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Turtle Races: A Threat to Wild Turtle Populations?

ALEX B. HEEB*
Turtle Conservation Group, 159 Bluebird Lane, Chaffee, Missouri 63740, USA
CHRISTINE LIGHT
Turtle Conservation Group, 159 Bluebird Lane, Chaffee, Missouri 63740, USA
WILL F. HANSON-REGAN
Department of Biology, Geology and Environmental Science, University of Tennessee at Chattanooga, 615 McCallie Ave, Chattanooga, Tennessee 37403, USA
GINA L. BUELOW
Ankeny, Iowa 50023, USA
JACOB D. HEEB
BRUCE R. WOLHUTER
Turtle Conservation Group, 159 Bluebird Lane, Chaffee, Missouri 63740, USA
AARON F. ELLISON
DAISY R. ELLISON
Columbus, Kansas 66725, USA
DANIEL S. WHITNEY
Blair, Nebraska 68008, USA
JACQUI A. GIBSON
Steele City, Nebraska 68440, USA
DAN E. CARPENTER
Derby, Kansas, 67037, USA
MADELINE R. SMITH
Turtle Conservation Group, 159 Bluebird Lane, Chaffee, Missouri 63740, USA
SHAREENA K. SCHIFFELBEIN
Wichita, Kansas 67219, USA
THANIEL P. BENTZ
Anoka, Minnesota 55303, USA
BECKY S. LISTER
Marquette, Kansas 67464, USA
EMILY N. MELGREN
Des Moines, Iowa 50320, USA
VALERIE N. VESTER
Hulbert, Oklahoma 74441, USA
ALAN J. BARTELS
Farwell, Nebraska 68838, USA
HANNAH L. CLARK
Verdigris, Oklahoma 74019, USA
CAILIN M. VERMILLION
E. O. JONES
Turtle Conservation Group, 159 Bluebird Lane, Chaffee, Missouri 63740, USA
LAURA C. PRIEST
Omaha, Nebraska 68132, USA
ELIZABETH I. HOUCHIN
Turtle Conservation Group, 159 Bluebird Lane, Chaffee, Missouri 63740, USA
KAROLINE L. WESTON
Environmental Sciences Department, Antioch University New England, 40 Avon Street, Keene, New Hampshire 03431, USA
LISA M. PROWANT
Biology Department, Culver-Stockton College, One College Hill, Canton, Missouri 63435, USA
HOLLY L. LACKEY
Council Hill, Oklahoma 74428, USA

** Corresponding author; e-mail: abheeb1s@gmail.com*

Life on Earth is undergoing an extinction crisis due to a multitude of anthropogenic sources (Ceballos et. al. 2010; Kolbert 2014). Among the animal groups affected by modern declines in biodiversity, chelonians stand out, with more than 50% considered imperiled by the International Union for the Conservation of Nature (Lovich et. al. 2018; Stanford et al. 2018). Turtles in the United States are a representative microcosm of what is happening at the global level, with chelonian declines being attributed to road mortality, disease, habitat loss, and commercial and recreational collecting (Garber and Burger 1995; Klemens 2000). Even relatively common species have experienced declines, which is attributable to the high annual survivorship needed to maintain steady turtle populations, where even small increases in annual mortality can trigger a tipping point toward population declines (Shine and Iverson 1995; Midwood et. al. 2015). Here, we present an overlooked cultural phenomenon in the United States, turtle racing, that presents a threat to North American turtle and tortoise populations if not properly addressed.

