

ANNUAL PERFORMANCE REPORT

State: Florida

Study Number:

Project Title: Distribution-wide Ranging Behavior and Important Use Areas of Florida Sub-adult Bald Eagles

Period Covered: 1 July 2002 through 1 July 2003

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INTRODUCTION

Florida's breeding population of bald eagles (*Haliaeetus leucocephalus*) continues to increase in number annually. The most recent survey for which data have been compiled, conducted in 2001-02, resulted in 1,133 occupied nest sites being counted, up from 1,102 in 2000-01 (S. Nesbitt 2001 and personal communication). However, despite the continuing apparent population increase, concern remains for the long-term welfare of the bald eagle in Florida due to increasing human development in bald eagle habitat, and the species potential vulnerability to the associated habitat loss. Although considerable work has been done in Florida to address conservation issues at nest sites (Wood and Collopy 1995, Wood et al 1989, Nesbitt et al. 1993), after fledging, and each summer thereafter, most of Florida's sub-adult bald eagles migrate north along the east coast to summering areas from North Carolina to Canada, where they spend 4 – 5 months (Broley 1947, Wood and Collopy 1995). These eagles then return to Florida, where they overwinter in areas that are often far away from their natal areas. The sites used regularly by sub-adult Florida bald eagles in summer and winter are also important resources that warrant management consideration. Defining and informing land managers of the location of these areas are important first steps in this process.

This project will expand our knowledge of area and habitat requirements of Florida's bald eagles by (1) providing data on migration routes and (2) estimating summer and winter home range sizes and location. This information will be summarized in eco-region GIS maps depicting important use areas of Florida bald eagles, both in and outside of Florida. These maps will be made available from a link on the Florida Fish and Wildlife Conservation Commission (FWC)

home page during years 1 – 3, and in year 4 will be published as a Florida Bald Eagle Atlas. State and federal wildlife management agencies will be made aware of the availability of these maps during year 2 of the project, and we will enlist their assistance making contact with local land managers of especially important sites to Florida bald eagles regarding the conservation status of these areas.

PROGRESS

Job # 1 – Collect and Manage Bald Eagle Satellite Telemetry Data

During a study comparing the survival and fecundity of Florida bald eagles fledged from suburban and rural natal areas, FWC attached 5-yr satellite transmitters (PTTs) to 70 nestling Florida bald eagles. Our initial objective for using the PTTs was to determine if there were differences in survival rates of bald eagles fledging from suburban and rural nest sites in west-central Florida. However, in addition to mortality data, NOAA satellites transmit latitude and longitude locations of PTT-equipped eagles and transmit these data daily by email to FWC biologists. These locations were, and under this study will continue to be, entered into databases on a daily basis. PTTs from the initial study will continue to generate location data for another 2 years, and it is this complete data set that will form the basis for this project. A summary of the status of each PTT is included in Table 1.

Job # 2 – Develop ArcView Project to Display and Analyze Location Data

Location data are displayed in an ArcView project with appropriate state and/or physiographic region views. Locations and migration routes are updated to the project's web page (<http://wld.fwc.state.fl.us/eagle/eaglestudy/default.htm>) bi-monthly for public access and to facilitate interactions with other state, federal and local land managers.

Job # 3 – Estimate Home Range and Characteristics of Both Summer and Winter Areas and Identify Important Use Areas

Locations from satellite telemetry are usually accurate to ≤ 1 km (CLS 2001), which is sufficient to calculate home range areas. We estimated home range for each eagle with sufficient locations for each season and year. We estimated home range with minimum convex polygon (MCP; example, Fig.1) and kernel estimators (50 and 95% contours; example, Fig. 2). We included MCP for comparative purposes; it is the most commonly used home range estimator in the literature (White and Garrott 1990). We also included the fixed kernel estimator, one of the best estimators for small sample sizes (Kernohan et al. 2001).

These data were also used to identify areas used by multiple Florida bald eagles (important use areas) during summer and winter, and to evaluate the fidelity of sub-adult eagles

to summering and wintering sites. We identified important use areas by plotting the home ranges of all individuals and then determining where home ranges overlap. In the example (Fig. 3), the area surrounding the Potomac and Rappahannock Rivers is an important use area because eagles #28108B and #22993 both used this area during summer 2001. Similarly, we evaluated fidelity of individual eagles by plotting the home ranges of individuals between years. Overlap between home ranges of an individual eagle in multiple years indicated fidelity. In the example (Fig. 4), eagle # 28108B showed extensive summer home range overlap between 2000 and 2001.

