

1994

## Non-Game and Endangered Wildlife Program, Annual Report - Bald Eagle Conservation

M. A. Byrd

*The Center for Conservation Biology*

K. Cline

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VIRGINIA DEPARTMENT OF GAME & INLAND FISHERIES  
PERFORMANCE REPORT (July 1, 1993 - June 30, 1994)

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PROJECT TITLE:	WILDLIFE CONSERVATION	PROJ. NO:	WE99R-3
STUDY TITLE:	RARE, THREATENED, & ENDANGERED BIRD CONSERVATION	STUDY NO:	IV
JOB TITLE:	BALD EAGLE CONSERVATION	JOB NO:	I
PERSONNEL:	MITCHELL BYRD, KEITH CLINE, DANA BRADSHAW	COSTS:	
		Total:	\$28,000
		Federal:	\$21,000
		State:	\$7,000

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SUMMARY:

Aerial and ground surveys resulted in the location of 164 active territories and 144 active nests. Of the 143 nests of known outcome, 96 were productive and 48 were unproductive. Many of the failures and inactive nests in active territories were attributed to the severe ice storm of mid-February. A total of 158 young were produced with an average production of 1.10 fledglings per active nest and 1.65 fledglings per productive nest.

Shoreline surveys were continued in the summer on the James and Potomac rivers.

Landowner lists were compiled for a number of sensitive areas.

OBJECTIVE A: Conduct aerial surveys to determine nest site locations and hatching or fledging success in Virginia.

FINDINGS:

Aerial surveys were conducted in February and March to locate active nesting territories. Surveys were conducted in May to determine the number of young produced. Surveys were conducted throughout Tidewater Virginia and the Eastern Shore. Results of the aerial survey are shown in Tables 1 and 2.

Aerial surveys resulted in the location of 164 active territories of which 144 were designated as active nests. Twenty nests were considered as active territories since no birds were actually observed incubating. It is believed that the severe ice storm in mid-February caused many nest failures. The number of occupied but inactive territories was actually 26, but six pairs renested, resulting in the production of 4 late broods.

Of the remaining 20 occupied but inactive nests, many were clearly active earlier from their appearance in early March. They are excluded, however, from the calculation, resulting in a reduced number of nests for 1993.

Of the 146 nest of known outcome, 96 were productive and 48 were unproductive. The total

important areas for eagles on the East Coast.

On July 19, 1994, a count of 297 eagles was made in the survey area and the 5 miles of river shore up river and down river from it. This would suggest that well over 300 eagles were using this section of the James River on this date. This area continues to be one of the most, if not the most, important areas for eagle on the East Coast.

OBJECTIVE D: Develop and produce a comprehensive Bald Eagle Management Plan for Virginia. This will include a summary of the existing resources, a prioritization of recommendations and sites, and a comprehensive strategy to provide effective protection to Virginia's bald eagle population and its essential habitat. The report will include maps of the resource and ownership of these sites.

FINDINGS:

A comprehensive report has been completed and is submitted separately.

Table 3. Results of bald eagle surveys on James River, 1993.

Date	Eagles Observed		Total Eagles Observed
	<u>Adults</u>	<u>Immatures</u>	
06-11	65 (43%)	87 (57%)	152
06-15	54 (50%)	54 (50%)	108
06-25	90 (71%)	37 (29%)	127
07-15	67 (61%)	43 (39%)	110
07-21	54 (68%)	25 (32%)	79
07-27	41 (50%)	41 (50%)	82
08-04	57 (69%)	26 (31%)	83
08-10	47 (56%)	37 (44%)	84
08-24	26 (40%)	39 (60%)	65
09-08	18 (32%)	39 (68%)	57

Table 2. Bald eagle nests and production, 1994, by area.

RIVER SYSTEM	James River	York, Pamunkey, Mattaponi	Rappahannock	Potomac River	Eastern Shore Reservoir Interior	Totals
Active Nests	27 (1)	17 (3)	44 <sup>a</sup> (7)	39 (7)	17 (2)	144 (20)
Prod. Nests	25	11	26	23	10	96
Unprod. Nests	2	6	17	16	7	48
% Prod.	89	69	58	60	59	68
Total Young Fledged	45	22	43	35	13	158
Fledglings per Prod. Nest	1.80	2.00	1.72	1.40	1.30	1.65
Fledglings per Active Nest	1.67	1.29	1.00	0.85	0.76	1.10

**OBJECTIVE C:** Conduct surveys to regularly monitor the summer concentrations of eagle on the James, Rappahannock, and Potomac rivers from April through September.

**FINDINGS:**

In a collaborative effort with the Division of Parks, surveys were conducted on the Potomac River from June 1993 - November 1993. Surveys were conducted along the identical route on which surveys were conducted in 1984. The purposes of the study were to determine if this shoreline received the same degree of utilization as in 1984 and whether patterns of use were the same. (A separate report on the Potomac River survey is attached.)

**James River:**

Surveys were conducted along both sides of the river from Powell's Creek to Wards Creek from June 11 - September 8, 1994. Surveys results are shown in Table 3.

Weekly surveys are normally conducted to conform with high tides, hence occur at different times of the day. Time of day and temperature appear to affect the numbers of eagles seen. The data also suggest that ratios of adults to immatures may have fluctuated considerably, probably reflecting real variation in the numbers on the river. Major changes in ratios in 1993 and in previous seasons suggest that there is a regular movement into and out of this concentration area.

On July 19, 1994, a count of 297 eagles was made in the survey area and the five miles of river shore up river and down river from it. This would suggest that well over 300 eagles were using this section of the James River on this date. This area continues to be one of the most, if not the most,

number of young produced was 158. Assuming that all young fledged successfully, average production was 1.10 fledglings per active nest and 1.65 fledglings per productive nest. The percentage of successful nests were identical to that of 1993.

**Table 1. Bald eagle productivity in Virginia for the period 1977-1994.**

Year	Total Active Nests <sup>b</sup>	Total Prod. Nests	Total Unprod. Nests	% Nests Prod.	Total Young Fledged	Fledglings Prod. Nest	Fledglings Active Nest
1977	33	13	20	39	18	1.38	0.54
1978	37	14	23	38	18	1.38	0.54
1979	33	15	18	45	20	1.33	0.61
1980	35	23	12	66	35	1.52	1.00
1981	39	27	12	69	40	1.48	1.02
1982	45	28	17	62	41	1.52	0.93
1983	52	31	21	60	51	1.68	0.98
1984	60	34	26	57	58	1.68	0.97
1985	65	47	18	72	84	1.79	1.29
1986	66	43	23	65	83	1.93	1.26
1987	73	61	12	84	107	1.75	1.47
1988	81	65	16	80	118	1.82	1.46
1989	92	52	40	57	88	1.69	0.96
1990	99	75	24	76	142	1.89	1.43
1991	111	94	17	85	157	1.67	1.41
1992	131	82	49	63	140	1.71	1.07
1993	151	99	51	66	173	1.75	1.15
1994	144 <sup>a</sup>	96	48	68	158	1.65	1.10

<sup>a</sup> One active nest not included in productivity calculations as nest could not be relocated in dense canopy.

