immigrant now that "war has been declared." Brian Sharp indicated that no formal decision had been made by the BBL, but no doubt a statement would be sent to banders, in the near future. At present, it is felt that banders should hold the birds so as to prevent their further spread and breeding. Then contact your state wildlife agency if you don't desire to keep them as pets.

This pretty bird is clearly in a dichotomous situation, with more strikes against him than for him. Bump (1971) states that "This is clearly a situation where the bird lover or pet fancier must forego the pleasure of keeping or observing in the countryside this interesting parakeet lest it become another expensive pest."

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A STUDY OF WINTERING BROAD-WINGED HAWKS IN SOUTHEASTERN FLORIDA 1968-1973

Eric Creighton Tabb

This paper presents results of a study of wintering Broad-winged Hawks (Buteo p. platypterus) which began in December, 1968 and is still in progress. During that period 135 Broad-winged Hawks were captured, weighed, measured, sexed and banded.

These observations were obtained as a part of a larger research program on South Florida raptorial birds which involves banding, habitat study, behavior observations, and food and feeding studies. The general study area is peninsular Florida south of Lake Okeechobee and the major effort has been devoted to wintering populations.

The research had hardly begun in the winter of 1968-69 before it became apparent that substantial numbers of Broad-winged Hawks wintered in Dade and Monroe counties between Miami and Key West. These offered an unusual opportunity to study a little-known species in the northern-most reach of its tropical winter range.

WINTER RANGE AND HABITAT

Our observations show that Broad-winged Hawks are largely limited to extreme southeastern Florida once the fall migration terminates in late November. Wintering individuals do not range much north of Miami nor west into the sawgrass and cypress of the Everglades (Figure 1). These observations are supported by a general lack of sightings by Audubon Christmas bird counts (Table 1). In the cases where single individuals have been reported outside the South Florida area they usually occur in habitat resembling the preferred forest habitat of the Florida Keys, a good deal of which is found along the Indian River of East-Central Florida and in the riverine forests along the lower West Florida coast.

Within the preferred wintering range Broad-winged Hawks may be found on all the larger Florida Keys to Key West and on

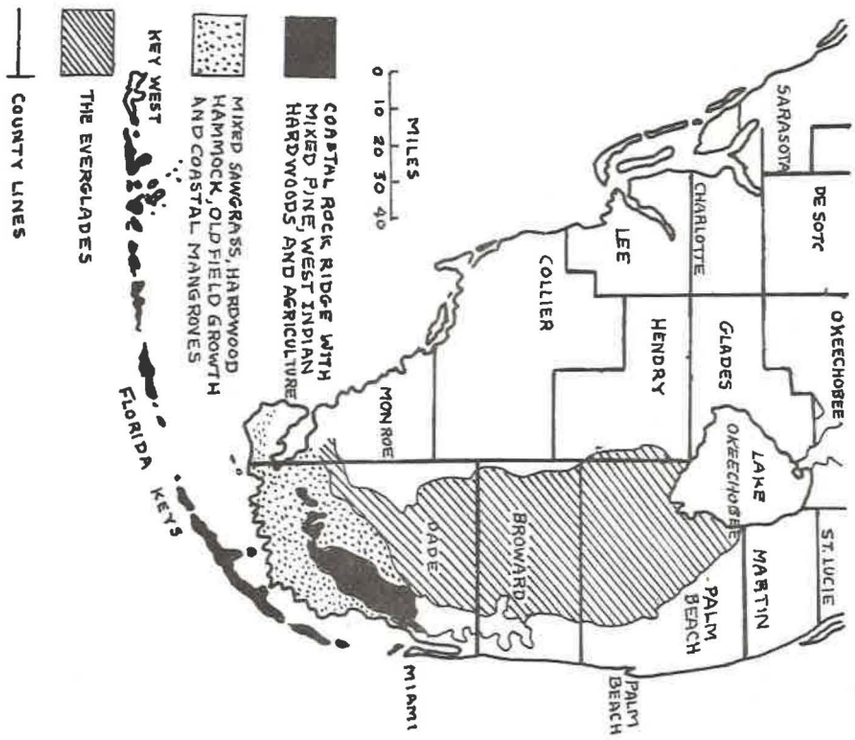


Figure 1: Map of Florida south of Lake Okeechobee showing location of wintering range.

Table 1: Places where Audubon Society Christmas Bird Counts have been made during the period 1960 and 1972 and indicating number of Broad-winged Hawks sighted each year. (data from Audubon Field Notes and personal records of Dr. William B. Robertson). NC indicates no counts made in the years indicated.