Satellite locations and home range boundaries will be overlaid on the best available land cover and physiographic imagery for each state to help in describing important habitat characteristics for both summer and wintering areas. These data will be added as a layer to the ArcView project for this study.

Job # 4 – Document Range-Wide Migration Patterns Through Adulthood

The 70 deployed PTTs have provided > 10,000 locations of sub-adult Florida bald eagles as they move between natal or wintering sites in Florida and summering areas as far north as the Atlantic provinces of Canada. These locations identify important use areas for eagles on migration, as well as information on the rate of movement, chronology of movement and possible correlations between movement and weather patterns.

We will use available data to develop maps of bald eagle migration routes that will be added as a layer to the ArcView project for this study. In addition, we will use animal movement path (Hooge and Eichenlaub 2000) in ArcView as a means to identify migration routes for individuals.

Job # 5 – Report Writing

Annual reports in each year of the study and a comprehensive final report will be written. These reports will be made available to other agencies and the public on the project's web site.

TASKS FOR THE UPCOMING YEAR

We plan to continue the project in 2003-2004 as in 2002-2003 with a continued emphasis on methods of projecting important eagle use areas on appropriate state and/or physiographic region maps.

COSTS INCURRED

<u>Federal Share</u>	<u>State Share</u>	<u>Total Costs</u>
\$26,996	\$8,999	\$35,995

ACKNOWLEDGMENTS

We would like to thank several individuals who assisted us in completing this work. Foremost among these are the landowners who allowed us access to eagle nests on their property. Special thanks in this regard are extended to the Florida Park Service, Department of Environmental Protection; Pinellas County; City of Cape Coral; and the Department of Defense - these agencies provided invaluable assistance and support. We would also like to acknowledge the technical assistance, support, and personal knowledge provided to us by Petra Bohall Wood, Stephen Nesbitt, Lt Lance Hamm, John White, Paul Schultz, and Jeff McGrady. David Cook and Tom Logan administered various contracts associated with the project. David Murphy and his veterinary staff at Lowry Park Zoo donated supplies and invaluable knowledge. Carolyn Cray and the staff of the Avian and Wildlife Laboratory, University of Miami provided expertise on clinical pathology for this study. Marilyn Spalding, Laboratory of Wildlife Disease Research, University of Florida provided pathology services.

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Table 1. Estimated dispersal dates, mortality dates, and causes of mortality of PTT-tagged nestling bald eagles from the west central Florida study area, 1996-97 to 1999-00 breeding seasons.

PTT	Sex	Nest Category	Laying date	Dispersal date	Mortality date (cause)	PTT Status
28112	F	Rural	12/02/96	05/12/97		Failed 04/23/97
N/A	F	Rural	12/14/96	----	03/20/97 (starvation)	----
28116	F	Rural	12/27/96	06/20/97		Failed 01/04/99
28111	F	Rural	01/06/97	06/14/97		Failed 07/21/97
28113	F	Rural	12/11/97	05/15/98		Failed 10/27/01
02217	M	Rural	12/12/97	05/28/98	05/04/99 (unknown)	----
03543	F	Rural	12/26/97	06/13/98	03/19/02 (hit by car)	----
02216	F	Rural	12/26/97	----	05/03/98 (storm/trauma)	----
28118	U	Rural	01/25/98	----	03/30/98 (disease)	----
28110	F	Rural	01/29/98	05/29/98	05/28/02 (hit by car)	----
13167	F	Rural	12/06/98	05/21/99		Failed 05/27/01
01439	F	Rural	12/06/98	05/26/99		Active
13487	M	Rural	12/06/98	05/08/99		Active
13494	F	Rural	12/12/98	05/17/99		Active
13520	F	Rural	12/12/98	05/13/99		Active
03567B	M	Rural	12/12/98	05/21/99		Failed 03/03/00
28106B	M	Rural	12/20/98	----	05/13/99 (starvation)	----
28112B	M	Rural	12/31/98	05/27/99		Active

