Seasonal distribution of marine birds in North Carolina waters, 1975–1986

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In 1979, Lee and Booth (*Am. Birds* 33(5):715–721) summarized information on the seasonal occurrence of pelagic birds off the North Carolina coast. Since that time a fair amount of additional information has become available, outdating that study. Major changes include the documentation of additional bird species, the extension of known seasonal occurrence for many, if not most species, changes in our knowledge about the relative abundance or recognized status of several species, and nomenclature.

This increased knowledge is a direct result of supportative funding from the United States Fish & Wildlife Service (Slidell Louisiana Laboratory), the Department of the Navy, and assistance from many individuals of the birding community, who made additional survey trips by our museum financially possible. These ongoing trips have allowed better coverage of the winter period, a season poorly covered anywhere in the western north Atlantic, and enabled us to penetrate deep-water zones that previously had not been systematically surveyed.

Figure 1 is an updated version of the seasonal distribution chart that appeared in Lee and Booth (1979). Information documenting the changes in the two versions has for the most part been presented in various journals, although some of it is in manuscripts or field records at the North Carolina State Museum. Five species included here are regarded as provisional by the North Carolina birds record committee: Cape Petrel (*Daption capense*), Bermuda Petrel (*Pterodroma cahow*), Soft-Plumaged Petrel (*P. mollis*), Little Shearwater (*Puffinus assimilis*), and Brown Booby (*Sula leucogaster*). Information provided in Figure 1 has been updated through July 1986.

This continuing study enhances our understanding of local pelagic bird abundance and occurrence.

Figure 2 illustrates the relative abundance of marine birds by month. Only the six most common species for each 4-week period are included. While this second figure accounts for monthly abundance it omits the rarer species. I believe that between the two figures, interested persons can have a relatively clear understanding of what to expect and what to hope for on a given date.

Finally, in Figure 3 and Table 1, I have illustrated relative densities of birds expressed in number of individuals en-

Table 1. Summer zonal distribution (individuals/hour) of six species selected to show deep water, shelf edge, and inshore distributions and zones of overlap. (Also see Fig. 3).

Depth (fathoms)	Total Survey Time in Zone (hr.)	*shelf edge species*			*deep water species*		*inshore species*	
		Wilson's Storm-Petrel	*Cory's Shearwater*	*Audubon's Shearwater*	*Black-capped Petrel*	*Band-rumped Storm-Petrel*	*Royal Tern*	*All Species**
<10	10.42	.38	0	0	0	0	4.41	11.13
11–19	7.25	1.38	3.17	0	0	0	2.48	12.41
20–30	35.42	2.32	4.71	0.62	0	0	0.28	10.42
31–50	12.42	14.75	6.04	.72	0	0	1.13	43.32
51–99	4.17	20.86	5.52	16.07	0.24	0	0.96	50.07
100–400	18.50	25.08	6.97	4.49	1.14	0.16	0.54	78.38
401–799	18.17	24.49	7.15	4.62	2.92	1.32	0.17	71.44
800>	19.75	14.23	17.92	15.34	3.39	1.11	0.10	61.62

