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SOUTHERN ONTARIO BALD EAGLE MONITORING PROJECT

2002 Final Report

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INTRODUCTION

Prior to European settlement, the Great Lakes supported a healthy population of Bald Eagles (*Haliaeetus leucocephalus*). An estimated 200 pairs nested from the Ottawa River to the lower Great Lakes and the density of Bald Eagle nests (active and inactive) may have reached as high as one per mile of shoreline along Lake Erie (Weekes 1974). However, loss of nesting and foraging habitat, through the clearing of land for agriculture, along with direct human persecution, led to a rapid decline in the Great Lakes Bald Eagle population in the early 1900s (reviewed in Austen et al. 1994). The introduction of protective legislation, including the Ontario Ministry of Natural Resources' Game and Fish Act in 1890, and the American Bald Eagle Act in 1940 helped the Southern Ontario eagle population rebound to approximately 100 pairs by 1950 (Weekes 1974). Unfortunately, this recovery was short-lived, due to the introduction of synthetic chlorinated compounds such as DDT and PCBs into the Great Lakes aquatic food chain. Bioaccumulation of DDT, and its breakdown product DDE, in the bodies of adult Bald Eagles led to reproductive failure through eggshell thinning and embryo death (Donaldson et al. 1999).

The Bald Eagle population in the Great Lakes basin declined almost to the point of extirpation in the 1960s (reviewed in Donaldson et al. 1999). Although Canada and the US severely restricted the use of DDT in the 1970s, the effects lingered on for many more years. Bald Eagles in the Great Lakes were slow to recover, possibly due to continued exposure to PCBs (Donaldson et al. 1999). In 1980, the Great Lakes Bald Eagle population experienced almost complete reproductive failure. There were only three active nests along the north shore of Lake Erie in that year, and only one nest produced young (Field, unpublished data).

To begin to address the problems facing this species, the Bald Eagle was declared a provincially Endangered species in 1973 and the Ontario Ministry of Natural Resources (OMNR) began closely monitoring the population. In 1983, the Southern Ontario Bald Eagle Monitoring Project, led by the OMNR and the Canadian Wildlife Service (CWS) was initiated. The study area includes the Canadian shores of lakes Erie, St. Clair, Huron and Ontario. Bird Studies Canada (BSC) became a partner in the Bald Eagle monitoring project in 1996 when it assumed responsibility for the coordination of field studies and monitoring efforts. This project relies heavily on the cooperation of both landowners and volunteer nest monitors to obtain information on Bald Eagle nesting activity and productivity.

Beginning in 1983, the Southern Ontario Bald Eagle Monitoring Project annually monitored productivity (number of young fledged per active nest), and also weighed, measured, and banded each eaglet within the study area. Nest site characteristics, such as tree species, and height of nest were also recorded. To further aid recovery efforts, from 1983-1987, 32 eaglets were transplanted by CWS and OMNR from northwestern Ontario and released at two different hacking sites on the north shore of Lake Erie. Between 1990-1999, blood and feather samples were taken from eaglets to monitor levels of pesticides and heavy metal contaminants in the eaglets. Data collected from these field studies showed that by the early 1990s the health of the Bald Eagle population had improved and levels of contaminants had declined dramatically. At the same time, the number of nests and the mean number of chicks produced at each nest had also increased.

Starting in 2000, a low-intensity monitoring protocol based on annual ground and aerial observations of nesting eagles was implemented. Blood sampling and banding will now occur

every five years, which should be adequate to monitor contaminant levels in juvenile birds (L. Shutt pers. comm.). The objective of the 2002 Southern Ontario Bald Eagle Monitoring Project was to continue to locate and monitor all territories (new and historic) in southern Ontario through a network of volunteer nest monitors and landowners.

METHODS

NEST MONITORING

Volunteers began monitoring Bald Eagle activity as soon as the birds returned to their territories. In some cases, pairs remained on territory year round, whereas at other locations the birds returned between January and February. In March, volunteer nest monitors were contacted to determine nesting status at each established territory. Established territories were defined as areas where eagles have nested on at least one occasion between 1980-2002. All reports of new territories and their respective nests were verified, landowners were contacted, and nest monitors were established.