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28107B	M	Rural	01/09/99	06/11/99	01/10/02 (unknown)	----
24984	M	Rural	12/04/99	05/17/00		Active
24978	U	Rural	12/05/99	05/16/00		Active
24981	M	Rural	12/10/99	05/13/00		Active
24982	F	Rural	12/11/99	05/24/00		Failed 06/02/01
24980	M	Rural	12/12/99	05/21/00		Active
28106c	F	Rural	12/16/99	05/24/00		Failed 09/08/01
28109b	M	Rural	12/23/99	05/19/00		Active
01438C	F	Rural	12/11/00	05/11/01		Failed* 11/27/01
12558B	F	Rural	12/19/00	05/20/01		Failed* 03/30/02
22985	F	Rural	12/07/00	05/22/01		Active
22987	M	Rural	12/16/00	05/11/01		Failed 07/18/02
22988	F	Rural	01/02/01	06/02/01		Active
22990	F	Rural	01/04/01	06/02/01		Active
22991	F	Rural	11/14/00	05/16/01		Active
22992	F	Rural	12/18/00	05/20/01		Active
28110B	F	Rural	01/13/01	06/26/01		Failed* 01/07/03
28107	M	Suburban	11/14/96	04/26/97		Failed 04/27/97
28108	M	Suburban	11/25/96	05/31/97		Failed 06/15/97
28106	F	Suburban	12/05/96	05/24/97		Failed 04/24/97
28109	F	Suburban	12/21/96	06/01/97		Failed 10/02/97
28115	M	Suburban	11/10/97	05/23/98		Failed 07/10/00
28114	F	Suburban	11/21/97	05/05/98	01/01 (unknown)	----
28117	F	Suburban	11/28/97	05/21/98		Failed 06/20/01
28119	M	Suburban	12/13/97	05/29/98		Failed 01/19/01

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03558	M	Suburban	12/21/97	05/24/98	08/30/98 (shot)	----
03567	F	Suburban	12/28/97	06/17/98	06/27/98 (electrocution)	----
03542	F	Suburban	10/25/98	04/10/99		Failed 10/12/99
13498	F	Suburban	11/06/98	05/11/99		3/1/03 (hit by car- in rehabilitation- will not be released)
03557	M	Suburban	11/06/98	05/18/99	07/16/00 (hit by car)	----
12558	M	Suburban	12/11/98	05/11/99	10/04/99 (unknown)	----
13490	M	Suburban	12/13/98	05/18/99		Active
13510	M	Suburban	12/13/98	06/23/99	10/99 (unknown)	----
01438	F	Suburban	12/31/98	05/29/99	07/29/99 (poisoned)	----
02216B	F	Suburban	12/31/98	07/08/99	09/20/99 (electrocution)	----
28118B	F	Suburban	01/24/99	07/01/99		Active
24986	F	Suburban	12/06/99	06/08/00		Active
24977	F	Suburban	12/09/99	05/09/00		Active
24985	M	Suburban	12/09/99	06/09/00		Active
24983	M	Suburban	12/09/99	04/15/00	12/07/01 (unknown)	----
24979	F	Suburban	12/11/99	06/27/00	03/01/02 (unknown)	----
28108b	M	Suburban	12/19/99	05/05/00		Active ----

DISTRIBUTION-WIDE RANGING BEHAVIOR AND IMPORTANT USE AREAS OF FLORIDA SUB-ADULT BALD EAGLES

01438b	M	Suburban	12/30/99	----	04/10/00 (psittacosis)	
02216C	F	Suburban	12/06/00	05/11/01		Active
03557B	F	Suburban	01/03/01	06/02/01		Active
22986	M	Suburban	12/19/00			Failed 07/22/01
22989	F	Suburban	11/18/00	05/03/01		Failed 05/21/01
22993	M	Suburban	12/08/00	05/18/01	03/01/03 (unknown)	----
22994	F	Suburban	11/22/00			Failed 06/01/01
22995	F	Suburban	12/01/00	04/01/01	06/04/01 (unknown)	----
22996	F	Suburban	11/03/00	04/24/01		Active
22997	F	Suburban	12/23/00	06/19/01		Active