<sup>b</sup> Twenty active territories not included because birds were not observed incubating. Most were probably disrupted as a result of the mid-February ice storm. There were, therefore, 166 active territories.

**OBJECTIVE B:** Identify land ownership of critical eagle sites (nesting and roosting areas) and provide list of current landowners to VDGIF.

**FINDINGS:**

With the exception of the Eastern Shore, land ownership information for 1993 nests was compiled and entered into VDGIF files. Determination of 1994 nest locations will be made.

# Caledon Natural Area Bald Eagle Study



By: Rhonda L. Hardesty  
December 1993

## Acknowledgment

My father, Sonny Hardesty, deserves special thanks for not only making his boat available for the extended shoreline surveys but for taking time out of his schedule to operate the boat. This allowed me to keep my focus on the bald eagles. Dr. Mitchell A. Byrd gave freely of his knowledge, provided assistance for field work, and checked in with me several times to make sure things were going well. Professor Ruth A. Beck, my advisor, provided advice and encouragement on my paper and assisted me in the field.

Special thanks to John Zawatsky, Nina C. Cox, and the rest of the staff at Caledon Natural Area who made the additional weekly survey of the Virginia side possible. They made my research a lot easier by providing assistance anytime I needed it and allowed unlimited access to the park and to a vehicle for road survey.

Mr. James Nash granted me unlimited access to Cedar Grove Farm, King George County. His interest and support were greatly appreciated.

Special thanks to the Northern Neck Audubon Society for providing a scholarship to offset the cost of the research and for their interest in Caledon and my research.

Thanks to Larry Beuglass who videotaped some of the eagles on one of my surveys, and to Brewer Eddy whose help with graphics I could not have done without.

## Introduction

The bald eagle (Haliaeetus leucocephalus) is an endangered species. After the pesticide DDT was introduced in 1946, the reproductive success of the bald eagles dropped dramatically. Bald eagle populations severely declined east of the Mississippi River, surviving only in parts of Florida, the Chesapeake Bay region, Maine, and interior Michigan and Wisconsin (Gerrard and Bortolotti 1988). Since DDT was banned in the United States in 1972, bald eagle populations have been making a dramatic comeback (Snyder and Snyder 1991). Two areas located on the Potomac River in King George County, Virginia, Caledon Natural Area and the adjoining Cedar Grove Farm which comprise 5,600 acres harbor one of the most significant summering concentrations of bald eagles on the east coast along with another summering area on the James River in Virginia (Wallin and Byrd 1984). Concentrations of bald eagles have been observed in these areas and the rest of the Chesapeake Bay region for many years. The total reproductive success in the Chesapeake Bay region has increased from a low of 7 young in 1962 to 188 young in 1986 (Gerrard and Bortolotti 1988). Current information on the reproductive success of eagles on the Chesapeake Bay was not available, however in 1993 in Virginia 173 young were produced (Byrd pers. comm.).

Bald eagles nest in areas that are usually within one mile of water for accessibility to obtain their primary food source of live or dead fish (Johnsgard 1990). Nesting habitat parameters include trees protruding from the forest canopy, allowing for both an

unobstructed departure and approach (Greenwalt et. al. 1976). This area on the Potomac River not only offers suitable roosting trees, but also is a plentiful food source during the summer months. General information infers this is a nursery area for several species of fish beginning in May.

A study of the summering area on the Potomac River including Caledon and Cedar Grove was conducted in 1983 by David Wallin and Mitchell A. Byrd (1984). The results of this study were used to determine the significance of the 2,600 acre tract of land called Caledon. Also, recommendations were submitted to provide a management plan that would protect the nesting and foraging habitat of the eagles. Caledon Natural Area was set aside by the state of Virginia to use in the state park system. Due to the eagles endangered status and the presence of an active nest on Caledon, it was decided to implement these plans when the park opened in 1986. The plans included limiting public access to the river by splitting the park into zones. The area closest to the river, referred to as the Eagle Impact Zone, is opened only for educational tours on the bald eagle for groups of 15 or less. The tours are twice daily Thursday through Sunday during the summer, and groups are only in the beach area for 15 to 20 minutes where they can observe the eagles soaring, roosting, and foraging. In addition to the zones within the park a no-boating zone was also established. It runs 1000 feet offshore for the entire 3.5 miles of the Caledon shoreline.

During the ten year period since the Wallin and Byrd study was completed, Caledon Natural Area opened for public use. The

