New Wine in Old Bottles: Using Modified Hoopnets to Catch Bait-Averse Basking Turtles

One of the most popular trap designs for capturing freshwater turtles for research is the baited three-hoop trap, which has a funnel-shaped throat of netting on the front hoop designed to facilitate ingress and block egress (Lagler 1943; Legler 1960; Vogt 2012). Oftentimes, however, certain target species are poorly sampled in baited traps (e.g., Graptemys spp., Pseudemys spp., Sternotherus spp.; Lagler 1943; Cagle and Chaney 1950; Plummer 1979; Browne and Hecnar 2005; Sterrett et al. 2010; Vogt 2012). Many of the bait-averse species are habitual baskers, thus a variety of basking trap designs have been described for catching such species. Many basking traps described in the literature work by inducing turtles to bask on platforms that are a component of the trap and some designs have additional components to prohibit turtles from climbing out of the traps after capture; such traps tend to be relatively cumbersome (e.g., Lagler 1943; Cagle 1950; Ream and Ream 1966; MacCulloch and Gordon 1978; Plummer 1979; Browne and Hecnar 2005; Valdeón et al. 2010) and are difficult to use in lotic habitats. As an alternative, open-top basking traps constructed of netting or PVC-coated crawfish wire have been placed at or just below the water’s surface (Fig. 2). A weight in the bottom of each netting piece of twine so that the opening was approximately flush with the water’s surface (Fig. 2). A weight in the bottom of each net (right). Such that the former throat is now the bottom of the net (right).

I trapped turtles in the Alabama River in Autauga and Lowndes counties, Alabama, in early July 2011 and mid June 2012 and 2013 and at a variety of sites on the Mermentau, lower Calcasieu, and Sabine river drainages in southwestern Louisiana, including the border with Texas, in May and early June 2012 and 2013. Trapping time on the Alabama was limited to ca. 4–5 hours most days due to water releases from an upstream dam that raised the river level daily by more than 1 m; times spent on the Mermentau, Calcasieu, and Sabine drainages were more variable, but rarely allowed more than 3–5 boat passes per basking trap.

To modify hoopnets as basking traps, I cut the netting at the front of the middle hoop of five 0.9-m diameter hoopnets (2.5-cm mesh) such that the front part of each original trap consisted of a hoop, outside netting to the point cut, and throat, while the back part consisted of two hoops and netting gathered at the back. The throat of each front section was then cut away from the first hoop, sewn to that hoop’s outside netting, and tied shut, yielding 10 open-top nets from the original five traps (Fig. 1). In setting the nets as basking traps underneath logs and branches used by basking turtles, I rotated them 90° so that their open ends faced upward and tied them in place with two nylon ropes or pieces of twine so that the opening was approximately flush with the water’s surface (Fig. 2). A weight in the bottom of each net.

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Image 1: Two basking traps constructed from a single hoopnet, by removing the two back hoops (left) and cutting the throat out of the inside of the former first hoop and sewing it to its outside netting, such that the former throat is now the bottom of the net (right).
extended its depth to ca. 1–1.5 m (deeper for the double-hooped rear sections of the original traps), so that turtles diving into the traps could dive deeply into the nets before encountering confinement. Additional traps deployed were 0.91-m diameter hoopnets baited with canned tuna in Louisiana and unbaited 0.91-m diameter fykenets with 5-m lead nets (Vogt 2012) in Alabama and Louisiana.

Turtles were spotted over traps with the aid of binoculars and approached rapidly in a jonboat, eliciting a flight response (Selman et al. 2012). Due to shallow water that did not allow use of an outboard motor, a canoe and paddles were used in one four-day trapping session on a tributary of the Calcasieu, the Whiskey Chitto River, and another three-day trapping session on the Sabine. During 2012 trapping on the Alabama River, I recorded hours spent on the river, numbers of turtles that I attempted to induce to jump into nets, and numbers captured. I measured the midline plastron length (PL) of turtles I captured, marked them (Cagle 1939), and released them at their sites of capture.

