

U. S. DEPARTMENT OF COMMERCE  
National Oceanographic and Atmospheric Administration  
National Marine Fisheries Service  
Southeast Fisheries Science Center  
3500 Delwood Beach Road  
Panama City, FL 32408

Examination of Proposed MPAs in the U.S. South Atlantic

**NOAA Ship Delaware II Cruise 04-07**

**Introduction**

The NOAA Ship Delaware II departed Morehead City, NC on April 16, 2004 for a research cruise examining five of the proposed Marine Protected Areas in the U.S. South Atlantic between Cape Hatteras, NC and Jacksonville, FL. The cruise was divided into two legs with a port call in Charleston, SC on April 16-17, 2004. The Delaware II returned to Morehead City for demobilization on May 7, 2004.

**Prioritized Objectives**

1. ROV visual survey of benthic habitats within and adjacent to proposed MPA sites with emphasis on discerning abundance and distribution of snowy grouper (*Epinephelus niveatus*), yellowedge grouper (*E. flavolimbatus*), warsaw grouper (*E. nigritus*), speckled hind (*E. drummondhayi*), misty grouper (*E. mystacinus*), tilefish (*Lopholatilus chamaeleonticeps*), and blueline tilefish (*Caulolatilus microps*).
2. Stationary video surveys of targeted reef fish inside and outside proposed MPA sites following a targeted sampling design based upon ROV surveys.
3. Conduct linear bathymetric survey of proposed MPA sites.
4. Chevron trap collection of targeted reef fish species for ageing and reproductive analysis.
5. Neuston net collection of ichthyoplankton associated with proposed MPA sites.
6. Otter trawl collections of reef and demersal fish associated with proposed MPA sites.

**Methods**

High resolution bathymetric maps do not exist for the majority of the five, natural hardbottom, proposed MPAs between Cape Hatteras, NC and Jacksonville, FL. Therefore dive site selection was based upon local knowledge acquired during previous scientific cruises and split beam acoustic bathymetry acquired during this cruise. The proposed MPAs are designed to protect deep reef grouper and tilefish, which are structure-oriented fish, thus known and suspected hardbottom and reef sites were the primary targets. Efforts were made to collect data from within each option of each proposed MPA (Figures 1 - 5). A Phantom S-2 ROV, owned and operated by the National Undersea Research Center at Wilmington, NC, was the primary gear type used on this cruise. The ROV provided continuous video data as well as high-resolution digital still images of fish and habitat within the study areas. The stationary video camera

array comprised 4 Sony VX2000 DCR digital camcorders in Gates underwater housings mounted orthogonally at a height of 30 cm above the bottom. The camera array was allowed to soak on the bottom for 30 minutes before recovery. A Seabird SBE39 temperature/depth recorder was also mounted on the ROV and within the camera array to provide *in situ* measurements of temperature. The chevron fish trap was patterned after the standard MARMAP design and measured 1.83 x 1.83 x 0.75 meters with 3.81-cm mesh. The fish trap was baited with mackerel and soaked for 90 minutes. The neuston net measured 3.20 x 3.20 m with 3.18 mm mesh and was towed at the surface at a ship speed of 2.0 kts. The otter trawl had a headrope of 5.18 m, a bag length of 15.40 m, a mesh size of 3.81 cm in the cod end and was towed at a ship speed of 2.0 kts. In addition to the MPA work, pelagic longlining was conducted on this cruise. Longlining operations were conducted during nighttime hours while the MPA work was conducted during daytime hours.

## Results

A total of 68 stations were surveyed during this cruise. Fifty five of these stations pertained to the MPA aspect of the research, and of those 31 were ROV dives, 11 were stationary video camera deployments, 9 were chevron fish trap deployments, 2 were otter trawls and 2 were neuston net tows (Table 1 and Figures 1 - 5). Four of the seven targeted reef fish were observed; snowy grouper (*Epinephelus niveatus*), yellowedge grouper (*E. flavolimbatus*), speckled hind (*E. drummondhayi*), and blueline tilefish (*Caulolatilus microps*). Hardbottom / reef habitat was observed in each of the five proposed MPAs visited. Lionfish (*Pterois volitans*) were observed in all proposed MPA sites. This invasive species, native to the western Pacific and Indian Oceans, had the highest density off Georgia, although there was no statistically significant difference in density across sites. Reef fish were captured in 5 of the 9 trap sets, and consisted of scamp (*Mycteroperca phenax*), vermilion snapper (*Rhomboplites aurorubens*), red porgy (*Pagrus pagrus*), gray triggerfish (*Balistes capriscus*), and knobbed porgy (*Calamus nodosus*) (Table 2). Otoliths were removed from these specimens and sent to the NMFS Panama City Laboratory for age determination. Video tapes were returned to the NMFS Panama City Laboratory for viewing. Data from the SBE39 temperature/depth recorder was recorded at all video sites.

