Southern Ontario Bald Eagle Monitoring Program

2005 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 all failed to produce young (OMNR historical 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 to closely monitor the population. In 1983, the Southern Ontario Bald Eagle Monitoring Project, a cooperative project led by the OMNR and the Canadian Wildlife Service (CWS) was initiated. Population monitoring was led by OMNR and the hacking of young eaglets was led by CWS. 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 landowners and volunteer nest monitors to obtain information on Bald Eagle nesting activity and productivity. The study area includes the Canadian shores of lakes Erie, St. Clair, Huron and Ontario.

From 1973-1982, OMNR (with assistance from the public) monitored territories, productivity (number of young fledged per active nest), and mortality. Beginning in 1983, productivity was monitored annually from the nest, and eaglets within the study area were weighed, measured, and banded. 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 from northwestern Ontario and released at two hacking sites on the north shore of Lake Erie. From 1988-1999, blood and feather samples were taken from eaglets to monitor levels of pesticides and heavy metal contaminants. Analysis of 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. Annual blood samples were no longer deemed necessary, since there was fairly strong evidence for a decline in contaminants in Great Lakes eagles (Donaldson *et al.*1999), and all examined eaglets hatched over the last decade have appeared to be healthy (P. Hunter pers. comm.). Blood sampling and banding now occurs at five-year intervals, which should be adequate to monitor contaminant levels in juvenile birds.

In 2004, a technological approach to monitoring, Destination Eagle, was introduced. Satellite telemetry was used to track three eaglets from their natal nest sites on their first flights to wintering areas. Only one of the three young birds was tracked successfully for the full year. In 2005, seven more transmitters were deployed.

The objectives of the 2005 project were to:

1. Continue to locate and monitor all territories (new and historic) in southern Ontario through a network of volunteer nest monitors and landowners, in order to continue to provide accurate information on eagle population size and productivity;
2. Use satellite telemetry to track movements of seven young eaglets (5 HY as part of the study, 2 AHY, not included in southern ON monitoring program) for approximately 3 to 5 years, in order to determine wintering areas, stopover sites, timing and dispersal patterns. Due to high mortality rates young raptors face within their first year of life, we also hope to identify potential regions in which young eagles may be putting themselves in unsafe situations (i.e. contaminants, disease, and/or unsafe industrial environments) resulting in mortality;
3. Sample blood and feathers of eagles fitted with transmitters, and their siblings, for contaminants analyses; and
4. Colour band eaglets to provide information on dispersal and longevity.

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 April, 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 from 1980-2004. 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. Further contact was made throughout June to determine productivity at each nest. 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. In 2005, the majority of Bald Eagle nests were monitored from the ground, with the exception of the southwestern basin of Lake Erie which was also surveyed from the air (Courtesy: P. Roberts).

Accessing nests

Prior to any fieldwork, landowners were contacted in order to gain permission for the field team to access nest sites. Nests were accessed only when the young appeared to be 9-10 weeks old. Most were handled at 64 days of age. This age range ensured that the bird was of sufficient size for banding, blood sampling and transmitter attachment, but young enough to prevent pre-mature fledging from the nest. Nests were not accessed under weather conditions that would have put the eagles or staff in danger (i.e. high winds and temperature extremes of >30 or < 4 ºC).

We hired a trained, certified tree-climber (Mark Bacro), who decided whether a given tree and nest could be safely accessed. A ropes method was used to climb the trees. This method was non-invasive and did not compromise the health of the tree. The ground crew was in constant contact with the climber via walkie-talkie. Mr. Bacro also provided us with details from the nest itself, including: prey remains in nest, nest dimensions, whether a waterbody was within the field of view, whether the nest was beneath the tree canopy cover and presence of likely perches within the field of view.

Birds were removed from the nest by immediate capture by hand or by coaxing them toward the climber by using an "eagle stick." They were then placed within a breathable bag, which was lowered via a rope system.

Morphological measurements

In 2005, only nestlings from nests accessed for satellite telemetry, and their siblings, were handled. Each nestling was measured and blood sampled in accordance with an approved animal care protocol (# 04-92), to obtain information on age, sex and condition (McCracken 2004). We collected a standard set of measurements for each nestling: body weight, culmen length, bill depth, food pad length, hallux claw length, and the length of the 8th primary feather. These measurements were subsequently used to age and sex the birds according to published formulae (Bortolotti 1984). All eaglets were checked for foot and bill abnormalities, and crop status was assessed (percent full). During the entire procedure, the bird's physical status was continually monitored. If a bird appeared to be overheating, proper procedures were followed to cool the bird following the approved protocol.

BANDING

Once measurements were completed, the birds were banded. A hood was placed on the bird's head. When not processing near the talons, the bird's legs were wrapped using a sponge and Velcro. A standard size 9-rivet, USFWS aluminum band was placed on the right leg and a black and white alphanumeric, rivet band was placed on the left leg. To properly attach the band rivet, holes were aligned using a nail, and needle-nosed vise grips were used to hold the alignment. The band was then secured with a pop rivet. This procedure was used for both bands and an overall inspection was made to ensure there were no rough edges and that they were attached properly.

BLOOD SAMPLING

Blood samples were collected from each nestling for contaminant analyses and sex determination. Once the bird was measured and banded, a 10 ml sample of blood was taken from the brachial vein under the proximal portion of the radius and ulna. A maximum of only two attempts to obtain the blood sample was permissible (one try per wing). If a sample could not be obtained after two attempts, the bird was considered a "non-donor."

The sampling area was cleaned using isopropyl alcohol, and downy feathers were pushed to the side to expose the skin and vein. We used a butterfly needle attached to a 10 ml vacutainer already containing freeze-dried Na Heparin. Immediately after sampling, the vacutainer was removed from the butterfly needle and rocked gently to ensure the contents were properly mixed. The sample was then placed on ice until it could be processed. Excess blood from the butterfly needle was blotted on special filter paper (used for sex determination), dried, and put in an envelope for shipping. Once samples were taken, the bird's vein was monitored to ensure that the area was free from excessive bleeding or haematomas. In the event of a haematoma, pressure was applied to the vein to ensure it clotted properly and would not increase in size.

Samples were put on ice until we were in an area in which we could properly process the samples. Samples were placed into a centrifuge, spun down for five minutes, and then the plasma was separated from the top of the red blood cells and placed into a nunc. This process was repeated until the plasma was completely separated. The nuncs were then placed into a portable dewar filled with liquid nitrogen. This kept the samples frozen until they could be returned to CWS for contaminants analyses.

FEATHER SAMPLING

Feathers were collected from each nestling for additional contaminant analysis. After banding, we took three breast feathers from the breastbone of each nestling. Feathers were sent to CWS for contaminant analysis.

