

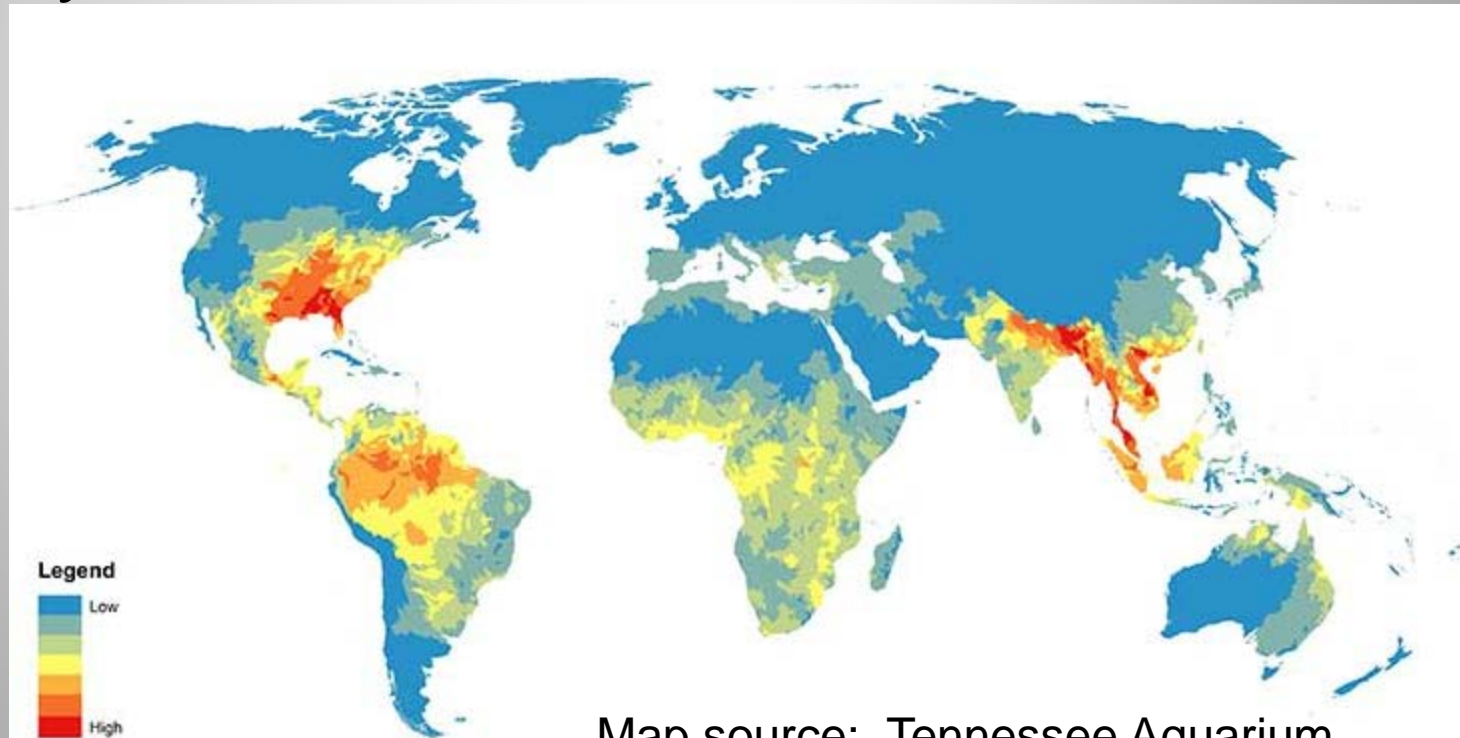
Diversity, Ecological Function, and Conservation Status of Riverine Turtles in Oklahoma: An Overview for Water Resource Managers



Tim Patton
Dept. Biological Sciences
Southeastern Oklahoma State University

Diversity

- 356 species worldwide
- 61 Species in North America
- SE United States is a biodiversity hotspot and evolutionary core