## Cruise Participants

Leg 1: 4/16/04 - 4/26/04 (ten sea days)

<u>Name</u>	<u>Role</u>	<u>Organization</u>
Mark Grace (Chief Scientist)	Field Party Chief (Sharks)	NMFS Pascagoula, MS
Andrew David	Field Party Chief (MPA)	NMFS Panama City, FL
Lance Horn	ROV Pilot	NURC/UNCW
Stacey Harter	MPA	NMFS Panama City, FL
Chris Palmer	MPA	NMFS Panama City, FL
Marta Ribera	GIS/MPA	NMFS Panama City, FL
Andrea Quattrini	MPA	UNCW
Dean Landi	Sharks	NMFS Pascagoula, MS
John Carlson	Sharks	NMFS Panama City, FL

Dana Bethea	Sharks	NMFS Panama City, FL
Brian Gervalis	Sharks	U. of Rhode Island

Leg 2: 4/27/04 - 5/7/04 (ten sea days)

<u>Name</u>	<u>Role</u>	<u>Organization</u>
Mark Grace (Chief Scientist)	Field Party Chief (Sharks)	NMFS Pascagoula, MS
Stacey Harter	Field Party Chief (MPA)	NMFS Panama City, FL
Marta Ribera	GIS/MPA	NMFS Panama City, FL
Lance Horn	ROV Pilot	NURC/UNCW
Tom Potts	ROV Technician/MPA	NURC/UNCW
Jeff Taylor	MPA	NMFS Panama City, FL
Michelle Satterwhite	MPA/Sharks	NMFS Panama City, FL
John Brusher	MPA	NMFS Panama City, FL
Ivy Baremore	Sharks	NMFS Panama City, FL
Dana Bethea	Sharks	NMFS Panama City, FL
Karen Mitchell	Sharks	NMFS Pascagoula, MS
Walter Ingram	Sharks	NMFS Pascagoula, MS

Note: This document has been reviewed for quality, objectivity, utility, and integrity of information as required by the Data Quality Act.

Submitted by:

Approved by:

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Andrew W. David, Field Party Chief - MPA  
Panama City Laboratory

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Dr. Pete Sheridan, Director  
Panama City Laboratory

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Dr. Nancy Thompson, Director  
Southeast Fisheries Science Center

Table 1. Stations sampled during Delaware II cruise 04-07.

