Research and Data: What we know, don't know, and want to know.

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MW Turtle Workshop
February 16, 2024

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COLLABORATIVE TO COMBAT THE ILLEGAL TRADE IN TURTLES

Research and Data Working Group

- Support the sharing and use of the best available science-based information to combat the illegal trade of turtles.
- Serve as liaisons between CCITT and the wider scientific community

R&D themes cut across working groups
- natural sciences
- social sciences
- criminology
- policy
- economics

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What are the trends?

- How many turtles
- What species
- Where are the hotspots (poaching locations & high demand markets)
- # of cases and/or convictions
- Demographics of offenders/#repeat
- Average price/value
- Connections to other illicit activities
- Are trends changing over time

Can we predict future trends so we can be proactive?

What we know – Legal Trade

(Mali et al. 2014)

- 2002-2012 – US Exported 127 mil. turtles
- 19% (24 mil.) wild* sourced
- Mostly *Trachemys* (sliders) , *Chrysemys* (painted) and *Pseudemys (cooters)*.

(AFWA 2020)

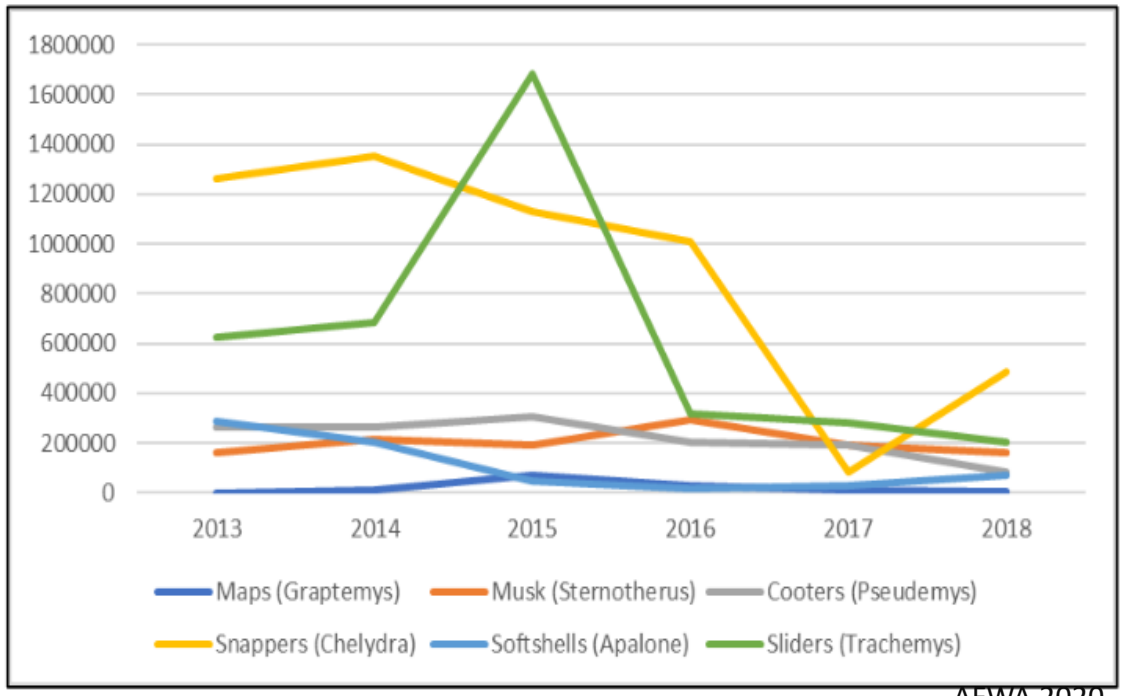
- 2013-2018 – US exported 18 million
- Mostly going to Asia, NA, & Europe

(USDA 2018)

45 turtle farms in the US

- $4.7 mil in sales in 2017
- 9 states have farms
- Louisiana (15), Florida (14)

18 million turtles were exported from the U.S. between 2013-2018 using LEMIS data reported by AFWA 2020

