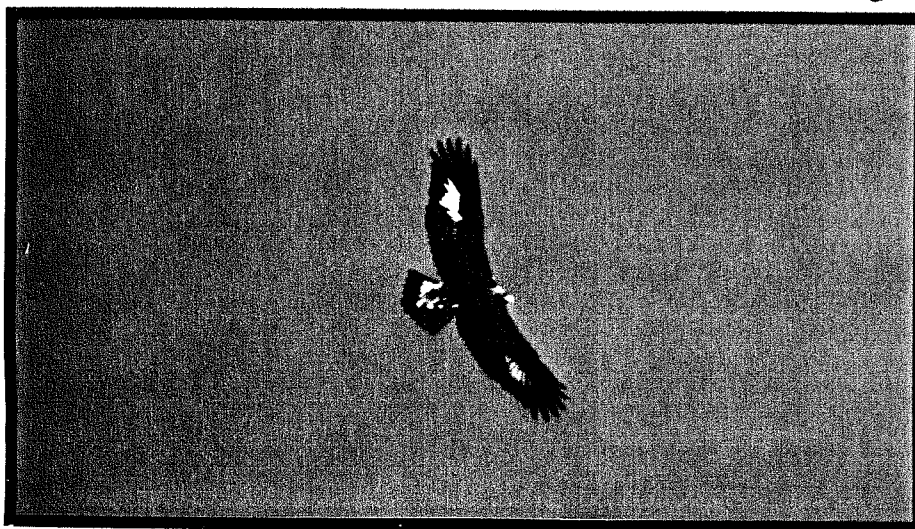


HA File No. 90.31

Autumn Raptor Migration Along
New Jersey's Delaware Bayshore.
A Hawk Migration Study
at East Point, New Jersey

Clay Sutton, Chris Schultz, and Paul Kerlinger



(Immature Golden Eagle Over the Maurice River,
Near East Point, November, 1990)

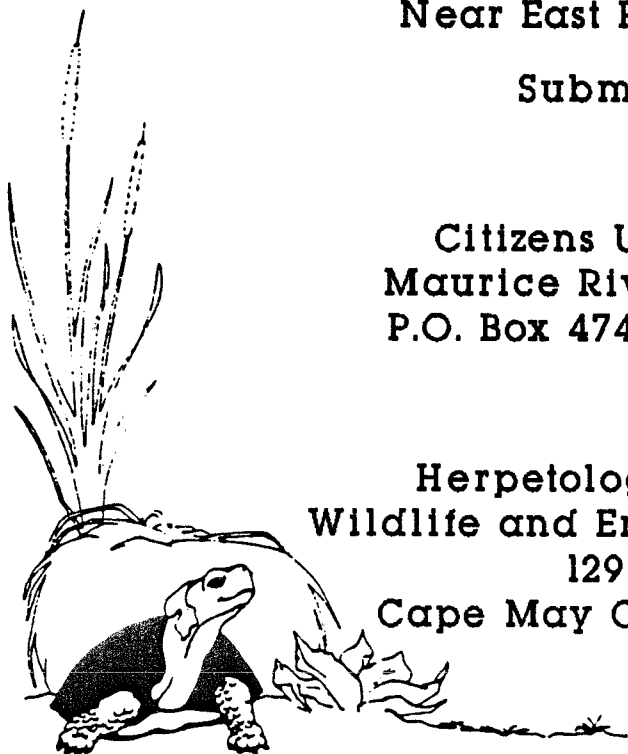
Submitted April, 1991

to

Citizens United to Protect the
Maurice River and Its Tributaries
P.O. Box 474, Millville, N.J. 08332

by

Herpetological Associates, Inc.
Wildlife and Environmental Consultants
129 Buck Avenue
Cape May Court House, N.J. 08210



Bog Turtle, *Clemmys muhlenbergii*

Herpetological Associates, Inc. - Environmental Consultants

Please reply to ☐ 1018 Berkeley Avenue, Beachwood, N.J. 08722 (201) 349-5065
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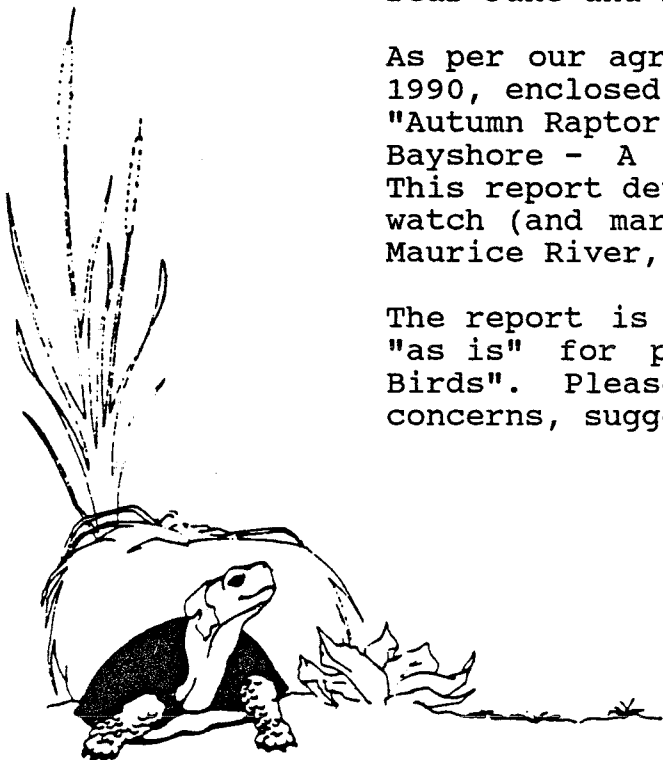
Dr. Paul Kerlinger
Director
The Cape May Bird Observatory
The New Jersey Audubon Society
P.O. Box 3
Cape May Point, New Jersey 08212

Re: East Point Raptor Migration Study Delaware
Bayshore, Cumberland County. HA File No. 90.31.

Dear Jane and Paul,

As per our agreement and contract dated September 14, 1990, enclosed please find our final report entitled, "Autumn Raptor Migration Along New Jersey's Delaware Bayshore - A Hawk Migration Study at East Point". This report details the results of our fall, 1990 hawk watch (and marking project) conducted at East Point, Maurice River, Cumberland County.

The report is in a format designed to be considered "as is" for publication in "Records of New Jersey Birds". Please contact me with any comments, concerns, suggestions, or changes.



Specializing in wetlands delineations and "endangered" and "threatened" plants
and wildlife, their ecology and environment.

Mrs. Jane Morton Galetto
Dr. Paul Kerlinger
Page Two

Let me know of your approval or acceptance of the paper as it should be mailed to both Rich Kane and Larry Niles as soon as possible.

Thank you for the opportunity to work with CU and CMBO once again on a project with such important conservation implications.

Sincerely,

HERPETOLOGICAL ASSOCIATES, INC.

Clay C. Sutton

Clay C. Sutton
Vice President

CCS/jm
Enclosures

cc: Robert T. Zappalorti, Pres., HA
Rick Radis, HA staff
James Dowdell, HA staff
Chris Schultz, CMRBP



Bog Turtle, *Clemmys muhlenbergii*

I. Introduction



Bog Turtle, *Clemmys muhlenbergii*

**AUTUMN RAPTOR MIGRATION ALONG NEW JERSEY'S DELAWARE BAYSHORE
A HAWK MIGRATION STUDY AT EAST POINT, NEW JERSEY**

INTRODUCTION:

While raptors have long been characterized as reluctant to cross water barriers (Heintzelman, 1975), recent studies have clearly shown that many raptor species regularly make water crossings (MacRae, 1985). The Delaware Bay crossing (12 miles) should be of little impediment to autumn raptor flights, yet for virtually as long as it has been known that major hawk concentrations occur at Cape May Point, New Jersey, it has also been known that not all raptors recorded there appear to cross the Delaware Bay, but that many return north up the western side of the Cape May peninsula (Allen and Peterson, 1936).

Witmer Stone (1937) noted a reverse migration up the Bayshore, but presumed that most birds "eventually" crossed the Delaware Bay. Stone recorded the heaviest (or most visible) concentrations on northwest winds, but also noted flights on days of little or no wind as well. This anecdotal information has been subsequently confirmed with hawk counts (Dunne and Clark, 1976) and radar studies as well (Kerlinger and Gauthreaux, 1984). While Delaware Bay crossing does occur on many wind conditions, a substantial return flight up the Delaware Bayshore is confirmed as well. During the expanded hawk watch project of the Cape May Bird Observatory, Ward recorded 632 hawks (including 192 sharp-shinned hawks and 419 American kestrel) migrating west over East Point on October 14, 1979 (Dunne and Clark, 1979). On November 29, 1981, a remarkable 15 rough-legged hawks were seen migrating west on the treeline near East Point (Sutton, 1981).

More telling, of 48 hatching year female sharp-shinned hawks followed via telemetry in 1980 and 1981, only one crossed the Delaware Bay, while most flew north up the peninsula (Hotthuijzen and Oosterhuis, 1985). This pattern has recently been confirmed by telemetry studies conducted by the Nongame Endangered Species Project of the New Jersey Division of Fish Game and Wildlife as well (Niles, in lit.).

It is theorized that, rather than risk being blown to sea by strong northwest winds during a water crossing of Delaware Bay, many raptors instead return up the peninsula and finally turn west along the Delaware Bayshore in an attempt to find a shorter crossing site. Indeed, these bayshore flights continue west as far as Greenwich and even Fort Mott in Salem County (Sutton, 1984; and Barber, 1990).

Other than the aforementioned studies, little systematic study has been made of flights going around Delaware Bay. In 1959, Don Kunkle organized a hawk watch for various sites along the bayshore (Cape May Point to Fort Mott), but results were inconclusive due to weather (Kunkle, 1978). In 1976, Kunkle recounted numerous hawk flights noted over the years heading northwest along the bayshore, and said that all "crossing" then takes place west of a line stretching from Bayside, New Jersey to Woodland Beach, Delaware. In this area, the bay is only four miles wide and hawks then readily make the crossing (Kunkle, 1976).

In 1987 and 1988, Sutton noted considerable hawk migration occurring in fall along the lower Maurice River, including East Point, as part of a larger seasonal study of raptor and waterfowl use of the Maurice River system (Sutton, 1988). Most significantly, on September 22, 1988, Barber saw a major flight heading west over Bivalve about two miles north of East Point. This flight contained an estimated 2,000 broad-winged hawks, on a day when only 134 (the largest flight of the month) were seen at Cape May. This flight intimated that not only was a large percentage of the Cape May flight returning up the bayshore, but that a larger number of birds might be short-cutting or bypassing the cape altogether. It was this flight more than any other event which inspired a full-time migration study at East Point in an attempt to document the dynamics of Delaware Bay hawk flights. All known East Point historical raptor migration records are shown in Table 1.



Figure One: Regional location of both the East Point Hawk-watch site conducted by HA and the Cape May Hawk-watch/Raptor Banding Station at Cape May Point.

EP= East Point Hawk-watch Station

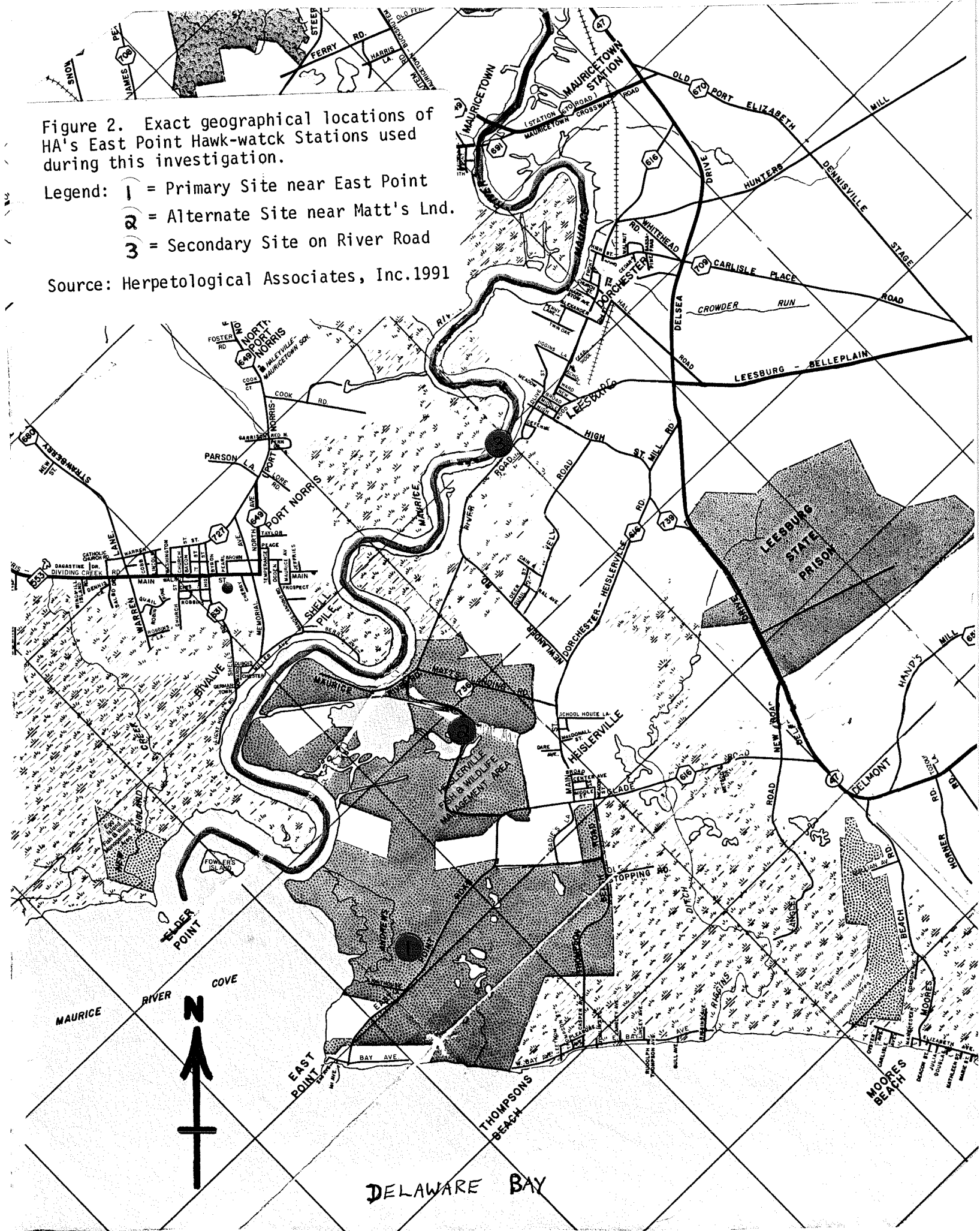
CM= Cape May Point Hawk-watch Station

Source: Photo credit by Earth Satellite Corp.

Figure 2. Exact geographical locations of HA's East Point Hawk-watch Stations used during this investigation.

- Legend: 1 = Primary Site near East Point
 2 = Alternate Site near Matt's Lnd.
 3 = Secondary Site on River Road

Source: Herpetological Associates, Inc. 1991



II. Methodological Approach



Bog Turtle, *Clemmys muhlenbergii*

MATERIALS AND METHODS:

Delaware Bay is a large estuary encompassing over 400 square miles. The mouth of the bay measures about 12 miles from Cape May to Cape Henlopen, and at its widest point, near East Point, the bay measures 22 miles across. From Cape May to the head of the bay is a distance of about 35 miles. East Point is a small peninsula lying on the east bank at the mouth of the Maurice River, in Cumberland County, New Jersey. The distance from Cape May to East Point is 26 miles following the treeline of the bayshore marshes, or "as the raptor flies".

East Point was chosen as the watch site because both historical data and the preliminary studies during the falls of 1987 and 1988 clearly showed that a major raptor concentration was occurring there. Raptors following the treeline west around Delaware Bay are geographically concentrated near East Point lighthouse by a peninsula of vegetated uplands extending southwest into the salt marsh and terminating on Maurice River Cove. The geographical location of East Point, and its relation to Cape May, are shown in Figure One. Raptor concentrations occur here because of the tendency for raptors to follow the treeline as well as the fact that they are faced with a water crossing across the mouth of the Maurice River. If a hawk flies directly northwest from East Point light, it must cross the two miles of water in Maurice River Cove before landfall over the salt marshes on the west bank. In addition, it is almost a total of four miles before the treeline is encountered again. Therefore, most hawks circle briefly, and then return about one to two miles north, to the vicinity of Matts Landing, before crossing the river to the west. Here they are only confronted with a treeline to treeline crossing of about one mile. In short, the East Point peninsula clearly functions as a "miniature Cape May", funnelling and concentrating raptors moving southwest along the treeline.

Historical and preliminary studies during the falls of 1987 and 1988 led to the formulation of a pilot study in 1989 and a full-time hawk migration study project in 1990. In the fall of 1989, we conducted fixed point surveys of migratory raptors on the lower Maurice River; a total of 43 hours of observation were conducted over 10 survey dates. This survey was essentially a hawk watch conducted at East Point and Heislerville Wildlife Management Area. The Heislerville site was generally used later in the day when, on some winds (particularly northwest) the flight line shifted inland (as

birds flew higher) away from the actual beach and East Point Light. In addition, on a few occasions, observations were conducted from a point overlooking the river just south of Leesburg. The specific location of these watch sites (used in both 1989 and 1990) is shown in Figure 2. The Heislerville site is about two miles north of the East Point watch site (which was about one-half mile north of the lighthouse on East Point Road). The Leesburg site (rarely used) was an additional 2.2 miles inland. The use of the alternative watch sites allowed the observer to better monitor high mid-day broad-front flights than would the use of only the primary site.

In 1990, a full time hawk watch was conducted; a total of 308.5 hours of observation occurred on 60 days spanning from September 9 to December 7, 1990. Sutton and Dowdell were principal observers. Observations were conducted following the guidelines of the Hawk Migration Association of North America (HMANA) and all data were kept on standard HMANA forms. (see Appendix I). All raptor identifications, as well as aging and sexing were done following the guidelines of Clark and Wheeler (1987) and Dunne, Sibley, and Sutton (1988). Both daily and seasonal results were compared and contrasted to Cape May's hawk watch results.