Station	Date	MPA	Option	Gear	Start Latitude (N)	Start Longitude (W)	End Latitude (N)	End Longitude (W)	Start Depth (m)	End Depth (m)
1	4/17/2004	NC	1	ROV	33E 30.2877	76E 56.7169	33E 30.0201	76E 57.1628	77.2	74.2
2	4/17/2004	NC	1	ROV	33E 24.8499	77E 04.5438	33E 24.6931	77E 04.6875	93.3	98.0
3	4/17/2004	NC	1	ROV	33E 24.9161	77E 04.5721	33E 25.2653	77E 04.9283	57.9	N/A
4	4/17/2004	NC	N/A	Longline	N/A	N/A	N/A	N/A	N/A	N/A
5	4/18/2004	NC	1	ROV	33E 25.8401	77E 02.2430	33E 26.3129	77E 01.6159	117.6	72.4
6	4/18/2004	NC	1	4 Camera	33E 24.8458	77E 04.2105	33E 25.2786	77E 03.7047	105.5	92.4
7	4/18/2004	NC	1	Fish Trap	33E 25.8657	77E 02.0247	33E 26.0541	77E 01.8961	105.3	96.6
8	4/18/2004	NC	1	Otter Trawl	33E 25.3894	77E 02.2343	33E 24.7758	77E 03.0638	122.8	126.8
9	4/18/2004	NC	1&2	ROV	33E 28.8185	76E 52.2913	33E 29.0380	76E 52.1489	191.2	189.1
10	4/18/2004	NC	N/A	Longline	N/A	N/A	N/A	N/A	N/A	N/A
11	4/19/2004	NC	1&2	ROV	33E 22.0821	77E 00.4733	33E 22.4059	77E 00.4321	191.0	186.4
12	4/19/2004	NC	1&2	Fish Trap	33E 23.4251	77E 01.1458	33E 23.5126	77E 01.1925	163.2	161.8
13	4/19/2002	NC	1&2	Otter Trawl	33E 23.4025	76E 59.1788	33E 22.5110	76E 59.7386	188.9	195.2
14	4/19/2002	NC	N/A	Longline	N/A	N/A	N/A	N/A	N/A	N/A
15	4/20/2004	NC	1&2	ROV	33E 23.5645	77E 02.7164	33E 23.8932	77E 01.9125	145.1	149.6
16	4/20/2004	outside NC	N/A	ROV	33E 21.6257	77E 08.8019	33E 21.401	77E 10.550	90.4	74.3
17	4/21/2004	SC A	2	ROV	32E 50.013	78E 14.562	32E 50.401	78E 14.304	110.5	109.2
18	4/21/2004	SC A	2	ROV	32E 48.446	78E 05.517	32E 49.108	78E 05.105	160.0	158.8
19	4/21/2004	SC A	2	ROV	32E 50.601	78E 15.589	32E 51.147	78E 15.579	53.9	48.8
20	4/21/2004	SC	N/A	Longline	N/A	N/A	N/A	N/A	N/A	N/A
21	4/22/2004	SC A	2	Fish Trap	32E 51.00	78E 15.63	32E 51.00	78E 15.36	46.2	52.0
22	4/22/2004	SC A	2	4 Camera	32E 50.91	78E 15.53	32E 51.03	78E 15.27	47.6	54.0
23	4/22/2004	SC A	1	ROV	33E 04.980	77E 51.755	33E 05.443	77E 51.065	57.4	58.3
24	4/22/2004	SC A	1	ROV	33E 08.029	77E 48.204	33E 08.275	77E 47.867	49.7	48.8
25	4/22/2004	SC A	1	Fish Trap	33E 08.18	77E 47.94	N/A	N/A	48.5	N/A
26	4/22/2004	SC		Longline	N/A	N/A	N/A	N/A	N/A	N/A
27	4/23/2004	SC A	1	4 Camera	33E 08.1868	77E 47.8401	33E 08.3765	77E 47.5265	48.7	48.6

Table 1 (continued). Stations sampled during Delaware II cruise 04-07.

Station	Date	MPA	Option	Gear	Start Latitude (N)	Start Longitude (W)	End Latitude (N)	End Longitude (W)	Start Depth (m)	End Depth (m)
28	4/23/2004	outside SC	N/A	Neuston	32E 50.5262	78E 18.2914	N/A	N/A	45.0	N/A
29	4/23/2004	outside SC	N/A	Neuston	32E 50.1559	78E 18.1752	N/A	N/A	45.0	N/A
30	4/23/2004	SC	N/A	Longline	N/A	N/A	N/A	N/A	N/A	N/A
31	4/24/2004	SC B	1	ROV	32E 24.0987	79E 00.4171	32E 24.1628	78E 59.7466	48.2	58.9
32	4/24/2004	SC B	1	ROV	32E 22.2473	79E 01.1655	32E 22.0347	79E 00.6262	60.4	64.8
33	4/24/2004	SC B	1	4 Camera	32E 22.0953	79E 00.8990	32E 22.0367	79E 00.8730	60.0	61.5
34	4/24/2004	SC	N/A	Longline	N/A	N/A	N/A	N/A	N/A	N/A
35	4/25/2004	SC B	1	ROV	32E 22.0750	79E 00.8446	32E 22.2517	79E 01.0020	62.0	60.3
36	4/25/2004	SC B	1	ROV	32E 21.8834	79E 03.0867	32E 22.0601	79E 03.1389	54.3	52.8
37	4/25/2004	SC B	1	4 Camera	32E 22.1711	79E 00.8752	32E 22.0692	79E 00.8231	58.9	62.4
38	4/28/2004	GA	2	ROV	31E 37.5299	79E 40.0465	31E 37.0524	79E 40.1733	67.6	68.6
39	4/28/2004	outside GA	2	ROV	31E 38.5947	79E 39.6597	31E 38.0546	79E 39.9385	67.6	67.4
40	4/28/2004	outside GA	2	Fish Trap	31E 38.0714	79E 39.8204	31E 38.2269	79E 39.6405	69.4	66.2
41	4/28/2004	outside GA	2	4 Camera	31E 38.3361	79E 39.7989	31 E38.5580	79E 39.9307	66.8	67.4
42	4/29/2004	GA	2	ROV	31E 36.1374	79E 40.4485	31E 36.9337	79E 40.3738	71.3	67.6
43	4/29/2004	outside GA	2	ROV	31E 31.6608	79E 44.5930	31E 32.0872	79E 44.6786	61.7	59.6
44	4/29/2004	outside GA	2	ROV	31E 31.3200	79E 43.9879	31E 32.4887	79E 44.0286	69.7	60.4
45	4/29/2004	outside GA	2	4 Camera	31E 32.2814	79E 43.9755	31E 32.9263	79E 43.7100	60.0	64.4
46	4/29/2004	outside GA	2	Fish Trap	31E 32.1976	79E 44.0094	31E 32.5455	79E 43.7300	63.6	N/A
47	4/29/2004	GA	N/A	Longline	N/A	N/A	N/A	N/A	N/A	N/A
48	4/30/2004	outside GA	1	Camera	31E 40.6479	79E 37.5842	31E 40.9268	79E 37.5407	67.2	70.0
49	4/30/2004	GA	2	Fish Trap	31E 36.4260	79E 40.3702	31E 36.6276	79E 40.5345	68.1	66.9
50	4/30/2004	GA/FL	N/A	Longline	N/A	N/A	N/A	N/A	N/A	N/A
51	5/1/2004	FL	1	ROV	30E 22.7173	80E 13.5796	30E 23.3402	80E 13.8130	54.4	49.6
52	5/1/2004	FL	1	Camera	30E 22.8188	80E 13.4807	30E 23.0102	80E 13.4990	55.3	54.6
53	5/1/2004	FL	1	ROV	32E 26.8603	80E 14.5157	30E 27.6162	80E 14.7821	47.0	47.3
54	5/1/2004	FL	N/A	Longline	N/A	N/A	N/A	N/A	N/A	N/A

