

Conservation of Migrating Raptors through Banding; results of over 30 years of the Cape May Raptor Banding Project

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ABSTRACT

Almost 100,000 migrating diurnal raptors have been captured and banded at Cape May, New Jersey since 1967; fewer than 200 of them had been banded previously. Almost 1550 of the banded raptors have been encountered later elsewhere during every month of the year. Maps of selected species will show winter and summer ranges and migratory pathways. Over 90% captured were juveniles. Sex ratios were different from 50:50; more males in some species, more females in others. Most captured raptors were in excellent condition, only a few showed injuries or abnormalities. Banding results followed trends of the annual raptor count at Cape May. Banding and count results were able to predict seasonal trends for Northern Harrier. Declines in captures during the late 1980's of Sharp-shinned Hawks and in recent years of American Kestrels suggest some reproductive failure in eastern Canada and northeastern USA. On the other hand, increases in captures of Cooper's Hawk from the same area indicate a gradual population increase over the past 30 years. Swainson's Hawks are a regular visitor. A vagrant Common Kestrel captured most likely rode a ship from Europe. Banded raptors were shown to tens of thousands of people and released after an educational message to the spectators.

INTRODUCTION

Placing numbered or lettered bands on birds legs, called 'banding' in North America and Australia and 'ringing' elsewhere, is one method used to study raptor migration, as the banded birds can be encountered elsewhere at any time during the year: either on migration or on breeding or wintering grounds. These areas can be determined if enough recoveries of bands are made. In addition, the bird in hand can also provide much useful information, such as age, sex, measurement data, blood sample, plumage details, parasites, moult, etc.

There are over 20 banding stations in North America that specialize in raptors. The Cape May Raptor Banding Project has been in operation for 32 years and has banded more raptors than any of

the others, almost 100,000 (Table 1). From these has come information on almost 1550 recoveries (Table 2), many of which were recovered alive and released and some of which have been encountered more than once. However, few have returned to be captured again at Cape May and few have already been banded, as over 90% of the raptors captured are juveniles, less than 6 months of age. For over the past 25 years, a few raptors were taken on weekends to the local State Park and shown to the public while presenting a raptor conservation message and then released. More than 30,000 people have seen this.

Table 1. Total raptors captured at Cape May by species.

<i>Species</i>	<i>No. caught</i>
Osprey <i>Pandion haliaetus</i>	17
Bald Eagle <i>Haliaeetus leucocephalus</i>	4
No. Harrier <i>Circus cyaneus</i>	2440
Sharp-shinned Hawk <i>Accipiter striatus</i>	57089
Cooper's Hawk <i>A. cooperi</i>	9253
No. Goshawk <i>A. gentilis</i>	262
Red-tailed Hawk <i>Buteo jamaicensis</i>	4923
Red-shouldered Hawk <i>B. lineatus</i>	259
Broad-winged Hawk <i>B. platypterus</i>	283
Rough-legged Hawk <i>B. lagopus</i>	7
Swainson's Hawk <i>B. swainsonii</i>	15
Golden Eagle <i>Aquila chrysaetos</i>	15
Peregrine <i>Falco peregrinus</i>	1026
Merlin <i>F. columbarius</i>	6236
Am. Kestrel <i>F. sparverius</i>	15990
Com. Kestrel <i>F. tinnunculus</i>	1
TOTAL	97820

Table 2. Recoveries from Cape May banded raptors.

<i>Species</i>	<i>No.</i>
Sharp-shinned Hawk <i>Accipiter striatus</i>	705
Cooper's Hawk <i>A. cooperi</i>	216
American Kestrel <i>F. sparverius</i>	207
Red-tailed Hawk <i>Buteo jamaicensis</i>	174
Merlin <i>F. columbarius</i>	109
Peregrine <i>Falco peregrinus</i>	91
Six other species	40
TOTAL	1542

METHODS AND MATERIALS

A raptor banding project has been operated at Cape May Point, New Jersey in the United States every autumn from 1967 until the present. Clark (1970, 1976, 1981) described the capture devices and procedures used to capture the migrant raptors. Raptors were aged and sexed and most had measurements of wing chord and weight recorded. Blood samples and colour tags were placed on some raptors in some years.

Banding and recovery information were input to two DBASE IV files. The geographic information

system (GIS) program ARCVIEW was used to generate maps of recovery locations for Sharp-shinned and Cooper's Hawks by season, sex, and species.