Using hoopnet basking traps on the Alabama River, I captured 82 turtles in 80 trap-days in 2011, 67 turtles in 73 trap-days in 2012, and 59 turtles in 49 trap-days in 2013, for an overall average of 1.03 turtles/trap-day. Pooling years, I captured 125 *Graptemys nigrinoda*, 61 *Graptemys pulchra*, 13 *Pseudemys concinna*, and 9 *Trachemys scripta* on the Alabama. Using hoopnet basking traps on the Mermentau, Calcasieu, and Sabine rivers, I captured 79 turtles in 119 trap-days in 2012 and 92 turtles in 140 trap-days in 2013, an overall average of 0.66 turtles/trap-day, including 141 *Graptemys sabinensis*, 17 *Graptemys pseudogeographica*, 10 *P. concinna*, and 3 *T. scripta*. While some traps caught no turtles on one or more days, at the other extreme, some caught as many as 10 turtles per day. Among the highest-yielding traps, with frequent multiple captures (i.e., more than one turtle at a visit), were those situated under “archway” sites, i.e., deadwood that projected out of the water and then back down into the water, allowing turtles to access the site from either end (e.g., Fig. 2b).

Capture success was for the most part lower for baited hoopnets and unbaited fykenets. In Louisiana, I captured 0.20 turtles/hoopnet-night (21 turtles in 103 trap-nights) and 0.85 turtles/fykenet-night (121 turtles in 143 trap-nights). In Alabama, I captured 0.33 turtles/fykenet-night (50 turtles in 150 trap-nights).

On the Alabama River in 2012, hoopnet basking traps captured 56% of turtles judged to be situated above their openings (67 of 119) and the overall rate of capture was 2.52 turtles/10 trap-
Table 1. Capture success of basking traps on the Alabama River in 2012, with success rate (percent of turtles observed over traps that were captured) and number of captures per 10 trap-hours (10 being the typical number of traps deployed at one time).

<table>
<thead>
<tr>
<th>Date</th>
<th>Captures</th>
<th>Misses</th>
<th>Success rate (%)</th>
<th>Trap hours</th>
<th>Captures/10 trap hours</th>
</tr>
</thead>
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<tr>
<td>11 June 2012</td>
<td>2</td>
<td>2</td>
<td>50</td>
<td>21</td>
<td>0.95</td>
</tr>
<tr>
<td>12 June 2012</td>
<td>19</td>
<td>5</td>
<td>79</td>
<td>34</td>
<td>5.59</td>
</tr>
<tr>
<td>13 June 2012*</td>
<td>2</td>
<td>6</td>
<td>25</td>
<td>24</td>
<td>0.83</td>
</tr>
<tr>
<td>14 June 2012*</td>
<td>2</td>
<td>3</td>
<td>40</td>
<td>16</td>
<td>1.25</td>
</tr>
<tr>
<td>15 June 2012*</td>
<td>10</td>
<td>17</td>
<td>37</td>
<td>40.5</td>
<td>2.47</td>
</tr>
<tr>
<td>16 June 2012</td>
<td>16</td>
<td>7</td>
<td>70</td>
<td>53</td>
<td>3.02</td>
</tr>
<tr>
<td>17 June 2012</td>
<td>7</td>
<td>7</td>
<td>50</td>
<td>43.5</td>
<td>1.61</td>
</tr>
<tr>
<td>18 June 2012</td>
<td>9</td>
<td>5</td>
<td>64</td>
<td>33.5</td>
<td>2.69</td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
<td>52</td>
<td>56</td>
<td>266</td>
<td>2.52</td>
</tr>
</tbody>
</table>

*Dates when the river was higher and more variable than at normal pool levels.

Fig. 3. Length-frequency distribution of six turtle species captured in hoopnet basking traps in the Alabama, Mermentau, Calcasieu, and Sabine river drainages, 2011–2013.

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moderate river currents (pers. observ.) or in lotic habitats with abundant existing basking substrates (W. Selman, pers. comm.). Hoopnet basking traps should thus be tied to basking substrates in a manner that allows easy and rapid adjustment of their height in the water column.