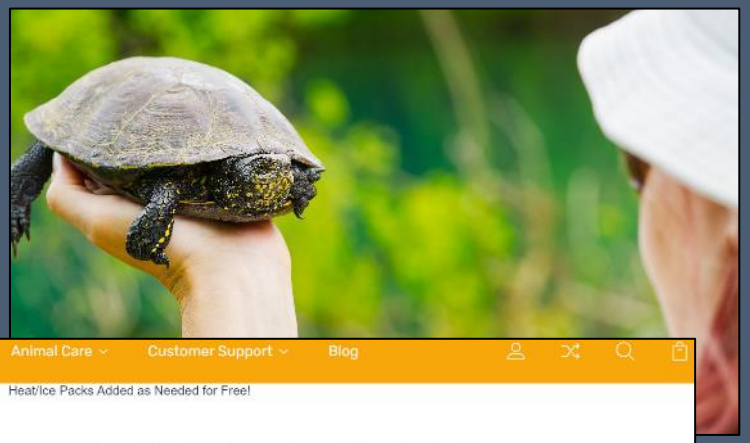


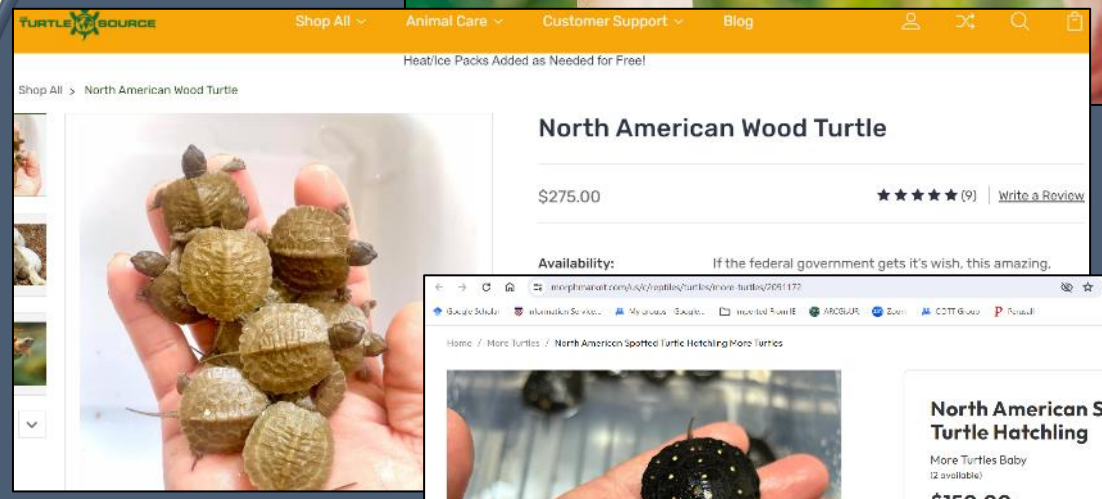
AFWA 2020

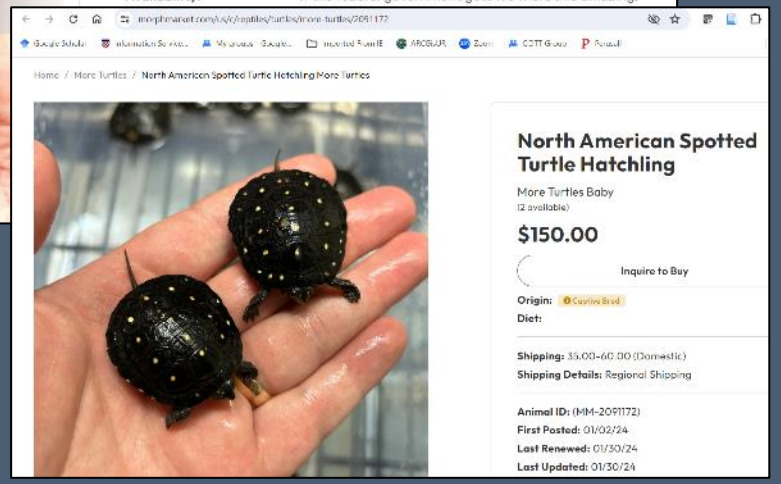
Overall: Exports decreased from an average of 12.7 mil/year to 3.6 mil/year

Turtles as pets

- In 2010, owners spent $765 million on turtle related products (Collis and Fenili, 2011)
- In 2019, ~3 million turtles owned in the US (American Pet Products Survey 2020)
- Turtles popular among Gen Z (Megna & Bailie 2024; Forbes Advisor 2022 survey)
- Plethora being sold under 4” legal size (Montague et al. 2022)
- Red-eared sliders are top 100 worst invasive species globally
- Research underway assessing knowledge and perceptions on owning pet turtles.







Does your agency require owners to register their pet turtles?

What we know – illegal trade

Easter et al. 2023; *Media portrayal of the illegal trade in wildlife: The case of turtles in the US and implications for conservation*

- 1998 – 2021; 54 U.S. cases
- ~24,000 native turtles
  - No numbers reported in 6 cases

- 34 species (8 subspecies); 14 genera
- 23 sp. listed under CITES and 12 IUCN redlist
- Box turtles and DBT most common

- Cases filed in 24 states; Sentencing – unk. for 7
  - 72% probation
  - 50% fines
  - 33% prison
- 6 repeat offenders


