From Nesting to Emergence at a Half-Century Communal Wood Turtle (*Glyptemys insculpta*) Nesting Site: Species Phenology Across a Full Protected Season, Hatchling Consumption by Yellow Jackets (*Vespula* sp.), and Nest Protection by Overlaid Netting

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Version 2 — 8 September 2026 — the season complete, 3 August–2 September; prepared for journal submission.
Version 1 (28 August 2026) reported the record through the morning of 26 August.

Abstract.—Long-term records that connect a turtle nesting season to the hatchling emergence it produces, at daily resolution and across multiple species, are rare. At a communal nesting site in Washburn County, Wisconsin, protected and monitored by our family for over five decades, we surveyed both ends of the 2026 season daily: the nesting period (25 May–13 June; 171 turtle sightings of five species, 143 of them *Glyptemys insculpta*) and the hatchling emergence (3 August – 2 September; 189 hatchlings of three species — 51 Wood Turtle, 56 Snapping Turtle, *Chelydra serpentina*, and 82 Spiny Softshell, *Apalone spinifera*). Emergence recapitulated the nesting sequence species by species: median nesting-sighting date to median emergence date spanned 70 d for Wood Turtle, 78 d for Snapping Turtle, and 81 d for Spiny Softshell. The Wood Turtle nesting and emergence windows were each exactly 18 d. Both seasons were strongly pulsed, with the peak day carrying 25% (nesting) and 20% (emergence) of the season. Day-after-rain emergence was elevated (11.5 vs. 4.8 hatchlings/d; excluding a trace-rain day, 13.8 vs. 4.6/d, permutation $p = 0.03$): the season's two largest rains — 0.20 in on 20 August and a 1.74-in storm spanning 25–26 August — were each followed the next morning by its two largest pulses (37 and 21 hatchlings), and a 0.07-in overnight rain on 30–31 August — after four hatchling-less days — was followed on the misty morning of 31 August by four more Spiny Softshells, a third, smaller instance of the same displacement; the season then closed with four Softshells on each of two dry mornings, 1 and 2 September, which the pattern does not predict. Like the nesting-season same-day rain association, the pattern is event-driven in a single season and is offered for testing against future seasons. Hatchlings observed per nesting-season sighting varied from 0.36 (Wood) to 13.7 (Spiny Softshell), showing that nesting surveys and emergence counts census different species best. No Painted Turtle (*Chrysemys picta*) emerged, consistent with hatchling overwintering in the nest. We also report yellow jackets (*Vespula maculifrons*) feeding on a Spiny Softshell hatchling — to our knowledge unreported for hatchling turtles. Eight hatchlings (4.2%) were found dead at the surface, the last of them desiccated; and the return of the most active members of the 2025 predator assemblage was observed — Raccoon (*Procyon lotor*), deer mice (*Peromyscus*), and Broad-winged Hawk (*Buteo platypterus*); on 28 August, within the hatchling-less days, a deer mouse (*Peromyscus* sp.) was recorded by trail camera before sunrise carrying a turtle hatchling — to our knowledge the first record of *Peromyscus* taking a hatchling turtle, and a reminder that daily counts are lower bounds. Innovatively using fine netting newly overlaid on the outside-cage array partially blocked the raccoon: all three depredated nests lay beyond the netting margin, and every netted nest survived.

Key words.—*Glyptemys insculpta*; Wood Turtle; communal nesting; hatchling emergence; phenology; incubation interval; nest protection; *Vespula maculifrons*; scavenging; netting; *Apalone spinifera*; *Chelydra serpentina*; *Peromyscus*

INTRODUCTION

The Wood Turtle (*Glyptemys insculpta*) is a species of conservation concern throughout its range, and nest protection is among the most widely applied management responses (Bougie et al. 2020, 2022; Badje et al. 2024). Most assessments of protection, however, observe only one end of the reproductive season: nests protected in June are scored as hatched or depredated, and the emergence itself — its timing, its species composition, its geography, and the predator community it assembles — is rarely counted day by day. To our knowledge single-site accounts that measure both ends of the same season in one record, for a multispecies communal aggregation, are very uncommon. Multi-year records of emergence alone exist — a 21-yr record of hatchling emergence in a six-species Nearctic community, in which *Chelydra serpentina* emerged earliest and *G. insculpta* proved an obligate early emerger (Lovich et al. 2014), and the Savannah River Site record since 1968 that frames delayed emergence as the default for many species (Gibbons 2013) — but they are not paired with daily counts of the nesting season that produced them.

The communal nesting site described here, on a restored prairie–savanna along a tributary of a river in northern Wisconsin, has been monitored by our family for over five decades and actively protected since 2015; its history, protection chronology, and five first natural-history records for *G. insculpta* are consolidated in Vraniak et al. (2026). In 2026 we surveyed the site daily through both the complete nesting season (25 May–13 June; Vraniak et al. 2026) and the hatchling emergence (3 August–2 September). This paper reports the complete emergence record and joins the two ends of the season in one analysis.

We asked five questions: (1) What is the phenology and species composition of emergence at a protected communal site, at daily resolution? (2) Does the emergence sequence recapitulate the nesting sequence species by species — do the two ends of the season keep the same timing? (3) Is emergence, like nesting at this site, associated with rainfall? (4) What does measuring each end of the season see that the other misses — that is, how do daily nesting sightings and daily emergence counts census the five species differently? (5) What new predators and new protections did the 2026 emergence add to the site record? Under (5) we report an observation of yellow jackets (*Vespula maculifrons*) feeding on a hatchling turtle, which we believe is previously unreported, and the first season of results from fine netting overlaid on the outside-cage array.

