

# Breeding Status and Distribution of American Oystercatchers in Maryland

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**Abstract.**—The Atlantic coast population of the American Oystercatcher (*Haematopus palliatus*) has seen mixed success in its recovery from historic lows at the turn of the 20th century. During the mid-1980s, breeding numbers in Maryland were estimated at 50-75 pairs based on incidental observations and the results of the state's first breeding bird atlas project. With growing national and regional concern for the species and a need for current information on its status in Maryland, the state's first comprehensive survey of nesting oystercatchers was conducted during the 2003 breeding season. Both hatching success and fledging success were relatively high, with some breeding birds nesting in areas where they were not previously found in the state. Most oystercatchers nested on salt marsh islands, as opposed to the extensive barrier island found along Maryland's coast. Although a similar number of birds nested in the Chesapeake Bay and Coastal Bays, nest success was significantly greater in the Chesapeake Bay. Landscape type proved to be the only variable that was significantly associated with statewide nest success, though it did not explain the differences in success between Chesapeake Bay and Coastal Bay birds. Several existing and potential threats require consideration in future studies and management of this species. Received 17 November 2005, accepted 12 June 2006.

**Key words.**—American Oystercatcher, status, breeding success, landscape, habitat.

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Changes in the status and distribution of the eastern race of the American Oystercatcher (*Haematopus palliatus*) have been well documented over the past century (Bent 1929; Forbush and May 1939; Nol and Humphrey 1994). Records indicate that its historic breeding range included the entire Atlantic coast as far north as Labrador (Forbush and May 1939; Nol and Humphrey 1994). However, by the early 1900s the American Oystercatcher was extirpated north of Virginia and declining over much of their remaining range due to market hunting, egg collecting, and human disturbance (Bent 1929; Nol and Humphrey 1994). Since then, the species has recolonized many parts of its former range and is now considered stable or slowly increasing north of Virginia. From Virginia south breeding numbers appear to be declining in recent years (Davis *et al.* 2001). In Virginia the number of oystercatchers nesting on barrier islands has dropped by more than 50% during the past 20 years (Davis *et al.* 2001, but see Wilke *et al.* 2005). The Atlantic coast breeding population may be as low as 1,600 pairs (Davis *et al.* 2001) with 7,500 pairs estimated worldwide (Brown *et al.* 2001). The American Oystercatcher is currently designated as a "species

of high conservation concern" in the U.S. Shorebird Conservation Plan due to low population size and fecundity, a relatively high degree of threats on breeding and non-breeding grounds, and a restricted non-breeding distribution (Brown *et al.* 2001).

In Maryland, the American Oystercatcher was considered a rare to uncommon breeding species (Stewart and Robbins 1958; Robbins and Boone 1984; Brinker 1996; Illiff *et al.* 1997). In the mid-1900s, the oystercatcher was a rare breeding species with only a few nesting records, all of which were confined to the Coastal Bays region of Worcester County. This region consists of several large estuarine bays situated between the Worcester County mainland to the west and Assateague Island (a 60 km long barrier island) to the east. The first Maryland breeding record for the Chesapeake Bay was reported in 1972 (Robbins 1972). By the early 1980s, the species was still rare, with an estimate of fewer than 20 pairs breeding annually in the state (Robbins and Boone 1984). During 1983-87, the Maryland Breeding Bird Atlas Project yielded probable or confirmed breeding records for 18 Atlas blocks (1 block = 10 × 10 km) in the Coastal Bays and lower Maryland portion of the Chesapeake Bay,

and an estimated 50-75 breeding pairs (Brinker 1996). With growing national and regional concern for the species and a need for current information on its status in Maryland, an intensive survey was conducted for nesting oystercatchers throughout the state during the 2003 breeding season. This study was conducted as part of the state's on-going Breeding Bird Atlas, and in conjunction with a comprehensive statewide survey of nesting colonial waterbirds. The primary objectives were to (1) determine the species' current breeding status, abundance, and distribution in Maryland; (2) examine potential changes in distribution and abundance since the 1983-87 Breeding Bird Atlas; (3) evaluate nest success and possible sources of nest failure; (4) determine nest site characteristics; and (5) compare nest success and nest site characteristics between the Coastal Bays and Chesapeake Bay regions.