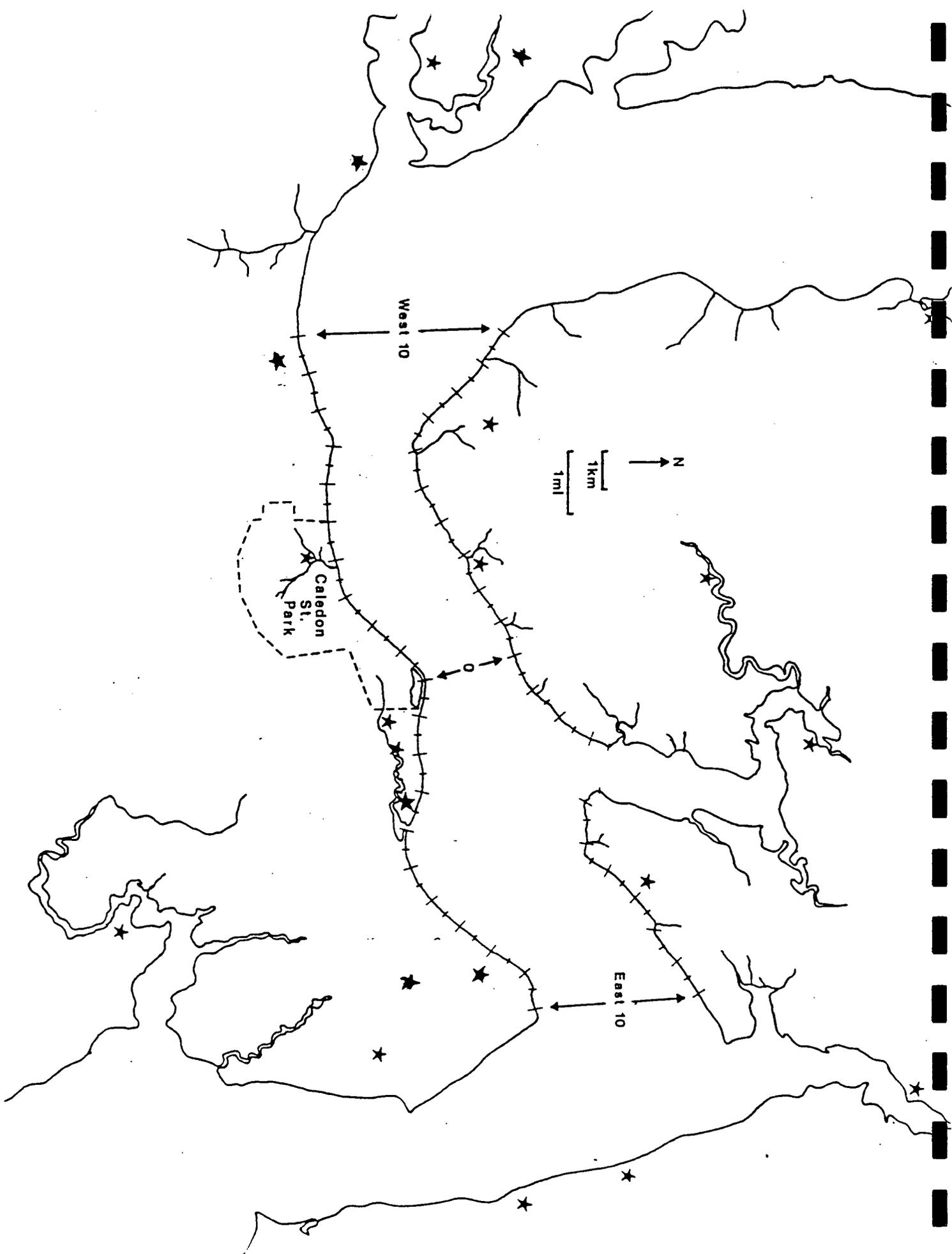
objective of this study is to duplicate the study site by repeating the boat survey line along the Potomac River along with a road survey of inland areas on Caledon and Cedar Grove. This research will determine if this area continues to be an important area for bald eagles during the summer months and will confirm or negate if the plans implemented at Caledon Natural Area have been successful in protecting the habitat of the endangered bald eagle.

## Methods and Materials

A shoreline bald eagle census route that was established on the Potomac River in 1983 was monitored from June 1993 to November 1993. The census route, which included Caledon Natural Area and Cedar Grove Farm shoreline (10 kilometers=6 miles), 5km sections of shoreline to the east of Cedar Grove and to the west of Caledon and a 20km section of shoreline directly across the river (figure 1), was surveyed once a week. The 1983 results concluded that 2/3 of all the bald eagles were found on the Virginia shoreline. Therefore this study incorporated an additional weekly Virginia shoreline census to determine if this area was still as critical for foraging and roosting habitat. The census route was covered from a 19.5 foot boat cruising approximately 100 yards offshore at a speed of approximately 15-20km/h. The number, age (adult or immature) and activity (perched, flushed, or airborne) of all the eagles within each 0.5km section was recorded. Bald eagles generally obtain their adult plumage in their fourth or fifth year (Southern 1964). For the study, adults are defined as those having white heads and tails and a uniformly dark brown body. Eagles lacking these features were classified as immatures. When eagles flew ahead of the survey boat and did not appear to leave the shoreline, the next eagle with the same plumage was not included in the count. Therefore, recounting of the same individual on one day was infrequent. The movement of eagles back and forth across the river during any particular survey was minimal. This movement had little or no effect on the accuracy of

Figure 1

Caledon Study Area, Shoreline Bald Eagle Census  
Route (★ - location of active bald eagle nests,  
1993).



the counts since the movement of individuals on average probably are equal. The area was usually censused once per week with the Virginia shoreline censused a second time during the week, however, adverse weather conditions and logistical problems occasionally reduced coverage.

In addition to the shoreline surveys, a weekly road survey by vehicle was also done using the original route on Caledon and Cedar Grove Farm established by Byrd (1981) to estimate the numbers of bald eagles found inland. This area included two tidal marshes, two freshwater ponds as well as open areas for possible roosting sites. This census route does not provide complete or uniform coverage of the riverfront and inland areas, but it does provide a rough estimate of eagles present in the two areas.

## Results

Between 31 May and 11 October 1993, a total of 12 complete shoreline census runs were conducted. During these runs, a total of 379 bald eagle sightings were recorded (table 1). Sixteen additional census runs were done of the Virginia side alone, making a total of 28 census runs of the Virginia side of the river. During these runs, a total of 716 bald eagle sightings were recorded (table 2). The highest numbers of eagles were present in the study area on the Virginia side in the month of July when an average of 31 eagles were observed per run. For the complete shoreline census, bald eagles observed were at their peak in August when an average of 46 eagles were observed per run (figure 2). The adults reached their peak in July (an average of 21 adults/run) and the immatures reached their peak in August (an average of 25 immatures/run). On 20 July, 65 eagles (29 adults and 36 immatures) were observed along the census route which is the largest number of eagles sighted in the study area at one time.

The number of eagles observed on the road census is presented in table 3, along with the results of the road surveys done along the same route in 1983 by Byrd. In 1983, twice as many eagles were observed along the river shore than over the inland areas, and an average of 8.3 eagles/survey were observed.

The cumulative total number of bald eagles observed within each 0.5km section of river shore are presented in figure 3. When the census route is divided into 5km blocks, there are variances among blocks in the number of adults, immatures, and all eagles

Table 1. Extended Shoreline Survey

<u>Date</u>	<u>Adults</u>	<u>Immatures</u>	<u>Total</u>
5-31-93	20	12	32
6-7-93	10	6	16
6-15-93	21	12	33
6-28-93	7	16	23
7-13-93	16	7	23
7-20-93	29	36	65
7-29-93	17	13	30
8-2-93	18	31	49
8-15-93	15	24	49
8-20-93	19	20	39
9-12-93	8	12	20
10-11-93	4	6	10
<hr/>			
TOTALS:	184	195	379
AVERAGES:	15.3	16.3	31.5

Table 2. Virginia Side Shoreline Surveys

<u>Date</u>	<u>Adults</u>	<u>Immatures</u>	<u>Total</u>
5-6-93*	5	29	34
5-12-93*	2	35	37
5-23-93	11	14	25
5-31-93	12	8	20
6-7-93	6	5	11
6-11-93	11	9	20
6-15-93	15	9	24
6-16-93*	5	3	8
6-21-93	12	23	35
6-23-93	5	12	17
6-28-93	3	11	14
6-30-93	13	23	36
7-10-93	11	29	40
7-13-93	7	5	12
7-20-93	18	25	43
7-21-93	11	29	40
7-28-93	18	13	31
7-29-93	12	10	22
8-2-93	15	23	38
8-5-93	16	20	36
8-10-93	16	27	43
8-15-93	5	15	20
8-20-93	8	12	20
8-25-93	7	15	22
9-1-93	8	19	27
9-12-93	6	9	15
9-26-93	10	8	18
10-11-93	2	6	8
<hr/>			
TOTALS:	270	446	716
AVERAGES:	9.6	15.9	25.6

\*Shortened survey of Virginia side was done (about 6 miles instead of 12).

