Final Report Summary

For the Commercial Fisheries Research Foundation
Southern New England Collaborative Research Initiative

# Project Title : "Is Cape Cod a Natural Delineation for Migratory Patterns in US and Canadian Spiny Dogfish Stocks?"

NOAA Prime - #NA09NMF4720414
CFDA # 11.472

Period of project: September 1, 2010 – December 31, 2012

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**Commercial Fisheries Research Foundation**
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**Total amount of sub-award -** $187,803.09

**List of equipment purchased –** No equipment purchased.

**Summary of tasks scheduled**

The project team planned to tag and release spiny dogfish with external and internal acoustic tags both North and South of Cape Cod in order to estimate intermixing rate between these two hypothetical populations. The target numbers were 8,000 sharks with external tags (4,000 in the North and 4,000 in the South) and 120 sharks with acoustic tags (60 in the North and 60 in the South). In order to detect movement ranges of sharks equipped with acoustic tags along the Northwest Atlantic coast, an acoustic array of 12 receivers was deployed off Cape Hatteras, NC in a line perpendicular to shore up to 12 miles offshore. In addition, acoustic detections from tagged sharks were recorded by similar acoustic arrays deployed between Gulf of Maine and Virginia by members of the Atlantic Cooperative Telemetry (ACT) network, which constitutes an extensive and effective data-sharing network. Recapture data of external tags were collected from commercial and recreational fishermen who found tagged dogfish in their catch. Over the period between the first tag-and-release sampling and the project ending, the project team worked at the creation of maps of shark distribution based on external and internal tags, respectively.

The planned sampling was divided into 3 different seasons: fall, spring and summer. During samplings, along with the aforementioned tag and released activity, fishing (longline or gillnet, and time of the day) and catch characteristics (total number of sharks by sex) of each set, and associated environmental water parameters (e.g. temperature, depth, salinity) were recorded. These data were analyzed to characterize changes in sex ratio and size of spiny dogfish captures through a typical commercial fishing day and by season, and to assess the influence of environmental water parameters for these changes to occur.

**Summary of tasks accomplished**

A total of 89 sets (71 by gillnet and 18 by longline) were conducted in the study area, with 54 sets in the North and 35 in the South. During the sampling period, a total of 7,745 spiny dogfish were tagged and released with external tags, and 120 spiny dogfish were tagged and released with internal acoustic tags after receiving surgeries. All sharks receiving surgeries recovered and were released alive in the water.

The project team collected recapture information from 90 different sharks (3 males and 87 females) tagged with external tags, and from 58 sharks (12 males and 46 females) tagged with

internal acoustic tags. These recapture/redetections data were mapped and used to estimate the intermixing rate between North and South populations.

A total of 59 sets conducted at different seasons and with both gears (42 by gillnet and 17 by longline) were used for the analysis of sex ratio changes, with 39 sets in the North and 20 in the South areas.

**Explanation of any problems encountered or differences between the scheduled and accomplished tasks**

The second experimental survey, which was planned for May 2011, was shortened due to one's collaborator's inability to commit to the field days. The research team contacted the CFRF in order to arrange for another fisherman willing to participate in the southern area. Low numbers of dogfish were captured after fieldwork was initiated, likely due to unusually cold bottom water temperature for the spring period in this area (mean = 4.9 °C, range of 4.7-5.8 °C at depths between 40-50 m). The spring survey was extended for another week in June in order to wait for warmer waters, which increase the probability of capturing the targeted number of dogfish necessary to achieve all objectives. Therefore, the data for May and June 2011 were pooled together and considered as the spring survey.

The original target of 8,000 sharks was not reached for the external tagging. This is because of the limited number of dogfish encountered during the first spring experimental survey in May 2011.

**Summary of major project results**

Results with external and acoustic tags suggest the existence of two stocks along the Northwest Atlantic coast, with the Cape Cod and New England area as the natural intermixing ground: the US and Canadian stock, respectively. The estimated average rate of intermixing between these two stocks is in the range of 28.4-38.4%.

Results of migratory behavior from acoustic and external tags rare consistent with the seasonal north-south migration pattern characteristic of the species for the purported US stock.

There exists a consistent and predictable diurnal sex ratio shift in the catches within 10 miles of the coastline east of the Cape Cod peninsula, with a higher number of males caught at dusk and early in the day in inshore waters and a higher number of females caught between late morning and night in deeper waters. This sex ratio changes seems to be not dependent on season and fishing gear, and suggests the possibility of establishing a male-only directed fishery in the southern study area off the northeast coastal area of the Cape Cod peninsula.

Longline gear can potentially catch more dogfish of both sexes in the Cape Cod area, and particularly more males in the South.