



# *Survey Report*



## *Spotted, Blanding's, & Wood Turtle* CONSERVATION SYMPOSIUM



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### Planning Committee:

Jessica Meck, Smithsonian Conservation Biology Institute

Tom Akre, Smithsonian Conservation Biology Institute

Houston Chandler, The Orianne Society

Lori Erb, Mid-Atlantic Center for Herpetology and Conservation

Mike Jones, Massachusetts Division of Fisheries and Wildlife

Jonathan Mays, Florida Fish and Wildlife Conservation Commission

H. Patrick Roberts, University of Massachusetts & American Turtle Observatory

Julie Slacum, U.S. Fish and Wildlife Service

Kevin Oxenrider, West Virginia Department of Natural Resources

Liz Willey, Antioch University New England & American Turtle Observatory

*Report prepared by:* Jessica Meck

The Spotted, Blanding’s, and Wood Turtle Conservation Symposium was supported by the Competitive State Grants program (administered by the U.S. Fish and Wildlife Service) through an award to the Virginia Department of Game and Inland Fisheries and their partners and Northeast Partners in Amphibian and Reptile Conservation (NEPARC).



## Symposium Synopsis

The 2019 Spotted, Blanding's and Wood Turtle Conservation Symposium spanned three days from November 3–5th, at the Cacapon Resort State Park in Berkeley Springs, West Virginia. A total of 130 turtle conservationists from 78 institutions convened to share their knowledge and build partnerships to continue advancing conservation objectives for Spotted (*Clemmys guttata*), Blanding's (*Emydoidea blandingii*), and Wood (*Glyptemys insculpta*) Turtles.

The first day consisted of optional field trips led by West Virginia DNR to local Spotted and Wood Turtle research sites to discuss different management techniques and the history of the sites. The following two days were devoted to presentations by 48 experts covering topics such as regional updates (Canada, Northeast, and Midwest/Great Lakes), conservation planning, monitoring and management, genetics, and law enforcement. The first day of presentations also concluded with a poster session and an insightful keynote presentation by Dr. Jackie Litzgus focusing on her decades of experience studying Spotted Turtles.

In addition to presentations, two break-out sessions provided structured time for participants to exchange ideas and knowledge surrounding key turtle conservation issues. The first break-out, which followed the law enforcement presentation session, consisted of an expert panel on illegal collection. For the second break-out session participants split into three groups for individual species and worked to identify knowledge gaps and actions needed to advance conservation efforts.

Overall, the symposium served as an opportunity for many to foster new working relationships and initiate coordination among institutions, states, and regions. We are hopeful that a third symposium will be planned in the coming years to help further collaborative conservation for these charismatic species.

Following the conclusion of the symposium, the committee developed and sent an electronic survey with the following objectives: (1) identify and gauge the relative severity of threats to Spotted, Blanding's, and Wood Turtles throughout their respective ranges, and (2) prioritize conservation actions to guide partners and collaborators in future conservation and management decisions. The survey was distributed to all symposium participants as well as other turtle conservationist who were unable to attend. The remainder of this document summarizes the survey results.



*Participants of the 2019 Spotted, Blanding's and Wood Turtle Conservation Symposium.*

## Survey Overview

In total, 88 turtle experts from 74 different affiliations completed the survey, approximately 33% of whom did not attend the symposium. Thirty states and four Canadian provinces were represented with 50% of participants from the Northeast, 8% from the Southeast, 23% from the Midwest, 16% from Canada, and 3% from elsewhere (Table 1). The average years of experience working with Spotted, Blanding’s and Wood Turtles were nine, eight, and ten, respectively.

Table 1. Summary of regions used to examine how survey responses varied throughout each species’ range. Northeast, Southeast, and Midwest correspond to U.S. Fish and Wildlife Service (USFWS) and Association of Fish and Wildlife Agencies (AFWA) regions.

	<b>Northeast, USA</b>	<b>Southeast, USA</b>	<b>Midwest, USA</b>	<b>Canada</b>	<b>Other</b>
States/Provinces represented	CT, DC, DE, ME, MD, MA, NH, NJ, NY, OH, PA, RI, VT, VA, WV	FL, GA, NC, SC	IL, IN, IA, MI, MN, MO, NE, OH, WI	NB, NS, ON, QB	AZ, NV, OR
Number of Respondents	44	7	20	14	3

Respondents were asked to only respond to the questions related to species they felt knowledgeable about and from the perspective of their region. They were then prompted to rank threats to the corresponding species on a scale of 0 (no threat) to 5 (major threat) and the conservation actions needed to maintain viable populations on a scale of 0 (unimportant) and 5 (very important). Spotted Turtle received 72 responses, Blanding’s Turtle received 73 responses, and Wood Turtle received 63 responses.

