

Trip report: Marine Reserves and the Spillover Effect: Seascape scale movement of grouper and snapper.

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Trip Dates: 10/7-10/19 2005

Participants:

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The overall goal of this project is to understand fish movement on multiple spatial and temporal scales as it related to the design of marine protected areas. IN October and November, 2004 a total of 11 Nassau grouper were captured in the Southern 1/3 of the Exuma Cays Land and Sea Park (ECLSP) and acoustic transmitters (Vemco V-8 and V-13 transmitters) were implanted into their body cavity. At the same time, a total of 19 acoustic receivers were deployed across the shelf edge at different distances from the southern boundary of the ECLSP (10, 5 and 1 km inside the park and 0, 2.5 and 5 km outside the park). In June 2005, the acoustic receivers were retrieved, their archived data downloaded and then redeployed. Data from June 2005 indicated that of the 11 fish tagged, the majority of the fish remained within the area in which they were initially captured and released, but 3 of the larger fish (>50 cm) migrated out of the park along the shelf edge on the same day in December, 2004 and returned to the park along the shelf edge within 24 hours of each other 2 weeks later. This movement corresponded with the December full moon, thus it was assumed to be movement associated with annual spawning migrations. Details of these findings can be found in previous reports.

During the current trip our primary objectives were to follow up on this previous research by (1) recovering and downloading all acoustic receivers to determine whether there was any further fish movement detected; (2) deploy acoustic receivers following a new sampling design, described below; and (3) implant acoustic tags in several more fish within the Exuma Park and in the Lee Stocking Island area.

All receivers that were redeployed in June 2005 were recovered and their data downloaded. Only 3 fish were detected by receivers since June 2005 and all three were detected by the receiver closes to thei location where they were initially captured and released, suggesting that, like most of the previous year, movement was local.

Following the data download, all receivers recovered from the field and new receivers (28 total) were deployed within 300 m of the shelf edge (marked by a sharp drop off to depths >150 m) of the western margin of Exuma Sound, from the area near Sail Rocks in

the north of Exuma Sound to the area between Long Island and Little Exuma in the south of Exuma Sound. Receivers were deployed at approximately 10 km intervals. An additional 2 receivers were placed across the shelf at the southern boundary of the ECLSP to improve our ability to detect movement of fish from the ECLSP. This sampling design will allow us to better track the movement of fish migrating to and from spawning aggregations and determine the extent to which fish move in the Exuma Sound system and whether there is spillover from the ECLSP. Table 1 shows the location of receivers deployed on this research trip.

During this trip, we also implanted acoustic transmitters in a total of 15 Nassau grouper and 1 mutton snapper (Table 2) and tagged them with externally visible tags. One Nassau grouper tagged (first listed in Table 2) was captured immediately South of the southern boundary of the ECLSP. Six Nassau grouper and the mutton snapper were captured within the ECLSP (the next 7 fish listed in Table 2), and the remaining Nassau grouper were caught in the Lee Stocking Island and Great Exuma area. Most fish were captured near receiver deployment sites so that their presence/absence may be noted throughout the year. For fish caught at inshore sites such as the Malobar Cays and Conch Cut in the Exuma Park, an additional receiver was deployed at each site to detect their presence/absence.

These receivers will be recovered and their data downloaded between May and July 2006. During the summer of 2006, we plan to continue this research expanding our receiver deployments and increase the number of fish with transmitters. Thus, we will better be able to detect movement patterns as a function of fish size, fish home range location and time of year.

Table 1. Location of acoustic telemetry receivers deployed in October, 2005.

