

Chimney Swift (*Chaetura pelagica*) South Transient Roost Staging and Timing on the Central Chesapeake Bay Coastal Plain

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ABSTRACT: For south transient Chimney Swifts (*Chaetura pelagica*), I define the dates for extreme arrival and departure, and mean period of peak abundance at sundown staging roost chimneys in the town of St. Michaels, Maryland, and morning migrants passing overhead along the east side of Chesapeake Bay at Tilghman Island, Maryland, 16 km (10 mi) southwest, during August-October 1969-2014. Additionally, staging roost behavior is noted at the former location. Transient staging at roost chimneys was first detected on 7 August and overhead on 19 August, while staging was last observed on 18 October and the last overhead transient seen on 21 October. The date of mean peak abundance was 23 September for staging swifts and 13 September for overhead transients. The date of mean peak abundance for transient numbers coincides closely with occurrence of the autumnal equinox suggesting this celestial event may be an important indicator in timing of south transient Chimney Swifts. Transient timing and staging behavior at roost chimneys in this study did not appear to differ appreciably from that noted in the literature.

Keywords: *Chaetura pelagica*, Chesapeake Bay Coastal Plain, Chimney Swift, south transient, sundown staging, transient timing.

The small size, shadow-coloring, aerial existence, and high-flying, fast erratic flight of the Chimney Swift (*Chaetura pelagica*) attract little attention at the terrestrial level. An exception may be during their south transient movements when hundreds or thousands may converge at dusk on a single urban chimney for overnight communal roosting (Figure 1). This spectacle is well publicized, attracting considerable historic bird banding attention that has provided us much of what we know about the staging behavior, and migratory timing and pathways of the species.

Nesting swifts and their progeny begin south transient activity by forming communal staging roosts in their village, town, or metropolitan neighborhoods once seasonal nesting and/or fledging is completed (Groskin 1945, Michael and Chao 1973, Hess et al. 2000). Initially, flock sizes in staging roosts vary in proportion to the number of existing chimneys in the immediate area and/or their



Figure 1. Approximately 4000 Chimney Swifts converging at dusk on an urban chimney for overnight communal roosting. Free State Bookbinders, 3110 Elm Avenue, Hampden, Baltimore, Maryland, 10 September 2003, 6:40 p.m. (photographed by Bill Hubick).

suitability for roosting, i.e., residential villages and towns may have up to a few hundred swifts (Burns 1899, Peters 1937, Michael and Chao 1973, Zammuto and Franks 1981) while thousands may gather in metropolitan areas with more and larger chimneys (Pickens 1935, Peters 1937, Coffey 1938, Green 1940, Lowery 1943, Groskin 1945, Bowman 1952). Diurnal transients stop at these convenient roost sites each evening (Calhoun 1938, Calhoun and Dickinson 1942, Kyle and Kyle 2005) where they may remain for days or weeks (Green 1940). Peters (1937) and Calhoun (1938) found that all swifts in a staging roost flock did not depart together in a body as might be expected. Thus, portions of the roost flock may depart south on days with cooler ambient temperatures and gentle northwest breezes, while soon being replaced in the staging roost site by other transient swifts from more northerly locations (Calhoun and Dickinson 1942, Lowery 1943). Hence, once a roosting chimney is established it tends to be consistently occupied for the duration of that season by transients of changing composition (Calhoun 1938, Zammuto and Franks 1979). Roost flock size may remain somewhat constant, but will exhibit days of increased or decreased numbers that reflect transient activity (Burns 1899, Coffey 1936, Groskin 1945, Michael and Chao 1973). Studies have shown 70% of the swifts entered the roosting chimney 20.7 minutes (± 2.4 minutes SD) after official sunset when light intensities ranged 0-2 foot candles (Zammuto and Franks 1981).

The swift's Atlantic Coastal Plain flyway includes Chesapeake Bay (Calhoun and Dickinson 1942) where, at these latitudes, south transients may be encountered during mid-August through mid-October with the most activity during 5 September-10 October (Stewart and Robbins 1958, Walsh et al. 1999, Hess et al. 2000, Rottenborn and Brinkley 2007). South transient diurnal movements are usually >50 m (>164 ft) overhead (Steeves et al. 2014) with some swifts being recorded above clouds at altitudes of 2,126 m (6,975 ft) riding warm air masses up the slope of an advancing cold front (Williams 1956).