* transmitter removed by eagle

DISTRIBUTION-WIDE RANGING BEHAVIOR AND IMPORTANT USE AREAS OF FLORIDA SUB-ADULT BALD EAGLES

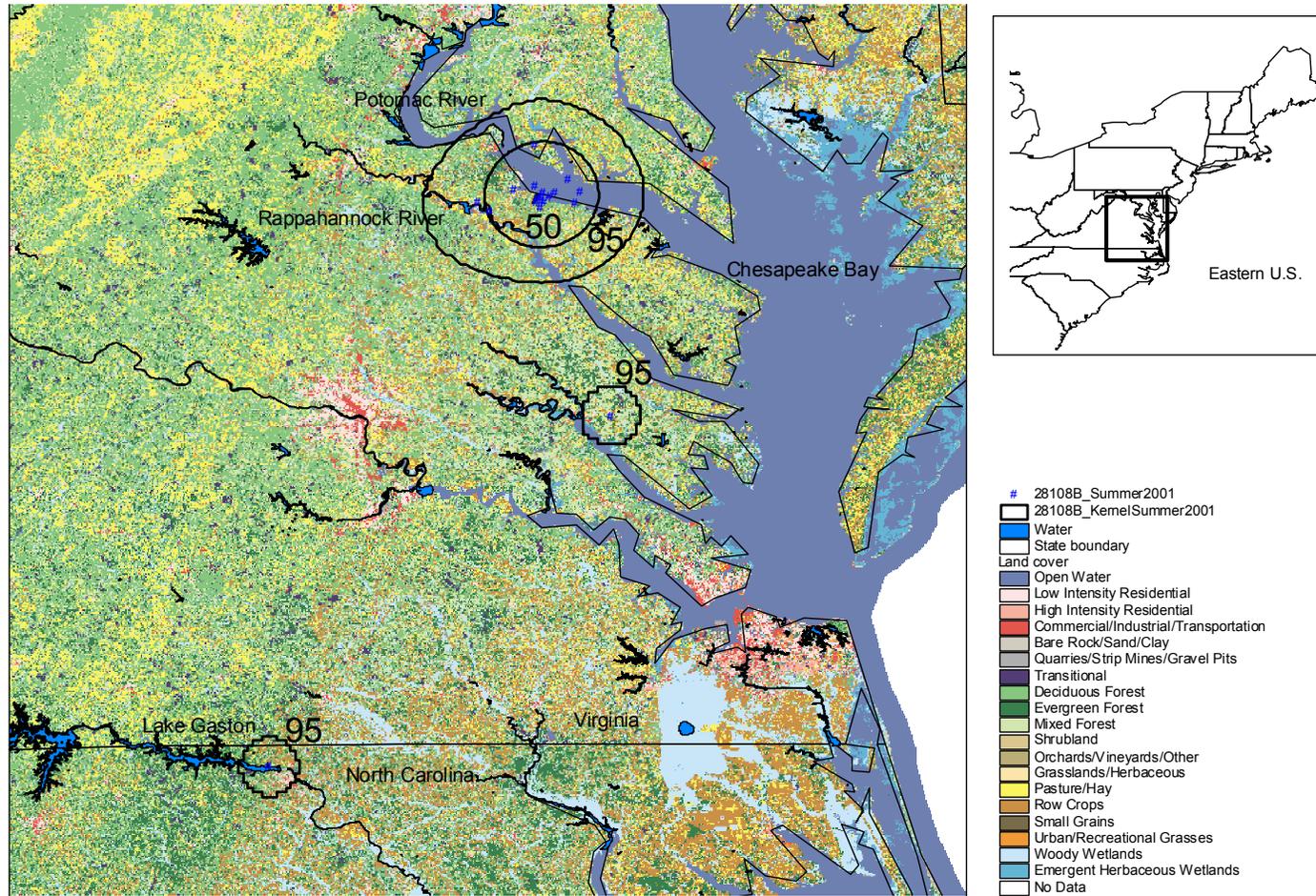


Figure 1. Kernel home range estimation with 50 and 95% contours for bald eagle #28108B during summer 2001. The home range was 100,545 ha and 350,659 ha for the 50 and 95% contours, respectively.