Figure 2

Mean number of bald eagles observed along the shoreline census route during different times of the year (31 May - 11 October).

Mean number of eagles/run

# Bald Eagles

## Extended Shoreline Census

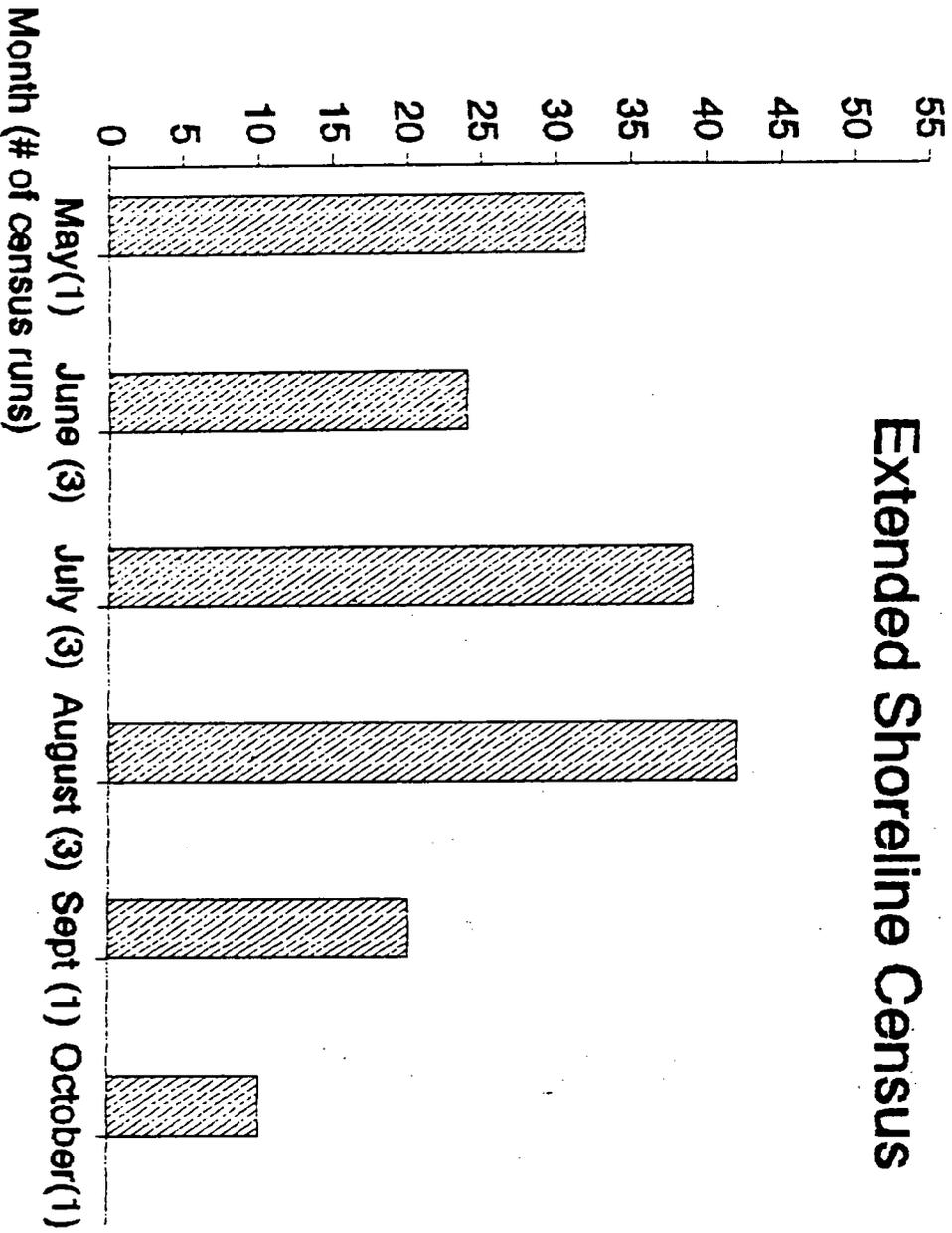


Figure 3

Cumulative total number of bald eagles observed within each 0.5km section of river shore along the Virginia portion of the shoreline census route (6 May - 11 October, 1993).

Table 3. Road Surveys

	Eagles Observed	Inland		Rivershore	
		Adults	Immatures	Adults	Immatures
30 May	10	2	2	4	2
17 June	7	1	1	2	3
25 June	10	1	3	2	4
2 July	17	1	7	6	3
12 July	21	1	7	3	10
23 July	18	2	6	4	6
6 August	14	0	5	2	7
13 August	15	1	5	4	5
11 Sept.	4	0	3	1	0
25 Sept.	11	2	2	2	5
16 October	5	1	1	1	2
		<u>12</u>	<u>42</u>	<u>31</u>	<u>47</u>
Mean=12 eagles/survey		54		78	

Bald eagles observed along the Caledon-Cedar Grove road census, 1983 (Wallin 1984)