Photo: USFWS

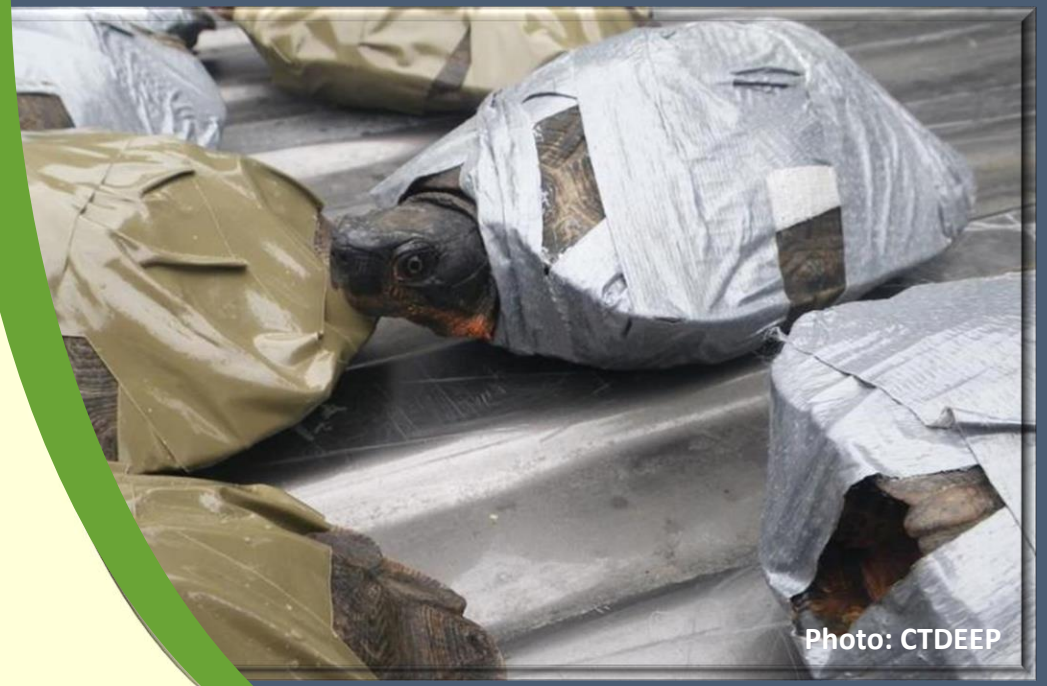
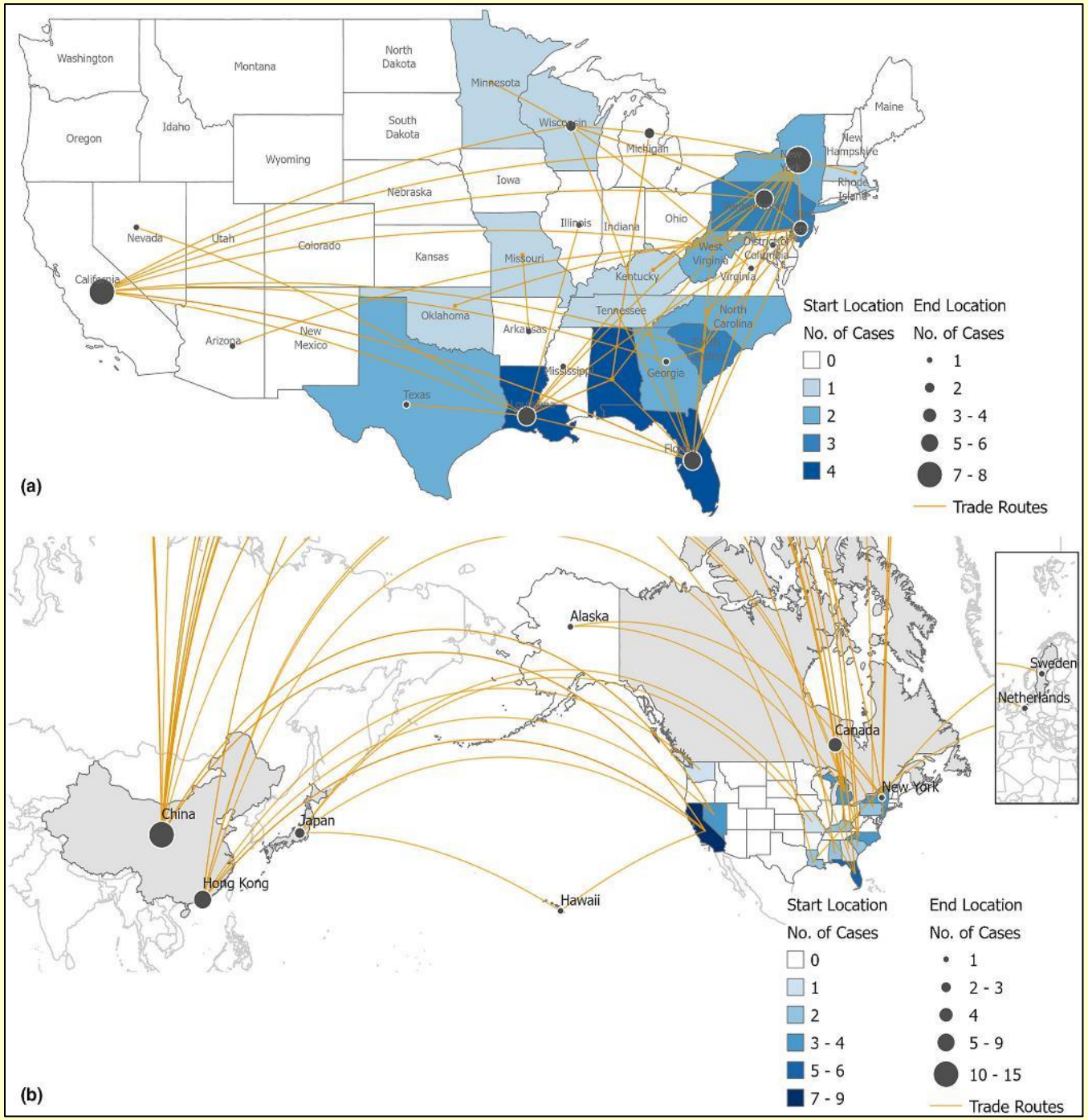