Map source: Tennessee Aquarium

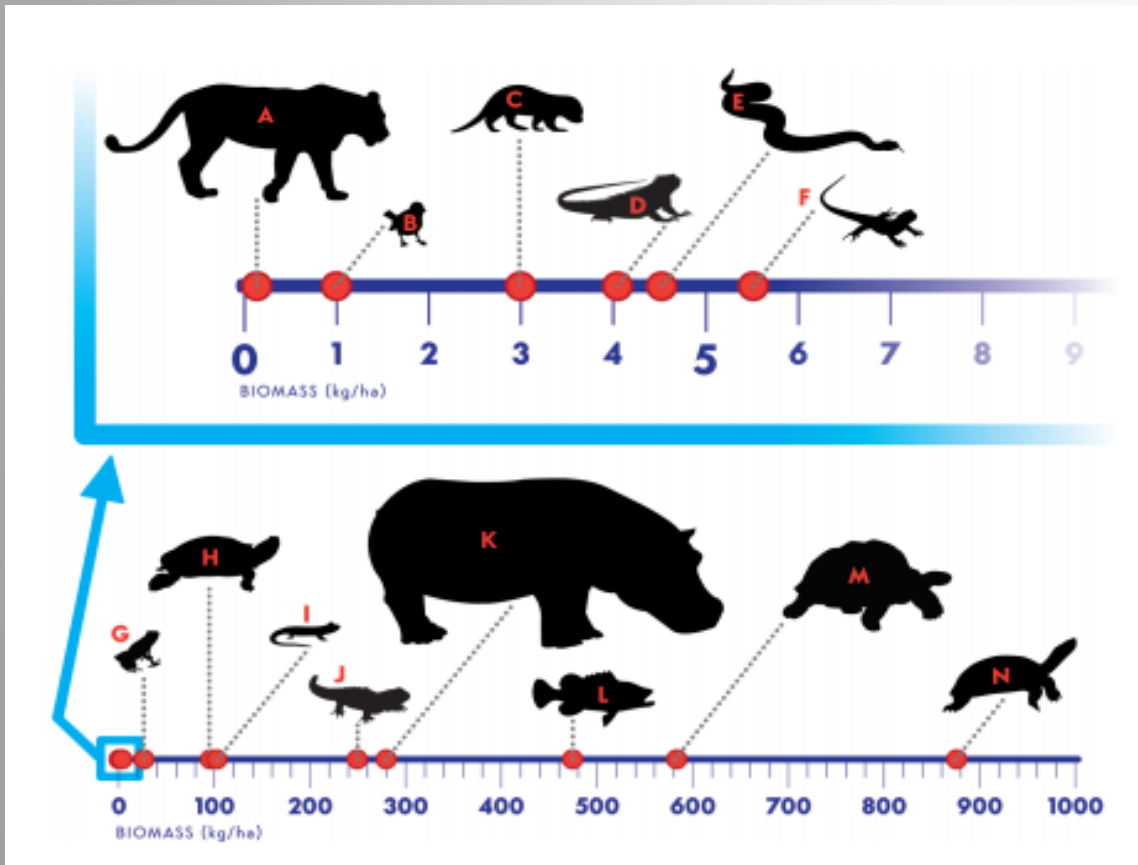
Diversity

- 19 species in OK



Relative Biomass

- Turtles often make-up significant proportion of biomass (Iverson 1982)
- General summary by Lovich (2018):



- Temporary aggregations up to several 1000's of kg/ha
- Why so high?
 - Ectothermy
 - Conversion efficiency
 - Trophic position
 - Susceptibility to predation
 - Ecological tolerances

Trophic Importance

- Large predator base
- Large prey base (esp. eggs and young)
- Conveyors of lower trophic levels
- Energy vector between terrestrial and aquatic ecosystems
- Mineral vectors (e.g., Ca and Sr)



Trophic Importance

- ◉ Some have shown to be keystone species
- ◉ Some important seed dispersers
- ◉ Some have shown top-down effect
- ◉ Some have shown bottom-up effect
- ◉ Many with significant bioturbation
- ◉ Virtually all studied have been shown to have important role in systems