Researchers not directly associated with the banding projects were invited to sample the migrant raptors as part of their research.

Twice every weekend in the autumn for six or seven weeks, one of the project's banders or helpers gathered from one to seven raptors from the banding stations and took them to the Cape May Point State Park. Here he or she exhibited each of the raptors for a short period while talking to the observers about raptor conservation. The raptors were released in front of the spectators. From four to eight private presentations were made every year as well.

RESULTS

Almost 100,000 raptors of 15 species have been captured (Table 1). Only 211 of these were previously banded. A total of 1452 recoveries, both live and dead, of the banded raptors were reported to the Bird Banding Lab (Table 2). Fewer than 20 raptors were recaptured at Cape May in subsequent years.

Maps of recoveries for Sharp-shinned Hawk and Cooper's Hawk show that the wintering area is mainly in the southeastern United States on the coastal plain (Figs. 1-7). Migration is primarily on the Atlantic coastal plain but is farther west in the spring compared to the autumn. Female Cooper's Hawks tended to winter farther south compared to males. The summer range and presumed breeding area for these species is north and east of Cape May.

Sex ratios were different from the expected 50-50 in most species (Table 3).

Table 3. Percent female of Cape May captured raptors by species.

<i>Species</i>	<i>Banding</i>	<i>Recovery</i>
No. Harrier <i>Circus cyaneus</i>	37	61
Cooper's A. <i>cooperi</i>	38	51
Kestrel <i>F. sparverius</i>	54	45
Merlin <i>F. columbarius</i>	55	64
Peregrine <i>Falco peregrinus</i>	60	69
Sharp-shin <i>A. striatus</i>	60	76

Results for individual species have been published for Peregrines (Henny & Clark 1982), Northern Harriers (Bildstein *et al.* 1984), Merlins (Clark 1985), and Sharp-shinned Hawks (Clark (1986).

Schultz (1996) showed that counts and numbers captured of Northern Harriers show a significant positive correlation with breeding bird surveys in New York State and that counts and capture numbers are strongly correlated.

Both count and banding results showed a steep decline in numbers of Sharp-shinned Hawks from the mid-1980's into the early 1990's; since that time their numbers have been somewhat steady. Kerlinger (1993) suggested that this drop was due to a population decline in the New England and far eastern Canada, as banding stations and counts farther west did not record this decline. However, Viverette *et al.* (1996) suggested that the decline was due to many more Sharp-shinned Hawks stopping their migration north of Cape May, as supported by the annual Christmas Count data. Presumably they did so because of the increase in the use of backyard bird feeders, providing a winter food source.

Kirkpatrick and Lauer (1985) found that almost 60% of 259 raptors of 12 species examined were infected with protozoan parasites. Kirkpatrick and Trexler-Myren (1986) found *Salmonella* in cloacal samples from two juvenile Red-tailed Hawks but not in 103 individuals of 6 other species examined.

A juvenile female Common Kestrel was captured in 1972 (Clark 1974a), for the second North

Figure 1. Recoveries of Cape May banded female Sharp-shinned Hawks during autumn and spring migration.