#### STUDY SITES AND METHODS

Surveys for American Oystercatchers throughout the Maryland portion of the Chesapeake Bay, Coastal Bays region and Assateague Island were conducted during 7 May-8 July, 2003. In the Chesapeake Bay and Coastal Bays region, potential island and mainland shoreline habitats were searched by boat every 1-3 weeks. When birds were located, observations were made from offshore and, if needed, by approaching the bird(s) to determine if a nest was present. If breeding was indicated (e.g., incubating bird, paired birds, copulation, piping and alarm calls), the area was carefully searched for nests, limiting search time to 10-15 minutes to minimize disturbance. All nests were flagged and monitored every one to two weeks to determine nest fate and sources of nest failure. Chicks were banded prior to fledging (~35 days of age) with standard stainless steel U.S. Fish and Wildlife Service leg bands. On non-banding visits, monitoring was conducted from a boat 25-75 m offshore. Nests were considered successful if one or more eggs hatched. In cases where chicks were not located but adults remained in the nest site area and were clearly agitated, we assumed chicks were present and that the nest was successful. Fledging success was also determined whenever possible. Successful fledging was indicated if one or more flighted or juvenal-plumaged chicks were present.

Surveys on the Maryland portion of Assateague Island were approached differently due to concerns regarding possible disturbance to nesting Piping Plovers (*Charadrius melodus*), a federally listed species. Assateague Island National Seashore (AINS) staff noted known or potential oystercatcher nest sites throughout the breeding season, incidental to their Piping Plover monitoring efforts. Two formal oystercatcher surveys were also conducted, the first on 4 June by AINS staff in conjunction with the annual Atlantic Coast Piping Plover

survey. The second survey was completed on 24 June by D. Brinker. While it was not possible to monitor nests or obtain detailed data on nest site characteristics, the combination of these efforts provided a reasonably accurate assessment of the distribution and number of breeding oystercatchers on Assateague Island.

Nest sites were characterized at two different spatial scales. At the smaller scale, the habitat immediately surrounding the nest, herein referred to as habitat type, was categorized as beach, micro-beach (<10 m length), primary dune, and salt marsh. The most common herbaceous plant species in salt marshes were *Spartina alterniflora*, *S. patens*, and *Juncus gerardi*. *Iva frutescens* and *Baccharis halimifolia* were common shrubs. Other frequently occurring species were *Solidago sempervirens*, *Ammophila breviligulata*, and *Panicum* sp.

At the larger scale, each nest was classified into one of the following landscape types: small salt marsh island (<10 ha); large salt marsh island ( $\geq 10$  ha); large salt marsh island peninsula tip; and barrier island. Beyond the size differences, small islands differed from large islands in several respects. The former generally lacked meso-carnivore predators (e.g., Red Fox (*Vulpes vulpes*), Raccoon (*Procyon lotor*)) due to their isolation from the mainland and larger islands where such predators were present. Small islands were also lower and more exposed to flooding during storms and high tides. The vegetation on small islands was more homogeneous, typically consisting of *S. alterniflora* along the shorelines and tidal pools, with *S. patens*, wrack lines and scattered shrub patches (*B. halimifolia*, *I. frutescens*) dominating the island interior. Large islands contained these same vegetative features, but also supported expansive areas of salt marsh dominated by *J. gerardi* along with small, scattered, densely vegetated hammocks with species such as *Celtis occidentalis*, *Rhus radicans*, *Morella cerifera*, *B. halimifolia* and *I. frutescens*. Many large islands also contained prominent peninsulas, the tips of which often contained small sandy or shell-lined beaches.

