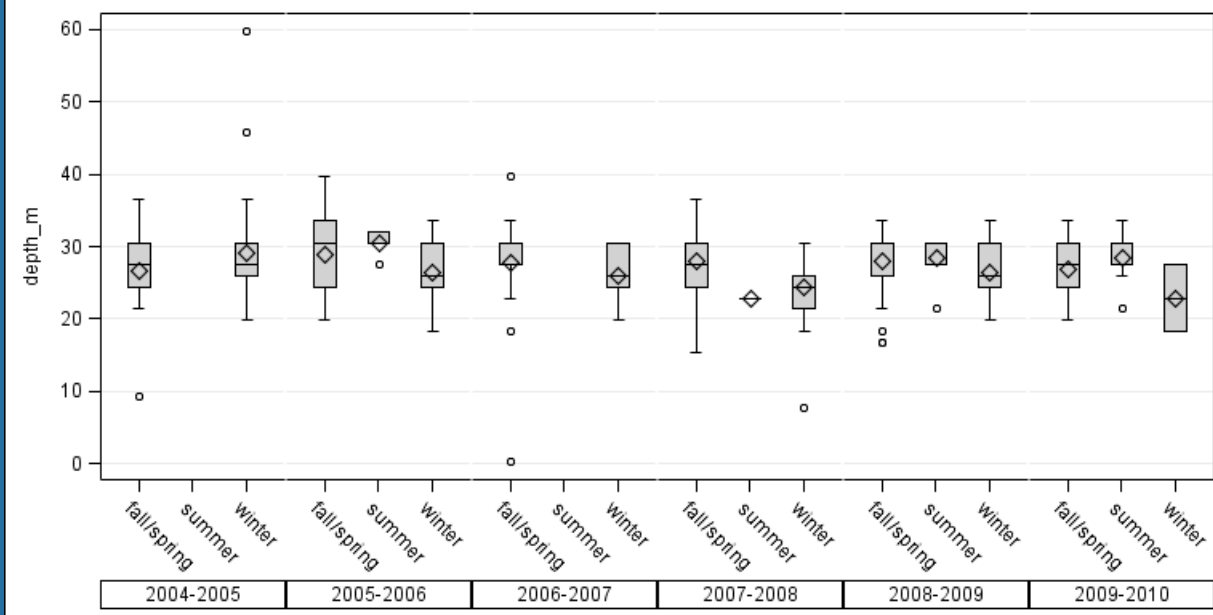
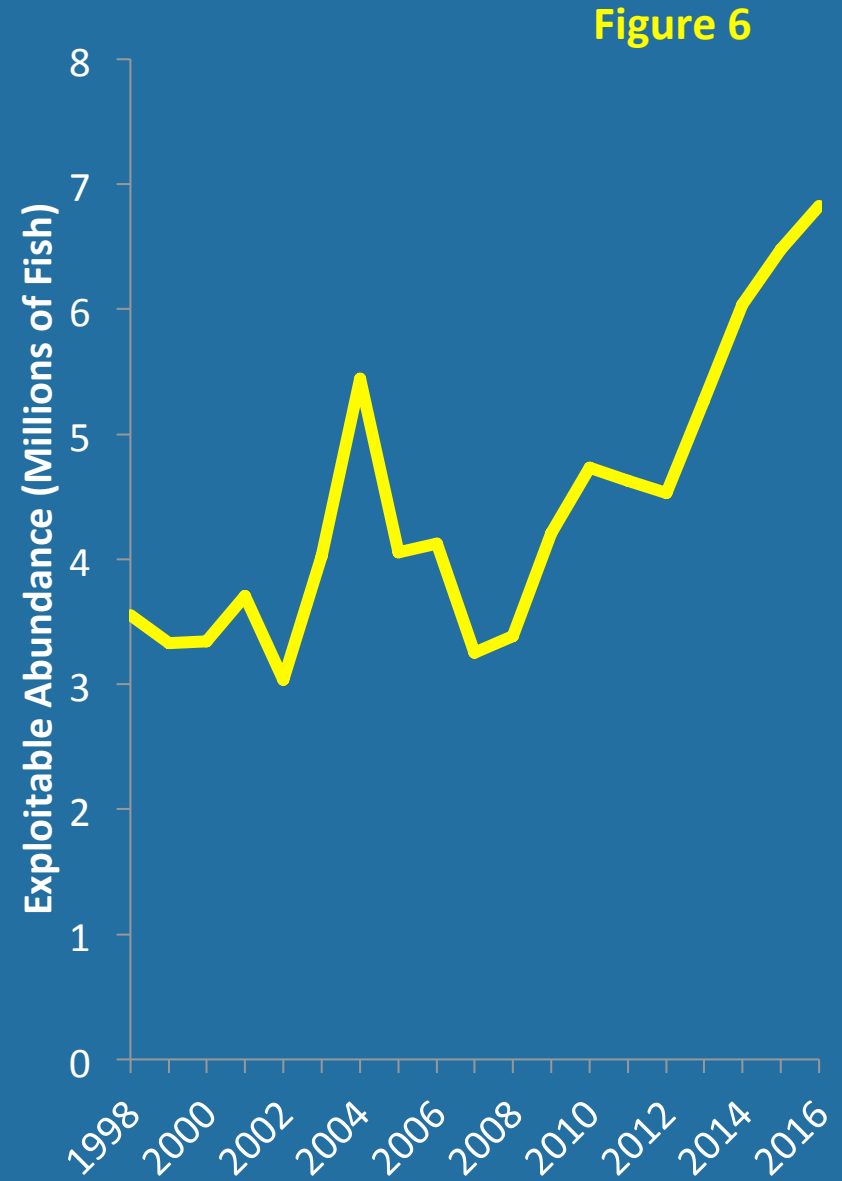
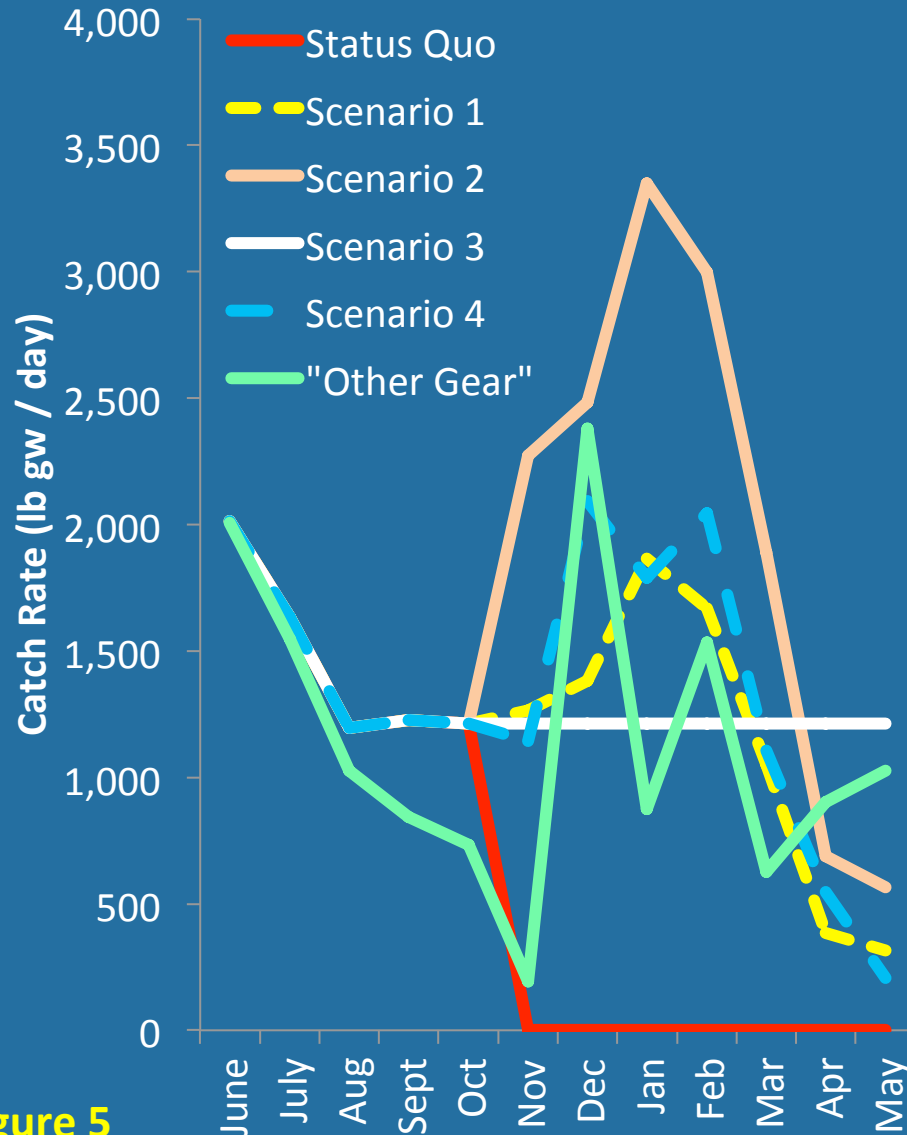


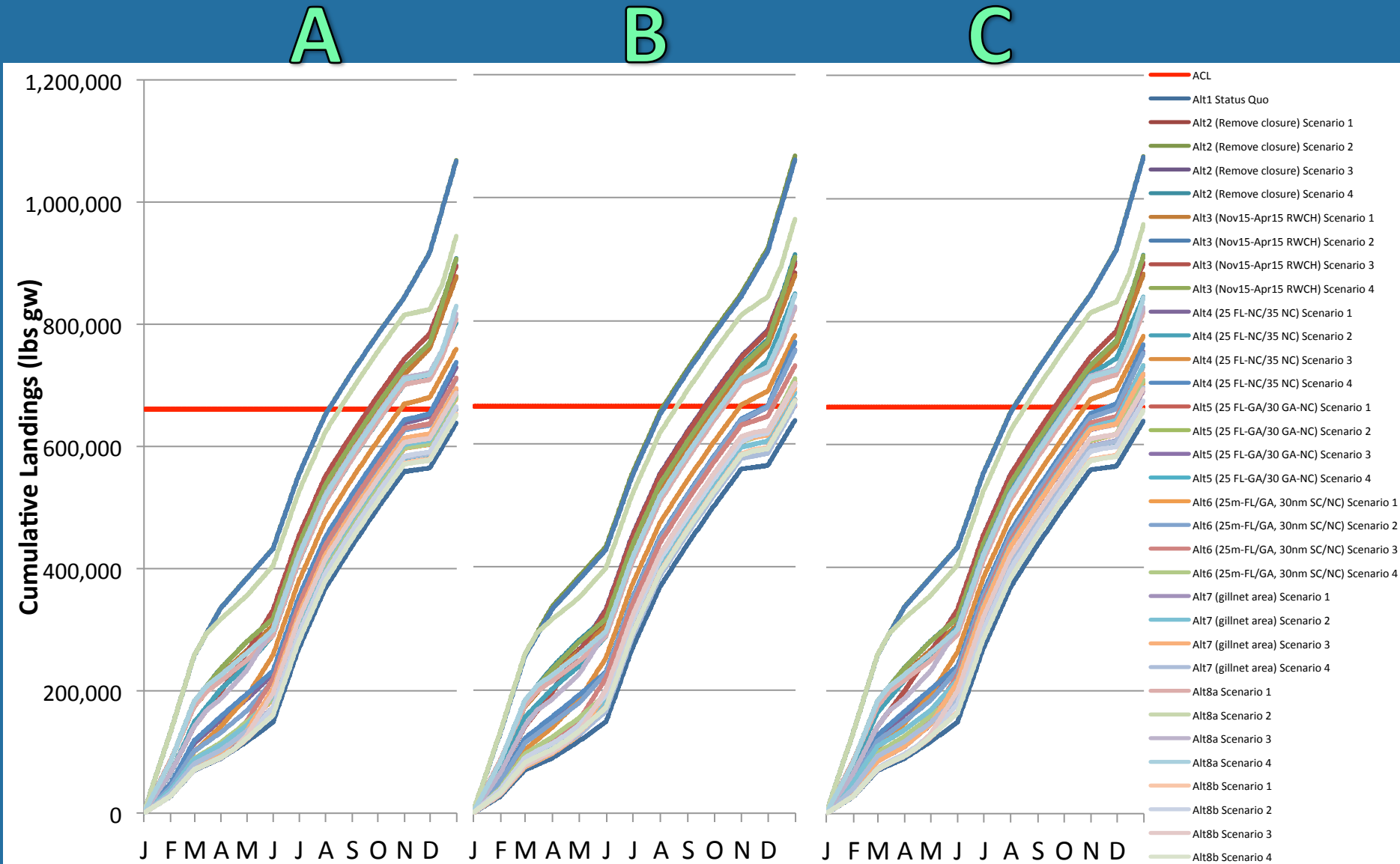
Figure 2B. Boxplots of captain-reported depth of fishing (ft) for South Carolina black sea bass trap gear endorsement holders by fishing year, and season (summer: Jul-Aug, winter: Dec-Feb, fall/spring: Mar-Jun, Sept-Nov).