At each active nest, monitors were asked to observe the nest without disturbing the eagles, and to note the number of young visible. Young that reached 8-10 weeks, or were observed out of the nest, were considered successfully fledged. Productivity was calculated as the number of young fledged/active nest (Postupalsky 1974). In 2002, most Bald Eagle nests were monitored from the ground with the exception of Phil Roberts, a volunteer nest monitor, who monitored nests in Essex County by aerial surveys. These aerial surveys were pre-approved by OMNR.

TERMINOLOGY

For this report, territories were classified as occupied, empty, or abandoned. A territory was considered occupied if a pair of Bald Eagles was observed throughout most of the breeding season. A territory was classified as “empty” if a pair of eagles has been present at least once in the last five years, but none were present this year. A territory was classified as abandoned if there has been no Bald Eagle activity during the past five years, or if the nest had been destroyed.

A nest was considered occupied if at least one of the following activities was observed during the breeding season: a) young were raised; b) eggs were laid; c) one adult sitting low in nest; d) two adults present on or near the nest, provided there was no reason to suspect they had been counted elsewhere; e) one adult and one sub adult bird at or near a nest, engaging in mating behaviour; f) a recently built or repaired nest, and/or droppings or moulted feathers on the rim or underneath the nest; g) a single adult bird frequenting the territory for a substantial part of the breeding period (to at least early April). A nest was classified as active only if eggs were laid. Active nests differ from occupied in that non-nesting territorial pairs and subadults that may occupy a breeding territory during a season without actually laying eggs are excluded. Generally birds categorized as a), b), or c) above can be considered to have laid eggs (from Postupalsky 1974).

RESULTS

NESTING ACTIVITY

There are thirty-seven Bald Eagle territories within the study area have been occupied at least once since monitoring began in 1980 (Appendix A). At five of these territories (BR2, BR3, EX5, LP4, MX1), however, active nests have not been documented (Table 1,2). There are an additional three artificial nesting platforms (PI1, PP1, NA1) within the study area that have never been used for nesting, although eagle activity has been observed at the sites. Only one of the existing active Bald Eagle nests (EN3) is on an artificial platform, but other territories (e.g., EN2, EN3, EX1) contain platforms that eagles have nested on in the past, but are presently inactive. All of these platforms are in good condition and thus should be monitored for future nesting activity.

In 2001 and 2002, Bald Eagle activity was observed at BR2, BR3, and EX5 in March and April, but nesting did not occur (Table 2). At BR2, an eagle pair was present and an adult was observed sitting low on a nest (a heron nest with sticks added to it), as if on eggs. At BR3 and EX5, full size nests were constructed but the pair abandoned the area early in the season. It is possible that some of these sites may not be true breeding territories but rather migration stopover areas, because the birds were not present through the majority of the breeding season. However, the construction of a full size nests suggests the establishment of a breeding territory. Perhaps these territories were occupied by young birds that were practice nesting for future years.

In 2002, 30 territories were occupied, including four that were new to the study area (KT2, LB1, LP4, LP5). Four of the 37 territories in the study area were classified as abandoned, either because they have been inactive for more than five years (EN1, HN1, RP1) or because the nest tree has been destroyed (HN2). These abandoned territories are still monitored periodically for the possibility of reoccupation. In 2002, there were three other territories (HN5, NH1, MX1) that were occupied, but no nesting activity was recorded (Table 1).

NEW TERRITORIES IN 2002

Nests were observed at all four of the new territories; three of these successfully fledged at least one young. The new Lambton nest (LB1) nest, the first in the area since 1969, was located within a protected area and public access near the nest was restricted. This nest successfully produced two young. There were two new Bald Eagle territories on Long Point this year, and all three of the established territories were active. One of the new nests was within the Long Point National Wildlife Area, an area with no public access, and the second new territory was located in an inaccessible area with little human disturbance. The pair at LP4 constructed a nest but did not produce young, and the LP5 pair successfully fledged at least one young. A new Bald Eagle territory was established in Kent County (KT2) in 2001. A nest was constructed in that year, but no eggs were laid. Unfortunately in the spring of 2002, the nest was destroyed during an ice storm. The eagle pair rebuilt the nest in the same tree, and then subsequently abandoned the nest tree in favour of a new location; two young were produced.