The 2003 numbers and breeding distribution were compared with 1983-1987 Breeding Bird Atlas data (Brinker 1996) by comparing the number and distribution of Atlas blocks having confirmed (evidence of nesting) oystercatcher breeding records. Hatching and fledging success during 2003 were examined in relation to region, landscape and habitat type using a Chi-square test, with Yates' correction coefficient applied to regional comparisons. Apparent hatching success was reported as a percentage of nesting attempts. We did not use the Mayfield method (1961, 1975) to calculate actual hatching success or daily nest survival due to the length of time between surveys and the difficulty in locating newly hatched young. Fledging success was calculated as the number of chicks fledged per nest.

#### RESULTS

##### 2003 Breeding Population Size and Distribution

A total of 108 oystercatcher pairs were located in Maryland, with 57 pairs in the Chesapeake Bay, 39 in the Coastal Bays and 12 pairs on Assateague Island. Nesting was con-

firmed for 72 pairs, which produced 85 nests, including 13 renesting attempts. A similar number of nests occurred in each region with 39 nests in the Chesapeake Bay and 46 nests in the Coastal Bays. In the Chesapeake Bay, most pairs and nests occurred in the southeastern part of the Bay, below 38° 09' latitude. Five nests were found in Dorchester County, and 34 occurred in Somerset County. In the Coastal Bays, oyster-catcher pairs and nests were found from the Virginia line north to the Delaware line. However, 26 (57%) of the nests in this region were concentrated in the northernmost 13 km, and 11 (24%) were concentrated in the southernmost 7 km. Of the 12 pairs on Assateague Island, eight occurred on the northern 8 km of the island.

#### Comparison with 1983-87 Atlas

During 2003, breeding was confirmed in a total of 26 Atlas blocks (Fig. 1a). Fifteen blocks were located throughout the lower Chesapeake Bay in Dorchester and Somerset counties, and 11 blocks occurred throughout the Coastal Bays (including Assateague

Island) in Worcester County. Possible or probable breeding birds were recorded in an additional 17 blocks across both regions. During 1983-87, only 16 blocks contained confirmed breeding records, six in the Chesapeake Bay and ten in the Coastal Bays (Fig. 1b), and only three blocks had possible or probable breeding bird occurrences.

#### Nest Success

Overall, 38 chicks successfully fledged during the 2003 breeding season. The estimated number of chicks fledged per nest was 0.45 (Table 1). We observed 38 nests where at least one egg hatched, and in 25 cases at least one chick fledged. Of the 21 nests for which unambiguous determinations were made, 12 nest failures were due to overwash, eight to avian or mammalian predation, and one to human disturbance.

Both hatching and fledging success were greater in the Chesapeake Bay than in the Coastal Bays. In the Chesapeake Bay, hatching was successful at 51% of nest sites, while in the Coastal Bay hatching success was observed at 39% of nest sites. Fledging success was significantly associated with nesting region ( $\chi^2_1 = 3.9$ ,  $P < 0.05$ ), with 44% of Chesapeake nests and 17% of Coastal Bay nests successfully fledging. Of the 20 successful Chesapeake nests, 19 were located on island complexes  $\geq 5$  km from the mainland.

#### Nest Site Characteristics

The most frequently used habitat types for nesting were beaches (34%), salt marsh (33%) and micro-beaches (27%) (Table 2). The most commonly used landscape types for nesting were small islands (45%); large islands (32%); and large island peninsula tips (16%) (Table 2). There were no significant regional differences (Chesapeake Bay vs. Coastal Bays) in the number of nests per habitat type or landscape type. Overall hatching and fledging success were significantly associated only with landscape type (Hatch  $\chi^2_2 = 16.6$ ,  $P < 0.001$ ; Fledge  $\chi^2_2 = 11.9$ ,  $P < 0.01$ ). Both measures of nest success were positively associated with large islands and negatively associated with large island peninsula tips.