RESULTS: Catch Rates



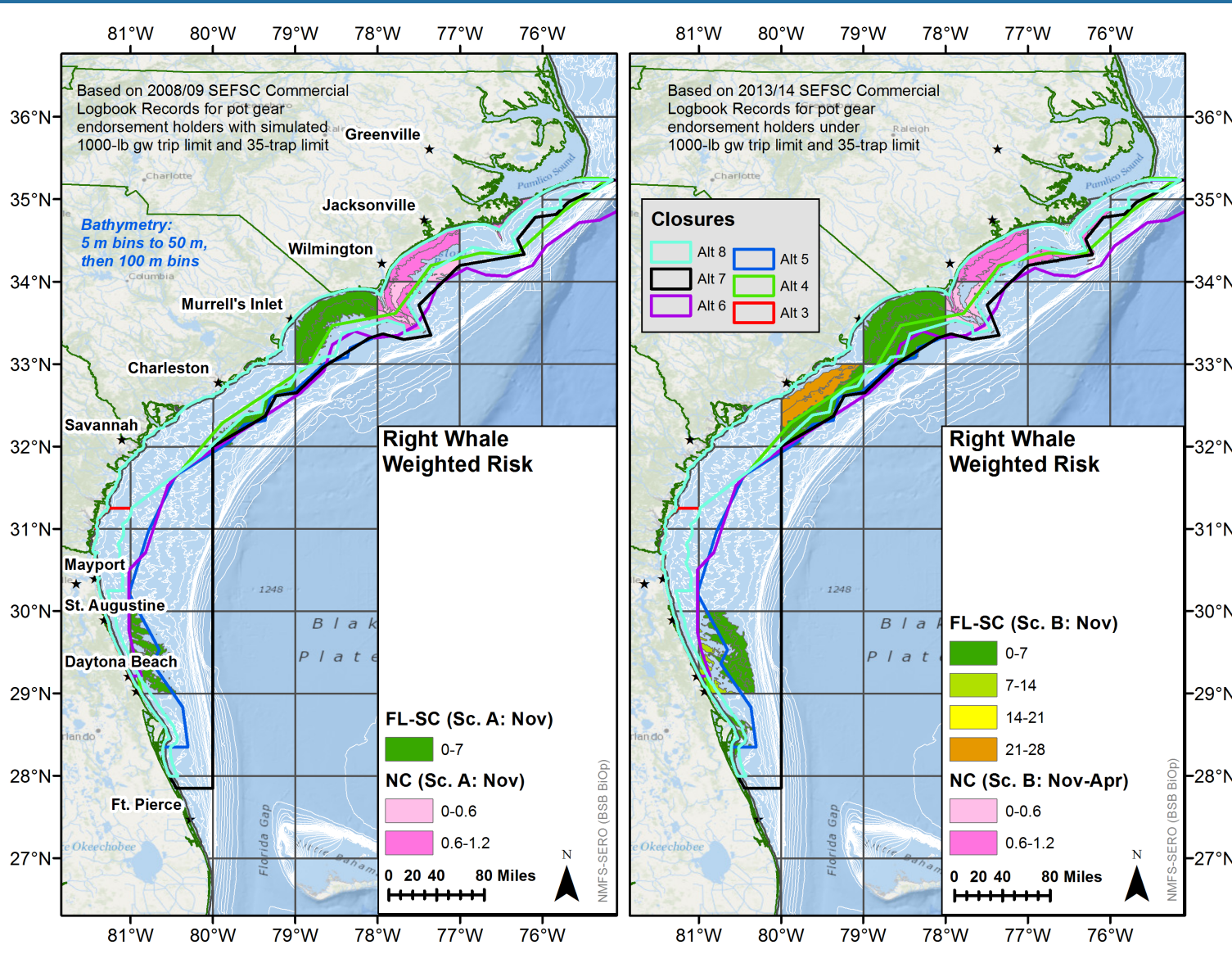
Quota Closure Dates

Figure 9



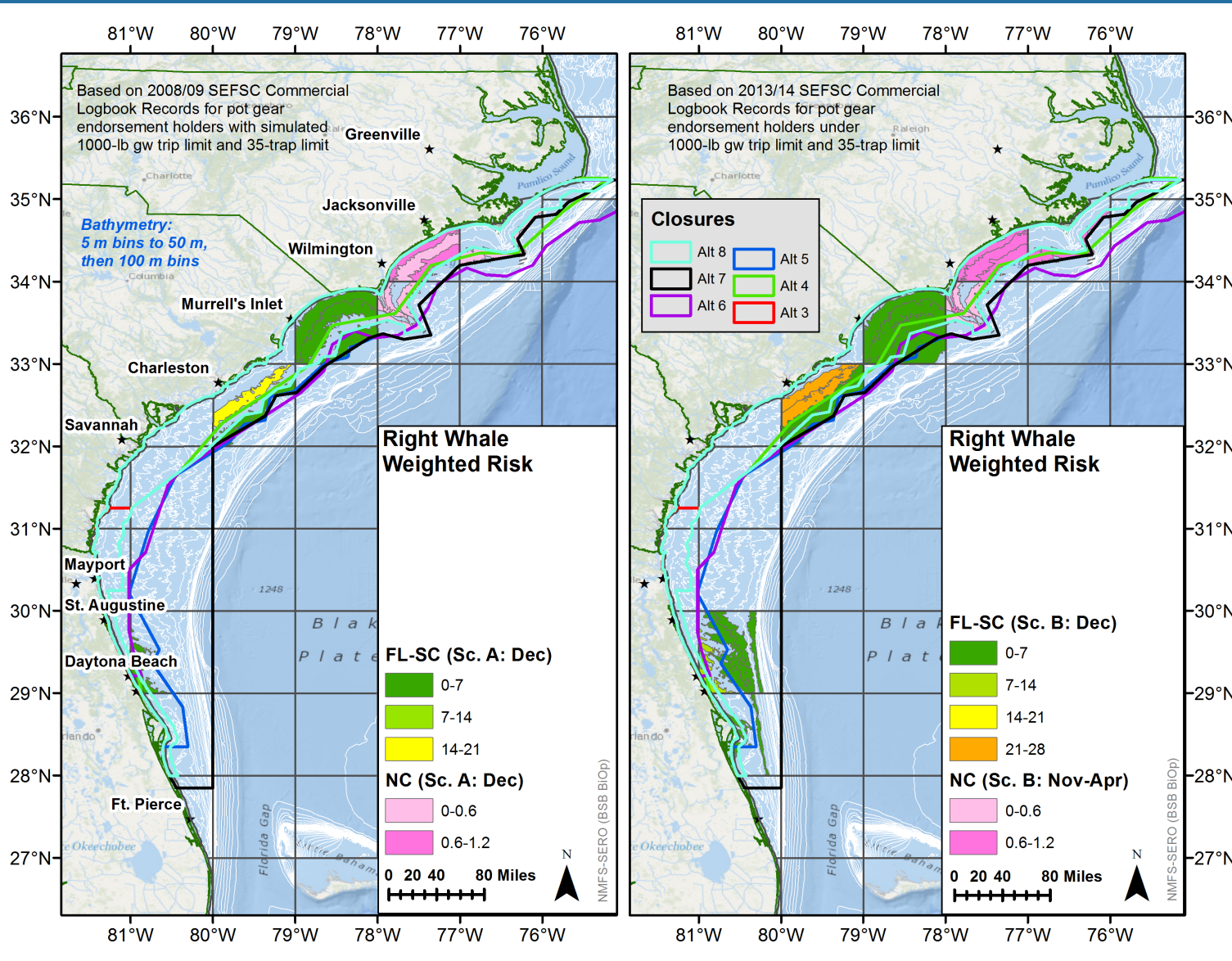
Mean Monthly NARW “Relative Risk”

**Figure 8:
November**



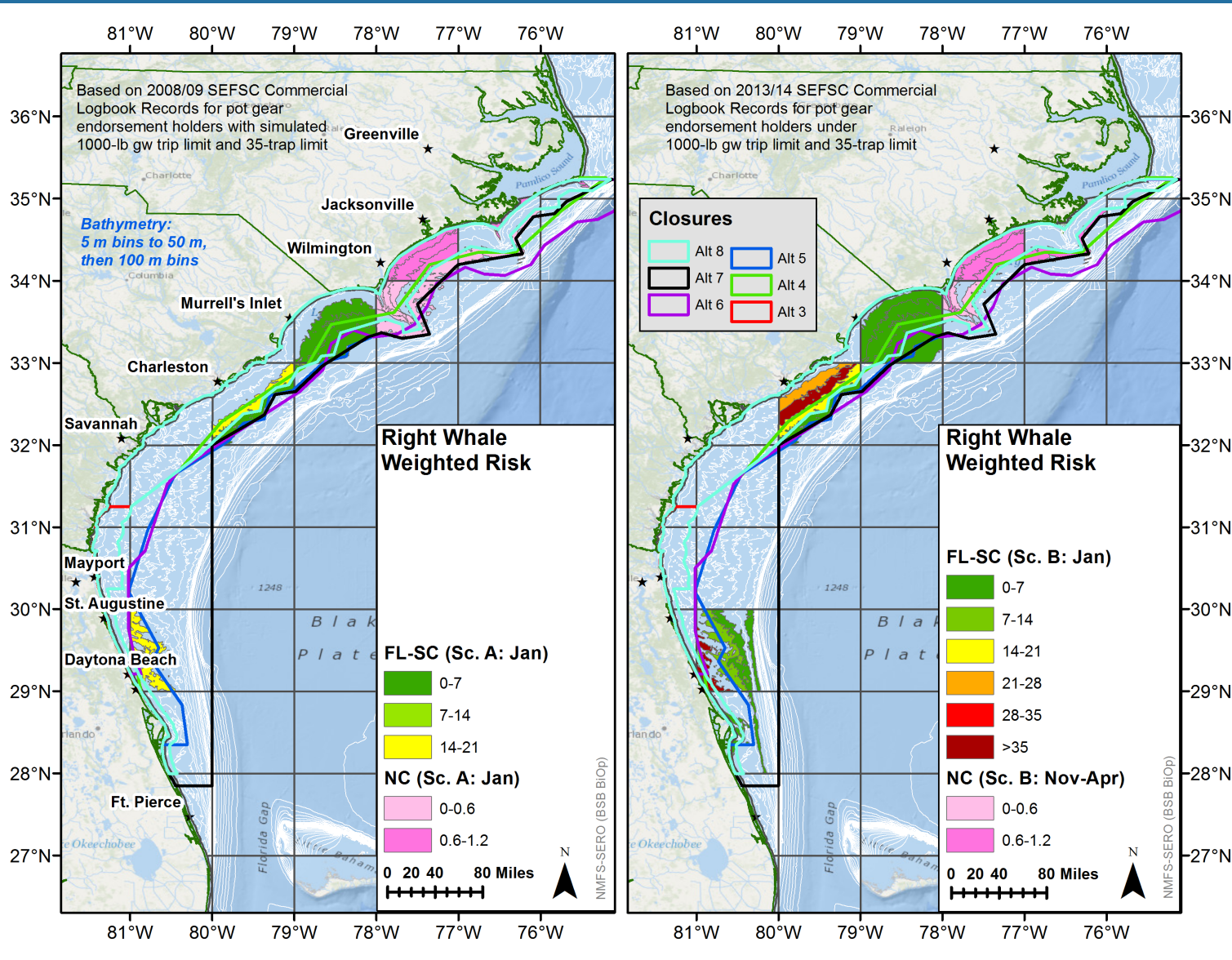
Mean Monthly NARW “Relative Risk”

**Figure 8:
December**



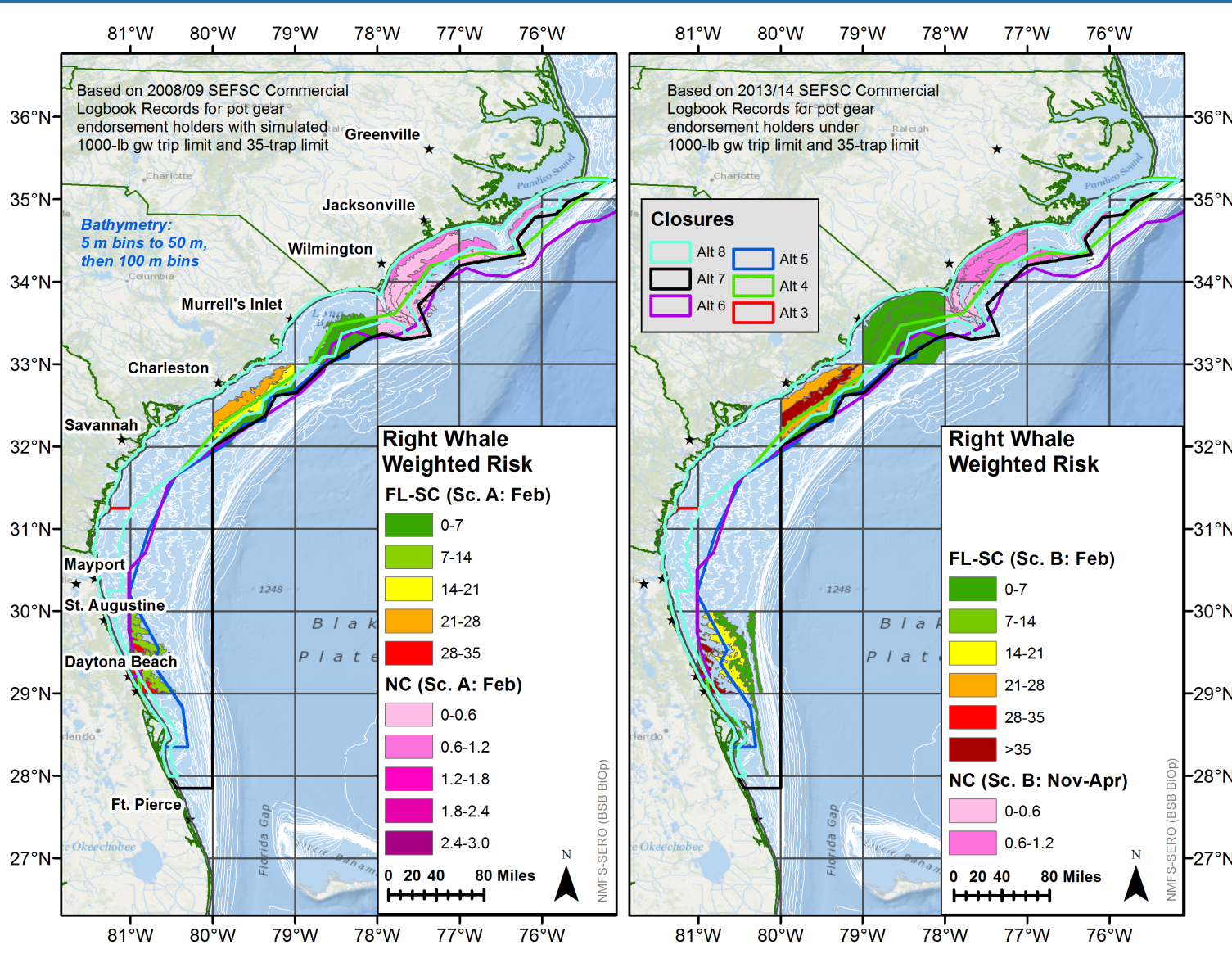
Mean Monthly NARW “Relative Risk”