* *Includes birds not listed in this table.*

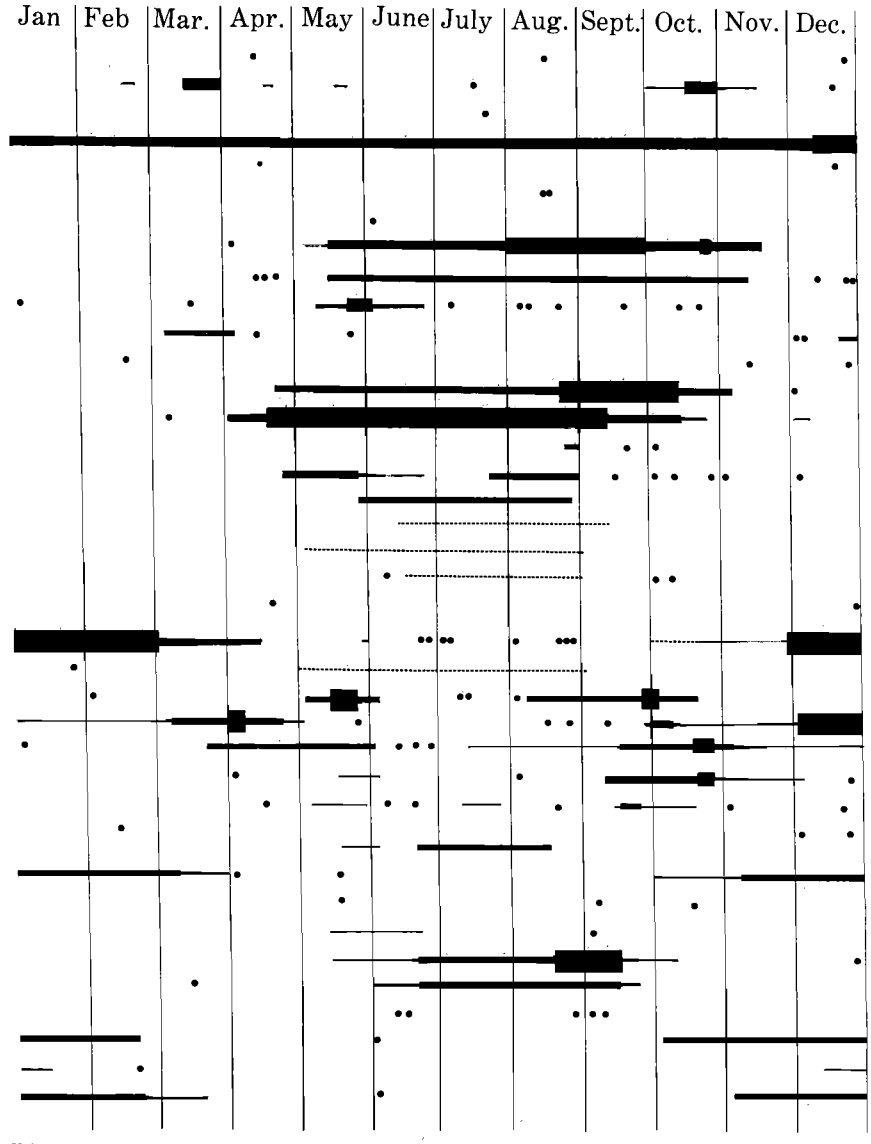


Figure 1. *Seasonal distribution of North Carolina offshore and pelagic birds. The heaviest lines indicate that the species is common-to-abundant during that period of the year, medium lines indicate fairly common and a thin line implies uncommon but within expected season of occurrence Dashed lines stand for documented period of occurrence of irregular visitors, and dots indicate records of single birds (modified from* Am Birds *33:720).*

countered/hour. This is based on 5316 sightings from 13 summer trips (June through August) that surveyed zones up to 1000 fathoms (calculated on a Honeywell computer using a dBase III program). Fauna composition shifts, with some overlap, from coastal and inshore species (up to 20 fathoms), to shelf-edge pelagics (100 fathoms) and highly pelagic species (500 fathoms and deeper). Patterns emerging off North Carolina, New England, and southern California are all indicating a deep-water zone of lower density, but one in which an interesting assemblage of "unusual" sea birds can be found.

That depth *per se* is probably not the key factor responsible, has been illustrated by an interesting series of studies conducted off Georgia by Chris Haney (see page 396 this issue). Nevertheless, it is becoming apparent that deep-water zones provide rewarding areas of study. In the past this was overlooked, partly owing to complicated logistics in getting big party boats to travel the necessary distances from shore. Recently this problem has been overcome, both locally and nationally, by the occasional use of smaller, faster boats (more costly/individual participant) and overnight excursions.