The modern concept of a turtle race was invented in 1924 at the 101 Ranch in Oklahoma (Collings and England 1937; Wallis 1999). In that year, the proprietors of the ranch conceived an idea for their Labor Day festivities. They devised a system whereby locally collected box turtles (what appear to be *Terrapene triunguis* and *T. ornata*, based on historic photographs and film reels) were placed in the center of a large circle with a small circular pen holding them in the middle. A pulley system raised the center pen up a pole, allowing the turtles to spread into the larger circle, with the first turtle exiting the circle winning a gambling payout for the person who registered the turtle. The spectacle received considerable positive media coverage in its first year. By 1925, the practice had spread to other states, including Kansas, where a state representative made an unsuccessful attempt to have the practice outlawed (Anonymous 1925). In the years following, newspaper archives (i.e., www.newspapers.com) indicate that races quickly spread across the country, with turtle races of a similar fashion occurring from California (where Desert Tortoises [*Gopherus agassizii*], were the species of choice; Fig. 1) to Maryland (where Eastern Box Turtles, [*Terrapene c. carolina*], Diamondback Terrapins [*Malaclemys terrapin*], and other local species were used) to Florida (where Gopher Tortoises [*Gopherus polyphemus*] were favored; Fig. 2). Turtle races evolved from gambling events into events largely geared toward children.

This practice has persisted to the current day (Fig. 3). Turtle races can be found in dozens of states and are nearly ubiquitous at county fairs and Fourth of July celebrations in Kansas, Oklahoma, and Missouri. Despite the widespread nature of the practice, few turtle specialists have focused on these events. In fact, we could find only three references to the practice in the published scientific literature. Dodd (2001) mentioned Kansas box turtle races in passing in his major work on box turtles, while Dietlein and Smith (1979) and Lee (2012) reported on observations and concerns surrounding turtle races in Florida and Maryland, respectively (the practice has since been banned in both states).

In 1997, an amateur naturalist in Kansas, Sarah Reeb, realized turtle races might be more than one-off oddities after

PHOTO FROM DELANEY (1969)

Fig. 1. Desert Tortoises (*Gopherus agassizii*) raced against one another in 1968 at a festival in Joshua Tree, California, USA. Today this species is listed as Threatened under the provisions of the U.S. Endangered Species Act of 1973, and Critically Endangered by the International Union for Conservation of Nature.

PHOTO BY C. KENNETH DODD, JR.

Fig. 2. Gopher Tortoises (*Gopherus polyphemus*) raced at a festival in San Antonio, Florida, USA, in October 1984.

PHOTO BY HOLLY LACKEY

Fig. 3. Three-toed Box Turtles (*Terrapene triunguis*), a few Ornate Box Turtles (*Terrapene ornata*), and a Red-eared Slider (*Trachemys scripta*) at a typical turtle race held at the National Sandbass Festival in Madill, Oklahoma, USA, in 2021.

observing several at local county fairs. In 1998, working with Sedgwick County Zoo interns on conducting phone surveys, she compiled a list of approximately 30 turtle races happening in the state. Some of these events involved hundreds of *T. ornata*. Reeb was strongly critical of the practice, arguing that it was inhumane and damaging to wild box turtle populations and should either be eliminated or reformed (Associated Press 1998). Her campaign raised considerable media attention, but ultimately resulted in little action. Following the publication of articles on problems with turtle races in Arkansas (Bowden 2019) and Virginia (Castiglia 2019), we began working to determine the extent of the impact the practice was having on North American turtles and their conservation.

Methods

To determine the extent of turtle races, we compiled a list of races from Fall 2019 through Spring 2020, counting any races which had been active since 2016. Turtle races are held under several different names, including "terrapin derbies," "turtle derbies" and "terrapin races." All of these terms were entered into search engines (primarily Google, but also DuckDuckGo) using advanced search techniques. Search engines only allow a certain number of results to be viewed in any given search, but by taking note of frequently co-occurring activities and adding those to the search pattern, many more results could be identified. For example, many turtle races were associated with Fourth of July celebrations, so a search for "turtle race" and "parade" or "turtle races" and "fireworks" would reveal the cross section of events with those common elements. A search for "county fair," "turtle race," and "greased pig chase" would likewise produce unique results. We used hundreds of unique combinations and went as deep into the results as the search engines would allow. Eventually this approach led to diminishing returns, as previously discovered turtle races began to outnumber new finds. When the vast majority of search engine results matched turtle races we were already aware of, we assumed we had identified most of the results that could be discovered through search engines and ceased the process. We also used an advanced search feature on Google that indicated when new results for the desired search terms appeared.