MATERIALS AND METHODS

Study site.—The study area comprises ca. 100 ha of restored prairie, savanna, and associated river and stream wetlands within the Northwest Sands Ecological Landscape in Wisconsin, USA. The primary communal nesting area lies on the east bank of a coldwater tributary of a river and has been protected since 2015, most recently by a four-sided enclosed nesting structure with a gap along the bottom to allow turtles to enter and exit (Bougie et al. 2024); nests laid outside the structure are covered by an array of small wire cages, over which fine mesh netting was newly laid in 2026, covering the cages and the intervening ground. Precise coordinates are withheld on account of the conservation status of *G. insculpta*. Full site history, restoration, and protection chronology are given in Vraniak et al. (2026) and Lapin et al. (2016, 2019). Five turtle species nest at the site: *G. insculpta* (Wood Turtle), *Chelydra serpentina* (Snapping Turtle), *Apalone spinifera* (Spiny Softshell), *Chrysemys picta* (Painted Turtle), and *Emydoidea blandingii* (Blanding's Turtle).

Nesting-season surveys, 2026.—The nesting area was surveyed daily from 25 May (Day 1) through 13 June (Day 20), with checks in the morning, at midday, in the late afternoon, and at 2000 h; every turtle present was counted and identified to species (Vraniak et al. 2026; the daily counts are reproduced here as Fig. 1). Daily counts represent sightings, not unique individuals; three independent approaches bounded the season at roughly 40 nesting Wood Turtle females (Vraniak et al. 2026).

Emergence-season surveys, 2026.—Daily monitoring of the nesting structure and surrounding area began 2 August, before the first emergence; counts reported here run through 3 September, the first morning after the last hatchling on which none was found alive; daily checks continued through the season's four hatchling-less days (27–30 August) and after. Each day the structure, the outside-cage array, and the surrounding ground (driveway, trail, and creek margin) were checked at least each morning, with additional timed spot-checks (time, hatchlings present, air temperature, relative humidity) on high-activity days. Every hatchling encountered was identified to species and tallied on a standing field sheet, with daily high and low air temperature and rainfall; hatchlings found dead were recorded separately. Each new exit hole was numbered (40 numbered log entries through 1 September) and mapped to a grid over the structure floor (rows A–D running east to west, columns 1–8 running north to south), or logged by named location when it lay beyond the structure. A daily log of predators and other visitors (birds, mammals, insects) was kept on a third sheet, supplemented by telephoto photography and a trail camera (GardePro, motion-triggered, stamping temperature on each frame) at the structure. Three grid entries queried in the field as probable ant or ground-bee burrows were retained with the query and excluded from no analysis that depended on them.

Analysis.—For each species we characterized both seasons by their windows (first–last day with a record) and by the median date of all records, treating each sighting (nesting) or hatchling (emergence) as one record. Nesting-to-emergence intervals are reported median-to-median and first-to-first. Because nesting-season counts are sightings of females rather than confirmed oviposition dates, these are window-to-window intervals, not per-nest incubation periods. Rainfall associations were tested by permutation: the observed mean count on rain days (or the days immediately following) was compared with the distribution of means of equal-sized random day sets drawn from the season (200,000 draws). Analyses used Python 3 (NumPy); the full transcribed dataset, with every reading flag, has been retained as a workbook.

RESULTS

***Emergence phenology and totals.*—**The first hatchling of 2026, a Wood Turtle, emerged 3 August — 70 d after the first nesting-area sighting of the spring (25 May). Through 2 September we recorded 189 hatchlings of three species: 51 Wood Turtle, 56 Snapping Turtle, and 82 Spiny Softshell (Table 1; Fig. 2). Emergence was strongly pulsed. The largest single day, 21 August, produced 37 hatchlings (26 Snapping, 11 Spiny Softshell) — 20% of the season total — and the four largest days together carried 52%. The season proceeded as a species succession: Wood Turtles dominated 3–20 August and none was recorded after 20 August, suggesting Wood Turtle emergence was complete; Snapping Turtle emergence began 19 August and Spiny Softshell 17 August, Snapping continuing through 26 August and Softshell through 2 September, with 23 August an all-Softshell day (20 hatchlings) and the morning of 26 August — following a 1.74-in storm that spanned 25–26 August — the season's second-largest day (21 hatchlings: 12 Snapping, 9 Spiny Softshell, the largest Snapping count since the 21 August peak). Four hatchling-less days followed (daily checks, 27–30 August — though on 28 August the trail camera recorded a hatchling in a mouse's grasp before the morning check; see below); then on the misty morning of 31 August, after a 0.07-in overnight rain, four Spiny Softshells emerged — two near the structure, two on the driveway — reopening a window that had appeared closed. The dry mornings of 1 and 2 September each brought four more Spiny Softshells, the last hatchlings of the season; the check of 3 September found none alive. Spiny Softshell passed Wood Turtle in season total on 24 August. No sighting of Painted or Blanding's Turtle hatchling was recorded.

***The timing: species-aligned phenology.*—**For each of the three emerging species, the emergence window reproduced the nesting window at a species-specific delay, in the same order (Table 2; Fig. 3). Wood Turtle: nesting sightings 25 May–11 June (median 2 June), emergence 3–20 August (median 11 August) — 70 d median-to-median and 70 d first-to-first, with the two windows each exactly 18 d long. Snapping Turtle: nesting 28 May–7 June (median 4 June), emergence 19–26 August (median 21 August) — 78 d median-to-median. Spiny Softshell: nesting sightings 31 May–12 June (median 4 June), emergence 17 August–2 September (median 24 August) — 81 d, the twelve Softshells of 31 August–2 September moving the median by one day. The Wood Turtle, which nested earliest, emerged earliest and fastest; the later, longer timings of the other two species are the season's final values. For *G. insculpta* the peak nesting day (4 June, 36 sightings, spanning a midday rain) to the peak Wood Turtle emergence day (12

August, 12 hatchlings) was 69 d, at the fast edge of published incubation ranges (Walde et al. 2007).