Edition citations

1. Lee *in press, Wilson Bull.*
2. N.C.S.M. records
3. Lee *in press, Chat*
4. *Am. Birds* 38:151–163
5. *Am. Birds* 38:151–163, Lee *in press, Wilson Bull.*
6. *Am. Birds* 33:138–139, *Am. Birds* 38:151–163
7. *Am. Birds* 38:151–163
11. Lee *in press, Am. Birds*
12. Lee *in press, Am. Birds*
13. Lee *in press, Am. Birds*
14. *Am. Birds* 38:151–163, Lee *in press, Wilson Bull.*
15. *Am. Birds* 38:151–163; Watson *et al., in press, Am. Birds*
16. *Am. Birds* 38:151–163
17. *Am. Birds* 38:151–163
18. *Chat* 47:1–13
19. *Chat* 47:1–13, *Am. Birds* 35:887–890
20. *Am. Birds* 37:117–118, *Chat* 48:29–45
21. *Chat* 48:29–45
22. *Chat* 48:29–45
25. Lee *in press, Wilson Bull.*
29. Lee *in press, Wilson Bull.*
30. N.C.S.M. Records
34. Lee *in press, Wilson Bull.*
36. *Chat* 44:89–100, *Chat* 43:79–81

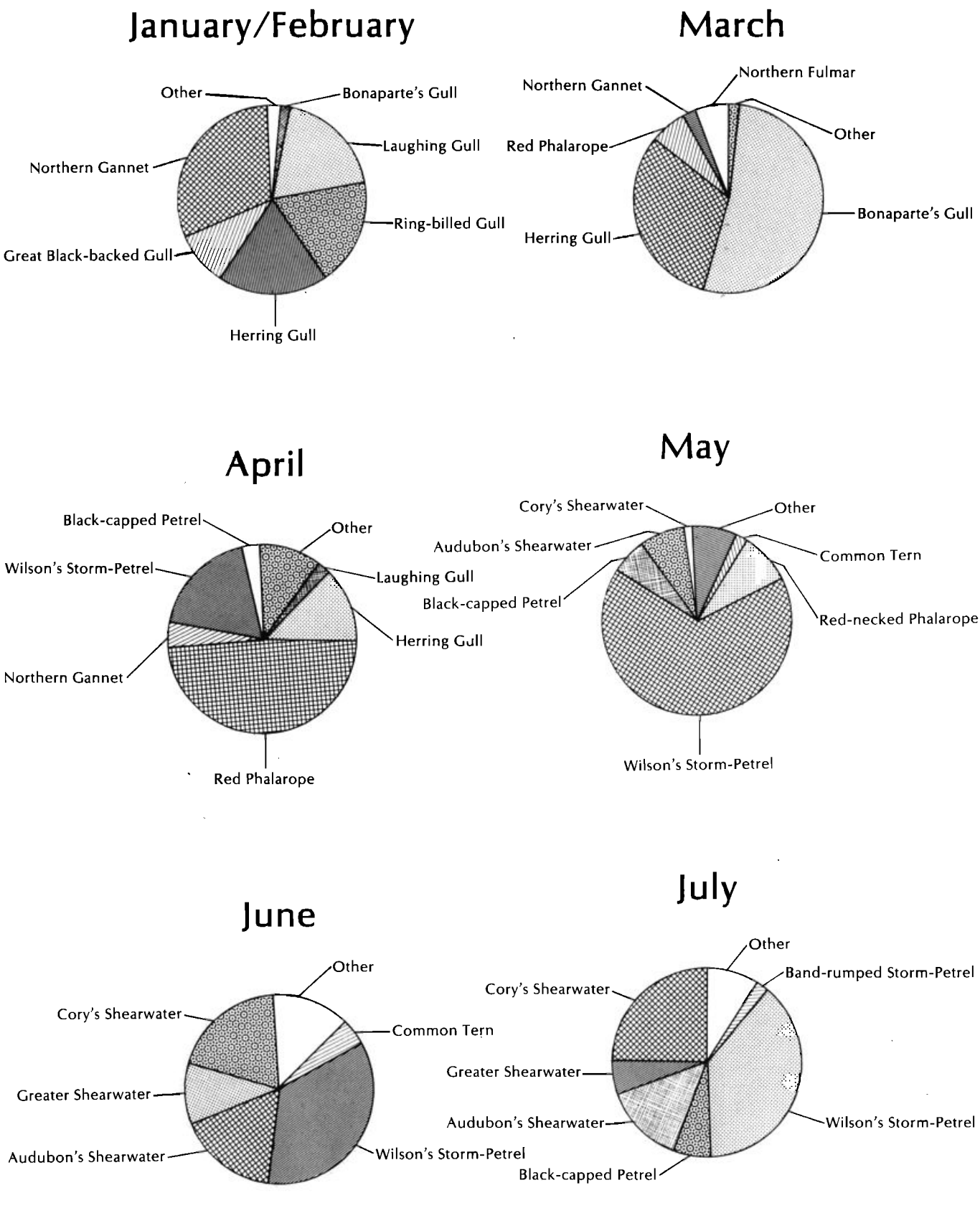
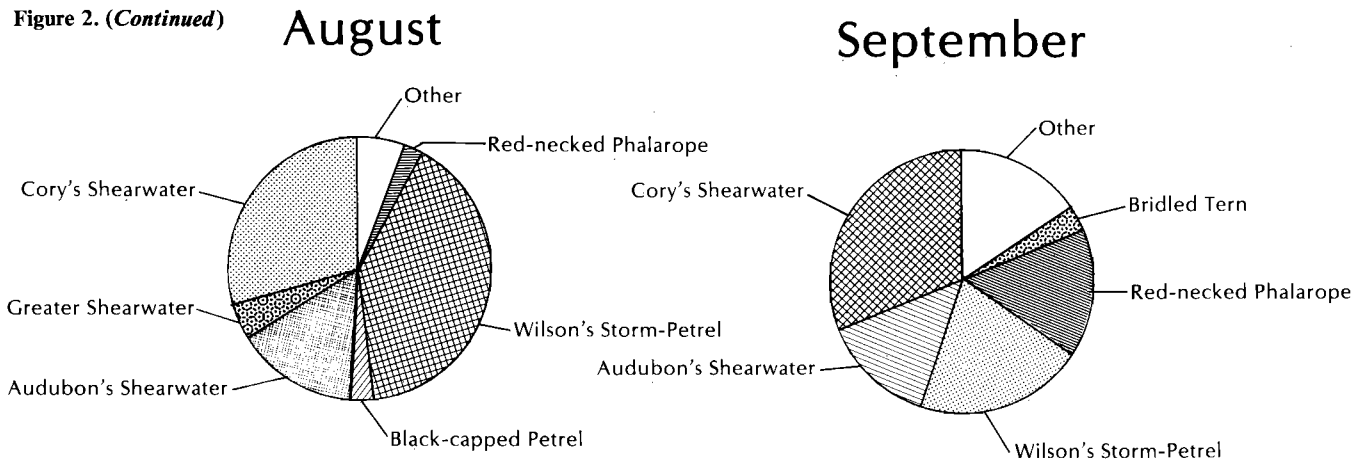
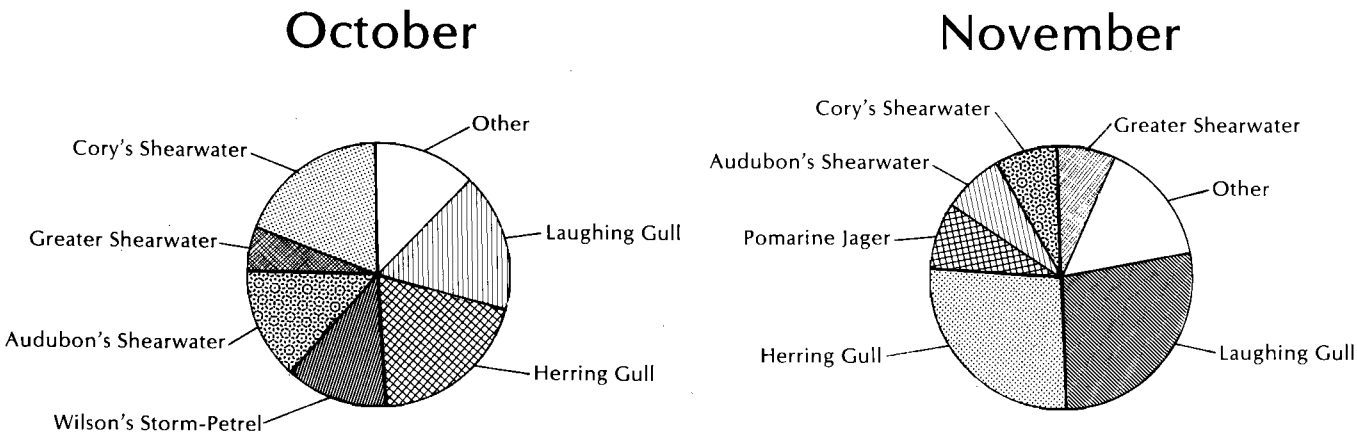