We further obtained lists of newspapers from state press associations for several states known to hold a substantial number of turtle races (Arkansas, Kansas, Kentucky, Minnesota, Missouri, Nebraska, Oklahoma, and Texas). We searched newspaper websites using internal search functions or by using Google's advanced search page, which allows queries to be limited to specific URLs. News alert services such as "Google Alerts" were also used, as were the Twitter and Facebook search engines to search the appearance of "turtle races" and synonyms on their respective platforms. The results were compiled into a spreadsheet, geocoded using the Google Maps API, and plotted on a map with QGIS.

We recruited volunteers and two interns to attend as many races as possible in order to determine how many turtles were being raced. A total of 112 people performed counts for us. Counts were originally planned for 2020, but the COVID-19 pandemic forced us to delay this effort until 2021. In cases where it was difficult to determine exactly how many turtles were being used (e.g., if turtles were reused, rather than only being raced once), volunteers were asked to estimate the total number of individual animals involved. Historical data from newspaper reports, social media sources and observer reports were analyzed to determine if counts were consistent with other years.

PHOTO BY HOLLY LACKEY

FIG. 4. Three-toed Box Turtles (*Terrapene triunguis*) and Ornate Box Turtles (*Terrapene ornata*) are dropped onto concrete as an official flips over a bucket at a 2021 turtle race at Old Settlers Day in Checotah, Oklahoma, USA.

PHOTO VIA GRANT COUNTY BANK FACEBOOK PAGE

FIG. 6. Overcrowded Ornate Box Turtles (*Terrapene ornata*) in a bucket shortly before the Grant County Fair in Ulysses, Kansas, USA, which is consistently the largest turtle race of which we are aware. The race had 456 entries in the year of the photo (2015).

PHOTO BY ALEX HEEB

FIG. 5. At a June 2009 turtle race in Salem, Illinois, USA, that featured about 150 turtles, this Eastern Box Turtle (*Terrapene carolina*) was one of many turtles that had its carapace painted. Eight Ornate Box Turtles, which are a state Threatened species, were also brought to the event, some of them painted in a similar fashion. The race has now been canceled after entries dwindled.

A slideshow of expected species in each state was created in order to train volunteers on turtle identification. Experience varied widely among participants, making exact determination of species compositions difficult in some cases, and in some cases the fast pace of the events made getting an exact count difficult; as such, volunteers were asked to note any uncertainties.

To quantify deficiencies associated with turtle races, we created an index with codes that corresponding to commonly observed husbandry issues (e.g., lack of water, overheating turtles, visible injury or illness, turtle dropped onto hard surface by participant or organizers, inhumane treatment [e.g., Figs. 4, 5], overcrowding [e.g., Fig. 6], and death of turtle due to neglect), conservation concerns (e.g., poor disease prevention measures, abandonment of turtles), and legal problems (e.g., use of protected species). We attempted to parse written narratives submitted by volunteers who attended these races into these coded categories.

RESULTS

A total of 615 annual turtle races in 30 U.S. states were found during the internet survey. These turtle races were not distributed evenly but were especially concentrated across the middle of the United States (Fig. 7). This cluster includes Kansas (141 races), Oklahoma (139 races), Missouri (78 races), Nebraska (64 races), Texas (28 races), Arkansas (24 races), Colorado (10 races), and New Mexico (7 races). Combined, these states accounted for 491 turtle races, or 80% of the total. Minnesota, which had a disjunct cluster of 34 turtle races, contributed another 6%. No other state had more than 15 turtle races. Of the turtle races we documented, four (1%) were held in April, 38 in May (6%), 114 in June (19%), 269 in July (44%), 87 in August (14%), 75 in September (12%), and 25 in October (4%). The Fourth of July—celebrated as Independence Day in the United States—and the day preceding it represented an especially notable incidence, with 156 turtle races (25% of the total) being held. Three turtle races in Minnesota were not held on a single date, but instead were held weekly as tourist draws from June to August.

