



PINELANDS COMMISSION SNAKE RESEARCH

January 8, 2021

Pinelands Commission Meeting

WHY STUDY SNAKES?

Rare snakes often a regulatory issue for development, forestry, and vegetation and habitat management

Many species rely on upland landscapes and these activities mostly occur in uplands

Know little about most species because many are small and secretive and available funding is limited

18 PINELANDS SNAKE SPECIES

Snake Species	Current Status	New Status*	Concern
Corn snake	E	E	—
Timber rattlesnake	E	E	—
Pine snake	T	T	—
Eastern kingsnake	SC	SC	—
Northern scarlet snake	U	T	↑
Hognose snake	S	SC	↑
Rough green snake	S	SC	↑
Smooth earth snake	U	SC	↑
Eastern worm snake	U	U	—
Garter snake	S	S	—
Ribbon snake	S	S	—
Dekay's brownsnake	S	S	—
Water snake	S	S	—
Ringneck snake	S	S	—
Northern redbelly snake	S	S	—
Eastern milk snake	S	S	—
Northern black racer	U	S	↓
Black ratsnake	U	S	↓

*not yet promulgated



COMMISSION SNAKE RESEARCH

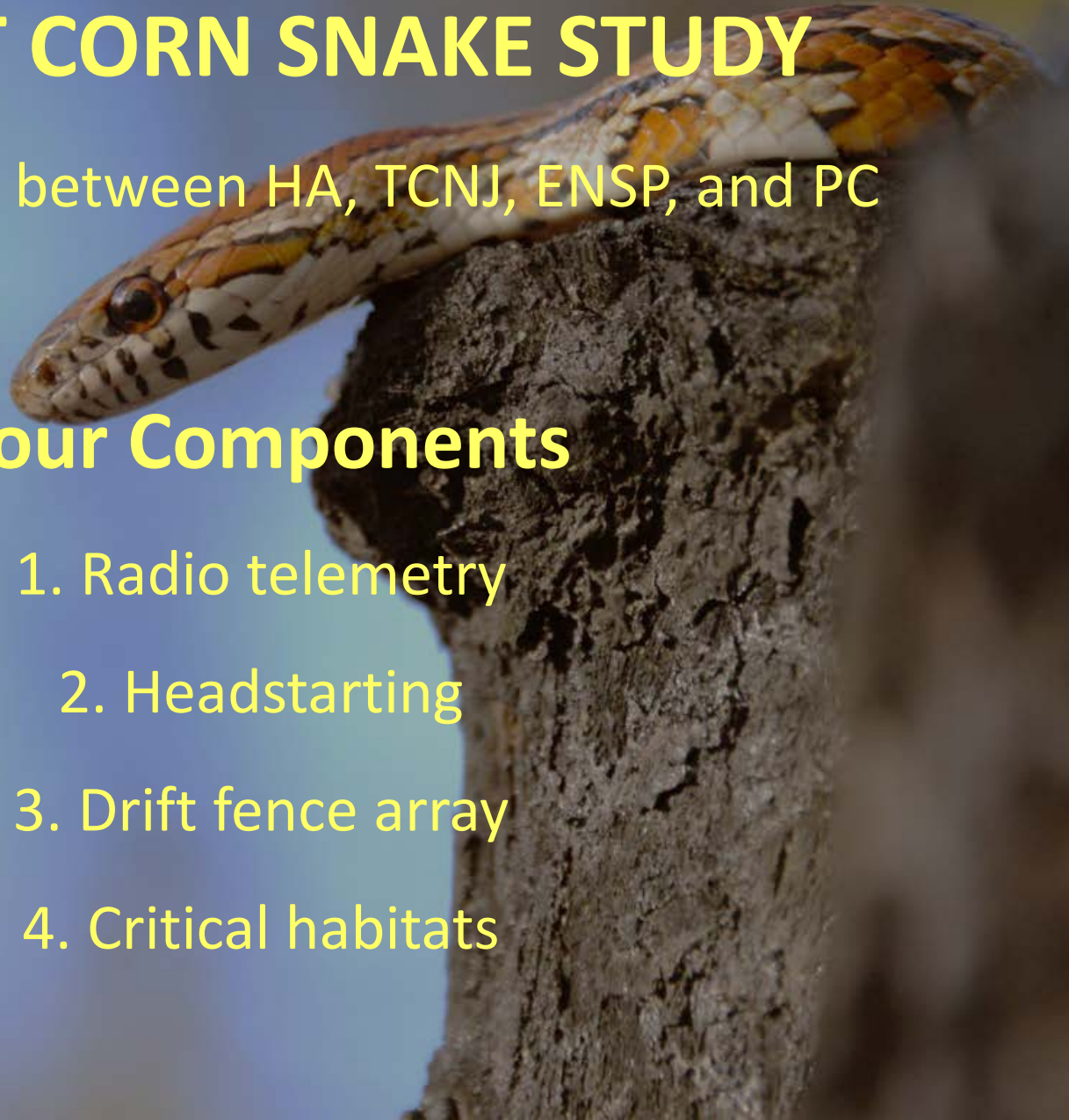
- I. Joint Corn Snake Study (PCF)
- II. Long-term Rare Snake Monitoring (NPS)
- III. EPA Kingsnake Study (EPA)
- IV. Snake Fungal Disease (NPS)
- V. Snake Genetics (PCF)