Rainfall at both ends of the season.—During nesting, the four rain days carried a higher per-day rate of Wood Turtle sightings (11.0/d) than the 16 dry days (6.2/d), an association previously judged suggestive rather than firm (Vraniak et al. 2026); under the permutation test used here it remains so ($p = 0.19$). During emergence the pattern was displaced by one day: counts on the six rain days themselves were not elevated (4.5 vs. 6.5/d; $p = 0.66$), but counts on the mornings immediately following rain were (11.5 vs. 4.8/d; $p = 0.06$; excluding a trace-only sprinkle day, 13.8 vs. 4.6/d; $p = 0.03$), treating 26 August and 31 August — whose counts were made the mornings after overnight rain — as day-after mornings. The association now rests on three events: the season's largest pulse (37, on 21 August) came the day after its largest single-day rain (0.20 in on 20 August), and its second-largest (21, on the morning of 26 August) followed a 1.74-in storm spanning 25–26 August — just as the largest nesting day had itself spanned a rain — and its smallest, four Spiny Softshells on the misty morning of 31 August, followed a 0.07-in overnight rain after four hatchling-less days. Against it stand the season's last eight hatchlings, four on each of the dry mornings of 1 and 2 September with no rain in the preceding 48 h. The day-after association reaches conventional significance in one variant of the test, but it remains event-driven in a 31-d season; we report it as one season's mirrored pattern — same-day association at nesting, day-after association at emergence — for testing against future seasons.

End of the season censuses.—Hatchlings observed per nesting-season sighting differed by a factor of nearly forty among species (Table 2): 0.36 for Wood Turtle (143 sightings, 51 hatchlings), 5.6 for Snapping Turtle (10 sightings, 56 hatchlings), and 13.7 for Spiny Softshell (6 sightings, 82 hatchlings) — while Painted Turtle (10 sightings) and Blanding's Turtle (2 sightings) produced no recorded emergence at all. The nesting survey censuses the conspicuous, slow-staging Wood Turtle well and the fast-nesting Spiny Softshell poorly; the emergence count reverses the ranking.

The geography of emergence.—Of the exit-hole log's 40 numbered entries, 26 mapped holes lie within the structure grid (row A, nearest the east wall which is nearest the creek, 10; row B, 7; row C, 3; row D, 6; five of these queried as possible ant or ground-bee burrows) and at least 15 exits lie beyond it (one entry covers three holes dug on the south side). The off-structure share rose sharply late in the season: of the 13 dated off-structure entries, 11 are dated 19 August or later — the driveway and its culvert (two attributed to Spiny Softshell, the second on 31 August), the hill, the trail (two entries, one attributed to Spiny Softshell), near the driveway channels, and the season's last entry, a Spiny Softshell exit logged 1 September outside the structure — coinciding with the shift from Wood Turtle to Snapping and Softshell emergence. The three depredated nests of 21 August also lay outside — beyond the netting margin (see below). Snapping turtles and spiny softshells nesting outside of the nesting enclosure preferred the southern exposed slope, and all species hatchlings tended to move along the trail that parallels the long enclosure when exiting the western side, while those exiting the eastern side of the enclosure immediately entered the creek.

Hatchling deaths and digging.—Eight of the 189 hatchlings (4.2%) were found dead at the surface: two Wood Turtles on 13 August (one caught in roots), three Spiny Softshells on 17 August, one Spiny Softshell each on 20 and 21 August, and — the season's last — a Spiny Softshell found on 3 September in a tuft of grass 4 ft south of the structure at its eastern edge, crusted in sand and dried to the size of a quarter, with several small holes along the carapace margin (insect scavenging after death suspected, not observed); the eaten remains of a further hatchling were found near the structure on 24 August (Fig. 4K). None was lost to nest predation under protection. Digging was found at the structure on 20 August, and on 21 August three nests in the outside area — all beyond the netting margin — were dug out; both are the work of a returning Raccoon (*Procyon lotor*), photographed at the netted cage array by trail camera at 0552 h on 25 August (Fig. 4J). It was one of the season's dead — the Spiny Softshell hatchling on the gravel drive — that drew the yellow jackets reported below.

The predator and visitor record.—The daily visitor log (Table 3; Fig. 4) recorded Great Blue Heron (*Ardea herodias*) — a documented predator of hatchling turtles (Niemela and Bury 2012) on four dates, Broad-winged Hawk (*Buteo platypterus*) on seven dates beginning 7 August — on 1 and 2 September sitting the top of the tall Red Pine over the structure on its fourth successive morning and, on 2 September, dropping to take something and carrying it toward the river — two Turkey Vultures (*Cathartes aura*) with two Broad-winged Hawks on 17 August, a Red-tailed Hawk (*Buteo jamaicensis*) on 21 August, and a Green Heron (*Butorides virescens*) on 24 and 26 August — the last three species new to the 2026 record, though not to the site. (A Bald Eagle, *Haliaeetus leucocephalus*, photographed 23 August, was out at the river, where it caught a beaver kit and carried it to a branch as a visiting field trip group looked on — a river observation, not part of the structure record.) The trail camera recorded a deer mouse (*Peromyscus* sp.) on the netting of the outside-cage array at 0506 h (6°C) and a Snapping Turtle hatchling bound in roots at 0205 h on 22 August, a Raccoon at the netted cage array at 0552 h on 25 August (Fig. 4J; see above), and — at 0548 h on 28 August, at 5°C and before sunrise, within the four hatchling-less days — a deer mouse carrying a turtle hatchling (Fig. 5; see below); a Raccoon was logged at the structure again on 2 September, after the last hatchlings. Nests within the protected area were depredated on 30 July, before first emergence, and a hatchling opened by avian pecking was found 13 August. Every 2026 predator at the structure is a return: the Raccoon (3 individuals in 2025), Prairie Deer Mouse, and Broad-winged Hawk (9 individuals in 2025, the most frequently recorded taxon) — the three most active members of the 2025 assemblage — along with the herons, vultures, and hawks above, all appear in the ≥17-taxon assemblage documented at the structure during the 2025 emergence (Vraniak et al. 2026). The predictable pulse is now attended by a predictable predatory assemblage; only the yellow jackets (below) are new, and the deer mouse returns at a new stage — a hatchling in 2026 where it carried eggs in 2025 (below). Two juveniles also attended the season's end: a two-to-three-year-old Snapping Turtle at the site on