Volunteers counted a total of 10,466 turtles at 268 turtle races (mean ± SE: 39 ± 2.6 turtles per race; median of 25.5 turtles per race), representing 22 native species, including a number that are considered endangered (Fig. 8) or otherwise had legal protections. A state level breakdown is given in Table 1. Not including non-native species, North American box turtles (*Terrapene* spp.) accounted for 6110 (59%) entries, while Painted Turtles (*Chrysemys picta*) made up 2111 entries (20%). This result varied regionally with 78% of native species entered in Kansas, Missouri, and Oklahoma being *Terrapene* spp., 64% of native species in Nebraska being *Chrysemys picta*, and 98% of native turtles in Minnesota being *Chrysemys picta*. Only 25 non-native turtles were entered across the country.

We discovered historical data for 26 races dated between 2008 and 2019. Some 3761 turtles were entered in these races in the year for which the most recent historical data were available, but only 2033 turtles were entered in those same races in 2021, a 46% reduction from pre-pandemic participation. The difference

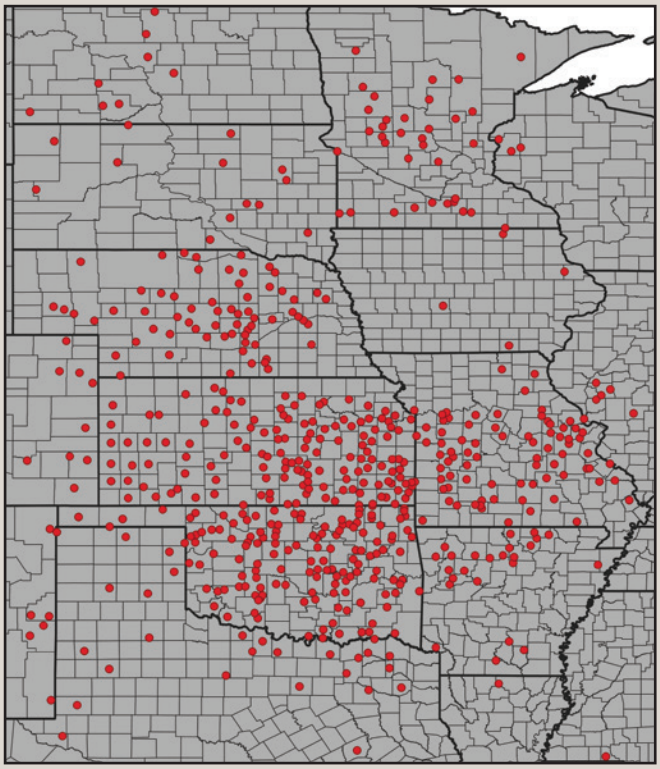

Fig. 7. A map showing the area in the United States with the highest density of turtle races. Races shown were active between 2016 and 2019.

PHOTO FROM JANNEY (2018)

Fig. 8. Two state threatened Wood Turtles (*Glyptemys insculpta*) are kept in a container with Eastern Box Turtles (*Terrapene carolina*) prior to a turtle race at the Frederick County Fair in Winchester, Virginia, USA, in 2018. Following criticism by state officials (Castiglia 2019), this turtle race, the only one in Virginia, was canceled in 2020.

PHOTO BY ALEX HEEB

Fig. 9. Following the Lincoln County Fair turtle race in Troy, Missouri, USA in July 2007, 24 of 182 turtles entered were deposited in a pickup truck provided by the organizers for participants to leave unwanted turtles. These Three-toed Box Turtles were observed trying to access the only sliver of available shade, and some showed physiological signs of heat distress.

between the two datasets was highly statistically significant (paired *t*-test, $t = 6.76$, df = 25, $P < 0.0001$).