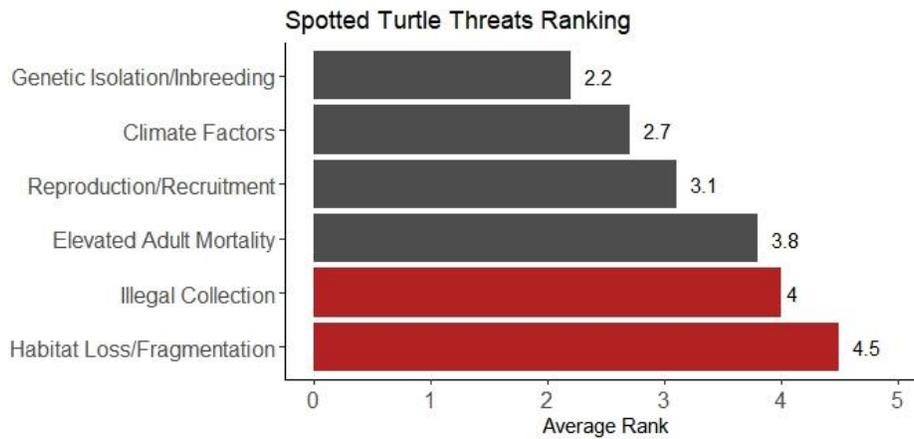
The final portion of the survey consisted of respondents ranking conservation actions needed for all three species in the following categories: Inter-regional Coordination, Compiling Information and Data, Education, Illegal Collection and Trafficking, and Habitat Management and Land Protection. The actions included in the survey were identified during the species-specific breakout session that were deemed to benefit all three. There was also an opportunity for respondents to provide additional input to threats or actions not addressed in the survey and feedback to the symposium’s location and format via an open-ended response section.

We hope the results of this survey aid researchers, state biologists, and the working groups, including the NEPARC Collaborative to Combat the Illegal Trade of Turtles (CCITT) working group, in future conservation decisions and coordination efforts. Definitions of the threats and actions can be found in Appendix B.

## Spotted Turtle Survey Results

### *Perception of Threats*

The results indicated the top two threats for Spotted Turtles across their range were **habitat loss and fragmentation** followed by **illegal collection**. Elevated adult mortality was also high ranking with an average score of 3.8 (Fig. 1). These rankings were consistent across all regions (Appendix A). It should be noted, however, climate factors (32%), reproduction and/or recruitment failure (32%) and genetic isolation or inbreeding had the highest percent of uncertainty (31%) among all respondents (Table 2).



**Figure 1.** The average ranked threats on a scale of 0 (not a threat) to 5 (major threat) for Spotted Turtles by all respondents range-wide.

**Table 2.** The percent of respondents that indicated ‘**unsure or not enough information**’ for each threat.

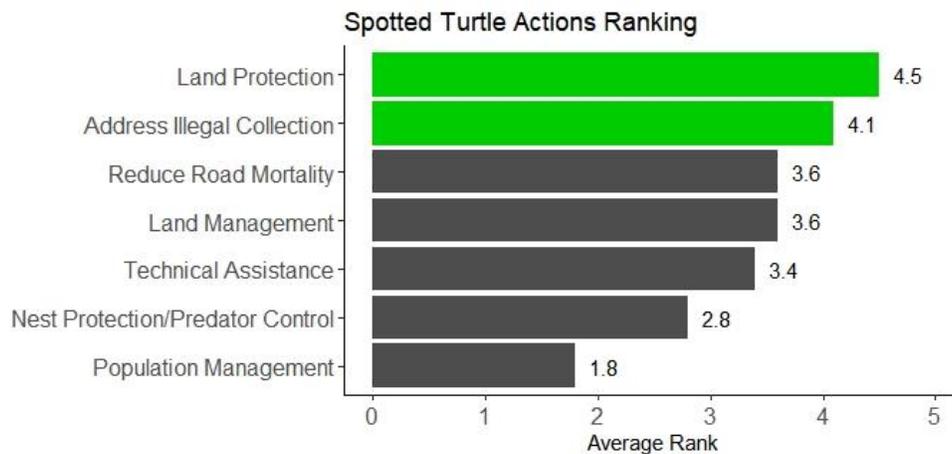
	Habitat Loss or Fragmentation	Illegal Collection	Adult Mortality	Genetic Isolation or Inbreeding	Reproduction or Recruitment Failure	Climate Factors
Percent	7%	18%	22%	31%	32%	32%

### *Other Threats*

Respondents indicated in the open-ended questions that many data gaps exist for Spotted Turtles in the Southeast, including South Carolina, that inhibit researcher’s understanding of the most pressing threats. Additionally, the extent of impact from mosquito control agencies managing ditches are unknown and should be considered a potential threat.

