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# Winter Abundance of the American Oystercatcher in South Carolina

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**Abstract.**—South Carolina winters a large proportion (over 1/3) of the eastern race of the American Oystercatcher (*Haematopus palliatus*), a declining species. During December of 1999-2002 ground surveys were conducted to provide baseline data on the abundance, age class partitioning and distribution of wintering American Oystercatchers in South Carolina. The number of oystercatchers in South Carolina was stable during this study (3,536, 95% CI: 3,030, 4,042). A single comprehensive survey can estimate the number of oystercatchers with enough precision to detect changes in the population of 13% and greater, but location of flocks and the range of tidal heights needed to concentrate flocks must be known prior to conducting the survey. About 89% of the birds in 2002 roosted on washed shell rakes and 9% had immature bill coloration. Winter surveys of the proportion of immature oystercatchers may provide an index of regional reproductive success, an important parameter for conservation plans. Because South Carolina winters a large number of oystercatchers, future surveys could be used to verify suspected declines on a regional scale. Received 12 May 2003, accepted 27 October 2003.

**Key words.**—American Oystercatcher, *Haematopus palliatus palliatus*, South Carolina, shorebird surveys.

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On the Atlantic coast of the United States, the eastern race (*palliatus*) of the American Oystercatcher (*Haematopus palliatus*) breeds from Massachusetts to Florida, with the highest concentrations between Virginia and Georgia (Humphrey 1990). Little is known about their migratory behavior except that oystercatchers gather in large flocks in the southern states during the winter (Nol and Humphrey 1994). The eastern race of the American Oystercatcher has been identified as an “extremely high priority” shorebird by the working group for the Southeastern Coastal Plain as part of the U.S. Shorebird Conservation Plan (Brown *et al.* 2001). This designation is based on estimated numbers of American Oystercatchers totaling less than 25,000 and the decline of suitable beach nesting habitat. Additionally, the number of breeding pairs from Virginia to Florida is declining and some studies have documented low reproductive success (Davis *et al.* 2001; Nol and Humphrey 1994).

Although population estimates of the eastern race of the American Oystercatcher have been assembled from censuses of breeding pairs (1,624 pairs), large wintering flocks suggest these estimates are low (Nol *et al.* 2000; Davis *et al.* 2001). Estimating total population size during the breeding season

is difficult because breeding pairs are widely distributed. Surveys of winter flocks could provide a more accurate population estimate (Nol and Humphrey 1994). Although extensive surveys of European Oystercatchers (*Haematopus ostralegus*) have been conducted during the winter on the Atlantic coast of Europe, extensive surveys of wintering flocks on the Atlantic coast of the United States had not been conducted prior to 1999 (Goss-Custard 1996; Nol *et al.* 2000).

The largest concentration of wintering oystercatchers on the Atlantic coast of the United States occurs in South Carolina (Thomkins 1947; Sprunt and Chamberlain 1949; Nol *et al.* 2000). The main objective of this study was to provide baseline data on the abundance, age class partitioning and distribution of wintering oystercatchers in South Carolina. Because South Carolina winters a large number of oystercatchers, future surveys could then be used to verify suspected declines on a regional scale. Additionally, these surveys identified methodology that can improve winter estimates.

## STUDY SITE AND METHODS

As high tide approaches, many shorebird foraging sites are flooded. Shorebirds often concentrate in flocks on exposed sites from two hours before high tide to two

hours after high tide (Prater 1981). In South Carolina, foraging sites are flooded during spring high tides but infrequently on neap tides. Spring high tide roosts of oystercatchers are characterized by sparse vegetation, presumably used to avoid mammalian predators, are relatively free from disturbance, and are in proximity of local mud flats that serve as foraging sites.

In South Carolina, four statewide surveys of high tide roost sites suitable for oystercatchers were conducted from 8-11 December 1999, 5-13 December 2000, 1-7 December 2001 and 6-12 December 2002. Surveys were initiated during either new or full moon phases so that high tide occurred two hours after sunrise and progressed each day until surveys were completed. All surveys were conducted within two hours of high tide. Most roost sites were located prior to the 1999 survey.