In addition to raptor enumeration, a color marking project was carried out in conjunction with the Cape May Raptor Banding Project (CMRBP) under the direction of Schultz. The purpose of the marking project was an additional test of the speculation that Cape May raptor flights go north and west along the Delaware Bayshore and cross into Delaware near the headwaters of the bay. Raptors were marked at Cape May and watched for at East Point. By recording each color-marked raptor seen, noting the shape of the marker and location of the marker on the tail, the time and distance traveled could then be calculated based on the known marking sequence. The relative percentages of Cape May Point birds occurring at East Point can be theoretically calculated based on the sample marked by the CMRBP.

The CMRBP used three inch pieces of black vinyl tape folded in half so that they projected approximately one inch beyond the end of the tail. Permits for marking were obtained from the Bird Banding Laboratory, USF&W Service, in Patuxent, Maryland. Based on the results of similar color marking conducted by the CMRBP during the autumn 1980 season, only square and pointed shapes, black color, and only central and outer rectrices were marked. Marking was conducted only on hatching year female American kestrels, hatchling year female sharp-shinned hawks, and hatching year red-tailed hawks. On succeeding days either rectrix L1, L6, or R6 were

marked. By selecting shapes and rectrices, six different marking combinations were achieved allowing observers to know exactly when a color-marked bird was marked. Marking was conducted by all cooperating banders of the CMRBP. Marking was begun on sharp-shins and kestrels on September 29, and two repetitions of the six combinations were conducted, with the marking finished on October 10. Red-tails were marked with just one repetition of the six combinations beginning on November 8.

The objectives of the study were to conduct a hawk migration study at East Point which would allow us to compare and contrast bird numbers going around Delaware Bay with those counted at Cape May Point, and to monitor for Cape May color-marked individuals in order to determine the amount of time necessary for migrants to reach East Point. This would allow a determination of the migratory route habitat use by migrating hawks and an estimation of the importance of Delaware Bay upland edge habitat to migrants. A major goal of the project was to provide conservation groups with data relevant to the identification and protection of habitats critical for the resting and feeding of migratory raptors.

Because no quantification of Delaware Bay fall migration had ever been done, raptors or otherwise, detailed daily estimates of all non-raptor migrants were made as well. In addition, migratory butterfly numbers were estimated daily as an adjunct to the project.

III. Results of Investigation



Bog Turtle, *Clemmys muhlenbergii*

RESULTS:

In 1989, the hawk watch at East Point recorded 1788 raptors of 15 species during 43.25 hours of observation spread over 10 days from October 11 to December 2. These results are shown in Table 2. A comparison to Cape May flights is shown as Table 3. This pilot study gave valuable insight to the dynamics of the flight, and was used as a basis for 1990 project planning. The 1989 hawk watch particularly yielded good data regarding late season buteo movements. Because only late season "flight days" were chosen for observation in 1989. East Point's 41.3 hawks/hour easily bested Cape May's 36.9 hawks/hour. (A figure which in itself is usually one of the highest in the nation north of Texas.) In 1989, 73% of the total number of hawks seen at Cape May were seen at East Point for the day compared, including exactly 100% of the red-tails and 550% of the bald eagles.

In 1990, a total of 9,042 raptors of 17 species were recorded as migrants at East Point during 308.5 hours of observation on 60 days between September 9 and December 7. This is an average of 150.7 birds per day or 29.3 hawks/hour. The 1990 daily results are shown in Table 4 as well as monthly and seasonal totals.

Comparisons of East Point data to Cape May flights are shown in Table 5. This table contains daily comparisons, Cape May grand totals and Cape May's compared total (comparison for the mutual 60 days when both watches were covered). In the color marking program, the Cape May Raptor Banding Project marked a total of 219 sharp-shinned hawks, 37 American kestrels and 104 red-tailed hawks for a total of 360 birds. Marked birds were sighted regularly from the Cape May Point hawk watch as well as the CMRBP stations up to six days after original marking. Marked birds were recaptured at the banding stations up to three days after marking and all tags appeared to be holding well and were still firmly attached, with no evidence of damage from preening behavior. The color marking scheme, and the report on birds banded and marked is included here as Appendix 2. Sightings (or lack thereof) are discussed in species commentaries below.

SPECIES COMMENTARY:

(DATA IS FOR 1990, UNLESS OTHERWISE NOTED)

BLACK VULTURE (Coragyps atratus):

A total of 15 black vultures were recorded at East Point, compared to 9 at Cape May for the 60 days of comparison. Therefore, 166% of Cape May's flight was seen at East Point. Considerable care was taken to separate local black vultures from migrants. The 15 vultures counted were all perceived to be migrants - usually high and moving rapidly northwest. The peak flight was 6 birds on November 15.

TURKEY VULTURE (Cathartes aura):

Turkey vultures, more than any other species, presented counting problems due to the presence of a large local roost. In 1989, TV totals undoubtedly include some "locals". In 1990, however, numerous flocks were seen moving, and were fairly easy to separate from locals; only flocks which disappeared to the west were counted. For 1991, 596 turkey vultures were counted, or 107% of Cape May's flight, with a peak of 40 on November 18. Significant was the appearance of a leucistic turkey vulture at East Point on November 15; this same bird was seen at Cape May five days earlier on November 9, indicating 5 days of travel time to cover the 26 miles between Cape May and East Point. Almost certainly, this same turkey vulture had appeared at Cape May the previous year in October. (All descriptions matched and Sutton saw both the 1989 Cape May bird and the 1990 East Point bird)

OSPREY (Pandion haliaeetus):

Osprey predictably should be one of the species least deterred by water at Cape May and have little reason to migrate around the bay. Indeed, only 182 birds were recorded (peak - 23 on 60 ct.), only 12% of the Cape May flight. Of birds aged, 12 were adult and 7 were hatching year. While some osprey were migrating west up the bay, many were seen migrating down the Maurice River, and a few were recorded moving east.

BALD EAGLE (*Haliaeetus leucocephalus*):

Bald eagles were a highlight of the East Point counts. In 1989, 33 were seen, with peaks of 9 on October 23 and 7 on October 11. In 1990, 46 were recorded, or 90% of the 51 seen at Cape May in the same time period. A total of 19 adults, 25 immature, and two unaged bald eagles were seen, a make-up which differs markedly from that at the Cape. At East Point, 43% of the balds were adult. At Cape May, only 18% were adult, lending proof that not all East Point migrants have previously been to Cape May (indeed, over half of Cape May's migrants, crossed the bay directly--meaning that many of East Point's birds have a different origin. Four balds were seen on October 20, October 30 and November 14 at East Point. Two local adults presented some counting problems but were eliminated to the best of the counter's ability.

NORTHERN HARRIER (*Circus cyaneus*):

Harriers presented a difficult counting problem as many feeding "locals" were always present northwest of the hawk watch. In 1989, the counts no doubt reflect some residents. In 1990, great effort was made to eliminate local birds and 538 migrants were recorded (150 hatching year, 40 adult females and 36 adult males) with a peak of 27 on October 24. This was 68% of the Cape May flight, yet because so many birds cross at Cape May (the harrier is remarkably unafraid to cross water), many different birds were undoubtedly involved in the total.

SHARP-SHINNED HAWK (*Accipiter striatus*):

As expected, sharp-shinned hawk was the most numerous raptor at East Point, comprising 44% of the flight westward along the Delaware Bay. Birds were generally quite low early in the day, flapping at tree-top level out to the lighthouse itself. Later in the day birds were usually higher and heading west or northwest well north of the primary watch site near the light. A total of 4,013 sharp-shins were recorded, peaking at 528 on October 2. Most were hatching year birds, with 187 adults casually noted. Thirty-six percent of the Cape May total was observed, but it appeared that the ratio of immatures to adults may have differed. On October 15, 37 of 315 sharp-shins at East Point were adult when none of the 437 sharp-shins at Cape May were seen to be

adults (although not all were carefully checked). Of 219 sharp-shinneds color-marked, only one was recorded on the bayshore - and even then not by the official count at East Point. A sharp-shinned marked October 1 at Cape May was seen on October 2 at Jakes Landing, Cape May County (about 8.5 miles east of East Point) by a Division of Fish, Game and Wildlife employee while radio-tracking sharp-shinneds. In approximately one day, it had traveled two-thirds of the way to East Point after being banded at Cape May.

COOPER'S HAWK (*Accipiter cooperii*):

A total of 604 Cooper's hawks were counted with a peak of 63 on October 2; 37 adults were casually recorded. Forty percent of the Cape May total was recorded, however, again, a different adult/immature ratio was suspected. On October 15, 8 of 41 Cooper's hawks at East Point were adult (19.5%), but only 2 of 119 were adults (1.7%) at Cape May (although a few may have been missed). Many Cooper's hawks recorded were low and hunting as they migrated over the trees and through the trees at East Point.

NORTHERN GOSHAWK (*Accipiter gentilis*):

Only 7 northern goshawks were seen (1 adult male and 6 hatching year) just 23% of those seen at Cape May. The peak of 2 individuals occurred on October 25. Some northern goshawks may have been missed at East Point due to their well known migratory behavior of migrating low "through the trees".

RED-SHOULDERED HAWK (*Buteo lineatus*):

A total of 68 red-shouldered hawks were counted (16 adults, 31 hatching year) with a peak of only 11 on October 27. They represented 38% of the compared total at Cape May. In 1989, only 20 were recorded, but 10 birds each were seen on November 13 and November 22.

BROAD-WINGED HAWK (Buteo platypterus):

If the major broad-winged flight around Delaware Bay witnessed by Barber on September 22, 1988 (2,000 birds) occurs yearly, it was missed by observers in 1990. Only 183 broad-wings (2 adults and 72 hatching year) were counted, peaking at 73 on September 20. Approximately 18% of Cape May's total was recorded. However, it should be noted the the September 20 flight was very high and spread-out (broad-fronted) with many birds well to the north, and many broad-wings could easily have been missed by the single observer at East Point. Nonetheless, based on the 1988 flight, it appears that in some years Delaware Bay could be a major leading line for broad-winged hawks, many of which may have bypassed or short-cut Cape May.

SWAINSON'S HAWK (Buteo swainsonii):

A single Swainson's hawk was seen on November 9 from the Heislerville watch site. It was a hatching year light form bird which was decidedly not the same Swainson's (hatching year - light form) seen at Cape May on October 24 (Sutton saw the East Point bird and reviewed photos of the bird banded at Cape May - which was a much darker individual). Interestingly, the November 9 bird at East Point was not migrating west, but was seen coming downriver on west winds. It disappeared to the southeast towards Cape May - yet this western vagrant was never recorded by the watchers there.

RED-TAILED HAWK:

In 1989, major red-tailed hawk flights were encountered on November 13 when 165 were seen (55 in sight at once, 21 in a tight kettle over the East Point watch), and on November 22, when 195 were recorded - all streaming west up the bayshore. In 1990, 753 were seen (91% of Cape May's flight), with 86 adults and 178 hatching year birds recorded. Peak flight was only 84 on November 14. Of note, however, was the regularity of the flights, and on gale force northwest winds, East Point regularly bested Cape May - conditions under which birds are well known to short-cut the hawk watch at Cape May. Of 104 red-tailed hawks which were color-marked at Cape May, only one was recorded at East Point. A bird captured, banded and tagged at Cape May on November 14 was seen at East Point four days later on November 18. While some birds no doubt can cover the 26 miles from Cape May to East Point in a single day or even a couple of hours in good winds, this bird clearly spent four days in transit resting, roosting and feeding in the important intervening Delaware Bayshore habitat.

ROUGH-LEGGED HAWK (*Buteo lagopus*):

A major rough-legged migratory pathway up the Delaware Bayshore was one of the major discoveries of the study. In 1989, twice the number of rough-legs (11) were seen at East Point in just 10 days than were seen at Cape May for the entire season. In 1990, 27 migrant rough-legged hawks were seen at East Point versus only three at Cape May - (900% of Cape May's flight) 15 hawks were light form, 8 dark form, and three undetermined. The year 1990 was the worst rough-legged hawk year ever at Cape May in the 15 years of the official count there. It is interesting to speculate that 900% of the average six seen there would mean that 54 rough-legs might occur at East Point, and during the best year when 12 were recorded (1980), 108 rough-legs might have been counted at East Point, if the 900% figure held true.

GOLDEN EAGLE (*Aquila crysaetos*):

Twelve golden eagles were seen at East Point in 1990, or 57% of Cape May's record count of 21 birds. However, all of Cape May's birds were immatures, where East Point saw two adult and 10 immatures, indicating that since 17% of East Point's flight were adult, at least 17% were different birds than had occurred at the Cape. This is more proof of differential age class migration and that East Point sees, to a degree, a different flight than Cape May. Golden eagles peaked at three on November 14, considerably later than Cape May's peak of four on October 29.

AMERICAN KESTREL (*Falco sparverius*):

With a total of 1,663 birds, American kestrels represented 18.4% of the East Point flight in 1990. These included 267 males and 202 females (57% male verses 45% male at Cape May). The East Point flight was 26% of the Cape May flight. Kestrels peaked at 495 on October 2; 37 kestrels were color-marked, yet none were seen at East Point. While most kestrels were seen traveling west up the bay on northwest winds, some were headed south (usually on southerly winds) and may have eventually reached Cape May.

MERLIN (Falco columbarius):

Approximately 270 merlins were recorded, an unexpectedly high number and 21% of the Cape May flight. A total of 76 merlins were seen on October 15 and 65 on October 19. Approximately 45 were adult males and four adult females; all others were female/ hatching year type. Merlins were seen traveling in many directions -while a few were seen heading west, most were seen heading due south, probably crossing the bay at East Point. These birds were probably different than the birds recorded at Cape May. Merlins usually spent considerable time hunting near the East Point watch site in the late afternoon.

PEREGRINE FALCON (Falco peregrinus):

Of all raptors, perhaps the peregrine shows the least fear of water crossings, with the adult male having been characterized as "pelagic" during its fall migration (Cochran, 1985). Accordingly, only 9% of the famous Cape May coastal peregrine flight was seen. Nonetheless, 64 peregrines were recorded - easily the highest count in the region away from the immediate barrier beaches. Peaking at 13 on October 4, 18 adults were tallied (two adult females/ six adult males) and 27 immatures (nine hatching year females and six hatching year males). While a few birds were seen heading west, most were traveling due south, and some southwest (possibly heading for Egg Island Point). Considerable hunting was noted over the Maurice River marshes.



Figure 3. An osprey as seen flying over the East Point Hawk-watch Station in October of 1990 by Clay Sutton of Herpetological Associates, Inc.

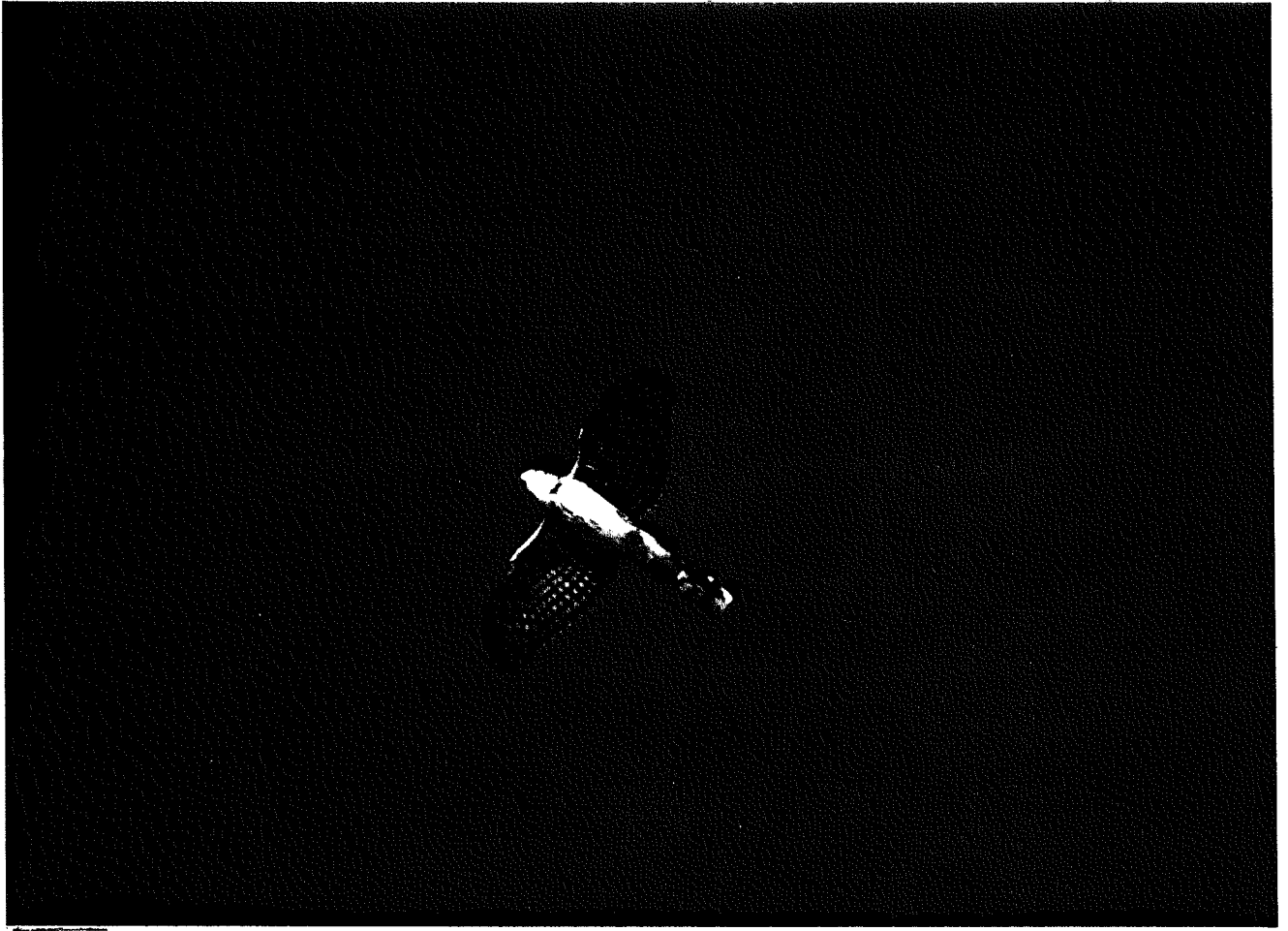


Figure 4. Immature Cooper's hawk circling over the East Point Hawk-watch Station and captured on film by Clay Sutton, October, 1990.