### *Conservation Actions Needed*

**Land protection** and **addressing illegal collection** were ranked as the most important actions needed to maintain viable populations of Spotted Turtles range-wide. The least important actions ranked were population management and nest protection and predator control (Fig. 2). The Midwest region (n=7 responses) indicated that nest protection and predator control (4.1) were the second most needed actions with addressing illegal collection (4.1) and land management (4) ranking similar.

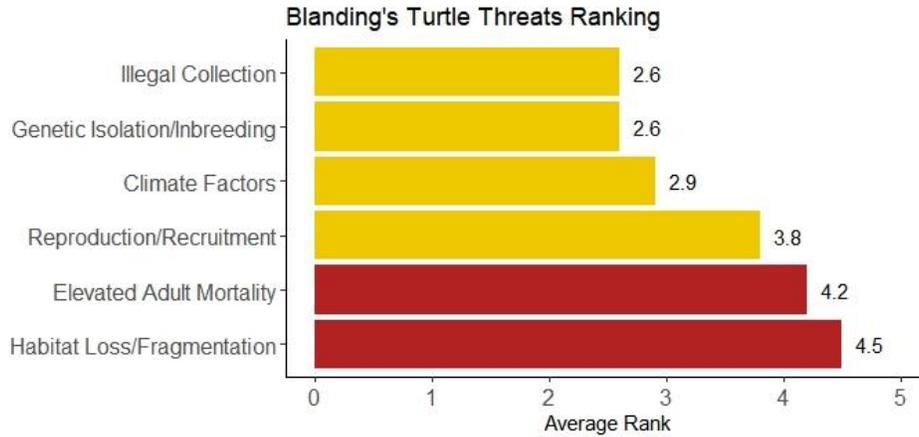


**Figure 2.** The average ranking of conservation actions needed for Spotted Turtles on a scale of 0 (unimportant) to 5 (very important) from all respondents range-wide.

## **Blanding’s Turtle Survey Results**

### *Perception of Threats*

The highest average ranked threats for the Blanding’s Turtle range-wide was **habitat loss and fragmentation** followed by **elevated adult mortality**. The lowest perceived threats were illegal collection and genetic isolation or inbreeding (Fig. 3). All regions had similar rankings with the exception of the Midwest (n= 18 respondents) ranking **reproduction and recruitment failure** (4.1) as the second major threat closely followed by elevated adult mortality (3.8). The three threats indicated by all respondents that had the most uncertainty were climate factors (19%), genetic isolation or inbreeding (19%), and illegal collection (15%) (Table 3).



**Figure 3.** The average ranked threats on a scale of 0 (not a threat) to 5 (major threat) for Blanding’s Turtles by all respondents.

**Table 3.** The percent of respondents that indicated ‘**unsure or not enough information**’ for each threat.

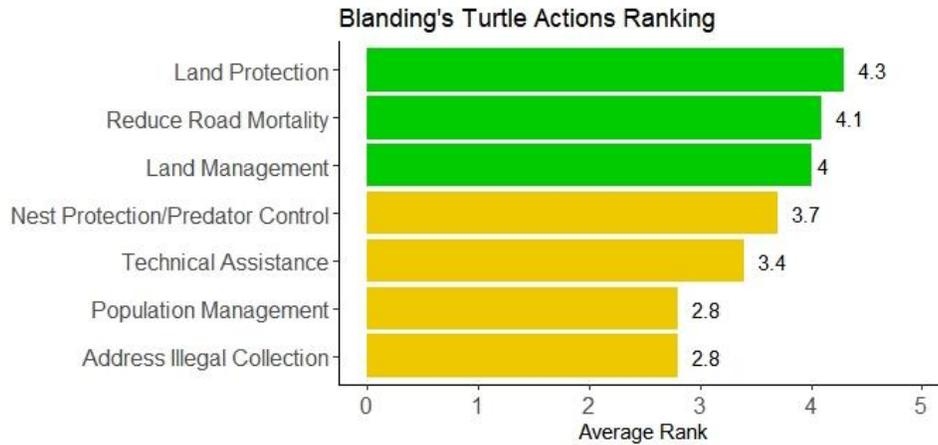
	Habitat Loss or Fragmentation	Adult Mortality	Reproduction or Recruitment Failure	Illegal Collection	Genetic Isolation or Inbreeding	Climate Factors
Percent	7%	8%	11%	15%	19%	19%