Photo: CTDEEP

Spatial Trends

(Easter et al. 2023)



- For 43 of the cases trade routes were documented
- Blue states are , with darker blues representing more cases
- Grey dots and filled in countries are where trade routes ended, with larger dots representing more cases.
- Orange lines represent trade routes to destination

- SE U.S. = most cases
- Transit hubs = CA, FL & NY
- Some turtles going to other states, many going to Asia, Canada and Europe

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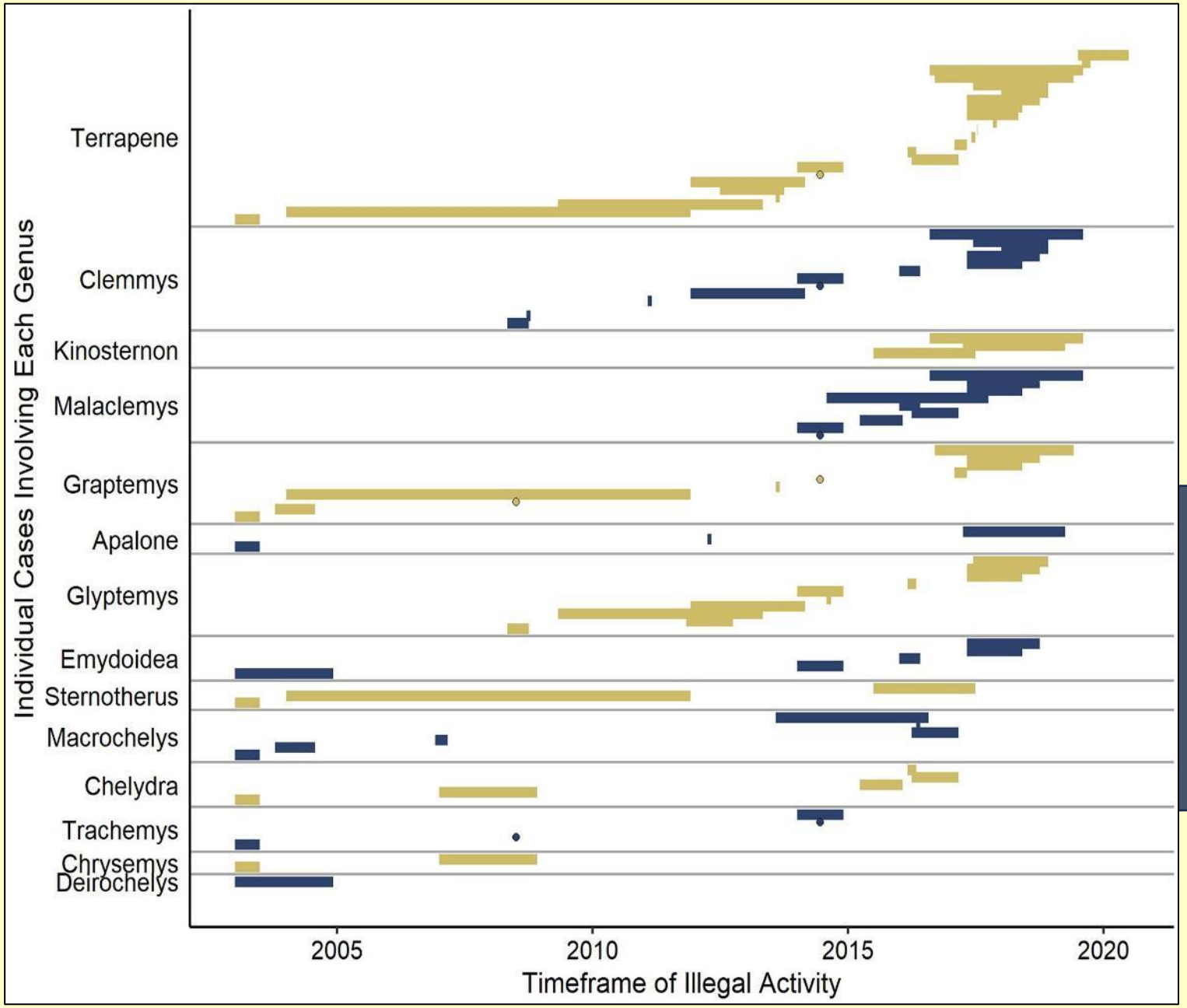
Temporal Trends

(Easter et al. 2023)



- 44 of 54 cases included genus and length of time engaged
- Each row is a case

- # of cases increasing*
- # of genera increasing
  DBT and mud turtles more recent

**Results potentially associated with increased enforcement and not increased trade*

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Scale & Scope of Illegal Trade in U.S.?

- CCITT = July 2018 - July 2022 → U.S. ~23,000 native turtles
- 4 years compared to Easter et al. 23 years
- Need to validate data

AZA/Wildlife Trafficking Alliance 2021 reported three of the top five genera or species seized or abandoned at wildlife ports by FWS in 2015-2019 were turtles.