TRANSMITTER ATTACHMENT

Seven Platform Transmitting Terminals (PTT) were purchased in 2005 from Northstar Science and Technologies (Baltimore, MD, USA), with funds generously donated by a variety of sources including: Mountain Equipment Co-op, TD-Friends of the Environment Fund, Shell Environment Fund, Wild Birds Unlimited, Ontario Trillium Foundation (in association with Essex County Field Naturalist's), Detroit River Canadian Clean-up, Tim Horton's, Caisse Populaire, Thousands Islands Biosphere Reserve Foundation, Parks Canada, Doug Rawlinson, and numerous small donations from various naturalist groups and individuals (see Acknowledgements). Four eaglets from nest sites in southern Ontario, one from Lake Ontario, and two rehab birds from northern Ontario received transmitters. In addition to the PTTs, VHF transmitters were also affixed, allowing us to track the birds intensively during the first two months following fledging – the period when mortality is expected to be greatest. Our PTTs were battery-powered and were factory outfitted with an auxiliary VHF transmitter allowing for this supplementary tracking. Each unit had a pre-set duty cycle, transmitting once every five days. The total weight of the assembly was approximately 93 grams, which is less than three percent of the bird's body weight.

Eaglets for telemetry work were chosen based on nest site location. Associated funders selected their nests, and often requested transmitters be fitted to eaglets within their community, or in some cases adjacent community. The PTT back-pack was custom fit to the eaglet using Teflon ribbon as straps. The straps were sewn with biodegradable cotton thread. This method has been tested on numerous raptor species (including young eagles) and no negative impact has been reported on the flight, reproductive, or hunting abilities of the birds as a result of wearing transmitters (Britten et al. 1999). There have been no documented cases of eagles being injured as a consequence of carrying transmitters. Care was taken to ensure that the harness was loose enough to allow for growth of the bird, yet tight enough so as not to interfere with natural movements. Once the transmitter was fitted, the eaglet's wing mobility was tested by doing a 'flap test,' while the bird is held by its legs. Once the harness was properly attached, the bird was returned to the nest. Birds were then monitored and observed from the ground to ensure there were no problems with attachment. If any problems had arisen, necessary efforts would have been made to recapture the bird and correct the problem.

Returning nestlings to the nest

After birds had been processed and all leg wrappings and hoods were removed, the birds were put back in the breathable bag and raised back up the tree via rope to the climber. The climber then carefully returned the young to the nest, and quietly descended. The ground crew closely monitored the behaviour of the young during the complete duration of the climber's descent, ensuring the birds remained in the nest.

Tracking and data analysis

Satellite transmission of the birds' locations was timed to be received at BSC once every five days. Location data (as transmitted by the Argos Data Collection services, ARGOS 2000) were put into a parsing program created by BSC's senior scientist, Denis Lepage, which separates the satellite data into an Access database. The data are then imported into a real time mapping program, which is automatically updated each time a transmission is received.

Movement data are reviewed and screened after each transmission is received. Once deemed to be sufficiently accurate, the data are then uploaded to an online tracking system, Eagle Tracker (www.bsc-eoc.org), for the public to view on maps.

Natal ranges, wintering ranges, and stopover sites will be determined by analyzing ARGOS PTT data using Arcview GIS. More specific movement analyses will be carried out using the Animal Movement (Hooge and Eichenlaub 2000) extension available for Arcview. Natal ranges will be evaluated using the 95% Kernel method and the core natal area will be determined using a 50% Kernel analysis (Bennett and Bloom, 2005). This will provide an estimate of the natal nest area used by the eaglets. ARGOS transmissions with a location class (LC) more than zero ($0<1<2<3$ accuracy) will be used in analysis. Dispersal patterns will be evaluated by calculating linear distance from the departure point, the point of last transmission, to the arrival location, and the next consecutive transmitted location. This will allow us to outline distances to and from stopover locations, wintering locations, and rates at which birds moved between stopover locations (Laing et al. 2005).

The BSC field crew also collected nest site habitat information for 11 active nests within the Lake Erie basin. Each nest tree was used as the centre point for a circle ordination (north, east, south, and west) of transects measuring 100m from the centre. At 25m intervals, the following measurements were take along transects in each of the four cardinal directions: species and tree count, tree height (meters), DBH (%), crown cover (estimated), and an assessment of the dominance of tallied trees (subdominant, co-dominant, or super-dominant canopy)

The nest tree and every tree within 25m bands up to 100m at every ordination (east, south, west, and north), using the nest tree as the centre point, and the four closest trees to that marked 25m tree at all ordinations, was inventoried on height, DBH, species, crown cover, and evaluated on dominance (sub-dominant, co-dominant, or super dominant canopy). Information was collected in order to refine a predictive GIS habitat model created for Lake Ontario.

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 was present at least once in the last five years, but not present in 2005. A territory was classified as **abandoned** if there was no Bald Eagle activity during the past five years, or if the nest was 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 nests in that non-nesting territorial pairs and sub-adults that occupy a breeding territory 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

UPDATE ON TERRITORIES THAT WERE NEW IN 2004

In 2004, eight new nesting territories were recorded in the study area – BR5, BR2, EX6, KT3, PR2, PR3, LP6, and MX2 (Laing and Badzinski 2005). Of those, five had activity at the nest, and two were confirmed to have produced young.

Two new nests were added to Peterborough in 2004, bringing its total up from one to three nest. We followed up on these new nests in 2005 and found PR3 to be an Osprey nest and PR2 to have an active pair of eagles that reared one young.

Long Point also had a new nest noted in 2004, LG6. One young and one adult were observed at this nest in 2004, but information was not complete. In 2005, this pair successfully produced and raised three young.

Essex County also had a new nesting pair in 2004, EX6, successfully producing two young. In 2005, this island nesting pair raised two young. The company owning the island used the nest to explain the health of aquatic indicator species on the property.

A newly established nest in Bruce County that failed 2004, BR2, remained inactive in 2005. This nest will be closely monitored in 2006 in order to determine whether the pair returns to the territory and/or nests elsewhere. BR5 was also new in 2004, and two adults were seen in May at the nest. However, the pair did not produce young or stay to nest. In 2005, no activity was noted at the nest site.

In Kent County, KT3 was established in 2004 and it appeared as though the pair was 'playing house' since no young were produced and the pair did not remain at the nest into the early summer. This nest may have succumbed to the weather in 2005, since it appeared to be smaller than originally noted in 2004. The pair was also not seen in the area in 2005. Follow up in 2006 may determine the existence of an alternate nest in the territory.

In Middlesex County, MX2 was noted as active in 2004 and it was speculated that one young was produced. In 2005, Ontario Atlassers reported one chick.

NEW TERRITORIES IN 2005

In 2005, we had six new nesting territories, three of them falling in Essex County. A combination of increased effort and possibly an increase in maturing population may be behind these numbers. Three of the new territories fledged at least one chick (Table 2), and only one nest was noted to have no activity this year (HN6).

In Haldimand-Norfolk, HN6 was originally confirmed in 2004, but it did not make the 2004 summary report. One adult was seen in the area near the nest in 2004 and in 2005 an adult was noted within the vicinity of the nest during February, but not noted thereafter.

This was the first year with reports of a new nesting territory in Oxford County. Reports were received of adults sitting in the nest tree, however, neither were observed on the nest. More effort will be made in 2006 to monitor this nest.

Bruce County also has a growing Bald Eagle residency, with one new nest being noted in 2005. BR6 was reported in early June and two young were spotted in the nest. Monitors observed the chicks stretching their wings and standing in the nest.