Table 1 (continued). Stations sampled during Delaware II cruise 04-07.

Station	Date	MPA	Option	Gear	Start Latitude (N)	Start Longitude (W)	End Latitude (N)	End Longitude (W)	Start Depth (m)	End Depth (m)
55	5/2/2004	FL	1	ROV	30E 22.1112	80E 13.3823	30E 22.8012	80E 13.1104	58.7	61.9
56	5/2/2004	FL	1	Fish Trap	30E 22.6301	80E 13.1694	30E 22.9060	80E 13.1699	54.9	56.1
57	5/2/2004	FL	1	Camera	30E 22.4843	80E 13.1854	30E 22.6794	80E 13.2806	56.5	56.9
58	5/2/2004	FL	N/A	Longline	N/A	N/A	N/A	N/A	N/A	N/A
59	5/3/2004	FL	2	ROV	30E 01.0674	80E 16.2195	30E 02.0327	80E 16.7308	68.7	54.5
60	5/3/2004	FL	N/A	Longline	N/A	N/A	N/A	N/A	N/A	N/A
61	5/4/2004	FL	2	Fish Trap	30E 01.6021	80E 16.7770	30E 01.7625	80E 16.6049	53.7	64.6
62	5/4/2004	outside FL	2	ROV	30E 05.1434	80E 20.0999	30E 04.4239	80E 19.6870	45.2	44.6
63	5/4/2004	FL	2	ROV	29E 57.1629	80E 20.1938	29E 56.7667	80E 20.2272	46.1	46.3
64	5/5/2004	FL	2	ROV	29E 55.2088	80E 17.2092	29E 57.7321	80E 17.0050	57.8	60.9
65	5/5/2004	FL	2	Camera	29E 55.9687	80E 17.0792	29E 55.9624	80E 17.0444	55.2	64.0
66	5/5/2004	FL/GA	N/A	Longline	N/A	N/A	N/A	N/A	N/A	N/A
67	5/6/2004	outside SC	N/A	ROV	32E 41.6922	78E 09.1187	32E 42.2655	78E 09.2171	190.8	187.3
68	5/6/2004	outside SC	N/A	ROV	32E 46.7983	78E 10.0351	32E 47.3424	78E 09.5956	157.6	166.7

Table 2. Fish captured in the Chevron trap during Delaware II cruise 04-07.