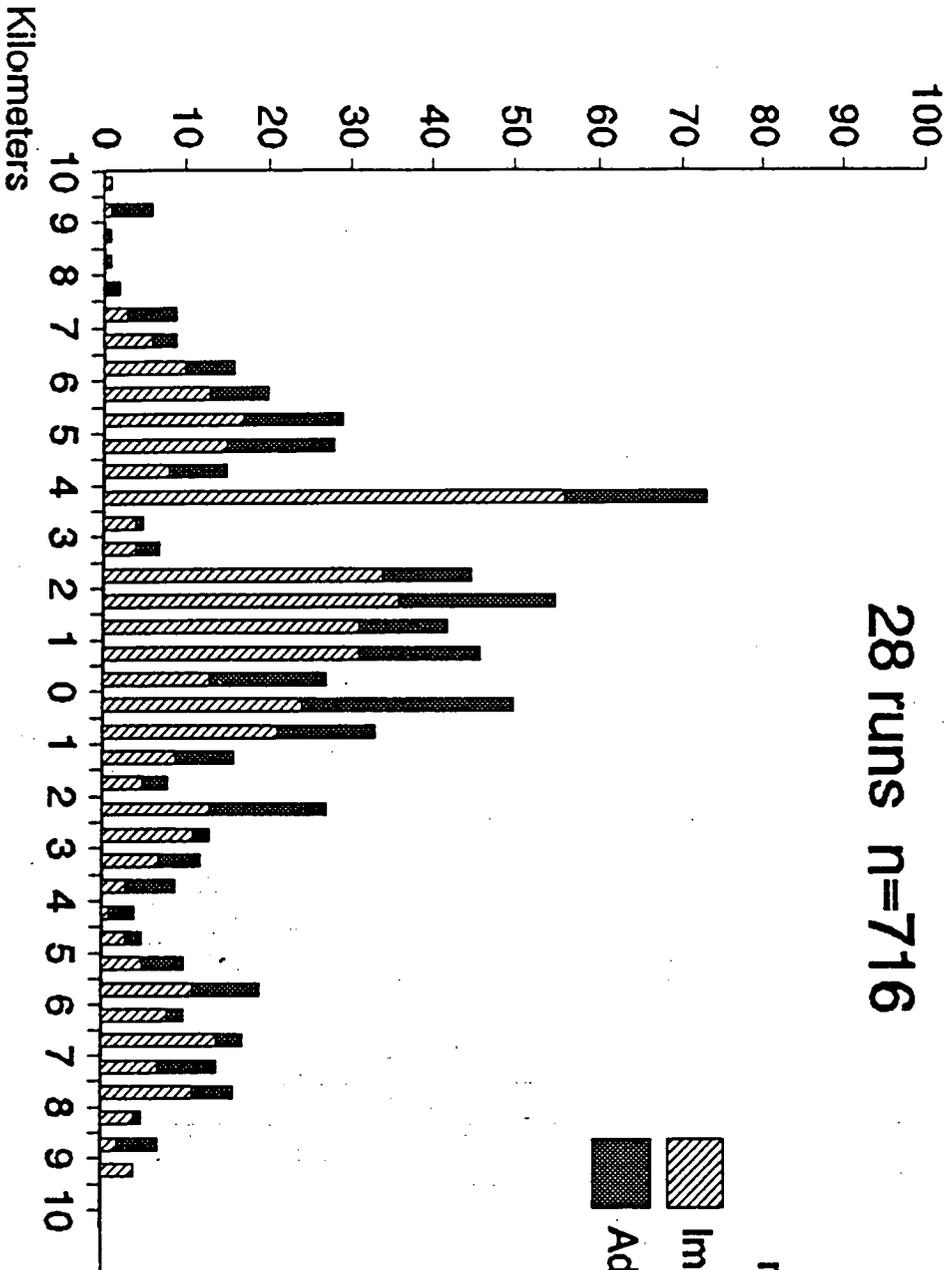
	Eagles Observed	Inland		Rivershore	
		Adults	Immatures	Adults	Immatures
6 June	7	1	2	1	3
16 June	7	0	3	1	3
21 June	11	1	5	2	3
14 July	6	0	3	1	2
12 August	15	0	5	2	8
16 August	7	0	1	1	5
23 August	12	1	1	4	6
30 August	5	0	0	0	5
9 September	5	2	0	0	3
		<u>5</u>	<u>20</u>	<u>12</u>	<u>38</u>
Mean=8.3 eagles/survey		25		50	

Number of Eagles

# VIRGINIA

28 runs n=716

mean=25.5 eagles/run



observed. For adults and immatures, the average number of individuals was higher at Caledon (Va-W5-0) than in any of the other 5km blocks (Table 4 and Table 5).

Table 4. Bald Eagles Seen on Caledon

<u>Date</u>	<u>Adults</u>	<u>Immatures</u>	<u>Total</u>
5-6-93	4	23	27
5-12-93	2	21	23
5-23-93	5	3	8
5-31-93	8	3	11
6-7-93	3	2	5
6-11-93	4	3	7
6-15-93	4	3	7
6-16-93	7	4	11
6-21-93	6	17	23
6-23-93	5	7	12
6-28-93	0	6	6
6-30-93	8	12	20
7-10-93	7	22	29
7-13-93	4	4	8
7-20-93	10	16	26
7-21-93	3	15	18
7-28-93	8	5	13
7-29-93	9	9	18
8-2-93	8	18	26
8-5-93	8	12	20
8-10-93	6	15	21
8-15-93	4	9	13
8-20-93	2	7	9
8-25-93	4	8	12
9-1-93	4	12	16
9-12-93	3	5	8
9-26-93	4	3	7
10-11-93	2	3	5
<b>TOTALS:</b>	<b>142</b>	<b>267</b>	<b>409</b>
<b>AVERAGES:</b>	<b>5.1</b>	<b>9.5</b>	<b>14.6</b>

Table 5.

Mean Number of Bald Eagles Observed in each 5km Block of Shoreline

Location	Mean # of eagles
VA-E5-E10	3.6
VA-0-E5*	6.3
VA-W5-0**	12.3
VA-W10-W5	3.4
MD-W10-W5	5.9
MD-W5-0	2.1
MD-0-E5	1.1
MD-E5-E10	2.4

\*\*Caledon Natural Area

\*Cedar Grove Farm

## Discussion

The results of this study indicate that bald eagle populations in this area have been on the rise since the Wallin and Byrd (1984) study done ten years ago. For the extended surveys, numbers reached their peak in August with an average of 46 eagles observed per census (Figure 2) compared to an average of 39 eagles per run in August 1983 in the Wallin study (Appendix I). Twelve census runs were made of the Maryland side of the river. A total of 132 eagles were observed with a mean of 11 eagles/run. Although Wallin had a bigger sample size with 52 census runs, a total of 353 eagles were observed on the Maryland side averaging 6.8 eagles/run.

Close to 2/3 thirds of the bald eagles were observed on the Virginia side of the Potomac River which is similar to the distribution found in the Wallin and Byrd study. Figure 3 shows a total of 716 eagles observed during the 28 census runs of the Virginia shoreline. The mean was 25.6 eagles/run. In the Wallin and Byrd surveys 860 eagles were observed during the 52 census runs with a mean of 16.5 eagles/run (Appendix I). These results imply a great increase in the eagle population since with half the number of runs in 1993 almost as many eagles were seen with an average of about 9 more eagles/run. The area on the Virginia shoreline that was the most populated on the Virginia side was Caledon Natural Area. Although Caledon only represents 3.5 miles of the 12 mile census area, over half the bald eagles were seen in this area. The mean number of bald eagles seen on Caledon was 14.6 per run (mean of 5.1 adults and 9.5 immatures).