Essex County has the largest number of newly reported nests this year: EX7, EX8, and EX9. EX7 was originally noted from the air and later confirmed by ground survey. Two nests are located within 20m of one another and only one was active this year. These two nests likely make up the single territory (EX7), and the pair will likely use either one or the other. In 2005, monitors noted that the birds originally started ‘refurbishing’ nest A and then actively nested in nest B. The pair successfully raised two young and one adult remained in the area as late as mid-October. In 2004, another nest was investigated but not included in the 2004 report. In late 2004, a nest was noted on a mid-sized woodlot, and MNR inspected the property in February 2004. The nest (EX8) was more actively monitored in 2005 and one young was raised. The pair was also reportedly seen in this territory during 2003, but as with 2004, nesting activity was not observed. Another active nest, EX9, noted in Essex successfully raised a single chick in 2005. The nest is located in an area littered with duck blinds and constant human activity. This nest should be closely monitored in 2006 in order to ensure that disturbance during nesting does not disrupt the pair.

NESTING ACTIVITY

In total, 53 Bald Eagle territories within the study area have been occupied at least once since monitoring began in 1980 (Appendix A). There are also non-occupied platforms (e.g. P11 and PP1), which despite reports of eagle activity in the area, remain inactive. At other territories containing platforms (e.g., EN2, EN3, EX1), nesting activity has been observed in the past, but the platforms are currently inactive. Territories that were active in 2004 and not active in 2005 include: EX1, EX3, and FR1. It is unknown why these pairs did not return.

Three historical nesting territories remained inactive this year (LG2, BR4, BR5). In 2003, LG2 was active and produced two chicks, but the nest later failed, apparently owing to predation. To aid in further nesting attempts, a predator guard was subsequently placed on the nest tree. However, the pair did not re-nest in 2004 or 2005, nor were any adults seen in the area. The pair at BR4 successfully raised two chicks in 2002, but did not return in 2003, 2004 or 2005. BR5 was a new noted territory in 2004, but the pair was not actively nesting. In 2005, this territory remained inactive.

NEST FAILURE AND ATTRITION

There was only one known nest failure (LP3) in 2005, for unknown causes. Pairs that did return to nesting territories and did not breed included: KT2, FR2, EX4, EX5, BR2 and OX1. In the case of OX1, this nest was poorly monitored and its productivity status remains unknown. Pairs were seen in the area and perching in trees, but no nesting behaviour was observed, nor were chicks thought to be produced.

Since human disturbance resulted in failure of the HN5 nest site in 2001, there has been no nesting activity. Adult eagles, however, continue to be seen within the territory, and two separate reports of eagles were received in 2005. A sub-adult bird was reported in the nest tree in early June, and an adult was seen standing on the nest May and late September. It is likely that the same pair of eagles has occupied Turkey Point and Fisher’s Glen throughout the years, because the two territories are less than 10 km apart and have never been active in the same years. HN2 was active from 1990-1998, and HN5 was active from 1999-2001. After the HN5 nest was disturbed in 2001, the pair was observed the same season building a nest at Turkey Point. This particular nest was never used, but a new nest was constructed nearby and has been used since 2003. Therefore, we speculate that following the disturbance at HN5, the pair subsequently relocated to HN2.

PRODUCTIVITY

In 2005, there were 43 known active Bald Eagle nests within the study area, of which 29 successfully reared at least one young (Table 1, Table 2). A record 52 young were produced overall, with a mean productivity of 1.73 fledglings per active nest (Table 2, Fig. 1). Productivity of successful nests in 2005 was a record high (see Fig. 2). In 2005, the majority of nests produced two young (45%) and five pairs produced triplets. This ties the 2004 record of triplets produced (Laing and Badzinski 2005).

Nests producing triplets in 2004 included EN3, HN2, LB1, LP3, and KT2 (Table 2). In 2005, only 2 of those nests (LB1 and HN2) succeeded in producing triplets again this year.

BANDING AND BLOOD SAMPLING

In 2004, 10 nests were accessed, and 21 eaglets were banded and blood sampled. Dr. Laird Shutt, Canadian Wildlife Service-National Wildlife Research Centre, analyzed the samples taken in 2004 for reports on the total PCB and p,p'DDE levels in chick plasma. Shutt and his team detected a mean of 56 ug/kg (ppb) total PCBs and 18 ug/kg (ppb) p,p'DDE in the blood plasma of the 21chicks sampled in 2004. In 2005 BSC banded and blood sampled birds only from nests accessed for satellite PTT deployment. We accessed 4 nests this year and blood sampled 7 birds (HN6=3, EN3=1, MX1=1, and LG1=2). Results will be documented in the 2006 final report.

In two cases, young pre-fledged from the nest. One young pre-fledged from MX1 and glided safely to the ground where field staff retrieved the bird, processed it, and returned it to the nest. Two young prefledged (of 3) from the LG1 nest and one was retrieved There were no complications related to blood sampling (e.g., haematomas), and a sample was obtained from all juveniles that were processed.

SATELLITE TELEMETRY

To date, satellite telemetry has proven to be a worthwhile effort towards learning more about the movements of southern Ontario Bald Eagles. In June 2004, three female eaglets were tagged with PTT units - two from Turkey Point (HN2) and one from Long Point (LP3). Ontario Power Generation, which funded the telemetry work, affectionately named the birds **O**livia, **P**amela (HN2), and **G**enna (LP3). In 2005, seven additional eaglets were satellite tagged, two of which were outside the study area. Nests accessed included MX1, EN3, HN2, and LG1.

In 2004, two of the three birds were tracked by satellite on their primary flights from natal areas, **O**livia and **P**amela (Table 3, Figure 3). **G**enna, the only bird PTT tagged on Long Point, was retrieved dead on 13 September 2004. For further details, see Laing and Badzinski (2005). Both **O**livia and **P**amela fledged before 1 July. **P**amela left her natal nest area, HN2, on 1 September 04, traveling in a northwesterly direction to the eastern shores of Lake Michigan. Five days later she was located moving through Detroit and traveled south to the upper Mississippi River in northern Illinois. Contact was lost with Pamela by 19 December 04, and her fate is unknown.

Olivia, also from HN2, was the first of the two siblings to move more than 10 km from the natal nest area. By 14 August, Olivia began to move in a northwesterly direction, reaching the Bruce Peninsula and Manitoulin Island by mid-August. **O**livia spent 40 days within the Manitoulin Island area until 16 October, when PTT transmissions revealed that she moved westerly through Sault Ste. Marie and into upstate Michigan. We have been able to document Olivia's full migratory cycle and have recorded her making 6 significant stopovers (further details available at Eagle Tracker: www.bsc-eoc.org). Olivia left Michigan by 30 December 04 and arrived in Sandusky, Ohio on 10 January 05, travelling approximately 200 km (linear distance). Olivia remained in this area until 16 January 05, where she arrived on her wintering grounds of Lake St. Clair. During this time she concentrated her movements within the northeastern portion of the lake and associated tributaries. She remained in this area until 19 June 05, when she moved nomadically through Lake Huron, north to Alphen, MI. She then returned to south east Michigan (Sault St. Marie area) on 30 June 05 and within a two-week period she moved from MI to northern

Ontario, over 1200km. She left northern Ontario after 18 August 05 and was recorded travelling through the Manitoulin area to reach Alphen by 13 October 05.

