THE BREEDING BIOLOGY OF HAMMOND'S FLYCATCHER

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THE small flycatchers of the genus Empidonax have attracted attention for years because of their abundance and the difficulty of identifying them. In particular Hammond's Flycatcher and Wright's Flycatcher have confounded ornithologists. This study was begun with the hope that a more detailed knowledge of the breeding biology of Hammond's Flycatcher (*Empidonax hammondi*) would permit a ready differentiation of the two species. In addition, the comparison of closely related species should produce data with taxonomic and evolutionary implications. Nomenclatural problems also confuse the situation, for Phillips (1939) concludes that Wright's Flycatcher (*E. wrighti* of the 1931 edition of the A.O.U. Check-List) should be called *E. oberholseri*.

It was obvious from the start that the study of Hammond's Flycatcher would not provide data of statistical proportions unless many people studied the bird for many years. Since such effort is not feasible, this report will be largely qualitative and descriptive. The work was done from late June until August in 1950, 1951, and 1952. The observations were obtained primarily on the grounds of the Montana State University Biological Station at Flathead Lake, Montana. Some data were obtained nearby and in Glacier National Park.

Hammond's Flycatchers live in areas of mixed coniferous and deciduous vegetation (plate 12). The frequency distribution of trees in a plot close to the area of observation is given in table 1. Observations in other places suggest, however, that the species of trees are not important so long as the vegetation is fairly dense, is about 40 feet high, and includes both coniferous and broadleaved trees. It should be noted that the flycatchers regularly live near open areas such as roads or lakes.

Other species of birds found in this vegetation are: Russet-backed Thrush (*Hylocichla ustulata*), Ruby-crowned Kinglet (*Regulus calendula*), Western Tanager (*Piranga ludoviciana*), Solitary and Red-eyed vireos (*Vireo solitarius* and *V. olivaceus*), and Ruffed Grouse (*Bonasa umbellus*).

The methods used to obtain the data were very simple. The observer merely sat or stood at a convenient spot and recorded the events, using binoculars when necessary. No blind was used since the birds are not wary. Most of the data were recorded at time intervals and rough maps showing movements were drawn on the spot.

TABLE 1

TREE COMPOSITION IN 15 QUADRATS (50 × 50 FT.) WITH 1152 TREES

Species (Peck, 1941)	*Per cent of Quadrats*	*Per cent of Total Trees*
Grand Fir (*Abies grandis*)	94	45
Douglas Fir (*Pseudotsuga mucronata*)	80	9
Yellow Pine (*Pinus ponderosa*)	13	0.2
Englemann Spruce (*Picea Englemanni*)	20	3
Western Larch (*Larix occidentalis*)	60	3
Paper Birch (*Betula papyrifera*)	73	15
Douglas Maple (*Acer glabrum*)	86	23
Bebb's Willow (*Salix bebbiana*)	7	2

RESULTS

Voice.—The notes will be described first because a knowledge of their functions is essential in understanding the breeding biology.

1. Male Position Note. The male regularly gives a note resembling "che-bec" that is sharp and harsh. The last part is at a lower pitch than the first part. The male gives this note, which is usually called "song," as he moves about his territory. This note is considered to serve to indicate to the female the position of the male. It is believed not to be a territorial defense note for the following reasons: (1) the bird gives it from inconspicuous places; (2) the male uses it within the territory as much as on the boundaries (documentation of this conclusion must be deferred for later presentation); (3) it is not given especially frequently before or after a territorial encounter (few observations); (4) its frequency is as great during the nesting phase as the building phase (table 2); (5) its frequency declines steadily during the day (table 3). The only suggestion that this note may have a function in territorial activities is that it sometimes is given at the time of territorial fights. But an alternative interpretation is that the note may merely indicate the position at this time.

The number of calls given by males was analyzed according to the stage of the nesting cycle. If the calls were territorial their number would be expected to decline rather than to increase while the young are in the nest, especially in view of the lack of second broods. Similarly one would expect that territorial song would be more frequent at morning and evening. Data of this type are not satisfactory, however, because the interpretation given above requires for its confirmation proof that the song, which is supposed to be territorial, in this or a closely related species, declines during the breeding period and increases at the beginning and end of the day. Neither of the

TABLE 2

RELATION OF NUMBER OF POSITION CALLS TO STAGE OF BREEDING CYCLE

Stage	*Minutes Observation*	*Calls per Minute*
Building	659	.396
Eggs in nest	924	.134
Young in nest	543	.448
Young fledged	442	.370

proofs is available for Hammond's Flycatcher or other members of the genus. The data and interpretation are presented in the hope that another person will be in a position to collect the proper data.

2. Female position note. The female gives a mellow "tweep" rather regularly when away from the nest. This note seems to have the same function as the male position note but is given less frequently.