Station	MPA	Species	SL (mm)	FL (mm)	TL (mm)	Weight (g)		
7	North Carolina - Option 1	<i>Pagrus pagrus</i>	346	380	431	N/A		
21	South Carolina A - Option 2	<i>Calamus nodosus</i>	348	376	434	N/A		
40	outside Georgia - Option 2	<i>Pagrus pagrus</i>	235	260	300	N/A		
		<i>Pagrus pagrus</i>	250	278	322	N/A		
		<i>Pagrus pagrus</i>	232	258	302	N/A		
		<i>Pagrus pagrus</i>	275	310	360	N/A		
		<i>Pagrus pagrus</i>	235	265	309	N/A		
		<i>Pagrus pagrus</i>	214	240	278	N/A		
		<i>Pagrus pagrus</i>	210	237	276	N/A		
		<i>Pagrus pagrus</i>	245	275	320	N/A		
		<i>Pagrus pagrus</i>	257	292	335	N/A		
		<i>Pagrus pagrus</i>	234	265	305	N/A		
		<i>Pagrus pagrus</i>	170	195	226	N/A		
		<i>Pagrus pagrus</i>	220	244	289	N/A		
		<i>Pagrus pagrus</i>	226	255	297	N/A		
		<i>Pagrus pagrus</i>	223	250	292	N/A		
		<i>Pagrus pagrus</i>	238	266	297	N/A		
				<i>Rhomboplites aurorubens</i>	277	320	354	N/A
		46	outside Georgia - Option 2	<i>Pagrus pagrus</i>	235	283	330	N/A
<i>Pagrus pagrus</i>	270			313	358	N/A		
<i>Pagrus pagrus</i>	294			345	400	N/A		
<i>Pagrus pagrus</i>	297			345	405	N/A		
<i>Pagrus pagrus</i>	292			342	394	N/A		
<i>Pagrus pagrus</i>	309			361	412	N/A		
<i>Pagrus pagrus</i>	275			321	368	N/A		
<i>Pagrus pagrus</i>	268			313	365	N/A		
<i>Pagrus pagrus</i>	286			335	380	N/A		
<i>Pagrus pagrus</i>	273			320	370	N/A		
<i>Pagrus pagrus</i>	273			317	371	N/A		
<i>Pagrus pagrus</i>	277			327	371	N/A		
<i>Pagrus pagrus</i>	235			275	320	N/A		
<i>Pagrus pagrus</i>	235			280	324	N/A		
<i>Pagrus pagrus</i>	304			356	412	N/A		
<i>Pagrus pagrus</i>	294			342	395	N/A		
<i>Pagrus pagrus</i>	315			372	428	N/A		
<i>Pagrus pagrus</i>	288			334	379	N/A		
<i>Pagrus pagrus</i>	260			308	350	N/A		
<i>Pagrus pagrus</i>	240			285	333	N/A		
<i>Pagrus pagrus</i>	299			350	400	N/A		
<i>Pagrus pagrus</i>	267			310	357	N/A		
<i>Pagrus pagrus</i>	248			288	336	N/A		
		<i>Balistes capriscus</i>	324	395	466	N/A		
		<i>Balistes capriscus</i>	290	358	384	N/A		
		<i>Balistes capriscus</i>	335	409	443	N/A		
49	Georgia - Option 2	<i>Pagrus pagrus</i>	278	316	355	N/A		
		<i>Pagrus pagrus</i>	266	309	353	N/A		

Table 2 (continued). Fish captured in the Chevron trap during Delaware II cruise 04-07.

Station	MPA	Species	SL (mm)	FL (mm)	TL (mm)	Weight (g)
49	Georgia – Option 2	<i>Pagrus pagrus</i>	275	316	361	N/A
		<i>Mycteroperca phenax</i>	345	428	455	2.25
		<i>Mycteroperca phenax</i>	394	480	525	3.00
		<i>Mycteroperca phenax</i>	450	534	590	5.00
		<i>Mycteroperca phenax</i>	495	614	687	6.75



