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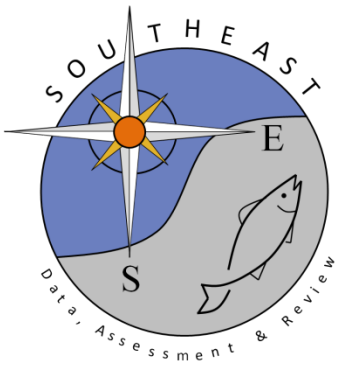

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Introduction:

Along the Atlantic coast of the United States (U.S.), the dusky smoothhound shark, *Mustelus canis,* is hypothesized to be seasonally distributed from Cape Cod, Massachusetts through Florida (Bigelow and Schroeder, 1948; Skomal, 2007; Kohler et al. 2014). We analyzed catch data from fisheries independent and dependent sources as well as completed a literature review to elucidate the seasonal distributions of this species. Here, we summarize these findings and provide spatial and temperature range hypotheses for this species along the Atlantic coast of the U.S.

Geographic Species Distribution:

Mustelus canis inhabits temperate coastal waters down to 200 meters (Compagno 1984) in the western Atlantic Ocean from Canada through Florida (Bigelow and Schroeder 1963), throughout the Gulf of Mexico and into Southern Brazil and Argentina (Compagno 1984). It is hypothesized that this species may be split into multiple discrete stocks (Bigelow and Schroeder 1948), including a northern stock occurring of the east coast of the U.S., which has been observed to migrate from wintering grounds off of the Carolinas and Virginia to New England during the summer months. The species appears to be abundant in the waters of the Carolinas during winter months and then migrate into northern portions of their range off New York, New Jersey, and Southern New England (Bigelow and Schroeder 1948) where they primarily occur during summer months. *Mustelus canis* are abundant off of Cape Cod until October, when they presumably begin migrating back to the wintering grounds off the southeastern U.S.

Seasonal abundance of *Mustelus canis* is apparent in the U.S. Atlantic. **Figure 1** shows the hypothesized distribution of *M. canis* across the Atlantic States by month, as ascertained by catch data and the literature search. The species is also present and/or abundant in Georgia and Florida primarily during the winter months, which also supports the distribution described by Bigelow and Schroeder (1948). **Figure 2** shows the seasonal distributions of this species. As expected based on previous reports and catch data, the range of this species is contracted during the summer months, when the species is most abundant in the northern end of it's range and in the winter, when the species is most abundant in the southern part of the U.S. Atlantic. During spring and fall, *Mustelus canis* occupy the greatest geographic range along the U.S. Atlantic, likely due to migrations to summer and wintering grounds (as described above).

Temperature Tolerance:

Mustelus canis appear to inhabit waters from 6°/7°C to about 10° to 15°C (Bigelow and Shroeder 1948) and seasonal migrations could be caused, in part, by the temperature tolerance or preference of this species. The available landings data (NMFS Commercial Landings Database) from the Atlantic coast of the U.S. are consistent with Bigelow and Schroeder's (1948) observations, though the temperature distribution for this species is wider than they described. According to Bigelow and Schroeder (1948), *Mustelus canis* migrate to southern New England when water temperature has reached at least 6°/7°C and are present there from May through November. Landings reported by Skomal (2007) show this species is present in shallow coastal bays in Cape Cod from mid-June through September; (temperature was recorded as sea-surface temperature; 16.0°C -27.0°C, mean 21°C). The Virginia Institute of Marine Sciences (VIMS) survey found that in their sampling area, *Mustelus canis* are present at least from April through October in waters ranging from 7.8°C – 26.0°C, with more than 90 percent of the captures between 10°C and 22°C (mean capture temperature of 16.0°C; Grubbs and Musick 2007). In South Carolina, *Mustelus canis* begin migrating north when the temperature increases above ~18°C in mid-April and return in November when the temperature falls below 18°C (mean temp 12°C; Ulrich et al. 2007). In Georgia, *Mustelus canis* are present in November and December when water temperature ranges from 14.4°C – 24.9°C (mean 17.1°C, N = 24). This species is present in Florida from January through March in temperatures from 14.3°C-25.3°C, mean 15.9°C, N =24)