County or City	Center of count area	1971	70	69	68	67	66	65	64	63	62	61	60
Bay County	30°11'N - 85°40'W	0	1	1	0	0	0	0	NC	NC	NC	NC	NC
Bradenton	26°08'N - 81°35'W	0	0	0	1	1	0	1	0	NC	NC	NC	NC
Carnestown	25°53'N - 81°23'W	1	0	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Cocoa	28°21'N - 80°42'W	2	1	1	0	1	0	0	1	NC	NC	NC	NC
Coot Bay	25°08'N - 80°57'W	4	3	15	7	8	8	2	10	10	8	1	5
Dade County	25°50'N - 80°11'W	1	3	4	NC	NC	NC	NC	NC	NC	NC	NC	NC
Ft. Lauderdale	26°08'N - 80°13'W	0	2	0	0	1	2	1	0	NC	NC	NC	NC
Ft. Myers	26°32'N - 81°59'W	2	0	0	1	1	0	0	0	NC	NC	NC	NC
Ft. Pierce	27°26'N - 80°20'W	1	0	1	1	1	0	0	0	NC	NC	NC	NC
Gainesville	29°36'N - 82°19'W	0	0	0	0	0	0	0	0	NC	NC	NC	NC
Jacksonville	30°25'N - 81°30'W	0	1	0	0	0	1	0	0	NC	NC	NC	NC
Key Largo	25°00'N - 80°35'W	4	3	2	4	12	7	7	15	NC	NC	NC	NC
Key West						6	3	1	4	3	6	3	1
Kissimmee	28°13'N - 81°23'W	0	0	0	0	0	0	NC	NC	NC	NC	NC	NC
Lakeland	28°00'N - 81°52'W	0	0	0	0	0	0	NC	NC	NC	NC	NC	NC
Lake Wales	27°55'N - 81°31'W	0	0	0	NC	NC	NC	NC	NC	NC	NC	NC	NC
Lower Keys	24°40'N - 81°21'W	6	2	10	3	14	16	7	12	7	9	6	8
Marathon	24°44'N - 81°00'W	15	8	13	NC	27	18	30	7	8	6	8	12
Merritt Island	28°39'N - 80°42'W	1	0	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Mt. Dora	28°45'N - 81°37'W	0	0	0	0	0	0	0	0	NC	NC	NC	NC
Myakka River	27°14'N - 82°14'W	0	1	1	0	0	1	0	0	NC	NC	NC	NC
Naples	26°08'N - 81°47'W	0	0	0	1	0	0	0	0	NC	NC	NC	NC
New Port Ritchie	28°15'N - 82°42'W	0	0	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Orlando	28°32'N - 81°23'W	0	0	0	0	0	NC	NC	NC	NC	NC	NC	NC
Panacea	30°00'N - 84°22'W	0	0	0	0	0	0	0	0	NC	NC	NC	NC
Pensacola	30°26'N - 87°09'W	0	1	0	0	0	0	0	0	NC	NC	NC	NC
St Marks	30°08'N - 84°13'W	0	0	0	0	0	0	0	0	NC	NC	NC	NC

Table 1: (continued)

County or City	Center of Count Area	1971	70	69	68	67	66	65	64	63	62	61	60
St. Petersburg	27°47'N - 82°40'W	0	0	0	0	0	0	0	0	NC	NC	NC	NC
Sanford	28°48'N - 81°15'W	NC	0	0	NC	NC	NC	NC	NC	NC	NC	NC	NC
Sanibel-Captiva	26°28'N - 82°09'W	0	1	1	NC	0	0	0	0	NC	NC	NC	NC
Sarasota	27°18'N - 82°28'W	0	0	0	0	0	0	0	0	NC	NC	NC	NC
South Brevard Co.	27°53'N - 80°31'W	0	1	2	0	0	0	NC	NC	NC	NC	NC	NC
Stuart	27°11'N - 80°15'W	0	0	0	0	1	0	0	0	NC	NC	NC	NC
Vero Beach	27°41'N - 80°27'W	0	2	0	0	2	0	2	1	NC	NC	NC	NC
West Palm Beach	26°34'N - 80°06'W	0	1	1	0	0	0	NC	NC	NC	NC	NC	NC
Zephyrhills	28°15'N - 82°10'W	0	0	0	NC	NC	NC	NC	NC	NC	NC	NC	NC

the southern mainland as far west as Cape Sable, but are most common on Key Largo, Marathon and in mainland areas surrounding Homestead and Florida City. Within these boundaries they occupy a variety of sites, generally on higher elevations away from water. The preferred habitat appears to be the undisturbed West Indian hardwood hammocks still found in more-or-less natural state on the larger Florida Keys. Such areas are rapidly being removed by development but Broad-wings are also common in the extensive groves of mango and avocado trees in the farming area known as the Redlands north and west of the city of Homestead.