I. JOINT CORN SNAKE STUDY

Collaboration between HA, TCNJ, ENSP, and PC

Four Components

1. Radio telemetry
2. Headstarting
3. Drift fence array
4. Critical habitats



I. JOINT CORN SNAKE STUDY

1. Radio telemetry

Capture snakes

Surgically implant radio transmitters



I. JOINT CORN SNAKE STUDY

1. Radio telemetry

Located snakes 2 – 3x per week in 2017 – 2019

Environmental, habitat, and behavioral data

Activity range and habitats used

Timing of nesting, shedding, and denning

Location of dens, nests, and shed sites

Before and after prescribed burning



I. JOINT CORN SNAKE STUDY

2. Headstarted vs cold released hatchlings

Collected eggs from nest areas and hatched in the laboratory

Cold release group released back to nest area

Headstarted group kept over winter and fed

A close-up photograph of a person's hand holding a corn snake. The snake has a complex pattern of brown, black, and tan spots and bands on its body. The background is a blurred natural setting with green foliage and brown ground.

I. JOINT CORN SNAKE STUDY

2. Headstarted vs cold released hatchlings

Performed lab experiments on headstarted hatchlings

Substrate, cover, temperature preferences

Headstarting was done 2017 – 2020

Goal is to compare survivorship of the two groups