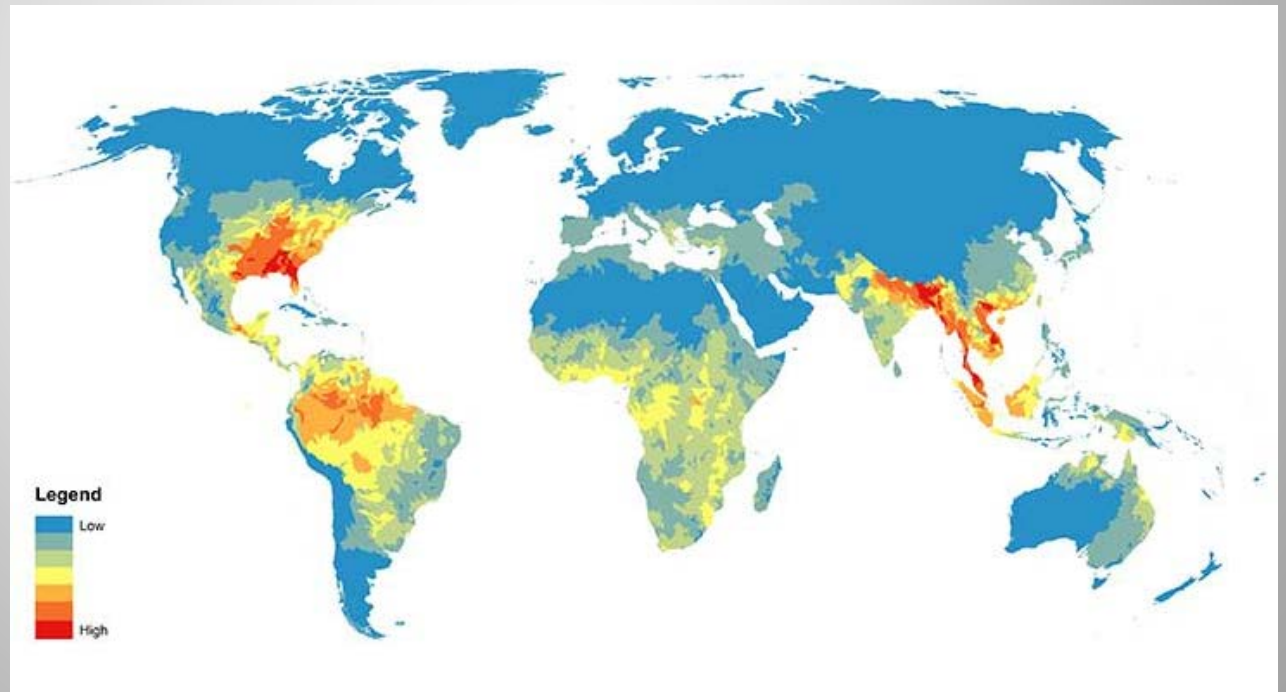


Worldwide declines of herpetofauna:

- Amphibians in general (Blaustein et al. 1994)
- As many as 1/3 of all amphibians threatened with extinction (Stuart et al. 2004)
- Reptiles in general (Gibbons et al. 2000)
- Random review of 1,500 species found 19% in danger of extinction (Bohm et al. 2013)
- As many as 30% of freshwater reptiles close to extinction (Bohm et al. 2013)
- 55% of turtles are threatened, mostly freshwater species (Rhodin et al. 2010)
- 61% threatened or extinct (Lovich et al. 2018)
- Turtles likely the most imperiled taxa of vertebrates

Diversity

- 61 Species in North America
- 10 Species listed under ESA (16%)
- However.....



Map source: Tennessee Aquarium

Species	ESA status	IUCN status	Congruent* (Yes or No)
<i>Emydoidea blandingii</i>	NL	EN	N
<i>Glyptemys cageli</i>	NL	CR	N
<i>Glyptemys insculpta</i>	NL	EN	N
<i>Glyptemys muhlenbergii</i>	T	CR	Y
<i>Gopherus agassizii</i>	T	VU	Y
<i>Gopherus morafkai</i>	C	NL	Y
<i>Gopherus polyphemus</i>	C	VU	Y
<i>Graptemys barbouri</i>	NL	VU	N
<i>Graptemys ernsti</i>	NL	NT	N
<i>Graptemys flavimaculata</i>	T	VU	Y
<i>Graptemys geographica</i>	NL	LC	Y
<i>Graptemys gibbonsi</i>	NL	EN	N
<i>Graptemys oculifera</i>	T	VU	Y
<i>Graptemys pearlensis</i>	NL	EN	N
<i>Graptemys pulchra</i>	NL	NT	N
<i>Kinosternon sonoriense</i>	NL	NT	N
<i>Macrochelys temminckii</i>	UR	VU	Y
<i>Malachemys terrapin</i>	NL	NT	N
<i>Pseudemys alabamensis</i>	E	EN	Y
<i>Pseudemys rubriventris</i>	PS	NT	N
<i>Sternotherus depressus</i>	T	LC	N
<i>Terrapene carolina carolina</i>	NL	VU	N
<i>Terrapene ornata</i>	NL	NT	N