Figure 8:
January



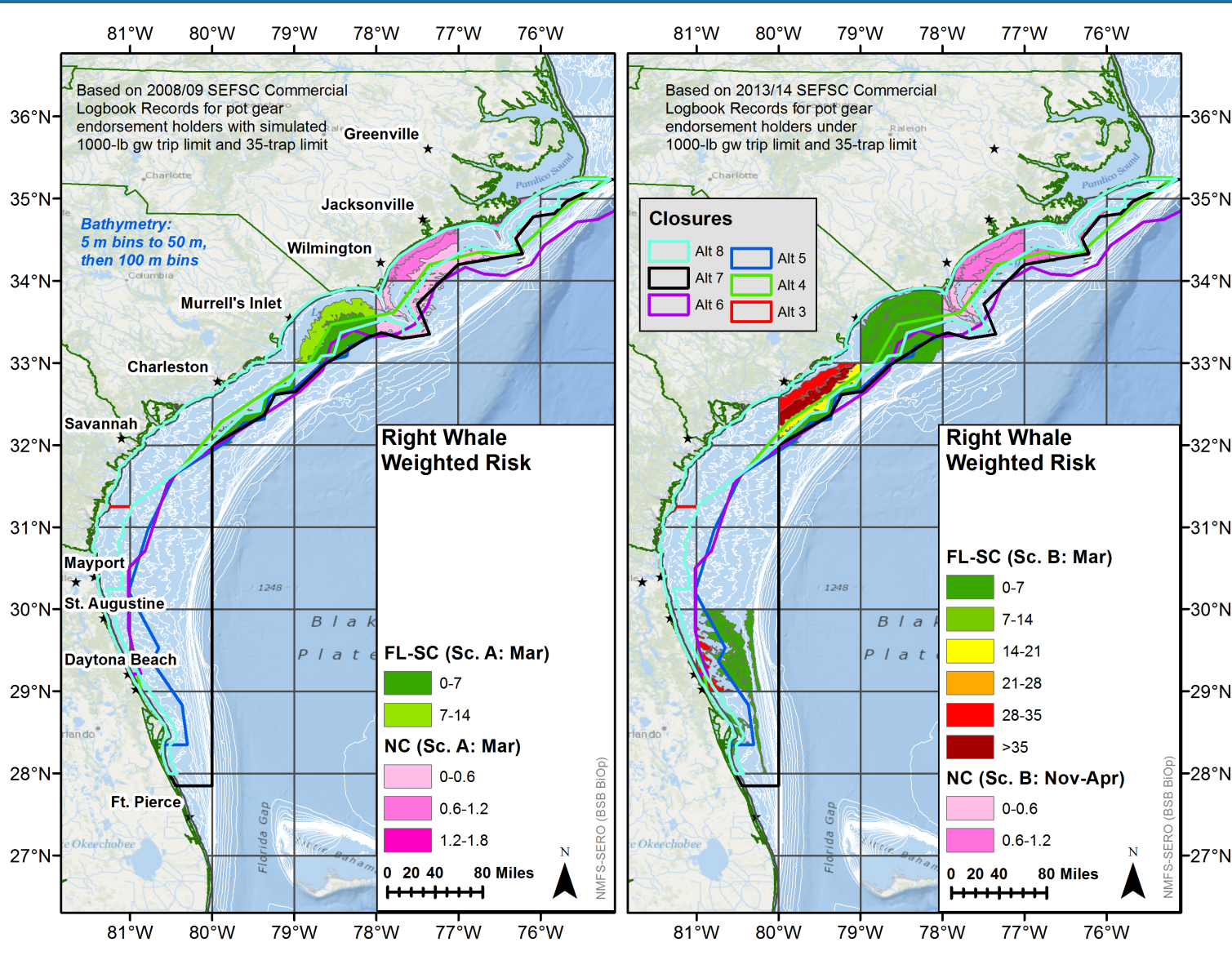
Mean Monthly NARW “Relative Risk”

Figure 8:
February



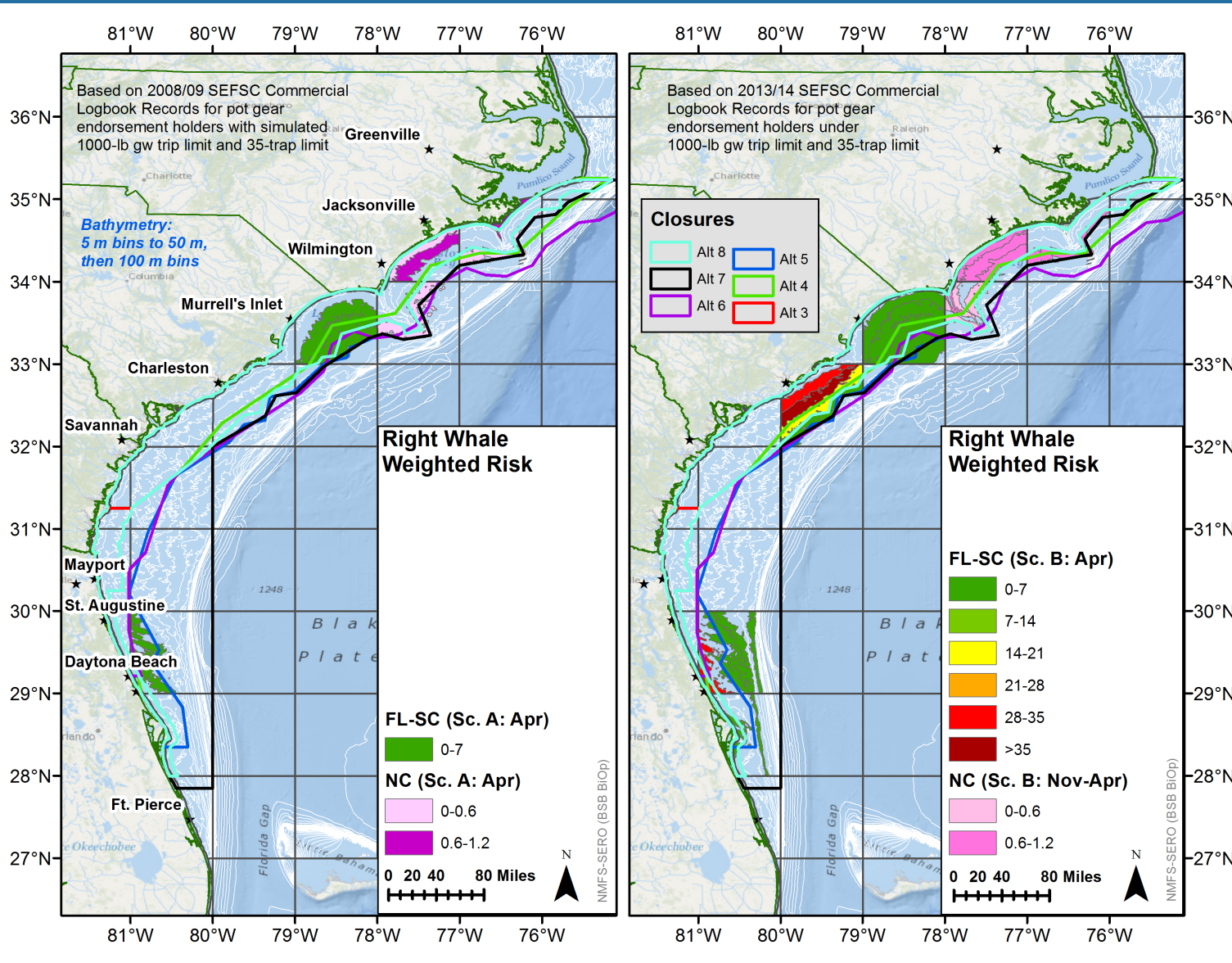
Mean Monthly NARW “Relative Risk”

Figure 8:
March



Mean Monthly NARW “Relative Risk”

Figure 8:
April



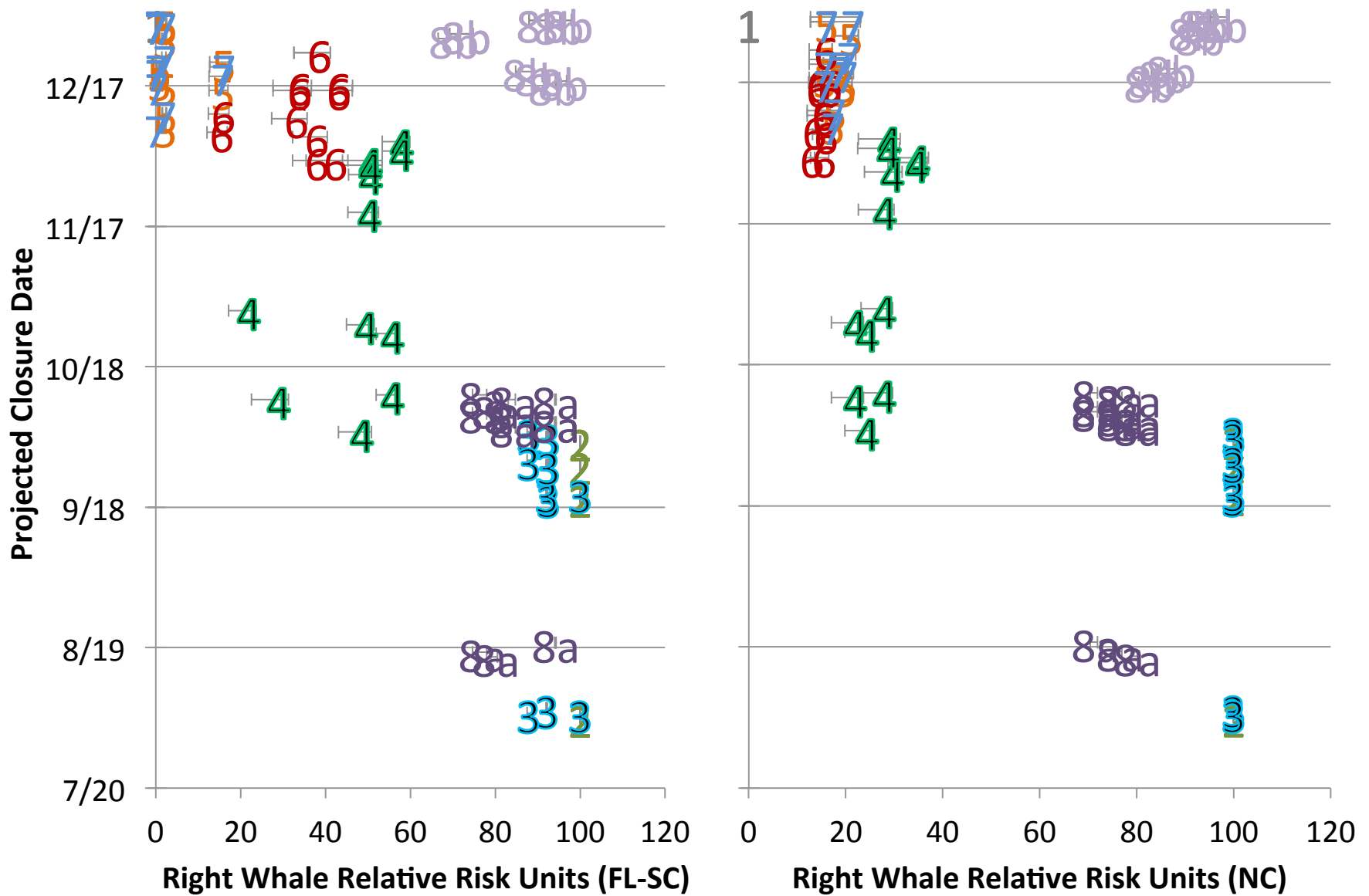


Figure F1. Relative right whale risk versus projected closure date, by alternative (colored numbers), across catch rate scenarios 1-4 and pot distribution scenarios A-C, for right whale distribution under mean conditions. Error bars denote 95% confidence intervals.

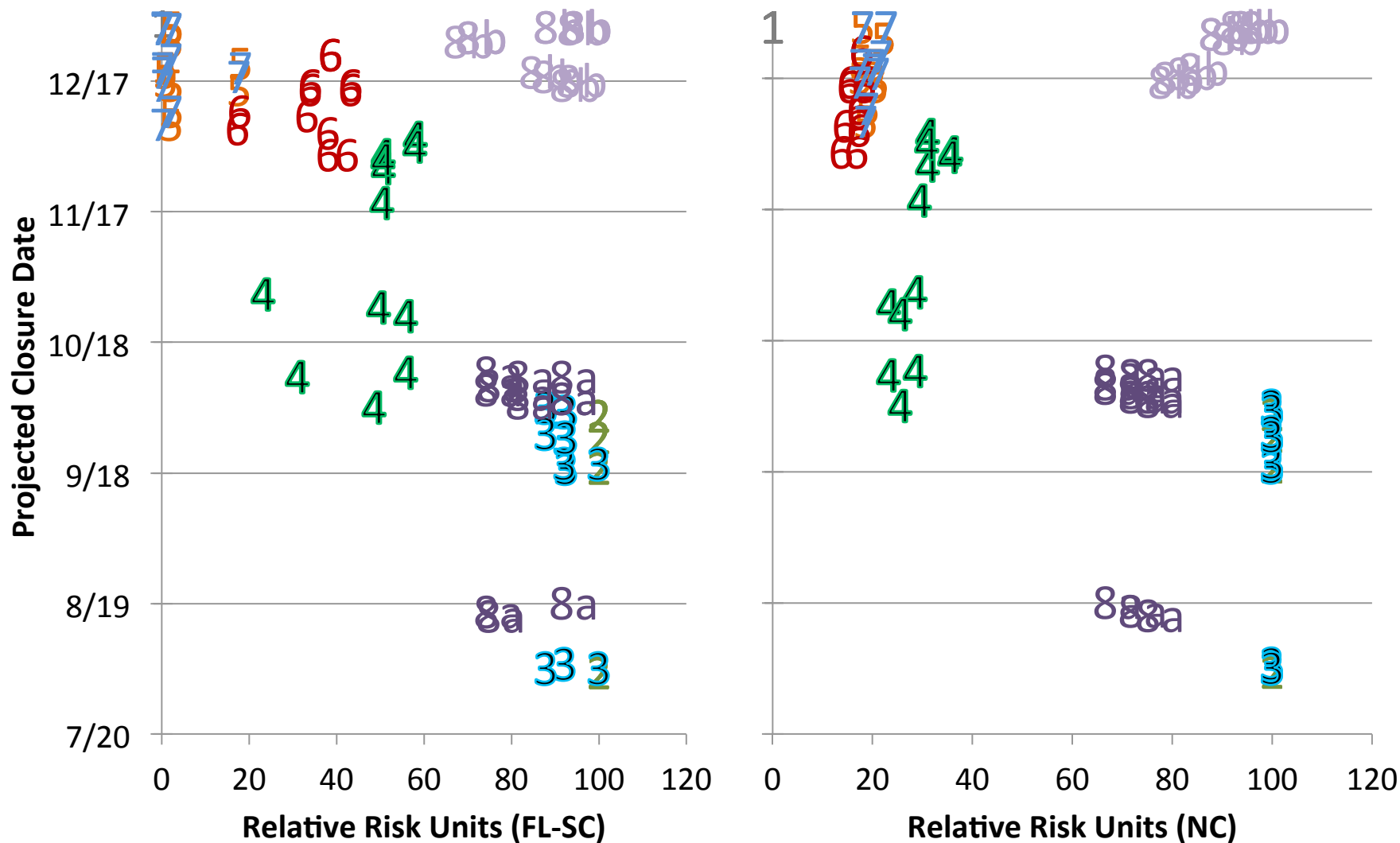


Figure E1. Projected closure date versus relative right whale risk, by alternative (colored numbers), across catch rate scenarios 1-4 and spatial pot gear distribution scenarios A-C, for right whale distributions under mean conditions. **North Carolina data modeled based on monthly predictions of right whale distribution based on mean monthly sea surface temperatures (SST).** Compare to Figure 11A.