The road surveys also indicated an increase in the population

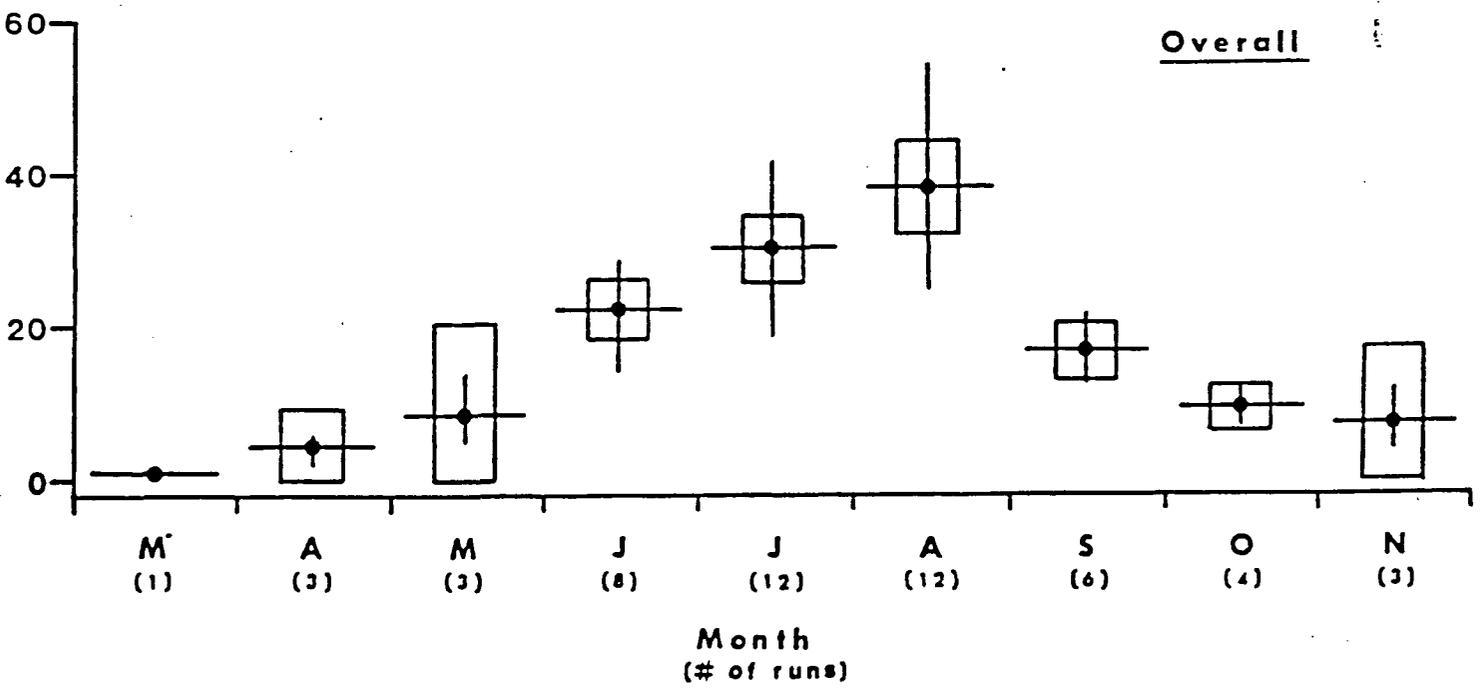
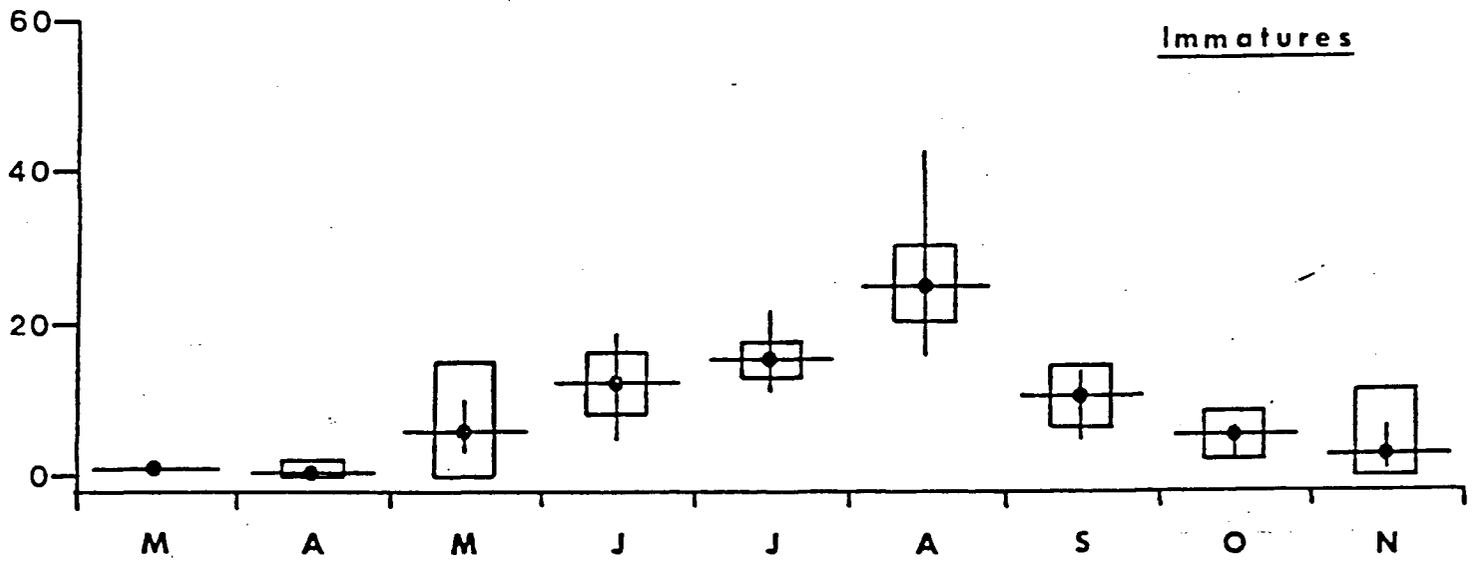
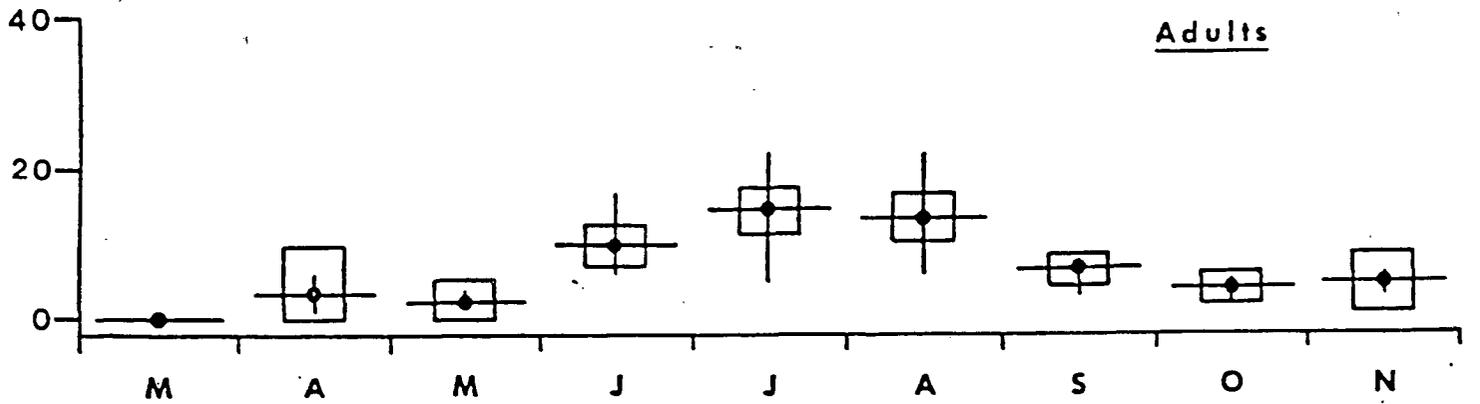
with an average of 12 eagles/survey compared to the 1983 results of 8.3 eagles/survey (Table 3). The results of the Wallin and Byrd study indicated that approximately twice as many eagles were observed along the river compared to inland areas. The 1993 results are not as clear cut, but more eagles were observed along the river compared to inland areas. The fact that a higher percentage of bald eagles are being seen inland may indicate that the birds are spreading out over a larger area due to increased numbers.