Preliminary analysis of the movements of the 2004 tagged birds suggests that the birds favoured large bodies of water and river tributaries. The PTT transmissions also demonstrated that the birds are active during the day and stationary during the evening. As well, siblings were recorded traveling independently of one another, immediately after dispersing from the natal area.

Comparatively, 2005 tagged birds (to date) have been documented making similar spatial movements. In 2005, 5 new PTT tagged birds were added to the study area (Tilson, Dominion, Terawatt, Ranger and Regal). On average, birds remained on their natal grounds for 47.5days using an average core area (50% kernel) of 4.5 km^2 and an overall natal area (95% kernel) of 21.8 km^2 (Table 4). The two birds that have made the most substantial movements since originally fledging are Tilson (PTT 57644, sponsored by TD-FOEF Tillsonburg Chapter) and Dominion (PTT 57646, sponsored by TD-FOEF London Chapter). Both tagged birds left their respective natal areas on the same day, 22 Aug 05 (Table 5).

Tilson left its natal area on 22 Aug 05 and moved a combined 1237 km in a linear distance with only one documented stopover between leaving the Long Point Bay area (HN2) and 31 Oct 05 (Table 3, Fig. 3). Tilson travelled first, southwest through Rondeau Provincial Park to Bay City, MI (arrived 29 Aug 05). Tilson then spent an estimated 30 days in Bay City, MI, using a core area (50% kernel) of almost 20 km^2, and a larger general area (95% kernel) of 86.5 km^2. Tilson left Bay City by 7 Oct 05 and flew to Indianapolis, Indiana. On 24 Oct 05 Tilson was observed by United States Fish and Wildlife Service employee Bill McCoy, perching on a levee of Cinergy Inc's 3,000 acre Gibson Lake. Cinergy Inc runs the third largest coal fire power plant in the United States and has set up numerous wetlands and aquatic environments as part of stewardship programs. Tilson continued to use this general area into the latter part of Oct 05. Current movements can be observed on Eagle Tracker.

Similarly, Dominion left its London natal grounds (MX2) on 22 Aug 05 and stopped over on the north shore of Lake Erie, near Port Stanley (Table 3, Figure 3). Dominion spent 46 days within this area and used a general range of 580 km^2 before moving west on 7 Oct 05 to Windsor. Dominion spent little time in Windsor, and five days later was found near Niagara, and then by 22 Oct 05 was back at his original stopover around Port Stanley. Dominion has been spotted on two different occasions, once by a Hawk Cliff bander and another time by an amateur photographer. Both reported the bird to be in good condition, and foraging and flying normally.

Not moving around much is young Regal (a community-sponsored bird hatched from LG1, Figure 3). Regal has been using the same core area (6.1 km^2, 50% kernel) about its original natal area (LG1, Table 4). This young bird has a general range of 26.5 km^2 and seems to be keeping close to home (Table 3). Observers have noted Regal and its 2 other siblings sitting in or near the nest since July, and more recently it seems as though Regal has taken to perching next to the nest site. The St. Lawrence River has a lot of foraging opportunities and therefore it is no cause for alarm that this bird has chosen to utilize its original natal habitat. Regal appears to use the waterways on the northeasterly side of its general range and has been observed foraging near the original nest tree (B. Andress, pers. comm.).

Unfortunately, we have lost contact with two of the five eaglets tagged for our Destination Eagle program, Terawatt (57643, sponsored by Ontario Power Generation) and Ranger (57645, sponsored by Wild Birds Unlimited). Mortality is not listed as the possible cause of loss of contact, as the young eaglets were both observed after original satellite transmission was lost. Terawatt remained in its natal area until 15 Aug 05, and was observed several times prior to this date. Terawatt got in regular fights with each of her siblings and we speculate damage may have been caused to the unit. Regardless, Terawatt was located via satellite on 17 Aug 05, when transmissions revealed she was in Bay City, MI. Coincidently, her sibling Tilson would arrive in this area one week later. Unfortunately, we have no records of Terawatt after this date and her current location remains unknown.

Ranger also ceased to transmit daily locations shortly after 7 Aug 05. Ranger was observed near its original nest site and then on Lake Erie's northshore, south of Rodney, Ontario. BSC biologists were able to locate this bird using radio telemetry, and observed Ranger amongst 5 other young juvenile birds along the northshore of Lake Erie near Early, Ontario. However, on 10 August we lost this birds location and think it left ahead of a weather front. Its current location remains unknown.

Combining the preliminary dispersal summaries and results from the 2005 birds (n=5) and the 2004 birds (n=2) it seems that the young eaglets remain within natal territories for an average of 45 days and utilize an immediate habitat surrounding the nest tree of 5.2 km^2 (50% kernel) and a more general area of 30.3 km^2 (95%, Table 5). All birds favoured large, open waterways, and those who dispersed followed the lakeshore, rivers, tributaries and remained at stopovers close to large waterbodies. Individual birds that have been spotted (Tilson, Dominion, and Ranger) appear to be in fine health (superficial viewing, no in hand analysis) and flew with ease. The transmitter does not appear to hinder manoeuvrability or flight speed.

EAGLE DEATHS IN SOUTHERN ONTARIO

No eagle deaths were recorded by, or reported to, BSC in 2005. Nor were there any injuries or other detrimental effects evident on any of the eaglets handled.

TABLE 1 – Summary of Bald Eagle nesting activity and productivity at each occupied territory in Southern Ontario in 2005. Territories were classified as occupied (O) or empty (E). Nests were classified as active (A, eggs laid), occupied (O, territory occupied but no eggs laid), or inactive (I, vary when occupied). Productivity was defined as the number of young raised to fledging; — indicates not applicable because territory and/or nest were inactive. Nesting territories, which were defined as abandoned for more than 5 years, have been removed from the list (EN1 & HN1).

Territory ID	Location	Territory Status	Nest Status	Productivity	Comments
BRUCE					
BR1	Lake Huron	O	A	2	
BR2	Lake Huron	O	O	—	
BR3	Georgian Bay	O	Unk	—	New nest location unknown
BR4	Lake Huron	E	I	—	
BR5	Lake Huron	E	I	—	
BR6	Lake Huron	O	A	2	New territory in 2005
ELGIN					
EN2	Lake Erie	O	A	2	
EN3	Lake Erie	O	A	1	Nest is on a platform
EN4	Lake Erie	O	A	2	
EN5	Lake Erie	O	A	1+	Unknown if more young were produced.
EN6	Thames River	O	A	2	
EN7	Catfish Creek	O	A	2	
ESSEX					
EX1	Lake Erie	O	I	—	
EX2	Lake Erie	O	A	2	
EX3	Lake Erie	O	A	1	
EX4	Detroit River	O	O	—	
EX5	Detroit River	O	O	—	
EX6	Detroit River	O	A	2	
EX7	Detroit River	O	A	2	
EX8	Lake Erie	O	A	1	New territory 2003; i.e. landowners planning to develop woodlot
EX9	Lake Erie	O	A	1	New territory 2005

TABLE 1 cont.