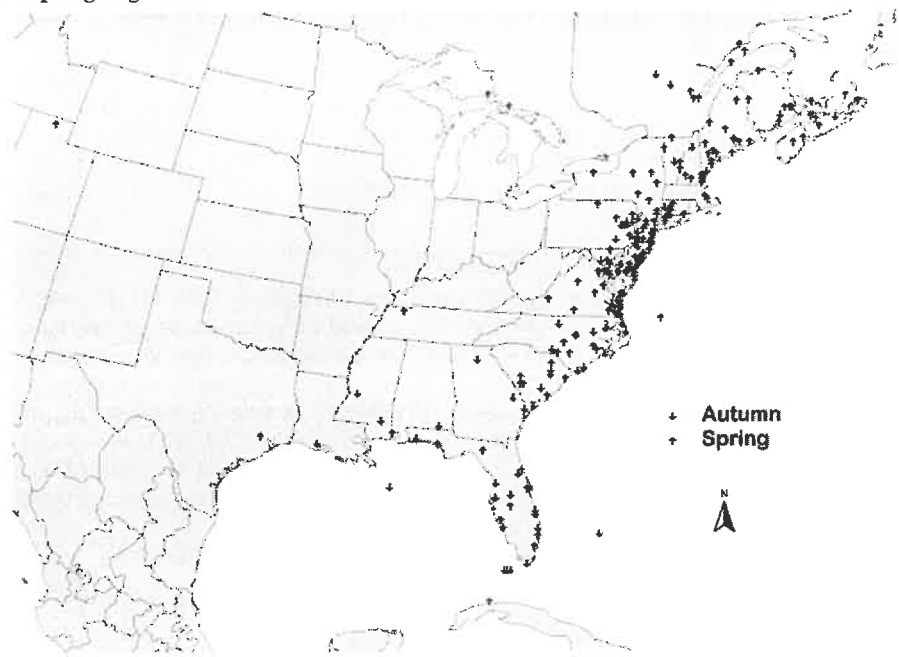


Figure 2. Recoveries of Cape May banded male Sharp-shinned Hawks during autumn and spring migration.

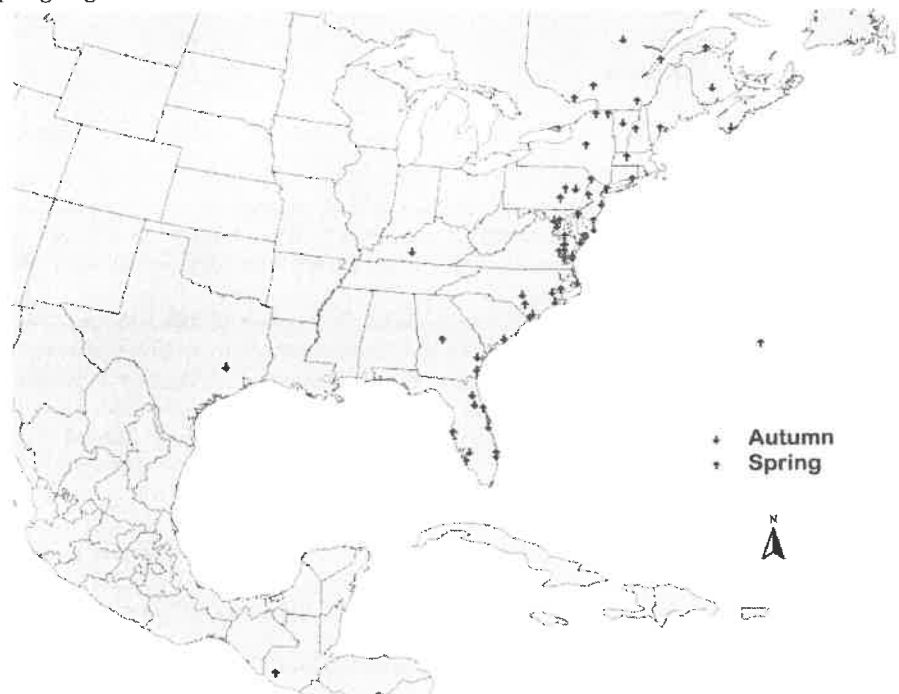


Figure 3. Recoveries of Cape May banded female Sharp-shinned Hawks during winter.

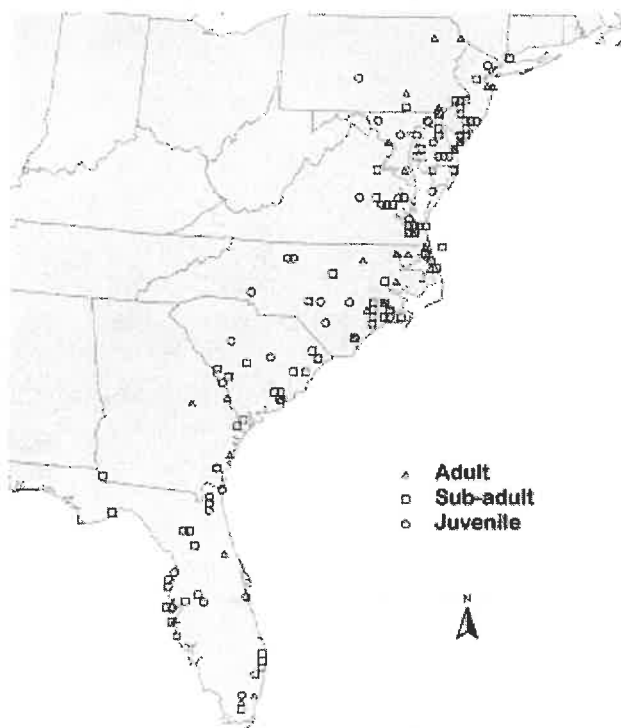


Figure 4. Recoveries of Cape May banded male Sharp-shinned Hawks during winter.