(Hill 2017)

Perhaps as many as 23 species warrant SC status (38%)

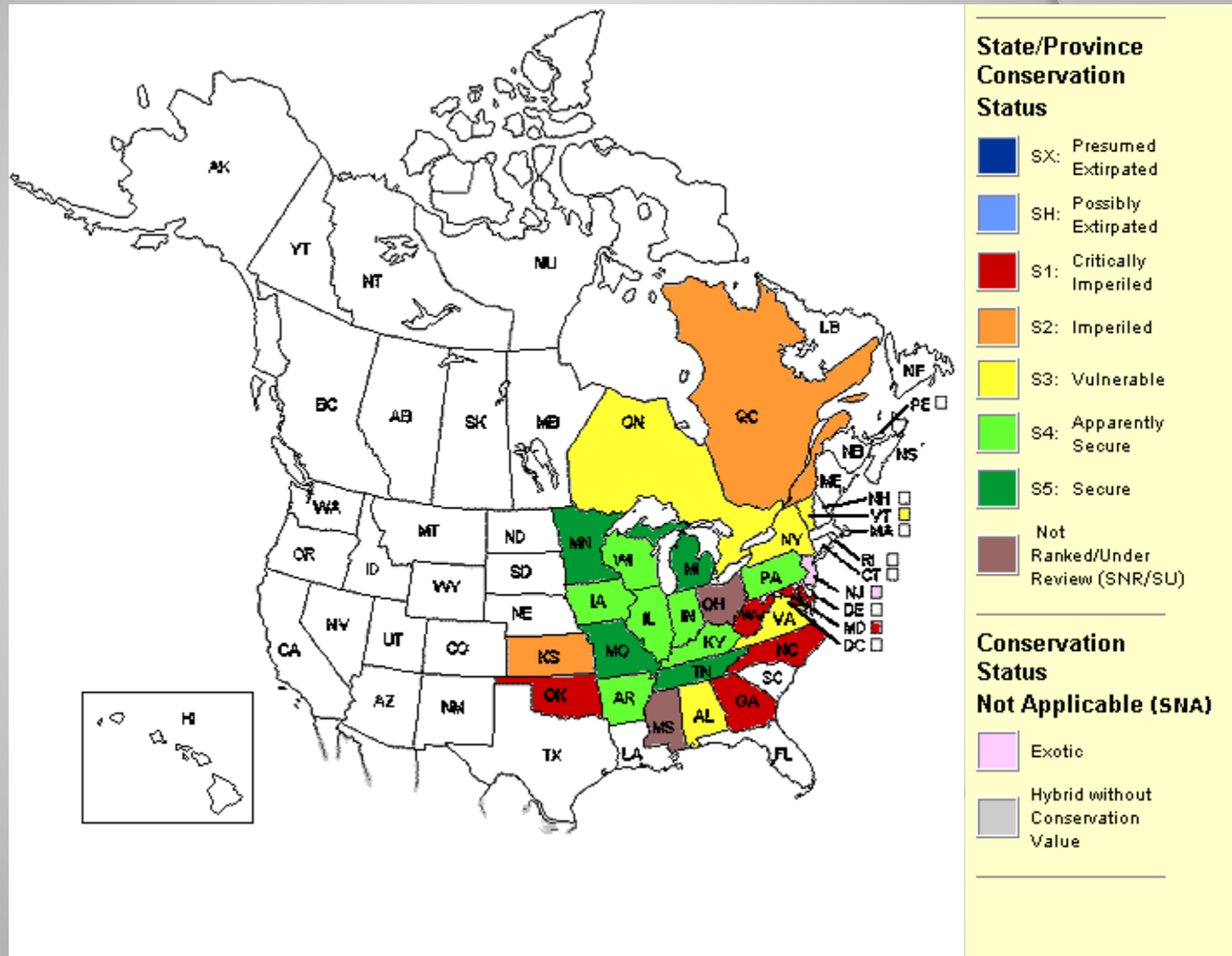
Natural Heritage Rankings

Example:
Northern Map
Turtle

S = (1-5)