Territory ID	Location	Territory Status	Nest Status	Productivity	Comments
PI2	Lake Erie	O	A	1+	Unsure if more were produced
PP1	Lake Erie	E	I	—	
FRONTENAC					
FR1	Bob's Lake	O	I	—	
FR2	Wolfe Lake	O	O	—	
GREY					
GY1	Lake Huron	O	Unk	Unk	Nest blew down last year and the new nest site remains unknown
HALDIMAND-NORFOLK					
HN2	Lake Erie	O	A	3	
HN3	Lake Erie	O	A	2	
HN4	Lake Erie	O	A	3	
HN5	Lake Erie	O	I	—	Adult was observed perched on nest in April and May 2005
HN6	Lake Erie	O	I	—	
LP1	Lake Erie	O	A	2	
LP2	Lake Erie	Unk	Unk	Unk	
LP3	Lake Erie	O	A	Unk	
LP4	Lake Erie	Unk	Unk	Unk	
LP5	Lake Erie	Unk	Unk	Unk	
LP6	Lake Erie	O	A	3	
KENT					
KT1	Lake St. Clair	O	A	1	
KT2	Lake Erie	O	O	—	
KT3	Lake Erie	E	I	—	
RP2	Lake Erie	O	A	1	

Territory ID	Location	Territory Status	Nest Status	Productivity	Comments
LAMBTON					
LB1	Lake Huron	O	A	2	
LEEDS-GRENVILLE					
LG1	St. Lawrence	O	A	3	
LG2	Sand Lake	E	I	—	
MIDDLESEX					
MX1	Thames River	O	A	1	
MX2	Fanshawe Lake	O	A	1	
NIAGARA					
NA1	Niagara River	O	A	2	New activity
NORTHUMBERLAND					
NH1	Trent River	O	A	2	
OXFORD					
OX1	Lake Erie	O	O	Unk	Unknown if young were produced, need to establish a regular monitor for this nest.
PETERBOROUGH					
PR1	Kawartha Lakes	O	A	1	
PR2	Kawartha Lakes	O	A	1	

TABLE 2 - Summary of Bald Eagle nesting activity in Southern Ontario in 2005.

Reproductive Parameter	Value
Number of occupied territories	43
Number of active nests	31
Number of successful nests	30
Number of failed nests	~1
Nests that fledged 1 young	12
Nests that fledged 2 young	14
Nests that fledged 3 young	4
Total number of young produced	52
Young/occupied territory	1.21
Young/successful nest	1.73
Productivity *(young/active nest)*	1.68
Productivity since 1980 *(young/active nest)*	1.34

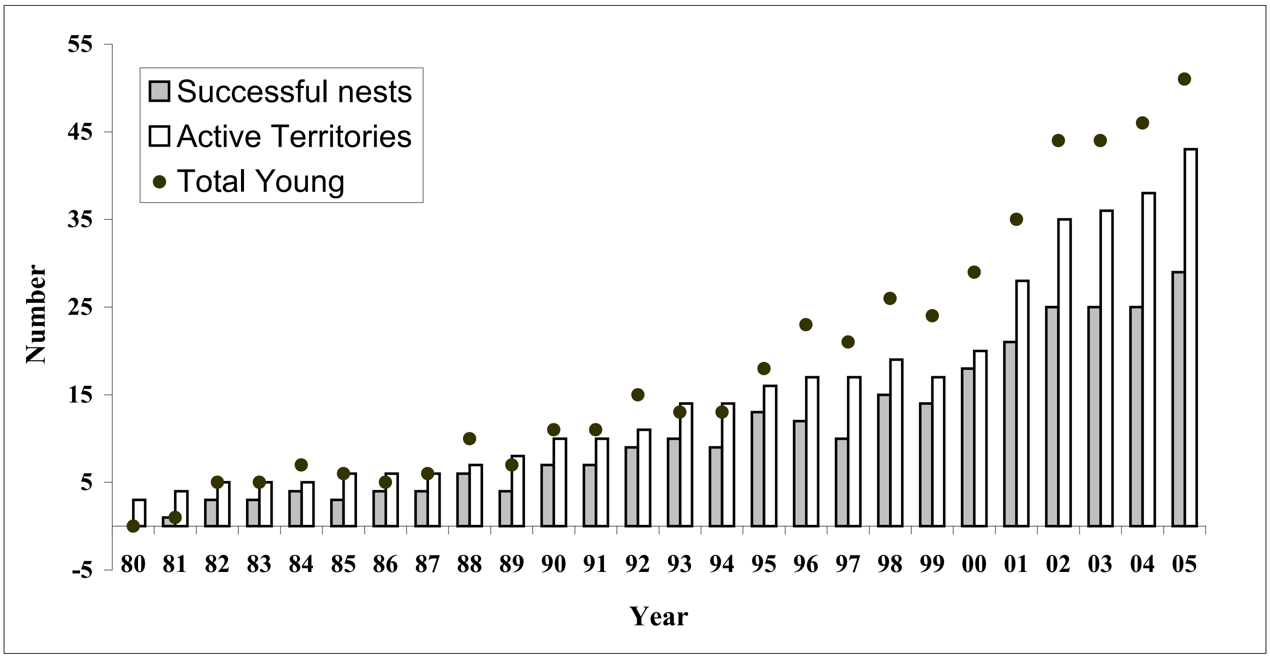

FIGURE 1 - The number of successful Bald Eagle nests and active territories in Southern Ontario (bars), and the total number of eaglets produced (dots) from 1980-2005. A nest was classified as successful if at least one young survived to fledging.

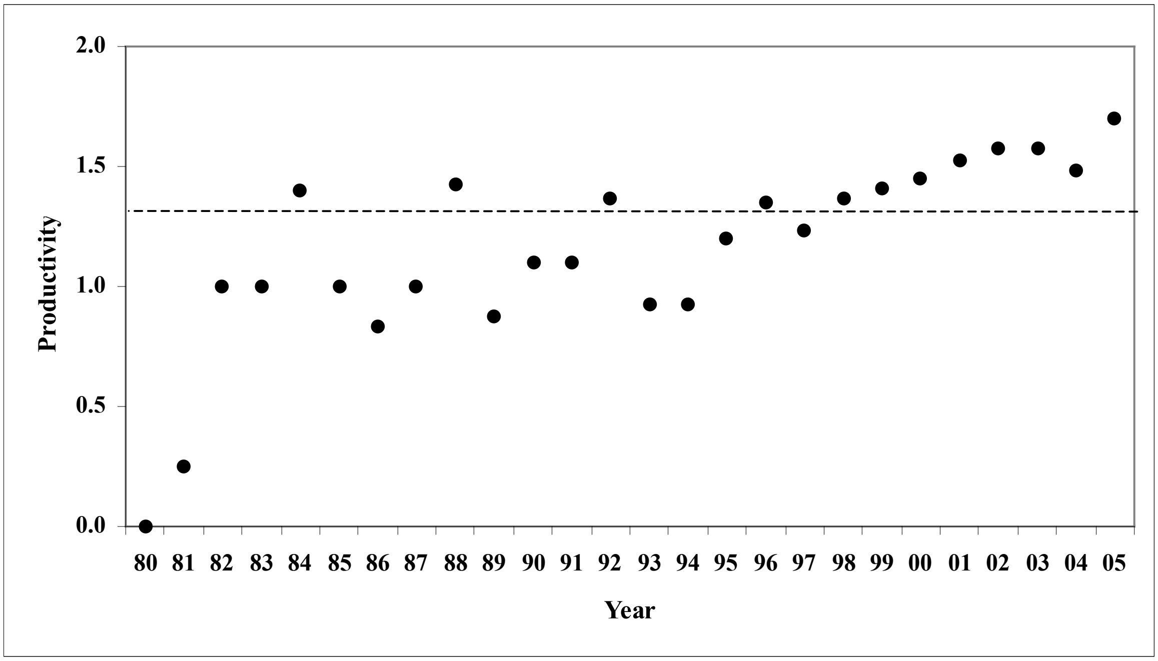

FIGURE 2 - Productivity (mean number of chicks fledged per active nest) of Bald Eagles in Southern Ontario between 1980 and 2005. The dashed line represents the average productivity over the last 25 years (1.38).