DISCUSSION

Challenging to predict the impacts of Reg-16:

Substantial changes in the fishery

No trap gear (Nov-Apr) in 5 years

Many scenarios considered to capture the range of uncertainty:

4 catch rates

3 spatial distributions of traps

3 spatial distributions of whales

Consistent results across broad range of sensitivity runs



Photo taken by NOAA/GDNR/Wildlife Trust under NOAA Permit #594-1759


NARW Protection	Alternative
Most Protective	Alternative 1: no relative risk of entanglement (0%)
	Alternative 7: low increase in relative risk off NC (+16-22%); very low additional risk off FL-SC (+0-2%).
	Alternative 5: low increase in relative risk off NC (+16-21%); low increase in relative risk off FL-SC (+1-3%).
	Alternative 6: low to moderate increase in relative risk off NC (+13-16%); low to high increase in relative risk off FL-SC (+14-58%).
	Alternative 4: low to moderate increase in relative risk off NC (+22-35%); moderate to high increase in relative risk off FL-SC (+23-68%).
	Alternative 8a: high to very high increase in relative risk off NC (+71-80%) and off FL-SC (+77-97%).
	Alternative 3: very high increase in relative risk off NC (+100% over status quo) and off FL-SC (+85-97%).
	Alternative 8b: very high increase in relative risk off NC (+83-95%) and off FL-SC (+70-105%).
Least Protective	Alternative 2: very high (100%) increase in the risk of right whale entanglement relative to status quo throughout the South Atlantic region.
Risk Classification	0-25% = low, 26-50% = moderate, 51-75%= high, 76-100+% = very high

Table 3

A Dynamic Time for Commercial BSB Fishing

2013/14 season: 99.6% of ACL caught (no traps Nov-Apr)

Nearly all scenarios for Reg-16 alternatives result in quota closure

Commercial fishery in a dynamic transition:

- Was a full-season fishery with peak catches in winter (1999-2009)
- Became a derby fishery with high summer catch rates and early quota closures (2009-2012)
- Amendment 18A → Effort restrictions, trip limits
- Reg-19 → Increased ACL
- Reg-14 → New trip limits, January start

Reduced trap gear participation offset by increased 'other gear' harvest

- 2013/14 season: 68% of the commercial harvest 'other gears'
- 2004-2013 average: ~28% harvest by 'other gears'

Questions?



Photo taken under Permit No. 932-1489
issued by NMFS

GA-DNR

Cumulative Effects: Mean Conditions

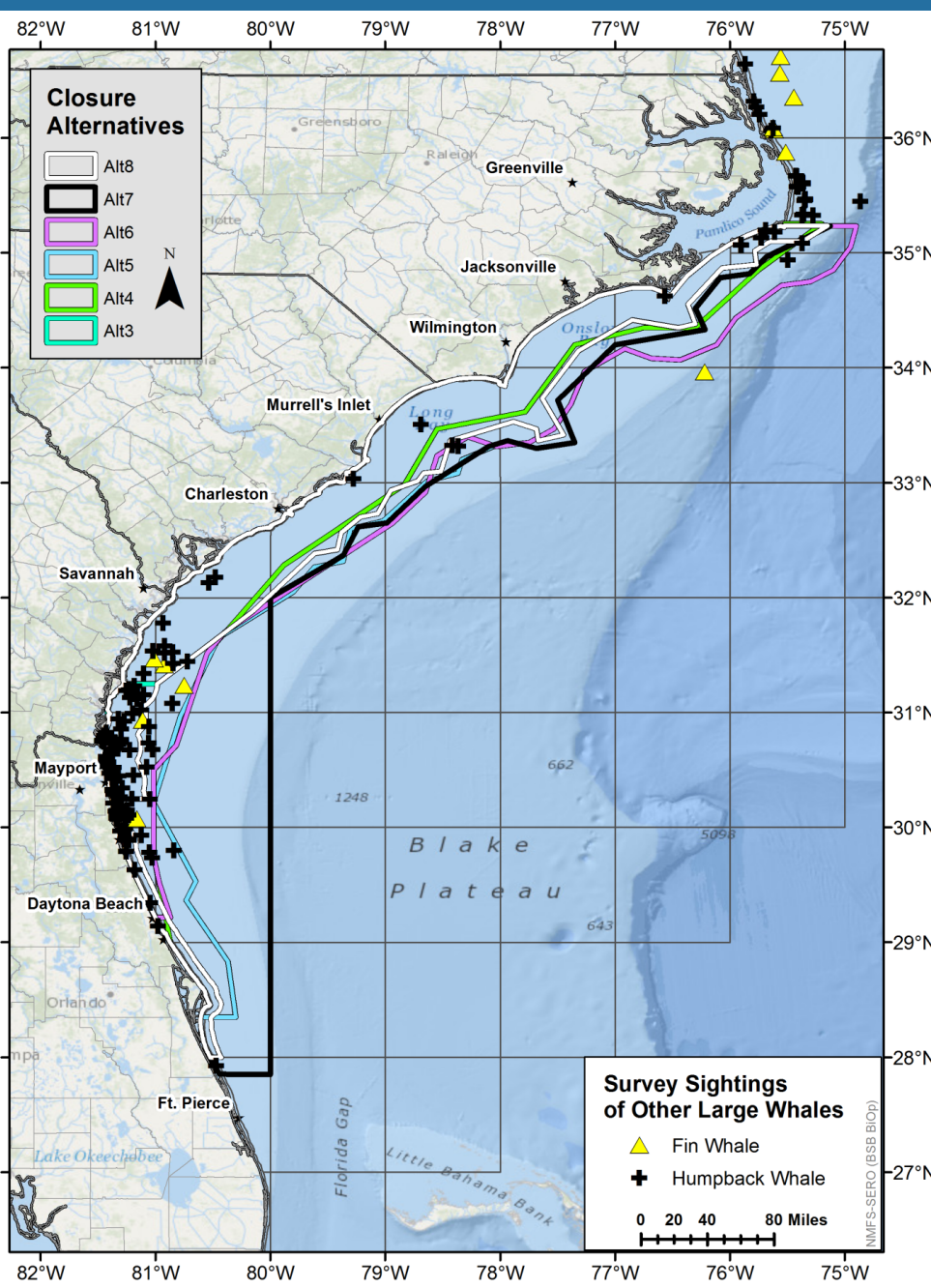
Table 2A

		Alt1	Alt2				Alt3				Alt4				Alt5				Alt6				Alt7				Alt8a				Alt8b				
		SQ	S1	S2	S3	S4	S1	S2	S3	S4	S1	S2	S3	S4	S1	S2	S3	S4	S1	S2	S3	S4	S1	S2	S3	S4	S1	S2	S3	S4					
Scenario A	Closure Date	n/a	10/2	8/4	9/20	9/27	10/3	8/5	9/20	9/27	12/5	10/11	10/27	12/3	12/30	12/22	12/18	12/31	12/24	12/11	12/10	12/24	12/30	12/21	12/17	12/30	10/11	8/17	10/5	10/6	n/a	12/30	12/20	n/a	
	%ACL	97	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99	100	100	99
	RW Risk (NC)	0	100	100	100	100	100	100	100	100	29	22	22	29	16	16	16	16	16	16	16	16	16	16	16	16	80	80	80	80	95	94	87	95	
	%RW Risk (FL-SC)	0	100	100	100	100	92	92	92	92	58	56	56	58	2	2	2	2	39	38	38	39	2	2	2	2	94	94	94	94	97	96	90	97	
Scenario B	Closure Date	n/a	10/2	8/4	9/20	9/27	10/4	8/6	9/21	9/28	12/1	10/12	10/30	11/30	12/27	12/17	12/16	12/27	12/17	12/1	12/7	12/16	12/30	12/23	12/19	12/31	10/12	8/20	10/9	10/8	12/28	12/18	12/17	12/28	
	%ACL	97	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
	RW Risk (NC)	0	100	100	100	100	100	100	100	100	35	28	28	35	21	20	20	21	14	13	14	14	21	21	20	22	71	71	71	71	92	83	83	92	
	%RW Risk (FL-SC)	0	100	100	100	100	88	88	88	88	51	49	49	51	2	2	2	2	43	42	43	43	0	0	0	0	77	77	77	77	73	70	70	73	
Scenario C	Closure Date	n/a	10/2	8/4	9/20	9/27	10/3	8/5	9/21	9/27	11/28	10/4	10/25	11/20	12/21	12/8	12/11	12/20	12/17	12/1	12/6	12/16	12/21	12/8	12/11	12/20	10/11	8/18	10/6	10/7	n/a	12/27	12/19	n/a	
	%ACL	97	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99	100	100	99
	RW Risk (NC)	0	100	100	100	100	100	100	100	100	30	24	24	28	19	17	18	19	17	16	16	17	19	17	18	19	77	77	77	77	98	93	85	98	
	%RW Risk (FL-SC)	0	100	100	100	100	93	93	93	93	51	50	50	50	1	1	1	1	34	33	33	34	0	0	0	0	84	84	84	84	91	88	82	91	

Other large whales

Figure 11. Aerial survey observations (2005-2014) of humpback whales and fin whales within the SAFMC jurisdiction relative to Reg-16 proposed closure alternatives.

- 135 humpback whale sightings (6 confirmed dead)
- 21 fin whales
- Number of observations was highest in areas of highest survey effort.
- Some of these sightings may represent multiple sightings of the same individual.



Impacts on Other Large Whales

Humpback whales and fin whales found within trap fishing areas

- May also be at risk of entanglement, impacted by Reg-16

North Atlantic humpbacks assumed to use mid-Atlantic as migratory pathway to/from calving/mating grounds in West Indies

Mid-Atlantic may be winter feeding range for non-reproductive humpbacks

Commercial fishing gear entanglement a concern for humpbacks:

- 60% mid-Atlantic mortalities due to vessel strike or entanglement
- At least 29 documented serious entanglement injuries for humpbacks from 2006-2010

Reg-16 Alternatives

Alternative 1 (No Action). Retention, possession, and fishing for black sea bass is prohibited using black sea bass pot gear, annually, from Nov 1-Apr 30.

Alternative 2. Remove the annual Nov 1-Apr 30 prohibition on the retention, possession, and fishing for black sea bass using black sea bass pot gear.

Alternative 3. The black sea bass pot closure applies to the area currently designated as NARW critical habitat... from Nov 15-Apr 15.

Note this area is currently under revision by NOAA

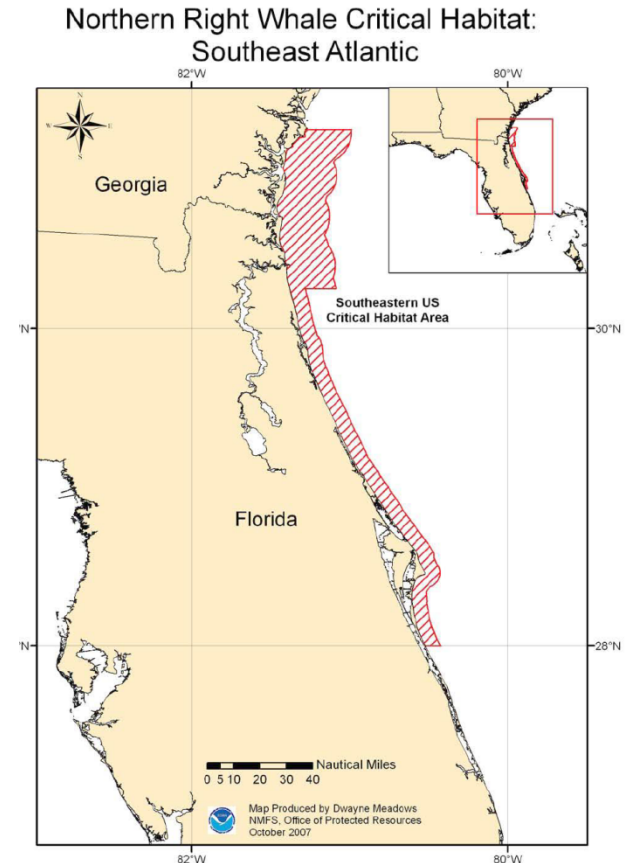
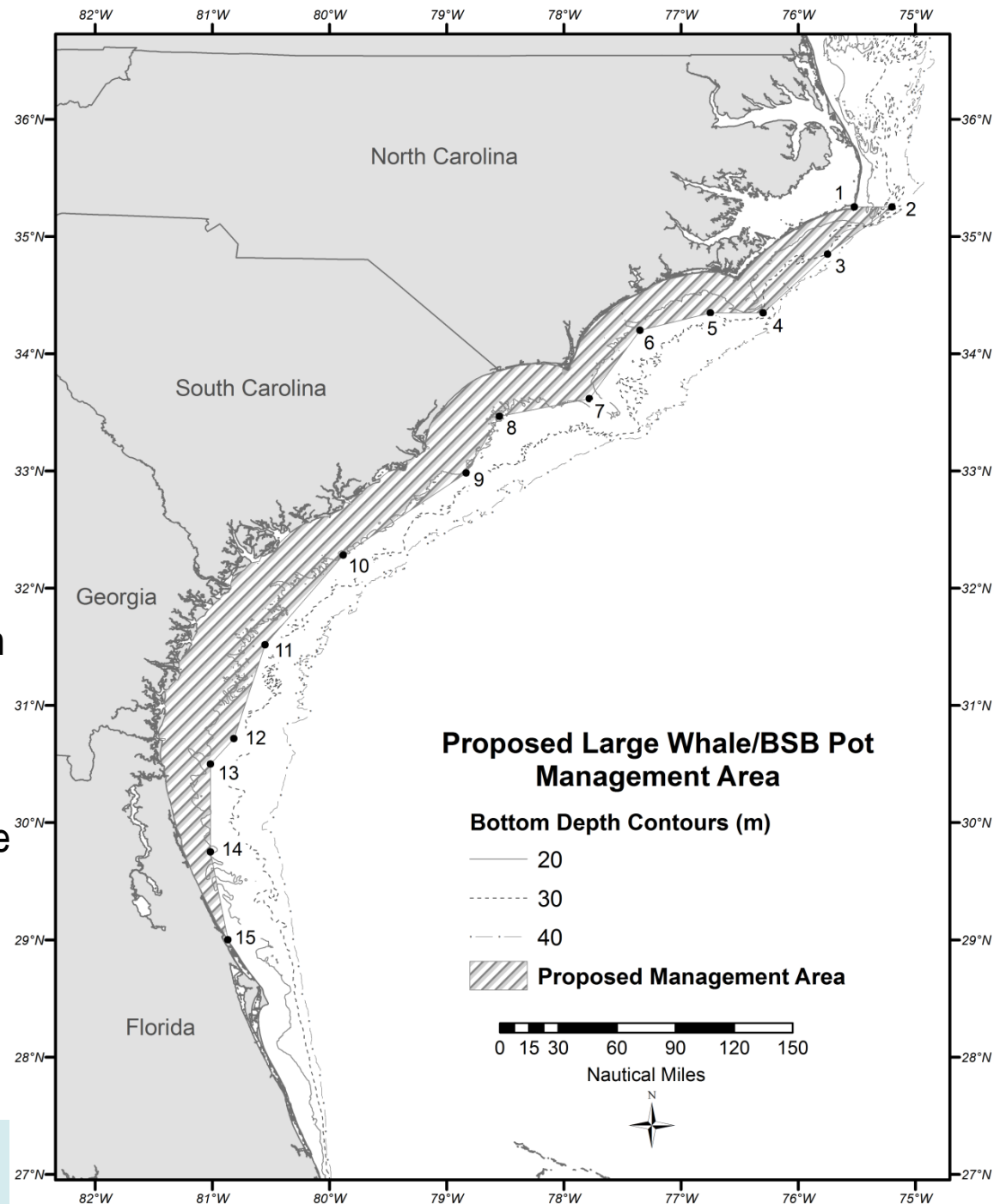


Figure A.1. Area for the proposed black sea bass pot closure in **Alternative 3**.