Where old fields have been abandoned by farmers and permitted to grow untended for 5 to 10 years, dense growths of guava, (Psidium guajava), and Brazilian holly, (Schinus terebinthifolius), up to 20 feet tall also become important habitat, providing cover and abundant rodent populations. All these areas have one thing in common, very dense cover adjacent to roads, field clearings and natural short grass "glades". Pine stands are seldom occupied by Broad-wings although other hawks use these more open forests extensively.

Although dense cover appears to be necessary Broad-wings are "edge feeders" coming to roadsides and clearings to hunt. Here they come into contact with man and become remarkably tame, showing almost no fear of auto and pedestrian traffic. Telephone poles, telephone cables and electric wires, and dead trees are favored hunting perches and, once a bird has become established for the winter it may be seen day after day at the same location. Generally their preferred feeding and sunning perches are low down and out of the wind. We have no evidence of wanton killing of these very tame hawks by humans. On the contrary, residents and winter visitors alike generally adopt a protective attitude and the bander must use caution to avoid giving the impression that the birds are being harmed in any way. In areas where Broad-wings hunt along heavily traveled highways such as U.S. 1 in the Florida Keys and Florida 27 north of the city of Homestead substantial numbers are killed each winter by fast-moving cars.

FALL MIGRATION AND WINTER ARRIVALS

Migrating Broad-wings can be observed in southeastern Florida anytime from the second week of September, through October and into November. Although the migrating flights are not as

spectacular as those seen in the northeastern U.S. or in Central America groups numbering into the "thousands" can be seen occasionally (Table 2) while smaller "kettles" are common. Passage of large concentrations of Broad-wings from the lower Keys southward over the open water of the Florida Straits is common but had not been generally recognized until recently (Robertson and Ogden, 1968). The offshore passage of Broad-wings appears, to us, to be associated with the passage of a cold front with winds out of the north during October and November each year.

TABLE 2

Records of Spring and Fall sightings of Broad-winged Hawks in Florida locations as indicated by Audubon Field Notes (1963-1972).

Location	Number of birds	Date
	Fall	
Sugarloaf Key	Hundreds	Oct. 6 and 7, 1972
Homestead	2	Sept. 11 1972
Plantation Key	300	Oct. 23 1970
Flamingo	60	Oct. 15 1970
Flamingo	15	Nov. 25 1970
Marquesas Keys	1	Oct. 13 1970
Dry Tortugas	2	Nov. 2 1970
Plantation Key	20	Sept. 28 1969
Key West	53	Oct. 6 1969
Key West	Many	Oct. 10 1969
Key West	200	Oct. 30 1969
Marathon		Sept. 14 1968
Key West		Sept. 24 1968
Royal Palm Hammock		Sept. 28 1968
Pine Island	11	Oct. 22 1968
Key West	Thousands	Oct. 11 1968
Key West	Thousands	Oct. 16 1968
Key West	Thousands	Oct. 20 1968
Long Key	"Great flocks"	Oct. 19 1968
Tallahassee	1	Oct. 29 1965
Key West	89	Oct. 10 1964
Miami	80	Oct. 16 1964
Marathon	50	Oct. 17 1964

Location	Number of birds	Date
	Spring	
Gainesville	2	May 1972
Dry Tortugas	1	May 19 1971
Merritt Island	Several	Apr. 6 1971
Gainesville	2	May 1971
Dry Tortugas	3	Apr. 15-20 1970
Tallahassee	1	Mar. 30 1969
Dry Tortugas	1	June 16-17 1969
Marathon	1	May 18 1968
Key Largo	1	Mar. 7 1967
Key Largo	1	Mar. 9 1967
Tallahassee	1	Mar. 21 1967
Royal Palm Hammock	1	May 5 1966
Dry Tortugas	1	May 17 1966
Miami	1	May 9 1965