TABLE 3 - Summary of juvenile BAEA fall dispersal from natal nest sites between 1 July and Oct 31 during their respective year of study. Core (50% kernel) and general ranges (95% kernel) within stopovers are noted within the comments section of the table. Olivia has the largest stopover ranges and Tilson has the smallest.

PTT	Name	Original natal area	Arrival date	Location	Duration (days)	Departure from stopover	Approx. Distance travelled to core (Km^2)	Comments
40303	Olivia	HN2	14 Aug 04	Bruce Peninsula	56	9 Oct 04	401.9	Bird used 3 major areas along the Bruce Peninsula and around Manitoulin Island 50%=653.2, 95%=3429.6
			14 Oct 04	Sault St. Marie Area	72	25 Dec 04	157	50%=124.5, 95%=758.5
40304	Pamela	HN2	25 Aug 04	Port Burwell and surrounding	12	6 Sept 04	105	50%=89.2, 95%=513.6
			7 Sept 04	Enroute and travelling	10	17 Sept 04	440, 354	Bird travelled from Port Burwell to the Muskegon Area, then to the upper Mississippi
			22 Sept 04	Upper Mississippi	77	8 Dec 04	354	50%=33.6, 95%=194.1
57643	Terawatt	HN2	17 Aug 05	Bay City, Michigan	N/A	n/a	246.2	Lost transmission 18 Aug 05
57644	Tilson	HN2	24 Aug 05	Enroute, Rondeau Provincial Park, On	1	25 Aug 05	138.1	Contained along the north shore of Lake Erie
			27 Aug 05	Enroute, SW of Bay City, MI	1	28 Aug 05	305.1	Transit location
			29 Aug 05	Bay City MI	39	7 Oct 05	123.1	50%=19.4; 95%=86.5
			11 Oct 05	Enroute, north of Lima, OH	1	12 Oct 05	293.7	Bird appears to be in transit
			16 Oct 05	Enroute, due west of Indianapolis, IN	2	18 Oct 05	242.2	
			22 Oct 05	Enroute, northern Extension of Wabash River	N/A	----------	135.1	Bird is travelling south along the Wabash River, and was recorded as far south as the intersection of the Wabash and Ohio rivers.
57645	Ranger	EN3	N/A	N/A	N/A	----------	N/A	Lost transmission, bird was observed foraging on the north shore of Lake Erie after transmission was lost.
57656	Dominion	MX2	22 Aug 05	Port Stanley, On	46	7 Oct 05	44.3	Used 60km of the shoreline, Port Stanley in the center 50%=111.9 95%=580.9
			11 Oct 05	Enroute, Windsor, On	1	12 Oct 05	140.0	Bird was recorded along the Detroit River and then close to Dunnville 5 days later.
			16 Oct 05	Enroute, Long Beach, On	2	18 Oct 05	322.2	Bird was located near Dunnville and departed the 5 days between the preceding transmissions.
			22 Oct 05	Port Stanley, On	N/A	---------	160.0	
57648	Regal	LG1	N/A	N/A	N/A	---------	N/A	Bird has been observed within natal area by several observers. Area has open water through winter and bird may take advantage (B. Andress, pers comm.)

TABLE 4 – Natal area dispersal of satellite tagged juvenile eagles. Eaglets used core areas (50%) around nest sites that varied from 0.9 km^2 to as large as 613.1 km^2. Birds remained near to natal nest areas until late August, with the exception of Regal who remained on natal grounds well into the fall. Table uses data from original tagging date until 31 Dec 05.

PTT	Name	Sex	Nest Code	Duration (Days)	Date depart Natal Area	Kernel Area (Km^2) 50%	Kernel Area (Km^2) 95%
40303	Olivia	F	HN2	30	30 Jul 04	1.2	12.4
40304	Pamela	F	HN2	52	21 Aug 04	13.1	90.4
57643	Terawatt	F	HN2	46	15 Aug 05	5.6	34.5
57644	Tilson	F	HN2	53	22 Aug 05	3.9	20.4
57645	Ranger	M	EN3	38	7 Aug 05	0.9	4.8
57646	Dominion	M	MX2	53	22 Aug 05	5.3	22.9
57648	Regal	F	LG1	123	Remained at natal area	6.1	26.5

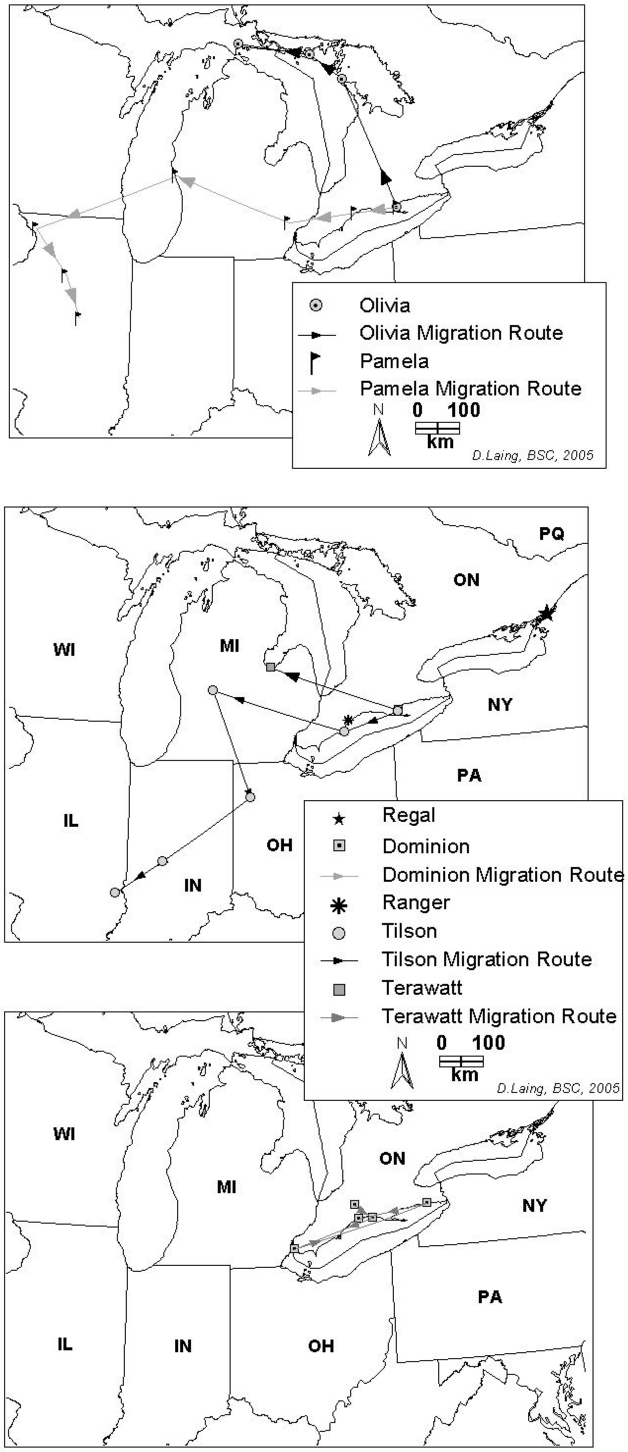

FIGURE 3 – Migratory movements of satellite-tagged eagles from natal areas, as measured between 1 Jul and 31 Oct of their respective year of study. Two birds were recorded at stationary locations (Table 3), while the rest were recorded on initial migration.