27 August, and on 2 September a six-year-old juvenile Wood Turtle beside the structure — earlier cohorts of this bank, surviving toward maturity.

Hatchling consumption by yellow jackets.—At 0955 h on 21 August 2026, during the peak emergence pulse, we found a recently dead *A. spinifera* hatchling lying on the gravel drive near a mapped hatchling exit route first recorded 19 August. Two to three yellow jackets (*Vespula maculifrons*, the Eastern Yellowjacket; identified from the archived photographs by K. J. Loope from the diagnostic anchor-shaped mark on the first abdominal segment) were feeding on the carcass, concentrating on the soft tissue of the neck, head, and forelimb bases, where the skin had been opened and tissue was being removed and carried off (Fig. 4F, G). Wasps departed and returned repeatedly, and feeding was still in progress when observations ended at 1039 h — at least 43 min of sustained attendance. Whether the hatchling was scavenged after death from other causes, or was attacked while moribund, is unknown; it was one of six *A. spinifera* hatchlings found dead during this emergence. That the carcass was a Spiny Softshell may not be incidental: the species' long neck and soft, leathery integument offer more accessible tissue than the harder, more fully ossified hatchlings of the site's other species, and six of the season's eight dead were *A. spinifera* — the species most vulnerable, among those emerging, to a consumer that works by opening soft tissue. Yellow jackets are well-known facultative scavengers of vertebrate carrion (Akre et al. 1981), and their late-summer colony maximum coincides with the concentrated hatchling emergence at this site. We are aware of no prior published record of yellow jackets feeding on a hatchling turtle.

Hatchling carried by a deer mouse (Peromyscus sp.).—At 0548 h on 28 August, at 5°C and before sunrise, the trail camera at the structure recorded a deer mouse (*Peromyscus* sp.) carrying a turtle hatchling (Fig. 5). The frame stands alone — no adjacent images were captured — but on enlargement a head, a tail, and at least two limbs are visible, of a size and conformation consistent with a hatchling, held against the mouse's chest between the forelimbs. The mouse is identified to genus only; the Prairie Deer Mouse (*P. maniculatus bairdii*) is the *Peromyscus* documented at the structure carrying eggs in 2025 (Vraniak et al., in press). The same camera had recorded a deer mouse on the netting of the outside-cage array at 0506 h on 22 August (6°C), so the array was visited by *Peromyscus* on at least two pre-sunrise mornings during the emergence. The hatchling's species could not be determined; on that date it was most likely *C. serpentina* or *A. spinifera*, the Wood Turtle's emergence having closed on 20 August. Whether it was taken alive or scavenged is unknown; at 5°C a hatchling above ground would have been cold-slowed, and mice pass freely through the structure's mesh and gap. The frame falls within the four days (27–30 August) on which the daily check found no hatchling: a hatchling present and removed before the morning check is counted by no one, so the daily count sets a lower bound on emergence rather than a census of it, and rodent removal of hatchlings is an unmeasured term in survival at the site. Small-mammal predation on turtle eggs, including by *Peromyscus*, is documented (Vraniak et al., in press); we are aware of no prior record of *Peromyscus* carrying or preying on a hatchling turtle.

Nest protection by overlaid netting: the raccoon partially blocked.**—**On 21 August, three nests in the outside area were dug out by the returning Raccoon, and all three lay beyond the margin of the fine netting newly overlaid on the cage array this year (Fig. 4H). Every nest beneath the netting remained intact, including nests between cages protected by the netting alone, and no cage was disturbed. The netting thus partially blocked the raccoon: complete protection where it reached, none beyond its edge — the depredation stopping precisely at the netting margin both demonstrates its effectiveness and marks where next season's arrangement must extend. The netting does not impede emergence: hatchlings surface and pass beneath it freely (Fig. 4I).

DISCUSSION

The two clocks.**—**The clearest result of measuring both ends of the season in one record is that emergence is not one event but a species succession, and the succession keeps the nesting season's own order: the species' median-to-median delays (70, 78, 81 d) preserve the sequence in which they nested, and the Wood Turtle's season translated most rigidly — an 18-d nesting window reappearing as an 18-d emergence window 70 d later, with first-to-first and median-to-median intervals identical. The longer delays of Snapping and Spiny Softshell are consistent with the generally longer incubation of those species at northern latitudes (Ernst and Lovich 2009), and with the season closed the Softshell's delay, at 81 d, is the longest of the three. For managers the practical reading is that nesting phenology predicts emergence phenology species by species: a site's June record schedules its August protection, species by species, with the Wood Turtle pulse arriving first. We caution that nesting-season counts are sightings rather than oviposition dates, so these are window-to-window intervals; matching individual June nests to August exit holes by grid cell — for which the field maps are in place — would convert them to true per-nest incubation periods.

