

# BANDING, PAINT-MARKING AND SUBSEQUENT MOVEMENTS OF BARN AND CLIFF SWALLOWS

By DAVID E. SAMUEL

Many bird studies require paint marking or banding for future sight or banding recapture data. If birds are captured during the breeding season, then such marking, or banding, may cause birds to abandon their nest site or the nest itself. It was necessary to mist-net and paint-mark birds while carrying out a behavior and ecology study of Barn Swallows (*Hirundo rustica*) and Cliff Swallows (*Petrochelidon pyrrhonota*) (Samuel, 1969). It is the purpose of this paper to determine banding and marking techniques and also to determine the effects of banding, paint-marking and handling on movements of Barn and Cliff Swallows.

## STUDY AREA AND CAPTURE METHODS

This study was conducted during the summers of 1967 and 1968, in 11 barns and 5 sheds in Preston County, West Virginia. Cliff Swallows on my study area nested immediately inside barn or shed entrances (Figure 1), while Barn Swallows nested deeper inside barns and sheds (Samuel, 1969).

Adult and juvenile birds were captured either with static mist nets or manually-operated nets. In capturing Barn Swallows, the static mist net was used, which consisted of stretching a 5-meter net at the most advantageous position inside a shed or barn. The amount of light striking the net seemed to influence capture success, so nets were placed in the darkest area possible. Net placement at the door opening proved unsuccessful; apparently the birds could see the net.

Nets were used two hours or less per day and never for more than two successive days in one barn, to avoid possible disturbance and nest desertion. Cliff Swallows were captured using a similar net placement, but because they nest closer to the outside (i.e., closer to light at the entrances), the nets were visible to the birds. Hence, a manual operation of 5-meter nets was necessary. In a manual operation, one side of the net was attached to the barn wall at the opening, while the top of the other side was connected to a string and allowed to droop to the ground. After Cliff Swallows entered the barn and their nests, the net was manually pulled into a closed position, using the string which ran over a high placed nail, thus acting as a pulley. This method would not be possible for capturing Cliff Swallows in the midwest or west where birds seldom nest inside barns or sheds (Aumann and Emlen, 1959; Myres, 1957). Cliff Swallows were also captured by placing a larger (9-meter) net in a static position outside a barn in which many swallows were active. The net was placed in a natural flyway near the entrance to the barn (Bell, 1962). Although the net was visible to the birds, a few were captured when there were a large number of birds in flight.



Figure 1. A typical open shed in which Cliff Swallows nested.

A total of 169 birds (118 Barn Swallows and 51 Cliff Swallows) were mist-netted during this study. This figure does not represent birds recaptured after initial capture. In addition, 286 Barn Swallow nestlings and 59 Cliff Swallow nestlings were banded.

The manual procedure was the most successful netting method used, with 3.33 birds per net hour (55 birds/15 hours) captured. The erection of a 9-meter net in a fly-way outside an active barn (non-manual method) produced 2.4 birds per net hour (25 birds/10.25 hours), but was only successful when there were many birds in the area. The static method of erecting a net inside a barn was the least successful on a net-hour basis (2.15 birds/net hour), but the most productive overall (121 birds in 56 hours). Once the net was erected in the barn, behavioral, nesting, and vocalization data could be collected until birds were captured.

#### BANDING AND MARKING

All captured birds were banded with numbered leg bands. Colored bands (Gullion, 1965) were used initially, but were discontinued because they could not be seen on flying and perching birds. As mentioned, many nestlings were banded. The best time to band nestlings is when they are in the quill stage (day 7 to day 12). Barn Swallows were not banded because the nestlings would not remain in the nest after being replaced. Each nest was numbered, and visits were



Figure 2. A Cliff Swallow with the outer rectrices painted silver.

planned so that nestlings could be safely banded. In order to remove Cliff Swallow nestlings from the nest, the rim had to be broken away. This damage was repaired immediately by the adults, and caused no nest desertion.

