

Combustion Permit by Rule (PBR) GUIDANCE
Department of Environmental Quality (DEQ)
Section III: Coastal Avian Protection Zone (CAPZ) Narrative

(NOTE: The interactive CAPZ map is posted on the [Coastal GEMS website](#))

Table of Contents

CAPZ Map	1
CAPZ Criteria and Boundaries	1
CAPZ Map Availability.....	2
ZONE I	3
Supporting Literature	3
ZONE 2	4
Supporting Literature	4
ZONE 3	5
Supporting Literature	5
ZONE 4	8
Supporting Literature	8
ZONE 5	10
Supporting Literature	10
ZONE 10	12
Supporting Literature	12
ZONE 11	14
Supporting Literature	14
ZONE 12	15
Supporting Literature	15
ZONE 14	17
Supporting Literature	17

CAPZ Map

The Coastal Avian Protection Zone (CAPZ) map was created in 2010 to assist small renewable energy project applicants wishing to construct and operate projects in Virginia's coastal areas in the identification of those zones that are critically important to avian resources. Virginia's small renewable energy permit by rule regulations are administered by the Virginia Department of Environmental Quality (DEQ).

The CAPZ map was the result of a collaborative effort by the Center for Conservation Biology at the College of William and Mary and Virginia Commonwealth University, the Virginia Department of Game and Inland Fisheries (DGIF), the Virginia Coastal Zone Management Program (CZM) and the Virginia Department of Conservation and Recreation – Natural Heritage Program (DCR-NH). The effort was conducted under the auspices of DEQ's Offshore/Coastal Wind Regulatory Advisory Panel as part of DEQ's rulemaking for the Small Renewable Energy Projects (Wind) Permit by Rule Regulation (9 VAC 15-40). The information provided in this document reflects the portion of the work that is applicable to Small Renewable Energy Projects (Combustion), as set forth in the Combustion Permit by Rule (PBR) Regulation (9VAC15-70). The underlying information used to develop the CAPZ map came from a number of existing data sources, and represents the synthesis of years of field research by a variety of agencies and institutions that are presented and summarized in reports and peer-reviewed publications, some of which are provided on the following pages.

The Combustion PBR requires, pursuant to 9VAC15-70-60 B 3, that projects located in part or in whole within zones 1, 2, 3, 4, 5, 10, 11, 12, or 14 on the CAPZ map shall contribute \$1000 per megawatt of rated capacity, or partial megawatt thereof, to a fund in support of research investigating impacts of projects in CAPZ on avian resources. This requirement is less encompassing than the requirements for wind projects in CAPZ. Accordingly, where possible, information relating specifically to wind projects, or to CAPZ zones not addressed by the Combustion PBR, has been removed from the original CAPZ Narrative developed for the Wind PBR. (The original information concerning all CAPZ may be found under the Wind PBR Guidance.)

The information below is being provided only to explain why it was deemed important to include these CAPZ in the Combustion PBR. It is **for informational purposes only**. Applicants for the Combustion PBR are not required to perform any analyses – only to determine whether their project is located in one of the specified zones and then to contribute monetarily to the CAPZ research fund if and as applicable.

CAPZ Criteria and Boundaries

The CAPZ boundaries were determined using a variety of criteria, the majority of which were based on known avian occurrences substantiated by previous or ongoing studies as listed in the supporting literature noted in the descriptions of each CAPZ. The boundaries for CAPZ 1 and 2 were designed to encompass all nearshore waters that fall under the Commonwealth's jurisdiction except for the mouth of the Chesapeake Bay. The exclusion of the mouth of the Bay was based on its likely, but unknown, significance to seabirds and sea ducks and its requirement for field studies. CAPZ 1 and 2 do not require field studies because both are known to serve as a major migratory corridor for a variety of species. The delineation between the two zones is based primarily on the fact that migratory bird densities along the very nearshore fringe (CAPZ 2) are likely to be higher than the density of birds occurring farther offshore, but still within state waters (CAPZ 1). Moreover, CAPZ 2 is likely to harbor foraging breeding birds, including Threatened and Endangered (T&E) species, thereby extending the

season of high avian use to year round. By contrast, CAPZ 1 is likely to have the highest avian use during the non-breeding season.

CAPZ 3, 4, 9, 10, 11 and 14 encompass lands and waters that have been designated as “Important Bird Areas” by the National Audubon Society for their local, regional, continental or global importance to birds. It should be noted that the 100 meter offshore buffer for CAPZ 3 includes foraging habitat for beach nesting shorebirds and seabirds breeding on the barrier islands which feed in the intertidal zone and over open nearshore waters, respectively. CAPZ 5 boundaries encompass the remaining upland portion of the Delmarva Peninsula, which is within the migratory pathway of migrant landbirds and is known to support breeding Bald Eagles. The delineations of CAPZ 6, 7, 8, and 13 encompass lands and waters considered to be important to birds but for which there are not enough data to indicate their overall significance to avian resources and/or to steer mitigation actions. Lastly, the boundaries for CAPZ 12 were established to protect a significant number of breeding Bald Eagles known to nest on the outer fringes of the lower, middle and northern peninsulas.

CAPZ Map Availability

The CAPZ map was generated using DEQ’s Coastal GEMS geospatial data system (9 VAC 15-40-120 B 1) and will ultimately be made available for direct access by applicants who are proposing to locate a small renewable energy project in Virginia’s coastal areas; however, currently an applicant interested in obtaining original datasets must do so by contacting the Coastal Zone Management Program directly:

Laura McKay
629 East Main Street
Richmond, VA 23219
Phone: (804) 698-4323
Fax: (804) 698-4319
Email: laura.mckay@deq.virginia.gov

Additional information can be found through DGIF and DCR-NH at the following websites: Virginia Department of Game and Inland Fisheries Fish and Wildlife Information Services: <http://vafwis.org/fwis/>.

Virginia Department of Conservation and Recreation Natural Heritage Program Resource Information: http://www.dcr.virginia.gov/natural_heritage/infoservices.shtml#lists

Disclaimer:

This document is provided as Guidance and, as such, sets forth standard operating procedures for the agency. It does not mandate any particular method nor does it prohibit any alternative method. If alternative proposals are made, such proposals should be reviewed and accepted or denied based on their technical adequacy and compliance with appropriate laws and regulations.