Date	Receiver	Location	Latitude	Longitude
10/7/2005	5820	Steventon, Exuma	23.659	75.928
10/7/2005	5821	Duck Cay, Exuma	23.595	75.848
10/7/2005	5475	Stocking Island, Exuma	23.549	75.763
10/7/2005	5478	Man O' War Cay, Exuma	23.503	75.679
10/8/2005	5822	Black Rocks, Exuma	23.500	75.577
10/8/2005	5476	Between Exuma & Long Island	23.524	75.486
10/8/2005	5472	Between Exuma & Long Island	23.580	75.407
10/9/2005	5477	Cambridge Cay, ECLSP	24.298	76.520
10/10/2005	5823	Compass Cay Offshore	24.291	76.506
10/10/2005	5824	Compass Cay Middle	24.289	76.510
10/10/2005	5471	Compass Cay Nearshore	24.287	76.514
10/10/2005	5286	O'Brien Cay, ECLSP	24.330	76.539
10/10/2005	5473	South of Compass Cay	24.257	76.477
10/10/2005	5819	Warderick Wells Cay	24.402	76.599
10/12/2005	5287	West of Danger Reef (~1km) ECLSP	24.429	76.684
10/12/2005	5284	Hawksbill Cay, ECLSP	24.300	76.737
10/12/2005	5285	Wax Cay	24.585	76.782
10/12/2005	4575	Long Cay	24.672	76.801
10/12/2005	5286	Allan's Cay	24.760	76.813
10/12/2005	4574	Ship Channel Cay	24.841	76.792
10/12/2005	5474	South Sail Rocks	24.914	76.792
10/12/2005	5825	Sail Rocks	24.952	76.703
10/13/2005	3028	Malobar Cays, ECLSP	24.366	76.635
10/13/2005	3023	Conch Cut Reef, ECLSP	24.286	76.543
10/13/2005	3027	Staniel Cay	24.190	76.433
10/13/2005	3025	Black Point	24.113	76.388
10/13/2005	2307	Great Guana Cay	24.031	76.348
10/13/2005	2301	Farmer's Cay	23.962	76.298
10/13/2005	2304	Rudder Cut Cay	23.881	76.222
10/16/2005	2302	3 Sister's rocks, Rolleville, Exuma	23 43.3	75 59.8
10/19/2005	3024	Bock Wall, Bock Cay	23 49.9	76 09.2
10/19/2005	3026	BA, Lee Stocking Island	23 46.8	76 05.0

NOTE: Coordinates in highlighted yellow are in degrees and minutes. All other coordinates are in degrees only.

Table 2. Fish tagged with acoustic transmitters, October 2005.

Date	Time	Location	Lat	Lon	Species	Size (cm)	Vemco	Floy
10/10/2005	11:24	South of ECLSP southern boundary	24.287	76.514	Nassau grouper	40.5	4549F (V8)	R-0518
10/10/2005	13:45	Conch cut	24.286	76.543	Nassau grouper	35.5	3358C	R-0517
10/11/2005		Jeep reef	24.350	76.589	Mutton snapper	46	5181F	R-0519
10/12/2005	9:16	Danger Reef	24.426	76.676	Nassau grouper	63	5184F	R-0552
10/13/2005	9:27	Malobar	24.366	76.634	Nassau grouper	71	5183F	R-0818
10/13/2005	9:27	Malobar	24.366	76.634	Nassau grouper	53.5	4536F	R-0867
10/13/2005	9:27	Malobar	24.366	76.634	Nassau grouper	63	5182F	R-0858
10/13/2005	12:50	Cambridge Cay	24.298	76.520	Nassau grouper	63	5179F	R-0523
10/16/2005	16:00	Exuma 3 sisters (offshore)	23 43.29	76 59.80	Nassau grouper	59	7283	R-0871
10/16/2005	16:10	Exuma 3 sisters (offshore)	23 43.29	76 59.80	Nassau grouper	39.5	7284	R-0853
10/16/2005	13:00	Exuma 3 sisters (offshore)	23 43.29	76 59.80	Nassau grouper	49.5	7278	R-0572
10/16/2005	13:00	Exuma 3 sisters (offshore)	23 43.29	76 59.80	Nassau grouper	52.5	7287	R-0563
10/17/2005	16:53	Exuma 3 sisters (inshore)	23 43.04	75 59.86	Nassau grouper	51	7275	N/A
10/17/2005	16:53	Exuma 3 sisters (inshore)	23 43.04	75 59.86	Nassau grouper	36	3361	N/A
10/18/2005	9:30	LSI - White Horse	23 48.29	76 07.32	Nassau grouper	43.2	5175	R-0564
10/18/2005	14:10	Exuma 3 sisters (mid shelf)	23 42.21	75 59.86	Nassau grouper	40	4541	R-0506

NOTE: coordinates highlighted in yellow are in degrees and minutes. All other coordinates are in degrees only.