Rain at both ends.**—**The 2026 season showed a suggestive, mirrored rainfall pattern: nesting activity clustered on rain days (Vraniak et al. 2026), while emergence clustered the day after rain. Neither association is statistically firm in a single short season, and each rests heavily on its largest events; but the displacement itself is a coherent hypothesis — one that recurred in miniature at the season's end, when a 0.07-in overnight rain after four hatchling-less days was followed by four more Softshells on 31 August — and then, on two dry mornings, by eight more, which the hypothesis does not predict. Rain (with warm, humid conditions) may act as an immediate cue to nesting females (Walde et al. 2007; Geller et al. 2022), whereas for hatchlings rain may act on the substrate — softening and moistening the overburden through which they dig — so that its effect appears with a lag. The two timings make this testable: future seasons at this site will accumulate rain events at both ends under identical daily protocols.

Two censuses, five species.**—**The nearly forty-fold range in hatchlings per nesting-season sighting is largely a detectability and life-history gradient, and it means the two ends of the season census different species best. The Wood Turtle stages conspicuously at the nesting area, often across several days (Walde et al. 2007), and so dominates the sighting record; the Spiny

Softshell, fast and wary in its nesting visits but laying large clutches (Ernst and Lovich 2009), is nearly invisible in June — six sightings — yet produced the largest observed emergence of any species, 82 hatchlings. A nesting-season survey alone would have ranked the site's 2026 reproduction Wood, Painted, Snapping, Softshell, Blanding's; the emergence count ranks it Softshell, Wood, Snapping. Sites assessed only by nesting surveys may thus systematically under-credit softshell (and over-read painted) reproduction. The Painted Turtle's zero is itself informative: hatchling *C. picta* commonly overwinter in the natal nest and emerge the following spring (DePari 1996; Costanzo et al. 2008), so the ten June sightings generate a specific prediction — Painted Turtle emergence at this structure in spring 2027 — that next season's monitoring can test.

The emergence and its newest predator.—Sustained protection has made this site's emergence large and predictable, and that predictability keeps recruiting predators: the badger from below (Vraniak et al. 2017), the deer mouse at the surface — carrying eggs in 2025 (Vraniak et al., in press) and, this season, a hatchling — the hawk and the herons from above, the roots from within (Vraniak and Vraniak, in press; Vraniak and Geller 2017; consolidated in Vraniak et al. 2026) — and now the wasps at the margin, converting even the season's dead into part of emergence predation. The raccoon, the deer mouse, and the Broad-winged Hawk — the most active taxa of the 2025 assemblage — all returned in 2026, evidence that the assemblage a protected aggregation recruits is not incidental but faithful, reassembling around the pulse each August. The yellow-jacket observation is modest in itself — two to three workers, one carcass, scavenging or predation-of-the-moribund left open. Its timing is not incidental: *Vespula* colonies reach their annual maximum in exactly the weeks this site concentrates dozens of soft-bodied neonates in a small area. Whether wasps at such aggregations will also attack live, weakened, or emerging hatchlings, as they do other small vertebrates, is a question close observation in the coming seasons may answer; the predator log now places insects in their own column.

Protection, layer by layer.—The netting result extends the site's phased, multidimensional protection framework (Vraniak et al. 2026): each season's losses have located the next season's refinement — fencing against the badger, enclosure against diggers, screening against the hawk, root clearing within — and the netting now takes its place in that sequence, its first season stopping the returning raccoon precisely at its edge. The 2026 emergence also shows what the framework protects: of 189 hatchlings counted, eight (4.2%) were found dead at the surface, none to nest predation under protection, and the only depredated outside nests were the three the netting did not yet reach; the mouse with a hatchling marks the one opening in the surface tier that exclusion cannot close without confining the hatchlings themselves. Incremental progress, year upon year, is itself the method.

Limitations.—These are direct daily counts at a single site in a single season: all cross-species intervals are window-to-window rather than per-nest. Counts are of hatchlings encountered; the trail camera's 0205 h detection of 22 August shows that some emergence and mortality occur overnight between checks, and its 0548 h frame of 28 August that a hatchling can be removed before the morning check; totals are minima. The rainfall tests are underpowered by design — we prefer to report one season's suggestive pattern than to pool it prematurely. The value of the record is its resolution and its completeness at both ends; its statistical weight will come from the seasons that follow it.

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AUTHOR CONTRIBUTIONS AND DISCLOSURE

D.A.V. conceived and directed the study; C. Vraniak, D. Vraniak, and A. Vraniak made observations, collected and recorded data; D.A.V. and C. Vraniak wrote and edited the report; all analyses, methods, statistics, results, and interpretations were specified, verified, and approved by the first author; the final text was written and edited by the first author and is responsible for the content of this manuscript. Observations and nest protection were conducted by the authors on private land. Wood Turtle handling and radio-telemetry (2014–2015) were carried out by the Wisconsin DNR and collaborators as part of the four-state Upper Midwest Riverine Turtle Habitat Improvement project (Competitive State Wildlife Grant no. F14AP00041); sampling and handling methods were approved by the Animal Care and Use Committee of the Wisconsin DNR (no. 14_Lapin_01). No external funding from that project was received by the authors. Data is available upon request.

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TABLES AND FIGURES

TABLE 1. Daily hatchling emergence counts by species at the protected communal nesting site, Washburn County, Wisconsin, USA, 3 August–3 September 2026. Dashes indicate no recorded count. * = morning count only. The 25–26 August storm delivered 1.74 in of rain in total. Cumulative and total figures reproduce the field sheet's running tallies exactly. No hatchling was found on the daily checks of 27–30 August (but see the trail-camera frame of 28 August, Fig. 5); four Spiny Softshells emerged 31 August after a 0.07-in overnight rain, four on each of 1 and 2 September, and on 3 September none alive — one Spiny Softshell hatchling found desiccated.