Turtles were almost always at the bottoms of nets when I reached them. Some care is necessary in pulling up the inside of the nets to retrieve turtles, as two of the “misses” in Table 1 came from trapper error, i.e., allowing turtles to escape over the top hoop as the traps were pulled upward.

The size-frequency distribution of turtles captured in basking traps shows that all size classes were well represented among captures, from a hatchling G. sabinensis measuring 36 mm PL to a female P. concinna measuring 265 mm PL (Fig. 3). The highly bimodal nature of the distribution is a consequence of the dominance of species of Graptemys, which are strongly sexually size dimorphic (Lindeman 2013). The size classes ≥ 210 mm in PL were only lightly populated (3 female P. concinna and 1 female G. pseudogeographica), because the only species that commonly reaches this size, P. concinna, was substantially less common in the basking turtle fauna than the smaller Graptemys spp. and T. scripta. The traps should capture large Pseudemys spp. well in habitats where they are more abundant, although a larger hoop diameter may better target larger turtles.

Paddling a canoe toward traps worked moderately well on the upper Sabine River, where capture rate was 0.4 turtles/trap-day (11 turtles in 27 trap-days), but yielded no captures in 8 trap-days on the Whiskey Chitto River. The difference was likely related to basking frequency, which was markedly lower on the Whiskey Chitto than on the Sabine during trapping days. Checking traps from a canoe meant less of the river could be covered and fewer checks of traps were possible, thus a motorized boat remains the better option in river reaches that are deep enough.

It was not uncommon to recover turtles not seen over traps before approach, demonstrating the ability of traps to occasionally hold turtles for long periods of time. These bonus or “Easter-egg” turtles were captured both when trap rims were slightly above the surface or slightly below and were always at the bottom of the trap when it was pulled up, suggesting that the ca. 1- to 1.5-m depth of the traps may be an added advantage of the design. In my experience, turtles often rapidly escape basking frame traps (the design of MacCulloch and Gordon 1978) with shallower nets (ca. 30–50 cm) and trapping turtles that were not seen on the basking platform of the trap during approach is much rarer.

All nets in the present study were set under logs and branches that projected up from the water at an angle (Fig. 2), so that traps could be set with the opening flush with or just above the river surface in an attempt to limit escapes. In a habitat in which the main basking substrates lie flat at the surface with a substantial underwater portion, as with floating logs, modification will be necessary to avoid setting the opening too low in the water column. Nails and twine can be used to secure a trap alongside a horizontal log, with additional nails on the opposite side of the...
log to prevent turtles from escaping into the water on that side, as described by Selman et al. (2012).

Two advantages of the method described over many other basking trap designs are ease of transport and cost. Ten traps collapse to a 1-m circle that stands ca. 15 cm high and thus take up little space in a trailered boat or in the back of a vehicle, in contrast to the bulky three-dimensional shape of crawfish-wire traps and traps with treadles. A 4.3-m jonboat can hold 15–18 nested crawfish-wire traps of various sizes, but they take up the majority of the deck and hull space (W. Selman, pers. comm.). Cost of five hoopnets that can be modified to produce 10 basking traps is ca. US $600 plus shipping (Memphis Net and Twine, Memphis, Tennessee).

Acknowledgments.—I thank W. Selman, who demonstrated the use of jonboat approach with crawfish-wire traps on the Alabama River for me in 2009 and thus helped to motivate the conception of my new trap design. Trapping was ably assisted by A. Fehrenbach and S. McFadden in Louisiana in 2012 and F. Armagost in Louisiana and Alabama in 2013. The manuscript was improved by the comments of J. Godwin and W. Selman. Trapping was carried out under Scientific Collecting Permits issued by the states of Alabama (2011000059266860, 2012000086566860, and 2013000058066860), Louisiana (LNHP-11-076, LNHP-12-070, and LNHP-13-026), and Texas (SPR-0513-059). Field work was funded by a Faculty Professional Development grant from the Pennsylvania State System of Higher Education and a Louisiana State Wildlife Grant.

Literature Cited