N = 3

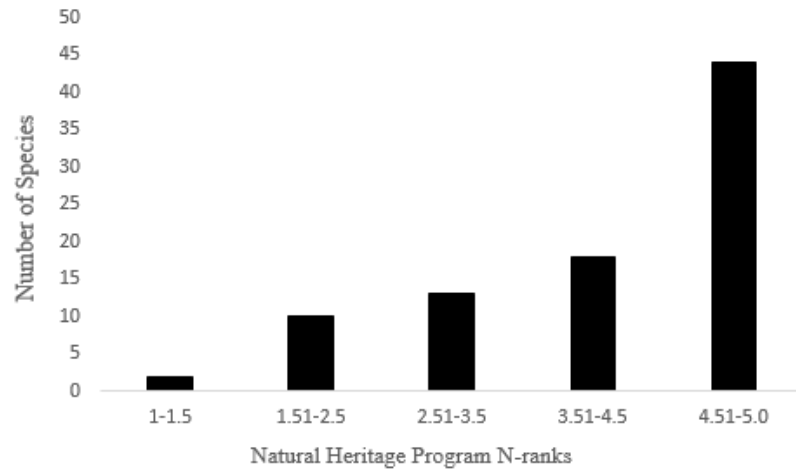
G = 5



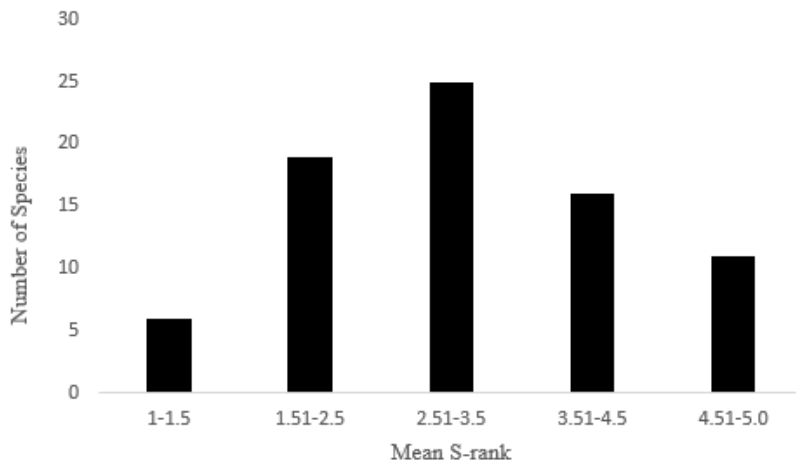
(Hill 2017)

Are N and mean S-ranks congruent?

(a)