Three 16-foot fiberglass Boston Whalers with 115 horsepower engines were used simultaneously to complete the surveys within one week. The boat surveys examined 998 washed shell mounds (Anderson *et al.* 1979). These deposits are composed primarily of oyster (*Crassostrea virginica*) shells accreted by wave and wind energy. They are located on outer edges of the coast and shorelines of creeks and rivers. Shell islands were surveyed by boat or by walking the length of the mound. Additionally, beachfronts, dredge spoil islands, and docks that were suitable roost sites for oystercatchers were surveyed by foot, on all terrain vehicles or by boat. Oystercatchers do not roost on beaches with extensive human development and such beaches were not surveyed.

The number of oystercatchers and their location were recorded. Locations in 2002 were categorized as barrier island beach, estuarine island, shell rake, or wooden dock. Locations were mapped in ArcView 3.2 (Environmental Systems Research Institute, 1999). We used PROC ANOVA (SAS 1996) to test for differences in flock sizes between years. We divided the coast into twelve regions based primarily on watershed boundaries. Regions ranged from 100-87,800 ha. PROC ANOVA (SAS 1996) with a repeated measures design was used to test for differences between years in the numbers of oystercatchers in these distinct regions, assuming that movement was minimal between regions.

The average temperature during November in Morehead City, North Carolina were used to indicate if conditions that might affect migration of northern oystercatcher flocks into South Carolina were similar during the different years of our study.

In 2002, the percentage of immature oystercatchers was estimated. Birds were distinguished as third year and older birds (orange bills) or first and second year birds (orange and brown bills) based on the assumption that changes in bill coloration in the American Oystercatcher is similar to those of the European Oystercatcher (Prater *et al.* 1977). The estimate of immature birds was from a subset of the total oystercatchers counted, because not all bills were clearly visible. Some of the bills were examined at each roost site. The number of immatures in flocks totaling over 100 was estimated four times and the average number of bills seen and the average number of immature birds in the flock was recorded. An arcsin $\sqrt{\pi}$  transformation of the percentage of immature birds at each roost site was performed before calculating a 95% confidence interval around the mean.

In addition to the annual statewide winter roost surveys, 21 surveys (approximately two per month) were conducted from 9 April 2001 to 12 April 2002 on the Atlantic Intracoastal Waterway from Marker 67 (in the

Cape Romain National Wildlife Refuge to south of Dewees Inlet (Marker 115). Location and flock size were recorded. The multiple surveys were used to determine the time of winter when the greatest numbers of oystercatchers were present.

## RESULTS

Statewide surveys revealed totals of 3,136 American Oystercatchers in 1999, 2,459 in 2000, 3,496 in 2001, and 3,734 in 2002 (Fig. 1). During the 2000 surveys, the tides were exceptionally high due to the combined effect of an easterly wind and spring tides. Consequently, typical high tides roosts were flooded during the survey and the birds were scattered in the marsh, many roosting on wrack beds. We were not able to count oystercatchers on all of their traditional roost sites in 2000, thus the numbers in that year were underestimated and we did not use this survey in further analyses. Two oystercatcher roost sites (with an average of 140 oystercatchers in 2001 and 2002) were not discovered until 2000 and two sites (with a total of 51 oystercatchers in 2002) were not discovered until 2002. The numbers in the 1999 and 2001 were increased by the number of oystercatchers counted at sites missed during the surveys. The adjusted 1999 (3,327) and 2001 (3,547) totals and the 2002 total suggest that the wintering numbers in South Carolina are stable (3,536, 95% CI: 3,030, 4,042).

The Cape Romain Region of the South Carolina coast from the Cape Romain National Wildlife Refuge south to Dewees Inlet had a high number of oystercatchers. In 1999, the Cape Romain Region had 57% (1,883) of South Carolina's wintering oystercatchers, in 55% (1,949) in 2001 and 51% (1,901) in 2002.

The number of oystercatchers at one site for all years ranged from 1-752. Mean group sizes for 1999 ( $37 \pm 11$  SE,  $N = 86$ ), 2001 ( $26 \pm 7$  SE,  $N = 133$ ) and 2002 ( $31 \pm 7$  SE,  $N = 118$ , Fig. 2) were similar ( $F_{2,336} = 0.40$ , n.s.). There was no difference between the number of oystercatchers in a region between years ( $F_{2,12} = 0.38$ , n.s.). In 2002, 89% roosted on washed shell rakes, 6% on docks, 4% on barrier island beaches, and 1% on estuarine islands.