This study determined the timing of south transient Chimney Swift staging at sundown roost chimneys and morning migrants overhead at central Chesapeake Bay on the Atlantic Coastal Plain flyway, and also noted sunset staging roost behavior.

METHODS

This study is based on approximately 330 individual field day observations involving thousands of south transient swifts made during 1969-2014 along the east-central portion of the Chesapeake Bay flood plain. Those observations were subdivided into subsets based on their geographic location and/or status of the swifts (staging at roost chimneys, overhead migrants) at that location. From the subsets, two were selected for distribution analysis.

Subset one included 147 observation days of south transients found “staging at roost chimneys” in the commercial and residential districts of St. Michaels, Maryland (latitude 38.784268°, longitude -76.343471°). Observation days and swift tallies were taken from August-October in 1971-2014 personal field notes with an overwhelming majority of the observation days occurring post-1999. Observations at staging sites were made from a stationary position 30-60 m (98-197 ft) southwest of the roost chimney to avoid glare from setting and dusk sunlight. Observations covered the period 30 minutes before official sunset until dark, i.e., about one hour. Daily flock size at these sites never exceeded 150 swifts and usually ranged less than 50 individuals.

Subset two included 114 observation days of diurnal south transients found “migrating overhead” along the west side of Tilghman Island near the village of Fairbanks, Maryland (latitude 38.686978°, longitude -76.343471°) about 16 km (10 mi) southwest of St. Michaels. Observation days and swift tallies were taken from personal field notes, August-October in 1969-2014, with those days well distributed throughout the years. Observations were made during 0700-1000 hours while canvassing various habitats for all species of south migrant birds along public roadways 1.4-2.6 km (0.9-1.6 mi) north of the southern tip of the island. Daily flock size at this location rarely exceeded 50 individual swifts.

The transitory period for individual subsets of data was taken as the inclusive period from the first August day to the last October day that south transient swifts were detected at historical or new roost chimneys or noted migrating overhead with variables from inclusive days used for distributional analysis. Microsoft Excel 7 with inbuilt functions (COUNTIF, SQRT, SUM, and SUM PRODUCT) was used to calculate weighted means and standard deviations. Dates were converted to Julian days to facilitate calculations then back-converted to conventional dates. Box plots were created using these dates within the extreme dates of the transitory periods.