ZONE I

Zone 1: Nearshore waters extending 1 - 4.83 km (0.62 - 3 mi) from Virginia's ocean-facing shoreline, excluding the mouth of the Chesapeake Bay. In this zone, the relevant avian species and other avian mitigation factors are: T&E species (migratory Piping Plovers, Wilson's Plovers, Peregrine Falcons, Gull-billed Terns, and Roseate Terns); hemispherically important migratory corridor for shorebirds, seabirds and waterfowl; and hemispherically important migratory staging area and wintering area for seabirds and waterfowl.

Supporting Literature

- Forsell, D. 2003. Special Report on the distribution and abundance of wintering seaducks and waterbirds in Mid-Atlantic Coastal waters emphasizing the mouth of the Chesapeake Bay. U.S. Fish and Wildlife Service, Chesapeake Bay Field Office, Annapolis, MD. 10 Pp.
- Stucker, J.H., F.J Cuthbert, B. Winn, B.L. Noel, S.B. Maddock, P.R.Leary, J. Cordes, and L.C. Wemmer. 2010. Distribution of Non-Breeding Great Lakes Piping Plovers (*Charadrius melodus*) along Atlantic and Gulf of Mexico Coastlines: Ten Years of Band Sightings. *Waterbirds* 33(1): 22-32.
- US Fish and Wildlife Service. 2009. Piping Plover (*Charadrius melodus*) 5-Year Review: Summary and Evaluation. Northeast Region, Hadley, MA and the Midwest Region's East Lansing Field Office, MI. 206 Pp.
- Watts, B. D. 2010. Wind and waterbirds: Establishing sustainable mortality limits within the Atlantic Flyway. Center for Conservation Biology Technical Report Series, CCBTR-10-05. College of William and Mary/Virginia Commonwealth University, Williamsburg, VA. 43 pp.
- Williams, J. W. and B. J. Paxton. 2004a. The Fall 2003 Capes Charles, Virginia Sea bird Watch. Center for Conservation Biology Technical Report Series, CCBTR-04-16. College of William and Mary, Williamsburg, VA. 19 p.
- Williams, J. W. and B. J. Paxton. 2004b. The Spring 2004 Capes Charles, Virginia Seabird Watch. Center for Conservation Biology Technical Report Series, CCBTR-04-17. College of William and Mary, Williamsburg, VA. 18 p.

ZONE 2

Zone 2: Nearshore waters that extend from Virginia's ocean-facing shoreline out to 1 km (0.62 mi), excluding the mouth of the Chesapeake Bay. In this zone, the relevant avian species and other avian mitigation factors are: T&E species (migratory and breeding Piping Plovers, Wilson's Plovers, Peregrine Falcons and Gull-billed Terns, and migratory Roseate Terns) and hemispherically important migratory corridor, migratory staging area, and wintering area for shorebirds, seabirds and waterfowl.

Supporting Literature

- Boettcher, R., T. Penn, R.R. Cross, K.T. Terwilliger, and R.A. Beck. 2007. An overview of the status and distribution of Piping Plovers in Virginia. *Waterbirds* 30(sp1): 138-151.
- Boettcher, R. and A.L. Wilke. 2009. 2008 Colonial Waterbird Breeding Status on Virginia's Barrier Islands. Final report to the Virginia Department of Conservation and Recreation Division of Natural Heritage, Nassawadox, VA. 23 Pp.
- Cohen, J.B., S.M. Karpanty, J.D. Fraser, B.D. Watts, and B.R. Truitt. 2009. Residence probability and population size of Red Knots during spring stopover in the mid-Atlantic Region of the United States. *Journal of Wildlife Management*. Vol. 73 (6): 939-945.
- Forsell, D. 2003. Special Report on the distribution and abundance of wintering seaducks and waterbirds in Mid-Atlantic Coastal waters emphasizing the mouth of the Chesapeake Bay. U.S. Fish and Wildlife Service, Chesapeake Bay Field Office, Annapolis, MD. 10 Pp.
- Stucker, J.H., F.J. Cuthbert, B. Winn, B.L. Noel, S.B. Maddock, P.R. Leary, J. Cordes, and L.C. Wemmer. 2010. Distribution of Non-Breeding Great Lakes Piping Plovers (*Charadrius melodus*) along Atlantic and Gulf of Mexico Coastlines: Ten Years of Band Sightings. *Waterbirds* 33(1): 22-32.
- US Fish and Wildlife Service. 2009. Piping Plover (*Charadrius melodus*) 5-Year Review: Summary and Evaluation. Northeast Region, Hadley, MA and the Midwest Region's East Lansing Field Office, MI. 206 Pp.
- Watts, B. D. 2010. Wind and waterbirds: Establishing sustainable mortality limits within the Atlantic Flyway. Center for Conservation Biology Technical Report Series, CCBTR-10-05. College of William and Mary/Virginia Commonwealth University, Williamsburg, VA. 43 pp.
- Williams, J. W. and B. J. Paxton. 2004a. The Fall 2003 Capes Charles, Virginia Sea bird Watch. Center for Conservation Biology Technical Report Series, CCBTR-04-16. College of William and Mary, Williamsburg, VA. 19 p.
- Williams, J. W. and B. J. Paxton. 2004b. The Spring 2004 Capes Charles, Virginia Seabird Watch. Center for Conservation Biology Technical Report Series, CCBTR-04-17. College of William and Mary, Williamsburg, VA. 18 p.

ZONE 3

Zone 3: Barrier island/seaside lagoon system, including a 100 m (328 ft) offshore buffer. In this zone, the relevant avian species and other avian mitigation factors are: T&E species (breeding and migratory Piping Plovers, Wilson's Plovers, Gull-billed Terns, Peregrine Falcons and Bald Eagles, and hemispherically important staging area and wintering area for shorebirds, seabirds and waterfowl.