Testors Airplane Dope was used to mark the outer five rectrices of 132 adult Barn and Cliff Swallows following the method of Emlen (1952) (Figure 2). Colors most easily seen were silver, gold, red, orange, yellow and green. Various color combinations were used on the right, left, or both wings, so that 48 individuals could be numbered and recognized at considerable distances (Table I). Forehead markings were placed on the Cliff Swallow adults, to aid in identification in the nest (Emlen, 1954). A spot of paint placed on the breast of birds (to aid in recognition when perched) lasted only 1-3 days as the birds repeatedly preened the feathers in this area.

Emlen (1952) indicated that wing-painted Cliff Swallows could be seen 300 feet, and were not distinguishable against a sky background. I found that some paints were more visible than others. Silver and gold were quite useful for three reasons. These paints dried very rapidly and could be seen up to 600 feet with the unaided eye and as far as 1000 feet with binoculars. Also, these two colors were the only ones seen against a sky background, and the sun's reflection sometimes increased their visibility. Emlen (1952) reported that white, red, yellow and green paints were useful for marking Cliff Swallows. I found that in addition to these colors, orange was

TABLE 1. PAINTED WING COMBINATIONS WHICH ALLOWED MARKING OF 48 INDIVIDUAL BIRDS. RW = RIGHT WING, LW = LEFT WING, BW = BOTH WINGS

*Singles\**

RW gold	RW silver	RW red	RW orange	RW yellow	RW green
LW gold	LW silver	LW red	LW orange	LW yellow	LW green

*Combinations*

	LW gold	LW red	LW yellow	LW silver	LW orange	LW green	% Birds Marked
RW gold**							6
RW silver							6
RW red							6
RW orange							6
RW yellow							6
RW green							6
							<b>36</b>

\*each represents 1 bird, hence 12 birds could be marked.

\*\*the best field method of marking when handling many birds was to; a) paint single wings first as indicated above, b) paint combinations next. First, the right wing of the first 6 birds captured was painted gold, and the left wings gold, silver, red, orange, yellow, and green. The right wing of the next birds was painted silver, with the left wing painted gold, silver, red, orange, etc.

easily identified at great distances. White was not used as it was confused with the silver color. Wing marks were easily distinguished in both species, while tail markings (although visible) proved of little additional value in individual identification. Wing marks lasted 45-75 days.

## BEHAVIOR AFTER MARKING

In order to determine natural movement during the breeding season, it was necessary to know the effects of netting and handling (i.e., wing painting and banding) on birds' movement and nest-sites or nest desertion. Records were kept on the behavior of 27 adult Barn Swallows and 14 adult Cliff Swallows. Fourteen of 27 Barn

TABLE 2. THE EFFECTS OF MARKING, NETTING AND HANDLING ON NORMAL SWALLOW MOVEMENTS AS MEASURED BY SUBSEQUENT SIGHT OR NET RECAPTURES. DATA INCLUDES THE SUMMERS OF 1967 AND 1968.

<i>Barn Swallows</i>								
Not seen	-1 day*	1-4*	5-29	30-59	60+	rept. I**	II**	III**
10	6	5	29	27	14	25	8	1
<i>Cliff Swallows</i>								
8	7	0	24	1	1	6	0	0

\*birds were seen during the day they were marked.

\*birds were seen from 1 to 4 days after they were marked.

\*\*birds were recaptured once (I) after they were marked.

\*\*birds were recaptured twice (II) after being marked.

\*\*birds were recaptured three times (III) after being marked.

Swallows fluttered low to the ground (100 feet or less) for 1-4 minutes, then landed and preened the painted rectrices. Thirteen birds landed and preened almost immediately after release. In 24 of 27 cases mates flew near or perched near marked birds. Twelve of 14 marked Cliff Swallows fluttered quite high upon release. Most flew in wide circles, alternately fluttering higher and gliding, until out of sight. Only two birds were seen perched immediately after release.