Figure 1. Proposed Snowy Wreck (North Carolina) MPA

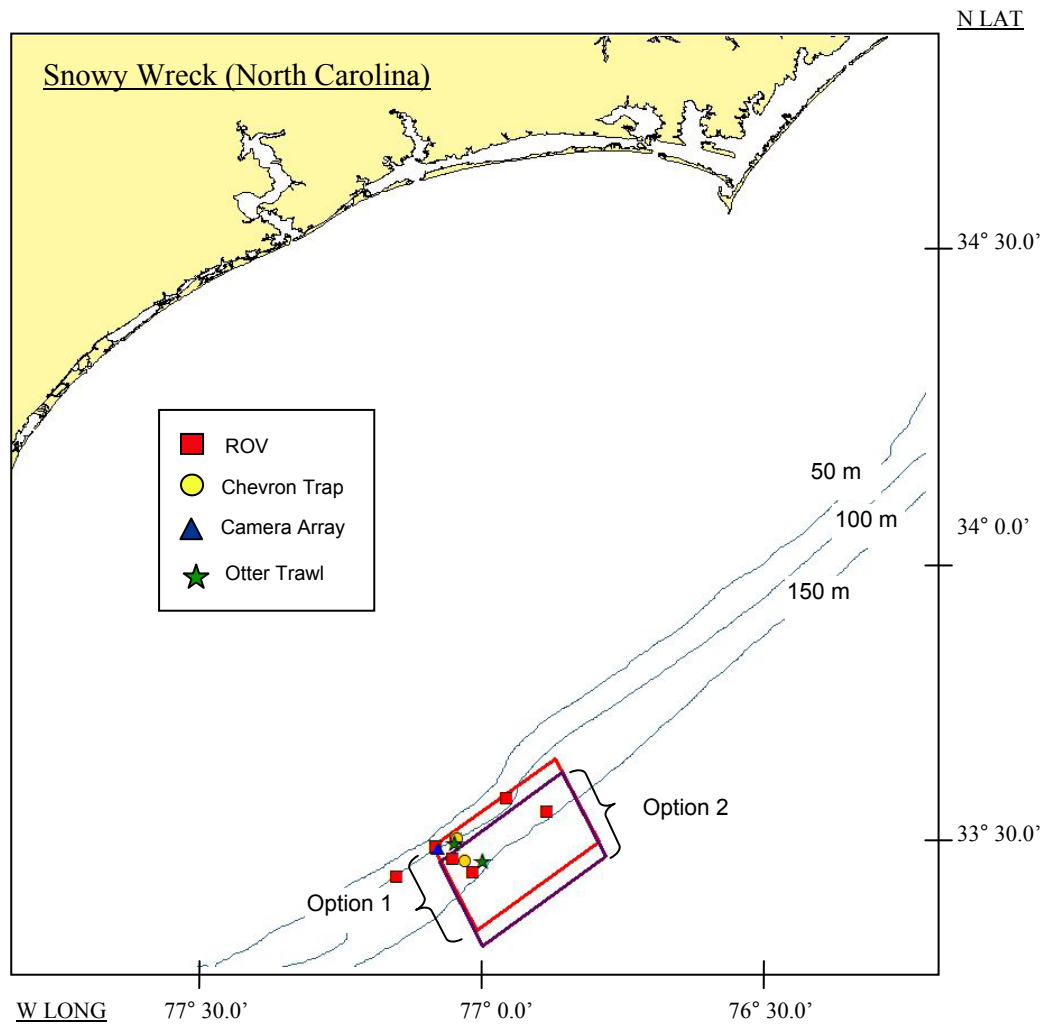


Figure 2. Proposed South Carolina "A" MPA