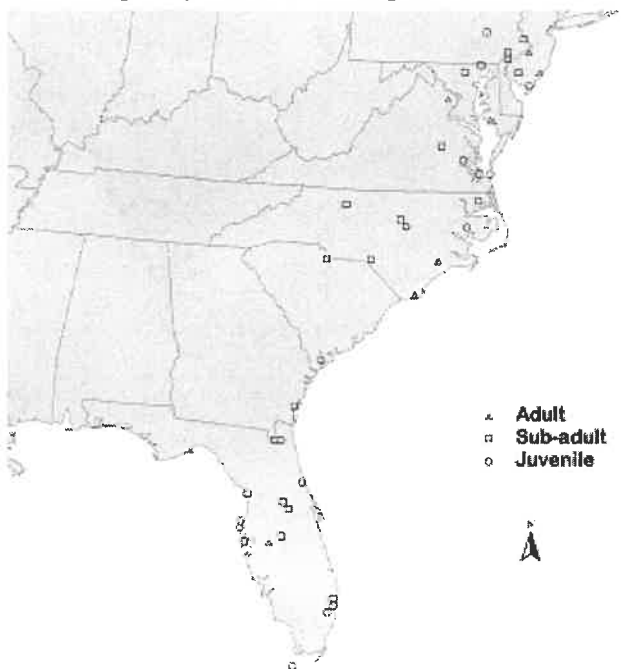


Figure 5. Recoveries of Cape May banded Sharp-shinned Hawks during summer.



Figure 6. Recoveries of Cape May banded female Cooper's Hawks.

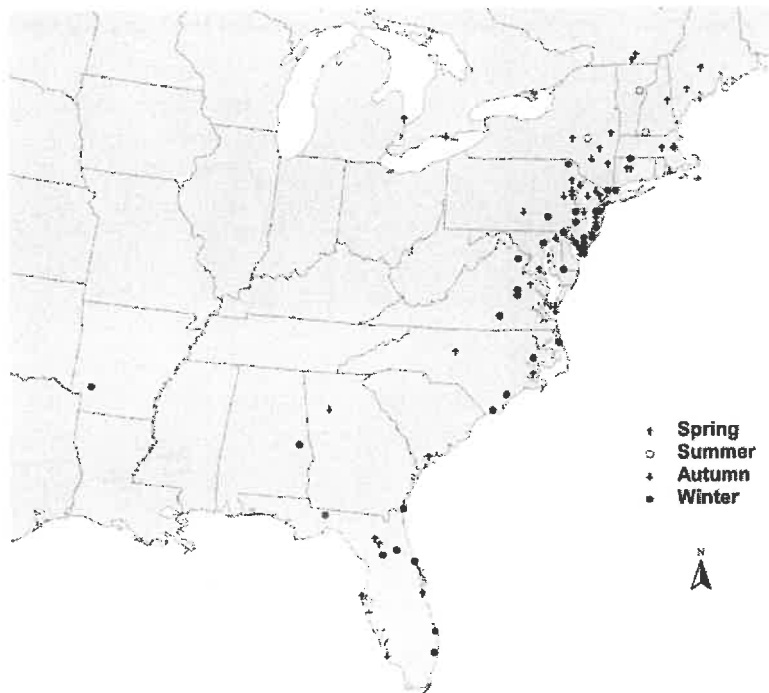
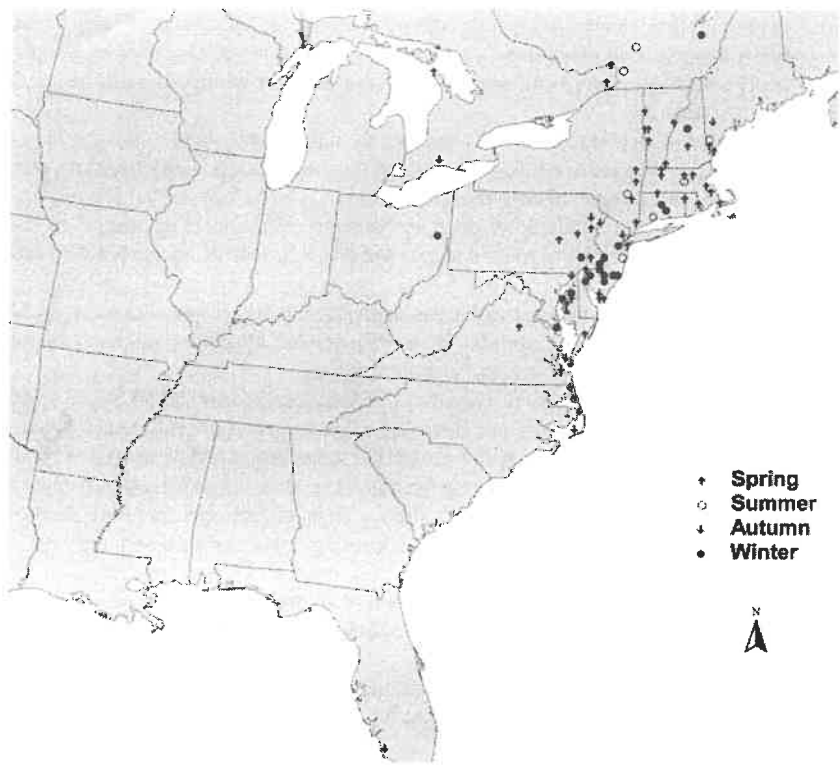