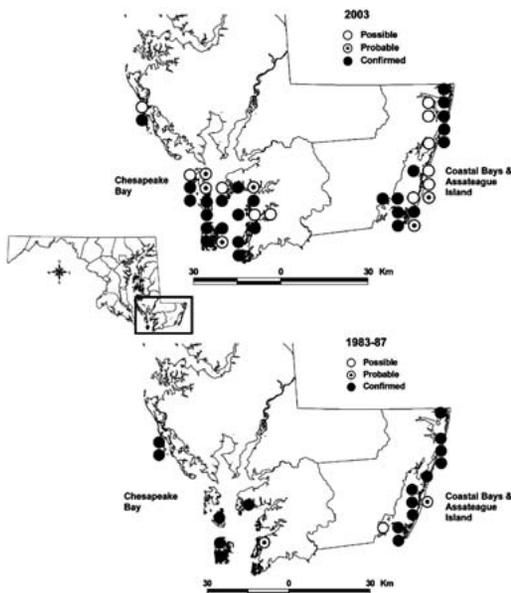


Figure 1. Maryland's lower Eastern Shore showing Breeding Bird Atlas blocks with American Oystercatcher locations in 2003 (above) and 1983-87 (below).

**Table 1. Hatching and fledging success of American Oystercatchers in Maryland during the 2003 breeding season.**

Region	No. of pairs <sup>1</sup>	No. of nests (renests)	No. of nests w/ hatchlings	No. of nests with fledglings	% hatched clutches fledged	No. of fledglings	No. of fledglings/nest
Chesapeake Bay	57	39 (6)	20	17	85	25	0.64
Coastal Bays	51	46 (7)	18	8	44	13	0.28
Total	108	85 (13)	38	25	66	38	0.45

<sup>1</sup>Includes both breeding and non-breeding.

## DISCUSSION

There is no evidence of a recent decline in breeding numbers of American Oystercatchers in Maryland. During 2003, a total of 108 breeding pairs were observed, of which at least 72 nested, compared to an estimated 50-75 pairs during the first Maryland breeding bird atlas in 1983-87. The number of Maryland atlas blocks with confirmed breeding records increased from 16 during 1983-87 to 26 in 2003 (Figs. 1a-b). However, the extent of the species' breeding range in the state has essentially remained unchanged during the past 20 years with no substantial shift or expansion. The ten additional atlas blocks in 2003 reflect an in-filling of blocks within a larger, already established breeding range; an artifact, no doubt, of greater survey effort and possibly a greater number of breeding pairs in this part of the Chesapeake Bay. These findings indicate that the state's breeding numbers have remained fairly stable or even increased during the past 20 years.

Most oystercatcher nests in Maryland occurred on salt marsh islands and not on the barrier island of Assateague. Nests were located on sand and/or shell beaches of varying length and width that were bordered by salt marsh. Nests also occurred in salt marshes along wrack lines and in small scrub patches. Such plasticity in nesting habitat selection, and an apparent shift away from barrier islands is being increasingly reported for both the American Oystercatcher (McNair 1988; Lauro and Burger 1989; Shields and Parnell 1990; Toland 1992; Nol and Humphrey 1994, McGowan *et al.* 2005) and European Oystercatcher (*H. ostralegus*) (Heppleston 1972; Briggs 1984; Munro 1984). Lauro and Burger (1989) suggested that a shift to marsh nesting may have been responsible for the reestablishment of oystercatchers in New England during recent decades. A 2003 breeding season study of oystercatcher abundance in Virginia found dramatically higher numbers than previously reported due in large part to the number of birds found breeding on salt