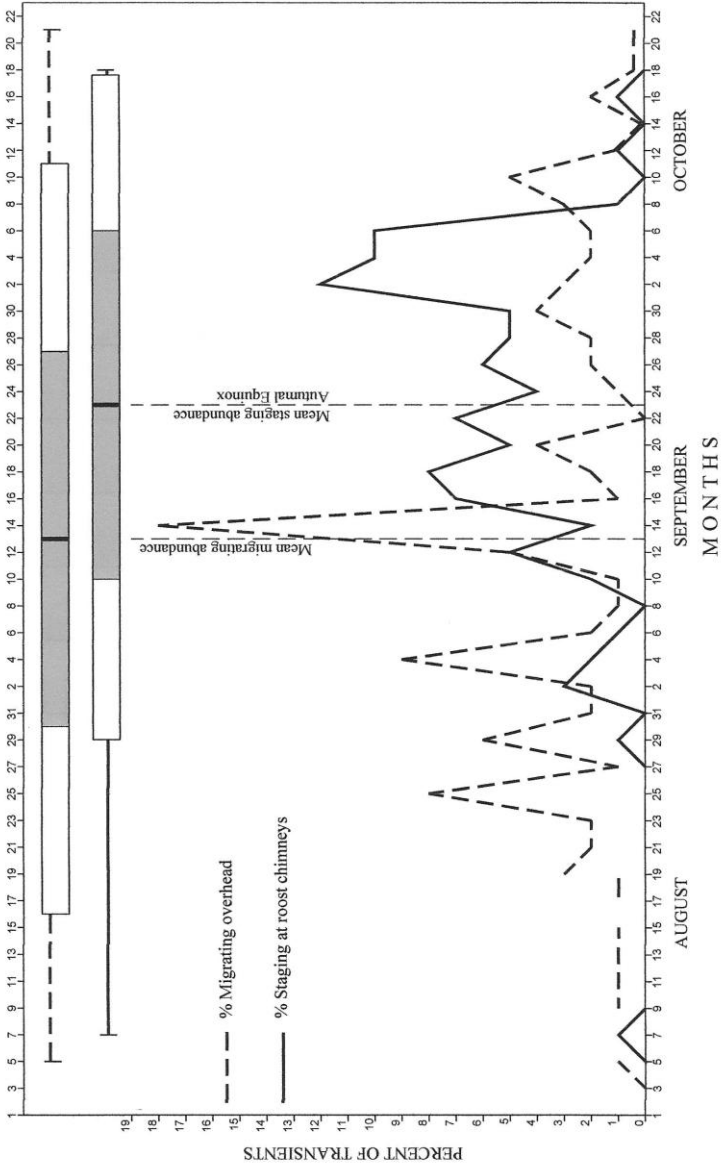
RESULTS

South transient Chimney Swifts at staging roost sites were first detected on 7 August with roost chimneys consistently hosting at least 2% of the seasonal transient population on 10 September-6 October, while roost numbers sharply declined thereafter with the last swift seen on 18 October (Figure 2: line graph). Nearly all south transient staging activity at roosting chimneys took place during a 51-day period (29 August-18 October) with the mean date of peak abundance on 23 September (Figure 2: box plot graph).

South transient swifts staged at the same roost chimney for the entirety of some seasons, while other seasons found that after several evenings use, they changed chimney sites and/or used more than one chimney some evenings. Aerial south

Figure 2. Chimney Swift (*Chaetura pelagica*) south transient timing in the Chesapeake Bay Coastal Plain, 1969-2014.

- a) Box plot whiskers delimit transient period extremes. Boxes represent one (gray) and two (white) weighted standard deviations both sides of the weighted mean peak (black bars).
- b) The 48-hour frequency interval includes swift tallies for that day and the previous day.
- c) Percent is the ratio of frequency interval tallies divided by the grand total of all frequency interval tallies for the transient period.
- d) Missing portions of line graphs in August are dates with no transient monitoring.



transient Chimney Swifts passing overhead along the east coastline of Chesapeake Bay were first noticed on 19 August with fluctuating increases and decreases in numbers on subsequent days, appreciably decreased numbers after 10 October, and the last swift seen on 21 October (Figure 2: line graph). Nearly all overhead south transients passed during a 57-day period (16 August-11 October) with a mean date of peak abundance on 13 September (Figure 2: box plot graph).

DISCUSSION

Progression of the Chimney Swift south transient season, and staging behavior at roost chimneys in this study did not differ appreciably from that reported in other studies. Similarly, transient timing dates and periods in this study closely aligned with those noted for other Chesapeake Bay latitudes and adjacent regional jurisdictions. Dates of south transient mean peak abundance coincided closely with occurrence of the autumnal equinox suggesting this celestial event may be an important indicator in timing of south transient Chimney Swifts at Chesapeake Bay Coastal Plain latitudes.

This study and others showed south transient swift activity may span up to 80 days or more (Peters 1937, Groskin 1945, Stewart and Robbins 1958, Michael and Chao 1973, Hess et al. 2000; Figure 2). South transient Chimney Swift timing dates for extreme arrival and departure, usual transient period, period of most abundance, and high counts in this study closely aligned with those timing dates noted for other Chesapeake Bay latitudes and adjacent regional jurisdictions (Table 1).

Table 1. Chimney Swift (*Chaetura pelagica*) south transient timing in the Mid-Atlantic States.

Location	Extreme Arrival	Usual Transient Period	Period of Most Abundance	Highest Counts	Extreme Departure	Reference
PA (Philadelphia)	1-7 AUG	1-7 AUG-11 OCT	21-27 SEPT	24 SEPT	16 OCT	Groskin 1945
DEL	13 AUG	10-15 AUG-5-10 OCT	No Data	20 SEPT	24 OCT	Hess et al. 2000
MD	No Data	15-25 AUG-10-20 OCT	5 SEPT-10 OCT	12 SEPT-5 OCT	2 NOV	Stewart and Robbins 1958
MD*	7 AUG	16 AUG-18 OCT	30 AUG-6 OCT	14 SEPT-3 OCT	21 OCT	(Present study)
VA	No Data	No Data-15 OCT	No Data	9 OCT	12 NOV	Rottenborn and Brinkley 2007
NC	No Data	No Data	No Data	No Data	15 NOV	Carolina Bird Club 2015

*Inclusive dates for migrating overhead and at staging roost chimneys

Absence of nine roost monitoring frequency intervals in August may have biased the mean date of peak roost abundance a few days later in September than if monitoring numbers had been available for those 18 days. Conversely, the 300+ swifts tallied on 14 September 1982 (Figure 2: line graph) is double that found on any other day in August-October during the 45 years. This anomaly may have biased the mean date of peak abundance for overhead migrants slightly earlier in September than if that doubling number had been more in line with other daily tallies during September. Considering the possibility that mean peak abundance may be biased later for staging roost swifts (23 September) and earlier for overhead swifts (13 September); the true date of peak abundance probably falls in the nine days between those dates. Coincidentally, the autumnal equinox (22-23 September) falls at or near the end of this period, suggesting this celestial event may be an important proximal cue in timing of south transient Chimney Swifts at Chesapeake Bay Coastal Plain latitudes.