### *Other Threats*

Respondents indicated that invasive species, such as Autumn Olive (*Elaeagnus umbellata*) and Reed Canary Grass (*Phalaris arundinacea*), are a prominent threat to Blanding’s Turtle nesting habitat and should be considered for management plans.

### *Conservation Actions Needed*

The three most important actions needed as indicated by average responses from all respondents for Blanding’s Turtles were **land protection, reducing road mortality, and land management**. Population management and addressing illegal collection were ranked as the least important actions (Fig. 4). The Midwest (n=18 responses) region ranked nest protection and predator control (4.1) equal to land management.

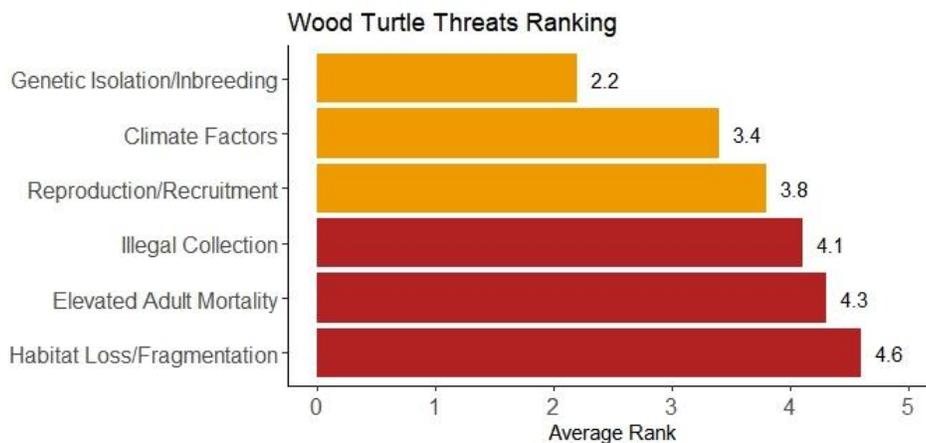


**Figure 4.** The average ranking of conservation actions needed for Blanding’s Turtles on a scale of 0 (unimportant) to 5 (very important) from all respondents.

## Wood Turtle Survey Results

### *Perception of Threats*

Results indicated that respondents ranked **habitat loss and fragmentation, elevated adult mortality, and illegal collection** as the top threats facing Wood Turtle populations. The lowest ranked threat was genetic isolation or inbreeding (Fig. 5). The Midwest region (n= 11 responses) differed from all regions combined. Their threat ranking was the following: reproduction and recruitment failure (4.8), elevated adult mortality (4.4), and habitat loss and fragmentation (4.2). Illegal collection was ranked second to last. Overall, the two threats with most uncertainty reported were climate factors (25%) and genetic isolation or inbreeding (21%) (Table 4).



**Figure 5.** The average ranked threats on a scale of 0 (not a threat) to 5 (major threat) for Wood Turtles by all respondents.

**Table 4.** The percent of respondents that indicated ‘**unsure or not enough information**’ for each threat.

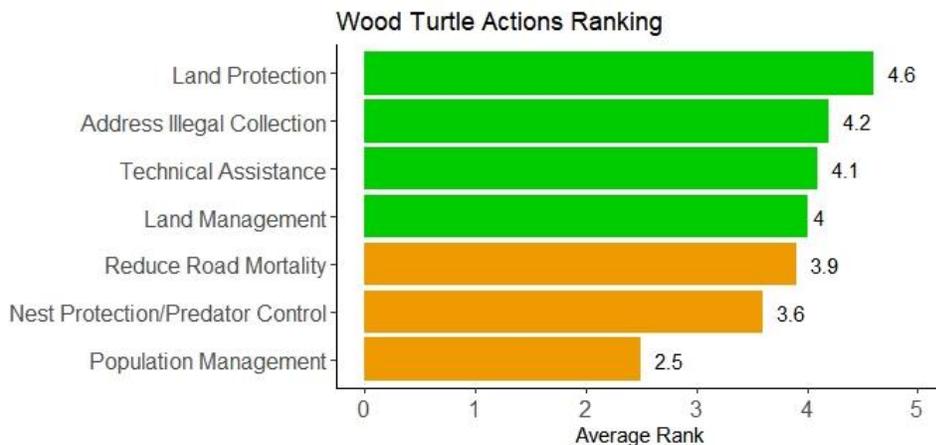
	Habitat Loss or Fragmentation	Adult Mortality	Illegal Collection	Reproduction or Recruitment Failure	Genetic Isolation or Inbreeding	Climate Factors
Percent	6%	13%	13%	19%	21%	25%