**Table 2. Nest site characteristics of American Oystercatchers in Maryland during the 2003 breeding season.**

Nest site characteristics	Chesapeake Bay			Coastal Bays		
	No. of nests	No. of nests w/hatchlings	No. of nests w/fledglings	No. of nests	No. of clutches hatched	No. of nests w/fledglings
<b>Landscape Type</b>						
Large island	14	11	9	13	9	3
Large island, peninsula	10	1	0	4	1	1
Small island	14	8	8	24	6	3
Barrier island	0	0	0	3	1	3
<b>Habitat Type</b>						
Beach	17	8	6	12	8	3
Micro-beach	7	4	3	16	4	2
Salt marsh	12	8	8	16	4	1
Other	3	0	0	2	2	2

marsh islands throughout Virginia's seaside lagoon system (Wilke 2005).

Landscape type proved to be the only variable that was significantly associated with statewide nest success. Both hatching and fledging success were negatively associated with large island peninsula tips and positively associated with large island, non-peninsula tips. It is likely that peninsula tips were more prone to overwash events. Other studies have shown that overwash is one of the main causes of oystercatcher nest loss (Nol 1989; Davis *et al.* 2001) and that nests placed on higher sites have greater reproductive success (Lauro and Burger 1989). Although we were unable to visit many nest sites with enough frequency to accurately determine the cause of nest failure, our limited data and field observations suggest that small islands and large island peninsula tips were washed over more frequently than large island, non-peninsula tips.

Nest success rate was significantly lower in the Coastal Bays than in the Chesapeake Bay (39% vs. 51%, respectively) even though similar numbers of oystercatchers nested in the two regions and there were no differences in nest placement at the habitat and landscape scale. Reasons for the regional differences in nest success are unclear. Predation pressure, coastal development, and human disturbance have all been suggested as primary factors determining site selection and nest success in breeding oystercatchers (DeGange 1978; Lauro and Burger 1989; Nol and Humphrey 1994; Davis *et al.* 2001, McGowan 2005). None of these factors appeared to entirely explain the regional differences in nest success in Maryland. In the Coastal Bays, most oystercatchers nested on salt marsh islands that were too small and isolated to support mesocarnivore nest predators (pers. obs.). Lauro and Burger (1989) also suggested that predation rates were lower on marsh islands. Assateague Island, a large barrier island in the Coastal Bays region, was an exception, where National Park Service staff believed that Red Fox (*Vulpes vulpes*) predation resulted in nearly complete oystercatcher nest failure on the north end of the island (J. Kumer, pers. comm.). However the few (3) breeding sites found on As-

sateague were not included in nest success analyses for the Coastal Bays region due to lack of survey effort. In the Chesapeake Bay region, mesocarnivore nest predators (Red Fox and Raccoon) are present on the larger islands, but little is known about their densities or the extent to which they may use areas where oystercatchers nest. These islands not only supported over 60% of the oystercatcher breeding localities in this region, but nest success was also relatively high in some areas.

The extent to which regional differences in coastal development and human disturbance may have influenced nest success were equally inconclusive, as evidenced by oystercatchers nesting in the Coastal Bays around Ocean City, a high density commercial/residential summer resort town immediately north of Assateague Island. Although the waters and islands in and around this area receive heavy recreational activity, 57% of the oystercatchers nesting in the Coastal Bays occurred in this area. Further, one of the most productive areas in the Coastal Bays in terms of nest success was found adjacent to the primary bridge leading to Ocean City, and in the middle of this region's most heavily used waterway. In contrast, the lower Chesapeake Bay islands and shorelines, where nest success rates were also relatively high, are much more remote and experience considerably less human disturbance.

Further investigation of the possible role that habitat features might play in regional differences in nest success will require more precise, quantified measurements. Other potential contributing factors include regional differences in tidal fluctuation and food availability. On Smith Island, where both breeding density and nest success were high, the large numbers of apparently non-breeding oystercatchers raises questions about the possible influence that these birds might have on reproductive success through increased vigilance and in assisting breeding pairs in the care of nests and young.

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