That the open waters of the Straits of Florida is a partial barrier to southward movement of migrating Broad-wings is suggested by the presence of congregations of birds occasionally found roosting and hunting for a day or two on the mainland near Cape Sable or on the larger Florida Keys. We believe they are waiting for appropriate soaring and wind conditions. As such flocks begin their over-water flight they can be seen rising, by ones and twos from the hammock growth to begin a characteristic circular climbing flight. They climb to very great heights at such times, all the time accumulating more individuals into the characteristic "kettle" formation until some condition at such heights sends them south and out of sight over water. On normal southern Florida fall and winter days thermal updrafts begin to form by about 10:00 am. At such times single Broad-wings can be seen rising to begin low soaring flight. At these times there is no congregating, rather they join other soaring birds for periods of several hours of slow flight before returning to the ground for late afternoon feeding.

It is difficult to determine when migration ends and why some birds remain in South Florida the entire winter. However, by mid-December most of the individuals that will remain have established territories where they will tend to stay until some time in mid-March. Our latest spring record is of a single immature Broad-wing observed on April 12, 1973 near South Miami.

BANDING PROCEDURE

All hawks, including Broad-wings, banded by us were captured with Bal-chatri traps. Our trapping areas in southern Florida are thoroughly criss-crossed by roads so that few areas are more than a quarter mile from easy access by auto. The technique of trapping from cars, called "road running", is particularly effective because the hawks seldom show fear of slowly moving vehicles.

When a prospective hawk is sighted, the trap, baited with a live mouse, is placed on the grassy shoulder of the road keeping the slowly moving car between the trap and the bird. The car is then driven past the bird a few yards before stopping, the distance depending on the species involved. With Broad-wings it is necessary to drive only a few feet; usually the bird is on the trap within seconds after the car clears the line of vision between bird and mouse.

The response of Broad-wings to the trap is predictable. They stand erect, arch the neck, bob the head from side to side, and launch from their perch all in quick sequence. Typically the flight path to the trap is flat, with rapid initial wing beats followed by glide and very heavy impact. The body response described above may be preceded by defecation followed by a quick lateral flutter of the tail, an action most likely to be taken by a bird that has recently fed. Although Broad-wings are typically "dumpy" on the perch their attack is remarkably swift and direct so that they usually become entangled in the nooses on the trap at first impact. At impact, and before they realize they are snared, they mantle in a sitting position with the body erect, wings thrust forward over the mouse, and resting on the spread tail. They will often remain in this position for several minutes while they calmly survey their surroundings. If given sufficient time, they regain a standing position and begin to "foot" the mouse until they realize they are snared. Only then will they attempt to escape. Once on the trap in the mantling position they will permit quite close approach by car or pedestrian before attempting to fly.

Adult Broad-wings are always more deliberate in their response to the trap than juveniles, and thus more difficult to trap. Adults and juveniles alike are impossible to recapture