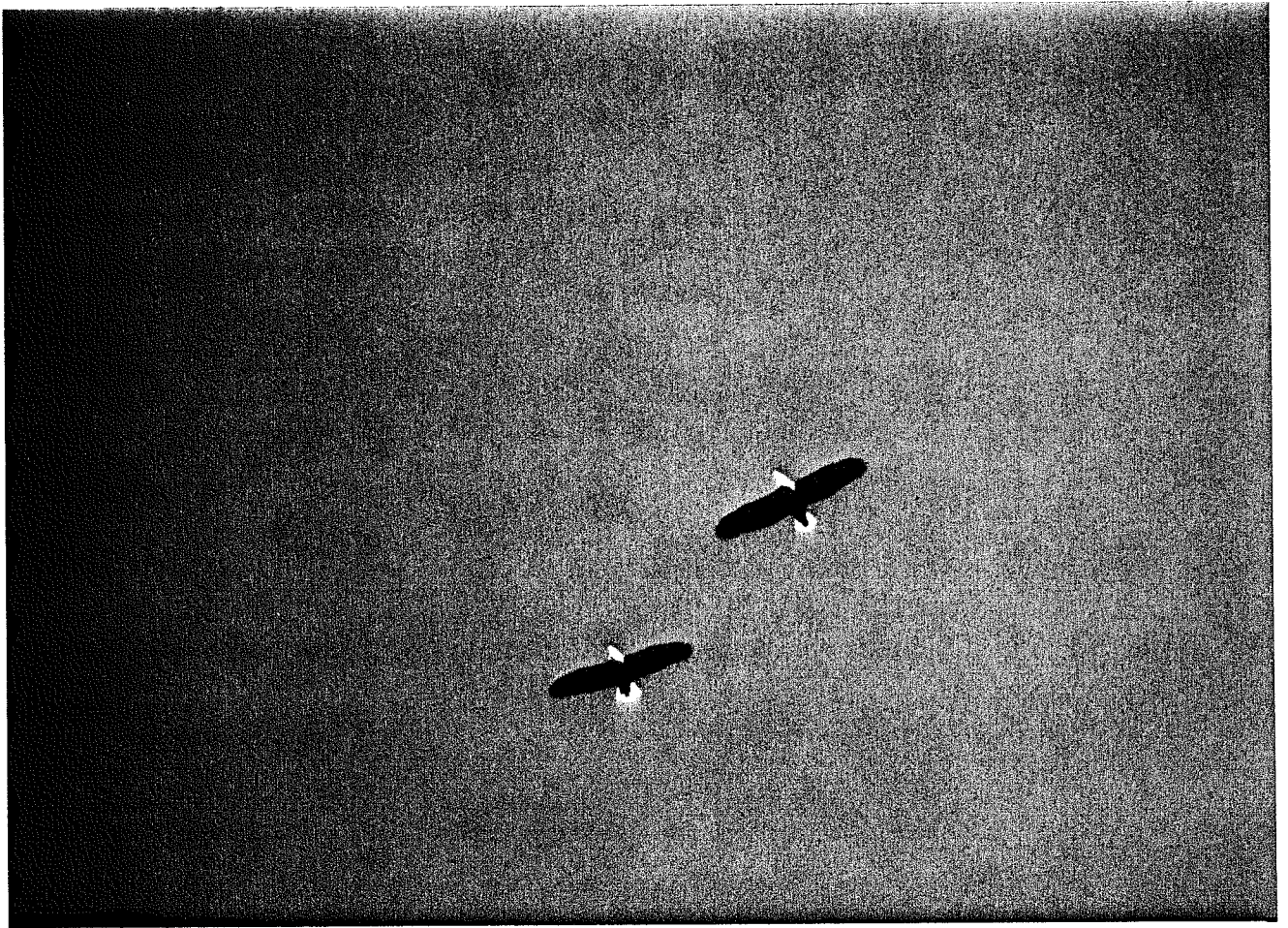


Figure 5. A pair of adult bald eagles flying over the East Point Hawk-watch Station as photographed by Clay Sutton on October 23, 1990.

OTHER MIGRANTS RECORDED

PASSERINES AND BUTTERFLIES:

A daily number was estimated for all non-raptor migrants at East Point, and passerine flights were equally as spectacular as the hawk flights. Table 6 shows daily counts for all species at East Point. Table 7 shows peak flights and dates for all species (including raptors), as well as totals for all migratory species seen in passage (for many species, the peak shows only the maximum numbers of "locals" resident in the area - and for these species no migratory total is shown). In what may be a first for any hawk watch anywhere, a black rail was heard calling from the East Point watch site on September 28. Geese passed East Point in large numbers, many going south, but many (particularly snow geese) moving west up the bay. Surprisingly, 14 red-headed woodpeckers were seen migrating over East Point while only 4-5 were seen at the Cape May hawk watch (Brett Ewald, 1990). While red-bellied woodpeckers are largely thought to be non-migratory, at least 54 were seen at East Point which were clearly exhibiting migratory behavior. Tree swallow numbers were spectacular, and a massive blue jay flight was noted in late September and early October, peaking at over 1,000 birds each day on October 1 and October 3. (East Point blue jay flights were seemingly much larger than those witnessed in Cape May during the 1990 season). A large yellow-rumped warbler movement occurred on October 15, when over 4,500 were witnessed passing East Point. In 1989, one massive passerine flight (larger than any seen in 1990) was encountered; when 2,000 sparrows (including two vesper sparrows and dozens of white-crowned sparrows), thousands of American robins, and hundreds of eastern bluebirds were seen around and over the watch on October 23.

A total of 169 species were noted from the hawk watch in 1990. While songbirds are clearly concentrated by the peninsular geography of East Point, and many were seen, it is important to note that numbers shown in Tables 5 and 6 do not represent any concerted birding effort and are simply birds recorded from or near the hawk watch sites, while the hawk watch was in progress. In addition, virtually no counting was done at dawn or shortly afterward, when migratory passerine movement would be heaviest (most hawk counting began at 8 to 9 a.m.). Early morning count-hours would vastly increase the number of passerines seen at East Point. Suffice it to say that a massive movement of land birds occurs in autumn at East Point. Birds are clearly concentrated there by the wooded treeline ending on a peninsula, and by the threat of a water crossing. Only a specific songbird project at East Point could hope to elucidate the true magnitude of the astounding passerine movement there.

In what is believed to be a first for New Jersey, totals were estimated for migratory butterflies passing East Point each day of the season. Exact numbers were tallied for rarer species; only estimates were possible for species occurring in large numbers such as monarchs. Table 8 shows estimated daily counts for butterflies. While most were recorded from the hawk watch, some were seen at seaside goldenrod patches along East Point Road. Resident species counts are included as well. Table 9 shows totals seen, peak flights and dates for East Point butterflies. A total of 35 species were seen, and seasonality is clearly shown in the tables. Monarch butterflies were the most numerous species, with 10,106 estimated, peaking at 1,500 on September 28. On September 29, 300 per hour were estimated passing the watch site. Buckeye and red admiral were the next most numerous species. One true vagrant, a long-tailed skipper was present on September 20 and 21 along East Point Road. This is perhaps the first Cumberland County record for this southern vagrant butterfly. Little Sulphur, an uncommon emigrant, was recorded on five dates. To some degree, the geography of East Point seemed to concentrate butterflies much like it concentrated birds. While most monarchs were seen heading south, on some days virtually all red admirals, buckeyes, American painted lady's and question marks were seen migrating west - up the Delaware Bayshore.

DISCUSSION:

The East Point watch recorded 9,042 raptors or 34.6% of the 26,164 birds seen at Cape May during the same 60 day period. Except for osprey, merlin and peregrine, virtually all birds were moving west around Delaware Bay, giving us a picture of the importance of bayshore habitats to migratory raptors.

This compared percentage grew during the season, from 24.5% on September 30 to 28.4% on October 15, to 33.2% on October 31, and to 34.5% by November 15, good indication that fewer accipiters and falcons comprise the East Point flight, and that the large buteos are comparatively more likely to appear at East Point. In addition, since adults of all raptor species are known to migrate later, and because preliminary information suggests that the percentage of adults is higher at East Point, it would be expected that East Point flights would grow in comparison later in the season.

The percentage of the Cape May flight subsequently going around the bay is undoubtedly higher than the 34.6% recorded. Observations clearly noted that the flight was broad-fronted later in the day when birds were higher, and particularly during west and northwest winds. For a total of 8.5 hours between October 5 and November 7, an alternate watch site (either the Heislerville or Leesburg site) was manned in addition to the primary site at East Point. During this 8.5 hour period, a second observer saw 111 raptors (in addition to the 203 at the "official count") that it is believed the primary site did not record. Therefore, 55% of the birds passing were not being recorded by the O.C. If this were extrapolated to the 25 days of northwest or west winds (at the 151 birds/day average), an additional 2,076 raptors would have been recorded.

In addition, the East Point watch was conducted with only a single observer. The effects of varying observer numbers on raptor count totals have been well explored and at Cape May, 2-3 observers will record from 13.3% to 44.4% (depending on species - average 23%) higher numbers than a single observer (Kochenberger and Dunne, 1985). Applied to East Point, an additional 23% would have meant an additional 2,080 raptors. Keep in mind that Cape May totals are accrued from dozens of "helpers" to the official counter. At East Point, the single observer could not hope to record all birds passing on high flight days.

Finally, it is speculated that possibly between 2.3 and 6.7% of Cape May raptors are recounted, based on markings and recaptures, as birds re-enter the cape on successive days and/or roost overnight in the immediate area (Sutton, 1991).

Such recounting is not a problem at East Point (except for the aforementioned "local" resident turkey vultures, etc.) as all birds are rapidly passing west. We can create a theoretical model regarding Delaware Bay flights. By adding the additional birds which might be seen by a second observer farther to the north (broad-front migrants) adding the additional birds which would be accrued by 2-3 watchers at the primary site and by deleting the maximum possible 6.7% recounted at Cape May, we can predict that possibly 54% of the Cape May flight is returning up the bayshore and passing East Point.

The 1990 Cape May hawk watch total of 29,630 raptors was the lowest total in the 15 year history of that count (Dunne and Sutton, 1986), and it is therefore somewhat unfortunate that 1990 was chosen as the year for the East Point comparison. (East Point actually "beat" Cape May totals on 8 out of 60 days, or 13.3% of the time in 1991, but 1991 East Point buteo counts were nowhere near as high as those in 1989 and 1990). Cape May's 15 year average, 1976-1989, is 59,811 raptors per year; on an average year, at 34.6%, it could be predicted that 20,695 hawks would pass west past East Point. At the theoretical 54%, 32,298 birds could be expected to migrate west up the bayshore.

Cape May's peak year was 88,937 hawks (1981); 34.6% of this number would be 30,772, and 54% of this would mean an astonishing 48,026 raptors going around the Delaware Bay according to our theoretical model. Whether 34.6% or 54%, we cannot gainsay the importance of the Delaware Bayshore habitat to coastal migrant raptors as a major proportion of Cape May raptors are proven to be migrating north and west through Cape May, Cumberland and Salem Counties.

Finally, the lack of marked bird sightings must be explored. Discussing red-tailed hawks alone, the CMRBP marked 104 of the 161 birds counted during the six day period from November 8-14, 1991, or 65% of the birds, that passed. At East Point, allowing for some lag time, only one bird of the 270 seen during the six day period from November 11-18 was marked, or .37% of the flight. Realistically, due to distance and altitude of flight, not all of these birds were close enough to see the markings if present. However, 95 of these red-tailed hawks were aged by the counter during that period, and we can assume if a bird was close enough to age that the color marking should have been seen if present. Therefore, 35% (95 birds) of the flight was close enough to see markings. Only one bird of the 95 was marked, or about 1% versus a predicted 65% (65% of 95 birds would be 62 birds). In short, East Point should have seen 62 of the 104 marked red-tailed hawks, yet only one was seen.

The reasons for this disparity is unknown, and we can only assume, based on the color markings, that the coastal plains flights are much larger than realized (and counted), due to the broad-front movement. It has long been known that on northwest winds, far more hawks pass Cape May on a broad-front than are recorded at the official count (Dunne and Clark, 1979). It is quite possible that many more hawks than realized (or counted) actually diluted the marked population prior to reaching East Point. It would then have to be assumed that large numbers were both: A) passing west on a broad-front inland from the hawk watches at either Cape May, East Point, or both, and B) crossing the bay at Cape May, and therefore never reaching East Point, with East Point totals then, in fact, being birds of a different origin (.e., not coming from Cape May).

Also, it is possible that some, or even many birds were removing the tail tag through preening, and this impact on the study remains unknown. Looking at rough-legged numbers, adult eagle percentages, and both accipiter and falcon age and sex ratios, however, we can assume that to an unknown degree, East Point is seeing a different flight than Cape May. Not just a flight comprised of birds leaving the Cape, it is augmented to an unknown degree by additional different raptors short-cutting Cape May itself or even the entire peninsula. Because it is assumed that adult birds will navigate by using landmarks (Drost, 1938), it is quite possible that they avoid the "dead-end" that is Cape May altogether, and make their turn to the west as far north as Dennis Creek or even the Tuckahoe River. These flight strategies might be expected by experienced adult birds (Kerlinger, 1989). Such a theory would explain the different composition of East Point flights, yet offers little in resolving the enigma of the lack of marked bird sightings.

SUMMARY AND RECOMMENDATIONS:

Because 1990 saw the lowest raptor migration totals in the 15 years of Cape May record keeping, it is recommended that this project be carried out again, including the color marking. The 1990 results did not include the large buteo flights seen in 1988 and 1989, either broad-wings or red-tails, and it is quite possible that the magnitude of the Delaware Bay flights have yet to be realized. Three specific recommendations are offered:

- A) Hours of coverage should be increased. In 1990, East Point was covered for 308.5 hours for a figure of 29.3 hawks/hour. This just bested Cape May's hawks/hour figure of 29.1, where 29,630 birds were seen in 1,018 hours of coverage. This is not to assume that 1000+ hours at East Point would record a flight of Cape May magnitude, however, for indeed, East Point was covered at all peak hours and peak days in 1990. Nonetheless, coverage earlier in the morning would undoubtedly record many more sharp-shinned hawks (coverage beginning at dawn would allow for passerine study as well), and coverage later would probably increase merlin totals appreciably. Indeed, many hundreds, if not thousands, of additional birds would be recorded at East Point through additional coverage. Coverage should begin earlier in the season as well.
- B) An additional observer would greatly augment the count. A second observer could assist the watcher at the primary site on days of north, northeast and southerly winds, and cover an alternative site (inland) on broad-front flights -days of northwest, west and southwest winds.
- C) A close-site study should be carried out, particularly during the color marking project, in an attempt to track individuals and groups of birds around the bay. Observers should be stationed at Reed's Beach, Jakes Landing, East Point, Turkey Point, Dix Wildlife Management Area (Cohansey River) and Bayside. Such coverage, centered on a cold front, could present an excellent picture of raptor-use and raptor movement around Delaware Bay.

- D) An observation tower should be built at the primary watchsite (the "turn-out", one-half mile north of East Point light). This is an excellent observation site, and the best watch site compromise, yet vision is obscured to the east by a red cedar grove. An observation tower about 20 feet tall would allow an unobstructed view to the east and northeast and would probably substantially increase peregrine and merlin sightings. Additionally, such an observation deck, with proper publicity and environmental education, could be a major asset to the Heislerville Wildlife Management Area and help meet the State's goal of multiple uses for public lands. Fall, 1990 proved that the area is an excellent hawk watch site, and publicity would result in birders coming to the site in numbers.

In summary, a major autumn raptor flight has been discovered and documented flying west up the Delaware Bayshore rather than crossing the bay at Cape May. A concentration of this flight occurs at East Point, in Cumberland County, due to geography (birds following a wooded peninsula to the southwest) and a minor water crossing (Maurice River Cove). In 1989, 1,788 raptors were recorded in 43.25 hours over 10 days of observation. In 1990, 9,042 raptors were recorded in 308.5 hours of observation over a 60 day period. Flights were compared and contrasted to Cape May. Travel times between Cape May and East Point as determined by color marking were about one day for a sharp-shinned hawk, four days for a red-tailed hawk, and five days for a leucistic turkey vulture. This data presents a picture of the importance of the Delaware estuary shoreline, both salt marshes and upland edges, to migratory raptors for roosting, resting and feeding. Prior to this study, virtually all knowledge of the return flight up the bay was anecdotal. From this quantitative study, we now have a clearer picture of the dynamics of coastal plain raptor migration through New Jersey and around the Delaware Bay.

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Bog Turtle, *Clemmys muhlenbergii*

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RAPTOR TOTALS 1979-88

RAPTOR TOTALS 1979-88

MONTH: Historical records

	10/14/87	11/29/87	12/11/87	10/6/87	10/16/87	10/27/87	11/4/87	11/9/87	11/11/87	11/24/87	8/23/88	9/22/88	10/10/88	10/11/01	88/11/11	88/11/11
BLACK VULTURE																
TURKEY VULTURE	8			52	43	76	5	26	70	68	14	20	35	40	68	
OSPREY				3		3	1				9	7	3	4	1	
AM. SW-TAILED KITE																
MISS. KITE																
BALD EAGLE			6	1		5	1	1	4	2		1	2	3	4	
N. HARRIER	5	30	40	19	11	29	29	30	29	24		3	22	18	22	
SHARP-SHINNED	192	1		12	9	7	6	1	2	2		40	5	14	8	
COOPER'S HAWK	1	1		7	3	2	4	2	3	2	1	6			4	
N. GOSHAWK		1	1			1			1							
RED-SH. HAWK			1				1								1	
BROAD-WINGED	4			1								2000				
SWAINSON'S																
RED-TAILED	2	6	4	21	13	36	23	33	42	35	8	2	22	25	34	
ROUGH-LEGGED		15	5				1			3					1	
GOLDEN EAGLE			3					1								
AM. KESTREL	419	3	1	9	2	4	2	3	3	6		16	2	5	2	
MERLIN				1		1		1				5			1	
PEREGRINE				1		1						2		1		
TOTAL HAWKS	632	57	61	127	82	164	73	97	154	142	32	2102	91	110	147	

1.5 hours observation only

RAPTOR TOTALS 1989

TABLE 2:

PROJECT: East Point, N.J. MONTH: Oct. → Dec.