DISCUSSION

PRODUCTIVITY

In order to maintain a stable Bald Eagle population, it has been estimated that productivity levels less than 1.0 young/active nest indicate pair impairment and a minimum of 0.7 young per occupied nest site is required to sustain the population (Merkens et al. 1999). Although no known Bald Eagle mortalities were noted in 2005, previous southern Ontario Bald Eagle reports have noted mortalities caused by unknown reasons, human disturbance, or contaminant loading (Badzinski 2002, Laing and Badzinski 2005). Since 1980, BSC has recorded an average productivity of 1.38 (young per active nest). This level is consistently higher than pre-2000 numbers recorded in neighbouring U.S. populations (Broley 1947, Anthony et al. 1993, Welch 1994, Bowerman et al. 1995, Grier et al. 2003, NYSDEC 2004). Prior to the DDT-era, literature suggests that a standard productivity level lingered around 1.6 in Chesapeake Bay and 1.2 in Florida (Broley 1947, Donaldson et al. 1999). It wasn't until the late 1980s and early 1990s that a rebound was seen in Bald Eagle productivity levels. An increase in productivity could be attributed to a decrease in contamination of parents and the surrounding environments in which food provisioning and foraging takes place (Donaldson et al. 1999). Characteristically, Bald Eagles prefer nesting habitat close to water and exploit aquatic food webs (Dzus and Gerrard 1993). Therefore, if an aquatic environment has become less contaminated, the food source becomes less contaminated, consequently providing healthier adults feeding healthier prey to offspring. However, information on contaminant levels of adults breeding along the northshore of Lake Erie and Lake Ontario is lacking and juvenile plasma samples represent the only baseline data we have for these birds.

While the current Southern Ontario population exceeds this threshold, productivity of 1.73 in 2005, survival rates of Bald Eagles likely have a greater effect on population dynamics than reproductive rates (Harmata et al. 1999). To date, the long-term viability of the lower Great Lakes Bald Eagle population is still of concern as information on the mortality and survivorship of banded juveniles and/or adults is lacking. Studies investigating survivorship of Bald Eagles have grown in popularity and there has been increased emergence of radio and satellite technology (Buehler 2000). There appears to be no difference in survival rates between sexes, however, it has been suggested that juvenile migratory populations may have a slightly lower survival rate (Wood et al. 1998). Documented survivorship in Maine suggests that 73% of eaglets survive their first year (McCollough 1986) and telemetry studies in the United States appear to support this hypothesis (McClelland et al. 1996, Harmata et al. 1999, and Jenkins et al. 1999). In a California study, 10 of 13 young survived to their first year (Jenkins et al. 199) and similarly a Yellowstone National Park study revealed that 13 of 15 young survived their first year (Harmata et al. 1999). Montana young also have a low mortality rate in their first year with 10 of 11 birds surviving (McClelland et al. 1996). Lake Erie tagged eaglets appear to have similar fates, however, a limited sample size does not allow confident conclusions to be drawn after only one full migratory study complete (2004-2005). Survivorship is also over estimated as many monitors only count the young the make it to fledging. Those young that do not survivor to fledging may not be noted as many of our monitors are observing from the ground and do not have views into nests.

Survivorship can be hindered by bioaccumulation of contaminants, disease, human persecution, and more recently the threats of Type E Botulism (Grier et al. 2003). The lower Great Lakes have had noted complications with contaminant and mercury and contaminant loading (Donaldson et al. 1999, Badzinski 2002, Grier et al. 2003) as well as human disturbance (Laing and Badzinski 2005). Other Bald Eagle populations had had similar mortality problems (Buehler 2000), however, more research is required to more closely identify sources of Lower Great Lakes mortality as well as more diligent recovery of carcasses and necropsy results.

TOXICOLOGY

Bald Eagles as predators at the top of the aquatic food chain, are exposed to various chemicals, pesticides, and industrial contaminants in their prey (Donaldson et al. 1999). Results from eaglet plasma collected in 2004 (Laing and Badzinski 2005), and tested for PCB and p,p'DDE levels by Dr. Laird Shutt (Canadian Wildlife Service, National Wildlife Research Centre) suggests there has been a decline in PCBs since the 1990's. The geometric mean PCBs in chick plasma from 1990-1996 was recorded at 130 ug/kg (Donaldson et al. 1999) and we have seen a decrease to 56 ug/kg in 2004 sampled birds. Comparatively, it seems that the p,p'DDE levels have remained relatively unchanged since the 1990-1996 sampling period (geometric mean of 22.4ug/kg). Since the levels of contaminants in chick plasma reflect the food fed to them by their parents, this information suggests that the environment is rebounding from contaminated levels felt in the late 1970's and early 1980's. (Donaldson et al. 1999). Assessing contaminant levels in juvenile plasma provides useful information on trends of persistent organic chemicals in the aquatic environment where the eagles obtain their food. Additionally, useful information on the health of adult eagles may be obtained through sampling of southern Ontario breeding birds and assessing their diet (Donaldson et al. 1999).

MOVEMENT AND STOPOVER ECOLOGY

Lower Great Lakes juvenile Bald Eagles display nomadic movement and dispersal characteristics of young juveniles eagles elsewhere in North America (Gerrard et al. 1978, Hunt et al. 1992, Mabie et al. 1994, Wood et al. 1998, Restani et al. 2000, Laing et al. 2002, Laing et al. 2005). Not surprisingly, the movements of the PTT-tagged birds tend to follow riverways, lakes, and tributaries, likely reflecting a direct relationship to changes of available food sources (Hodges et al. 1987, Hunt et al. 1992, McClelland et al. 1996, Wood et al. 1998, Restani et al. 2000, Laing et al. 2005).

Specific cues for migrating post-fledging juvenile Bald Eagles is unknown, however departure dates greatly varied with one young tagged in 2005 remaining on natal grounds into November. Assuming weather and changes in prey availability are primary determinants for dispersal (Hodges et al. 1987, Hunt et al. 1992, McClelland et al. 1996, Wood et al. 1998, Restani et al. 2000, Laing et al. 2005) it is difficult to speculate as to why juveniles from Lake Erie departed from natal areas as early as the first week of July. It is interesting to note that, with the exception of the tagged LG1 eaglet, all tagged eaglets were from natal areas with similar latitude and longitude and were exposed to the same weather events and experiences. Therefore, the birds nomadic movements may just be a reflection of character individuality (Harmata et al. 1999).