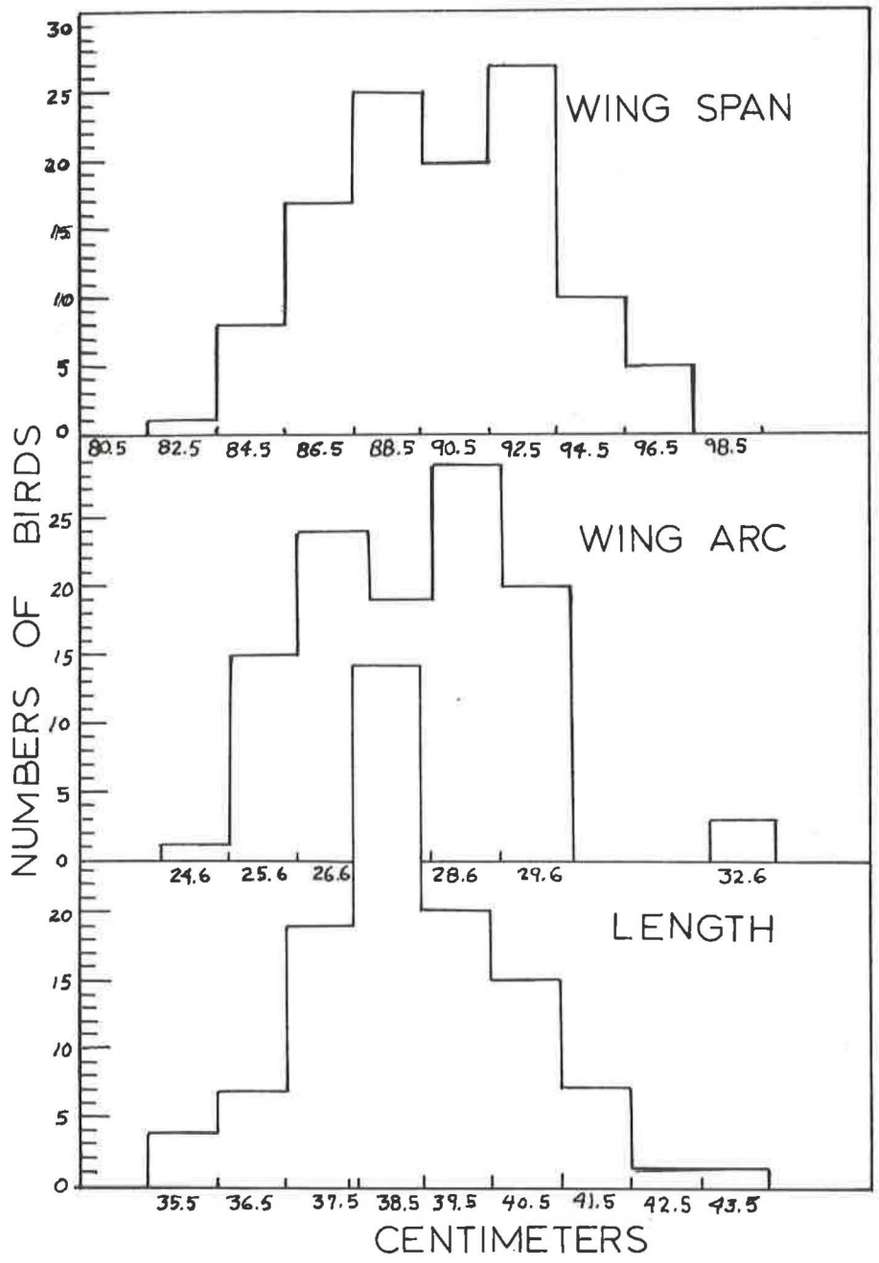
on a Bal-chatri trap, even after several years, indicating an extraordinary ability to learn from a single capture episode lasting at the most 5 minutes. Although made trap-wise by such capture they do not otherwise show increased fear of man. We have repeatedly returned to observe birds we banded and they permit approach by car to within a few yards, often allowing us to drive directly under their perch to examine the band at close range.

Once the bird has been freed from the nooses, it is banded with lock-on number 5 or 6 bands depending upon its size. The condition of the bird, its sex, age, weight, and measurements are quickly noted and the bird released. Occasionally deformities, healed wounds or parasites are observed and noted. Almost without exception banded Broad-wings return directly to the perch from whence they came to the trap. We have seen no evidence of shock due to capture and the band does not appear troublesome to the birds.

SEX DETERMINATION

One of the most difficult aspects of working with Broad-winged Hawks is to determine sex accurately. During the first 3 years of banding, sex was estimated on the basis of size. However, when any of the measurements used to indicate this parameter are plotted as frequency histograms one quickly learns that there is broad overlap of the modal groups assumed to be males and females (Figure 2).

With this in mind, and at the urging of the Bird Banding Laboratory to find a more reliable indication of sex, we turned to cloacal examination beginning in December, 1972 in an attempt to discover characters that would permit rapid and accurate sexing. We have concluded that there are visible differences in the cloacal structure which probably can be attributed to sex and that these are visible in juvenile as well as adult Broad-wings. Furthermore, these characters agree generally with the assumption that larger size is apt to be associated with females smaller size with males among buteos.



Manual eversion of the cloaca in those specimens regarded as females shows a simple tubular structure internally for about 1/4 inch. The exterior, unfeathered aspect of the cloacal sphincter is gray and radially striated. Specimens we now regard as males have the same external appearance of the sphincter but eversion shows a bi-lobed shiny hemisphere within the anterior arc of the cloacal circle. Among juveniles this may appear as a small, single, rounded papilla with a median crease while in SY and AHY birds the mass is more deeply creased to form two similar, rounded papillae which are often flushed a deeper pink than the surrounding smooth tissue. The true function of this fleshy mass, whether or not it is actually related to the reproductive tract, is not known to us at this time and can only be determined by disection, something we are reluctant to perform unless we receive a fresh road kill. These gross anatomical differences do exist, however, and we put it forth for others to consider.