DISTRIBUTION-WIDE RANGING BEHAVIOR AND IMPORTANT USE AREAS OF FLORIDA SUB-ADULT BALD EAGLES

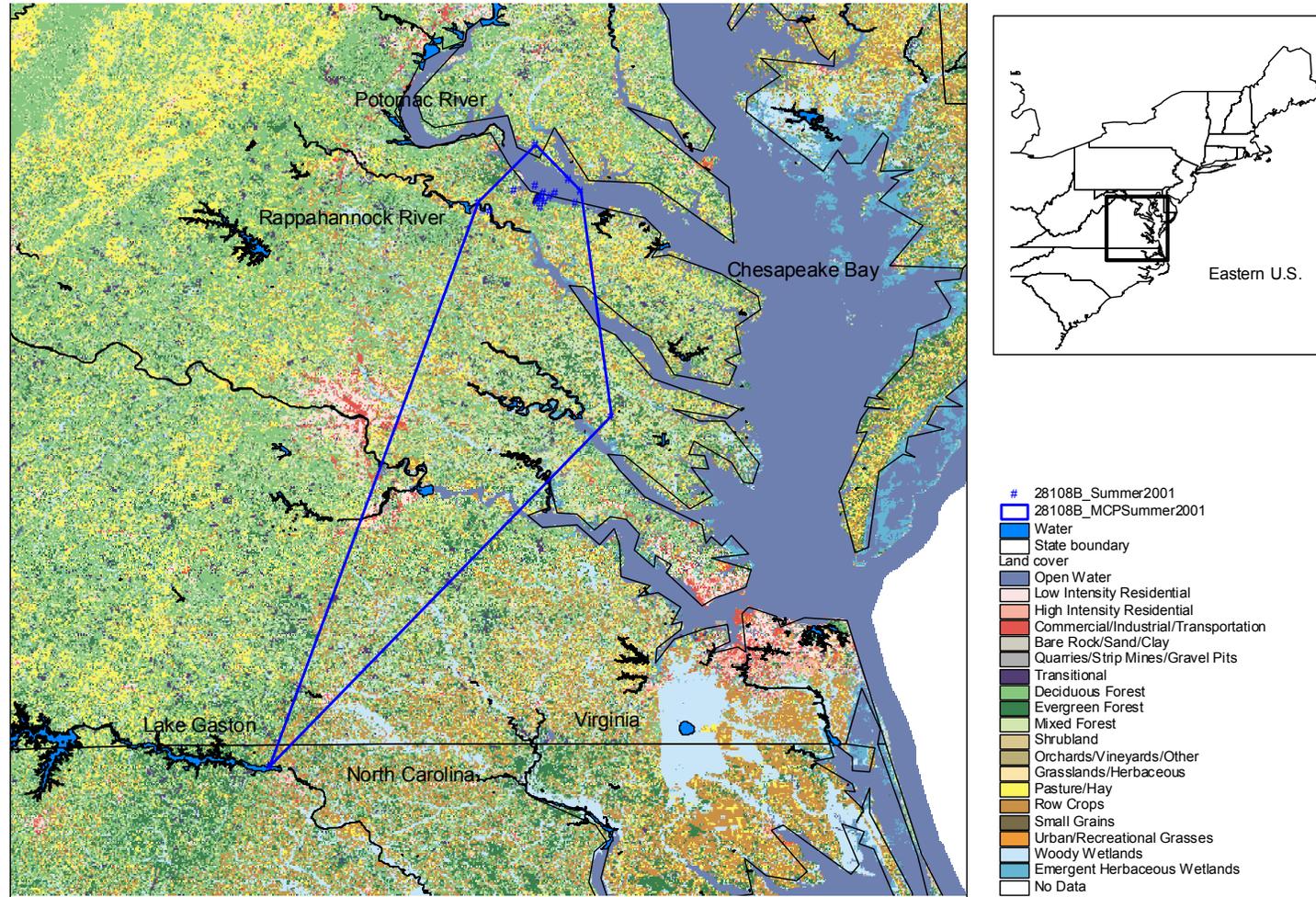


Figure 2. Minimum convex polygon home range estimation for bald eagle #28108B during summer 2001. The home range was 644,300 ha.