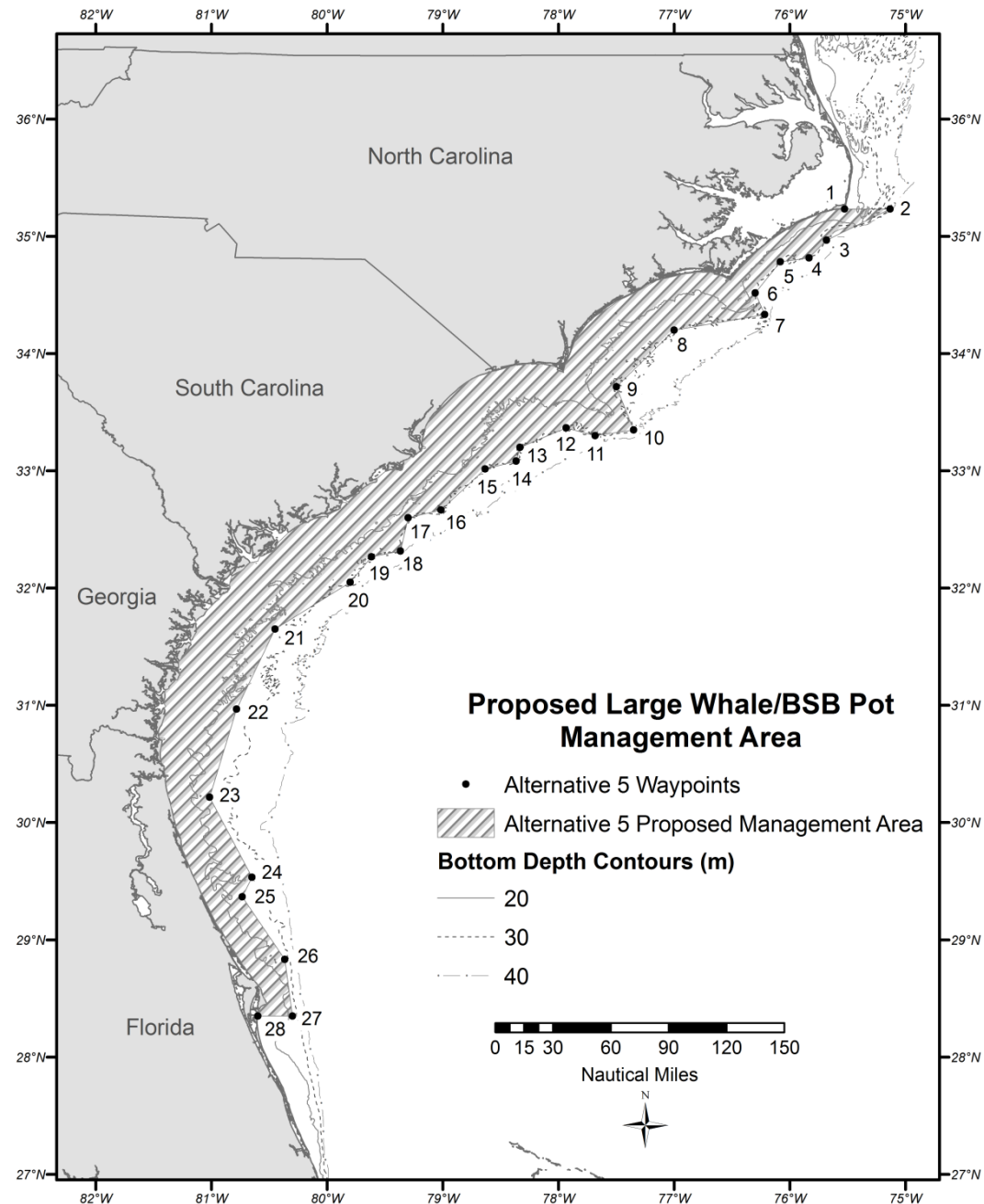
Alternative 4. The black sea bass pot closure applies to... Ponce Inlet, FL, to Cape Hatteras, NC (Figure A.2)...annually from Nov 1-Apr 30.

The area identified from Cape Fear, North Carolina, southward to 29°N (approximately Ponce Inlet, Florida) is based on model outputs (i.e., Garrison 2007, Keller et al. 2012, Good 2008). The area from Cape Fear, North Carolina, to Cape Hatteras, North Carolina, is an extrapolation of those model outputs and based on sea surface temperatures and bathymetry.



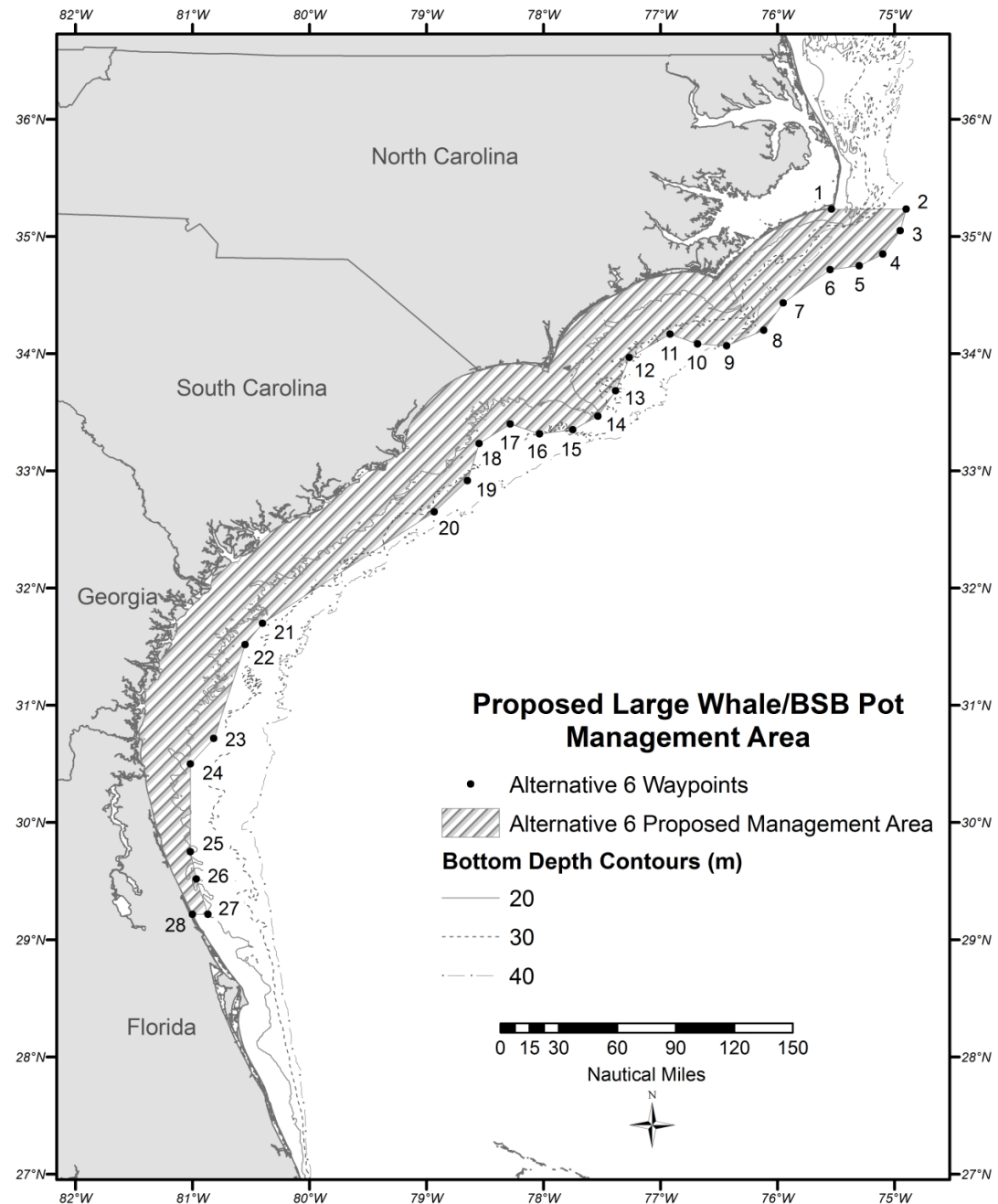
Alternative 5. The black sea bass pot closure applies...Cape Canaveral, FL, to Cape Hatteras, NC (Figure A.3)...Nov 1-Apr 30.

Note: This bathymetric area is based on right whale sightings (all demographic segments) and sightings per unit of effort (proxy of density) by depth and captures 97% and 96% of right whale sightings off the North Carolina/South Carolina area, and Florida/Georgia area, respectively.



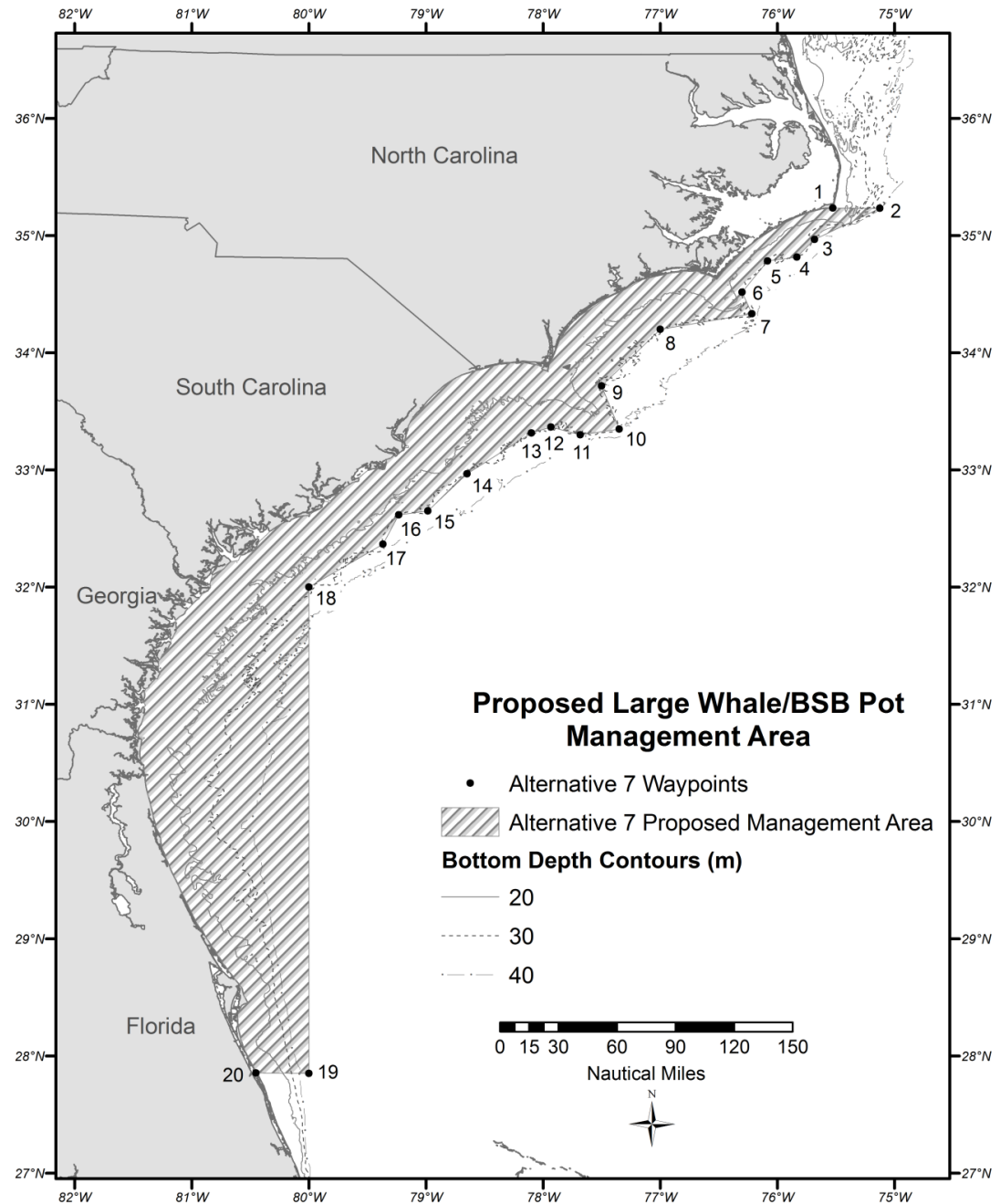
Alternative 6. The black sea bass pot closure applies...Cape Canaveral, FL, to Cape Hatteras, NC (Figure A.4)...Nov 1-Apr 30.

The area [is] based on calving right whale habitat modeling work of Garrison (2007) and Keller et al. (2012). This area represents the 75th percentile of sightings (91% of historical sightings included in their study) off Florida and Georgia (Garrison 2007 and Keller et al. 2012). Off the coasts of North Carolina and South Carolina, the closure extends from the coastline to 30 nautical miles offshore.



Alternative 7. The black sea bass pot closure applies... Sebastian, FL, to Cape Hatteras, NC (**Figure A.5**)...Nov 1-Apr 30.

This area represents an existing management area, the Southeast Seasonal Gillnet Restricted Area, under the Atlantic Large Whale Take Reduction Plan; and an additional area off North Carolina. The area off North Carolina includes waters shallower than 30 m and is northward of the designated ALWTRP Southeast Restricted Area.