AGE COMPOSITION

The ratio of juvenile Broad-winged Hawks (SY, HY) to adults (AHY) as described by the Bird Banding Laboratory (U.S. Department of Interior, 1972) in the study area was 113 to 22 for the period indicated above. It is our belief that this ratio is representative for the wintering population and raises the question of why so many young birds remain in Florida? By all the criteria we know the birds are vigorous, fat upon arrival in southern Florida and relatively free from parasites and diseases. John Ogden (personal communication) believes that there is a movement northward by adult Broad-wings in early and mid-March. Our data were plotted with this in mind (Table 3) with inconclusive results. No doubt, small sample size makes such an analysis unsatisfactory from a statistical standpoint.

(Figure 2/Page 20: Some examples of measurements of Broad-winged Hawk body dimensions to show overlapping of modal groupings in wing span and wing arc, or single "normal" grouping of both sexes when considering length. Sexes combined.)

TABLE 3

Numbers of adult and juvenile Broad-winged Hawks collected by month during the period Dec. 1968 through March, 1973.

		Males		Females	
Months	Total Caught	Juv.	Adult	Juv.	Adult
Sept.	0	0	0	0	0
Oct.	14	6	3	5	0
Nov.	42	12	1	25	4
Dec.	37	14	1	20	2
Jan.	46	17	2	19	8
Feb.	6	2	1	3	0
Mar.	3	2	1	0	0

SIZE AND WEIGHT

Measurements have been made on each bird of body length, wing arc, tail length and wing span. Weight has been measured in ounces. The range of sampled body lengths has been 35.8 to 43.9 cm. Wing arc range was 26.0 to 33.1 cm. Tail lengths ranged between 14.1 and 17.5 cm. Wing span ranged between 84.0 and 97.5 cm. As expected, the data do not depart significantly from published data except to extend the extremes somewhat and that might be expected where large numbers of a relatively poorly sampled species is concerned. Dr. William B. Robertson pointed out that scant utility of wing span and total length measurements (personal communication) and we readily agree that this might be different among relaxed, dead specimens and living birds.

Dr. Robertson also pointed out that our wing arc measurements are in good agreement with other work (Friedmann, 1950) with the exception of three large birds collected by us in the range 32.6 and 33.5 cm. He also pointed out that our tail lengths are consistently lower than Friedmann's (Table 4). These data are of little significance, as has been pointed out above, in determining sex; they are presented to add to the body of existing

information on the size of the species. The three large individuals (Band No.'s 576-93916; 695-02996; 695-51955) mentioned above may be recaptured. If so, they should be carefully remeasured and examined for other unusual characteristics.

TABLE 4

Table of comparison between Broad-winged Hawks measured by Friedmann (1950) and by the author with sexes combined.

	Friedmann	Tabb
Wing	24.4-29.6 cm.	24.6-33.5 cm.
Tail	14.8-18.5 cm.	14.1-17.2 cm.

FOOD AND FEEDING

Broad-winged Hawks feed most heavily in the morning between first light and 10:00 am. and again in the afternoon between 3:00 and 6:00 pm. During the interval between these periods they spend a good portion of the time soaring if the weather is fair. If the weather is rainy and cold they tend to remain in the shelter of heavy tree growth.

Examination of the feet and talons of captured Broad-wings often shows, by presence of hair or feather, the kinds of animals eaten. Our observations indicate that wintering Broad-wings of south Florida feed most heavily on locally abundant cotton rats (Sigmodon hispidus), and cotton mice (Peromyscus gossypinus). We have also found feathers of Gray catbird (Dumetella carolinensis), and ground dove (Chaemepelia p. passerina). We have also seen Broad-wings eating anoles (Anolis carolinensis), but doubt that these lizards are an important food source. As yet we have no data which indicate actual hunting success.

We have the impression that scarcity of prey in marginal hunting areas causes certain Broad-wings to move about and that this search for food grows more intense as the winter progresses. This seems especially true for juveniles which are secretive during the early weeks of winter but later become conspicuous and active in open areas, even entering towns in search of prey.

Adult Broad-wings invariably take up the choice hunting territories and the juveniles are pushed into marginal range. A similar situation exists among wintering kestrels where the larger, stronger females take up and defend choice sites and drive most males into considerably less productive feeding areas along the coast.

We define choice hunting sites as those areas having large stands of short grass, maximum edge between grass and tree stands, and minimal human disturbance. Roadsides where fallow fields abutt on mowed road shoulders are ideal for kestrels. Natural and man-made clearings in and near native hammocks or tree groves provide the optimum habitat for the rodent populations sought by Broad-wings while the dense tree cover offers shelter while hunting.