Supporting Data: Mid-winter aerial waterfowl survey counts conducted each year in early January, 1998 - 2010(file name: MidwinterSurvey_all yrs.xls) These data are available at the Virginia Department of Game and Inland Fisheries Fish and Wildlife Information Services <http://vafwis.org/fwis/>. **Caution:** The purpose of these data is to confirm the presence of wintering waterfowl in Virginia's coastal waters and to provide some measure of species diversity within relevant CAPZ. They should not be used to estimate and/or draw inferences about waterfowl population trends.

Supporting Literature

- Boettcher, R., T. Penn, R.R. Cross, K.T. Terwilliger, and R.A. Beck. 2007. An overview of the status and distribution of Piping Plovers in Virginia. *Waterbirds* 30(sp1): 138-151.
- Boettcher, R. and A.L. Wilke. 2009. 2008 Colonial Waterbird Breeding Status on Virginia's Barrier Islands. Final report to the Virginia Department of Conservation and Recreation Division of Natural Heritage, Nassawadox, VA. 23 Pp.
- Brinker, D. F., B. Williams, B. D. Watts, and R. M. Erwin. 2007. Colonial nesting seabirds in the Chesapeake Bay region: where have we been and where are we going? *Waterbirds* 30:93-104.
- Center for Conservation Biology. 2010. Virginia eagle nest locator. <http://www.ccb-wm.org/virginiaeagles/locator.php>
- Cohen, J.B., S.M. Karpanty, J.D. Fraser, B.D. Watts, and B.R. Truitt. 2009. Residence probability and population size of Red Knots during spring stopover in the mid-Atlantic Region of the United States. *Journal of Wildlife Management*. Vol. 73 (6): 939-945.
- Mojica, E.K., B.D. Watts, and S.M. Padgett. 2010. Virginia Peregrine Falcon monitoring and management program: Year 2010 report. Center for Conservation Biology Technical Report Series, CCBTR-10-10. College of William and Mary & Virginia Commonwealth University, Williamsburg, VA. 21 pp.
- Molina, K.C. and M. Erwin. 2006. The Distribution and conservation status of the Gull-billed Tern (*Gelochelidon nilotica*) in North America. *Waterbirds* Vol. 29(3): 271-295.
- Smith, F.M., A. E. Duerr, B.J. Paxton and B.D. Watts. 2008. An Investigation of Stopover Ecology of the Red Knot on the Virginia Barrier Islands. Center for Conservation Biology Technical Report Series, CCBTR-07-14. College of William and Mary, Williamsburg, VA. 35pp.

- Smith, F.M., B. D. Watts, and A.E. Duerr. 2009. Migration Ecology of the Whimbrel: Fall 2009 Report. Center for Conservation Biology Technical Report Series, CCBTR-09-13. College of William and Mary & Virginia Commonwealth University, Williamsburg, VA. 27 pp.
- Stucker, J.H., F.J. Cuthbert, B. Winn, B.L. Noel, S.B. Maddock, P.R. Leary, J. Cordes, and L.C. Wemmer. 2010. Distribution of Non-Breeding Great Lakes Piping Plovers (*Charadrius melodus*) along Atlantic and Gulf of Mexico Coastlines: Ten Years of Band Sightings. *Waterbirds* 33(1): 22-32.
- Truitt, B.R. and D.J. Schwab. 2001. 1998 Eastern Shore seaside barrier island/lagoon colonial waterbird survey. *The Raven* Vol. 72(2): 126-131.
- US Fish and Wildlife Service. 2009. Piping Plover (*Charadrius melodus*) 5-Year Review: Summary and Evaluation. Northeast Region, Hadley, MA and the Midwest Region's East Lansing Field Office, MI. 206 Pp.
- Watts, B. D. 1994. Distribution of colonial waterbirds on the Eastern Shore of Virginia: Implications for beneficial uses of dredge material. Center for Conservation Biology Technical Report, CCBTR-94-04. College of William and Mary, Williamsburg, VA. 92pp.
- Watts, B. D. 2006. Synthesizing information resources for the Virginia Important Bird Area Program: Phase I Delmarva Peninsula and tidewater. Center for Conservation Biology Technical Report Series, CCBTR-06-05. College of William and Mary, Williamsburg, VA. 70 pp.
- Watts, B. D. 2010. Wind and waterbirds: Establishing sustainable mortality limits within the Atlantic Flyway. Center for Conservation Biology Technical Report Series, CCBTR-10-05. College of William and Mary/Virginia Commonwealth University, Williamsburg, VA. 43 pp.
- Watts, B. D., D. S. Bradshaw, and R. R. Cross. 1996. Annual Plover survey of the Virginia Barrier Islands: A ten year summary. *The Raven* 67: 84-89
- Watts, B. D. and B. R. Truitt. 2001. Abundance of shorebirds along the Virginia Barrier Islands during spring migration. *The Raven* 71: 1-12.
- Watts, B. D. and S. J. Rottenborn. 2002. Status of breeding Northern Harriers in coastal Virginia. *The Raven* 72:153-157.
- Watts, B. D., S. M. Padgett, M. A. Byrd, B. J. Paxton, and Jeffrey L. Cooper. 2002. FALCONTRAK: Year 2001 report. Center for Conservation Biology Technical Report Series. CCBTR-02-06. College of William and Mary, Williamsburg, VA. 46pp.
- Watts, B. D. and B. J. Paxton. 2004. Digital atlas of colonial waterbirds in coastal Virginia: 2003 breeding season. CCBTR-04-05. Center for Conservation Biology, College of William and Mary, Williamsburg, VA.
- Watts, B. D. 2004. Status and distribution of colonial waterbirds in coastal Virginia: 2003 breeding season. CCBTR-04-06. Center for Conservation Biology, College of William and Mary, Williamsburg, VA 25 pp.