	10/11	10/17	10/23	11/2	11/5	11/13	11/18	11/22	11/27	12/2	12/1								
BLACK VULTURE																			
TURKEY VULTURE	105	2	72	51	40	51	22	80	33	46	502								
OSPREY	4	3	2	1	1						11								
AM. SW-TAILED KITE																			
MISS. KITE																			
BALD EAGLE	7	3	9	4	2	3	2	1	2		33								
N. HARRIER	30	19	38	26	23	27	22	33	22	22	262								
SHARP-SHINNED	155	29	30	5	3	14	1	7	3	2	249								
COOPER'S HAWK	21	3	16	2	2	13	1	5	4	2	69								
N. GOSHAWK				1							1								
RED-SH. HAWK						10		10			20								
BROAD-WINGED	1	1									2								
SWAINSON'S																			
RED-TAILED	43	2	24	23	20	165	12	195	34	28	546								
ROUGH-LEGGED				1		2	2	1	3	2	11								
GOLDEN EAGLE						1				1	2								
AM. KESTREL	42	5	6	2		3	1	2	1		62								
MERLIN	14								1		15								
PEREGRINE		1		2					1		4								
HOURS/WIND DIRECTION	8/NW	4/SW	5.5/NW	3.5/N	4/SE	3.25/ENE	2.5/SW	6/NW	3.5/NE	3/E	43.25								
TOTAL HAWKS	422	67	198	119	91	289	63	335	104	103	1788								

inc. 1 un. eagle

RAPTOR TOTALS 1989

TABLE 3:

PROJECT: East Point N.J. MONTH: Oct. → Dec.
 Comparison to: Cape May, N.J. Cape May totals shown in red.

	10/11	10/17	10/23	11/2	11/5	11/13	11/18	11/22	11/27	12/2	12/1	Cape May Totals	Cape May Totals
BLACK VULTURE				2								2	
TURKEY VULTURE	905	225	72	435	240	295	1022	80	2233	446	502	178	456
OSPREY	400	47	311	5	17	2	2				11	174	11
AM. SW-TAILED KITE													
MISS. KITE													
BALD EAGLE	7	3	9	2	4	2	3	2	1	2	33	6	33
N. HARRIER	2030	19	1638	12	26	23	27	822	4233	1122	262	123	240
SHARP-SHINNED	1755	133	292530	67	520	354	1422	130	740	3	249	789	247
COOPER'S HAWK	8021	20	31616	9	2	2	13	1	10	57	69	202	67
N. GOSHAWK				1					1		1	1	1
RED-SH. HAWK	2		2	6	2	9	10	1	14	10	20	40	20
BROAD-WINGED	1	1	3	3		1					2	8	2
SWAINSON'S													
RED-TAILED	243	2	724	8	23	520	165	14	12	195	546	516	518
ROUGH-LEGGED				1		2	2	1	3	2	11	9	9
GOLDEN EAGLE			1	2		2	1		1	1	2	6	1
AM. KESTREL	8942	31	56	2	2	1	3	1	2	1	62	129	62
MERLIN	6014	21	1	1		2			1		15	85	15
PEREGRINE	17	15	1	2					1		4	32	4
OTHER													
TOTAL HAWKS	422	267	198	173	119	164	91	177	289	63	335	2305	1685

no count

inc. 1 un. eagle

TABLE 4 :

RAPTOR TOTALS 1990

PROJECT: East Point, N.J. MONTH: September

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Σ TOTAL
BLACK VULTURE									1																						1
TURKEY VULTURE									16						15	1	18	11		20	11		7	9			6	1	1		116
OSPREY									1						2	5	2			7	10		3	4	6		4	5	1		50
AM. SW-TAILED KITE																															
MISS. KITE																															
BALD EAGLE									3							1	1	1		3	1					1		2			13
N. HARRIER									6						8	8	11	15		23	7		5	10	6		11	3	2		115
SHARP-SHINNED									10						10	34	114	32		171	76		25	104	10		71	36	3		696
COOPER'S HAWK									1							1	3	5		20	10		2	13	2		39	23	1		120
N. GOSHAWK																															
RED-SH. HAWK									5								1	9	7	73	39		1	6			6				147
BROAD-WINGED																															
SWAINSON'S																															
RED-TAILED									4								1	6	5	8	3		1	2			4	1			35
ROUGH-LEGGED																															
GOLDEN EAGLE																															
AM. KESTREL									26						9	49	78	22		74	5		6	7	1		13	10	1		301
MERLIN															1	2	1	2		3	2		1	1							14
PEREGRINE																															3
HOURS / WIND DIRECTION									45 / NE						6.5 / NW	5.75 / N	6.25 / N	4.5 / NW		9 / NW	4.5 / NE		5 / NW	6.25 / NW	3 / SW		5.75 / N	5 / SW	2 / SW		71 /
TOTAL HAWKS									73						45	103	243	100		402	164		52	156	26		159	79	9		1611

RAPTOR TOTALS 1990

PROJECT: East Point, N.J. MONTH: October

TABLE 4 cont.:

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	DATE
BLACK VULTURE														1							2								3	1		7
TURKEY VULTURE	8	33	3		1			4			2			36	15	8	1		32	17	8			17	14		25		29	14	14	281
OSPREY	1	8	6	8	9	23	3	2	7	1	3			5	7	8	20	2	2	2	6	2		1	2		1			1		130
AM. SW-TAILED KITE																																
MISS. KITE																																
BALD EAGLE																																
N. HARRIER	14	23	10	5	5	18	3	5	3	3	5			22	16	18	7	8	9	9	8	3		27	7		22		16	10	12	288
SHARP-SHINNED	36	528	69	43	78	108	83	84	118	84	149			46	315	84	45	20	145	35	9	1		346	113		96		261	60	38	2894
COOPER'S HAWK	6	63	20	14	15	18	8	27	16	14	10			13	41	19	9	4	16	6	4	1		29	28		23		20	12	10	446
N. GOSHAWK																										2	1				1	4
RED-SH. HAWK		1													1	1					3					9	11		7	3	7	42
BROAD-WINGED		3	7			6		7									1			2				4	1		4					36
SWAINSON'S																																
RED-TAILED	1	2	2		1	1	3		1		1			3	2	19	12	1	13	10	9	2		20	28		65		57	46	33	332
ROUGH-LEGGED					1																							1				6
GOLDEN EAGLE																																3
AM. KESTREL	120	495	5	13	11	29	12	7	10	16	12			71	271	26	12	2	88	3				102	6		5		30	1	1	1348
MERLIN	1	25		8	3	9	3	3	3	4	8			5	76	4	7		65	1				27	1				1			254
PEREGRINE	1	3	2	13	6	10	1	1	1	1	5			2	3	2	2	1	1	1	1				1							57
HOURLY WIND DIRECTION	75/NW	75/NW	435/E	6/S	7.5/W	7/S	2.25/S	4.25/S	5.5/S	4.25/S	4.25/S			4.25/NW	9/NW	8/N	5.25/W	4/S	8/W	3.25/NE	4.5/SE	2/SE		7/NW	5.25/NE		5.25/N	8.5/NW	4.25/NW	5/N	144.25/	
TOTAL HAWKS	188	1185	124	104	132	222	116	140	159	123	195			206	748	190	114	38	371	92	48	10		574	272		255		432	153	118	6248

TABLE 4 cont.:

RAPTOR TOTALS 1990

PROJECT: East Point, N.J. MONTH: November

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
BLACK VULTURE													1		6																7
TURKEY VULTURE							37	3	3		15	13	24	39	3			40	6	3	1			5		4					196
OSPREY											1								1												2
AM. SW-TAILED KITE																															
MISS. KITE																															
BALD EAGLE	1						1						2	4				1	1										1	11	
N. HARRIER	6	1	3			3	6	15	9		12	13	15	18	4			6	5	3	6			1		2			4	132	
SHARP-SHINNED	22	22	22			6	23	24	12		10	15	31	25	13			38	9	32	7				5				6	322	
COOPER'S HAWK	2		1			1	5	3	1		1	3	4	7	1			6		1	1									37	
N. GOSHAWK																				1										2	
RED-SH. HAWK							8					1	4	7				2	1	1						1			1	26	
BROAD-WINGED																															
SWAINSON'S									1																						1
RED-TAILED						9	30	7	10		17	47	72	84	4			46	14	11	7			4		4			13	379	
ROUGH-LEGGED						1	2	1			1	4	1	5				1		2	1								1	20	
GOLDEN EAGLE														2	3			1	1	1										9	
AM. KESTREL	2					2		5	1			2		1				1												14	
MERLIN						2																								2	
PEREGRINE	1					1												1											1	4	
HOURS/WIND DIRECTION	6/s	3/s	2.5/s			5/w	5.5/N	5/NW	4.35/w		5.5/NW	6.5/NW	6.5/NW	6/NW	4/sw			6/N	4.5/NW	5/NW	4/N			2/w		1/ESE			6/NW	8.25	
TOTAL HAWKS	34	23	26			25	113	58	37		57	98	157	193	31			143	38	55	23			10		16			27	1162	

TABLE 4 cont. : RAPTOR TOTALS 19 90
 PROJECT: East Point, N.J. MONTH: December

	1	2	3	4	5	6	7	TOTAL for MONTH	SEPT TOTAL	OCT TOTAL	NOV TOTAL	DEC TOTAL	TOTAL
BLACK VULTURE									1	7	7		15
TURKEY VULTURE							3	3	116	281	196	3	596
OSPREY									50	130	2		182
AM. SW-TAILED KITE													
MISS. KITE													
BALD EAGLE					1		1	2	13	20	11	2	46
N. HARRIER					1		2	3	115	288	132	3	538
SHARP-SHINNED					1			1	696	2944	322	1	4013
COOPER'S HAWK							1	1	120	446	37	1	604
N. GOSHAWK					1			1		4	2	1	7
RED-SH. HAWK										42	26		68
BROAD-WINGED									147	36			183
SWAINSON'S											1		1
RED-TAILED					5		2	7	35	332	379	7	753
ROUGH-LEGGED							1	1		6	20	1	27
GOLDEN EAGLE										3	9		12
AM. KESTREL									301	1348	14		1663
MERLIN									14	254	2		270
PEREGRINE									3	57	4		64
HOURS/WIND DIRECTION					4/NW		1/NE	5/	71/	144.25	88.25	5/	308.5
TOTAL HAWKS					9		10	19	1611	6248	1164	19	9042

TABLE 5:

RAPTOR TOTALS 1990

PROJECT: East Point, N.J.
Comparison to: Cape May, N.J.

MONTH: September

Cape May totals shown in red.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1990 Total		
BLACK VULTURE									1									3													3		
TURKEY VULTURE									16						1	15	2	1	4	18	7	20	1	11	7	5	9	6	5	6	9	1	116
OSPREY								8	1						41	2	97	5	11	2	18	7	42	10	3	17	4	13	6	24	4	324	
AM. SW-TAILED KITE																															50		
MISS. KITE																																	
BALD EAGLE								3							1	5	1	4	1	1	3	1			3	1		2			13		
N. HARRIER								1	6						8	43	8	17	11	44	15	35	23	16	7	5	10	5	6	14	11	148	
SHARP-SHINNED								37	10					121	10	440	24	408	32	171	152	76	100	25	34	104	79	10	28	71	120	266	
COOPER'S HAWK								1	1					1	10	1	10	3	5	20	74	10	9	2	37	13	39	2	47	39	44	38	
N. GOSHAWK																															120		
RED-SH. HAWK															1																2		
BROAD-WINGED								5							29	1	18	9	53	7	73	182	39	1	90	6	38	24	6	4	660		
SWAINSON'S																																	
RED-TAILED								4							1	1	1	6	6	5	2	8	4	3	1	1	2		1	4	1	19	
ROUGH-LEGGED																																	
GOLDEN EAGLE																																	
AM. KESTREL									26					455	9	402	49	321	78	73	22	261	74	5	73	6	43	7	5	1	87	13	56
MERLIN								2						22	1	35	2	28	1	15	2	40	3	19	2	35	1	15	1	5	29	1	24
PEREGRINE														2	7	2	2	4			3	5			22	1	4	7		16	2	26	
HOURS/WIND DIRECTION									4.5/N/E					6.5/N/W	5.75/N	6.75/N	6.75/N	4.5/N/W		6/N/W	4.5/N/E		5/N/W	6.25/N/W	3/SW		5.25/N	5/SW	2/SW		71		
TOTAL HAWKS	(59)	(25)	(92)	(104)	(52)	(37)	(10)	(253)	61	73	(332)	(533)	(51)	(11)	644	45	103	243	100	402	164	(9)	52	156	26	30	159	311	79	277	9	6581	

TABLE 5 cont. :

RAPTOR TOTALS 1990

PROJECT: East Point, N.J.

MONTH: October

Comparison to: Cape May, N.J.

Cape May totals shown in red.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	월간 합계				
BLACK VULTURE														1							2								3	1		7				
TURKEY VULTURE	7	8	23	7	3			4			2			36	9	15	8	3		32	25	17	12	8	1	6	17	7	14	22	29	17	14	281		
OSPREY	87	1	389	8	21	6	3	23	3	29	2	19	7	24	1	2	3	2	4	2	46	2	44	2	48	6	5	2	7	1	5	3	1	150		
AM. SW-TAILED KITE																																				
MISS. KITE																																				
BALD EAGLE	1		1		2		1			2				1	1	1	4	1		4	1	1		2	1		1		6	3	4	1	20			
N. HARRIER	22	14	44	23	27	10	3	5	3	5	3	5		22	19	16	17	8	7	9	22	9	2	8	1	3	14	27	7	36	22	8	10	21	288	
SHARP-SHINNED	713	36	528	57	69	7	43	75	78	108	152	83	84	18	84	315	84	45	20	44	35	132	9	36	1	46	376	113	96	261	35	60	75	2994		
COOPER'S HAWK	61	6	91	63	20	5	14	23	15	18	50	8	27	28	16	33	14	9	4	16	41	6	44	2	1	66	29	43	28	32	20	17	12	446		
N. GOSHAWK																				1	1				2		3	1	3	1	1	1	10	4		
RED-SH. HAWK	2		1													1				2	3	2			9		27	11	9	7	31	6	7	92	42	
BROAD-WINGED	8	12	3	18	7		11	8	6	26					35	1	70	48	1	2	20	2	1			3	4	3	1	8	4	2	3	36		
SWAINSON'S																																				
RED-TAILED	6	1	4	2	3	2		1	2	1	2			2	3	2	21	19	3	12	1	5	13	10	15	9	2	2	6	20	10	28	57	46	9	332
ROUGH-LEGGED																2														2	1	2	3	6		
GOLDEN EAGLE																	1			1	2				1		1	1	4	2			12	3		
AM. KESTREL	24	120	495	5	13	79	11	29	4	12	35	7	74	10	95	16	12	2	20	28	17	3	2			102	11	6	30	1	7	1	1348			
MERLIN	300	1	54	25	26	2	8	18	3	9	6	3	9	3	3	5	4	7	1	28	65	8	1	3		89	27	4	1	11	8	3	1	254		
PEREGRINE	49	1	3	18	2	35	13	6	33	10	41	1	38	1	20	1	16	5	1	8	1	5	5	1	5	9	1	5	1	1	1	2	64	57		
HOURS/WIND DIRECTION	7.5/NW	7.5/NW	4.25/E	6/S	7.5/NW	7/S	2.25/S	4.25/S	5.5/S	4.25/SE	4.25/SE			4.25/NW	9/NW	8/W	5.25/W	4/S	8/W	3.25/NW	4.5/NE	2/SE			7/NW	5.25/NE				8.5/NW	4.25/NW	5/N	144.25			
TOTAL HAWKS	168	188	1185	124	104	132	222	116	140	159	123	195	111	206	748	190	114	38	371	92	448	58	10	(6)	574	212	255	432	153	118	6248	7117				

RAPTOR TOTALS 1990

TABLE 5 cont. :

PROJECT: East Point, N. J. MONTH: November
 Comparison to: Cape May, N. J. Cape May totals shown in red.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
BLACK VULTURE						2	2						1		6				2												6	7	
TURKEY VULTURE	14				30	17	37	19	3	3	7	15	13	24	22	39	7	3	23	40	35	6	30	3	31		4			18	196	300	
OSPREY	2	1			7	3	3	2			1	1							1											16	2		
AM. SW-TAILED KITE																																	
MISS. KITE																																	
BALD EAGLE	1						1	1	1		1		2	2	4			1	1	1				3		1				1	12	11	
N. HARRIER	7	6	1	6	3	8	3	15	6	21	15	12	13	44	15	31	18	6	10	6	12	5	8	3	3	6	5	2		6	4	132	237
SHARP-SHINNED	21	22	108	22	16	22	97	6	62	23	120	14	26	12	10	10	15	23	31	93	9	74	32	46	7	11	12	5		20	6	322	1080
COOPER'S HAWK	2	1	2	1		9	1	12	5	16	3	7	1		6	1	8	3	4	11	7	1				3			4	4	105	37	
N. GOSHAWK	1		2					1				1	1	1	3			4	2	2	1	1	2			1				19	2	74	
RED-SH. HAWK	2					2	7	8	3	8	2	1	1	4	16	7	1	8	2	12	1	9	1			1	1			6	1	26	
BROAD-WINGED							1	1	1									1	1												4		
SWAINSON'S									1																						1		
RED-TAILED	3		3			11	9	19	30	43	7	11	10	3	17	9	47	72	84	3	4			4		4	7			24	13	379	358
ROUGH-LEGGED							1	2	1		1	4	1	5				1	1		2	1								1	20		
GOLDEN EAGLE			1			1	2	1	1				1	2	3			2	1	1	1										9		
AM. KESTREL	1	2	3	27		55	2	1	17	5	1		1	2	2	1	1	8	1	1	1	1				1				2	123	14	
MERLIN	1		1			8	2		1	1								2				1		2						1	18	2	
PEREGRINE	2	1	2			2	1	1			1		1					3	1		1									1	1	14	
HOURS/WIND DIRECTION	6/s	3/s	2.5/s			5/w	5.5/s	5/w	4.35/w		5.5/w	6.5/w	6.5/w	6/w	4/s	4/s		6/w	4.5/w	5/w	4/w			2/w		1/E				6/NW	88.37		
TOTAL HAWKS	54	34	23	26	134	235	113	58	37	10	50	98	157	193	31	31	230	143	208	38	55	100	23	10	38	16	14	16	83	27	1162	2412	

TABLE 5 cont.: :

PROJECT: East Point, N.J. MONTH: December

December
Cape May totals shown in red.