3. Male Alarm Note. A sharp, harsh "chip" or "pip" is used for alarm when hawks, squirrels, or humans come near nest or young. The tail is jerked each time the note is given.

TABLE 3

RELATION OF NUMBER OF CALLS TO TIME OF DAY

Time of Day (MST)	*Minutes Observation*	*Calls per Minute*
5 to 7 a.m.	1440	.49
7 to 9 a.m.	360	.52
9 to 11 a.m.	480	.29
11 a.m. to 1 p.m.	660	.36
1 to 3 p.m.	60	—
3 to 5 p.m.	240	.09
5 to 7 p.m.	480	.03
7 to 9 p.m.	480	.14

4. Female Alarm Note. This note is very similar to that of the male but slightly lower in pitch.

5. Song. On a few occasions a mellow, undulating "twit-twit-twit" has been heard. On several evenings birds have been seen on a tree-top singing a miscellaneous assortment of notes including some male position calls. The bird may fly ten feet into the air and tumble back into the trees. A morning song comparable to that in other species has not been observed, but the weather conditions in the early part of the breeding season make suitable observations impossible.

6. Greeting Note. The female at the nest may chatter or twitter as the male comes near. The greeting is also used when the birds meet away from the nest, probably by both sexes.

Territory.—Unfortunately the territories were established in early June before observations began. During the latter half of June and July the birds remain within a small area and occasionally react toward other birds by brief fights involving some "twit-twit" notes and bill-snapping. Apparently territories are clearly established and little conflict occurs. It is, of course, difficult to observe birds in the dense wood. The position note may be used when these mild fights occur.

Nest.—The nest is built primarily, if not exclusively, by the female in the limited observations available for the latter part of the breeding season. One female constructed a nest alone after her mate had disappeared. She tore apart an old nest at which she and her mate had been seen four days previously but which never had eggs.

The nests are generally placed 25 to 40 feet from the ground (13 nests) although one nest was only 10 feet above ground. Four of fourteen nests were in crotches of the main trunk of small trees and ten were in crotches on horizontal branches about three to five feet from the trunk. Four nests were in birches, one in maple, two in yellow pine, six in western larch, and one in Douglas fir. Note that this distribution is not related to abundance of trees (table 1). These nests are similar to those described in Bent (1942).

The nest is constructed from plant fibers, especially the bark of nine-bark (*Physocarpus capitatus*). A few small twigs or pine needles may occur. The nest is lined with a few feathers and scales from cones of Douglas fir. The inside width is about 6 cm.; the outside width about 9 cm.; the inside depth about 3 cm.; the outside depth about 7 cm. The nest becomes flattened as the young grow large.

The number of eggs averages about three. Four nests had three eggs, one had two, and one had four. In addition three other nests had three young each when first found and two nests had four young.

Incubation is done by the female alone. The male is constantly nearby and may perch in the nest tree. The female comes directly to the nest after an absence and settles down at once. The duration of incubation (15 days from laying last egg) was obtained for only one nest, since most nests had eggs when they were first observed. Incubating birds were observed for 1,159 minutes (19.3 hours). During this time the females left the nest 61 times and were on the nest 77 per cent of the time.

Both adults feed the nestlings. The observations indicated that the male begins to feed the young the day they hatch but the female usually continues to brood and in some cases may not feed the young for several days. At the time of the hatching, the adults are obviously excited. They flit to and fro at the nest, perch on the ledge and peer in, jerk their tails, and give the alarm call. A sexual difference of behavior is evident at feeding. In all cases where the sex could be determined, the female flew directly to the nest and perched on the brim as she does during the incubation period. The male, in contrast, perched on a twig a few inches from the nest before hopping to the brim. In 998 minutes (16.5 hours) of observation at four nests, the male fed the young 17 times and the female fed the young 122 times.

In two cases, the young left 17 days after hatching and in one case, 18 days. All young left within two hours and perched on nearby limbs. The parents continued feeding, and the young continued the calling they had been making while in the nest. The whole family stayed near the nest for several days, and the young slept together on a limb at night. Gradually the young became more active till about 20 days after leaving the nest when they were able to take care of themselves. The family disperses at this time. There is no evidence of a second brood, although renesting occurs.

Some meager data are available for hatching and fledging success. In five nests, with 14 eggs, 5 hatched. In six nests, with 19 young, 16 fledged.

COMPARISON WITH OTHER EMPIDONACES

The breeding biology of some other species of *Empidonax* has been studied. This section will comment on differences or similarities between species that appear in published papers. No extensive search for miscellaneous notes has been made.

The Gray Flycatcher (*E. wrightii*, formerly *E. griseus*) has been observed by Russell and Woodbury (1941) in Utah and Arizona. The similarities to Hammond's Flycatcher are conspicuous. The nest is built by the female, who lays one egg a day until the set is complete and incubates. Both adults feed the young, and the female approaches the nest directly but the male perches on a limb before alighting on the nest. The birds generally remain within a limited area, but territorial defense is rarely seen. The call notes are interpreted in table 4. The two species have different notes and of course live in different types of vegetation.