- Watts, B. D., B. J. Paxton. 2009. Status and distribution of colonial waterbirds in coastal Virginia: 2008 breeding season. CCBTR-09-03. Center for Conservation Biology, College of William and Mary/Virginia Commonwealth University, Williamsburg, VA 21 pp.
- Watts, B. D. and M. A. Byrd. 1998. Status and distribution of colonial waterbirds in coastal Virginia. *The Raven* 69:20-31.
- Watts, B. D. and M. A. Byrd. 2006. Status and distribution of colonial waterbirds in coastal Virginia: The 2003 breeding season. *The Raven* 77:3-22.
- Watts, B. D. and M. A. Byrd 2010. Virginia bald eagle nest and productivity survey: Year 2010 report. Center for Conservation Biology Technical Report Series, CCBTR-10-09. College of William and Mary and Virginia Commonwealth University, Williamsburg, VA. 40 pp.
- Watts, B. D., B. R. Truitt, F. M. Smith, E. K. Mojica, B. J. Paxton, A. L. Wilke, and A. E. Duerr. 2008. Whimbrel tracked with satellite transmitter on migratory flight across North America. *Wader Study Group Bulletin* 115:55-57.
- Watts, B. D. and B. R. Truitt. 2010. Decline of whimbrels within a mid-Atlantic staging area (1994-2009). *Waterbirds*, In Press.
- Wilke, A. L., B.D. Watts, B.R. Truitt and R. Boettcher. 2005. Breeding season status of the American Oystercatcher in Virginia, USA. *Waterbirds* 28(3): 308-315.
- Wilke, A.L., R. Boettcher, and C. Smith. 2009. 2008 Piping Plover, Wilson's Plover and American Oystercatcher Breeding Status in Virginia. Final Report submitted to the Virginia Department of Conservation and Recreation Division of Natural Heritage, Nassawadox, VA. 23 Pp.
- Williams, B., D. F. Brinker, B. D. Watts, and R. M. Erwin. 2007. The status of colonial nesting wading bird populations within the Chesapeake Bay and coastal barrier island lagoon system. *Waterbirds* 30:82-92.
- Wilson, M. D., B. D. Watts, and J. E. LeClerc. 2007. Assessing habitat stability for disturbance-prone species by evaluating landscape dynamics along the Virginia barrier islands. Center for Conservation Biology Technical Report Series, CCBTR-07-06. College of William and Mary, Williamsburg, VA. 47pp.
- Wilson, M. D., B. D. Watts, and F. M. Smith. 2009. Status and Distribution of Black Rails in Virginia. Center for Conservation Biology Technical Report Series, CCBTR-0-010. College of William and Mary and Virginia Commonwealth University. Williamsburg, VA. 22 pp.

ZONE 4

Zone 4: Southern end of the Delmarva Peninsula (mainland only), including a 10 km long (6.21 mi) strip along the western (bayside) fringe of peninsula that extends from Wise Point to (and including) Savage Neck. In this zone, the relevant avian species and other avian mitigation factors are: T&E species (migratory Peregrine Falcons and breeding and migratory Bald Eagles), the designation as an Important Bird Area, and hemispherically important migratory staging area for passerines and other landbirds.

Supporting Literature

- Center for Conservation Biology. 2010. Virginia eagle nest locator. <http://www.ccb-wm.org/virginiaeagles/locator.php>
- Lukei, R. F., Jr. and M. A. Byrd. 2001. Lower Delmarva Peninsula raptor migration study: Year 2000 report. Center for Conservation Biology Technical Report CCBTR-01-01, College of William and Mary: 10 pp.
- Lukei, R. F., Jr. and M. A. Byrd. 2002. Trapping and banding of raptors on the Eastern Shore of Virginia: September 5 - December 2, 2001. Center for Conservation Biology Technical Report CCBTR-02-01, College of William and Mary: 16 pp.
- Paxton, B. J. and B. D. Watts. 2000. Investigation of grassland/shrubland migrants on the lower Delmarva Peninsula. Center for Conservation Biology Technical Report CCBTR-00-03, College of William and Mary: 23 pp.
- Paxton, B. J. and B. D. Watts. 2001. Fall stop-over ecology of neotropical migrants: Are inner or outer coastal habitats energy sources for migrants. Center for Conservation Biology Research Report Series, CCBTR-01-11. College of William and Mary, Williamsburg, VA.
- Watts, B. D. 2006. Synthesizing information resources for the Virginia Important Bird Area Program: Phase I Delmarva Peninsula and tidewater. Center for Conservation Biology Technical Report Series, CCBTR-06-05. College of William and Mary, Williamsburg, VA. 70 pp.
- Watts, B. D. and S. E. Mabey. 1993. Spatio-temporal patterns of landbird migration on the lower Delmarva Peninsula. Center for Conservation Biology Technical Report CCBTR-93-01, College of William and Mary.
- Watts, B. D. and S. E. Mabey. 1994. Migratory landbirds of the lower Delmarva: Habitat selection and geographic distribution. Center for Conservation Biology Technical Report CCBTR-94-05, College of William and Mary: 101 pp.
- Watts, B. D. and S. E. Mabey. 1994. Northampton migratory bird habitat utilization study: Year two. Center for Conservation Biology Technical Report CCBTR-94-02, College of William and Mary: 16 pp.
- Watts, B. D., M. D. Wilson, and D. S. Bradshaw. 1997. Habitat requirements of early successional bird communities: Management implications for mid-Atlantic region. Center