PROJECT: East Point, N.J.
Comparison to: Cape May, N.J.

	1	2	3	4	5	6	7	TOTAL for MONTH										GROSS TOTAL	Cape Hen TOTAL	East TOTAL
BLACK VULTURE																		11	9	15
TURKEY VULTURE						8	3	8										679	555	596
OSPREY																		1843	1528	182
AM. SW-TAILED KITE																				
MISS. KITE																				
BALD EAGLE				1	1		1	1	2									62	51	46
N. HARRIER				1	1	1	2	2	3									1047	794	538
SHARP-SHINNED				1	1		18	18	1									12542	11249	4013
COOPER'S HAWK							3	3	1									1602	1523	604
N. GOSHAWK				1	1		1	1	1									37	30	7
RED-SH. HAWK																		186	123	68
BROAD-WINGED																		1079	1007	183
SWAINSON'S																		1	1	1
RED-TAILED				1	5	5	2	6	7									930	829	753
ROUGH-LEGGED							1	1										3	3	27
GOLDEN EAGLE																		21	21	12
AM. KESTREL																		7345	6389	1663
MERLIN																		1423	1260	270
PEREGRINE																		819	742	64
HOURS/WIND DIRECTION										4/NW	1/NE	5/						1018	308	9
TOTAL HAWKS	(28)	(27)	(11)	(0)	3	9	(0)	39	10									29630	26164	9042

TABLE 6:
Non-raptor Migrants Recorded, East Point, N.J., Fall 1990. Page 1A.

[illegible]

TABLE 6 cont.:
Non-raptor Migrants - cont.

Brown Creeper	2	1	1	2	1	1	1	2	3	3	1	1	2	2	2
Carolina Wren															
House Wren															
Winter Wren															
Sedge Wren															
Marsh Wren	1	1	1		1		2	1	2	1	1	1	1	1	1
Golden-crowned Kinglet															
Ruby-crowned Kinglet														3	7
Blue-gray Gnatcatcher														3	1
N. Wheatear					1	1				1	1				
E. Bluebird															
Veery	1														
Gray-cheeked Thrush															
Swainson's Thrush					2						2				
Hermit Thrush															
Wood Thrush															
Am. Robin															
Vaied Thrush	2	1			1								1	1	2
Gray Catbird	1	8	6	8	35		2	10	20	10	10	20	15	20	15
N. Mockingbird	1	2	1	2	1	2		1	1	2	1	1	1	1	3
Brown Thrasher														2	2
Water Pipit															
Cedar Waxwing	4	2					8	4	3	2				6	6
N. Shrike															
Loggerhead Shrike															
European Starling	5	80	40	50	25	20	30	10	20	20	50	40	20	40	40
White-eyed Vireo															
Solitary Vireo															
Yellow-throated Vireo															
Warbling Vireo															
Philadelphia Vireo															
Red-eyed Vireo															
unid. Warbler (sp)	10	15	6	4	20	2	2	6	4	6	4	60	30	50	10
"Brewster's Warbler"															
"Lawrence's Warbler"															
Golden-winged Warbler															
Tennessee Warbler															
Orange-crowned Warbler															
Nashville Warbler															
N. Parula															
Yellow Warbler							4								
Chestnut-sided Warbler															
Magnolia Warbler							1								
Cape May Warbler															
Black-throated Blue Warbler															
Yellow-rumped Warbler															
Black-throated Green Warbler															
Blackburnian Warbler															
Yellow-throated Warbler															
Pine Warbler															
Prairie Warbler															
Palm Warbler															
Bay-breasted Warbler															
Blackpoll Warbler															
Cerulean Warbler															
Black-and-white Warbler															
Am. Redstart															
Prothonotary Warbler															
Worm-eating Warbler															
Ovenbird															

Non-raptor Migrants Recorded, East Point, N.J., Fall, 1990. Page 2 A

[illegible][illegible][illegible]

TABLE 6 cont. :
Non-raptor Migrants — cont.

[illegible][illegible]

Non-raptor Migrants Recorded, East Point, N.J., Fall, 1990. Page 3A

[illegible][illegible][illegible]

Page 3B

[illegible]

**A CHECK LIST OF
NEW JERSEY BIRDS**

OBSERVER:

TABLE 7:

Totals/Peak flights and dates -
East Point, N.J.

Y
E
A
R

Fall, 1990

MO.
DAY

16
4
10/27

LOCALITY

Redhead

Ring-necked Duck

Gr. Scaup

L. Scaup

Com. Eider

King Eider

Harlequin Duck

Oldsquaw

Black Scoter

White-winged Scoter

Com. Goldeneye

Barrow's Goldeneye

Bufflehead

Hooded Merganser

Com. Merganser

Red-breasted Merganser

Ruddy Duck

Black Vulture

Turkey Vulture

Osprey

Am. Swallow-tailed Kite

Mississippi Kite

Bald Eagle

N. Harrier

Sharp-shinned Hawk

Cooper's Hawk

N. Goshawk

Red-shouldered Hawk

Broad-winged Hawk

Swainson's Hawk

Red-tailed Hawk

Rough-legged Hawk

Golden Eagle

Am. Kestrel

Merlin

Peregrine Falcon

Gyr Falcon

Ring-necked Pheasant

Ruffed Grouse

Wild Turkey

N. Bobwhite

Yellow Rail

Black Rail

Clapper Rail

King Rail

Virginia Rail

Sora

Purple Gallinule

Com. Moorhen

Am. Coot

Sandhill Crane

Black-bellied Plover

L. Golden-Plover

Wilson's Plover

Semipalmated Plover

Piping Plover

Killdeer

Am. Oystercatcher

Black-necked Stilt

Gr. Yellowlegs

L. Yellowlegs

Solitary Sandpiper

Willet

Spotted Sandpiper

Upland Sandpiper

Whimbrel

Hudsonian Godwit

Bar-tailed Godwit

Marbled Godwit

Ruddy Turnstone

Red Knot

Sanderling

Semipalmated Sandpiper

Western Sandpiper

Least Sandpiper

White-rumped Sandpiper

Baird's Sandpiper

Pectoral Sandpiper

Purple Sandpiper

Dunlin

Curlew Sandpiper

Stilt Sandpiper

Buff-breasted Sandpiper

Ruff

Short-billed Dowitcher

Long-billed Dowitcher

Com. Snipe

Am. Woodcock

Wilson's Phalarope

Red-necked Phalarope

Red Phalarope

Pomarine Jaeger

Parasitic Jaeger

Long-tailed Jaeger

Great Skua

South Polar Skua

Laughing Gull

Little Gull

Com. Black-headed Gull

Bonaparte's Gull

Ring-billed Gull

Herring Gull

Iceland Gull

L. Black-backed Gull

Glaucous Gull

Great Black-backed Gull

Black-legged Kittiwake

Gull-billed Tern

Caspian Tern

Royal Tern

Sandwich Tern

Roseate Tern

Com. Tern

Arctic Tern

Forster's Tern

Least Tern

Black Tern

Black Skimmer

Gr. Yellowlegs

L. Yellowlegs

Solitary Sandpiper

Willet

Spotted Sandpiper

Upland Sandpiper

Whimbrel

Hudsonian Godwit

Bar-tailed Godwit

Marbled Godwit

Ruddy Turnstone

Red Knot

Sanderling

Semipalmated Sandpiper

Western Sandpiper

Least Sandpiper

White-rumped Sandpiper

Baird's Sandpiper

Pectoral Sandpiper

Purple Sandpiper

Dunlin

Curlew Sandpiper

Stilt Sandpiper

Buff-breasted Sandpiper

Ruff

Short-billed Dowitcher

Long-billed Dowitcher

Com. Snipe

Am. Woodcock

Wilson's Phalarope

Red-necked Phalarope

Red Phalarope

Pomarine Jaeger

Parasitic Jaeger

Long-tailed Jaeger

Great Skua

South Polar Skua

Laughing Gull

Little Gull

Com. Black-headed Gull

Bonaparte's Gull

Ring-billed Gull

Herring Gull

Iceland Gull

L. Black-backed Gull

Glaucous Gull

Great Black-backed Gull

Black-legged Kittiwake

Gull-billed Tern

Caspian Tern

Royal Tern

Sandwich Tern

Roseate Tern

Com. Tern

Arctic Tern

Forster's Tern

Least Tern

Black Tern

Black Skimmer

Gr. Yellowlegs

L. Yellowlegs

Solitary Sandpiper

Willet

Spotted Sandpiper

Upland Sandpiper

Whimbrel

Hudsonian Godwit

Bar-tailed Godwit

Marbled Godwit

Ruddy Turnstone

Red Knot

Sanderling

Semipalmated Sandpiper

Western Sandpiper

Least Sandpiper

White-rumped Sandpiper

Baird's Sandpiper

Pectoral Sandpiper

Purple Sandpiper

Dunlin

Curlew Sandpiper

Stilt Sandpiper

Buff-breasted Sandpiper

Ruff

Short-billed Dowitcher

Long-billed Dowitcher

Com. Snipe

Am. Woodcock

Wilson's Phalarope

Red-necked Phalarope

Red Phalarope

Pomarine Jaeger

Parasitic Jaeger

Long-tailed Jaeger

Great Skua

South Polar Skua

Laughing Gull

Little Gull

Com. Black-headed Gull

Bonaparte's Gull

Ring-billed Gull

Herring Gull

Iceland Gull

L. Black-backed Gull

Glaucous Gull

Great Black-backed Gull

Black-legged Kittiwake

Gull-billed Tern

Caspian Tern

Royal Tern

Sandwich Tern

Roseate Tern

Com. Tern

Arctic Tern

Forster's Tern

Least Tern

Black Tern

Black Skimmer

Gr. Yellowlegs

L. Yellowlegs

Solitary Sandpiper

Willet

Spotted Sandpiper

Upland Sandpiper

Whimbrel

Hudsonian Godwit

Bar-tailed Godwit

Marbled Godwit

Ruddy Turnstone

Red Knot

Sanderling

Semipalmated Sandpiper

Western Sandpiper

Least Sandpiper

White-rumped Sandpiper

Baird's Sandpiper

Pectoral Sandpiper

Purple Sandpiper

Dunlin

Curlew Sandpiper

Stilt Sandpiper

Buff-breasted Sandpiper

Ruff

Short-billed Dowitcher

Long-billed Dowitcher

Com. Snipe

Am. Woodcock

Wilson's Phalarope

Red-necked Phalarope

Red Phalarope

Pomarine Jaeger

Parasitic Jaeger

Long-tailed Jaeger

Great Skua

South Polar Skua

Laughing Gull

Little Gull

Com. Black-headed Gull

Bonaparte's Gull

Ring-billed Gull

Herring Gull

Iceland Gull

L. Black-backed Gull

Glaucous Gull

Great Black-backed Gull

Black-legged Kittiwake

Gull-billed Tern

Caspian Tern

Royal Tern

Sandwich Tern

Roseate Tern

Com. Tern

Arctic Tern

Forster's Tern

Least Tern

Black Tern

Black Skimmer

Gr. Yellowlegs

L. Yellowlegs

Solitary Sandpiper

Willet

Spotted Sandpiper

Upland Sandpiper

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Sanderling

Semipalmated Sandpiper

Western Sandpiper

Least Sandpiper

White-rumped Sandpiper

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Pectoral Sandpiper

Purple Sandpiper

Dunlin

Curlew Sandpiper

Stilt Sandpiper

Buff-breasted Sandpiper

Ruff

Short-billed Dowitcher

Long-billed Dowitcher

Com. Snipe

Am. Woodcock

Wilson's Phalarope

Red-necked Phalarope

Red Phalarope

Pomarine Jaeger

Parasitic Jaeger

Long-tailed Jaeger

Great Skua

</

NOTES:

169 species recorded - 9/9 → 12/8

Non-migratory species are shown in this list as well as migratory. Some species recorded along East Point Road, between the primary and alternate watch sites. Totals not shown for resident or "local" species, (or migratory species hard to count due to lingering, etc.).

Species	1	20	1	16
Brown Wren	3	9/29		
Carolina Wren	5	10/4		
House Wren	4	10/16		
Winter Wren				
Sage Wren				
Marsh Wren	2	9/25		
Golden-crowned Kinglet	495	10/16	74	10/16
Ruby-crowned Kinglet	237	10/16		
Blue-gray Gnatcatcher	6	9/20		
N. Wheatear				
E. Bluebird	232	11/7		
Veery				
Gray-cheeked Thrush				
Swainson's Thrush	4	9/21		
Hermit Thrush	52	10/16	3	11/9
Wood Thrush				
Am. Robin	467	11/14		
Varied Thrush				
Gray Catbird	343	10/16	2	10/3 10/11
N. Mockingbird	3	10/5	2	10/3 10/16
Brown Thrasher	11	2 10/3		
Water Pipit	63	10/31	30	10/16
Cedar Waxwing	467	10/16		
N. Shrike				
Loggerhead Shrike			39	10/16
European Starling	1000	10/5		
White-eyed Vireo	1	10/1		
Solitary Vireo				
Yellow-throated Vireo				
Warbling Vireo				
Philadelphia Vireo				
Red-eyed Vireo	1	9/25		
Unidentified Warbler (sp.)	244	10/1	54	10/16 10/18
"Brewster's Warbler"				
"Lawrence's Warbler"				
Golden-winged Warbler			500	10/16
Tennessee Warbler			376	10/18
Orange-crowned Warbler	1	10/17	1	10/3
Nashville Warbler			763	10/18
N. Parula			2	10/16 10/18
Yellow Warbler	6	9/21	17	11/24
Chestnut-sided Warbler			363	9/16
Magnolia Warbler	1	9/21		
Cape May Warbler	1	10/4		
Black-throated Blue Warbler				
Yellow-rumped Warbler	963	10/15	39	10/16
Black-throated Green Warbler				
Blackburnian Warbler				
Yellow-throated Warbler				
Pine Warbler				
Prairie Warbler	1	10/9		
Palm Warbler	32	10/15		
Bay-breasted Warbler				
Blackpoll Warbler	11	8 10/16		
Cerulean Warbler				
Black-and-white Warbler	1	9/16		
Am. Redstart				
Prothonotary Warbler				
Worm-eating Warbler				
Ovenbird				
Louisiana Waterthrush				
Kentucky Warbler				
Connecticut Warbler				
Mourning Warbler				
Com. Yellowthroat				
Hooded Warbler				
Wilson's Warbler				
Canada Warbler				
Yellow-breasted Chat				
Summer Tanager				
Scarlet Tanager				
W. Tanager				
N. Cardinal				
Rose-breasted Grosbeak				
Black-headed Grosbeak				
Blue Grosbeak				
Indigo Bunting				
Dickcissel				
Rufous-sided Towhee				
Am. Tree Sparrow				
Chipping Sparrow				
Clay-colored Sparrow				
Field Sparrow				
Vesper Sparrow				
Lark Sparrow				
Savannah Sparrow				
Grasshopper Sparrow				
Henslow's Sparrow				
Sharp-tailed Sparrow				
Seaside Sparrow				
Fox Sparrow				
Song Sparrow				
Lincoln's Sparrow				
Swamp Sparrow				
White-throated Sparrow				
White-crowned Sparrow				
Dark-eyed Junco				
Lapland Longspur				
Snow Bunting				
Bobolink				
Red-winged Blackbird				
E. Meadowlark				
Yellow-headed Blackbird				
Rusty Blackbird				
Boat-tailed Grackle				
Com. Grackle				
Brown-headed Cowbird				
Orchard Oriole				
N. Oriole				
Pine Grosbeak				
Purple Finch				
House Finch				
Red Crossbill				
White-winged Crossbill				
Com. Redpoll				
Pine Siskin				
Am. Goldfinch				
Evening Grosbeak				
House Sparrow				

TABLE 7 cont.:

CHECKLIST OF BUTTERFLIES

TABLE 8:

DATE:

[illegible]

DATE _____

[illegible]

* probable Compton's Tortoiseshell - 10/30

Buck Math - 10/24

Buck Moth - 10/24
1000+ Dragonflies - 9/9

35 species total, Sept. 9 to Nov. 26, 1990.