COLOR PHASES

Dark phase Broad-wings are sometimes seen among migrating flocks but we have captured only one truly dark adult in 3 years of banding. Typically, the wintering birds appear like the individual shown (Figure 3) as an adult and fall somewhere between the two extremes shown for juveniles (Figures 4 and 5). The most useful aids to recognizing juvenile Broad-wings is the variable amount of light streaking on the head which is absent in other juvenile buteos of similar size and the generally buffier breast with evenly distributed brown tear drop shaped markings in sharp contrast. Adult Broad-wings are recognizable by the very dark head with constrasting white chin and a symetrical pattern of brown, heart-shaped spots on the breast which, at a distance, give them a barred breast.

INTERACTION WITH OTHER HAWKS

Broad-winged Hawks and Red-shouldered Hawks (Buteo lineatus), often occupy the same hunting areas. Conflict and competition appear to be minimized by differences in hunting behavior and use of habitat. When they are found in close association, particularly in western Dade County on the edge of the Everglades, the Red-shoulders are almost always young of the year which wander out of the Everglades marsh nesting territory. Under such conditions the

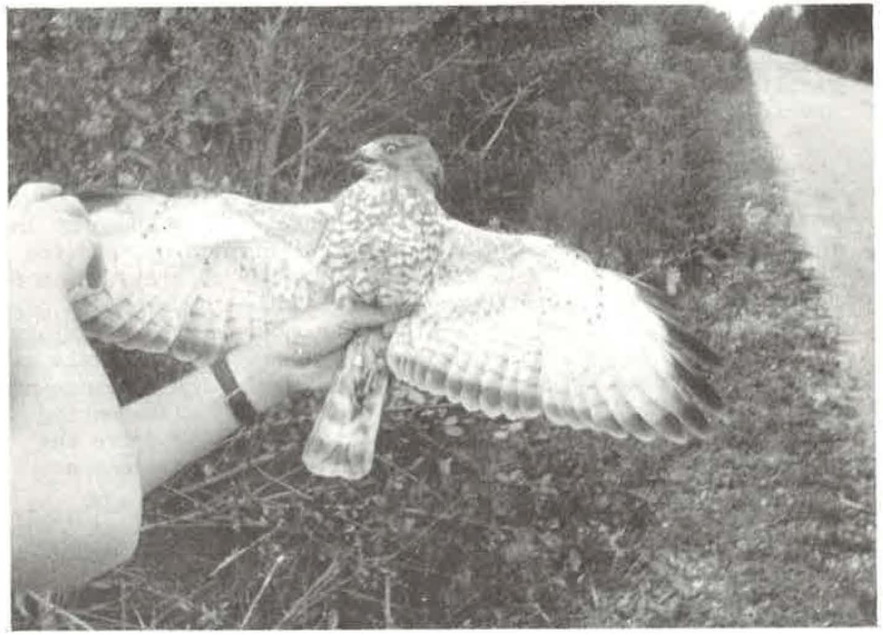


Figure 3: Ventral aspect of adult male Broad-winged Hawk showing "normal" color pattern.

Red-shoulders seem not to have strongly developed territorial instinct and are constantly on the move. The wintering Broad-wings, on the other hand, tend to stay in one hunting area of relatively small size. When both species are found in the same grove of trees they tend to "stratify" with Red-shoulders occupying the tree tops while Broad-wings occupy the lower tiers of branches and tend to stay in the shade. The reason for this is not entirely clear. Red-shoulders seem to enjoy sunning much more than Broad-wings and they are highly vocal, often perching on high limbs with wings partially spread while calling. The differences in perch preference do not appear to result from competition over hunting territory even though both species prey on the same small mammal populations.

Broad-wings and Kestrels also share hunting territories where short grass areas are found adjacent to or are interspersed with hammock trees. This kind of habitat is especially abundant in the larger Florida Keys where development clearing within the hardwood forest results in extensive acreages of grass for a few years after initial clearing and before actual development begins. Broad-wings lurk in the trees along the edges of the clearings or in "specimen" trees within the cleared areas while Kestrels perch on wires and dead twigs in exposed locations. The presence of Broad-wings in such areas is often indicated by dive-bombing Kestrels that attempt, usually without success, to drive the Broad-wings from their territory. Under such conditions no serious competition for food seems to occur.