Figure 7. Recoveries of Cape May banded male Cooper's Hawks.



Swainson' Hawks, which breed in western North America, have been captured regularly since the first was caught in 1973 (Clark 1974b), for a total of 15. One banded in October of 1988 was found dead in New Brunswick in May of 1989, northeast of the banding location.

Over 30,000 people have witnessed the showing of banded raptors and received a raptor conservation message over the past 25 years, or about 1300 every year. We estimate an average attendance of 100 people at every public showing and around 15 for each private showing.

Table 4. Recovery rates of Cape May banded raptors by species.

Species	Recovery rate
No. Harrier <i>Circus cyaneus</i>	0.7 %
Sharp-shinned Hawk <i>A. striatus</i>	1.3
Cooper's Hawk <i>A. cooperi</i>	2.6
Red-tailed Hawk <i>Buteo jamaicensis</i>	2.5
Broad-winged Hawk <i>B. platypterus</i>	5.7
Peregrine <i>F. peregrinus</i>	9.0
Merlin <i>F. columbarius</i>	1.8
Am. Kestrel <i>F. sparverius</i>	0.6
OVERALL	1.6%

DISCUSSION

Banding (ringing) numbers of raptors at migration concentration areas can provide much information useful for their conservation, such as their condition, age and sex ratios, and, in particular, their migration pathways, wintering areas, and summer breeding areas. However, to get sufficient recoveries for the seasonal areas to be determined, large numbers of raptors must be banded, as recovery rates are rather low.

If a raptor count is also conducted in that area, then the data are even better, as it has been shown that counts and banding data are correlated. Counts and banding data can yield long-term trend data if they are conducted in the same manner annually.

Making captured raptors available to other researchers facilitates their studies as they can concentrate on taking their samples or measurements and do not have to be concerned with capturing a large enough sample size.

Age ratios from banding can be important in evaluating the banding results. For example, because over 90% of the raptors captured at Cape May Point are juveniles, annual variations in numbers are reflective of breeding success rather than population changes.

Sex ratios are interesting, particularly when they differ noticeably from 50:50, as is the case with many species in our data. Possible causes are differential migratory pathways, differential survivability, and capture bias. Further discussion of this is outside the scope of this article but will be addressed in later publications. However, we feel that capture bias alone does not explain our results.

Our showing of banded raptors to the public, although a secondary objective for the project, has allowed us to reach tens of thousands of people with a strong raptor conservation message.

Our future plans include concentration on capturing more of the species that occur in lower numbers to get more recoveries, to continue to make raptors available to other researchers, and to put a few satellite transmitters on species that occur in low numbers, e.g. Swainson's Hawk, to learn their wintering and breeding areas.

In summary, raptor banding stations can provide important conservation information, especially the migration pathways and wintering and breeding areas, but also to gather information from the individual migrants.

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