Checklist of Butterflies

TABLE 9:

Site: East Point Hawkwatch

Totals/Peak Flights/Dates - East Point, N.J.-Fall, 1990

Total	Peak Flight	Date
1	1	10/5
2	1	9/28 9/28

- SWALLOWTAILS (Papilionidae)
- PIPEVINE SWALLOWTAIL, r
 - ZEBRA SWALLOWTAIL, r
 - EASTERN BLACK SWALLOWTAIL, c
 - TIGER SWALLOWTAIL, c
 - SPICEBUSH SWALLOWTAIL, c
 - PALAMEDES SWALLOWTAIL, r*

WHITES & SULPHURS (Pieridae)

- CHECKERED WHITE, c
- EUROPEAN CABBAGE WHITE, a
- FALCATE ORANGETIP, c
- CLOUDED SULPHUR, a
- ORANGE SULPHUR, a
- GIANT CLOUDLESS SULPHUR, c*
- LITTLE SULPHUR, u*
- SLEEPY ORANGE, u*

288	40	9/27
66	10	9/28
357	50	9/28
5	1	9/27 10/5

COPPERS, HAIRSTREAKS, &

BLUES (Lycaenidae)

- AMERICAN COPPER, c
- BOG COPPER, u
- BRONZE COPPER, u
- GREAT PURPLE HAIRSTREAK, r*
- CORAL HAIRSTREAK, u
- BANDED HAIRSTREAK, c
- STRIPED HAIRSTREAK, c
- RED-BANDED HAIRSTREAK, u
- OLIVE HAIRSTREAK, c
- HESEL'S HAIRSTREAK, c
- BROWN ELFIN, c
- FROSTED ELFIN, u
- HENRY'S ELFIN, u
- PINE ELFIN, c
- WHITE-M HAIRSTREAK, u
- NORTHERN HAIRSTREAK, u
- GRAY HAIRSTREAK, c
- EASTERN TAILED BLUE, a
- SPRING AZURE, a

3	1	9/21 9/21
4	2	9/27
40	15	9/28
44	20	9/27
3	1	9/27 10/10

SNOUTS (Libytheidae)

- SNOUT BUTTEFLY, u

6	4	9/23
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BRUSHFOOTS

(Nymphalidae:Nymphalidae)

- GULF FRITILLARY, r*
- VARIEGATED FRITILLARY, c*
- GREAT SPANGLED FRITILLARY, u
- REGAL FRITILLARY, r
- SILVER-BORDERED FRITILLARY, r

13	4	10/10
----	---	-------

Total	Peak Flight	Date
108	20	9/28
177	60	10/30
26	6	10/16
204	40	9/28
3	1	9/27 10/8
863	200	10/3
1382	250	9/27
7	2	9/27
1	1	9/27

- MEADOW FRITILLARY, r
- PEARL CRESCENT, a
- BALTIMORE, u
- QUESTION MARK, c
- COMMA, c
- MOURNING CLOAK, c
- AMERICAN PAINTED LADY, c-a*
- PAINTED LADY, u
- RED ADMIRAL, c-a
- BUCKEYE, c-a*
- RED-SPOTTED PURPLE, u
- VICEROY, c

LEAF WINGS

(Charaxinae:Nymphalidae)

- HACKBERRY BUTTERFLY, u-c
- TAWNY EMPEROR, u

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SATYRS & WOOD NYMPHS

(Satyrinae:Nymphalidae)

- NORTHERN PEARLY EYE, r
- NORTHERN EYED BROWN, r
- APPALACHIAN EYED BROWN, u
- CAROLINA SATYR, r
- GEORGIA SATYR, c
- LITTLE WOOD SATYR, c
- COMMON WOOD NYMPH, c-a

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MILKWEED BUTTERFLIES

(Danainae:Nymphalidae)

- MONARCH, a*

10,106	1500	9/28
	1000	10/6

SKIPPERS (Hesperiidae)

- SILVER-SPOTTED SKIPPER, u
- LONG-TAILED SKIPPER, r*
- HOARY EDGE, c
- SOUTHERN CLOUDYING, c
- NORTHERN CLOUDYING, c
- SOUTHERN or SCALLOPED SOOTYING, u
- SLEEPY DUSKYING, u
- JUVENAL'S DUSKYING, c-a
- HORACE'S DUSKYING, c
- ZARUCCO DUSKYING, r
- WILD INDIGO DUSKYING, u
- CHECKERED SKIPPER, c
- COMMON SOOTYING, c
- SWARTHY SKIPPER, c
- LEAST SKIPPER, c

1	1	9/20 9/21
1	1	10/3
1	1	10/4
1	1	9/5
1	1	10/5
4	2	9/23

- EUROPEAN SKIPPER, u
- FIERY SKIPPER, c*
- LEONARDUS SKIPPER, u
- PECK'S or YELLOWPATCH SKIPPER, u
- TAWNY-EDGED SKIPPER, u
- CROSSLINE SKIPPER, c
- NORTHERN BROKEN DASH, c
- LITTLE GLASSYING, u
- SACHEM, u-c*
- DELAWARE SKIPPER, c
- SOUTHERN GOLDEN or ZABULON SKIPPER, u
- AARON'S or SAFFRON SKIPPER, c
- BROAD-WINGED SKIPPER, c
- DION or SEDGE SKIPPER, u
- DUN SKIPPER, u
- BRAZILIAN SKIPPER, r*
- SALT MARSH SKIPPER, c

HYPOTHETICAL LIST

(Species to look for)

- GIANT SWALLOWTAIL
- DOGFACE*
- ORANGE-BARRED SULPHUR
- HARVESTER
- EDWARD'S HAIRSTREAK
- HICKORY HAIRSTREAK
- HOARY ELFIN
- APHRODITE
- SILVER CRESCENTSPOT
- COMPTON'S TORTOISESHELL* / probable, 10/30
- GOLDEN-BANDED SKIPPER
- EASTERN CLOUDYING
- COLUMBINE DUSKYING
- COBWEB SKIPPER
- DOTTED SKIPPER
- INDIAN SKIPPER
- WHIRLABOUT
- BEARDGRASS SKIPPER
- MULBERRY WING
- NORTHERN GOLDEN or HOBOMOK SKIPPER
- BLACK DASH
- TWO-SPOTTED SKIPPER
- DUSTED SKIPPER
- ROADSIDE SKIPPER
- CLOUDED SKIPPER*
- OCOLA or LONG-WINGED SKIPPER*

Buck Moth - 1, 10/24

35 species, total.

13,985 individuals

SPECIES RECORDS

If you see a given species in one hour but not in other hours, enter "0" in any hour when none of that species was seen. If you don't see a particular species all day, leave all the hours BLANK for that species.

If you do not keep records of certain raptor species you observe because of doubts that they are migrants, mark the appropriate COMMENT box "1" and explain on the back.

Large Numbers: Early and late hourly columns provide space for only 3 digits; others allow for 4 and the TOTALS column for 5. Numbers too long for the space must be entered on the back of the form or on an attached sheet—with written details. For such hours or totals leave the space on the form BLANK and write "1" in the COMMENT box for the species.

Unusual Sightings: Please note the passage of all unusually large groups of raptors, with information about time of appearance and disappearance, numbers, altitude and behavior. Species that are rare or endangered in your area should also be specially noted, with passage times and as much other information as possible included in COMMENTS.

SUPPLIES AND EQUIPMENT

Topographic maps are very useful for locating possible new lookouts, for finding the latitude and longitude of an existing site, and for establishing precise distances by which to judge visibility from a lookout. A kilometer scale is printed on such maps, too.

Other equipment to take along to your lookout might include a strip of ribbon. Fluttering in the breeze it makes a fine indicator of wind direction. Small wind-gauges, obtainable through scientific instrument outlets, are useful, too. So is a Celsius thermometer and a compass. *Don't forget your watch. And something to write with.*

Carry a notebook. That's usually the easiest way to keep your notes for the day. Many observers write all their original records in field notebooks and transfer the data to report forms once they get home. This allows them to be as detailed in their notes as they want to be, and it leaves them with permanent personal records.

Regional editors can provide report forms and instruction folders as well as station-description cards.

GOOD HAWKING!



Hawk Migration Association of North America

INSTRUCTIONS FOR DAILY REPORT FORMS

Standard daily lookout report forms are supplied by the Hawk Migration Association of North America (HMANA) to all hawkwatchers who ask for them. The style of the report form has changed rapidly since 1974. We began with a design appropriate for casual record-keeping, and the forms were to be stored for researchers who would get their data by going through the sheets one by one. From the beginning, however, HMANA hoped to link up with computer technology, to quickly advance knowledge of bird-of-prey migration. Basic changes are suggested to make the form "computer-compatible" and to insure that essential data conformed to standards adopted by the world scientific community—metric distances and Celsius temperatures.

The resulting form may take some getting used to, but HMANA agreed to the changes because our data thereby become more accessible to science and consequently more beneficial to the welfare of the birds of prey.

Design and details of these forms and instructions are the combined product of many contributors, who worked on it for more than a year. The initial printing was done with the aid of a grant from the Raptor Information Center of the National Wildlife Federation.

GENERAL INSTRUCTIONS

Use one data sheet for each day's observations at any given site (see LOCATION on next page). Be aware that the keypuncher will record only what you record on the form and will not assume or guess at what you may have meant. So if you treat the form casually, your day's observations may have less value than they deserve.

Fill in the form as completely as you can. Even simple daily species totals are useful, but the more other data you record the more valuable your observations are. Don't try to supply data that you're not sure about, but *do* record the rest. We also welcome *additional* information—key weather changes that occur in a recording hour, interesting bird behavior, the passage of birds other than diurnal raptors, the type of equipment and the count methods you are using - *anything you think is noteworthy*. Enter a "1" in the COMMENT box to the right of the weather section or, if a particular raptor species is involved, to the right of the vertical TOTALS column, opposite the appropriate species designation; write your comments on the back of the form or on a sheet you attach to the form.

NUMBERS

All written numbers should be right-justified: a single digit number goes in the rightmost column; a double-digit number in the rightmost 2 columns, etc.

Disregard the numbers in small print on the form; they are guides for the key-punchers only.

LINE BY LINE **Date** (8 digits): Using all the spaces, record day and month and year. Sample: 01091979 for 1 September 1979.

Location (blank for location name, followed by 4-digit location code): As lookouts are established, they will be assigned location-code numbers, based on station-description cards available from HMANA regional editors. If your lookout doesn't have such a number or if you don't know what the number is, ignore the boxes and simply write the name of the site, locating it in terms of map coordinates or in relation to a town, a lake, a road intersection, or the like.

If you move your lookout operation during any one day, or if your group splits its operation to cover the passage of hawks from more than one vantage point at a time, use a separate report form for each post. The rule of thumb is, fill out a new form if by moving or dividing you have affected your count. The separate forms will help provide information about the width of flight paths and about the effects of time of day and changing weather conditions on flight paths.

Banding Station (1 digit): If the count is made while operating a raptor-trapping-and-banding station, enter "1."

Station Leader (15 spaces and separate address box): In the 15 spaces print in capital letters last name and initials. (If that totals more than 15 letters—e.g., G. W. Featherstonhaugh—print only so much of the last name as will allow you to end with the initials—e.g., FEATHERSTONHAGW.) In the address space write your name and address, with ZIP.

Maximum Visibility (3 digits): This indicates atmospheric clarity. Judge from your longest view and enter distance in kilometers (conversion table on next page); if it is less than 1 km enter 0 in the first box, the decimal point in the second, the tenths of a km in the last. Treat other fractions similarly. Sample: 5.5

Air Temperature (2 digits): Record in Celsius (conversion table on next page). Below 0°C, use a minus sign in the first space; below -9°C, mark the COMMENT box "1" and note the hour and temperature on the back of the sheet.

Sky Code (1 digit): Using the table on the next page, enter the number best describing the *predominant* condition. If you feel that you can't do justice that way to a given set of conditions, leave the space blank for the hour, mark the COMMENT box "1," and elaborate on the back of the form.

Wind Speed Code (1 digit): Describe wind speed by the table on the next page.

Wind From (3 spaces): Enter direction from which the wind is blowing. Sample: NNW. Variable wind: VAR. No wind, enter "0."

Altitude of Flight Code (1 digit): Using the table on the next page, give the code number of representing the apparent height of most passing birds of prey when they pass the count point.

Flight Direction (3 spaces): Record the direction toward which the birds are moving when they are directly above or to the side of the count point. In a strong wind, this may be different from the direction they are facing in flight. If different birds follow markedly different courses, write "1" in the appropriate comment boxes and note the variations on the back of the form.

Number of Observers (2 digits): Include only observers who are actively engaged in helping take the count.

WIND SPEEDS

METRIC CONVERSIONS

YARDS/MILES / KM	OF	°C
25	0.0	0
100	0.1	-12
300	0.3	-7
	0.25	0
	0.5	4
	0.75	10
	1	16
	2	32
	3	48
	4	64
	5	80
	10	160
	25	400
	50	800

To convert miles to kilometers, multiply by 1.61
To convert °F to °C, subtract 32, multiply by .5, divide by 9.

ALTITUDE OF FLIGHT

- 0 Below eye level
- 1 Eye level up to about 30 meters (100 feet) overhead
- 2 Birds seen easily with unaided eye (eyeglasses not counted as aids)
- 3 At limit of unaided vision
- 4 Beyond limit of unaided eye but visible with binoculars — to 10X
- 5 At limit of binoculars
- 6 Beyond limit of binoculars 10X or less, but can detect with binoculars or telescope of greater power (Mark "1" in COMMENT box and note magnification)
- 7 No predominant height

SKY CODE

- 0 Clear; 0-15% cloud cover
- 1 Partly cloudy; 16-50% cover
- 2 Mostly cloudy; 51-75% cover
- 3 Overcast; 76-100% cover
- 4 Wind-driven sand, dust, snow
- 5 Fog or haze
- 6 Drizzle
- 7 Rain
- 8 Snow
- 9 Thunderstorm, with or without precipitation

Minutes of Observation per Hour (2 digits): This permits you to note the precise time covered during the hours you arrive and depart a lookout and to indicate other partially-covered hours.

PLEASE PROVIDE THE WEATHER AND OBSERVATION INFORMATION AT THE TOP OF THE FORM FOR EACH HOUR YOU OBSERVE. REPORT CONDITIONS AS THEY ARE AT THE START OF THE HOUR. If a condition remains the same one hour to the next, draw a line from the recorded data through the hours in which no change occurred; do not use ditto marks or dashes. If any information can't be provided for a particular hour, or if the lookout is uncovered for any whole hour, leave the pertinent spaces blank.



The Hawk Migration Association of North America

See instruction sheet for weather codes and metric equivalents. If code instructions or any data are unavailable or insufficient, omit that information. Send filled-out form to the appropriate HMANA regional editor or to HMANA, P.O. Box 3482 Rivermont Station, Lynchburg, VA 24503.

DATE: Day Month Year
1 9

LOCATION

BAND STA. 1-10

LEADER 1-10

Address

TIME (Standard)	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	TOTALS	
MAX. VISIBILITY 30																	BV
AIR TEMP. °C 14																	TV
SKY CODE 44																	OS
WIND SPEED CODE 39																	SK
WIND FROM 14																	BK
ALT. FLIGHT CODE 39																	MK
FLIGHT DIR. 14																	BE
NO. OBSERVERS 14																	NH
MINUTES OBSERV. 45																	SS
BLACK VULTURE 22																	CH
TURKEY VULT. 21																	NG
OSPREY 77																	RS
AM. S.T. KITE 32																	BW
BL. SH. KITE 31																	SW
MISS. KITE 34																	RT
BALD EAGLE 72																	FH
NO. HARRIER 5																	RL
SHARPSHINNED 47																	GE
COOPER'S HAWK 43																	AK
NO. GOSHAWK 41																	ML
RED-SHOULDERED 72																	PG
BROAD-WINGED 73																	PR
SWAINSON'S 54																	UV
RED-TAILED 51																	UA
FERRUGINOUS 49																	UB
ROUGH-LEGGED 58																	UE
GOLDEN EAGLE 71																	UF
AM. KESTREL 65																	UU
MERLIN 86																	OO
PEREGRINE 45																	TH
PRAIRE FALCON 11																	
Unid. VULTURE 11																	
Unid. ACCIPITER 40																	
Unid. BUTEO 31																	
Unid. EAGLE 70																	
Unid. FALCON 30																	
Unid. RAPTOR 49																	
OTHER RAPTOR 11																	
Total Hawks 11																	

COMMENT no. ☐

Appendix 2.

FROM: Chris Schultz, Director, Cape May Raptor Banding Project
TO: Clay Sutton, Biologist, Herpetological Associates, Inc.
Paul Kerlinger, Director, Cape May Bird Observatory
SUBJECT: Color Marking Raptors during 1990 Autumn Migration
DATE: 20 November 1990

PURPOSE

The purpose of this color marking project was to test the historic speculation that the Cape May Point raptor flights go north from Cape May along the Delaware Bay shore and cross into Delaware near the mouth of the Delaware River, and to assess the importance of the bay shore to migratory raptors. Mr. Clay Sutton of Herpetological Associates, Inc. conducted observations at East Point, NJ. Mr. Sutton recorded each color marked raptor seen, noting species, shape of marker and location of marker on the tail. The timing and distance traveled can then be calculated based on the marking schedule. The relative percentages of Cape May Point birds occurring at East Point can be calculated based on the sample marked by the CMRBP.

METHODS

The CMRBP used three inch pieces of black vinyl tape folded in half so that they projected approximately one inch beyond the end of the tail. Based on the results of similar color marking conducted by the CMRBP during the autumn 1980 season we used only square and pointed shapes, black color, and only central and outer rectrices were marked. Marking was conducted only on HY female American Kestrels, HY female Sharp-shinned Hawks and HY Red-tailed Hawks. On succeeding days either rectrix L1, L6 or R6 was marked. By randomly selecting shapes and rectrices, six different marking combinations were achieved.

MARKING SCHEDULE

We began marking Sharp-shinned Hawks and American Kestrels on 29 September and conducted two repetitions of the six combinations, finishing the marking on 10 October. Beginning on 8 November we marked Red-tailed Hawks for one repetition of the six combinations. Marking was conducted by all cooperating banders operating stations for the Cape May Raptor Banding Project. The following list is the schedule of marker shapes and locations used by the CMRBP.

<u>Date</u>	<u>Shape</u>	<u>Location on Tail</u>
9/29 & 11/8	Square	L6
9/30 & 11/9	Point	L1
10/1 & 11/11	Square	R6
10/2 & 11/12	Point	R6
10/3 & 11/13	Point	L6
10/4 & 11/14	Square	L1
10/5	Square	L6
10/6	Point	L1
10/7	Square	R6
10/8	Point	R6
10/9	Point	L6
10/10	Square	L1

RESULTS

The Cape May Raptor Banding Project marked a total of 219 Sharp-shinned Hawks, 104 Red-tailed Hawks and 37 American Kestrels. On 2 October NJ Fish, Game and Wildlife employees sighted a Sharp-shinned Hawk at the Dennis Creek Wildlife Management Area wearing a square marker on the right side of the tail. On 19 November Sutton observed a Red-tailed Hawk wearing a square marker on the L1 tail feather. To my knowledge these are the only reported sightings of marked birds outside of Cape May Point. Marked birds were sighted regularly from the Cape May Point Hawkwatch as well as the CMRBP banding stations up to six days after original marking. Marked birds were recaptured at the banding stations up to three days after marking and all tags appeared to be holding well and still firmly attached with no evidence of damage from preening behaviors. Study results and data analysis will be submitted for publication in an appropriate scientific journal with Mr. Sutton, Dr. Kerlinger and myself as co-authors.