SPECIES

The **TOP FIVE GENERA OR SPECIES** by number of **LIVE INDIVIDUALS** were:

5,700 live individuals of ***Litopenaeus Vannamei*** **"Whiteleg shrimp"**	**5,115** live individuals of ***Trachemys*** **"Slider Turtles"** (5,079 of *Trachemys scripta*)	**3,760** live individuals of ***Malaclemys terrapin*** **"Diamondback Terrapins"**
1,893 live ***Scleractinia*** **"Stony Corals"** (no species information available)	**1,520** live individuals of ***Terrapene*** **"Box Turtles"** (1,273 of *Terrapene carolina*)	

= 10,395 turtles

Photo: USFWS

Scale & Scope of Illegal Trade in U.S.?

Quantities presented are minimums

Not included are:

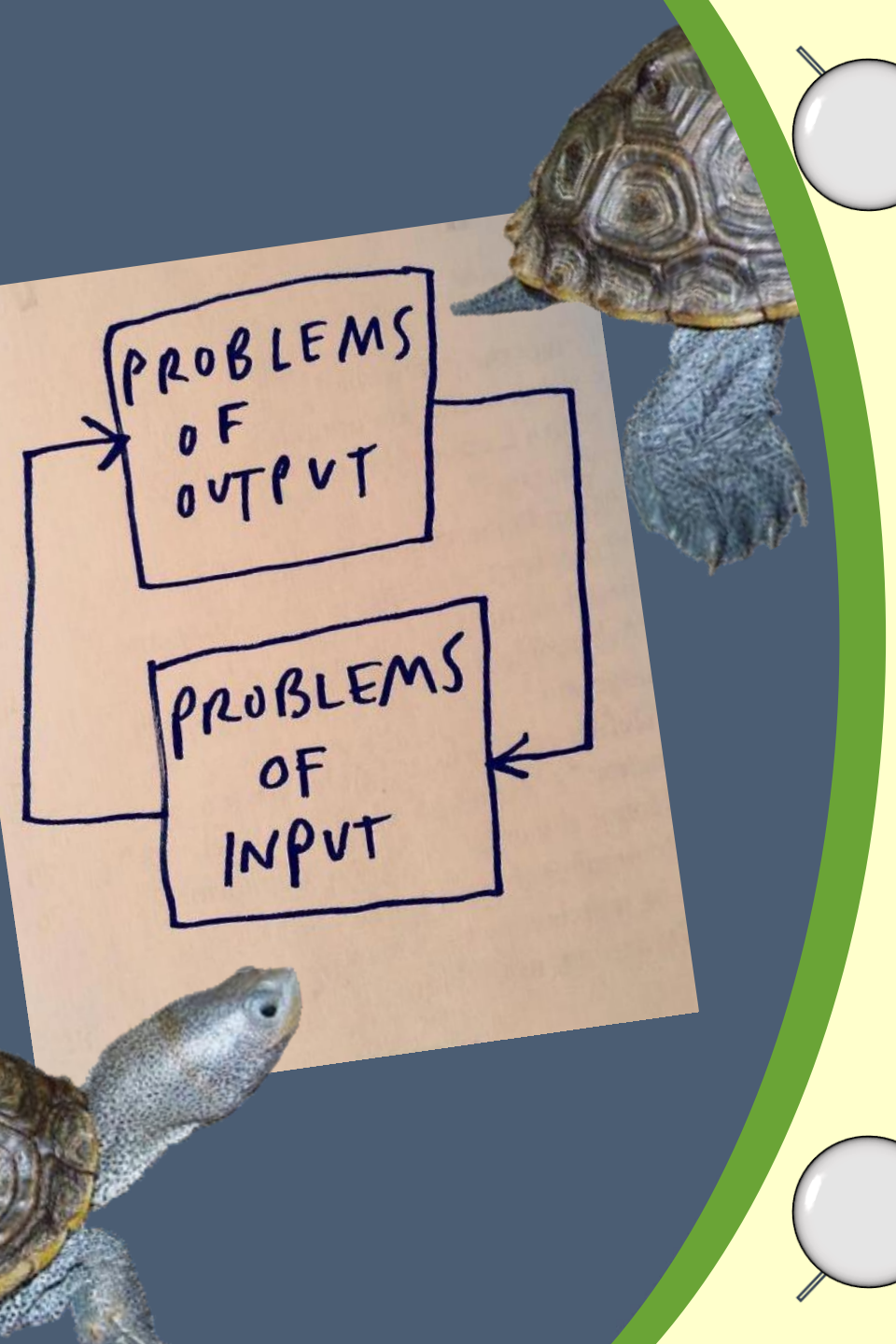
- County or state; smaller-scale violations
- Open cases
- Violations, but turtles not documented or seized
- Native turtles seized outside of the US
- Cases involving products, parts, eggs, meat, etc.
- Estimated #s prior to investigated (e.g. Sommers)

- SGCN, T&E, CITES species involved
- Keep common species common

Estimated < 10% of illegal wildlife is detected and seized by authorities (UNEP 2013)

We know it is bad, but don't know how bad!