- for Conservation Biology Technical Report, CCBTR-97-03. College of William and Mary, Williamsburg, VA. 62pp.
- Watts, B. D. and S. J. Rottenborn. 2002. Status of breeding Northern Harriers in coastal Virginia. *The Raven* 72:153-157.
- Watts, B. D. and B. J. Paxton. 2004. Digital atlas of colonial waterbirds in coastal Virginia:2003 breeding season. CCBTR-04-05. Center for Conservation Biology, College of William and Mary, Williamsburg, VA.
- Watts, B. D. 2004. Status and distribution of colonial waterbirds in coastal Virginia: 2003 breeding season. CCBTR-04-06. Center for Conservation Biology, College of William and Mary, Williamsburg, VA 25 pp.
- Watts, B. D., B. J. Paxton, and Z. Smith. 2004. Raptor trapping at Wise Point Station: Year 2003 report. Center for Conservation Biology Technical Report Series, CCBTR-04-02. College of William and Mary, Williamsburg, VA. 24 pp.
- Watts, B. D. and M. A. Byrd 2010. Virginia bald eagle nest and productivity survey: Year 2010 report. Center for Conservation Biology Technical Report Series, CCBTR-10-09. College of William and Mary and Virginia Commonwealth University, Williamsburg, VA. 40 pp.
- Watts, B. D. and M. A. Byrd 2010. Virginia bald eagle nest and productivity survey: Year 2010 report. Center for Conservation Biology Technical Report Series, CCBTR-10-09. College of William and Mary and Virginia Commonwealth University, Williamsburg, VA. 40 pp.
- Watts, B. D. and S. E. Mabey. 2010. Relationship between vegetation volume and fall migrants along the lower Delmarva Peninsula. *Wilson Journal of Ornithology*, In Press.
- Watts, B. D., G. D. Therres, and M. A. Byrd. 2007. Status, distribution and the future of Bald Eagles in the Chesapeake Bay. *Waterbirds* 30:25-38.
- Watts, B. D., G. D. Therres, and M. A. Byrd. 2008. Recovery of the Chesapeake Bay bald eagle nesting population. *Journal of Wildlife Management* 72:152-158.
- Whalen, D. M. and B. D. Watts. 2002. Annual migration density and stopover patterns of Northern Saw-whet Owls (*Aegolius acadicus*). *Auk* 119:1161-2002.
- Whalen, D. M., B. D. Watts, M. D. Wilson, and D. S. Bradshaw. 1997. Magnitude and timing of the fall migration of Northern Saw-whet Owls through the Eastern Shore of Virginia, 1994-1996. *The Raven* 68:97-104.
- Wilson, M. D. and B. D. Watts. 1997. Autumn migration of Gray-cheeked and Bicknell's Thrushes at Kiptopeke, Virginia, USA. *Journal of Field Ornithology* 68:519-525
- Wilson, M. D., B. D. Watts, and D. F. Brinker. 2007. Status review of Chesapeake Bay marsh lands and breeding marsh birds. *Waterbirds* 30:122-137.

ZONE 5

Zone 5: Delmarva Peninsula, excluding zones 3 and 4. In this zone, the relevant avian species and other avian mitigation factors are: T&E species (breeding Bald Eagles) and regionally to hemispherically important fall migratory staging area for landbirds.

Supporting Literature

- Center for Conservation Biology. 2010. Virginia eagle nest locator. <http://www.ccb-wm.org/virginiaeagles/locator.php>
- Smith, F. M., B. D. Watts, and B. J. Paxton. 2010. Autumn Migration of the Northern Saw-whet Owl on the Lower Delmarva Peninsula: Fall 2010 Report. Center for Conservation Biology Technical Report Series, CCBTR-10-12. College of William and Mary & Virginia Commonwealth University, Williamsburg, VA. 17 pp.
- Lukei, R. F., Jr. and M. A. Byrd. 2001. Lower Delmarva Peninsula raptor migration study: Year 2000 report. Center for Conservation Biology Technical Report CCBTR-01-01, College of William and Mary: 10 pp.
- Mabey, S. E. and B. D. Watts. 2000. Conservation of landbird migrants: Addressing local policy. *Studies in Avian Biology*, 20:99-108.
- Mabey, S. E., B. J. Paxton, B. D. Watts, F. M. Smith, D. Dawson, and B. R. Truitt. 2007. Baseline assessment of neotropical migrant landbird stopover habitat in the lower Chesapeake Bay region for conservation planning and protection. Final report to USGS. College of William and Mary, Williamsburg, VA 63 pp.
- Mojica, E.K., B.D. Watts, and S.M. Padgett. 2010. Virginia Peregrine Falcon monitoring and management program: Year 2010 report. Center for Conservation Biology Technical Report Series, CCBTR-10-10. College of William and Mary & Virginia Commonwealth University, Williamsburg, VA. 21 pp.
- Watts, B. D., S. M. Padgett, M. A. Byrd, B. J. Paxton, and Jeffrey L. Cooper. 2002. FALCONTRAK: Year 2001 report. Center for Conservation Biology Technical Report Series. CCBTR-02-06. College of William and Mary, Williamsburg, VA. 46pp.
- Watts, B. D. and B. J. Paxton. 2004. Digital atlas of colonial waterbirds in coastal Virginia:2003 breeding season. CCBTR-04-05. Center for Conservation Biology, College of William and Mary, Williamsburg, VA.
- Watts, B. D. and S. E. Mabey. 1994. Migratory landbirds of the lower Delmarva: Habitat selection and geographic distribution. Center for Conservation Biology Technical Report CCBTR-94-05, College of William and Mary: 101 pp.
- Watts, B. D. and S. E. Mabey. 1994. Northampton migratory bird habitat utilization study: Year two. Center for Conservation Biology Technical Report CCBTR-94-02, College of William and Mary: 16 pp.