*Other Threats*

Survey respondents indicated several other threats facing the long-term survival of Wood Turtles or potential threats where more information is needed. Similar to Blanding’s Turtle, Reed Canary Grass (*Phalaris arundinacea*) is a highly invasive species impacting vital nesting areas. Additionally, major flooding events attributed to climate change is a concern, but more is needed to accurately rank among other threats. Finally, the impact of forestry management on overall adult mortality is unknown across its range.

*Conservation Actions Needed*

Most actions for Wood Turtles were ranked as high importance. Specifically, **land protection, addressing illegal collection, technical assistance, and land management** were ranked the highest. Population management was clearly ranked as the least important action (Fig. 6). Respondents in Canada (n= 11 responses) indicated nest protection and predator control (3.8) are as important as technical assistance. The Midwest region (n= 11 responses) had different average rankings: nest protection and predator control (4.8), land protection (4.5), land management (4.5), and addressing illegal collection (3.9).



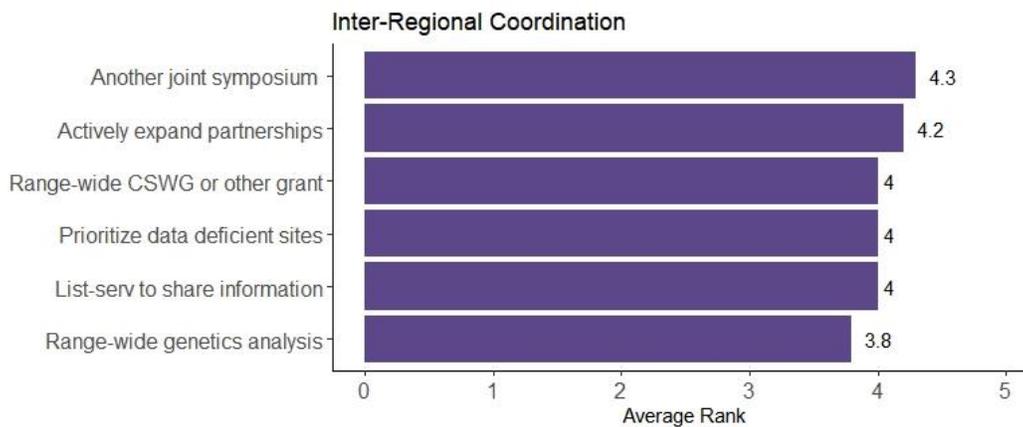
**Figure 6.** The average ranking of conservation actions needed for Wood Turtles on a scale of 0 (unimportant) to 5 (very important) from all respondents.

## Range-wide Actions Needed to Achieve Conservation Objectives

The subsequent results represent the rankings of range-wide actions by all respondents. The categories were developed by symposia attendees in 2016 and 2019 during break-out sessions to incorporate the most important actions identified. The survey was then distributed to attendees and other turtle conservationists unable to attend to prioritize the actions.

### *Inter-Regional Coordination*

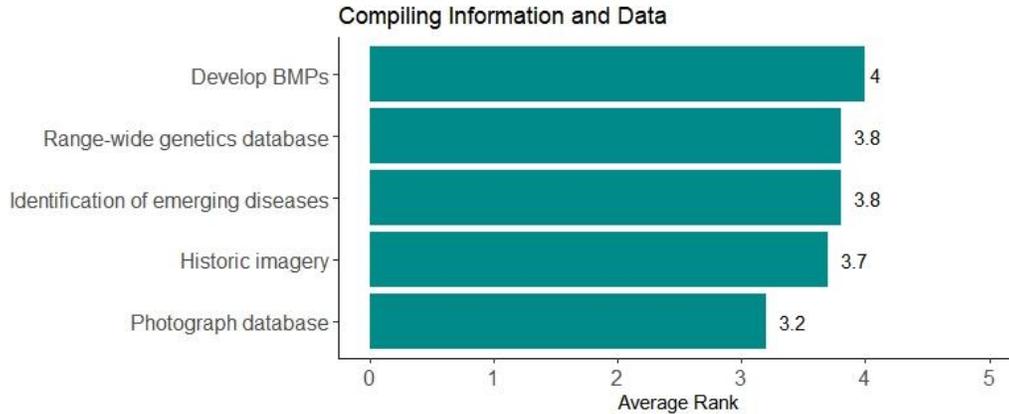
All actions for inter-regional coordination were ranked as relatively important, with **another joint symposium** and **actively expanding partnerships** ranking as the top two (Fig. 7). A third symposium is possible pending funding from an additional USFWS Competitive State Wildlife Grant for Wood Turtles. Generally, coordination is considered one of the top priorities among active partners to ensure the long-term survival of Spotted, Blanding's, and Wood Turtles.