Photo: USFWS



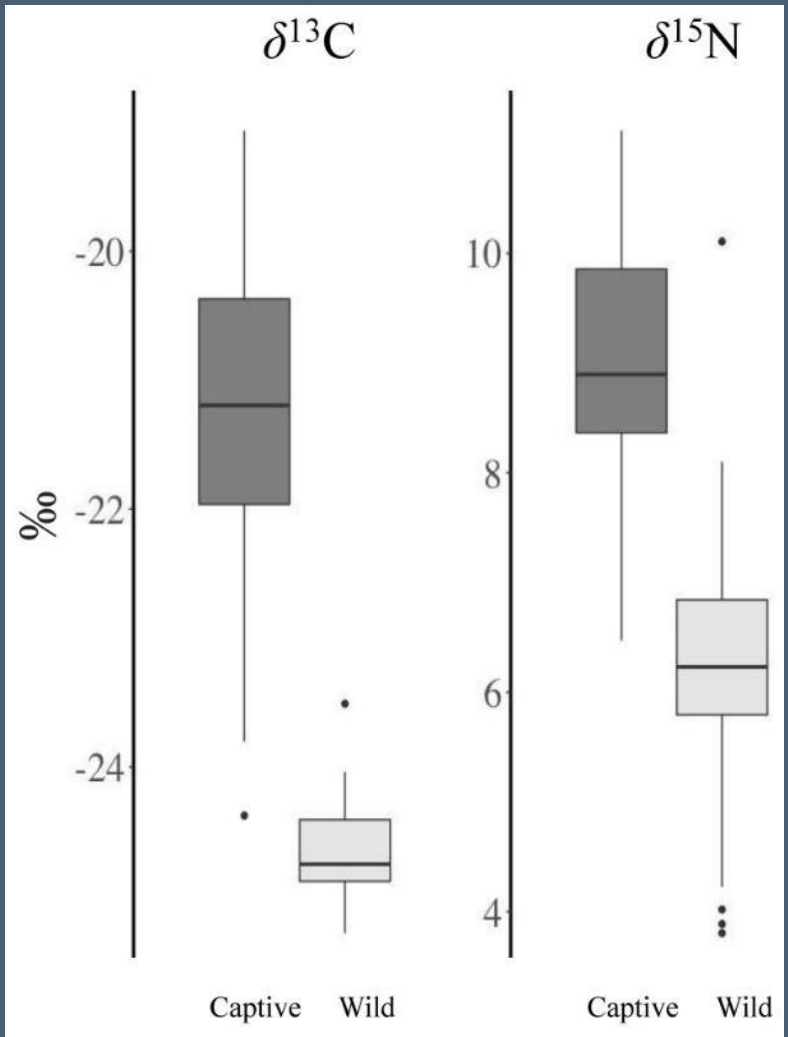
Challenges

- Illicit activity and difficult to quantify
- Lack of data collection & sharing
- Can’t merge existing data – dif. systems
- Need standard data collection & reporting
- Need consensus if centralized database
- Requires leadership support & buy-in
- Lack of funding…(International $$$$)

Captive vs. Wild & Provenance

Research Tools

- Physical characteristics
  (e.g. molecular bone disease, scratch marks, discoloration, responsiveness, parasites, etc.)
- Genetics/DNA
- Isotope Composition
- Elemental Composition
- Microbiome
- Volatile Organic Compounds
- PIT tags
- Biometrics (e.g. patterns, symmetry)
- eDNA



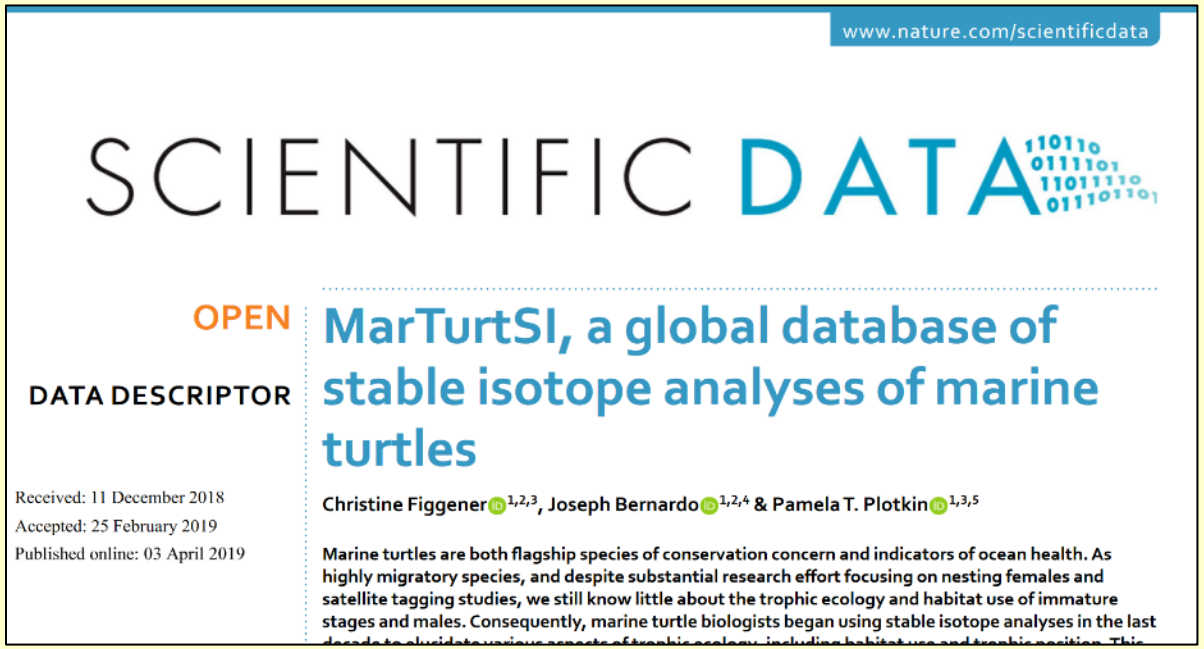
Carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) stable isotope values (per mil, ‰, measured by IRMS) from claw tips of wild wood turtles captured in Maine and captive wood turtles sampled at various animal care facilities throughout the eastern United States (Hopkins et al. 2022)