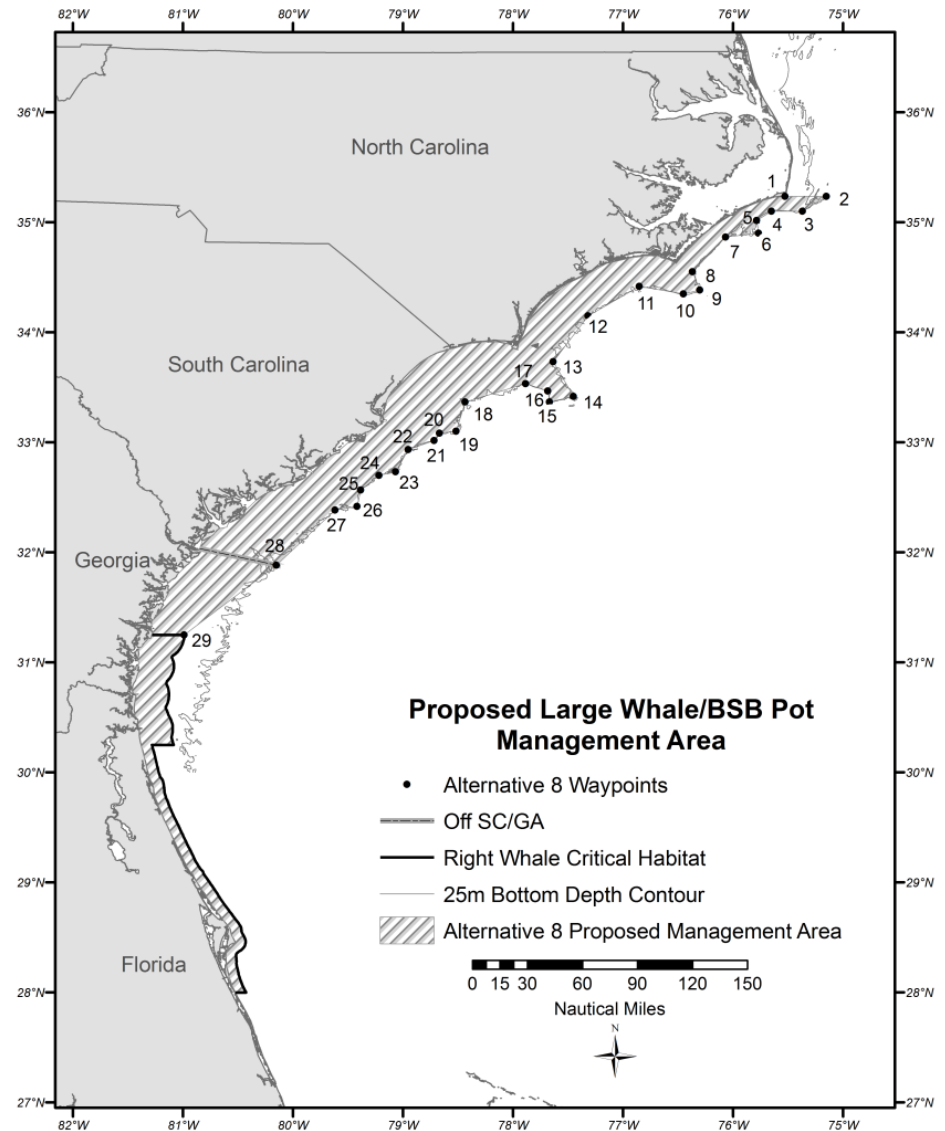


Alternative 8. The black sea bass pot closure applies to the area currently designated as NARW critical habitat, in addition to waters...North of the Altamaha River, GA, to Cape Hatteras, NC (**Figure A.6**).

Sub-alternative 8a. The black sea bass pot closure applies to the area annually Nov 1-Dec 15 and Mar 15-Apr 30.

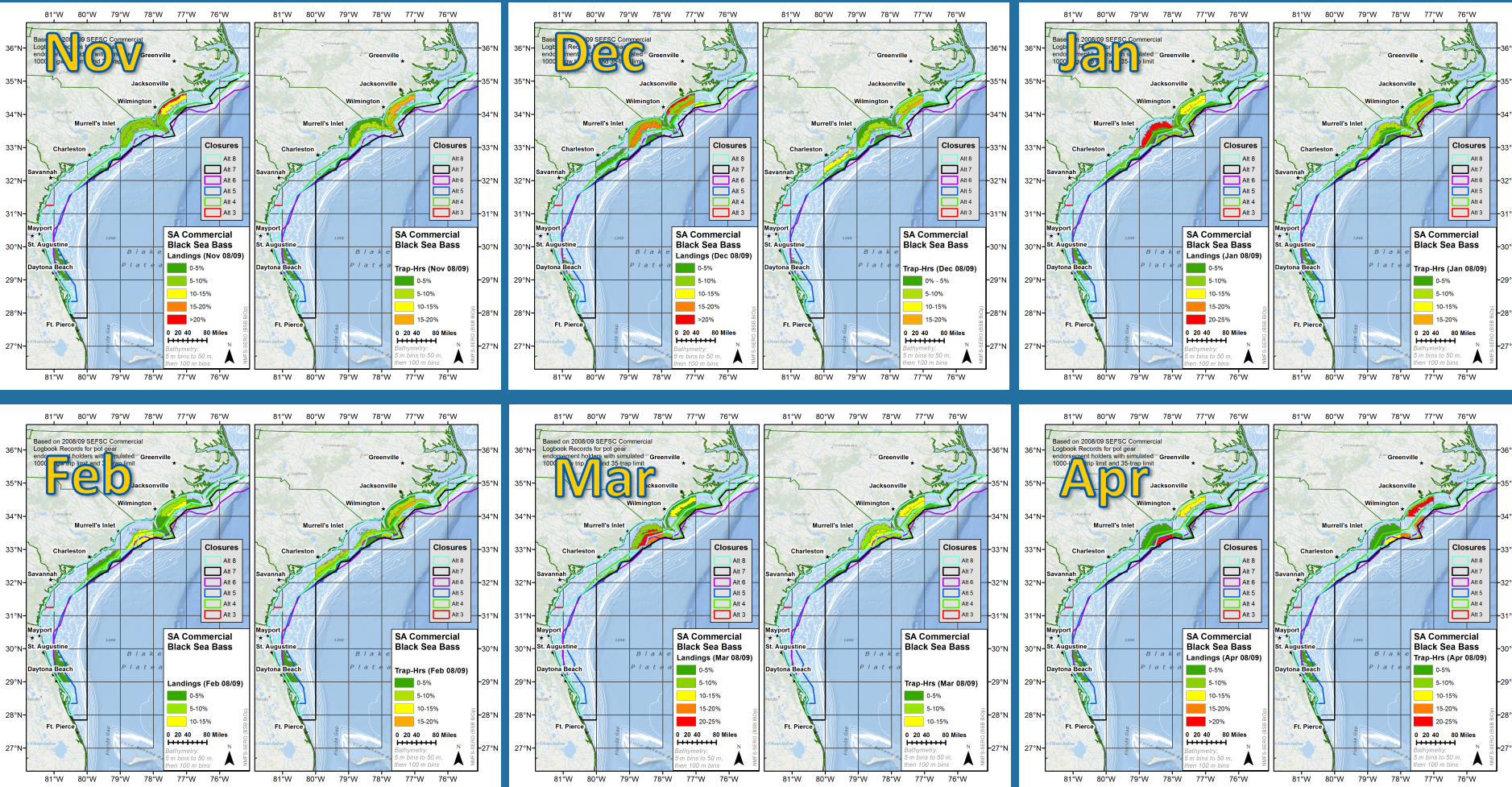
Sub-alternative 8b. For the area off NC-SC, the black sea bass pot closure applies annually from Nov 1-Dec 15 and Mar 15-Apr 30. For the area off GA-FL, the black sea bass pot closure applies annually from Nov 15-Apr 15.

Note: This area represents NARW critical habitat in the South Atlantic region designated on June 3, 1994. Off NC-SC, the black sea bass pot closure applies in the exclusive economic zone in waters shallower than 25 m. The eastern boundary of the closure between these two areas was formed by drawing a straight line from the southeastern corner waypoint of the northern portion (NC/SC) to the northeastern corner waypoint of the southern section (FL/GA).



Scenario A (Winter 2008/09)

Figure 3A-F: Spatial distribution of reported South Atlantic commercial black sea bass trap gear endorsement holder landings and effort under Amendment 18A regulations, by area and depth. Landings and effort are aggregated into 5-m wide by 1° tall bins.



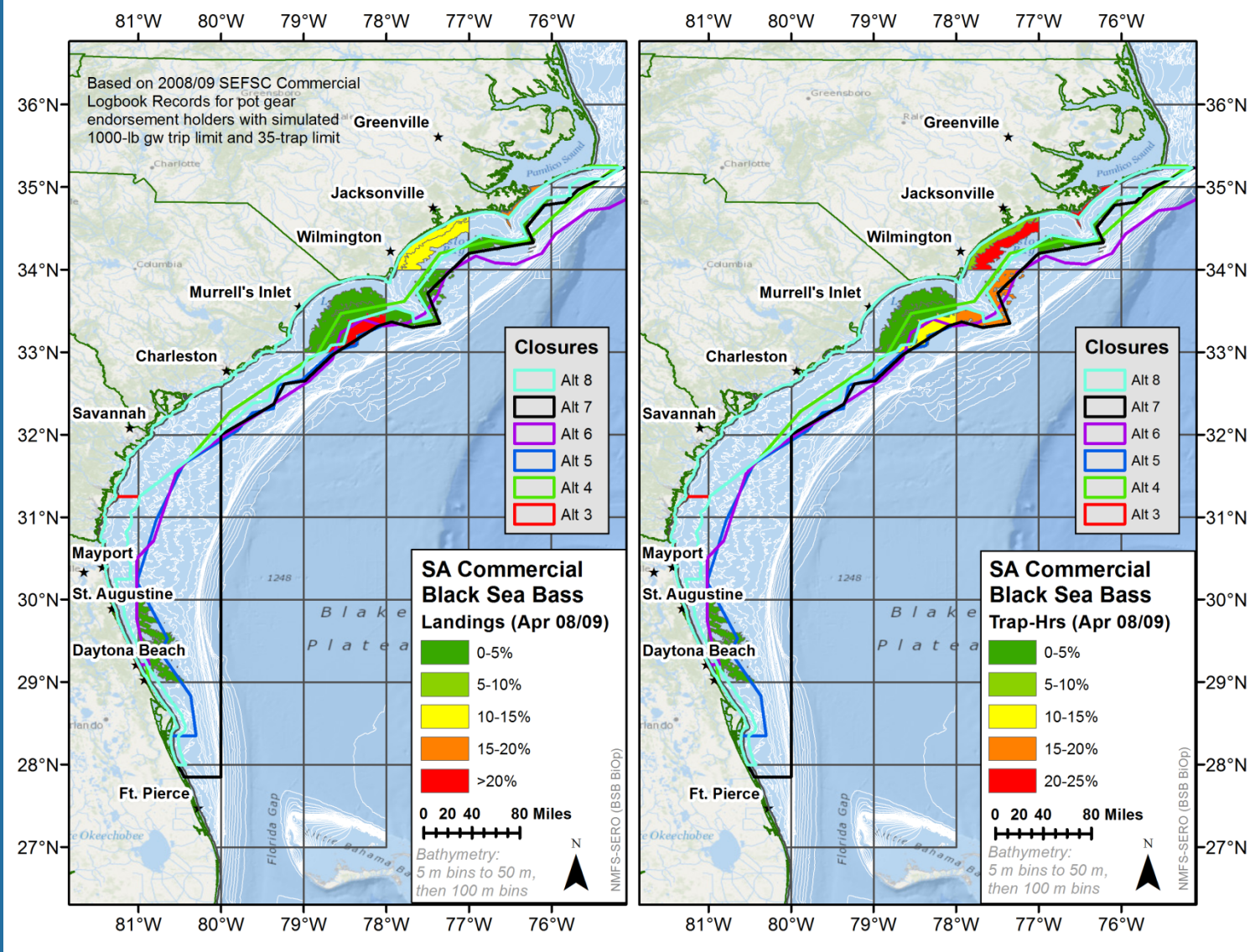
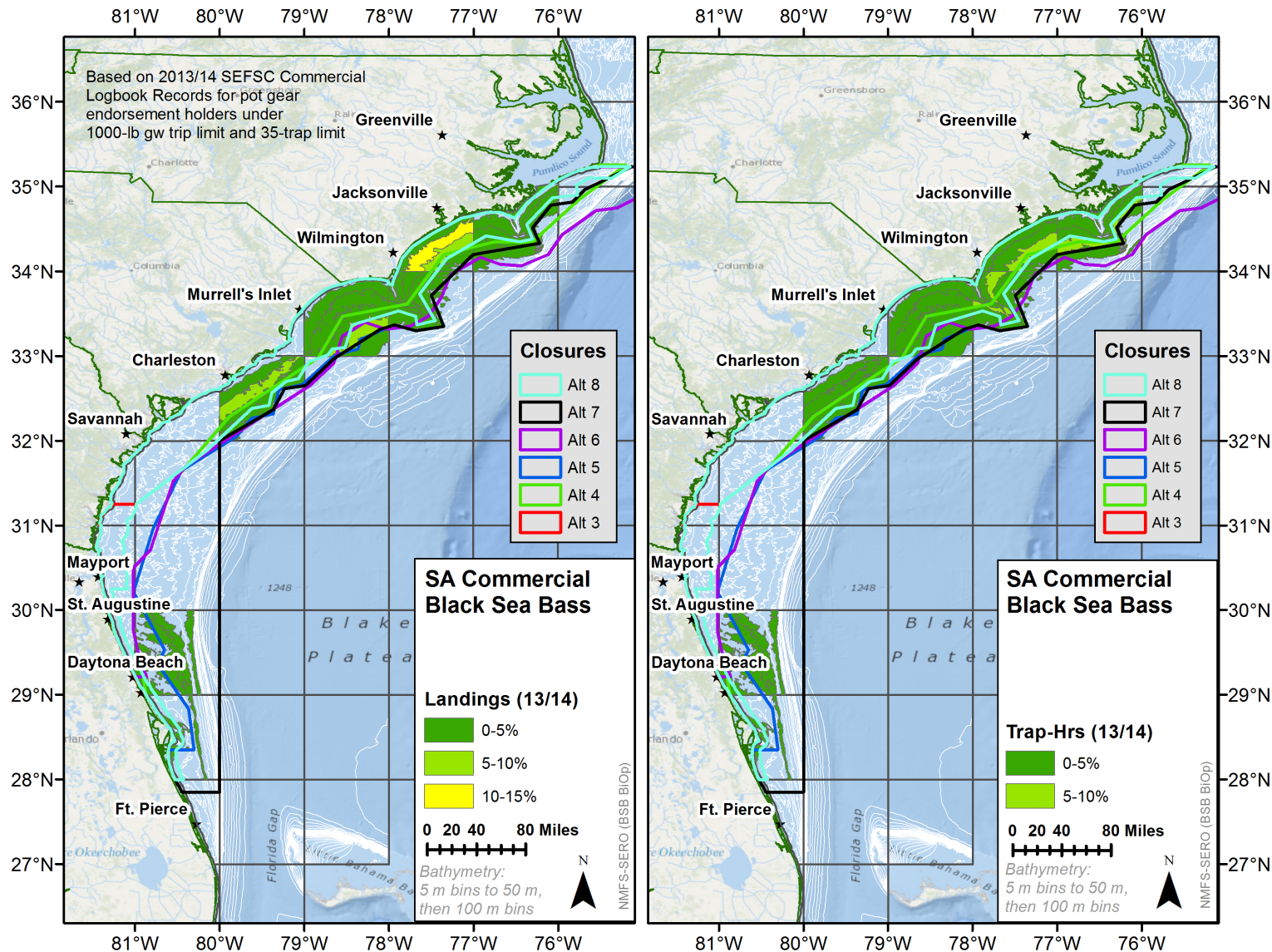


Figure 3F:
April
2008/09

Spatial distribution of reported South Atlantic commercial black sea bass trap gear endorsement holder landings and effort under Amendment 18A regulations, by area and depth. Landings and effort are aggregated into 5-m wide by 1° tall bins.