Figure 2. *Major composition of bird fauna between the 20 and 1000 fathom contour off the northern North Carolina coast by month. Number of trips on which this is based: January–February 6, March 8, April 11, May 15, June 20, July 16, August 19, September 10, October 10, November 6, December 11 (all trips out of Oregon Inlet between 1975 and Autumn 1985).*

Figure 2. (*Continued*)





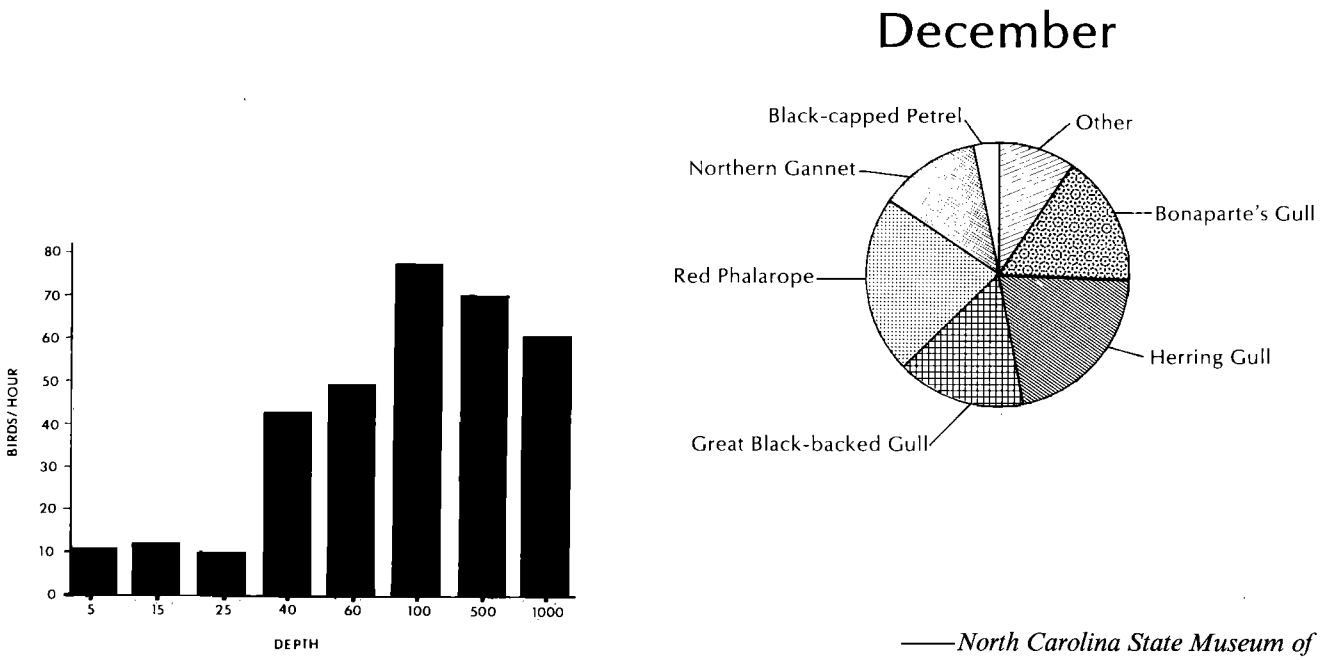


Figure 3. *Summer zonal distribution by water depth for all marine birds expressed in mean number of birds encountered/hour of survey at each depth range. Also see Table 1 for basis of this figure.*

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