TAIL MOUNTED MARKERS APPLIED BY
CAPE MAY RAPTOR BANDING PROJECT
AUTUMN 1990

SPECIES	BAND #	AGE	SEX	DATE	STA.	BNDR	REMARKS
SSHA	105331787	HY	F	09/28/90	NN	SC	MARKED L 6 SQUARE
SSHA	103396001	HY	F	09/29/90	E	BO	MARKED L 6 SQUARE
SSHA	105331788	HY	F	09/29/90	NN	SC	MARKED L 6 SQUARE
SSHA	105331789	HY	F	09/29/90	NN	SC	MARKED L 6 SQUARE
SSHA	105331790	HY	F	09/29/90	NN	SC	MARKED L 6 SQUARE
SSHA	105331791	HY	F	09/29/90	NN	SC	MARKED L 6 SQUARE
SSHA	105331792	HY	F	09/29/90	NN	SC	MARKED L 6 SQUARE
SSHA	105331793	HY	F	09/29/90	NN	SC	MARKED L 6 SQUARE
SSHA	105331794	HY	F	09/29/90	NN	SC	MARKED L 6 SQUARE
SSHA	137358025	HY	F	09/29/90	N	CE	MARKED L 6 SQUARE
SSHA	137358026	HY	F	09/29/90	N	CE	MARKED L 6 SQUARE
SSHA	105331795	HY	F	09/30/90	NN	SC	MARKED L 1 POINT
SSHA	105331796	HY	F	09/30/90	NN	SC	MARKED L 1 POINT
SSHA	105331797	HY	F	09/30/90	NN	SC	MARKED L 1 POINT
SSHA	105331798	HY	F	09/30/90	NN	SC	MARKED L 1 POINT
SSHA	123340418	HY	F	09/30/90	S	EN	MARKED L 1 POINT
SSHA	123340419	HY	F	09/30/90	S	EN	MARKED L 1 POINT
SSHA	103396005	HY	F	10/01/90	E	BO	MARKED R 6 SQUARE
SSHA	103396006	HY	F	10/01/90	E	BO	MARKED R 6 SQUARE
SSHA	103396007	HY	F	10/01/90	E	BO	MARKED R 6 SQUARE
SSHA	103396009	HY	F	10/01/90	E	BO	MARKED R 6 SQUARE
SSHA	103396010	HY	F	10/01/90	E	BO	MARKED R 6 SQUARE
SSHA	105331799	HY	F	10/01/90	NN	SC	MARKED R 6 SQUARE
SSHA	105331800	HY	F	10/01/90	NN	SC	MARKED R 6 SQUARE
SSHA	105331934	HY	F	10/01/90	NN	SC	MARKED R 6 SQUARE

TAIL MOUNTED MARKERS APPLIED BY
CAPE MAY RAPTOR BANDING PROJECT
AUTUMN 1990

SPECIES	BAND #	AGE	SEX	DATE	STA.	BNDR	REMARKS
SSHA	105331935	HY	F	10/01/90	NN	SC	MARKED R 6 POINT
SSHA	105331936	HY	F	10/01/90	NN	SC	MARKED R 6 SQUARE
SSHA	105331937	HY	F	10/01/90	NN	SC	MARKED R 6 SQUARE
SSHA	105331938	HY	F	10/01/90	NN	SC	MARKED R 6 SQUARE
SSHA	105331939	HY	F	10/01/90	NN	SC	MARKED R 6 SQUARE
SSHA	105331940	HY	F	10/01/90	NN	SC	MARKED R 6 SQUARE
SSHA	105331942	HY	F	10/01/90	NN	SC	MARKED R 6 SQUARE
SSHA	105331943	HY	F	10/01/90	NN	SC	MARKED R 6 SQUARE
SSHA	105331944	HY	F	10/01/90	NN	SC	MARK R 6 SQUARE
SSHA	123340420	HY	F	10/01/90	S	EN	MARKED R 6 SQUARE
SSHA	123340421	HY	F	10/01/90	S	EN	MARKED R 6 SQUARE
SSHA	123340422	HY	F	10/01/90	S	EN	MARKED R 6 SQUARE
SSHA	123340423	HY	F	10/01/90	S	EN	MARKED R 6 SQUARE
SSHA	123340424	HY	F	10/01/90	S	EN	MARKED R 6 SQUARE
SSHA	123340425	HY	F	10/01/90	S	EN	MARKED R 6 SQUARE
SSHA	125391904	HY	F	10/01/90	N	OT	MARKED R 6 SQUARE
SSHA	125391905	HY	F	10/01/90	N	OT	MARKED R 6 SQUARE, RETRAPPED NN STA 0950 TODAY
SSHA	125391906	HY	F	10/01/90	N	OT	MARKED R 6 SQUARE
SSHA	149392706	HY	F	10/01/90	E	BO	MARKED R 6 SQUARE
SSHA	103396011	HY	F	10/02/90	E	BO	MARKED R 6 SQUARE
SSHA	103396017	HY	F	10/02/90	E	BO	MARKED R 6 POINT
SSHA	103396018	HY	F	10/02/90	E	BO	MARKED R 6 POINT
SSHA	103396019	HY	F	10/02/90	E	BO	MARKED R 6 POINT
SSHA	103396021	HY	F	10/02/90	E	BO	MARKED R 6 POINT, RETRAPPED N STA 1236 TODAY

TAIL MOUNTED MARKERS APPLIED BY
CAPE MAY RAPTOR BANDING PROJECT
AUTUMN 1990

SPECIES	BAND #	AGE	SEX	DATE	STA.	BNDR	REMARKS
SSHA	103396022	HY	F	10/02/90	E	BO	MARKED R 6 POINT
SSHA	103396024	HY	F	10/02/90	E	BO	MARKED R 6 POINT
SSHA	105331945	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
SSHA	105331946	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
SSHA	105331947	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
SSHA	105331948	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
SSHA	105331949	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
SSHA	105331950	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
SSHA	105331951	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
SSHA	105331952	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
SSHA	105331953	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
SSHA	105331954	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
SSHA	105331955	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
SSHA	105331956	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
SSHA	105331957	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
SSHA	105331958	HY	F	10/02/90	NN	SC	MARKED R 6 POINT, R P 6,7,8,9 B 1/4
SSHA	105331959	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
SSHA	105331960	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
SSHA	105331961	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
SSHA	105331962	HY	F	10/02/90	NN	SC	MARKED R 6 POINT, BAND OVERLAPPED & RELEASED ACCIDENTALLY
SSHA	105331963	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
SSHA	105331964	HY	F	10/02/90	NN	SC	MARKED R 6 POINT, KEEL SHARP
SSHA	105331965	HY	F	10/02/90	NN	SC	MARKED R 6 POINT

TAIL MOUNTED MARKERS APPLIED BY
CAPE MAY RAPTOR BANDING PROJECT
AUTUMN 1990

SPECIES	BAND #	AGE	SEX	DATE	STA.	BNDR	REMARKS
SSHA	105331966	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
SSHA	105331967	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
SSHA	105331968	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
SSHA	105331969	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
SSHA	123340426	HY	F	10/02/90	S	EN	MARKED R 6 POINT
SSHA	123340428	HY	F	10/02/90	S	EN	MARKED R 6 POINT
SSHA	123340429	HY	F	10/02/90	S	EN	MARKED R 6 POINT
SSHA	123340430	HY	F	10/02/90	S	EN	MARKED R 6 POINT
SSHA	123340431	HY	F	10/02/90	S	EN	MARKED R 6 POINT
SSHA	123340432	HY	F	10/02/90	S	EN	MARKED R 6 POINT
SSHA	123340433	HY	F	10/02/90	S	EN	MARKED R 6 POINT
SSHA	123340434	HY	F	10/02/90	S	EN	MARKED R 6 POINT
SSHA	123340435	HY	F	10/02/90	S	EN	MARKED R 6 POINT
SSHA	123340436	HY	F	10/02/90	S	EN	MARKED R 6 POINT
SSHA	123340437	HY	F	10/02/90	S	EN	MARKED R 6 POINT
SSHA	123340438	HY	F	10/02/90	S	EN	MARKED R 6 POINT
SSHA	123340439	HY	F	10/02/90	S	EN	MARKED R 6 POINT
SSHA	125391907	HY	F	10/02/90	N	OT	MARKED R 6 POINT
SSHA	125391908	HY	F	10/02/90	N	OT	MARKED R 6 POINT
SSHA	125391910	HY	F	10/02/90	N	OT	MARKED R 6 POINT
SSHA	125391911	HY	F	10/02/90	N	OT	MARKED R 6 POINT
SSHA	125391912	HY	F	10/02/90	N	OT	MARKED R 6 POINT
SSHA	125391913	HY	F	10/02/90	N	OT	MARKED R 6 POINT
SSHA	125391914	HY	F	10/02/90	N	OT	MARKED R 6 POINT
SSHA	125391915	HY	F	10/02/90	N	OT	MARKED R 6 POINT

TAIL MOUNTED MARKERS APPLIED BY
CAPE MAY RAPTOR BANDING PROJECT
AUTUMN 1990

SPECIES	BAND #	AGE	SEX	DATE	STA.	BAND	REMARKS
SSHA	125391916	HY	F	10/02/90	N	OT	MARKED R 6 POINT
SSHA	125391917	HY	F	10/02/90	N	OT	MARKED R 6 POINT
SSHA	125391918	HY	F	10/02/90	N	OT	MARKED R 6 POINT
SSHA	125391919	HY	F	10/02/90	N	OT	MARKED R 6 POINT
SSHA	125391920	HY	F	10/02/90	N	OT	MARKED R 6 POINT
SSHA	125391921	HY	F	10/02/90	N	OT	MARKED R 6 POINT
SSHA	125391922	HY	F	10/02/90	N	OT	MARKED R 6 POINT
SSHA	125391923	HY	F	10/02/90	N	OT	MARKED R 6 POINT
SSHA	125391924	HY	F	10/02/90	N	OT	MARKED R 6 POINT
SSHA	125391925	HY	F	10/02/90	N	OT	MARKED R 6 POINT
SSHA	143350287	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
SSHA	149392730	HY	F	10/02/90	E	BO	MARKED R 6 POINT
SSHA	103396028	HY	F	10/03/90	E	BO	MARKED L 6 POINT
SSHA	105331970	HY	F	10/03/90	NN	SC	MARKED L 6 POINT
SSHA	105331971	HY	F	10/03/90	NN	SC	MARKED L 6 POINT
SSHA	105331972	HY	F	10/03/90	NN	SC	MARKED L 6 POINT
SSHA	105331973	HY	F	10/03/90	NN	SC	MARKED L 6 POINT
SSHA	105331974	HY	F	10/03/90	NN	SC	MARKED L 6 POINT
SSHA	123340441	HY	F	10/03/90	S	EN	MARKED L 6 POINT
SSHA	123340442	HY	F	10/03/90	S	EN	MARKED L 6 POINT
SSHA	123340443	HY	F	10/03/90	S	EN	MARKED L 6 POINT
SSHA	123340444	HY	F	10/03/90	S	EN	MARKED L 6 POINT
SSHA	125391927	HY	F	10/03/90	N	OT	MARKED L 6 POINT
SSHA	125391928	HY	F	10/03/90	N	OT	MARKED L 6 POINT
SSHA	125391929	HY	F	10/03/90	N	OT	MARKED L 6 POINT

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AUTUMN 1990

SPECIES	BAND #	AGE	SEX	DATE	STA.	BNDR	REMARKS
SSHA	125391930	HY	F	10/03/90	N	OT	MARKED L 6 POINT
SSHA	125391931	HY	F	10/03/90	N	OT	MARKED L 6 POINT
SSHA	125391932	HY	F	10/03/90	N	OT	MARKED L 6 POINT
SSHA	105331975	HY	F	10/04/90	NN	SC	MARKED L 1 SQUARE
SSHA	105331976	HY	F	10/04/90	NN	SC	MARKED L 1 SQUARE
SSHA	123340446	HY	F	10/04/90	N	EN	MARKED L 1 SQUARE
SSHA	123340447	HY	F	10/04/90	N	EN	MARKED L 1 SQUARE
SSHA	123340448	HY	F	10/04/90	N	EN	MARKED L 1 SQUARE
SSHA	123340449	HY	F	10/04/90	N	EN	MARKED L 1 SQUARE
SSHA	125391933	HY	F	10/04/90	N	OT	MARKED L 1 SQUARE
SSHA	103396030	HY	F	10/05/90	E	BO	MARKED L 6 SQUARE
SSHA	105331977	HY	F	10/05/90	NN	SC	MARKED L 6 SQUARE
SSHA	105331978	HY	F	10/05/90	NN	SC	MARKED L 6 SQUARE
SSHA	105331980	HY	F	10/05/90	NN	SC	MARKED L 6 SQUARE
SSHA	105331981	HY	F	10/05/90	NN	SC	MARKED L 6 SQUARE
SSHA	105331982	HY	F	10/05/90	NN	SC	MARKED L 6 SQUARE
SSHA	123340450	HY	F	10/05/90	N	EN	MARKED L 6 SQUARE
SSHA	123340451	HY	F	10/05/90	N	EN	MARKED L 6 SQUARE
SSHA	125391934	HY	F	10/05/90	N	OT	MARKED L 6 SQUARE
SSHA	125391935	HY	F	10/05/90	N	OT	MARKED L 6 SQUARE
SSHA	125391936	HY	F	10/05/90	N	OT	MARKED L 6 SQUARE
SSHA	103396031	HY	F	10/06/90	E	BO	MARKED L 1 POINT
SSHA	103596032	HY	F	10/06/90	E	BO	MARKED L 1 POINT
SSHA	105331984	HY	F	10/06/90	NN	SC	MARKED L 1 POINT
SSHA	105331986	HY	F	10/06/90	NN	SC	MARKED L 1 POINT

TAIL MOUNTED MARKERS APPLIED BY
CAPE MAY RAPTOR BANDING PROJECT
AUTUMN 1990

SPECIES	BAND #	AGE	SEX	DATE	STA.	BNDR	REMARKS
SSHA	105331987	HY	F	10/06/90	NN	SC	MARKED L 1 POINT
SSHA	105331989	HY	F	10/06/90	NN	SC	MARKED L 1 POINT
SSHA	105331990	HY	F	10/06/90	NN	SC	MARKED L 1 POINT
SSHA	105331991	HY	F	10/06/90	NN	SC	MARKED L 1 POINT
SSHA	105331992	HY	F	10/06/90	NN	SC	MARKED L 1 POINT
SSHA	105331993	HY	F	10/06/90	NN	SC	MARKED L 1 POINT
SSHA	105331994	HY	F	10/06/90	NN	SC	MARKED L 1 POINT
SSHA	105378008	HY	F	10/06/90	S	CE	MARKED L 1 POINT
SSHA	105378009	HY	F	10/06/90	S	CE	MARKED L 1 POINT
SSHA	123340452	HY	F	10/06/90	N	EN	MARKED L 1 POINT
SSHA	123340453	HY	F	10/06/90	N	EN	MARKED L 1 POINT
SSHA	123340454	HY	F	10/06/90	N	EN	MARKED L 1 POINT
SSHA	125391938	HY	F	10/06/90	N	OT	MARKED L 1 POINT
SSHA	125391939	HY	F	10/06/90	N	OT	MARKED L 1 POINT
SSHA	149331407	HY	F	10/06/90	NN	SC	MARKED L 1 POINT
SSHA	103396035	HY	F	10/07/90	E	BO	MARKED R 6 SQUARE
SSHA	103396036	HY	F	10/07/90	E	BO	MARKED R 6 SQUARE
SSHA	105331995	HY	F	10/07/90	NN	SC	MARKED R 6 SQUARE
SSHA	105331996	HY	F	10/07/90	NN	SC	MARKED R 6 SQUARE
SSHA	105331997	HY	F	10/07/90	NN	SC	MARKED R 6 SQUARE
SSHA	105331998	HY	F	10/07/90	NN	SC	MARKED R 6 SQUARE
SSHA	105331999	HY	F	10/07/90	NN	SC	MARKED R 6 SQUARE
SSHA	116335248	HY	f	10/07/90	S	FO	MARKED R 6 SQUARE
SSHA	116335249	HY	F	10/07/90	S	FO	MARKED R 6 SQUARE
SSHA	116335250	HY	F	10/07/90	S	FO	MARKED R 6 SQUARE

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AUTUMN 1990

SPECIES	BAND #	AGE	SEX	DATE	STA.	BNDR	REMARKS
SSHA	116335251	HY	F	10/07/90	S	FO	MARKED R 6 SQUARE
SSHA	116335252	HY	F	10/07/90	S	FO	MARKED R 6 SQUARE
SSHA	116335253	HY	F	10/07/90	S	FO	MARKED R 6 SQUARE
SSHA	116335254	HY	F	10/07/90	S	FO	MARKED R 6 SQUARE, REMOVED OLD BONE PROTRUDING FROM CROP
SSHA	105378103	HY	F	10/08/90	NN	SC	MARKED R 6 POINT, BAND USED OUT OF SEQUENCE
SSHA	105378104	HY	F	10/08/90	NN	SC	MARKED R 6 POINT, BAND USED OUT OF SEQUENCE
SSHA	105378105	HY	F	10/08/90	NN	SC	MARKED R 6 POINT
SSHA	105378106	HY	F	10/08/90	NN	SC	MARKED R 6 POINT
SSHA	116335255	HY	F	10/08/90	S	FO	MARKED R 6 POINT
SSHA	116335256	HY	F	10/08/90	S	FO	MARKED R 6 POINT
SSHA	116335257	HY	F	10/08/90	S	FO	MARKED R 6 POINT
SSHA	116335258	HY	F	10/08/90	S	FO	MARKED R 6 POINT
SSHA	143349015	HY	F	10/08/90	N	OR	MARKED
SSHA	143349016	HY	F	10/08/90	N	OR	MARKED
SSHA	143349017	HY	F	10/08/90	N	OR	MARKED
SSHA	143349018	HY	F	10/08/90	N	OR	MARKED
SSHA	143349019	HY	F	10/08/90	N	OR	MARKED
SSHA	103369038	HY	F	10/09/90	E	BO	MARKED L 6 POINT
SSHA	105378108	HY	F	10/09/90	NN	SC	MARKED L 6 POINT
SSHA	105378109	HY	F	10/09/90	NN	SC	MARKED L 6 POINT
SSHA	105378110	HY	F	10/09/90	NN	SC	MARKED L 6 POINT
SSHA	105378113	HY	F	10/09/90	NN	SC	MARKED L 6 POINT
SSHA	105378114	HY	F	10/09/90	NN	SC	MARKED L 6 POINT