- Watts, B. D. and B. J. Paxton. 2004. Digital atlas of colonial waterbirds in coastal Virginia:2003 breeding season. CCBTR-04-05. Center for Conservation Biology, College of William and Mary, Williamsburg, VA.
- Watts, B. D. 2004. Status and distribution of colonial waterbirds in coastal Virginia: 2003 breeding season. CCBTR-04-06. Center for Conservation Biology, College of William and Mary, Williamsburg, VA 25 pp.
- Watts, B. D. and M. A. Byrd 2010. Virginia bald eagle nest and productivity survey: Year 2010 report. Center for Conservation Biology Technical Report Series, CCBTR-10-09. College of William and Mary and Virginia Commonwealth University, Williamsburg, VA. 40 pp.
- Watts, B. D. and S. E. Mabey. 2010. Relationship between vegetation volume and fall migrants along the lower Delmarva Peninsula. *Wilson Journal of Ornithology*, In Press.
- Watts, B. D., G. D. Therres, and M. A. Byrd. 2007. Status, distribution and the future of Bald Eagles in the Chesapeake Bay. *Waterbirds* 30:25-38.
- Watts, B. D. and M. A. Byrd. 1998. Status and distribution of colonial waterbirds in coastal Virginia. *The Raven* 69:20-31.
- Watts, B. D. and M. A. Byrd. 2006. Status and distribution of colonial waterbirds in coastal Virginia: The 2003 breeding season. *The Raven* 77:3-22.
- Watts, B. D., G. D. Therres, and M. A. Byrd. 2008. Recovery of the Chesapeake Bay bald eagle nesting population. *Journal of Wildlife Management* 72:152-158.
- Whalen, D. M. and B. D. Watts. 2002. Annual migration density and stopover patterns of Northern Saw-whet Owls (*Aegolius acadicus*). *Auk* 119:1161-2002.
- Whalen, D. M., B. D. Watts, M. D. Wilson, and D. S. Bradshaw. 1997. Magnitude and timing of the fall migration of Northern Saw-whet Owls through the Eastern Shore of Virginia, 1994-1996. *The Raven* 68:97-104.
- Wilke, A. L., D. F. Brinker, B. D. Watts, A. H. Traut, R. Boettcher, J. M. McCann, B. R. Truitt, and P. P. Denmon. 2007. American Oystercatchers in Maryland and Virginia: Status and distribution. *Waterbirds* 30:152-162.
- Wilson, M. D. and B. D. Watts. 1997. Autumn migration of Gray-cheeked and Bicknell's Thrushes at Kiptopeke, Virginia, USA. *Journal of Field Ornithology* 68:519-525.
- Wilson, M. D., B. D. Watts, and D. F. Brinker. 2007. Status review of Chesapeake Bay marsh lands and breeding marsh birds. *Waterbirds* 30:122-137.
- Wilson, M. D., B. D. Watts, and F. M. Smith. 2009. Status and Distribution of Black Rails in Virginia. Center for Conservation Biology Technical Report Series, CCBTR-0-010. College of William and Mary and Virginia Commonwealth University. Williamsburg, VA. 22 pp.

ZONE 10

Zone 10: Upper reaches of the James, Rappahannock and Potomac rivers. In this zone, the relevant avian species and other avian mitigation factors are T&E species (breeding Bald Eagles and continentally important Bald Eagle concentration areas), the designation as Important Bird Areas, and locally to continentally important waterfowl wintering areas.

Supporting Literature

- Center for Conservation Biology. 2010. Virginia eagle nest locator. <http://www.ccb-wm.org/virginiaeagles/locator.php>
- Markham, A. C. and B. D. Watts. 2008. The influence of salinity on provisioning rates and nestling growth in bald eagles in the lower Chesapeake Bay. *Condor* 110:183-187.
- Markham, A. C. and B. D. Watts. 2008. The influence of salinity on the diet of nesting bald eagles. *Journal of Raptor Research* 42:99-109.
- Mojica, E.K., B.D. Watts, and S.M. Padgett. 2010. Virginia Peregrine Falcon monitoring and management program: Year 2010 report. Center for Conservation Biology Technical Report Series, CCBTR-10-10. College of William and Mary & Virginia Commonwealth University, Williamsburg, VA. 21 pp.
- Paxton, B. J. and B. D. Watts. 2001. Fall stop-over ecology of neotropical migrants: Are inner or outer coastal habitats energy sources for migrants. Center for Conservation Biology Research Report Series, CCBTR-01-11. College of William and Mary, Williamsburg, Va. 46 pp.
- Paxton, B. J. and B. D. Watts. 2003. Bird surveys of Lee and Hill Marshes on the Pamunkey River: Possible affects of sea-level rise on marsh bird communities. Center for Conservation Biology Technical Report Series. CCBTR-03-02. College of William and Mary, Williamsburg, VA 31 pp.
- Perry, M.C., A.M. Wells-Berlin, D.M. Kidwell, and P.C. Osenton. 2007. Temporal changes of populations and trophic relationships of wintering diving ducks in the Chesapeake Bay. *Waterbirds* Vol. 30 (sp 1): 4-16.
- Viverette, C. B., G. C. Garman, S. McIninch, A. C. Markham, B. D. Watts, and S. A. Macko. 2007. Finfish-waterbird trophic interactions in tidal freshwater tributaries of the Chesapeake Bay. *Waterbirds* 30:50-62.
- Watts, B. D. and S. Factor. 1994. Eagle investigations within the James River Concentration Area. Center for Conservation Biology Technical Report CCBTR-94-01, College of William and Mary: 13 pp.
- Watts, B. D. and D. M. Whalen. 1997. Interactions between Eagles and Humans in the James River Bald Eagle Concentration Area. Center for Conservation Biology Technical Report, CCBTR-97-02. College of William and Mary, Williamsburg, VA. 81pp.

- Watts, B. D. 1998. Investigation of bald eagles within the Rappahannock River Concentration Area. Center for Conservation Biology Technical Report CCBTR-98-02, College of William and Mary: 65 pp.
- Watts, B. D. and M. A. Byrd. 1999. Expansion of the James River Bald Eagle concentration area. *The Raven* 70: 18-23.
- Watts, B. D. and M. A. Byrd. 1998. Status and distribution of colonial waterbirds in coastal Virginia. *The Raven* 69:20-31.
- Watts, B. D. and B. J. Paxton. 2004. Digital atlas of colonial waterbirds in coastal Virginia:2003 breeding season. CCBTR-04-05. Center for Conservation Biology, College of William and Mary, Williamsburg, VA.
- Watts, B. D. 2004. Status and distribution of colonial waterbirds in coastal Virginia: 2003 breeding season. CCBTR-04-06. Center for Conservation Biology, College of William and Mary, Williamsburg, VA 25 pp.
- Watts, B. D. 2006. Synthesizing information resources for the Virginia Important Bird Area Program: Phase II Western Shore. Center for Conservation Biology Technical Report Series, CCBTR-06-13. College of William and Mary, Williamsburg, VA. 78 pp.
- Watts, B. D. and M. A. Byrd. 2006. Status and distribution of colonial waterbirds in coastal Virginia: The 2003 breeding season. *The Raven* 77:3-22.
- Watts, B. D., A. C. Markham, and M. A. Byrd. 2006. Salinity and population parameters of Bald Eagles (*Haliaeetus leucocephalus*) in the lower Chesapeake Bay. *Auk* 123:393-404.
- Watts, B. D., M. D. Wilson, F. M. Smith, B. J. Paxton, and J. B. Williams. 2008. Breeding range expansion of the Coastal Plain Swamp Sparrow. *The Wilson Journal of Ornithology* 120:393-395.
- Watts, B. D., G. D. Therres, and M. A. Byrd. 2007. Status, distribution and the future of Bald Eagles in the Chesapeake Bay. *Waterbirds* 30:25-38.
- Watts, B. D., G. D. Therres, and M. A. Byrd. 2008. Recovery of the Chesapeake Bay bald eagle nesting population. *Journal of Wildlife Management* 72:152-158.
- Watts, B. D. and M. A. Byrd 2010. Virginia bald eagle nest and productivity survey: Year 2010 report. Center for Conservation Biology Technical Report Series, CCBTR-10-09. College of William and Mary and Virginia Commonwealth University, Williamsburg, VA. 40 pp.
- Wilson, M. D., B. D. Watts, and D. F. Brinker. 2007. Status review of Chesapeake Bay marsh lands and breeding marsh birds. *Waterbirds* 30:122-137.