Sex Ratios:

Some catch data show that there could be segregation occurring among sexes. Skomal (2007) reported that 97% of the individuals caught in long-line sets off of Massachusetts were female (63.0 – 121.0 cm FL) and in the gill-net fishery, 69 % of the individuals caught were female. Similarly, in South Carolina, the female:male ratio was 2.4:1. 1.39: 0.57. Sample sizes were low in both Georgia and in Florida; specimens caught 5-7 miles off-shore consisted mainly of mature females, while near-shore samples comprised both immature males and immature females (N=24, 1.4:1.0 F:M ; Gelsleichter pers. comm.) When comparing sex ratios, it is important to consider hook selectivity, since mature females are often larger than mature males of this species. Grubbs and Musick (2007 found that female:male sex ratios were nearly 3:1 in a longline survey using 9/0 J-hooks but was close to 1:1 using smaller circle hooks .

Parturition and Nursery Grounds

Mustelus canis have a gestation period of approximately 11 months (Conrath and Musick 2002). Based on movement of gravid females and post-partum females, and the presence of neonate and juvenile animals in estuarine and near-shore habitats (TeWinkle 1950; Conrath and Musick 2002; Skomal 2007), it is likely that these habitats could be important nursery grounds. Landings of gravid females and neonate animals from May through July support these observations and provide estimates for the pupping season. Nursery grounds in the U.S. Atlantic extend from eastern shore of Virginia through southern Massachusetts (Grubbs and Musick 2007; Skomal 2007).

References:

Bigelow, H.B. & Schroeder, W.C. (1948) Sharks. In: Tee-Van, J., Breder, C.M., Hildebrand, S.F., Parr, A.E., & Schroeder, W.C. (Eds), *Fishes of the Western North Atlantic. Part One. Lancelets, Cyclostomes, Sharks*. Sears Foundation for Marine Research, Yale University, New Haven, 576 pp.

Compagno, L.J.V. (1984). *FAO Species Catalogue. Vol. 4, Sharks of the World. An annotated and illustrated catalogue of shark species known to date. FAO Fisheries Synopsis No. 125. vol. 4, pt. 2 (Carcharhiniformes)*. United Nations Development Programme/Food and Agriculture Organization of the United Nations, Rome, 251–655.

Grubbs, R.D. & Musick, J.A. (2007) Occurrence, catch rates, and length frequencies for smooth dogfish (Mustelus canis) caught in the VIMS Longline Survey: 1974-2006. Report to AMFC *Mustelus* Working Group, 9 pp.

Jensen, C.F. & Hopkins, G.A. (2001) Evaluation of byctach in the North Carolina Spanish and king mackerel sinknet fishery with emphasis on sharks during October and November 1998 and 2000 including historical data from 1996-1997. Report to North Carolina Sea Grant, 63 pp.

Kohler, N.E.,Turner, P.A., Pezzullo, M. & McCandless, C.T. (2014) Mark/recapture data for the smooth dogfish, *Mustelus canis*, in the Western North Atlantic from the NMFS Cooperative Shark Tagging Program. SEDAR39-DW-20.

Rountree, R.A. & Able, K.W. (1996) Seasonal abundance, growth, and foraging habits of juvenile smooth dogfish, *Mustelus canis*, in a New Jersey estuary. *Fishery Bulletin* 94:522-534.

Schwartz, F.J. (1964) Fishes of the Isle of Wight and Assawoman Bay near Ocean City, Maryland. Chesapeake Science 5:172-193.

Skomal, G.B. (2007) Shark Nursery Areas in the Coastal Waters of Massachusetts. *American Fisheries Society Symposium* 50:17-33.