Captive vs. Wild & Provenance

Each of these tools requires a robust database to match samples.

Forensic evidence must be valid in court – standardized sampling protocols and published research

Requires commitment, time, money, & long-term management



www.nature.com/scientificdata

SCIENTIFIC DATA

OPEN

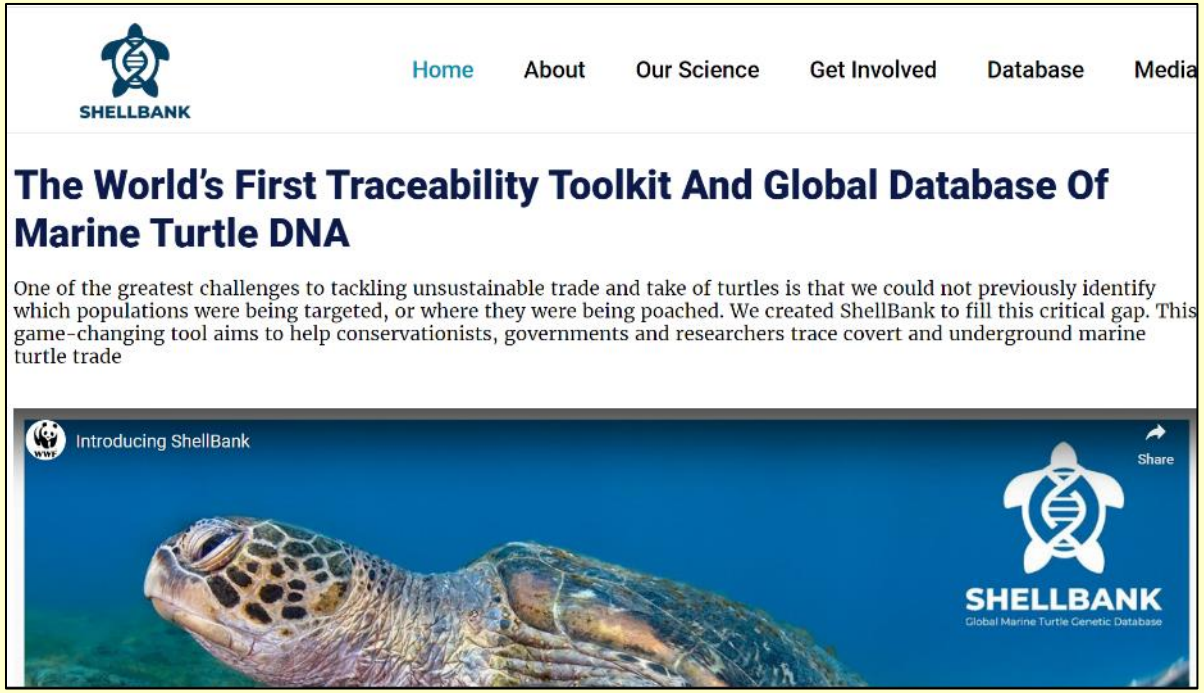
DATA DESCRIPTOR

MarTurtSI, a global database of stable isotope analyses of marine turtles

Received: 11 December 2018
Accepted: 25 February 2019
Published online: 03 April 2019

Christine Figgener[1,2,3], Joseph Bernardo[1,2,4] & Pamela T. Plotkin[1,3,5]

Marine turtles are both flagship species of conservation concern and indicators of ocean health. As highly migratory species, and despite substantial research effort focusing on nesting females and satellite tagging studies, we still know little about the trophic ecology and habitat use of immature stages and males. Consequently, marine turtle biologists began using stable isotope analyses in the last



SHELLBANK

Home About Our Science Get Involved Database Media

The World's First Traceability Toolkit And Global Database Of Marine Turtle DNA

One of the greatest challenges to tackling unsustainable trade and take of turtles is that we could not previously identify which populations were being targeted, or where they were being poached. We created ShellBank to fill this critical gap. This game-changing tool aims to help conservationists, governments and researchers trace covert and underground marine turtle trade

Introducing ShellBank

Share

SHELLBANK

Global Marine Turtle Genetic Database

Photo: USFWS

Cybercrime
Open, Deep, & Dark Web

Not prevalent on the dark web

(Stringham et al. 2023)