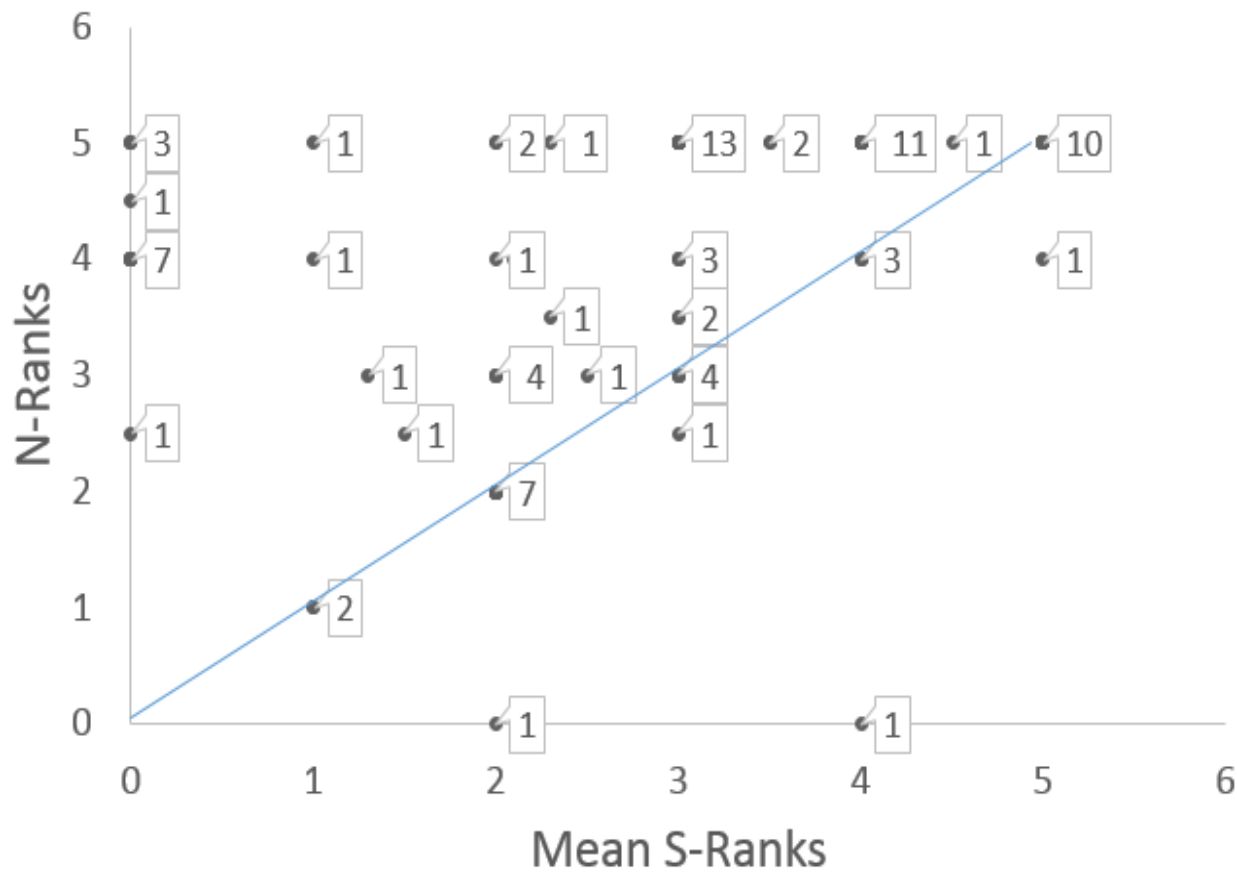


(b)



(Hill 2017)

Are N and mean S-ranks congruent?



Status in Oklahoma

Tier I	Tier II	Tier III
Alligator snapping turtle	Western chicken turtle	Mississippi map turtle
		Northern map turtle
		Ouachita map turtle
		Razorbacked musk turtle
		Western spiny softshell

(ODWC Comprehensive Wildlife Conservation Strategy 2005)

7/19 species (37%)

Summary of Status

- ⦿ 61% worldwide special concern species
- ⦿ IUCN and ESA incongruent, but combined suggest 38% special concern species
- ⦿ Natural Heritage Rankings?
- ⦿ ODWC “Tier” rankings: 37% of species in OK with special concern status

Review of Regulations Related to Commercial Harvest

- About 32 states allowed commercial harvest (Center for Biological Diversity 2009)
- 2007: Request to ODWC for review by Center for Biological Diversity to several states that allow harvest
- 2008: 3 year harvest moratorium on public waters while reviewing
- 2011: 2-year extension on moratorium
- 2013: Revised Regulations passed



Prior to Revisions:

Commercial Harvest Regulations in OK

- ⦿ Allowed in all “waters of the state” and private waters
- ⦿ Three protected species
 - *Chelydra serpentina*
 - *Deirochelys reticularia*
 - *Graptemys geographica*
- ⦿ 3 inch mesh on all nets
- ⦿ Must record number of each species harvested