Departure dates from natal areas varies, 22 August to 5 October from Montana (McClelland et al. 1996), first week of October from Saskatchewan (Gerrard et al. 1978), 7 October to 12 November from Labrador (Laing et al. 2005), and as late as 3 November in northern Saskatchewan (Harmata et al. 1999). Two of the tagged eaglets, siblings, in 2004 had departure dates within 3 weeks of one another (17 September and 9 October). Eaglets tagged in 2005 departed natal areas between 7 and 22 Aug 05, with one eaglet remaining on the St. Lawrence well into November. Therefore, it seems that eaglets hatched from the lower Great Lakes have similar departure times from natal areas when compared to mid-west (McClelland et al. 1996) and Saskatchewan (Gerrard et al. 1978) eaglets.

To date the most important stopovers for young eaglets originating from southern Ontario appears to be the north shore of Lake Erie west of Long Point, Turkey Point, the Bruce Penninsula, and the Detroit River. Grier et al. (2003 draft report) suggest that there are several new wintering sites within Ontario, including: mainland sites along the Grand and Thames Rivers, 1000 Islands Parkway, Wolfe Island, Rondeau, Long Point, Point Pelee, Nanticoke Generating Station, Niagara River, Detroit River, Manitoulin Island, Baie du Dore area (next to the Bruce Nuclear Power Development Plant), and Nipigon River. It could be speculated that the young hatched out in the Lake Erie area could choose any number of these locations for wintering locations.

CONCLUSIONS

The Southern Ontario Bald Eagle Monitoring program has successfully monitored the steady increase of southern Ontario Bald Eagle productivity over the last 25 years. Since the program began in the 1980's the population has increased from only a few nesting pairs, to a record productivity level in 2005 (1.73 versus 1.48 in 2004) across 29 successful nests. The number of productive nests fledging two young has also increased (up to 13 nests from 11 in 2003), and was complimented by a steady number of nests fledging triplets (n=5). This increase in population is likely reflective of a decline in toxic chemicals over the last 30 years (Donaldson et al. 1999), however this conclusion is speculative as there is limited information available regarding the health of the parent birds. BSC expanded their original monitoring program in 2004, to include satellite telemetry in order to provide valuable insight into the dispersal patterns, stopover ecology, site fidelity and wintering patterns of 8 juvenile Bald Eagles from southern Ontario. To date we have documented the full migratory cycle of one eaglet and the fall migration of

7 eaglets from natal areas. Three eaglets tagged in 2005 continue to be monitored, as does the second year movements of a HY bird tagged in 2004.

RECOMMENDATIONS

The following recommendations frame a work plan for the Southern Ontario Bald Eagle Monitoring Project in 2006:

- Continue to monitor all territories and nests within the study area and closely monitor territories that had failed, or inactive, nests in 2005.
- Closely monitor those territories that were new in 2005 for signs of nesting activity.
- Continue to monitor abandoned territories for the possibility of reoccupation.
- Closely monitor inactive platform sites.
- Increase public awareness of the Southern Ontario Bald Eagle Monitoring Project and continue to work with landowners to increase awareness and to protect Bald Eagle nesting habitat, and ensure that all nests have monitors designated in a timely fashion.
- Focus on determining sources of mortality in adult and juvenile eagles.
- Continue to investigate dispersal patterns of free-flying juveniles and young adults through satellite tracking technology.
- Sample blood and feathers from eaglets that are processed as part of the telemetry portion of this project.
- Prepare proposals for wintering research and the sampling of adult birds in 2006-2007.

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APPENDIX A – Productivity of Southern Ontario Bald Eagle nests, 1980-2005 (mean = total/#years nest occupied). AB=abandoned, P=unoccupied platform, U = unknown.

ID	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	Total	Mean
BR1																							2	1	2	2	7	1.75
BR2																												
BR3																												
BR4																						1	1				2	1.0
BR5																									0			
BR6																										2	2	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	1	0	2	16	0.8
EN3						0	0	1	1	2	2	3	1	0	3	1	3	3	3	3	2	2	2	0	3	1	36	1.7
EN4																	0	0	1	0	1	1	3	2	2	2	12	1.3
EN5																		1	2	2	1	3	0	2	0	1	12	1.5
EN6																					0	0	1	0	2	2	5	0.83
EN7																						2	3	3	2	2	12	2.4
EX1	0	0	0	0	2	2	1	0	0	0	1	2	3	1	1	0	2	2	1	2	0	2	2	2	1	0	27	1.08
EX2		1	2	2	1	2	2	3	2	1	2	1	2	1	1	2	3	0	2	0	2	2	2	-	2	2	40	1.74
EX3										0	2	1	2	1	1	1	3	3	2	2	2	2	2	2	U	1	27	1.80
EX4													0	0	1	1	2	3	1	1	2	2	2	2	1	0	18	1.29
EX5																							U	2	1	0	3	1.0
EX6																									2	2	4	1.0
EX7																										2	2	2.0
EX8																										1	1	1
EX9																										1	1	1
PI2																			1	1	3	2	2	1	2	1	13	1.62
PP1[P]																												
OX1																										0	0	
FR1																					2	2	3	3	2	0	12	2.4
FR2																						1	1	1	2	0	5	1.25
GY1													1	2	1	2	2	0	0		0	1	U	1		U	10	1.0
HN1[AB]											0	0	0	0	0												0	
HN2											0	0	2	2	2	2	1	0	3				2	2	3	3	22	1.70
HN3														1	2	2	2	2	3	2	2	2	0	0	2	2	20	1.81
HN4															0	1	1	2	2	2	2	2	2	2	2	3	21	1.75
HN5																				2	1	0					3	1.0
LB1																							2	3	3	2	10	2.5
LP1			2	0	1	0	1	0	2	2	1	0	1	1	0	1	0	0	1		2	1	1	1	1	2	21	.95
LP2									2	0	2	1	2	2	1	0	0	0	2	2	1	1	1	3		U	20	1.33
LP3														1		2	0	1	0	1	1		1	1	3	O	11	1.0
LP4																							0	1	U	U	1	0.5
LP5																							1			U	1	1
LP6																									1	3	4	2.0
KT1															0	1	1	3	1	1	1	1	1	2	1	1	14	1.16
KT2																							2	2	3		7	2.0
KT3																												
RP1[AB]	0	0	1	2	3	2	1	1	2	2	1	0		0	0	1	0										16	1.0

APPENDIX A – Productivity of Southern Ontario Bald Eagle nests, 1980-2005 (mean = total/#years nest occupied). AB=abandoned, P=unoccupied platform, U = unknown.

ID	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	Total	Mean
RP2												2	1	1	0				1		1	2	2	2	U	1	13	1.3
LG1																				1	0	1	2	1	2	3	10	1.4
LG2																											0	
MX1																										1	1	1
MX2																										1	1	1
NA1[P]																										2	2	2
NH1																	2	0	0	0	1			1	1	2	7	1.0
PR1																										1	1	1
PR2																									U	1	1	1
Total	**0**	**1**	**5**	**5**	**7**	**6**	**5**	**6**	**10**	**7**	**11**	**11**	**15**	**13**	**13**	**18**	**23**	**21**	**26**	**24**	**29**	**35**	**44**	**44**	**46**	**52**	**431**	**1.34**