NEST FAILURES

There were two nest failures in 2002, and three territories that were occupied but for which nesting did not occur. At EN5, birds were seen incubating as late as 1 May, but no chicks were seen in the nest. This territory has been active since 1997, and a total of 9 young have been produced, including the production of triplets in 2001. A similar situation occurred at HN3 (active since 1993, 18 young produced), where eagles were observed incubating into mid-April, at which point the nest was abandoned. The adults remained near the nest until early May, but a field visit by BSC on 28 May confirmed that the nest was abandoned. No adult were seen, and there were no eggshell fragments, dead chicks, or 'whitewash' near the tree. Nest monitors at HN5 reported that the nest tree was damaged early in 2002 (a limb was broken during a storm), but suggested that this did not likely cause abandonment because the birds continued to incubate for several weeks after this event. These two nests were not accessed, so the causes of failure are unknown. It is recommended that these territories be closely monitored in 2003.

For the third consecutive year, a territory was established and a nest was constructed at MX1, but no young were produced. A pair of adult eagles was observed throughout the winter months and an eagle was on a nest from late February to early April, approximately 500 meters away from the 2001 nest tree. It is unknown whether eggs were laid, but the presence of a bird on the nest into early April suggests an active nest; the cause of abandonment is unknown. The Bald Eagle nest on Hardy Island (NH1) was inactive for the third consecutive year, but the eagles were still present in the area and may be using the nest tree for perching and/or roosting.

Although there was eagle activity observed at HN5, the Fisher's Glen nest was inactive (Table 2). This is not surprising given the high level of disturbance at the site in 2001. In 2001, trees were cleared and brush was burned near the nest site, which caused the eagle pair to leave the nest unattended all night, and as a result, the 10-day old eaglet died of exposure (Badzinski 2001). Several reports were received throughout 2001 (January-November) of a pair of adult eagles flying around near the nest site, as well as reports of the birds sitting in the nest tree. Interestingly, juvenile Bald Eagles were also observed perching on the nest tree. Two young were produced at this site in 1999 and one young in 2000, so it is possible that these birds returned to their natal area. This territory should be closely monitored in 2003 for reoccupation.

PRODUCTIVITY

This year there were 26 known active Bald Eagle nests within the study area, 23 of which successfully produced at least one young (Table 1, Table 3). This success rate (92%) is similar to the 2001 breeding season (Badzinski, 2001). More young were produced in 2002 than were produced in any other year (1980-2002) (Figure 1,2). Forty-one young were produced from 23 successful nests, with a mean of 1.6 fledglings per active nest, which was higher than rates for the past five years (Figure 3). The increase in mean productivity in 2002 was at least in part due to the production of triplets at three nests (Table 1).

EAGLE DEATHS

In 2002, there were two adult Bald Eagle deaths reported in Southern Ontario. First, a volunteer nest monitor at HN4 discovered a carcass of a large raptor, suspected to be that of a Bald Eagle. The carcass was collected, so it is recommended that an expert examine the bones to determine the species. Interestingly, there was also a mate change at this territory; in 2002, the male did not have complete adult plumage, whereas both eagles had full adult plumage in previous years.

The second eagle death occurred in Bruce County in late October 2002. An adult female Bald Eagle was discovered sick, and then died a short time later. The cause of death is presently unknown, but the eagle carcass was sent to the Ontario Veterinary Hospital for necropsy. It is unknown whether this eagle originated from one of the Bruce county territories, or is a migrant. The eagle is not from BR1 because both adults and one immature were seen on the Boat Lake territory after the death of the eagle.

DATABASE MANAGEMENT

A number of changes were made to the Southern Ontario Bald Eagle Monitoring Program databases in 2001-2002. First, the database was converted from Paradox to Microsoft Access and the tables were all error checked and cleaned up. Some new fields, including band returns, adult turnovers, and nest changes were also added to the database. Second, Aylmer District OMNR hired a contract biologist to update all the nest location and land ownership information into a Geographic Information System. All nest trees within each territory in Aylmer District were georeferenced and most are accurate to within 200 meters. The database also contains a field that identifies whether the landowner is eligible for the Conservation Lands Tax Incentive Program (CLTIP). A copy of the GIS database was sent to BSC where it was expanded to include the entire study area and combined with the existing database. The GIS database, in combination with the Access database, has proven to be a very useful tool for viewing and querying historic data.