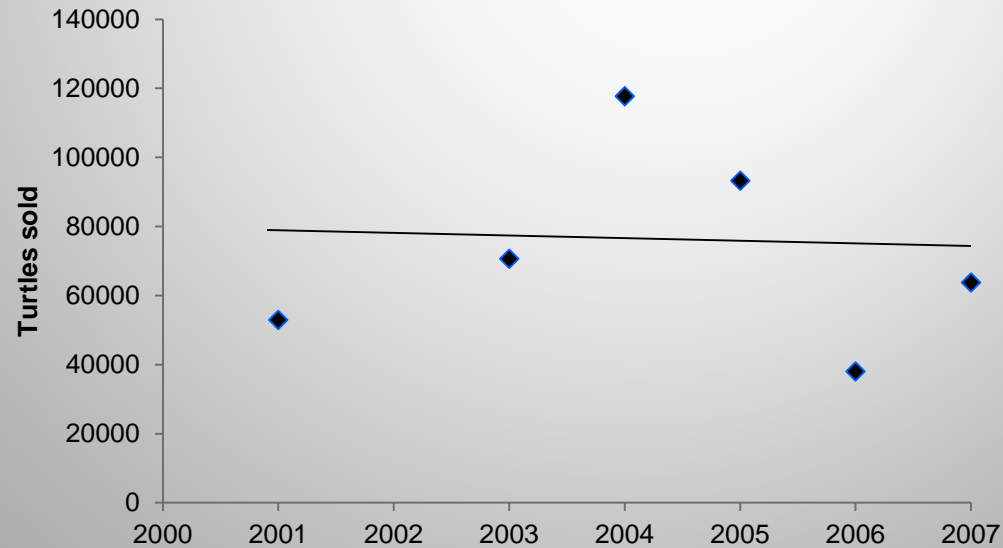
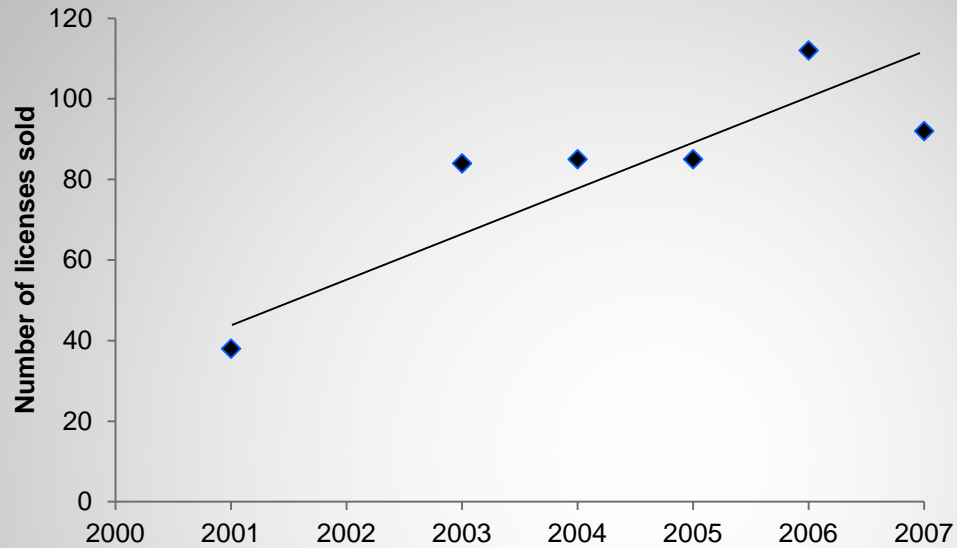
Presentation to the ODWC Wildlife Commission (2013)

- ◉ Commissions determine wildlife regulations in most states
 - Political (Governor) appointees
 - Most with no ecological background
- ◉ Presentation to the commission
 - Required for most regulation changes
 - Presented 5 major points relevant to this issue