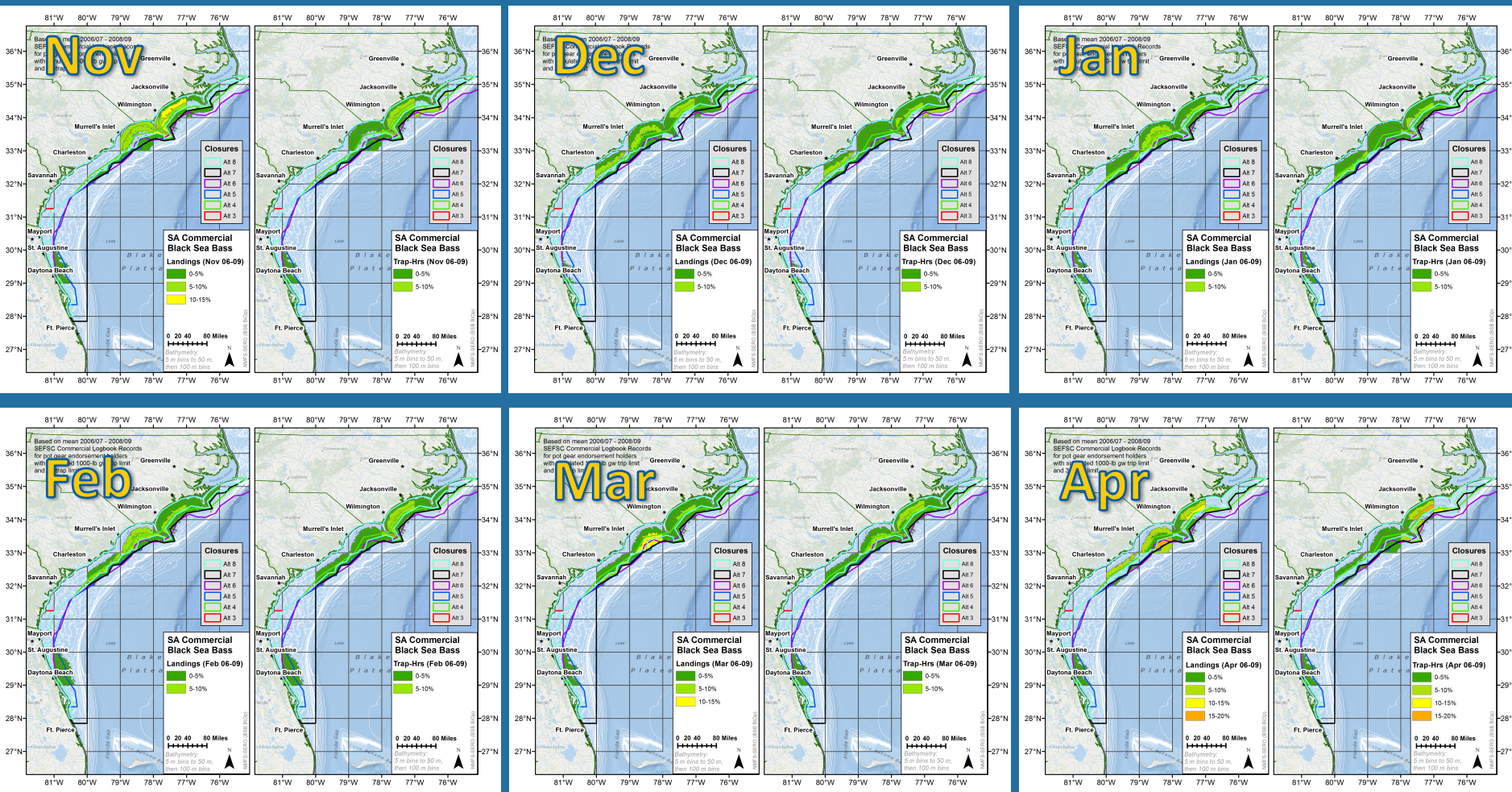
Scenario B (Summer 2013/14)

Figure 3G



Scenario C (Winter 2006/07-2008/09)

Figure 3H-M: Spatial distribution of reported South Atlantic commercial black sea bass trap gear endorsement holder landings and effort under Amendment 18A regulations, by area and depth. Landings and effort are aggregated into 5-m wide by 1° tall bins.



RESULTS: Pot Gear Effort

Pots per Month

Pre-18A (2004-2009): **2126 ± 1410** pots/month

Post-18A: **2122 ± 653** pots/month

2013/14 Season

24.9 ± 9.7 pots/trip

52.3 ± 36.4 hauls/trip

1.4 ± 0.6 days/trip

4.4 ± 4.0 hours/pot (range 0.33-28.0 hours)

245.8 ± 337.6 hours soaktime per trip

RESULTS: Catch Rates

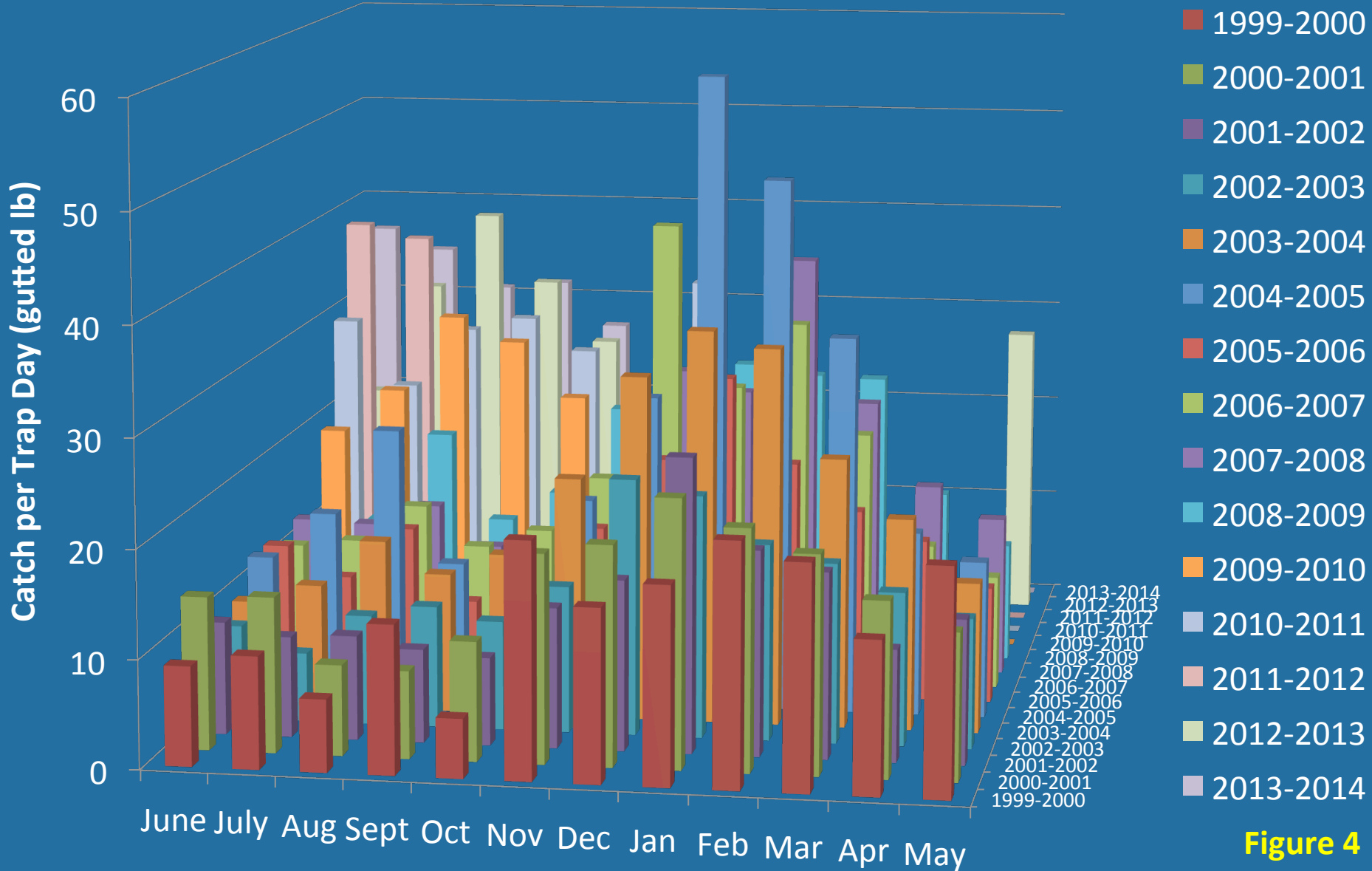
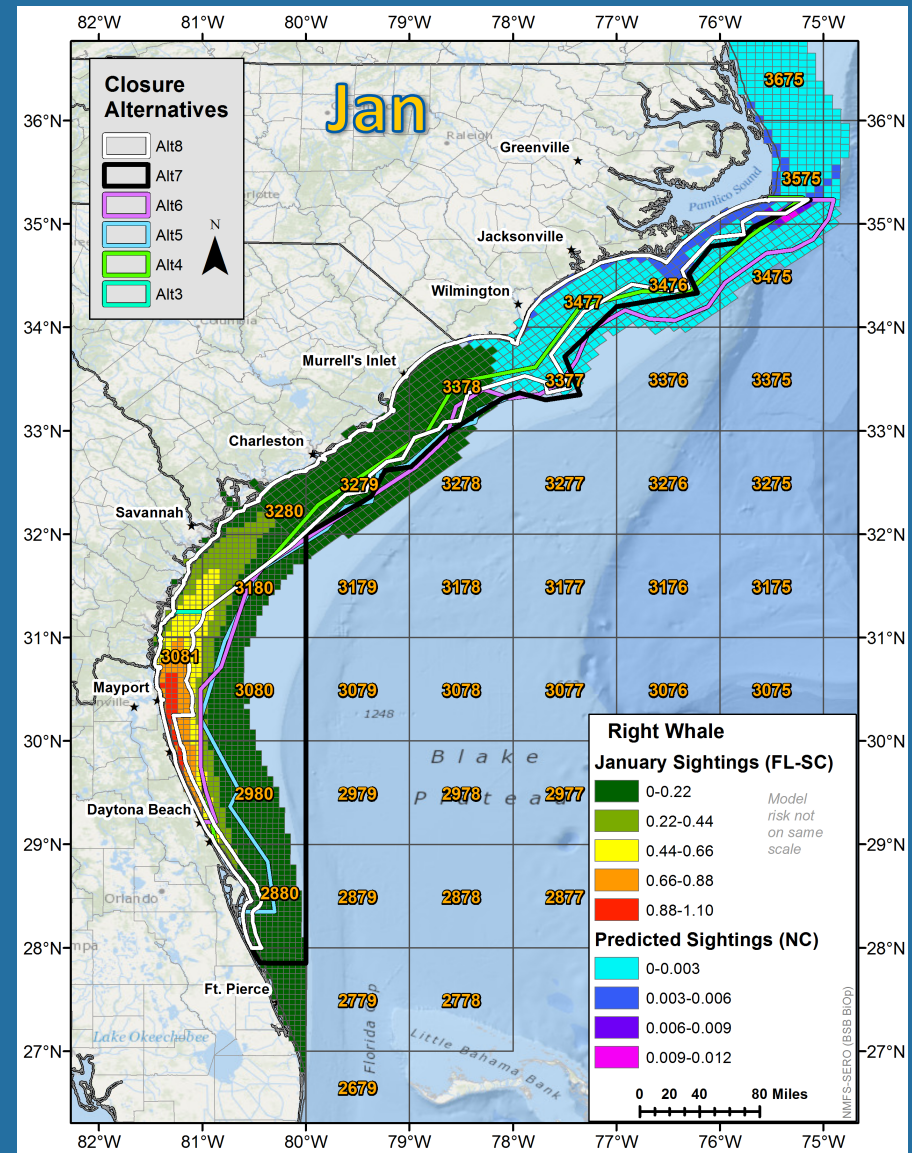
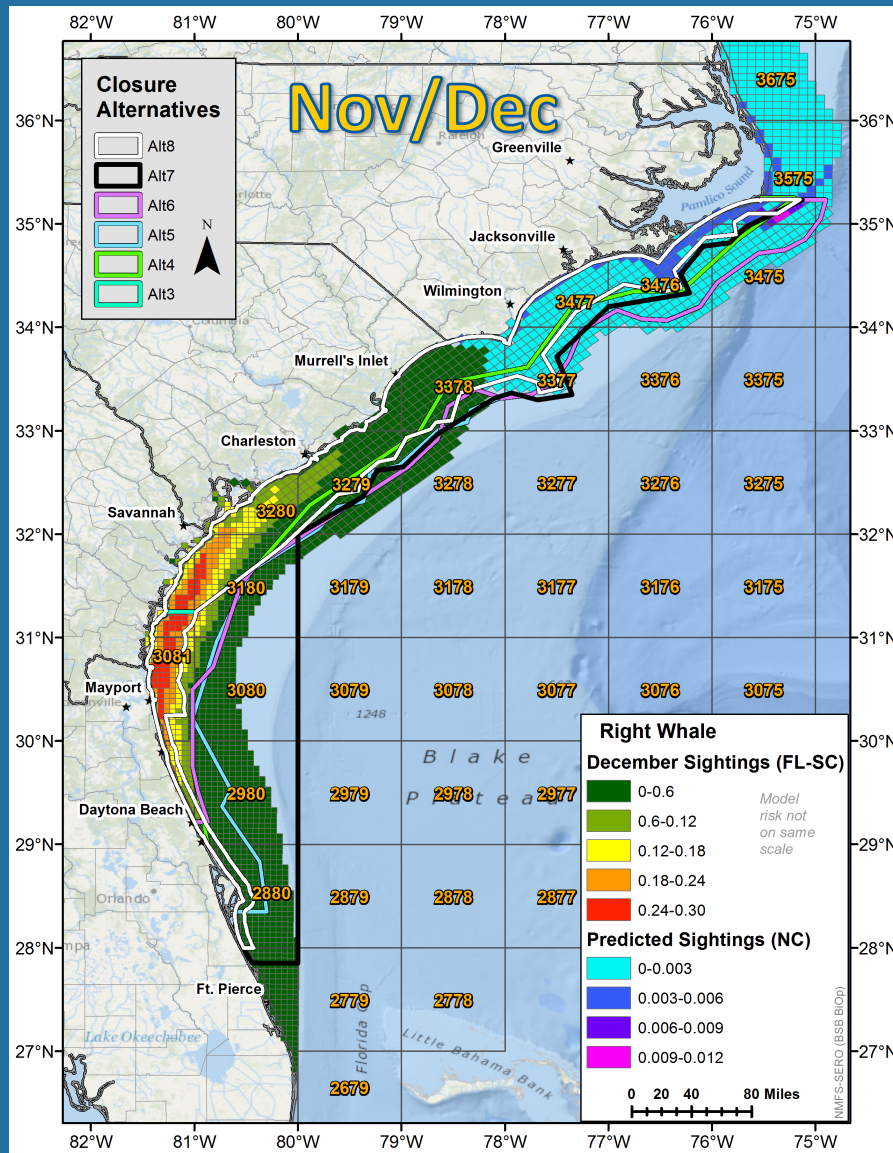