TABLE 1 – Summary of Bald Eagle nesting activity and productivity at each occupied territory in Southern Ontario in 2002. See Appendix A for history of nesting activity at each territory and Table 2 for additional details on territories that were occupied but there was no nesting activity. Nests are classified as active (A, eggs laid), occupied (O, territory occupied but no eggs laid), or inactive (I, territory inactive). Productivity was defined as the number of young raised to fledging; — indicates not applicable because territory and/or nest were inactive.

Territory ID	Territory Status	Nest Status	Productivity	Comments
BRUCE				
BR1	O	A	2	First year that young were produced.
BR2	O	I	—	See Table 2 for details.
BR3	O	I	—	See Table 2 for details.
BR4	—	—	—	Nest was not monitored.
ELGIN				
EN1	AB	AB	—	No activity since 1984.
EN2	O	A	1	Territory has an unoccupied platform.
EN3	O	A	2	Nest is on a platform.
EN4	O	A	3	
EN5	O	A	0	Cause of failure unknown (see text).
EN6	O	A	1	New nest tree in 2002.
EN7	O	A	3	
ESSEX				
EX1	O	A	2	Territory has an unoccupied platform.
EX2	O	A	2	
EX3	O	A	2	Same nest as 2001, but “dummy” nest also built.
EX4	O	A	2	
EX5	E	I	—	See Table 2 for details.
PI1	E	I	—	Platform has never been occupied.
PI2	O	A	2	
PP1	O	I	—	Platform has never been occupied.
FRONTENAC				
FR1	O	A	3	
FR2	O	A	1+	Nest active, at least one young produced.

TABLE 1 cont.

Territory ID	Territory Status	Nest Status	Productivity	Comments
GREY				
GY1	O	A	—	Unknown if young produced.
HALDIMAND-NORFOLK				
HN3	O	A	0	Cause of failure unknown (see text).
HN4	O	A	2	Mate change in 2002.
HN5	O	I	—	See Table 2 for details.
LP1	O	A	1+	
LP2	O	A	1+	
LP3	O	A	1+	
LP4	O	A	0	New territory in 2002
LP5	O	O	1+	New territory in 2002
KENT				
KT1	O	A	1+	At least 1 young produced.
KT2	O	A	2	New nest in 2002.
RP1	AB	AB	—	No activity since 1996.
RP2	O	A	2	
LAMBTON				
LB1	O	A	2	New territory in 2002. Female does not have full adult plumage.
LEEDS-GRENVILLE				
LG1	O	A	2	Change in nest site location. Moved to nearby island (<1 km away)
MIDDLESEX				
MX1	O	I	0	New nest built, no young produced
NIAGARA				
NA1				See Table 2 for details.
NORTHUMBERLAND				
NH1	O	I	0	Eagles still in area, but did not nest.

TABLE 2 – Additional details on Bald Eagle territories that were occupied in 2001 or 2002 but no active nests were documented.

Identifier	Observations
BRUCE	
BR2	In both 2001 and 2002, a pair of Bald Eagles added material to a Great Blue Heron nest and an adult was observed sitting low in the nest from March to early April. The eagles departed the nest coincident with the arrival of Great Blue Herons to the colony. In 2002, the pair was last observed mid-April.
BR3	A pair of Bald Eagles was observed on a nest in 2001, but no eggs were laid. In 2002, a single adult bird was seen on the territory but there was no indication that the bird was paired. The lone eagle was last seen on 19 June.
ESSEX	
EX5	A nest was built on this island in 2001, and a pair of eagles was observed until fist week of April. There was no activity observed in 2002. It is unlikely that Bald Eagles will establish a territory at this site, because the level of disturbance from boat traffic on the Detroit River is quite high (P. Hunter, pers. comm.).
HALDIMAND-NORFOLK	
HN5	Human disturbance at this site in 2001 resulted in nest abandonment. In 2002, there were several reports of adult and juvenile Bald Eagles within the territory. Further, adult and juveniles were observed using the nest tree for perching and/or roosting.
NIAGARA	
NA1	Some eagle activity reported during the winter of 2001-2002, but nesting did not occur.

TABLE 3 - Summary of Bald Eagle nesting activity in Southern Ontario in 2002.