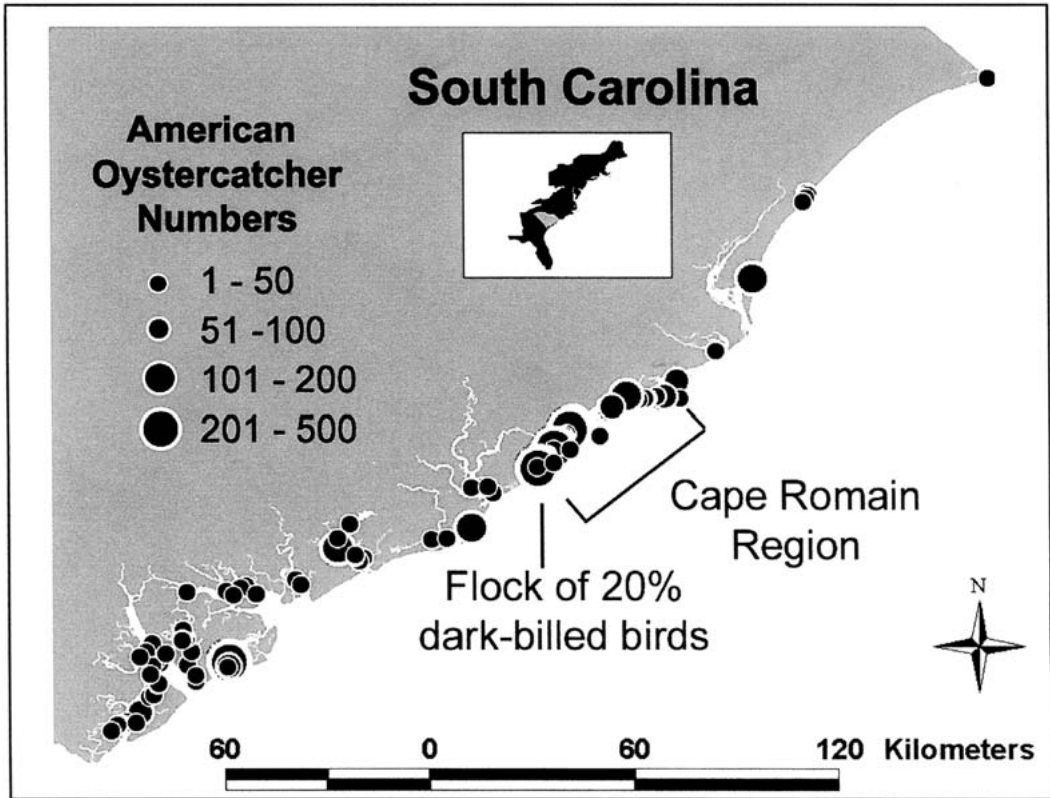


Figure 1. Distribution and abundance of American Oystercatchers in December 2002 on the coast of South Carolina. Approximately half the oystercatchers in South Carolina (adult and immature) wintered in the Cape Romain Region.

The average temperatures in November, the month before our surveys, at Morehead City, North Carolina in 1999 (15.3°C), in 2001 (15.5°C) and in 2002 (12.2°C) were similar (Southeast Regional Climate Center 2002).

In 2002, we estimated immature-to-adult ratios at all roost sites in the State by looking at bill color of 39% (1,443) of the total birds. Immature birds appeared to be evenly distributed in a flock. Nine percent of the birds examined had immature bill coloration. This estimation suggests of the 2002 winter total, 324 were immature birds and 3,410 were adults. The percentage of immature birds in flocks varied from 0% to 20% (95% CI: 2%-8%) but this distribution was skewed, by a single flock of 719 birds containing 20% (149) dark-billed birds (Fig. 1). Sixty-eight percent of the roost sites contained no dark-billed birds.

The repeat surveys suggest most of the wintering birds arrived by late September, peaked in early December and left by early March (Fig. 3). Paired birds were roosting on known nesting territories in all months except early October. Although the number of paired birds seen after July dropped, different pairs were seen at different known nesting sites on repeat surveys suggesting that South Carolina breeders do not migrate and that they are loosely territorial during the non-breeding season. Limited band recoveries and re-sightings of colored marked breeding birds from North Carolina, Massachusetts, New York and other areas in South Carolina (N = 28) during the winter in South Carolina suggest our winter numbers represents not only breeders from South Carolina but from a large area (South Carolina DNR unpublished data; Bird Banding Laboratory, Patuxent Wildlife Research Center).