ZONE 11

Zone 11: Lower reaches of the Mattaponi and Pamunkey tributaries. In this zone, the relevant avian species and other avian mitigation factors are: T&E species (breeding Bald Eagles) and the designation as an Important Bird Area.

Supporting Literature

- Center for Conservation Biology. 2010. Virginia eagle nest locator. <http://www.ccb-wm.org/virginiaeagles/locator.php>
- Viverette, C. B., G. C. Garman, S. McIninch, A. C. Markham, B. D. Watts, and S. A. Macko. 2007. Finfish-waterbird trophic interactions in tidal freshwater tributaries of the Chesapeake Bay. *Waterbirds* 30:50-62.
- Watts, B. D. and M. A. Byrd. 1998. Status and distribution of colonial waterbirds in coastal Virginia. *The Raven* 69:20-31.
- Watts, B. D. and B. J. Paxton. 2004. Digital atlas of colonial waterbirds in coastal Virginia:2003 breeding season. CCBTR-04-05. Center for Conservation Biology, College of William and Mary, Williamsburg, VA.
- Watts, B. D. 2004. Status and distribution of colonial waterbirds in coastal Virginia: 2003 breeding season. CCBTR-04-06. Center for Conservation Biology, College of William and Mary, Williamsburg, VA 25 pp.
- Watts, B. D. 2006. Synthesizing information resources for the Virginia Important Bird Area Program: Phase II Western Shore. Center for Conservation Biology Technical Report Series, CCBTR-06-13. College of William and Mary, Williamsburg, VA. 78 pp.
- Watts, B. D. and M. A. Byrd. 2006. Status and distribution of colonial waterbirds in coastal Virginia: The 2003 breeding season. *The Raven* 77:3-22.
- Watts, B. D., A. C. Markham, and M. A. Byrd. 2006. Salinity and population parameters of Bald Eagles (*Haliaeetus leucocephalus*) in the lower Chesapeake Bay. *Auk* 123:393-404.
- Watts, B. D., G. D. Therres, and M. A. Byrd. 2007. Status, distribution and the future of Bald Eagles in the Chesapeake Bay. *Waterbirds* 30:25-38.
- Watts, B. D., G. D. Therres, and M. A. Byrd. 2008. Recovery of the Chesapeake Bay bald eagle nesting population. *Journal of Wildlife Management* 72:152-158.
- Watts, B. D. and M. A. Byrd 2010. Virginia bald eagle nest and productivity survey: Year 2010 report. Center for Conservation Biology Technical Report Series, CCBTR-10-09. College of William and Mary and Virginia Commonwealth University, Williamsburg, VA. 40 pp.
- Wilson, M. D., B. D. Watts, and D. F. Brinker. 2007. Status review of Chesapeake Bay marsh lands and breeding marsh birds. *Waterbirds* 30:122-137.

ZONE 12

Zone 12: Outer fringes of the lower, middle and northern peninsulas. In this zone, the relevant avian species and other avian mitigation factors are: T&E species (breeding Bald Eagles).

Supporting Data:

- 2009 monthly bird counts at Craney Island Dredge Material Management Area (file name: 2009CraneyIs_ebirdReports.xls)
- 2010 monthly bird counts at Craney Island Dredge Material Management Area (file name: 2010CraneyIs_ebirdReports.xls)

These data are available at the Virginia Department of Game and Inland Fisheries Fish and Wildlife Information Services <http://vafwis.org/fwis/> **Caution:** The purpose of these data is to confirm avian occurrences and provide some measure of species diversity at Craney Island Dredge Material Management Area which located in Zone 12. They should not be used to estimate and/or draw inferences about overall avian population trends in Zone 12.

Supporting Literature

- Brinker, D. F., B. Williams, B. D. Watts, and R. M. Erwin. 2007. Colonial nesting seabirds in the Chesapeake Bay region: where have we been and where are we going? *Waterbirds* 30:93-104.
- Center for Conservation Biology. 2010. Virginia eagle nest locator. <http://www.ccb-wm.org/virginiaeagles/locator.php>
- Watts, B. D. 1992. The influence of marsh size on marsh value for bird communities of the lower Chesapeake Bay. Center for Conservation Biology Technical Report, CCBTR-92-01. College of William and Mary, Williamsburg, VA. 115pp.
- Watts, B. D. 1993. Effects of marsh size on incidence rates and community organization within the lower Chesapeake Bay. Center for Conservation Biology Technical Report, CCBTR-93-03. College of William and Mary, Williamsburg, VA. 53pp
- Watts, B. D. and M. A. Byrd. 1998. Status and distribution of colonial waterbirds in coastal Virginia. *The Raven* 69:20-31.
- Watts, B. D. and S. J. Rottenborn. 2002. Status of breeding Northern Harriers in coastal Virginia. *The Raven* 72:153-157.
- Watts, B. D. and B. J. Paxton. 2004. Digital atlas of colonial waterbirds in coastal Virginia: 2003 breeding season. CCBTR-04-05. Center for Conservation Biology, College of William and Mary, Williamsburg, VA.
- Watts, B. D. 2004. Status and distribution of colonial waterbirds in coastal Virginia: 2003 breeding season. CCBTR-04-06. Center for Conservation Biology, College of William and Mary, Williamsburg, VA 25 pp.