TeWinkle, L.E. (1950) Notes on ovulation, ova, and early development in the smooth dogfish, *Mustelus canis*. *Biological Bulletin* 99:474-486.

Ulrich, G.F., Jones, C.M., Driggeres, W.B. III, Drumon, M.J., Oakley, D. & Riley, C. (2007) Habitat utilization, relative abundance, and seasonality of sharks in the estuarine and nearshore waters of South Carolina. *American Fisheries Society Symposium* 50:125-139.

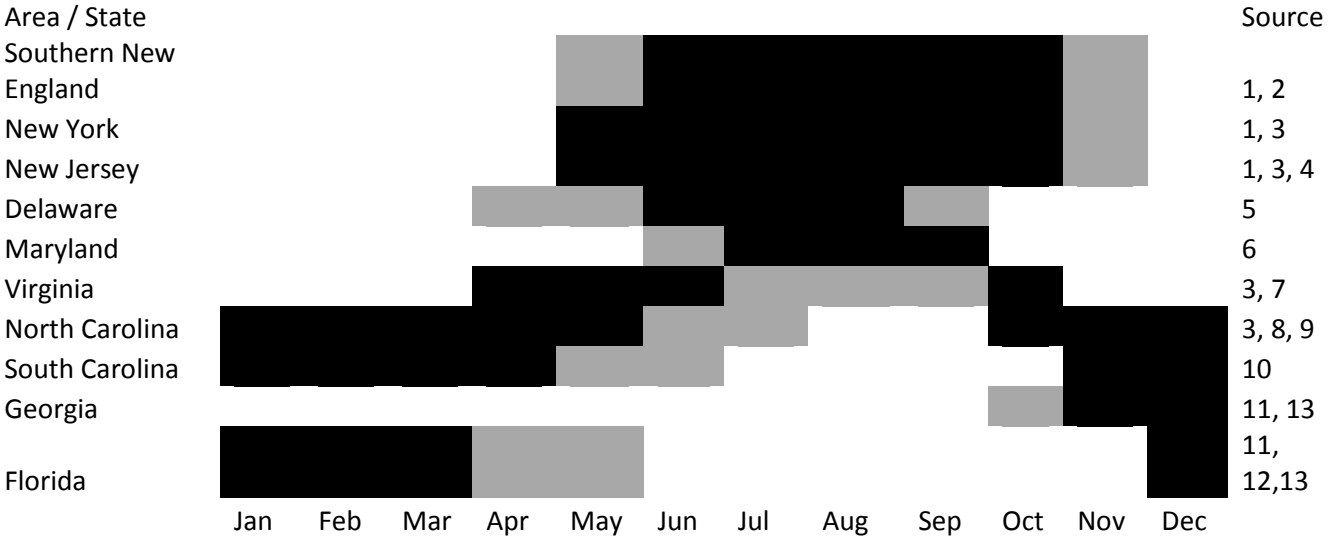

Figure 1. Seasonal distribution of *Mustelus canis* along the East coast of the United States. Months highlighted indicate presence while those in black represent peak abundance. References: 1. Bigelow and Schroeder (1948), 2. Skomal (2007), 3. NMFS Commercial Landings Database, 4. Rountree and Able (1996), 5. C. McCandless, personal communication, 6. Schwartz (1964), 7. Grubbs and Musick (2007), 8. UNC Longline Shark Database, 9. Jensen and Hopkins (2001), 10. Ulrich et al. (2007), 11. C. Belcher, personal communication, 12. Gelsleichter, personal communication. 13. Kohler et al. (2014)