(*Top*) HABITAT OF HAMMOND'S FLYCATCHER. Note that vegetation consists of conifers and broadleaved species and is fairly tall and dense.

(*Bottom*) HABITAT OF WRIGHT'S FLYCATCHER. Note that conifers and broadleaved species occur but that habitat is on edge of a field.

The Least Flycatcher (*E. minimus*) has been studied by MacQueen (1950) in Michigan. The birds maintain a territory, and the female builds the nest and incubates. Both adults feed the young. MacQueen reports that the nestling period is 14 days in contrast to 17 to 18 days observed in 3 nests of Hammond's Flycatcher in Montana. Both adults drive intruders from the territory but the female is the less active. Limited observations suggest that this behavior occurs in Hammond's Flycatcher also. The notes of the Least Flycatcher are summarized in table 4. The note "che-bec" is easily identified as the male position note. The note "chweep" is identified as the female position note because MacQueen says only the female gives it, whereas both adults give the "whit" which must be the alarm. The nest of the Least Flycatcher as described in Bent (1942: 216) appears to be very similar in construction and size to that of Hammond's allowing for differences in availability of materials in different parts of the country.

The songs of the Alder Flycatcher (*E. traillii*) have been studied by McCabe (1951) in Wisconsin. The male position call is readily recognized, but no female position call is mentioned. He discusses in detail geographic variation in the male position call and also the flight song.

The breeding biology of the Yellow-bellied Flycatcher (*E. flaviventris*) is barely mentioned by Bent (1942), although data on type of nest and voice are available. The nest is placed on or near the ground and is built in 2 layers of mosses and rootlets. The male position note is apparently variable.

The nest of the Acadian Flycatcher (*E. virescens*) is described by various authors in Bent (1942), but little of its breeding biology is mentioned. Limited personal observations at Thomasville, Georgia, in 1951 and 1952 permit a comparison of the call notes (table 4). The birds were found in moist ravines of beech and live oak vegetation. Three nests were found far out on overhanging limbs about 20 feet above the ground.

The nesting of the Western Flycatcher (*E. difficilis*) and Buff-breasted Flycatcher (*E. fulvifrons*) is poorly known. Bent (1942) summarizes some notes on nest type and voice.

Some observations were obtained at 4 nests of Wright's Flycatcher. The notes are readily separated from those of Hammond's Flycatcher (see table 4). The habitat of Wright's Flycatcher (plate 12) differs subtly from that of Hammond's. Wright's requires an edge of mixed conifers and deciduous trees bordering on an open or low bushy area. Three of the nests were located in bushes about 3 feet above the

TABLE 4

COMPARISON OF NOTES OF EMPIDONAX FLYCATCHERS

Species	*Position*		*Alarm*		*Flight Song*	*Morning Song*	*References*
	Male	*Female*	*Male*	*Female*			
Hammond's	che bec	tweep	pip	pip	yes	?	Davis
Least	che bec	chweep	whit	whit	yes	yes	MacQueen (1950)
Alder	fitz creet bew	?	wheet	wheet	yes	yes	McCabe (1951)
Yellow-bellied	pse-ek′	?	chu-e-e′-p	?	yes	?	Bent (1942)
Acadian	pee-whip	whew	whit peet	?	yes	?	Davis
Wright's	clip zee whee	tweep	whit	whit	?	?	Davis
Gray	tu-weet	tseet	?	prit	?	?	Russell and Woodbury (1941)
Gray	pee-ist	?	whit	?	?	?	Bent (1942)

ground, but one nest was in the crotch of a birch about 20 feet above ground. (Both adults were collected at this latter nest.) One nest had 4 eggs of which 3 hatched, another had 4 eggs (4 fledged); another fledged 3 young, and one nest was not yet completed when the adults were collected.

Hammond's and Wright's flycatchers can be easily separated if a good view of the back is obtained. Hammond's has a short tail that is the same color as the back whereas Wright's has a long tail that is brown in contrast to the olive-gray back. Indeed Wright's Flycatcher resembles a miniature Crested Flycatcher (*Myiarchus crinitus*).

SUMMARY

Observations on the breeding biology of Hammond's Flycatcher were made at Flathead Lake, Montana, during three summers. The birds inhabit moderately tall, dense, mixed vegetation. The male and female each have a position note and alarm call. The male has a flight song. The birds maintain a territory. The nest is built about 30 feet from the ground, primarily by the female. The usual clutch consists of three eggs. The female alone incubates, but both adults feed the young.

A comparison with published and personal observations on other members of the genus indicates that there is a considerable similarity of breeding biology but conspicuous differences in habitat. Original data on four nests of Wright's Flycatchers are presented.

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