- Watts, B. D. and M. A. Byrd. 2006. Status and distribution of colonial waterbirds in coastal Virginia: The 2003 breeding season. *The Raven* 77:3-22.
- Watts, B. D., G. D. Therres, and M. A. Byrd. 2007. Status, distribution and the future of Bald Eagles in the Chesapeake Bay. *Waterbirds* 30:25-38.
- Watts, B. D., G. D. Therres, and M. A. Byrd. 2008. Recovery of the Chesapeake Bay bald eagle nesting population. *Journal of Wildlife Management* 72:152-158.
- Watts, B. D., B. J. Paxton. 2009. Status and distribution of colonial waterbirds in coastal Virginia: 2009 breeding season. CCBTR-09-03. Center for Conservation Biology, College of William and Mary/Virginia Commonwealth University, Williamsburg, VA 21 pp.
- Watts, B. D. and M. A. Byrd 2010. Virginia bald eagle nest and productivity survey: Year 2010 report. Center for Conservation Biology Technical Report Series, CCBTR-10-09. College of William and Mary and Virginia Commonwealth University, Williamsburg, VA. 40 pp.
- Wilke, A. L., D. F. Brinker, B. D. Watts, A. H. Traut, R. Boettcher, J. M. McCann, B. R. Truitt, and P. P. Denmon. 2007. American Oystercatchers in Maryland and Virginia: Status and distribution. *Waterbirds* 30:152-162.
- Williams, B., D. F. Brinker, B. D. Watts, and R. M. Erwin. 2007. The status of colonial nesting wading bird populations within the Chesapeake Bay and coastal barrier island lagoon system. *Waterbirds* 30:82-92.
- Wilson, M. D., B. D. Watts, and D. F. Brinker. 2007. Status review of Chesapeake Bay marsh lands and breeding marsh birds. *Waterbirds* 30:122-137.
- Wilson, M. D., B. D. Watts, and F. M. Smith. 2009. Status and Distribution of Black Rails in Virginia. Center for Conservation Biology Technical Report Series, CCBTR-0-010. College of William and Mary and Virginia Commonwealth University. Williamsburg, VA. 22 pp.

ZONE 14

Zone 14: Back Bay and surrounding private lands. In this zone, the relevant avian species and other avian mitigation factors are: T&E species (breeding Bald Eagles), the designation as Important Bird Area, and locally to continentally important migratory staging area and wintering area for waterfowl.

Recent supporting data made available by Back Bay NWR:

- 2008 peak monthly waterbird totals in Back Bay NWR impoundments (file name: 2008PeakWaterbirdPops.xls)
- 2009 peak monthly waterbird totals in Back Bay NWR impoundments (file name: 2009PeakWaterbirdPops.xlsx)
- 2009 weekly shorebird totals at Back Bay NWR and False Cape State Park beaches and impoundments (file name: Shorebirds2009.xls)
- 2009 weekly waterfowl totals at Back Bay NWR and False Cape State Park impoundments (file name: Waterfowl2009.xls)
- 2009 weekly marshbird, raptor and other species totals at Back Bay NWR and False Cape State Park impoundments (file name: Marshbirds,etc2009.xls)
- 2010 weekly shorebird totals at Back Bay NWR and False Cape State Park beaches and impoundments (file name: Shorebirds2010.xls)
- 2010 weekly waterfowl totals at Back Bay NWR and False Cape State Park impoundments (file name: Waterfowl2010.xls)
- 2010 weekly marshbird, raptor and other species totals at Back Bay NWR and False Cape State Park impoundments (file name: Marshbirds2010.xls)

These data are available at the Virginia Department of Game and Inland Fisheries Fish and Wildlife Information Services <http://vafwis.org/fwis/> **Caution:** The purpose of these data is to confirm avian occurrences and provide some measure of species diversity at Back Bay NWR, which is located in Zone 14. They should not be used to estimate and/or draw inferences about overall avian population trends in Zone 14.

Supporting Literature

- Center for Conservation Biology. 2010. Virginia eagle nest locator. <http://www.ccb-wm.org/virginiaeagles/locator.php>
- Watts, B. D. and M. A. Byrd. 1998. Status and distribution of colonial waterbirds in coastal Virginia. *The Raven* 69:20-31.
- Watts, B. D. and B. J. Paxton. 2004. Digital atlas of colonial waterbirds in coastal Virginia:2003 breeding season. CCBTR-04-05. Center for Conservation Biology, College of William and Mary, Williamsburg, VA.
- Watts, B. D. 2004. Status and distribution of colonial waterbirds in coastal Virginia: 2003 breeding season. CCBTR-04-06. Center for Conservation Biology, College of William and Mary, Williamsburg, VA 25 pp.

- Watts, B. D. 2006. Synthesizing information resources for the Virginia Important Bird Area Program: Phase I Delmarva Peninsula and tidewater. Center for Conservation Biology Technical Report Series, CCBTR-06-05. College of William and Mary, Williamsburg, VA. 70 pp.
- Watts, B. D. 2006. Synthesizing information resources for the Virginia Important Bird Area Program: Phase II Western Shore. Center for Conservation Biology Technical Report Series, CCBTR-06-13. College of William and Mary, Williamsburg, VA. 78 pp.
- Watts, B. D. and M. A. Byrd. 2006. Status and distribution of colonial waterbirds in coastal Virginia: The 2003 breeding season. *The Raven* 77:3-22.
- Watts, B. D. 2010. Wind and waterbirds: Establishing sustainable mortality limits within the Atlantic Flyway. Center for Conservation Biology Technical Report Series, CCBTR-10-05. College of William and Mary/Virginia Commonwealth University, Williamsburg, VA. 43 pp.
- Watts, B. D. and M. A. Byrd 2010. Virginia bald eagle nest and productivity survey: Year 2010 report. Center for Conservation Biology Technical Report Series, CCBTR-10-09. College of William and Mary and Virginia Commonwealth University, Williamsburg, VA. 40 pp.