Reproductive Parameter	Value
Number of occupied territories	33
Number of active nests	26
Number of successful nests	23 (89%)
Number of failed nests	2 (8%)
Nests that fledged 1 young	8
Nests that fledged 2 young	12
Nests that fledged 3 young	3
Total number of young produced	41
Young/occupied territory	1.2
Young/successful nest	1.8
Productivity (young/active nest)	1.6

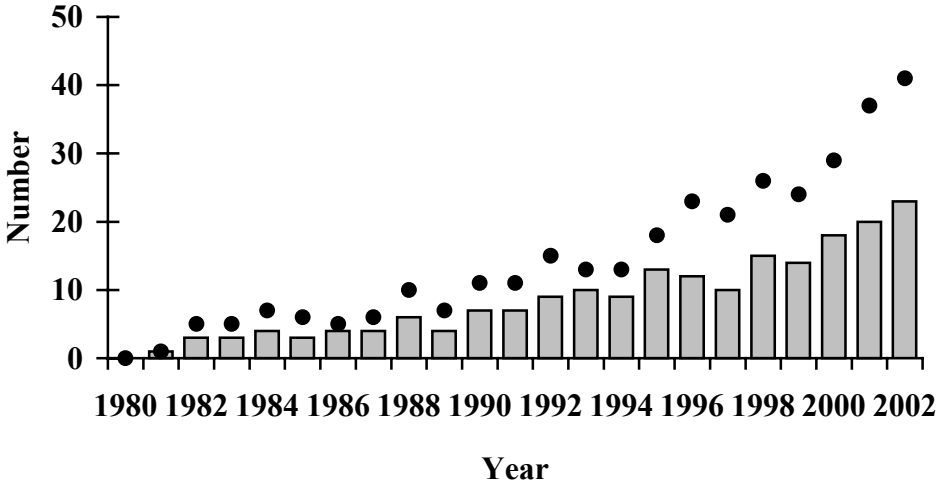

FIGURE 2 - The number of successful Bald Eagle nests in Southern Ontario (bars), and the total number of eaglets produced (dots) from 1980-2002. A nest was classified as successful if at least one young survived to fledging.

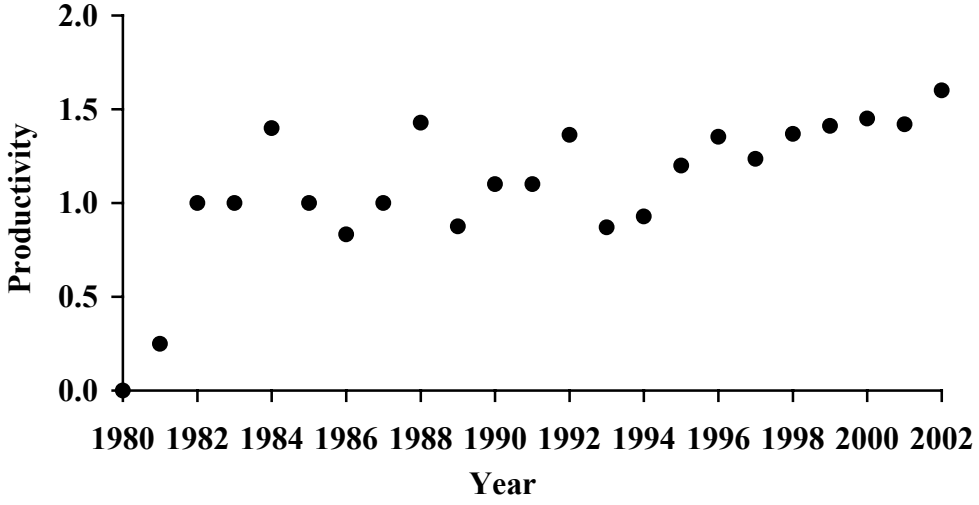

FIGURE 3 - Productivity (mean number of chicks fledged per active nest) of Bald Eagles in Southern Ontario between 1980 and 2002.

DISCUSSION

In 2002 Bald Eagle productivity was the highest recorded in Southern Ontario since monitoring began; 41 eaglets were produced, and mean productivity was 1.6 young per active nest. Over the last five years, the number of Bald Eagle pairs in Southern Ontario has steadily increased, and productivity has been stable at 1.3 - 1.5 young. Productivity in 2002 was slightly higher than average, in part because three pairs successfully raised triplets, which is a very rare event. The decline in toxic chemicals over the last 30 years (Donaldson et al. 1999), the release of 32 eaglets from hacking sites at Long Point and Taquanyah between 1983 and 1987, enhanced landowner stewardship, improved management techniques, and endangered species legislation, have all played a role in creating a more healthy environment for Bald Eagles.