Date	Day	Wood	Snap.	Soft.	Total	Cum.	Dead	Weather
3 Aug	1	1			1	1		
4 Aug	2					1		sprinkle (early a.m.)
5 Aug	3					1		
6 Aug	4	11			11	12		0.01 in (3 p.m.)
7 Aug	5					12		
8 Aug	6					12		
9 Aug	7					12		
10 Aug	8	7			7	19		early fog, 96% RH
11 Aug	9	9			9	28		
12 Aug	10	12			12	40		
13 Aug	11	5			5	45	2	
14 Aug	12					45		
15 Aug	13					45		
16 Aug	14					45		
17 Aug	15	4		4	8	53	3	
18 Aug	16					53		
19 Aug	17	1	1	2	4	57		0.02 in; sprinkle 9:30 a.m.
20 Aug	18	1	4	2	7	64	1	0.20 in
21 Aug	19		26	11	37	101	1	
22 Aug	20		9	1	10	111		
23 Aug	21			20	20	131		
24 Aug	22		3	17	20	151		
25 Aug*	23		1	4	5	156		0.08 in by evening; storm continuing
26 Aug*	24		12	9	21	177		1.74 in total, 25–26 Aug (overnight)
27 Aug	25					177		
28 Aug	26					177		
29 Aug	27					177		
30 Aug	28					177		0.07 in overnight (30–31 Aug)
31 Aug	29			4	4	181		misty, overcast morning
1 Sep	30			4	4	185		
2 Sep	31			4	4	189		
3 Sep	32					189	1	none alive; desiccated Softshell hatchling found
Total		51	56	82	189		8	

TABLE 2. The two clocks: species-aligned nesting and emergence phenology, 2026. Nesting figures are daily sightings (25 May–13 June; Vraniak et al. 2026), not confirmed oviposition dates; emergence figures are hatchlings counted through 2 September, the season complete. H/S = hatchlings observed per nesting-season sighting.

Species	Sight. (Jun)	Nesting window	Nest. med.	Hatch.	Emergence window	Em. med.	Med.→med. (d)	First→first (d)	H/S
Wood	143	25 May–11 Jun (18 d)	2 Jun	51	3–20 Aug (18 d)	11 Aug	70	70	0.36
Snapping	10	28 May–7 Jun (11 d)	4 Jun	56	19–26 Aug (8 d)	21 Aug	78	83	5.6
Softshell	6	31 May–12 Jun (13 d)	4 Jun	82	17 Aug–2 Sep (17 d)	24 Aug	81	78	13.7
Painted	10	26 May–13 Jun (19 d)	1 Jun	0	—	—	—	—	0
Blanding's	2	29 May–10 Jun (13 d)	4 Jun	0	—	—	—	—	0

TABLE 3. Predators and other visitors recorded in the daily log at the nesting structure during the 2026 emergence, 3 August–3 September. The log's standing columns are Bird, Mammal, Insect, and Herp; the yellow-jacket and trail-camera records appear in the Results. Slats were removed from the structure 26 July.

Date	Record	Note
5 Aug	Great Blue Heron (Ardea herodias)	time annotation read as 11 a.m.
7 Aug	Broad-winged Hawk (Buteo platypterus)	ca. 7 a.m.
13 Aug	Great Blue Heron	8 p.m.
14 Aug	Broad-winged Hawk	ca. 6 a.m.
16 Aug	Broad-winged Hawk	
17 Aug	Turkey Vulture (Cathartes aura), 2; Broad-winged Hawk, 2	
18 Aug	Great Blue Heron	
20 Aug	Mammalian digging at the structure	attributed to Raccoon (Procyon lotor), photographed at the structure (Fig. 4J)
21 Aug	Red-tailed Hawk (Buteo jamaicensis); Raccoon depredation of 3 nests beyond netting	RTH first of season; also yellow jackets at hatchling carcass, 0955–1039 h
22 Aug	Deer mouse (Peromyscus sp.) on the netting; Snapping Turtle hatchling root-bound	trail camera, 0506 h and 0205 h
24 Aug	Green Heron (Butorides virescens); Broad-winged Hawk	Green Heron first of season; eaten remains of a hatchling found near the structure
25 Aug	Great Blue Heron; Raccoon	Raccoon at the netted cage array, trail camera 0552 h
26 Aug	Green Heron	
28 Aug	Deer mouse (Peromyscus sp.) carrying a turtle hatchling	trail camera, 0548 h, 5°C, before sunrise (Fig. 5)
1 Sep	Broad-winged Hawk	on the Red Pine over the structure
2 Sep	Broad-winged Hawk; Raccoon	hawk on the Red Pine over the structure, fourth successive morning; dropped to take prey toward the river; six-year-old juvenile Wood Turtle beside the structure