By parsing volunteer narratives, a total of 5399 husbandry, conservation, and legal deficiencies were noted across 27 observed categories (Table 2), which is likely an underestimate due to challenges of counting such occurrences, and the post hoc nature of our analysis (a profile of deficiencies could not be developed until field work was completed, therefore volunteers could not be told to note these specific occurrences). The average race was deficient in 2.2 categories. Only 24 races had no recorded deficiencies; 78 races were deficient in one category, 62 were deficient in two categories, 51 were deficient in three categories, 30 were deficient in four categories, 10 were deficient in five categories, five were deficient in six categories, seven were deficient in three categories, and two were deficient in eight categories (N = 265).

Discussion

The results of this study indicate that turtle racing is a much more widespread phenomenon than was previously realized, that can potentially affect local turtle populations due to direct collection and other impacts. One especially notable turtle race in Ulysses, Kansas, had 659 Ornate Box Turtles (*T. ornata*) entered in 2013 and 456 in 2015, according to social media posts by the sponsors. The majority of turtles appeared to be of wild origin. Lee (2012) reported that at two turtle races in Maryland, 84% and 89% of Eastern Box Turtles (*Terrapene carolina*) were wild caught for the events.

Anecdotally, 2021 appeared to be an especially difficult climatic year for finding box turtles, per informal interviews with race participants. For example, in late May, participants in Arkansas described a cold and wet spring that made finding turtles difficult, while in late July participants at a Nebraska race said dry conditions had reduced the number of turtles found. The lingering effects of the COVID-19 pandemic may also have diminished participation. Consequently, turtle race entries may have been significantly lower in 2021 than a typical year, a conclusion supported by the available historic data.

Many of the racing turtles are returned to the wild following the race, but not necessarily to their original home range. For example, we received reports that large numbers of box turtles were formerly abandoned around the harbor at Warsaw, Missouri, site of Jubilee Days. In 2022 when we attended this event, a local fisheries biologist with the Missouri Department of Conservation offered to take any unwanted turtles following the race. Dozens of box turtles were placed into the pickup truck he provided for this purpose, including the locally rare Ornate Box Turtle (*T. ornata*), which has limited habitat in the area.

TABLE 1. A breakdown of turtle races by USA state and species. Non-native species are not tallied. "All other" states includes Colorado, Connecticut, Georgia, Idaho, Iowa, Kentucky, Louisiana, Montana, New Mexico, North Carolina, North Dakota, Ohio, South Carolina, South Dakota, Tennessee, Texas, and Wisconsin.

State	Total turtle races	Turtle races attended	Total turtles	*Terrapene triunguis*	*Terrapene carolina*	*Terrapene ornata*	Unknown *Terrapene*	*Chrysemys picta*	*Trachemys scripta*	*Pseudemys* spp.
Arkansas	24	13	796	517	–	–**	–	–	240	3
Illinois	10	6	33	–	6	–**	–	7	3	–
Indiana	6	5	550	–	–**	–	–	188	44	–
Kansas	141	93	2640	201	–	1672	27	174	212	2
Michigan	15	3	251	–	–	–	–	31	–	–
Minnesota	34	18	737	–	–	–	–	724	5	–
Mississippi	1	1	104	44	–	–	–	–	46	6
Missouri	78	39	1010	800	2	76	34	52	18	–
Nebraska	64	26	1067	1	–	271	–	683	14	–
New York	1	1	90	–	3*	–	–	50	30	–
Oklahoma	139	41	2043	810	2	551	248	2	132	3
Pennsylvania	2	1	150	–	3*	–	–	141	–	–
West Virginia	4	0	–	–	–	–	–	–	–	–
all others	96	21	970	–	223	619	–	59	39	2
Total	615	268	10,411	2373	239	3189	309	2111	783	16

* A protected or endangered species observed during the 2021 survey.

** An endangered or protected species that was not observed in 2021, but was detected in prior years either by observation or via discovery of a social media post.

TABLE 1. Continued.