**Figure 7.** The average rankings of potential inter-regional coordination actions.

### *Compiling Information and Data*

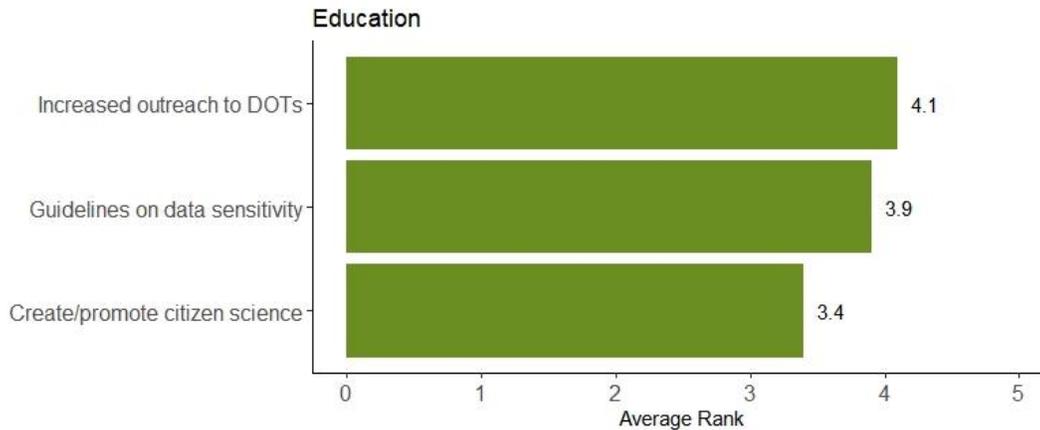
Similar to inter-regional coordination, compiling information and data actions were all ranked relatively important with the exception of a regional photograph database of captured individuals. The most important action was **developing best management practices** (Fig. 8). This category was created with the intention of making all the resulting outputs available to all partners to strengthen coordination and sharing of information.



**Figure 8.** The average ranking of compiling information and data actions.

*Education*

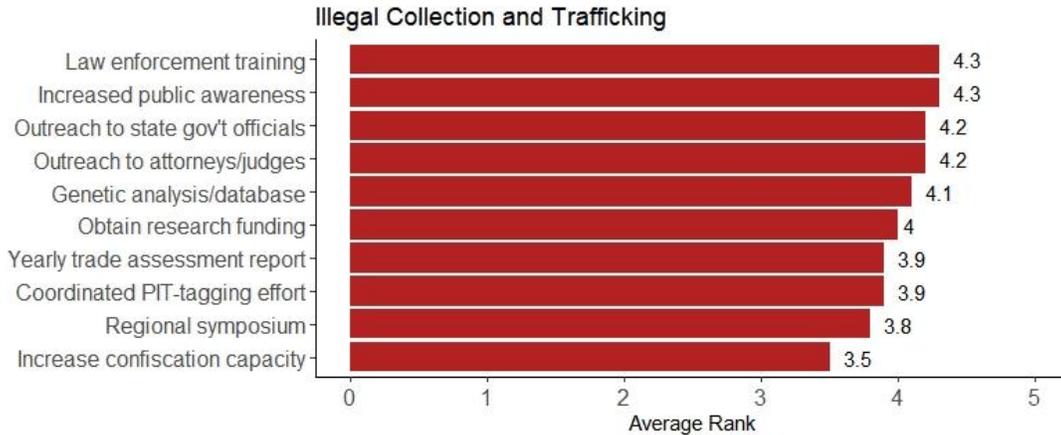
Only three actions were identified during the symposium regarding education. Results indicated that **increased outreach to DOTs** and **guidelines for data sensitivity** on social media and other public applications were the most important (Fig. 9).