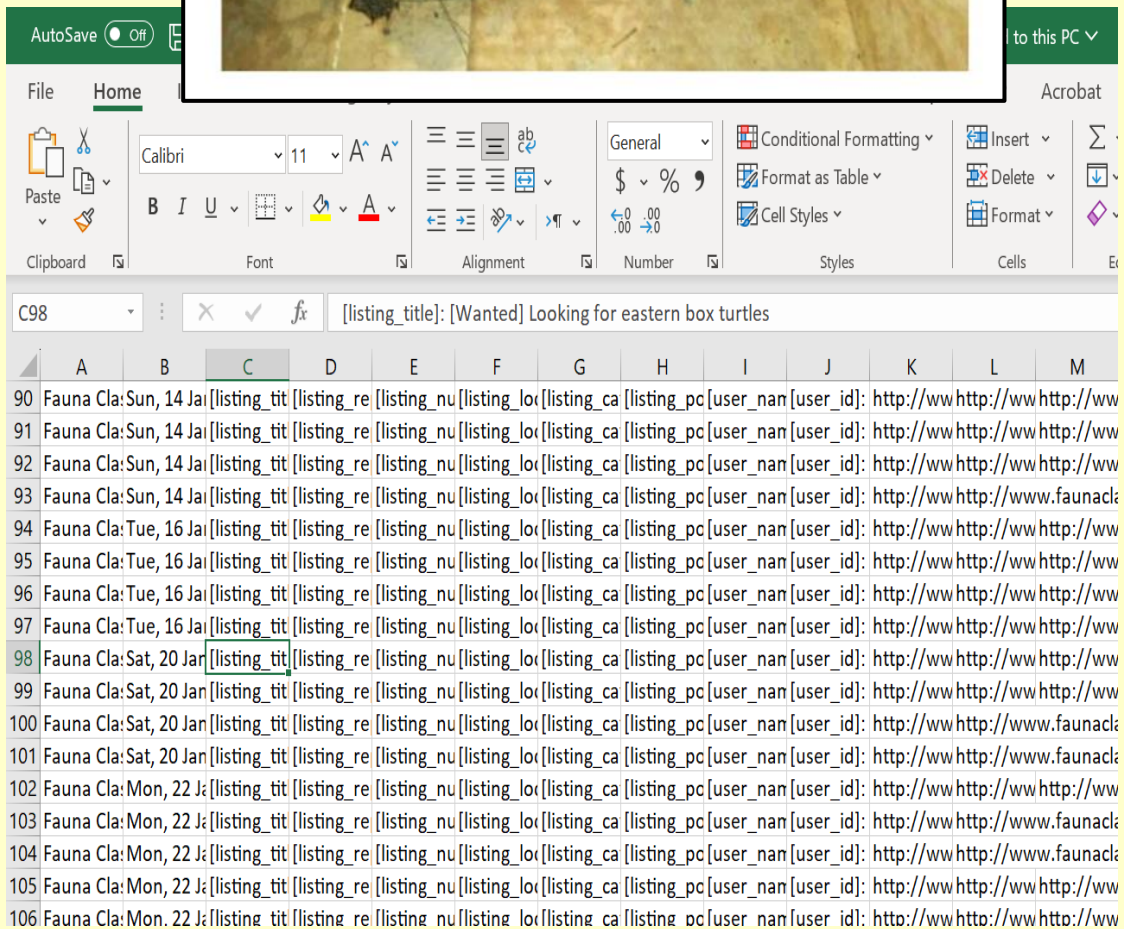
- Examined ~2 mil advertisements from 51 marketplaces and ~155k sellers, 2014 to 2020
- 153 species traded in 3,332 advertisements on 47 marketplaces with 1,222 sellers
- Primarily psychedelics and medicinals sold
- No turtles observed

Turtles prevalent on the web, social media, and cross-platform messaging services (open & deep web)

Does your agency have a cybercrime unit or dedicated investigato r?

Open Web

- Buyers, Sellers, Traders, “Rehoming”, “Rescue”
- Historically very time consuming
- Now web scraping and other applications
- Still shortcomings
  - Not all agencies have cybercrime units or the technology and training
  - Need search terms that traffickers use
  - Images harder to get – technology, server space and AI to search them
- Opportunity
  - CCITT database has 25k+ entries since July ‘22 from 13 websites (DIWT Australia).
  - Interest?



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The Risk in Repatriation

Collated all published data on ranavirus – only about 2,000 samples and mostly from the East.

Testing done mortality event – doesn't give us detection or occupancy → collect data

<u>Seeking all unpublished</u> data on any diseases

"Genetics revealed that bog turtles have high genetic structure, indicating local adaptations, which would pose challenges to repatriating turtles to populations not originally sourced." *(Dresser et al. 2018)*

Collect additional data when you can

zotero

CCITT Group ~1600 publications

Dr. Jennifer Sevin
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Breakout Groups

1. What is your agency's policy for publicly sharing data on locations of sensitive species, including turtles, or their habitats? How do you manage FOIA/AIT requests?

2. What are some of your biggest research and data needs?

3. How can we overcome the challenges to better share or centralize data?

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