State	*Graptemys* spp.	*Graptemys pearlensis*	*Clemmys guttata*	*Emydoidea blandingii*	*Glyptemys insculpta*	Kinosternidae	*Chelydra serpentina*	*Apalone* spp.	*Gopherus polyphemus*	Unidentified
Arkansas	1	–	–	–	–	1	–	–	–	34
Illinois	–	–	–	–	–	–	–	–	–	17
Indiana	53	–	–	–**	–	33	6	23	–	203
Kansas	3	–	–	–	–	22	5	11	–	311
Michigan	20	–	–	1*	–**	180	–	15	–	4
Minnesota	–	–	–	–	–	–	–	–	–	8
Mississippi	1	1*	–	–	–	2	–	2	1*	1
Missouri	1	–	–	–	–	–	4	–	–	23
Nebraska	–	–	–	4*	–	–	19	24	–	51
New York	–	–	2*	–	2*	–	–	–	–	3
Oklahoma	1	–	–	–	–	37	5	–	–	252
Pennsylvania	–	–	–	–	6*	–	–	–	–	–
West Virginia	–	–	–	–	–**	–	–	–	–	–
all others	1	–	–	–	–	12	–	2	–	13
Total	81	1	2	5	8	287	38	77	1	920

* A protected or endangered species observed during the 2021 survey.

** An endangered or protected species that was not observed in 2021, but was detected in prior years either by observation or via discovery of a social media post.

Relocation of such turtles without specific intent to return them to appropriate habitat would provide significant risk of mortality.

While there is conflicting information on the effects of relocating turtles, particularly box turtles, with some studies indicating mortality approaching 50% (Cook 2004), these research studies relocated turtles into large tracts of appropriate habitat with the purpose of re-establishing populations, bolstering existing populations, or translocating populations in danger of development or which have resulted from confiscations. Based on observations and informal interviews, many participants do not attempt to return their turtle to the location of original capture and may not choose appropriate habitats when relocating turtles, often selecting the nearest convenient location to dispose of turtles that are unwanted after a race.

The presence and effects of pathogens in race turtles is also a significant concern. Because turtles are brought together in high concentrations, they can transmit diseases among themselves and potentially spread such diseases back to wild populations

Table 2. Volunteer observation of deficiencies at turtle races.

Action	Total instances of deficiency	Total races with deficiency
Handling and Care:		
Accidental turtle dropping by participants or staff	201	43
Rough handling of turtles	97	18
Handling snapping turtles by the tail	23	4
Injury caused by participants or staff	3	3
Accidental stepping on turtles	14	3
Environmental Conditions and Turtle Disposition:		
Absence of instructions to repatriate turtle to home range	180	180
Observations of post-race turtle abandonment	364	19
Transfer of turtles to other individuals post-race	44	14
Turtles stacked in overcrowded conditions	695	25
Lack of shelter from direct sunlight	502	22
Health and Welfare:		
Racing of visibly injured or ill turtles	44	14
Health issues in turtles from prolonged captivity	27	11
Symptoms of dehydration or malnourishment	115	7
Turtle fatalities due to neglect	2	1
Egg laying by female turtles during racing	3	3
Application of paint, glue, or other substances on turtles	1067	81
Physical and Psychological Stress:		
Turtles subjected to multiple racing events	228	19
Goading of turtles by participants to accelerate movement	145	15
Turtles fighting due to close confinement	45	6
Canine harassment of turtles	1	1
Ethical and Legal Concerns:		
Minor and severe intentional cruelty towards turtles	32	14
Physical kicking of turtles by participants or staff	22	10
Inclusion of protected or imperilled species	25	10
Disease and Contamination Risks:		
Co-mingling of frogs and turtles (Ranavirus risk)	38	14
Overcrowding in a single container (disease risk)	1211	35
Mixing of indigenous and exotic species (disease risk)	10	5
Cross-contamination risk via towels, enclosures, or hands	261	5

upon release. Four emerging diseases (*Mycoplasma* spp., herpesviruses, ranaviruses and adenoviruses) are of particular concern to North American Box Turtles (Jamie Palmer, pers. comm.). Further, because turtle races are frequently held in conjunction with frog jumping contests, the potential for the spread of ranaviruses from frogs to turtles (Brenes et. al. 2014) is another concern.