It is important to note that productivity estimates reported in this study should be considered a minimum, because the number of eaglets present in a nest may be underestimated. There are several nest sites within the study area that are located in remote or inaccessible locations (e.g., Long Point, St. Clair National Wildlife Area, Meaford Tank Range) and others where visibility from the ground is poor once foliage is present on the trees. This makes monitoring nests very difficult and may cause observers to unintentionally underestimate the number of chicks in a nest. This is especially true for nests that are visited on only one occasion. Furthermore, there may be some nests within the study area that have not been reported to the Southern Ontario Bald Eagle Monitoring Project. Increased public awareness and cooperation with the second Ontario Breeding Bird Atlas will help to ensure that nests are reported and monitors are set up in a timely fashion.

Although the Southern Ontario Bald Eagle population has recovered significantly since the 1980s, there are continuing concerns about its long-term viability. The Bald Eagle has a life history strategy that includes high adult survival rates and low productivity, so even a small decrease in survival rates, or the loss of a single breeding pair can have a large impact on population growth rate (Buehler 2000). Further, the relatively small size of the population makes it more susceptible to disturbance and other factors that could negatively affect survival rates.

There are indications that the Southern Ontario Bald Eagle population may have lower survival rates than that of other populations. Adult turnover rates, which are generally associated with adult mortality (P. Hunter pers. comm.), were estimated to be quite high (once every 11 years) compared to the normal life expectancy of a Bald Eagle (20-25 years) (Whittam 2000). Over the last two years (2001-2002) there have been two, or possibly three deaths of adult Bald Eagles reported to the Southern Ontario Bald Eagle Monitoring Project. Two of these deaths were confirmed by OMNR and the third unconfirmed. The reason(s) for high adult turnover rates and possible high mortality rates are unclear, and further research is required. Results of necropsies on these birds will hopefully provide information on the cause(s) of death.

Levels of organochlorine compounds such as DDT and PCBs have been significantly reduced within the Great Lakes, but there are other types of contamination that may threaten Bald Eagles. The first potential threat is Type E Avian Botulism, which has been killing large numbers of fish and waterbirds on Lake Erie in recent years. In fall 2001 and 2002, thousands of dead water birds washed up on the shores of Lake Erie. These birds were mostly fish eaters (e.g., loons, grebes, mergansers) and scavengers (e.g., gulls), but others such as shorebirds were also affected. Given that the Bald Eagle is an opportunistic forager, it is likely that eagles will feed on the carcasses of diseased birds that have washed up on shore, thereby ingesting the botulism toxin. It is unknown at this time whether carcasses

of botulism-killed birds comprise a large proportion of the Bald Eagle's diet or how much of the toxin must be ingested before the birds is affected. There has been at least one confirmed case of a young of the year Bald Eagle succumbing to Avian Botulism in New York State in 2001. So, it is possible that botulism may affect Bald Eagles along Lake Erie, particularly in areas where numerous dead birds wash up on beaches.

In addition, Bald Eagles are exposed to heavy metals, particularly lead and mercury. In the last few years, several Bald Eagles found dead in Ontario have had elevated levels of both mercury and lead in their bodies. Long-term exposure to such contaminants can limit an eagle's reproductive capabilities, alter their behavior and impair their foraging abilities, increase their susceptibility to disease, and possibly result in death. Determining whether heavy metal exposure is a long-term problem that is responsible for decreased longevity is one of the main questions that the Southern Ontario Bald Eagle Monitoring Projects needs to explore. All indications are that the eagles are picking up mercury somewhere away from the Great Lakes. Determining where Bald Eagles go in the period between fledging and breeding (4-6 years) will help identify sources of mercury contamination.