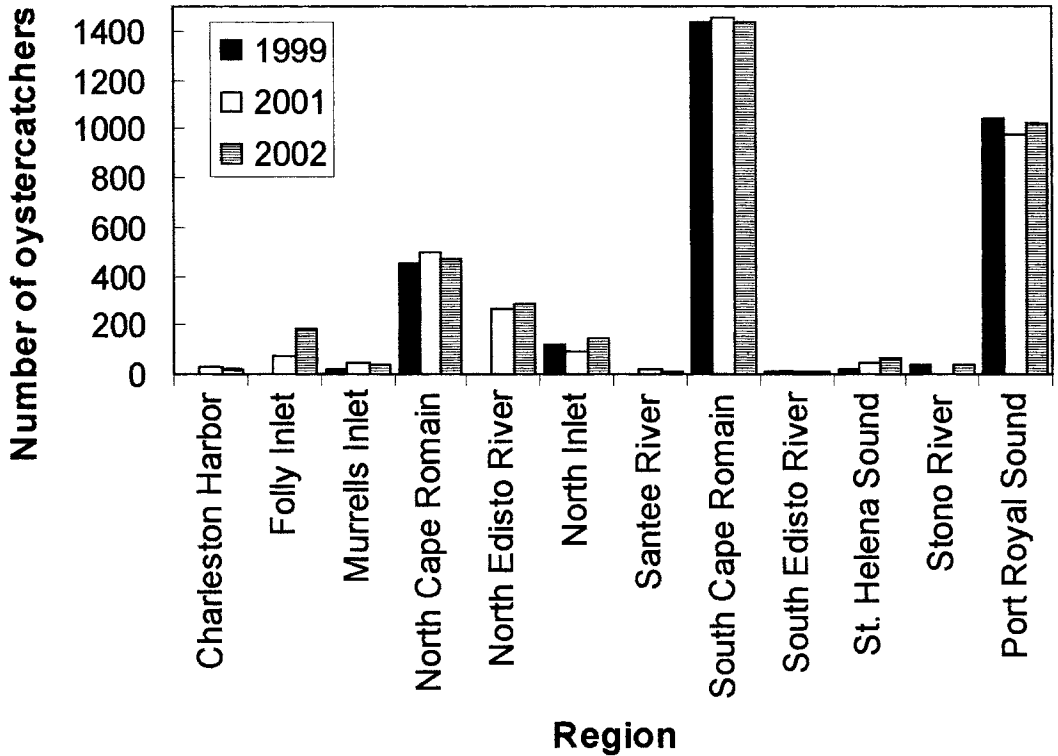


Figure 2. Number of American Oystercatchers in each of 12 regions of South Carolina in December of 1999, 2001 and 2002.

## DISCUSSION

If the wintering number of oystercatchers in South Carolina was the same each year of our surveys, the 95% CI on our statewide surveys suggest that a comprehensive survey can estimate the number of oystercatchers with enough precision to detect changes of 13% and greater (e.g., 95% CI is  $\pm 13\%$  of mean). Although one annual survey is sufficient for monitoring changes, our 2000 survey demonstrates the problem in estimating the number of oystercatchers with only one survey. Field conditions during a survey must be optimal. To complete a large scale survey in a short time, biologists must know prior to the survey: the location of the flocks, methodology to count large flocks, and the range of tidal heights needed to concentrate flocks. This knowledge may require surveyors a few years to acquire (i.e., if the foraging grounds are not flooded or if the roosting sites are flooded, the birds are not concentrated enough to count). Tidal

height is important in concentrating flocks yet wind can contribute to poor survey conditions by substantially lowering or raising the predicted tide height. Survey conditions can often only be assessed just prior to or during a survey.

Although the conditions were similar for different years of our study, in colder years more birds may migrate into South Carolina from the more northern wintering sites, hence making several winter surveys necessary. These patterns of movement of the American Oystercatcher in response to the extreme temperatures are not known. European Oystercatchers have been observed to migrate in response to severe cold weather, although these movements were in January and February, and only after prolonged freezing temperatures (Hulscher *et al.* 1996). Secondary migration in December is unlikely but regional temperatures may influence surveys conducted later in the winter. Duplicate range wide counts would resolve questions concerning cold weather movements.