Based on interviews, most participants are not well informed about basic turtle husbandry or conservation practices. At one illustrative race at the Clarendon, Texas, Fourth of July celebration in 2022, many turtles in the race were spray painted various colors to allow for identification, which may create increased predation risk if the animal is released, along with other potential physiological problems. Turtles were raced across a brick street during the heat of the day. An infrared thermometer recorded the temperature of the bricks immediately before the race at 60°C. Clouds moved in as the race was starting, and immediately after the race, the temperature was recorded at 53°C. The proprietor of the race left several abandoned turtles sitting in the sun following the event in a cardboard box recorded to be 43°C.

We have observed that thermal issues like the one described above are not uncommon at turtle races (Fig. 9). North American Box Turtles (*Terrapene* spp.) begin showing signs of heat distress once their core temperatures reach 36°C, such as actively trying to cool themselves (urinating on their hind legs and "frothing" at the mouth to increase evaporative cooling) and perish once core temperatures reach 43°C (Sturbaum and Riedesel 1974; Sturbaum 1981).

Recommendations

Based on the data collected and our observations, we believe that turtle races represent a threat to the conservation of the species involved and should either be eliminated or significantly reformed. Turtle races, however, are long standing traditions and sources of civic pride in many small towns and attempts to stop them have been met with significant resistance. Nevertheless, we have found that most turtle race organizers are open to the idea of reform, with ca. 70% of race organizers willing to allow us to set up an educational booth in 2022. At our booth, where

we determined sex and approximately aged turtles, identified species, and provided other educational information, most children were very engaged and fascinated by what we had to say. They were particularly enthralled to learn about the age and sex of the turtle they had brought. We were able to use this opportunity, as well as an "oldest turtle contest" we conducted, to convey conservation information to the children and encourage them to release their turtle back into its original home range. Many organizers even gave us their microphone to announce the oldest turtle contest and once again present important turtle conservation information.

This experience has convinced us that reform is possible and is a more viable alternative than trying to stop turtle racing, as long as the work is performed in a way that respects local inhabitants and their traditions. In fact, if reforms were fully realized, turtle races could actually become a net positive for turtle conservation and a venue for spreading interest and education. However, regulatory intervention may be required in cases where turtle race officials are unwilling to implement best practices. If an entry fee were required across turtle races, or donations solicited, substantial revenue could perhaps be generated for turtle conservation, potentially even enough to support a major turtle-focused organization.

We are currently in the process of developing an application that turtle race participants can download to their smartphone to aid in the conservation process. Quick Response (QR) coded stickers will be provided along with the app that will allow for the turtle to be tagged (by putting the sticker on the turtle's shell). This will allow them to be scanned into the app, which will record the location of their original capture utilizing the smartphone's GPS capabilities, allowing for turtles to be returned to their home range by volunteers even if the participants are not able to do so and providing assistance to people who are willing to return their turtles. The data produced by this method could be scientifically valuable for managing turtle populations.

We suggest six overarching principles for race participants and organizers that we believe would make a turtle race ethical. These are:

Humane: Humane practices at turtle races generate better conservation outcomes.

Sustainable: Turtle friendly races proactively follow best practices to safeguard vulnerable populations.

Legal: Ethical turtle races never involve endangered species or violate wildlife laws.

Educational: An informed public is vital to turtle conservation efforts.

Scientific: Data collected at turtle races help biologists manage turtle populations.

Philanthropic: Participants' generous donations help to fund turtle conservation efforts.