**Figure 9.** The average ranking of education actions.

*Illegal Collection and Trafficking*

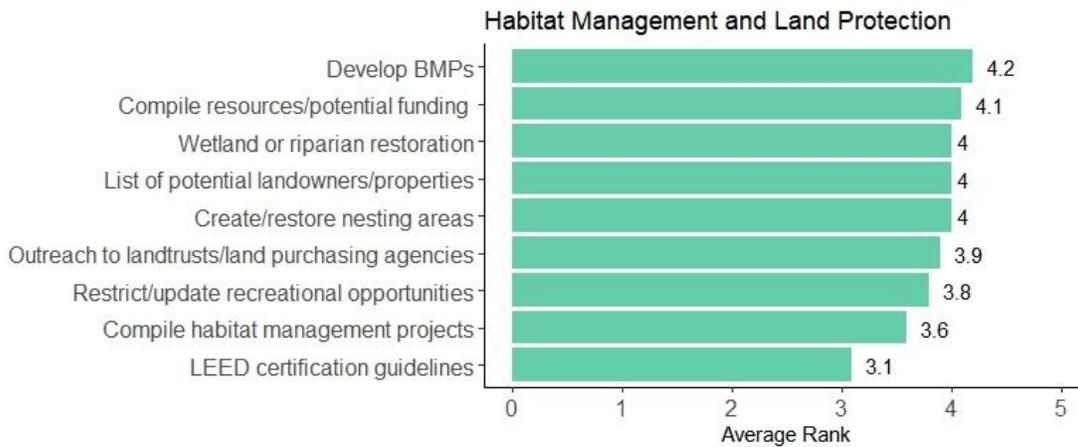
The topic of illegal collection and connecting with law enforcement was one of the major themes in the 2019 symposium. Overall, it has been a growing concern and NEPARC’s CCITT working group has been making progress over the past year to identify and organize next steps in combating the issue. The survey respondents ranked all of the identified actions as important, with the exception of increasing confiscation capacity (Fig. 10). The top two needed actions were **increasing law enforcement training** in identifying species and **increasing public awareness** to incidental take. An important aspect in combating illegal collection has become increasing the education of all parties involved from the public to the judiciary system.



**Figure 10.** The average ranking of illegal collection and trafficking actions.

### *Habitat Management and Land Protection*

Similar to the other range-wide action categories, the habitat management and land protection actions were predominately ranked as important. **Developing best management practices** and **compiling resources**, such as potential funding, were ranked as the most important (Fig. 11). LEED certification guidelines were ranked as the least important action.



**Figure 11.** The average rankings of habitat management and land protection actions.

### **Other Threats and Concerns**

Many respondents provided comments during the survey highlighting numerous concerns and unknowns that pertain to our three focal species. These concerns included having more conversations and communication regarding turtle races, bycatch related incidents, and repatriation of confiscated turtles. Confiscated turtles are becoming increasingly more abundant, but many states do not have enough resources to maintain their care long-term. Repatriation is a potential option and requires effective coordination and communication between states and

researchers to reach an appropriate solution. Another related issue to confiscations is respondents indicated that Lacey Act violations should be tracked and compiled for the region.

Additional comments included the need to address numerous knowledge gaps. These knowledge gaps include understanding the effectiveness of habitat management and best management practices (BMPs), survival rates and habitat requirements of juvenile stages, and the capacity for species to adapt to climate change.

The remaining comments addressed the need for increased outreach and education opportunities to pet store owners, wildlife rehabilitators, private landowners, and the general public on the appropriate threats and actions that can be taken by individuals to contribute to the species' conservation.

## Appendix A

### Regional Threats and Actions Tables

**THREATS:** The average ranking for each threat by species and region.

#### *SPOTTED TURTLE*

Threat	Northeast (n=40)	Southeast (n=7)	Midwest (n=7)	Canada (n=10)
Climate Factors	2.8	2.2	2.2	3
Elevated Adult Mortality	3.9	3	4	3.6
Genetic Isolation and/or Inbreeding	2.2	1.8	2.7	2.4
Habitat Loss/Fragmentation	4.6	3.7	4.4	4.5
Illegal Collection	4	3.4	4.5	4.1
Reproduction and/or Recruitment Failure	3.5	1.5	3	2.3