DISTRIBUTION-WIDE RANGING BEHAVIOR AND IMPORTANT USE AREAS OF FLORIDA SUB-ADULT BALD EAGLES

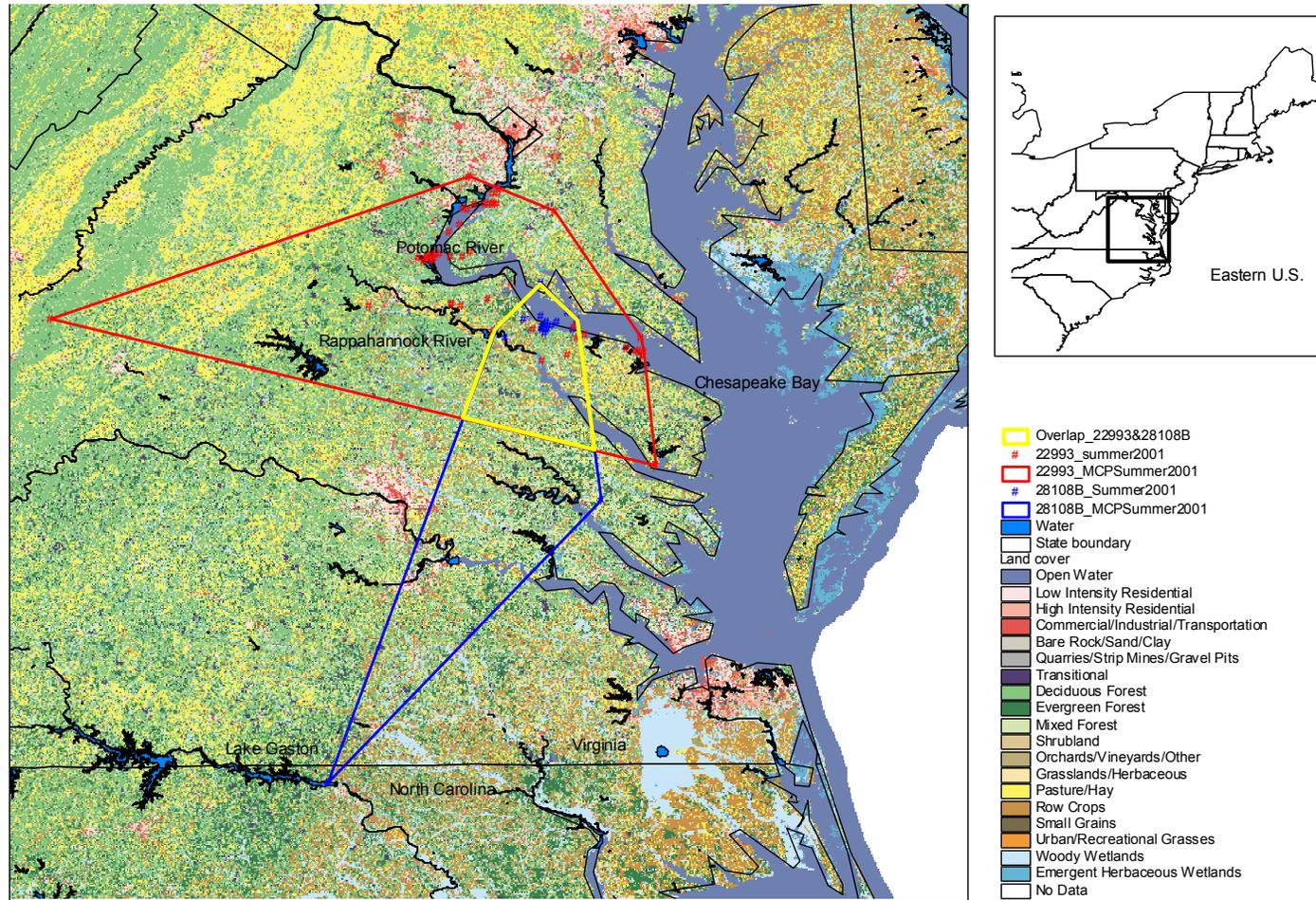


Figure 3. The area surrounding the Potomac and Rappahannock Rivers is an important use area, indicated by the range overlap between bald eagles #28108B and #22993 during summer 2001 (MCP home range estimation).