The objective of this study was to see if the area was still important to bald eagles during the summer months. The results overwhelmingly support the fact that there are more eagles in this area now than there were ten years ago, and the fact that the highest numbers of eagles were seen in July and August supports that this is a highly used area during the summer months. The results also indicate that the plans implemented by Caledon Natural Area have been successful in protecting the habitat of the endangered bald eagle. Not only were large numbers of eagles observed all along the Caledon shoreline but over half the eagles concentrated themselves in this area.

Appendix I  
(Wallin and Byrd 1984)

Figure 2

Mean number of bald eagles observed along the shoreline census route during different times of the year (26 March - 22 November, 1983). The horizontal lines indicate the mean, the vertical lines indicate the range and the boxes indicate the 95% confidence interval for the mean.



# VIRGINIA (1983)

52 runs n=860

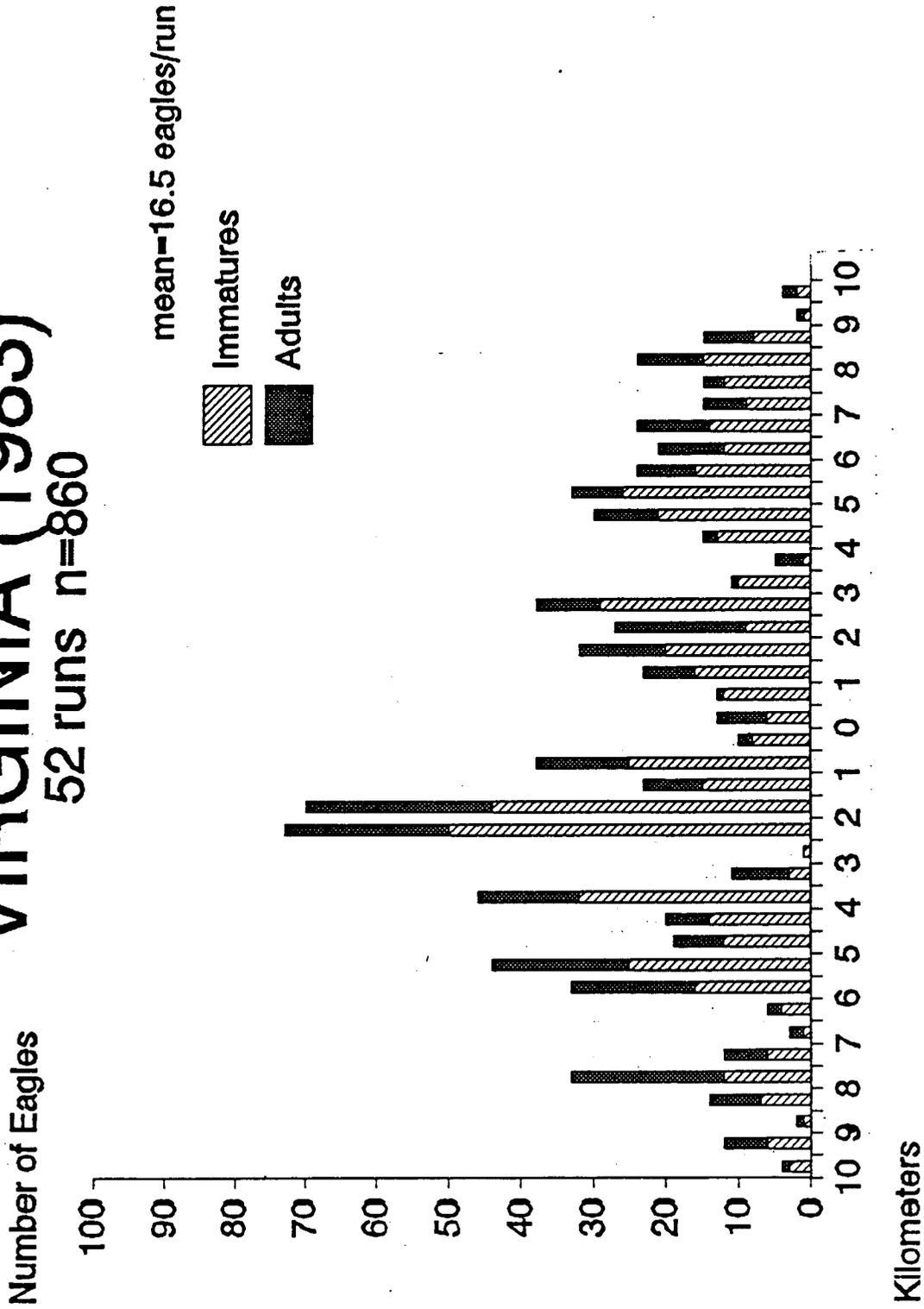
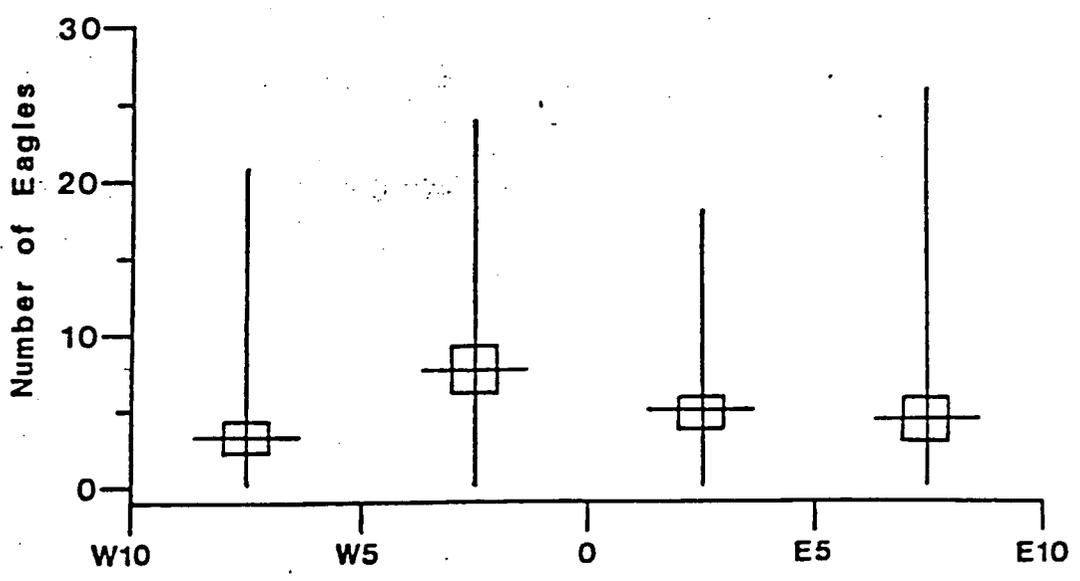
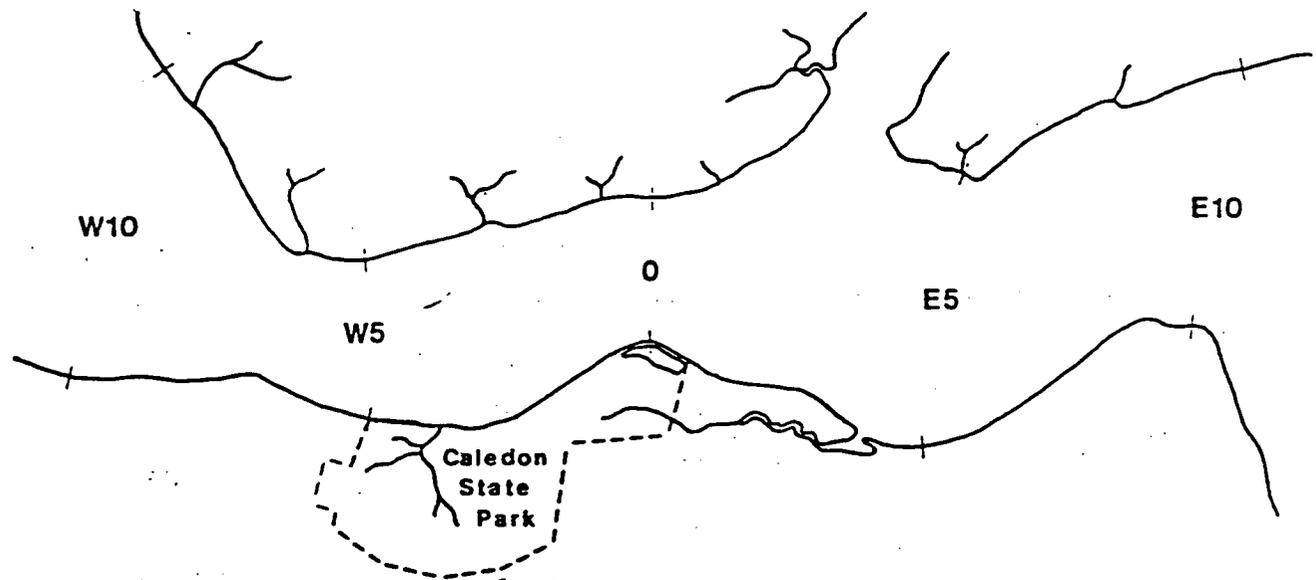
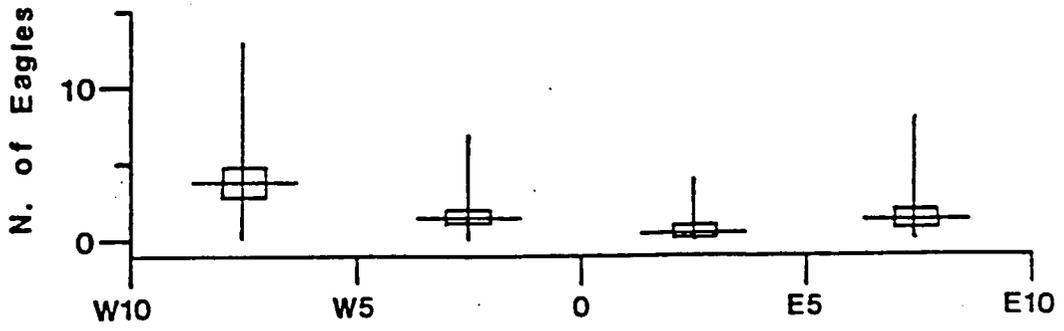


Figure 5