INTERACTION WITH MAN

Man affects the Broad-winged Hawk population of southeastern Florida chiefly by outright destruction of habitat, especially in the Florida Keys. Some Keys have been stripped of natural vegetation to such an extent that prey species no longer are found there in sufficient numbers to support predators. When Broad-wings arrive in such locations they hunt for awhile, often within dense concentrations of house trailers and amid heavy auto and pedestrian traffic, before moving to more productive areas.

In Dade County, nearer Miami, destruction of natural habitat has been offset, at least temporarily, by the planting of large acreages of citrus, mango and avocado trees. These groves have

a grass under-story and along with thousands of acres of fallow field thickets, appear to provide an acceptable substitute for the natural West Indian hardwood habitat. Creation of large parks and preserves such as Islandia National Monument and Lignumvitae Key save natural hunting and wintering areas virtually intact for Broad-winged Hawks. Where city dumps are located in wooded areas Broad-wings and Red-shoulders alike congregate and feed on the abundant rodent populations.

In summary it appears that Broad-winged Hawks are adaptable to many man-made changes to a remarkable degree and will continue to winter successfully in South Florida for many years to come. The long-term prospects are not so certain, however, since the human population of greater Miami and the Florida Keys promises to spread and engulf most of the grove and agricultural lands now used so successfully by a major part of the wintering population.

RECOVERIES

During the past three years of study, a few recoveries of our banded Broad-winged Hawks have been reported. These are too few in number to be significant, but they provide interesting examples of migration patterns of the Florida wintering population.

1. Rc. 576-93567 — Broad-winged Hawk
   Age banded — SY, Sex F
   Age recovered — ASY
   Banded — January 25, 1969 — on Key Largo, Florida
   Recovered dead — January 25, 1970 — at Chiapas, Mexico

2. Rc. 695-02999 — Broad-winged Hawk
   Age banded — AHY, Sex M
   Age recovered — AHY
   Banded — October 17, 1970 — on North Key Largo, Fla.
   Recovered dead — Spring 1972 — at Hancock, Maine

ACKNOWLEDGMENT

I am indebted to my father, Dr. Durbin C. Tabb who holds the Master Permit under which I band and who was my constant companion in the field throughout this study. My special thanks are hereby extended to Dr. William B. Robertson and to Mr. John C. Ogden,

biologists in Everglades National Park, who gave valuable advice and criticism of the manuscript. Dr. Robertson was especially helpful in providing Christmas Bird Count data from his own files.

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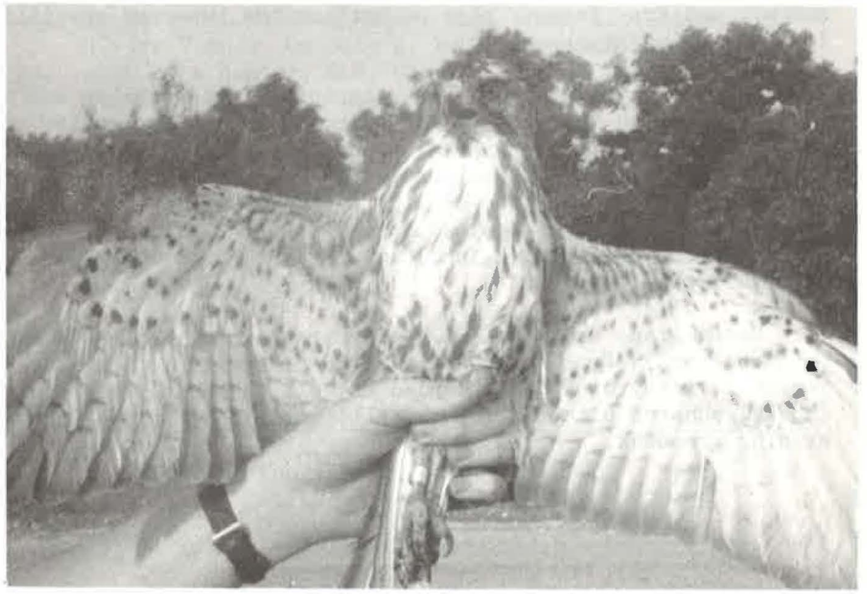
TOP: Figure 4. Light phase of juvenile plumage found in wintering Broad-winged Hawks of South Florida. Note light streaks in head plumage and virtual absence of spotting on under side. (male).

BOTTOM: Figure 5. Dark, normal plumage of juvenile Broad-winged Hawks wintering in South Florida. Characteristic light streaking in head region, characteristic of Broad-wings in juvenile plumage. (female).



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