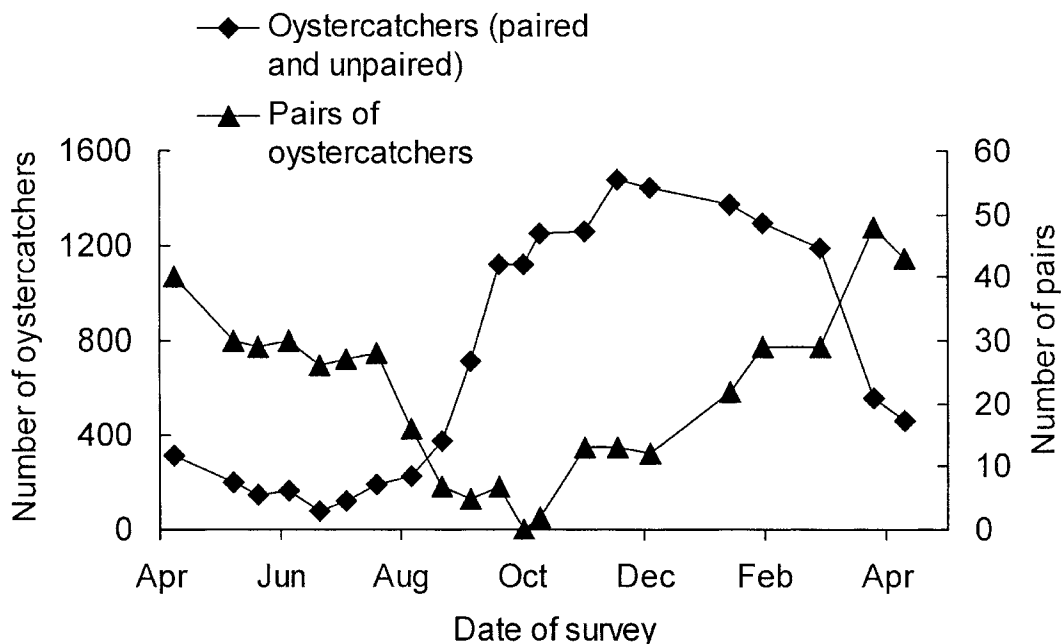


Figure 3. Twenty-one surveys of paired and unpaired American Oystercatchers from 9 April 2001 to 12 April 2002 on the Atlantic Intracoastal Waterway, South Carolina, from Marker 67 (in the Cape Romain National Wildlife Refuge) to Marker 115 (south of Dewees Inlet).

Surveys of immature oystercatchers in the winter may provide an index of regional reproductive success, an important parameter for conservation plans. Range wide counts of immatures may be superior to studies of reproductive success at specific breeding sites, because it could be less expensive, less intrusive and may reflect success of an entire region. Yet, estimates of immature oystercatchers must include all flocks in the survey area, as evident in South Carolina by 46% of the immature birds in the State occurring in one flock.

The 9% dark-billed birds represent 4-5% first-year birds. Adult mortality of American oystercatchers is unknown, but adult mortality of European oystercatchers on the Atlantic coast is 9% (Goss-Custard *et al.* 1996). This suggests that breeding success may not be sufficient to maintain the population.

South Carolina supported just over one third of the estimated Oystercatcher population that winters on the Atlantic and Gulf coasts of the United States (approximately 10,000) (this study; Brown *et al.* 2003). The Cape Romain Region in South Carolina has

both historically and recently, wintered a large portion of the oystercatchers found on the Atlantic coast (Sprunt and Chamberlain 1949; Marsh and Wilkinson 1991) yet this area comprises only 7% of the length of South Carolina's coastline. Further research is needed to identify the characteristics of the Cape Romain Region that attract large numbers of American Oystercatchers.

Although the Cape Romain Region has high numbers of oystercatchers there is evidence that these numbers are a small proportion of the total that once existed in this area. The Christmas bird count in December of 1970 reported 8,121 oystercatchers on a route in Cape Romain National Wildlife Refuge (National Audubon Society 2002). The average November temperature in Morehead City in 1970 (13.9°C) was similar to those during our surveys (Southeast Regional Climate Center, 2002), so cold weather cannot account for this high number. Today, only 200-300 birds can be seen along this route (South Carolina DNR unpublished data). Censuses in the winter of 1988 and 1989 made by the South Carolina Department of Natural Re-

sources and Coastal Carolina University in the Cape Romain Region reported a peak of 2,401 birds in the winter of 1988 (Marsh and Wilkinson 1991). The results of our 2001 surveys suggest a 21% decline in oystercatchers in the Cape Region Romain over 14 years.

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