#### MARKING AND MOVEMENT

The effects of marking on movement can be seen from Table II. Records were kept on subsequent recaptures (sight or net) of painted birds at the barn where they were originally captured. Data from barns not visited regularly were excluded. Ten of 91 Barn Swallows were never seen after handling, 29 were seen at least 30 days after marking, and 14 were seen at least 2 months after marking (Table II). The fact that 10 of 91 Barn Swallows were not subsequently seen does not mean that nest desertion took place. Some netting was done early in the season when all birds captured were not paired, and thus all captured birds may not have been residents of the barns. Adults from area barns are occasionally seen entering one barn during courtship. Since 81 of 91 Barn Swallows were subsequently seen (Table II), and 34 of 91 were recaptured one or more times (Table II), handling and painting appeared to have little effect on normal movement.

Eight of 41 Cliff Swallows handled and painted were never seen again. The behavior of released birds indicated that Cliff Swallows were more disturbed by marking than Barn Swallows. Nevertheless, seven birds were seen in the area of their barn on the same day they were marked, and 24 were seen between 5-29 days thereafter (Table II).

Eighteen of 132 painted birds were not subsequently seen at the original banding site. Thus, the movement of marked birds was probably not a result of marking and handling. Also, marking did not affect normal daily activities at the banding site except during the actual netting period (usually 1-2 hours/day). When nets were removed, adults continued normal courtship, incubation, and brooding behavior. Activities at barns where banding was carried out were not delayed when compared to activities at barns where no banding was done.

Known mortality resulting from marking and handling was limited to a broken wing and death for the first bird handled in this study.

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#### SUMMARY

Three different methods were used to capture Barn and Cliff Swallows. The most productive method for capturing Barn Swallows involved the placement of a mist net inside the entrances. Cliff Swallows were captured by pulling a net into position after birds entered their nests. Airplane Dope was used to mark the outer five rectrices of 132 adult Barn and Cliff Swallows. Colors most easily seen were silver, gold, red, orange, yellow and green. Wing marks lasted 30-60 days. Actual banding and paint-marking appeared to disturb Cliff Swallows more than Barn Swallows. Barn Swallows perched within four minutes of marking, while Cliff Swallows fluttered high until out of sight.

Eighteen of 132 painted birds were not subsequently seen at the original banding site. Thus, the movement of marked birds was probably not a result of marking and handling.

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## WEIGHT CHANGES AND FEEDING BEHAVIOR OF A CAPTIVE-REARED BALD EAGLE

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On 15 June 1962, when I was stationed at Petersburg, Alaska, a nestling Bald Eagle (*Haliaeetus leucocephalus*) was brought to me by fishermen. The eaglet was reported to have been found on the bare ground of the shore of Wrangell Narrows near an area of intensive logging operations. The fishermen thought that the eaglet had been removed from its nest by the logging crew before they felled its nesting tree and that it had been left on the ground with the expectation that the parent birds would find and care for it. There was an unidentified dead bird with the eaglet, presumably left as food for the eaglet by either the logging crew or the parent birds. The eaglet appeared to be in perfect health and thus was assumed to be of approximately normal weight. As I was at the time employed by the U. S. Fish and Wildlife Service on a research project involving the effects of DDT exposure on Bald Eagles, I was prepared to care for the eaglet and to collect data on its feeding behavior and growth rate. The eaglet was later transported to the Patuxent Wildlife Research Center, Laurel, Maryland where research on it was continued. This paper reports some of the results of the research conducted on this bird in Alaska and at the Patuxent Wildlife Research Center. Various phases of this study extended through about the first year of the eagle's life.

### METHODS AND EQUIPMENT

When at Petersburg, Alaska, during the period 15 June to 2 July, the eaglet was kept in a cardboard box where it was fed on ground flounders, liver meal, and multiple vitamins, the same diet as was used by Chura and Stewart (1967), except that Terramycin was not used. At the Patuxent Wildlife Research Center, until growth was completed, the bird was fed whole whittings and ground horse meat, purchased at a local store. During the 16 days in Alaska the eagle was fed twice daily; later it was fed once daily except when feeding experiments were in progress.