Figure 4

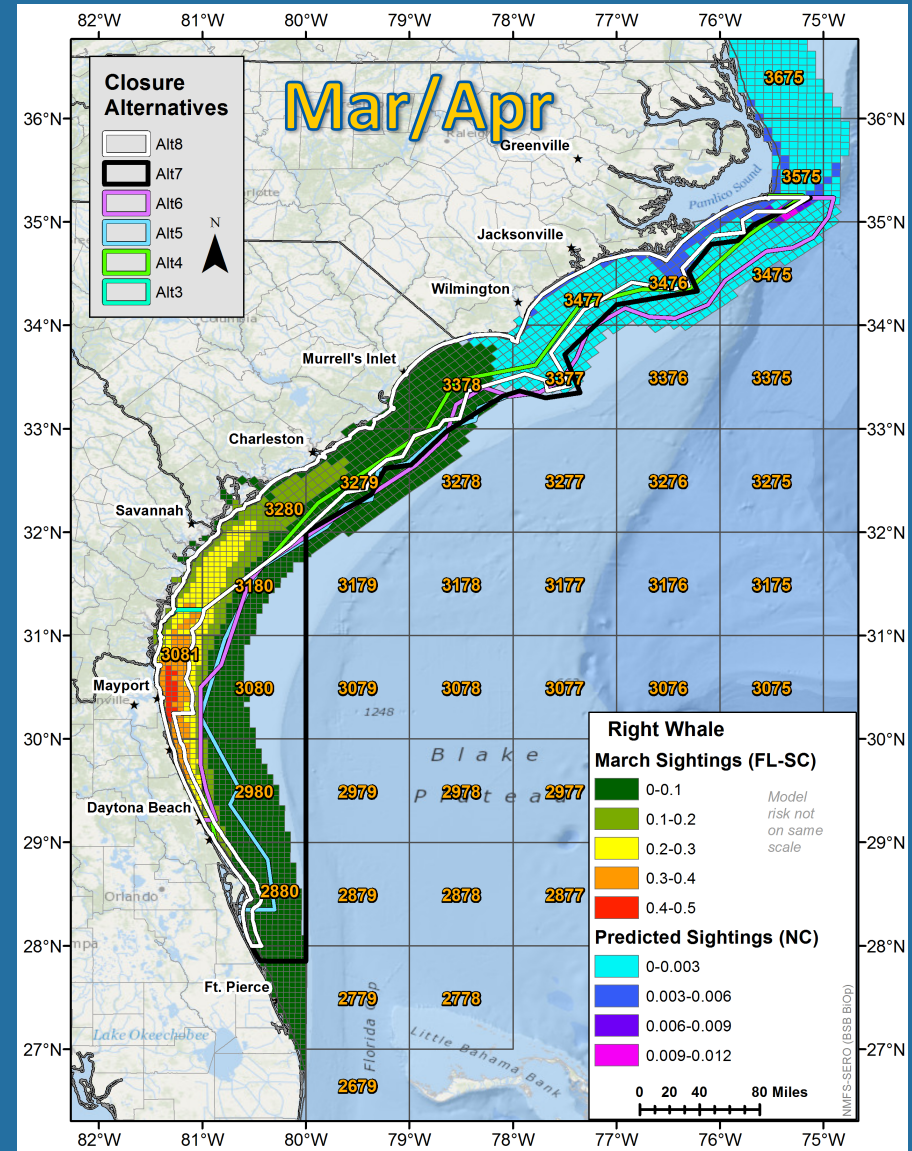
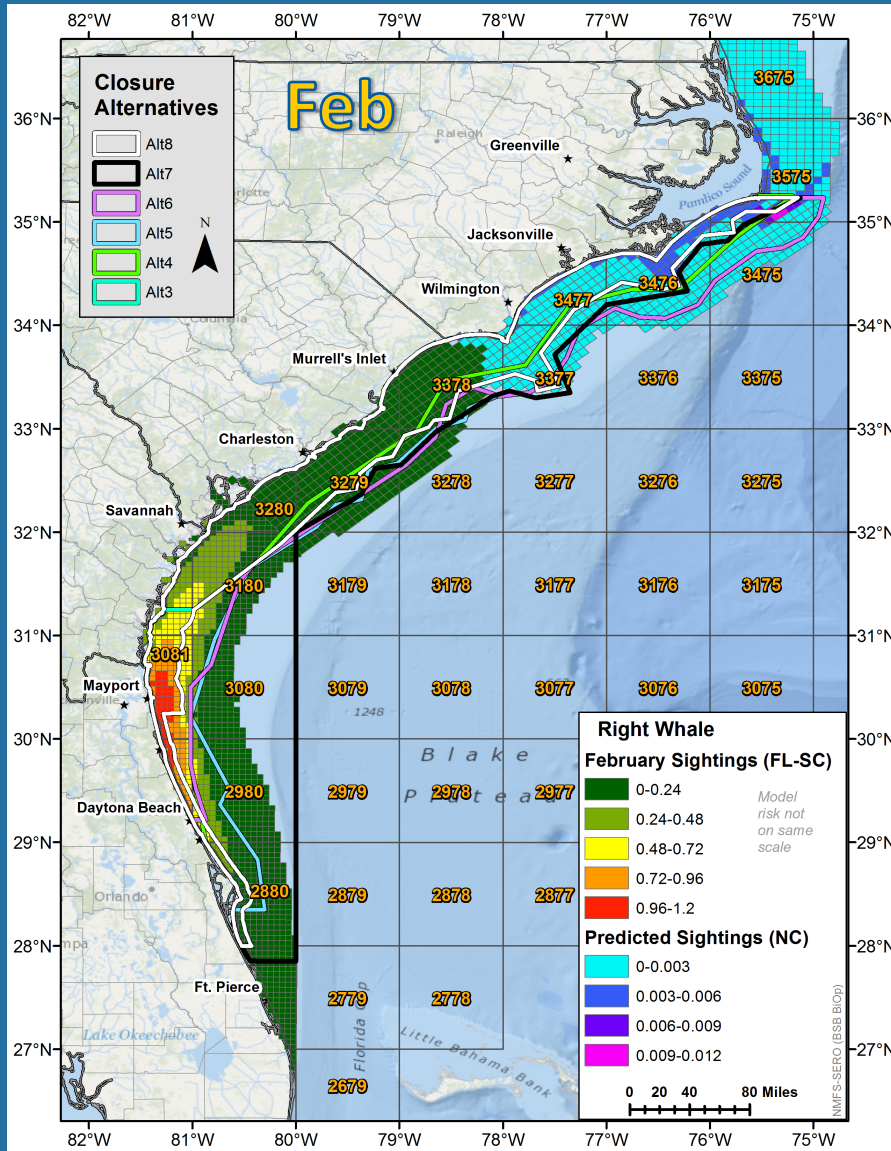
Mean Monthly NARW Distribution

Figure 7



Mean Monthly NARW Distribution

Figure 7



Sensitivity Runs

Figure A4

Cold

Warm

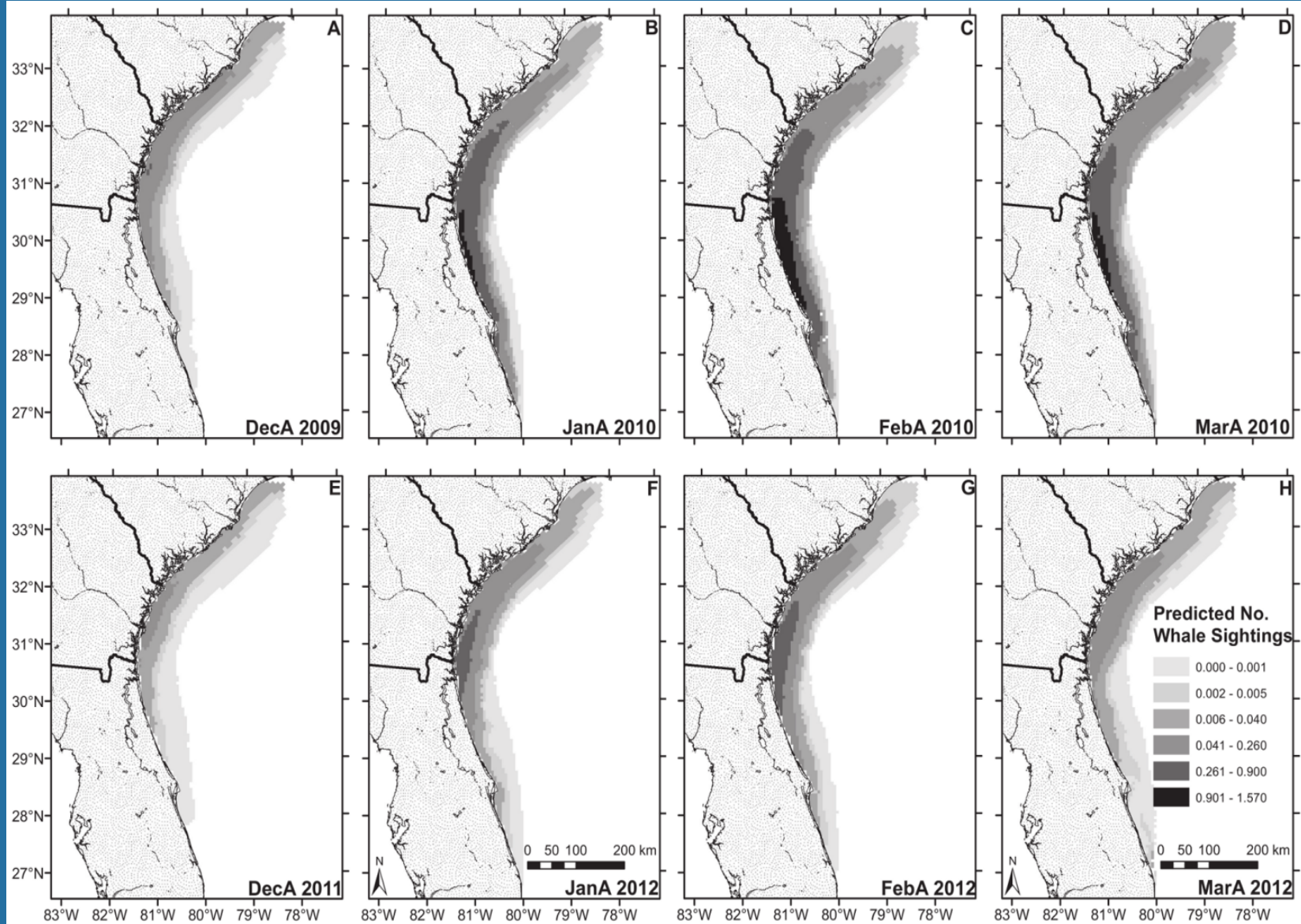


FIGURE 5 in: Gowan, T.A. and Ortega-Ortiz, J.G. 2014. Wintering habitat model for the North Atlantic right whale (*Eubalaena glacialis*) in the southeastern United States. PLoS ONE 9(4): e95126. doi:10.1371/journal.pone.0095126

Figure 11

MEAN

WARM

COLD

Figure 11

MEAN

WARM

COLD

Figure 11

MEAN

WARM

COLD

Figure 11

MEAN

WARM

COLD



Uncertainty in Catch Rates

1

Does not account for the rebuilding (based on 2008/09), but winter catch rates are similar to observed summer 2013/14.

2

Does not account for localized depletion; catch rates predicted have never been observed in consecutive months. May be realistic given increasing abundance.

3

Does not account for temporal dynamics of catch rate caused by fish movement or adverse weather conditions reducing number of potential trips.

4

Accounts for potential impacts of economic crash and high fuel prices in 2008/09 by averaging across last three open winter seasons; does not account for rebuilding.

Uncertainty in Spatial Distribution of Fishing

A

Does not account for shifts in core distribution of fishing pressure since 2008/09; stock may have shifted, endorsement holders may have moved or dropped out.

B

Does not account for inshore/offshore dynamics of stock and fishing effort in winter.

C

Does not account for shifts in core distribution of fishing pressure since 2006/07-2008/09; stock may have shifted, endorsement holders may have moved or dropped out.

Uncertainty in Spatial Distribution of Whales

Three whale distribution scenarios:

Average: Most appropriate for projection when future conditions unknown

Warmer: Right whale distribution compressed closer to shore, making most spatial closures more effective

Colder: right whale population is located farther south and more broadly distributed offshore beyond the closure boundaries, making closures less effective

Insufficient data to evaluate temperature impacts off NC

Associated impacts on spatial distribution of BSB catch rates / fishing effort not evaluated

Uncertainty in Spatial Distribution of Whales

Limited data

- Off NC: No time-dynamics
- Off FL-SC: December distributions used to represent November; March distributions used to represent April

Models implicitly assume detectability of whales (i.e., number of sightings) is equivalent across spatial domain

- Detectability varies due to whale behavior
 - Lower for migrating whales (less time on surface)
 - Lower in poor weather conditions

Models based on right whale distribution on primary wintering grounds, not migratory corridor

- Residency data suggests steady movements of right whales throughout the mid-Atlantic each winter

Uncertainty in Spatial Distribution of Whales

Model averages across years with relatively low and years with relatively high sighting frequency

- Unlikely this averaging would have a substantial impact upon the projected relative risk

Modelling approach implicitly assumes that right whale entanglement rates do not vary by gender, size, space or time

- Certain behaviors or size classes of whales in certain locations at certain times might be more inherently vulnerable to entanglement than others

Trap gear soak times are not time-dynamic

- Comparisons are relative, mitigating most impacts
- Shorter winter soak times could lower relative risk for Alternatives with quota closures later than Alt 2

Effort Shifting?

Few areas remaining open have been fished for black sea bass

Most areas remaining open have not been fished Nov-Apr for 5+ yrs

Difficult to determine:

1. How much effort might shift to open areas
2. Which open areas would receive new effort
3. Whether fishing opportunities exist in areas beyond closure
4. What catch rates might be in those areas

Substantial effort shifting unlikely:

- ACL projected to be reached
- Fuel costs to get 10-60 miles offshore may be disincentive under a 1000-lb trip limit, although trips will likely occur

If Effort Shifting Happens

1. Catch rates underestimated
2. Closures sooner than projected
3. Increased relative whale risk in open areas
4. Overall entanglement risk might go up or down
 - Increased risk in open areas vs. earlier closure date
 - Most applicable Nov-Dec
 - Alt 4 off Charleston
 - Alt 3/4/6/8 off Daytona Beach