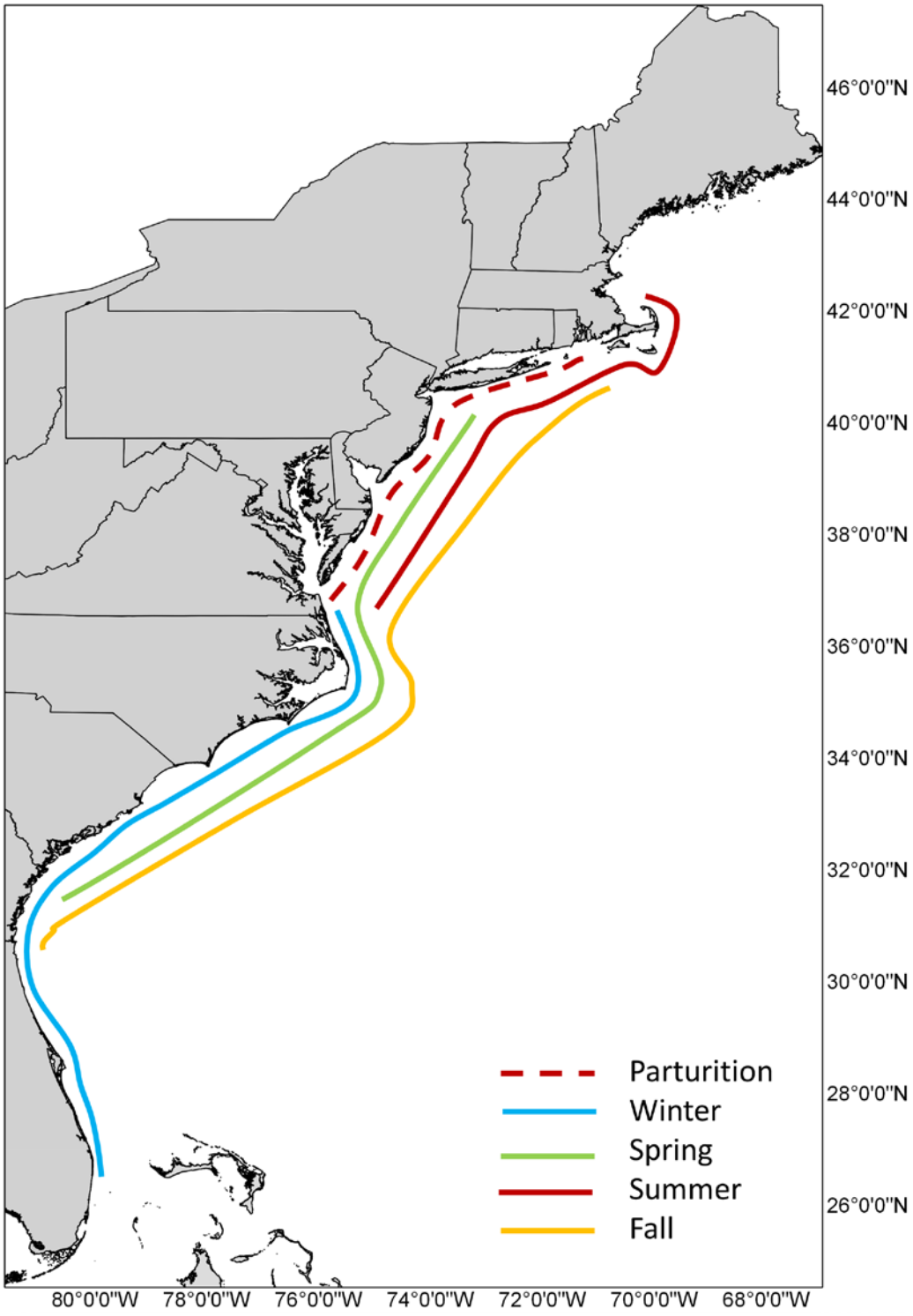

Figure 2: Seasonal distribution pattern of smooth dogfish along the East coast of the United States. Winter (Blue) is the distribution from December to February. Spring (Green) is the distribution from March through May. Summer (Red) is the distribution from June through August. Fall (Orange) is the distribution from September through November.