TAIL MOUNTED MARKERS APPLIED BY
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AUTUMN 1990

SPECIES	BAND #	AGE	SEX	DATE	STA.	BNDR	REMARKS
SSHA	116335259	HY	F	10/09/90	S	FO	MARKED L 6 POINT
SSHA	116335260	HY	F	10/09/90	S	FO	MARKED L 6 POINT
SSHA	116335261	HY	F	10/09/90	S	FO	MARKED L 6 POINT
SSHA	143349020	HY	F	10/09/90	N	OR	MARKED
SSHA	143349021	HY	F	10/09/90	N	OR	MARKED L 6 POINT
SSHA	87236784	HY	M	10/10/90	HV	SW	MARKED L 6 POINT
SSHA	87236785	HY	M	10/10/90	HV	SW	MARKED L 6 POINT
SSHA	103396039	HY	F	10/10/90	E	BO	MARKED L 1 SQUARE
SSHA	105378115	HY	F	10/10/90	NN	SC	MARKED L 1 SQUARE
SSHA	105378116	HY	F	10/10/90	NN	SC	MARKED L 1 SQUARE
SSHA	105378117	HY	F	10/10/90	NN	SC	MARKED L 1 SQUARE
SSHA	105378118	HY	F	10/10/90	NN	SC	MARKED L 1 SQUARE
SSHA	116335263	HY	F	10/10/90	S	FO	MARKED L 1 SQUARE
SSHA	116335264	HY	F	10/10/90	S	FO	MARKED L 1 SQUARE
SSHA	116335265	HY	F	10/10/90	S	FO	MARKED L 1 SQUARE
SSHA	116335266	HY	F	10/10/90	S	FO	MARKED L 1 SQUARE
SSHA	132349320	HY	F	10/10/90	N	OR	MARKED L 1 SQUARE
SSHA	143349022	HY	F	10/10/90	N	OR	MARKED
SSHA	143349023	HY	F	10/10/90	N	OR	MARKED
SSHA	143349024	HY	F	10/10/90	N	OR	MARKED
SSHA	143349025	HY	F	10/10/90	N	OR	MARKED
SSHA	143349026	HY	F	10/10/90	N	OR	MARKED
SSHA	144358310	HY	F	10/10/90	HV	SW	MARKED L 6 POINT
SSHA	144358311	HY	F	10/10/90	HV	SC	MARKED L 1 SQUARE
RTHA	138736910	HY	U	09/08/90	E	BO	RETRAPPED NN STA 1040 11/09/90, WGT 970, MARKED L 1 POINT

TAIL MOUNTED MARKERS APPLIED BY
CAPE MAY RAPTOR BANDING PROJECT
AUTUMN 1990

SPECIES	BAND #	AGE	SEX	DATE	STA.	BNDR	REMARKS
RTHA	87724035	HY	U	11/08/90	HV	CE	MARKED L 6 SQUARE
RTHA	87724036	HY	U	11/08/90	HV	CE	MARKED L 6 SQUARE
RTHA	87724037	HY	U	11/08/90	HV	CE	MARKED L 6 SQUARE
RTHA	87724038	HY	U	11/08/90	HV	CE	MARKED L 6 SQUARE
RTHA	87724039	HY	U	11/08/90	HV	CE	MARKED L 6 SQUARE
RTHA	87724040	HY	U	11/08/90	HV	CE	MARKED L 6 SQUARE
RTHA	87724041	HY	U	11/08/90	HV	CE	MARKED L 6 SQUARE
RTHA	87724042	HY	U	11/08/90	HV	CE	MARKED L 6 SQUARE
RTHA	87724043	HY	U	11/08/90	HV	CE	MARKED L 6 SQUARE
RTHA	98779104	HY	U	11/08/90	HV	CE	MARKED L 6 SQUARE
RTHA	98779105	HY	U	11/08/90	HV	CE	MARKED L 6 SQUARE
RTHA	98779106	HY	U	11/08/90	HV	CE	MARKED L 6 SQUARE
RTHA	98797374	HY	U	11/08/90	NN	SC	MARKED L 6 SQUARE
RTHA	98797375	HY	U	11/08/90	NN	SC	MARKED L 6 SQUARE
RTHA	98797376	HY	U	11/08/90	NN	SC	MARKED L 6 SQUARE
RTHA	98797377	HY	U	11/08/90	NN	SC	MARKED L 6 SQUARE
RTHA	120738662	HY	U	11/08/90	NN	SC	MARKED L 6 SQUARE
RTHA	120738663	HY	U	11/08/90	NN	SC	MARKED L 6 SQUARE
RTHA	120755003	HY	U	11/08/90	HV	CE	MARKED L 6 SQUARE
RTHA	138747645	HY	U	11/08/90	NN	SC	MARKED L 6 SQUARE, RETRAPPED HV STA 0947 TODAY
RTHA	138747646	HY	U	11/08/90	NN	SC	MARKED L 6 SQUARE, R P 8 B 1/8
RTHA	138747648	HY	U	11/08/90	NN	SC	MARKED L 6 SQUARE
RTHA	138747649	HY	U	11/08/90	NN	SC	MARKED L 6 SQUARE

TAIL MOUNTED MARKERS APPLIED BY
CAPE MAY RAPTOR BANDING PROJECT
AUTUMN 1990

SPECIES	BAND #	AGE	SEX	DATE	STA.	BNDR	REMARKS
RTHA	138747650	HY	U	11/08/90	NN	SC	MARKED L 6 SQUARE
RTHA	138747651	HY	U	11/08/90	NN	SC	MARKED L 6 SQUARE
RTHA	138747652	HY	U	11/08/90	NN	SC	MARKED L 6 SQUARE
RTHA	138754009	HY	U	11/08/90	N	BO	MARKED L 1 SQUARE, ACCIDENTALLY, SHOULD HAVE BEEN L 6 SQUARE
RTHA	138754010	HY	U	11/08/90	N	BO	MARKED L 6 SQUARE
RTHA	138754011	AHY	U	11/08/90	N	SC	MARKED L 6 SQUARE, MARKED BY MISTAKE
RTHA	138754012	HY	U	11/08/90	N	BO	MARKED L 6 SQUARE
RTHA	138754013	HY	U	11/08/90	N	BO	MARKED L 6 SQUARE
RTHA	138754014	HY	U	11/08/90	N	BO	MARKED L 6 SQUARE
RTHA	138754015	HY	U	11/08/90	N	BO	MARKED L 6 SQUARE
RTHA	138754016	HY	U	11/08/90	N	BO	MARKED L 6 SQUARE
RTHA	138754017	HY	U	11/08/90	N	BO	MARKED L 6 SQUARE
RTHA	138754018	HY	U	11/08/90	N	BO	MARKED L 6 SQUARE
RTHA	138754019	HY	U	11/08/90	N	BO	MARKED L 6 SQUARE
RTHA	138754020	HY	U	11/08/90	N	BO	MARKED L 6 SQUARE
RTHA	87724044	HY	U	11/09/90	HV	CE	MARKED L 1 POINT
RTHA	98797378	HY	U	11/09/90	NN	SC	MARKED L 1 POINT
RTHA	138747653	HY	U	11/09/90	NN	SC	MARKED L 1 POINT
RTHA	87724045	HY	U	11/11/90	HV	CE	MARKED R 6 SQUARE
RTHA	87724046	HY	U	11/12/90	HV	CE	MARKED R 6 POINT
RTHA	98797379	HY	U	11/12/90	NN	SC	MARKED R 6 POINT, TAIL VERY RUFOUS
RTHA	98797380	HY	U	11/12/90	NN	SC	MARKED R 6 POINT
RTHA	120738664	HY	U	11/12/90	NN	SC	MARKED R 6 POINT

TAIL MOUNTED MARKERS APPLIED BY
CAPE MAY RAPTOR BANDING PROJECT
AUTUMN 1990

SPECIES	BAND #	AGE	SEX	DATE	STA.	BAND	REMARKS
RTHA	120755004	HY	U	11/12/90	HV	CE	MARKED R 6 POINT
RTHA	138747655	HY	U	11/12/90	NN	SC	MARKED R 6 POINT
RTHA	138747656	HY	U	11/12/90	NN	SC	MARKED R 6 POINT
RTHA	138747657	HY	U	11/12/90	NN	SC	MARKED R 6 POINT
RTHA	138747658	HY	U	11/12/90	NN	SC	MARKED R 6 POINT
RTHA	138754021	HY	U	11/12/90	N	BO	MARKED R 6 POINT
RTHA	87724047	HY	U	11/13/90	HV	CE	MARKED L 6 POINT
RTHA	98753826	HY	U	11/13/90	N	BO	MARKED L 6 POINT
RTHA	98779107	HY	U	11/13/90	HV	CE	MARKED L 6 POINT
RTHA	98779108	HY	U	11/13/90	HV	CE	MARKED L 6 POINT
RTHA	98797381	HY	U	11/13/90	NN	SC	MARKED L 6 POINT
RTHA	98797383	HY	U	11/13/90	NN	SC	MARKED L 6 POINT
RTHA	120738665	HY	U	11/13/90	NN	SC	MARKED L 6 POINT
RTHA	138747659	HY	U	11/13/90	NN	SC	MARKED L 6 POINT, RETRAPPED N STA 1110 TODAY
RTHA	138747660	HY	U	11/13/90	NN	SC	MARKED L 6 POINT
RTHA	138747662	HY	U	11/13/90	NN	SC	MARKED L 6 POINT
RTHA	138747663	HY	U	11/13/90	NN	SC	MARKED L 6 POINT
RTHA	138747664	HY	U	11/13/90	NN	SC	MARKED L 6 POINT
RTHA	138747665	HY	U	11/13/90	NN	SC	MARKED L 6 POINT
RTHA	138747666	HY	U	11/13/90	NN	SC	MARKED L 6 POINT
RTHA	138754022	HY	♂	11/13/90	N	BO	MARKED L 6 POINT, RETRAPPED NN STA 0940 TODAY
RTHA	138754024	HY	U	11/13/90	N	BO	MARKED L 6 POINT
RTHA	138754025	HY	U	11/13/90	N	BO	MARKED L 6 POINT

TAIL MOUNTED MARKERS APPLIED BY
CAPE MAY RAPTOR BANDING PROJECT
AUTUMN 1990

SPECIES	BAND #	AGE	SEX	DATE	STA.	BNDR	REMARKS
RTHA	87724048	HY	U	11/14/90	HV	CE	MARKED L 1 SQUARE
RTHA	87724049	HY	U	11/14/90	HV	CE	MARKED L 1 SQUARE
RTHA	87724050	HY	U	11/14/90	HV	CE	MARKED L 1 SQUARE
RTHA	98753827	HY	U	11/14/90	N	BO	MARKED L 1 SQUARE
RTHA	98753829	HY	U	11/14/90	N	BO	MARKED L 1 SQUARE
RTHA	98753830	HY	U	11/14/90	N	BO	MARKED L 1 SQUARE
RTHA	98753831	HY	U	11/14/90	N	BO	MARKED L 1 SQUARE
RTHA	98753832	HY	U	11/14/90	N	BO	MARKED L 1 SQUARE
RTHA	98797384	HY	U	11/14/90	NN	SC	MARKED L 1 SQUARE
RTHA	120738666	HY	U	11/14/90	NN	SC	MARKED L 1 SQUARE
RTHA	120755005	HY	U	11/14/90	HV	CE	MARKED L 1 SQUARE
RTHA	120756002	HY	U	11/14/90	N	BO	MARKED L 1 SQUARE
RTHA	120756003	HY	U	11/14/90	N	BO	MARKED L 1 SQUARE, RETRAPPED HV STA 1140 TODAY
RTHA	138747667	HY	U	11/14/90	NN	SC	MARKED L 1 SQUARE, L 2 & R 1,2 T B 1/4
RTHA	138747668	HY	U	11/14/90	NN	SC	MARKED L 1 SQUARE
RTHA	138747669	HY	U	11/14/90	NN	SC	MARKED L 1 SQUARE
RTHA	138747670	HY	U	11/14/90	NN	SC	MARKED L 1 SQUARE
RTHA	138747671	HY	U	11/14/90	NN	SC	MARKED L 1 SQUARE
RTHA	138747672	HY	U	11/14/90	NN	SC	MARKED L 1 SQUARE
RTHA	138747673	HY	U	11/14/90	NN	SC	MARKED L 1 SQUARE
RTHA	138747674	HY	U	11/14/90	NN	SC	MARKED L 1 SQUARE
RTHA	138747675	HY	U	11/14/90	NN	SC	MARKED L 1 SQUARE
RTHA	138747676	HY	U	11/14/90	NN	SC	MARKED L 1 SQUARE, L 2 T B 1/4

TAIL MOUNTED MARKERS APPLIED BY
CAPE MAY RAPTOR BANDING PROJECT
AUTUMN 1990

SPECIES	BAND #	AGE	SEX	DATE	STA.	BNDR	REMARKS
RTHA	138747701	HY	U	11/14/90	HV	CE	MARKED L 6 SQUARE, BEGINNING OF STRING GIVEN TO LAURIE CLEARY
RTHA	138747703	HY	U	11/14/90	HV	CE	MARKED L 1 SQUARE, END OF STRING GIVEN TO LAURIE CLEARY
RTHA	138754026	HY	U	11/14/90	N	BO	MARKED L 1 SQUARE
RTHA	138754027	HY	U	11/14/90	N	BO	MARKED L 1 SQUARE
RTHA	138754030	HY	U	11/14/90	N	BO	MARKED L 1 SQUARE
RTHA	138754031	HY	U	11/14/90	N	BO	MARKED L 1 SQUARE
RTHA	138754032	HY	U	11/14/90	N	BO	MARKED L 1 SQUARE
RTHA	138754033	HY	U	11/14/90	N	BO	MARKED L 1 SQUARE
RTHA	138754034	HY	U	11/14/90	N	BO	MARKED L 1 SQUARE
RTHA	1387540 ² 38	HY	U	11/14/90	N	BO	MARKED L 1 SQUARE
RTHA	1387540 ² 39	HY	U	11/14/90	N	BO	MARKED L 1 SQUARE
AMKE	136342497	HY	F	10/01/90	S	EN	MARKED R 6 SQUARE
AMKE	137388501	HY	F	10/01/90	N	OT	MARKED R 6 POINT
AMKE	144334299	HY	F	10/01/90	N	OT	MARKED R 6 SQUARE
AMKE	144334300	HY	F	10/01/90	N	OT	MARKED R 6 SQUARE
AMKE	149331683	U	F	10/01/90	NN	SC	SUB > 2, MARKED R 6 SQUARE
AMKE	149392704	HY	F	10/01/90	E	BO	MARKED R 6 SQUARE
AMKE	149392714	HY	F	10/01/90	E	BO	MARKED R 6 SQUARE
AMKE	136342499	HY	F	10/02/90	S	EN	MARKED R 6 POINT
AMKE	137388502	HY	F	10/02/90	N	OT	MARKED R 6 POINT
AMKE	137388503	HY	F	10/02/90	N	OT	MARKED R 6 POINT
AMKE	137388504	HY	F	10/02/90	N	OT	MARKED R 6 POINT
AMKE	137388505	HY	F	10/02/90	N	OT	MARKED R 6 POINT

TAIL MOUNTED MARKERS APPLIED BY
CAPE MAY RAPTOR BANDING PROJECT
AUTUMN 1990

SPECIES	BAND #	AGE	SEX	DATE	STA.	BNDR	REMARKS
AMKE	137388507	HY	F	10/02/90	N	OT	MARKED R 6 POINT
AMKE	137388509	HY	F	10/02/90	N	OT	MARKED R 6 POINT
AMKE	137388510	HY	F	10/02/90	N	OT	MARKED R 6 POINT
AMKE	137388511	HY	F	10/02/90	N	OT	MARKED R 6 POINT
AMKE	144334305	HY	F	10/02/90	S	EN	MARKED R 6 POINT
AMKE	144334306	HY	F	10/02/90	S	EN	MARKED R 6 POINT
AMKE	144334307	HY	F	10/02/90	S	EN	MARKED R 6 POINT
AMKE	149331402	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
AMKE	149331694	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
AMKE	149331696	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
AMKE	149331699	HY	F	10/02/90	NN	SC	MARKED R 6 POINT
AMKE	149392723	HY	F	10/02/90	E	BO	MARKED R 6 POINT
AMKE	149392724	HY	F	10/02/90	E	BO	MARKED R 6 POINT
AMKE	149392727	HY	F	10/02/90	E	BO	MARKED R 6 POINT
AMKE	149392728	HY	F	10/02/90	E	BO	MARKED R 6 POINT
AMKE	149392732	HY	F	10/02/90	E	BO	MARKED R 6 POINT
AMKE	149331404	HY	F	10/03/90	NN	SC	MARKED L 6 POINT
AMKE	144334308	HY	F	10/05/90	N	EN	MARKED L 6 SQUARE
AMKE	144334309	HY	F	10/05/90	N	EN	MARKED L 6 SQUARE
AMKE	149331406	HY	F	10/05/90	NN	SC	MARKED L 6 SQUARE
AMKE	149392737	HY	F	10/05/90	E	BO	MARKED R 6 SQUARE
AMKE	149392738	HY	F	10/05/90	E	BO	MARKED L 6 SQUARE
AMKE	149392739	HY	F	10/05/90	E	BO	MARKED L 6 SQUARE
AMKE	149331408	HY	F	10/06/90	NN	SC	MARKED L 1 POINT
AMKE	149392742	HY	F	10/06/90	E	BO	MARKED L 1 POINT