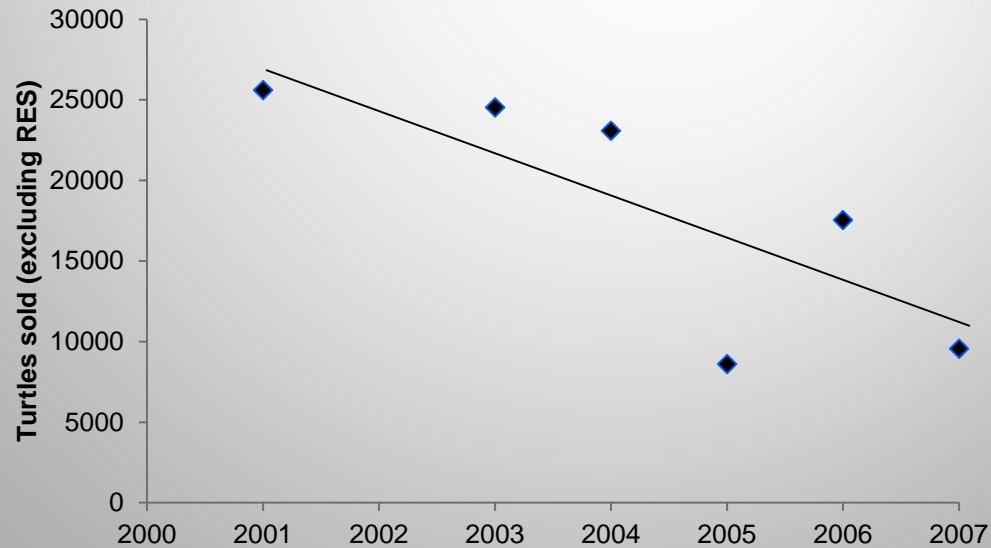
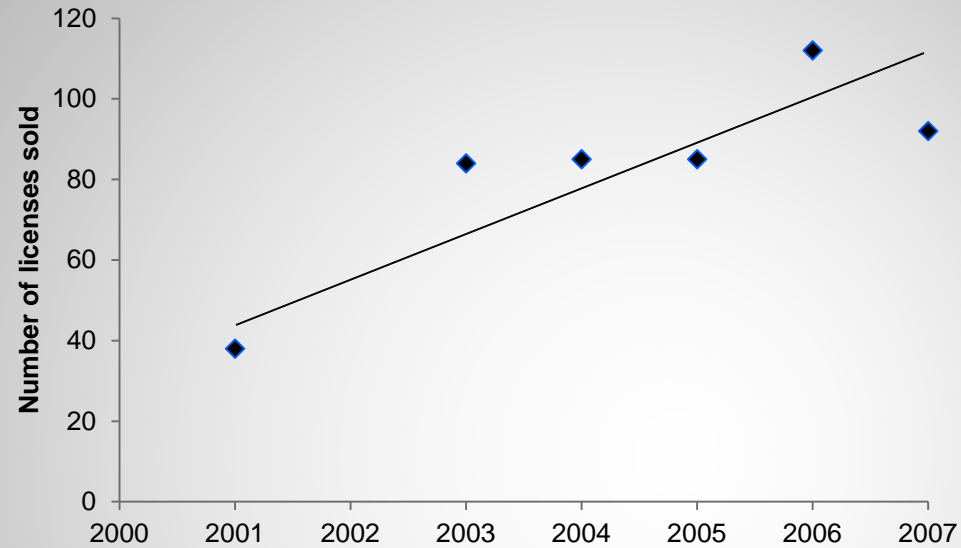
5 points of consideration:

1. Research suggests declines in abundance and diversity
2. Harvest numbers are not insignificant
3. Harvested turtles are exported out of US, mostly for food
4. Harvest data suggests CPUE is going down (supports reduction in abundance)
5. There are several philosophical arguments to support stopping commercial harvest

4. Harvest data



4. Harvest data



5. Philosophical list of arguments against commercial harvest in OK

- ⦿ Affects few people, mostly hobbyists or supplemental income
- ⦿ Generated <\$0.05/turtle harvested for the state
- ⦿ Turtles exported from the country
- ⦿ Commercial harvest of wildlife is an archaic practice (evokes the “era of exploitation”)
- ⦿ Many other states have recently passed bans
- ⦿ If other states ban, harvest in OK may go up
- ⦿ If harvest goes up, may further exacerbate declines
- ⦿ If declines continue, may lead to ESA issues
- ⦿ If other states ban, grass roots pressure may go up

Response of the commission?

- ◉ Lots of nodding in agreement
- ◉ A “slam dunk”



Political Roadblock:



- Original proposal: complete closure
- Turtle buyer pressured a state representative
- State representative was a turtle trapper!
- State legislature trumps ODWC regulations
- The compromise...

Proposed Regulations and Roadblocks

- ⦿ Harvest closed to “waters of the state”
- ⦿ Harvest closed to waters in a city, town, or municipality
- ⦿ Additional protected species:
 - Alligator snapper, W. chicken, N. map, plus:
 - All *Graptemys*, all *Chrysemys*, *Sternotherus carinatus*
 - All state and/or federally threatened species (none)
- ⦿ 16” minimum CL for common snapping turtle
- ⦿ 16” maximum CL for *Apalone*
- ⦿ Data records req'd: number/species, county, total weight/species, etc.

So, what should water resource managers know about turtles?

- ◎ I encourage familiarity with:
 - Importance of taxa to ecosystem integrity
 - What taxa are in your management area
 - What is their basic ecology
 - What species have special concern status
 - What are the regulations regarding turtles
- ◎ Most importantly, consideration as an important part of an ecosystem in management decisions