DISTRIBUTION-WIDE RANGING BEHAVIOR AND IMPORTANT USE AREAS OF FLORIDA SUB-ADULT BALD EAGLES

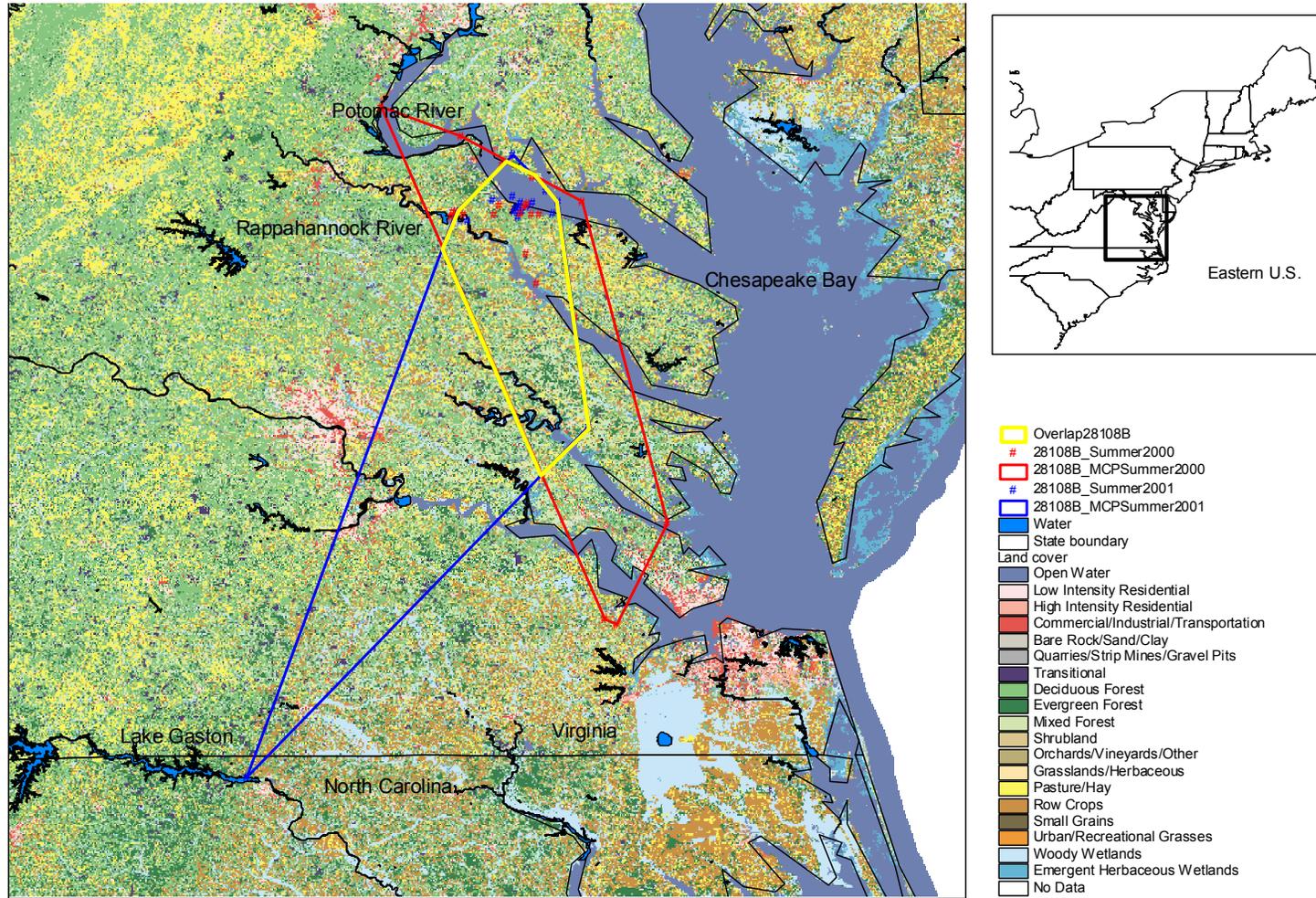


Figure 4. Minimum convex polygon home range estimation for bald eagle #28108B during summer, 2000 and 2001. As indicated by the large area of overlap, this eagle exhibited strong fidelity to part of its 2000 summer range.