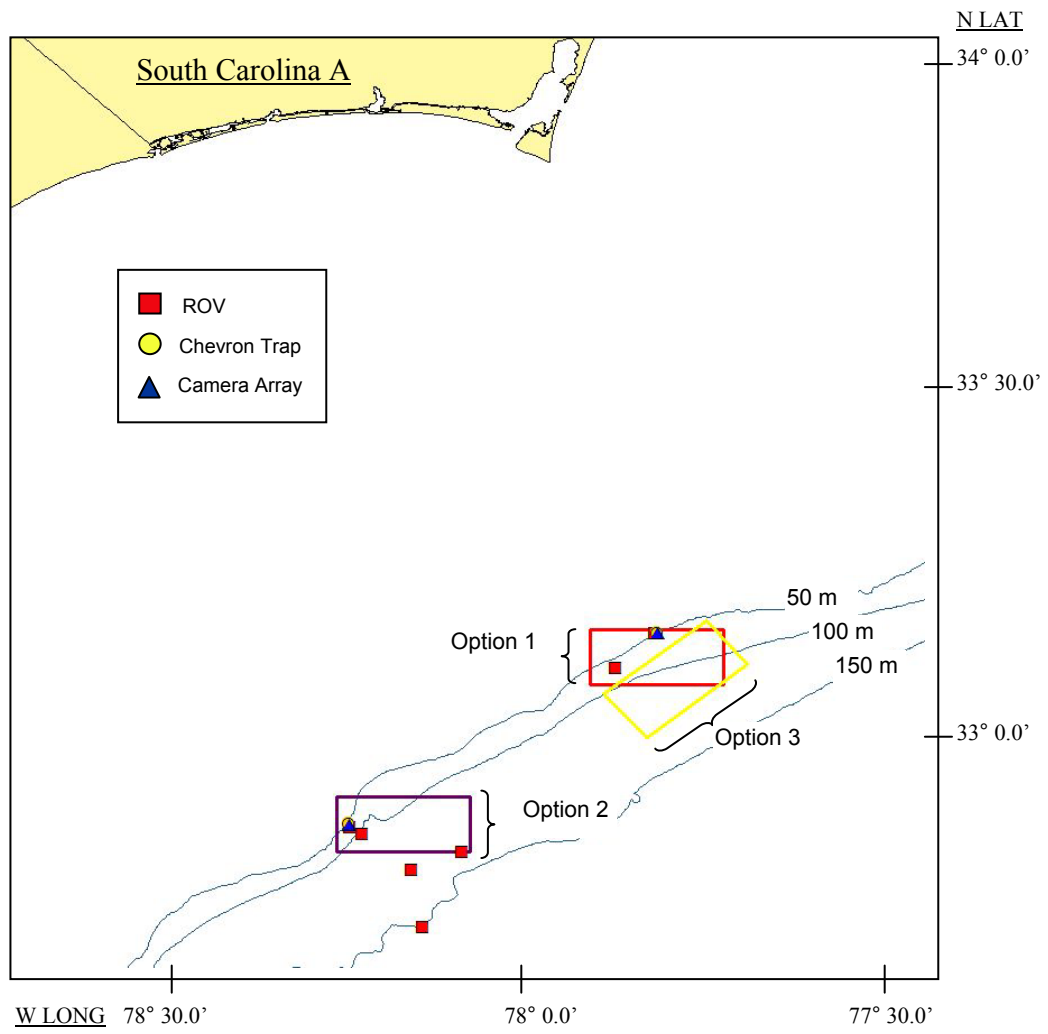


Figure 3. Proposed South Carolina “B” MPA

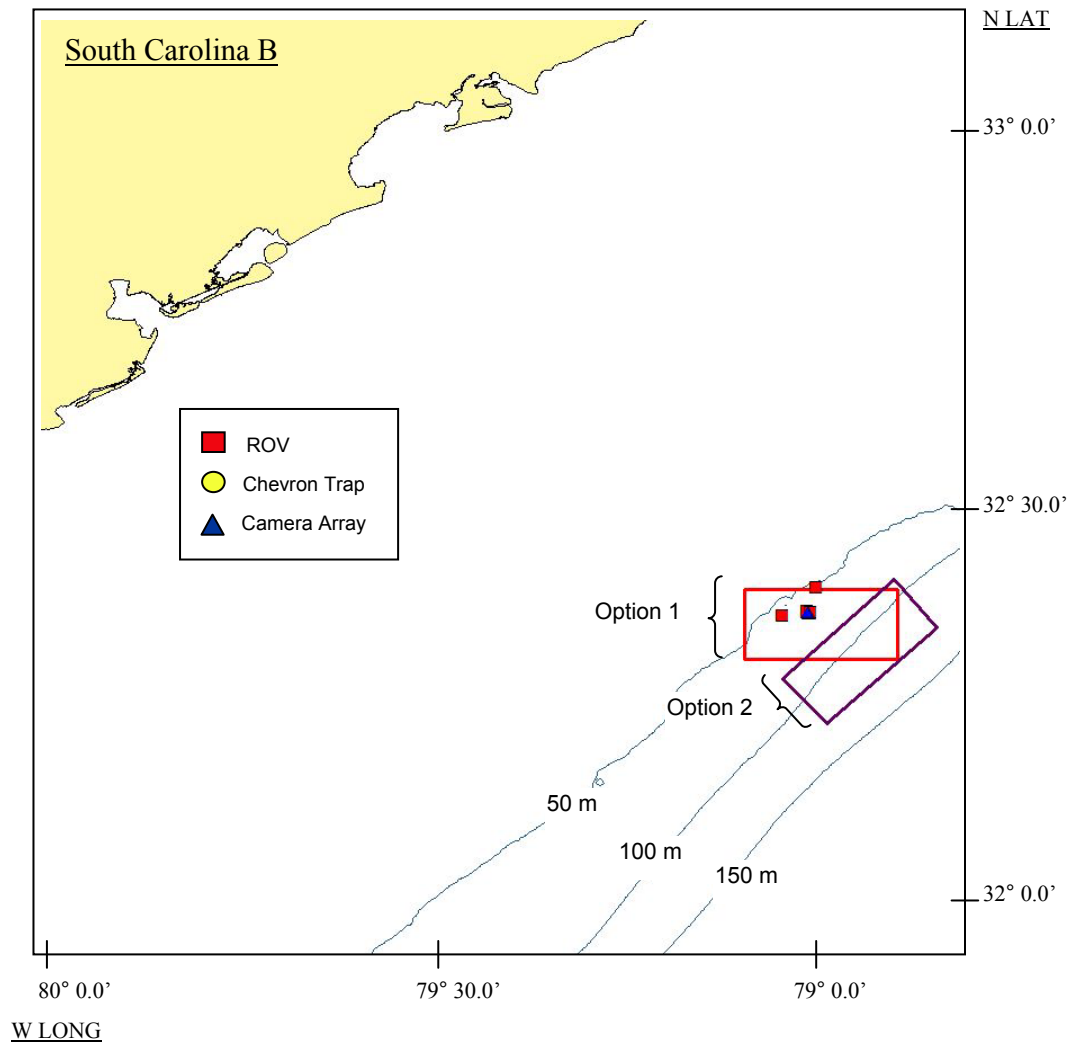