Mean number of bald eagles observed within each 5km section of river shore along the shoreline census route (26 March - 22 November, 1983). The horizontal lines indicate the mean, the vertical lines indicate the range and the boxes indicate the 95% confidence interval for the mean.



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Table III

Mean numbers of bald eagles observed within each 5km block of shoreline during 52 complete shoreline census runs (26 March - 22 November 1983).

Mean  $\pm$  standard error  
(range)

Location	Adults	Immatures	Overall
VA-E5-E10	2.2 $\pm$ 0.34 0 - 13	2.2 $\pm$ 0.37 0 - 13	4.4 $\pm$ 0.70 0 - 26
VA-0-E5**	2.40 $\pm$ 0.249 0 - 6	2.6 $\pm$ 0.34 0 - 12	5.0 $\pm$ 0.55 0 - 18
VA-W5-0*	3.9 $\pm$ 0.39 0 - 12	3.9 $\pm$ 0.40 0 - 12	7.7 $\pm$ 0.78 0 - 24
VA-W10-W5	1.77 $\pm$ 0.274 0 - 11	1.56 $\pm$ 0.268 0 - 10	3.3 $\pm$ 0.53 0 - 21
MD-W10-W5	2.06 $\pm$ 0.248 0 - 6	1.86 $\pm$ 0.265 0 - 7	3.9 $\pm$ 0.49 0 - 13
MD-W5-0	1.19 $\pm$ 0.145 0 - 4	0.38 $\pm$ 0.092 0 - 3	1.58 $\pm$ 0.210 0 - 7
MD-0-E5	0.29 $\pm$ 0.074 0 - 2	0.36 $\pm$ 0.087 0 - 2	0.65 $\pm$ 0.150 0 - 4
MD-E5-E10	0.71 $\pm$ 0.144 0 - 4	0.69 $\pm$ 0.159 0 - 5	1.40 $\pm$ 0.295 0 - 8

\*Caledon State Park

\*\* Cedar Grove Farm