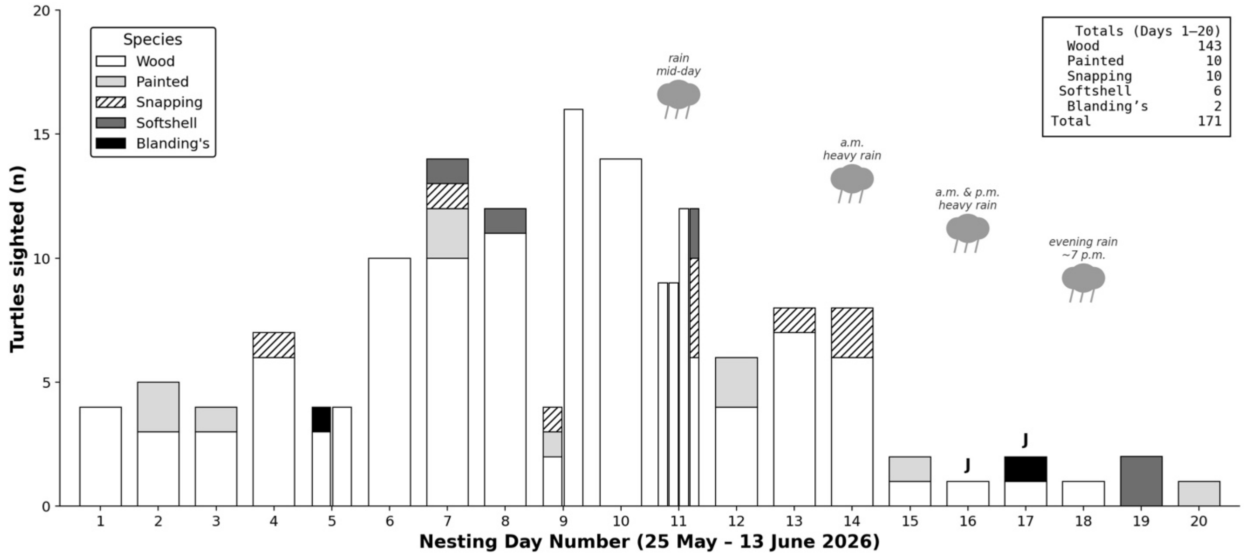

FIG. 1. Number of turtles by species sighted at the communal nesting site, 25 May–13 June 2026 (Days 1–20); reproduced from Vraniak et al. (2026, Fig. 2). Cloud symbols mark rain days; J denotes juveniles; narrower adjacent bars show separate same-day arrivals.

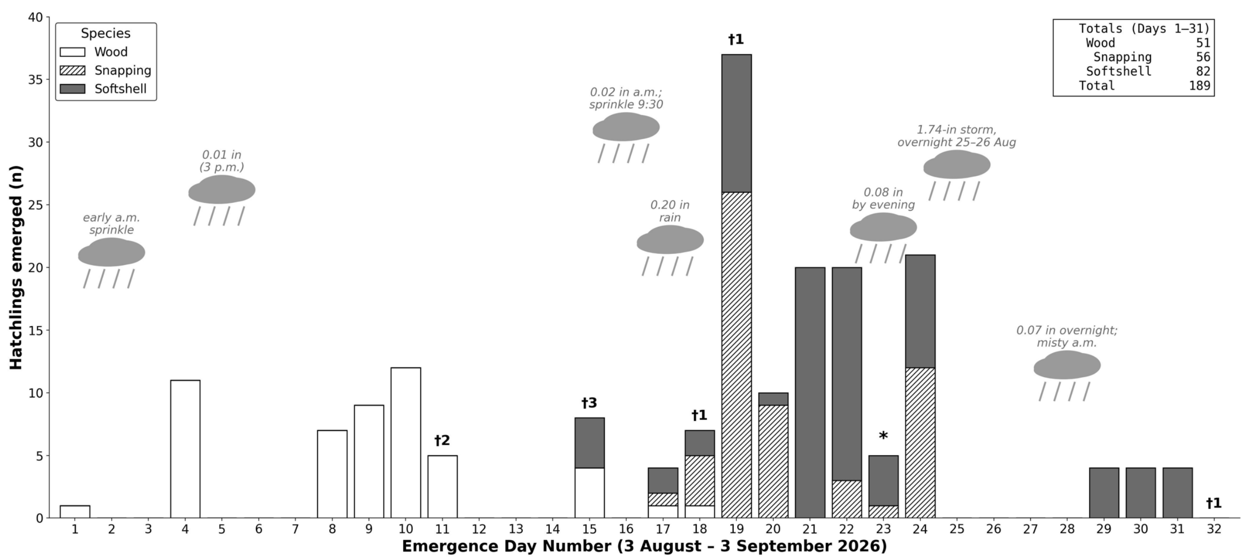

FIG. 2. Number of hatchling turtles by species emerging at the protected communal nesting site, 3 August–3 September 2026 (Days 1–32; Day 1 = 3 August, first hatchling; Day 32 = 3 September, none alive). **Bars are daily counts from the emergence tally sheet; Days 14 and 16 had no recorded count,** and the daily checks of Days 25–28 and Day 32 found none alive. **Cloud symbols mark rainfall (Days 2, 4, 17, 18, 23, the 1.74-in storm overnight into Day 24, and a 0.07-in overnight rain into Day 29);** † marks hatchlings found dead that day (Day 11, two Wood; Days 15, 18, 19, and 32, six Spiny Softshell in all); *** marks Day 23, a morning count only.**