To begin addressing this problem, in 2003, the Bald Eagle Monitoring Team will be initiating a pilot program to track the seasonal movements and fate of a minimum of three young eaglets from the time they leave the nest to the time they begin breeding five years later. This will be accomplished through satellite tracking of the eagles, using 90-gram backpack transmitters that have a broadcast life span of up to 5 years. Such transmitters have been used very effectively in recent years on pre-fledged eaglets in Florida (Millsap et al. 2000). Satellite transmitters will be attached to the young eaglets before they leave the nest, and will then relay precise locations of where the birds are spending their time, and perhaps give us a better idea of where the birds are picking up mercury contamination. In 2003, the Southern Ontario Bald Eagle Monitoring Program will also be accessing nests, banding the eaglets, and taking blood samples, which will be analyzed for the presence of chlorinated hydrocarbon contaminants. Banding and blood sampling will occur in 2003 and 2004 so that all nests in the study area can be sampled.

RECOMMENDATIONS

- Continue to monitor all territories and nests within the study area and closely monitor territories that had failed nests in 2002.
- Continue to monitor abandoned territories and platforms for the possibility of reoccupation.
- Work with landowners to increase awareness and to protect Bald Eagle nesting habitat.
- Confirm that the bones collected at HN5 are from a Bald Eagle and determine the cause of death of the eagle collected in Bruce County.
- Increase public awareness of the Southern Ontario Bald Eagle Monitoring Project and continue to work with the Ontario Breeding Bird Atlas so that all nests have monitors set up in a timely fashion.
- Initiate a pilot project that involves satellite tracking of juvenile eagles to determine where the birds go in the five year period between fledging and becoming a breeding adult.
- Visit most (15-20) nest sites in 2003-2004 so that the eaglets can be banded and blood sampled and the condition of the nest tree and surrounding habitat can be assessed.

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APPENDIX A – Productivity of Southern Ontario Bald Eagle nests, 1980-2002 (mean = total/#years nest active). AB=abandoned, P=unoccupied platform.

ID	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total	Mean
BR1																						0	2	2	1.0
BR2																									
BR3																									
BR4																						1	U	1	1.0
EN1[AB]		0	0	1																				1	0.3
EN2	0				0	0	0	1	1	0	0	1	0	0	0	1	1	1	0	2	2	2	1	13	0.6
EN3						0	0	1	1	2	2	3	1	0	3	1	3	3	3	3	2	2	2	32	1.8
EN4																	0	0	1	0	1	1	3	6	0.9
EN5																		1	2	2	1	3	0	9	1.0
EN6																					0	0	1	1	0.3
EN7																						2	3	5	2.5
EX1	0	0	0	0	2	2	1	0	0	0	1	2	3	1	1	0	2	2	1	2	0	2	2	24	1.0
EX2		1	2	2	1	2	2	3	2	1	2	1	2	1	1	2	3	0	2	0	2	2	2	36	1.6
EX3										0	2	1	2	1	1	1	3	3	2	2	2	2	2	24	1.7
EX4													0	0	1	1	2	3	1	1	2	2	2	15	1.4
EX5																									
PI1[P]																									
PI2																			1	1	3	2	2	9	1.5
PP1[P]																									
FR1																					2	2	3	7	2.3
FR2																						1	1	2	1.0
GY1													1	2	1	2	2	0	0		0	1		9	1.0
HN1[AB]											0	0	0	0	0									0	0
HN2[AB]											0	0	2	2	2	2	1	0	3					12	1.3
HN3														1	2	2	2	2	3	2	2	2	0	18	1.8
HN4															0	1	1	2	2	2	2	2	2	14	1.5
HN5																				2	1	0		3	1.0
LB1																							2	2	2.0
LP1			2	0	1	0	1	0	2	2	1	0	1	1	0	1	0	0	1		2	1	1	17	0.8
LP2									2	0	2	1	2	2	1	0	0	0	2	2	1	1	1	17	1.1
LP3														1		2	0	1	0	1	1	0	1	7	0.8
LP4																									
LP5																							1	1	1.0
KT1															0	1	1	3	1	1	1	1	1	10	1.1
KT2																							2	2	2.0
RP1[AB]	0	0	1	2	3	2	1	1	2	2	1	0		0	0	1	0							16	1.0
RP2												2	1	1	0				1		1	2	2	10	1.2
LG1																				1	0	1	2	4	1.0
MX1																									
NA1[P]																									
NH1																	2	0	0	0	1			3	0.6
Total	0	1	5	5	7	6	5	6	10	7	11	11	15	13	13	18	23	21	26	24	29	37	41	332	1.2