Importance of the equinox is also implicated in south transient staging roost counts during 21 August-11 October at Ardmore (latitude 40.007777°) near Philadelphia, Pennsylvania, 158 km (98 mi) northeast of this study, that showed 50% of the seasonal flock occurred during the period 19-27 September 1944 (Groskin 1945). Similarly, banding south transient swifts over a 32-year period (1944-1976) at staging roost chimneys on the campus of Kent State University (latitude 41.146817°), at Kent, Ohio during 2 August-28 September showed 49% of the seasonal flock occurred during the period 18-22 September (Dexter 1990). Accordingly at approximately 901 km (560 mi) south of central Chesapeake Bay (latitude 38.701648°), an operation banding over 20,000 swifts at Baton Rouge (latitude 30.457975°), Louisiana in 1937-1939 found transient swifts most abundant on 27 September (Lowery 1943).

Studies relate that swift staging behavior at roost chimneys follows a basic pattern of near sunset gathering, circling the chimney, chattering, dipping, and entry about 20 minutes after sunset. However, behaviors may be variable within any portion of this pattern. Annual, seasonal, or even day-to-day changes in flock selection of a roost chimney found in this study was concurred in other studies (Green 1930, Pickens 1935, Coffey 1936), while variable aerial activity starting times and duration was also noted by Pickens (1935) and Michael and Chao (1973). Chimney circling, chattering, dipping, accumulating numbers of individuals, occasional flock departures for periods of time with sudden reappearances, and increased activity and intensity with approaching darkness are noted in other studies as well (Pickens 1935, Coffey 1936, Bent 1940, Michael and Chao 1973, Kyle and Kyle 2005). Those studies found both clockwise and counterclockwise flock circling while this study found only counterclockwise circling. Prevailing wind (direction, drafts, temperature), chimney visibility (light illuminated, in shadow, poorly focused), nearby

protruding obstacles (antennas, guy wires, other chimneys or buildings, roof-top heating/air conditioning units), human interference (activity, noises, lights), or missed staging cues within the roosting flock may be among the many factors that might contribute to the circling direction of staging flocks. The majority of the flock entering the chimney at approximately 15-20 minutes after sundown is in agreement with other studies (Michael and Chao 1973, Zammuto and Franks 1981, Kyle and Kyle 2005). I seldom saw more than eight swifts entering the chimney at one time helicoptering down tail-first, while urban flocks numbering in the thousands are reported to funnel en masse into big commercial chimneys (Pickens 1935; Coffey 1936, 1938; Bent 1940; Green 1940; Groskin 1945). Burns (1899) and Kyle and Kyle (2005) also observed only a few swifts at a time entering the roost. The difference in simultaneous entry numbers may be attributed to the smaller residential chimney openings versus the large commercial chimney openings that may even allow birds to enter head-first (Steeves et al. 2014). This study was consistent with the data presented in Kyle and Kyle (2005) where a majority (<50 individuals) of the swifts entered the chimney within a 5-6 minute period. Bent (1940) reported it took a flock in excess of 13,000 more than 15 minutes to enter a commercial chimney in Atlanta, Georgia, and similarly Groskin (1945) noted it took 10,000 swifts a variable 25-55 minutes (average 37 minutes) to enter a large commercial chimney near Philadelphia, Pennsylvania. A few late lingering swifts either disappearing from view and/or entering the chimney after dark were also related by others (Pickens 1935, Bent 1940, Kyle and Kyle 2005).

In conclusion, Chimney Swift south transient timing at staging roost chimneys and migrants overhead, plus sundown behavior at roost chimneys did not differ appreciably from that reported from other studies. However, the autumnal equinox coincided closely with the mean peak abundance in this study and transient high counts in other studies, suggesting that the celestial event may be an important indicator in the timing of south transient Chimney Swifts.

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