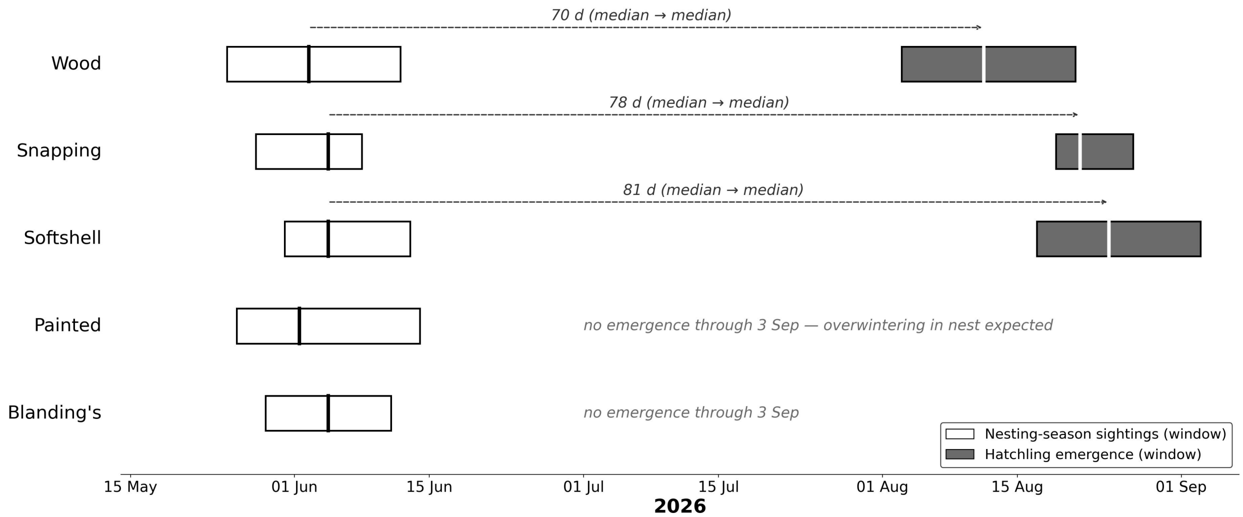

FIG. 3. The two clocks: nesting-season sighting windows (open bars, 25 May–13 June) and hatchling-emergence windows (gray bars, 3 August–2 September) for the five turtle species **at the site, 2026. Vertical ticks mark the median date of each window (black on nesting bars, white on emergence bars); dashed arrows connect medians, labeled with the median-to-median interval.** The season is complete; no window remains open. **Nesting bars show sightings, not confirmed oviposition dates.**

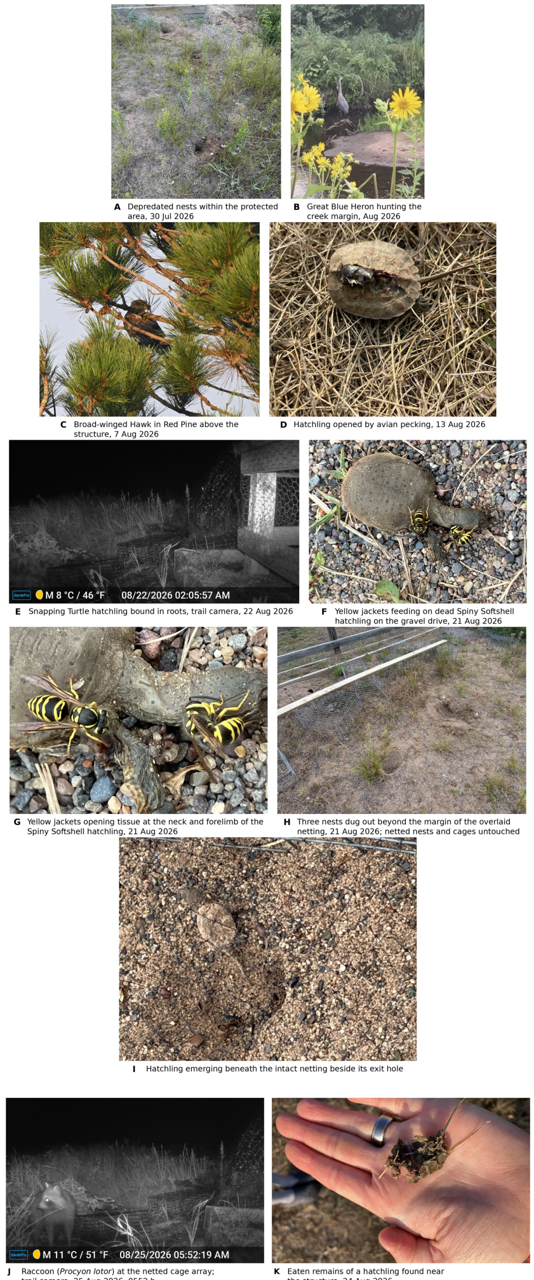

FIG. 4. The 2026 hatchling-emergence predator record, and the netting protection result. (A) Depredated nests within the protected area, 30 July. (B) *Ardea herodias* hunting the creek margin below the nesting bank. (C) *Buteo platypterus* perched in a Red Pine above the nest protection structure, 7 August. (D) Hatchling opened by avian pecking, 13 August. (E) *Chelydra serpentina* hatchling bound in roots; trail-camera frame, 22 August, 0205 h. (F) Yellow jackets (*Vespula maculifrons*) feeding on a dead *Apalone spinifera* hatchling on the gravel drive, 21 August. (G) Detail: wasps opening and removing tissue at the neck and forelimb. (H) Three nests dug out beyond the margin of the overlaid netting, 21 August; every netted nest, and every cage, was untouched. (I) A hatchling emerging beneath the intact netting beside its exit hole. (J) Raccoon

(*Procyon lotor*) at the netted cage array — the returning excavator of the 20 August digging and the three nests beyond the netting; trail-camera frame, 25 August, 0552 h. (K) Eaten remains of a hatchling found near the structure, 24 August.

FIG. 5. A deer mouse (*Peromyscus* sp.) carrying a turtle hatchling at the nesting structure; trail-camera frame, 28 August 2026, 0548 h, 5°C, before sunrise, within the four days on which the daily check found no hatchling. (A) The full frame, the mouse boxed. (B) Enhanced detail of the same frame: the hatchling held against the chest between the forelimbs, with head, tail, and at least two limbs visible on enlargement. The hatchling's species could not be determined.