The Turtle Conservation Group has developed detailed and specific guidelines attached to each of these principles, which will be made publicly available on the internet, and plans to offer a certification to events where turtle race organizers adopt all guidelines. Although not easy and requiring the help of local volunteers and patrons, a concerted effort to reform turtle races could have a significant positive impact, while creating an avenue to connect children with turtles and create the next generation of turtle conservationists.

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Gastroesophageal Intussusception and Sectioned Stomach in the Japanese Giant Salamander, *Andrias japonicus*

Emesis, the oral ejection of upper digestive-tract contents, is one of the common physiological responses of animals to ingesting unsafe substances such as defensive toxins of prey species or indigestible material (Brunnschweiler et al. 2005; Glendinning 2007). It is considered an adaptive response and has been reported from various vertebrates, including mammals (Horn 2017), birds (Savarie et al. 1983), reptiles (Andrews et al. 2000), fish (Brunnschweiler et al. 2005), and also from some invertebrates (Sykes et al. 2020). In amphibians, the ability to vomit only develops at metamorphosis for frogs, whereas both larval and adult salamanders can vomit (Naitoh et al. 1989; Naitoh and Wassersug 1992, 1994).

Amphibians vomit by elevating abdominal pressure through the contractions of abdominal muscles, which can result in the small intestine sliding into the esophagus (Hukuhara et al. 1973), a condition known as gastroesophageal intussusception (GEI). In the Black-spotted Frog (*Pelophylax nigromaculatus*) and American Bullfrog (*Lithobates catesbeianus*), GEI can eventually lead to both the esophagus and stomach turning inside out and being ejected to the mouth (Hukuhara et al. 1973).

GEI has also been reported in animals with bacterial or parasitic infections. The reported cases include the Red Cornsnake (*Pantherophis guttatus*) infected with an apicomplexan parasite (*Cryptosporidium* spp.) (Bercier et al. 2017), the Green Sea Turtle (*Chelonia mydas*) infected with the helminth *Octangium* sp. (Oliveira et al. 2021), and the Channel Catfish (*Ictalurus punctatus*) infected with *Clostridium botulinum*, a neurotoxin-producing bacterium (Khoo et al. 2011). Furthermore, Hoitsy et al. (2021) found that intestinal neoplasia caused intussusception in Rainbow Trout (*Oncorhynchus mykiss*). GEI and the mechanism of regurgitation remain unexplored for most amphibians, and to our knowledge, there have been no reports of GEI from salamanders.

Here, we present the first published report on GEI in salamanders from the Japanese Giant Salamander (*Andrias japonicus*). The Japanese Giant Salamander is a threatened species inhabiting fast-flowing streams in western Japan. The typical adult size ranges from 50 cm to 100 cm in total length. Its conservation status is listed as "Vulnerable" by the IUCN (IUCN SSC Amphibian Specialist Group 2022) and also by the Japanese Ministry of the Environment (Ministry of the Environment 2020). In addition, the Japanese Giant Salamander has been given the highest protection as a "Special Natural Treasure" by the Japanese Agency for Cultural Affairs since 1952 (Agency for Cultural Affairs 1952). Because of its size and status as a "Special Natural Treasure," dead bodies of this species attract attention. Over the past decades, the Hanzaki Research Institute of Japan has obtained several dead salamanders as the general public has reported them to the institute. In this study, we performed necropsies of those specimens and conducted a morphological analysis of their digestive tracts.

All of the dead individuals we analyzed were found in the Ichi River Watershed, Asago City, Hyogo Prefecture, Japan, of which appropriate notification forms were submitted to the Agency for Cultural Affairs following the law for the Protection of Cultural Properties. Because of the long-term preservation of five

KAORI TAKAGI
The Hanzaki Research Institute of Japan, Asago, Hyogo, Japan
TAKAHIRO SAKONO
Department of Animal Resource Sciences, The University of Tokyo, Tokyo, Japan
MIZUKI K. TAKAHASHI
Department of Biology, Bucknell University, Lewisburg, Pennsylvania, USA
**Corresponding author; e-mail: mt027@bucknell.edu*