#### *BLANDING'S TURTLE*

Threat	Northeast (n=22)	Southeast (n=0)	Midwest (n=17)	Canada (n=13)
Climate Factors	2.9	N/A	3	2.9
Elevated Adult Mortality	4.3	N/A	3.8	4.5
Genetic Isolation and/or Inbreeding	2.9	N/A	2.7	2.2
Habitat Loss/Fragmentation	4.4	N/A	4.7	4.4
Illegal Collection	2.9	N/A	2.6	2.3
Reproduction and/or Recruitment Failure	3.9	N/A	4.1	3.3

#### *WOOD TURTLE*

Threat	Northeast (n=37)	Southeast (n=0)	Midwest (n=11)	Canada (n=11)
Climate Factors	3.3	N/A	3.9	2.9
Elevated Adult Mortality	4.3	N/A	4.4	4.3
Genetic Isolation and/or Inbreeding	2	N/A	2.9	2.1
Habitat Loss/Fragmentation	4.7	N/A	4.2	4.8
Illegal Collection	4.3	N/A	3.7	4
Reproduction and/or Recruitment Failure	3.7	N/A	4.8	3.3

**ACTIONS:** The average ranking for each action by species and region.

*SPOTTED TURTLE*

<b>Action</b>	<b>Northeast (n=40)</b>	<b>Southeast (n=7)</b>	<b>Midwest (n=7)</b>	<b>Canada (n=10)</b>
Address Illegal Collection	4.2	4.3	4.1	4.2
Land Management	3.7	2.6	4	3.6
Land Protection	4.6	4	4.9	4.5
Nest Protection/Predator Control	2.9	1.4	4.1	2.2
Population Management	1.9	1	2.1	2.2
Reduce Road Mortality	3.8	3.3	3.1	3.5
Technical Assistance	3.6	2.3	3.1	3.3

*BLANDING'S TURTLE*

<b>Action</b>	<b>Northeast (n=22)</b>	<b>Southeast (n=0)</b>	<b>Midwest (n=17)</b>	<b>Canada (n=13)</b>
Address Illegal Collection	3.1	N/A	2.5	2.4
Land Management	4	N/A	4.1	3.5
Land Protection	4.2	N/A	4.5	4.5
Nest Protection/Predator Control	3.5	N/A	4.1	3.5
Population Management	2.8	N/A	2.8	3
Reduce Road Mortality	4.2	N/A	3.6	4.8
Technical Assistance	3.8	N/A	2.8	3.5

*WOOD TURTLE*

<b>Action</b>	<b>Northeast (n=37)</b>	<b>Southeast (n=0)</b>	<b>Midwest (n=11)</b>	<b>Canada (n=11)</b>
Address Illegal Collection	4.5	N/A	3.9	3.7
Land Management	3.9	N/A	4.5	3.6
Land Protection	4.7	N/A	4.5	4.6
Nest Protection/Predator Control	3.2	N/A	4.8	3.8
Population Management	2	N/A	3.9	3.2
Reduce Road Mortality	4.2	N/A	3.8	3.4
Technical Assistance	4.2	N/A	3.9	3.9

## Appendix B

### Threats and Actions Definitions

#### *Species Threats*

Climate Factors: Any factor related to climate change, which includes seasonal temperature changes, flooding, and precipitation changes.

Elevated Adult Mortality: Direct mortality to adults due to anthropogenic influence (road mortality, agricultural and forestry practices, etc.).

Genetic Isolation/Inbreeding: Isolated populations with limited to no emigration.

Habitat loss/Fragmentation: Any habitat where the species is known to occur that is being degraded or separated from other adjoining habitat patches via development.

Illegal collection: Populations are under additional stress due to illegal collection activity that includes for black market trade and incidental collection by the public.

Reproduction/Recruitment: Populations are not consistently producing new offspring each year due to lack of nesting habitat, over-abundance of predators, etc.

#### *Species Actions*

Address Illegal Collection: Includes law enforcement training, regulatory updates, etc.

Land Management: Habitat enhancement that includes wetland restoration, invasive species removal, nesting habitat creation, etc.

Land Protection: Includes acquisition via purchasing and partnering with private landowners to establish conservation easements.

Nest Protection/Predator Control: Active management of protecting individual nests using predator exclusion devices or nest banks (Wood Turtle streams) during nesting season and incorporating predator control measures (e.g., raccoon traps)

Population Management: Includes releasing head-started individuals, reintroducing, and repatriating individuals.

Reduce Road Mortality: Any effort to reduce mortality on roadways (signage, drift fences, culverts, education, etc.).

Technical Assistance: Includes providing information to any land manager or private landowner that may include BMPs.