Figure 4. Proposed Georgia MPA

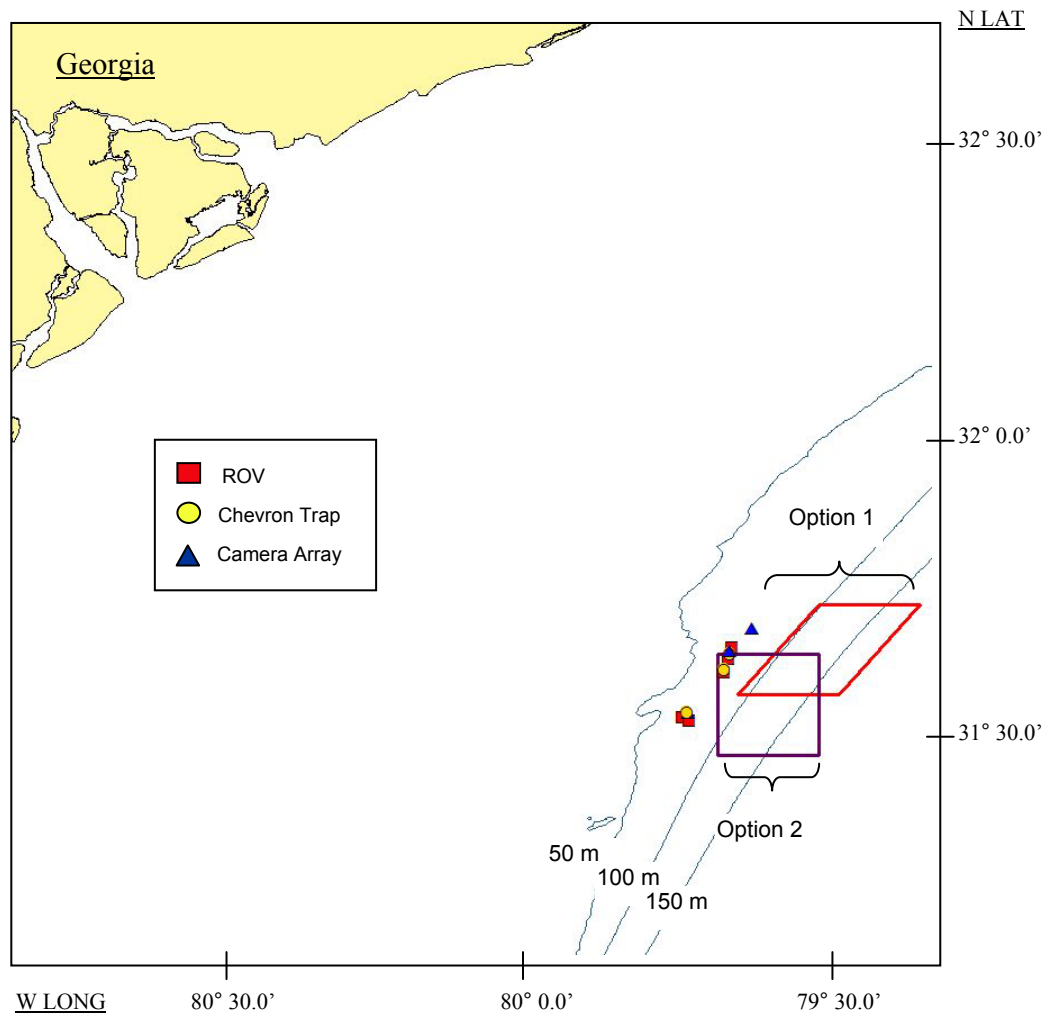


Figure 5. Proposed North Florida MPA