Recaptured 6 headstarted and 5 cold released so far

Need to find more of both groups

I. JOINT CORN SNAKE STUDY

3. Drift Fence trapping and cover study

Drift fences: 800 ft, 1800 ft, 255x255 ft, 150x225 ft

83 box traps, 83 plywood, 83 metal

Spring – Fall of 2019 – 2022

Goal: capture hatchlings and assess survey methods

I. JOINT CORN SNAKE STUDY

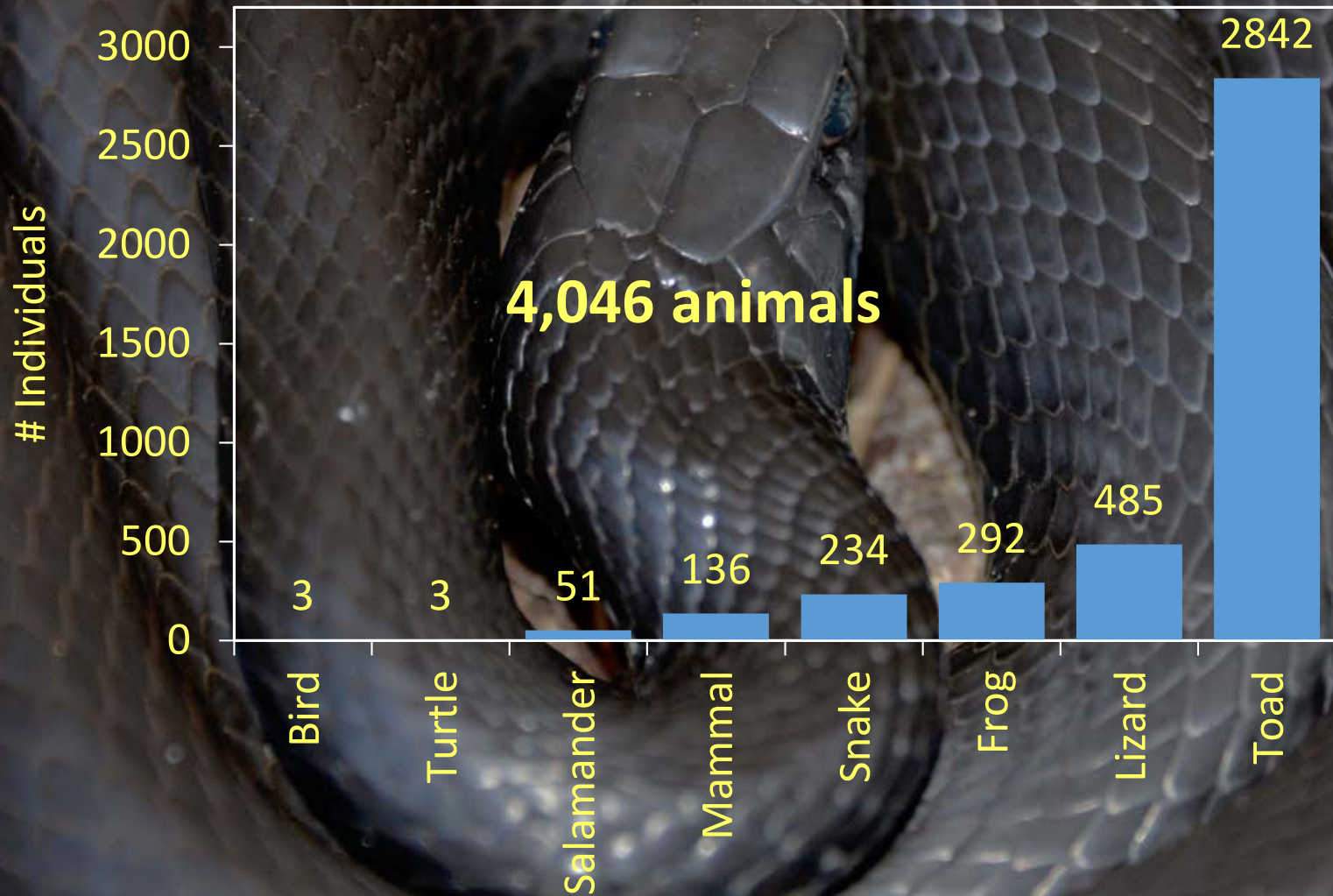
3. Drift Fence trapping and cover study

Box trap



I. JOINT CORN SNAKE STUDY

3. Drift Fence trapping and cover study



I. JOINT CORN SNAKE STUDY

3. Drift Fence trapping and cover study

234 snakes

15 species

Eastern kingsnake	1
Eastern worm snake	1
Northern brown snake	1
Northern scarlet snake	1
Timber rattlesnake	1
Eastern hognose snake	3
Northern pine snake	4
Northern water snake	4
Eastern garter snake	13
Eastern ribbon snake	16
Northern black racer	29
Rough green snake	30
Corn Snake	31
Southern ringneck snake	32
Northern redbelly snake	67

I. JOINT CORN SNAKE STUDY

3. Drift Fence trapping and cover study



Fence successfully captured large and small snakes

Tracked four corn snakes around the fence

The tracked corn snakes climbed over the fence

Moved them back and climbed over the fence again

I. JOINT CORN SNAKE STUDY

4. Locating dens, nests, and shed areas

2017 – 2020

Critical habitats

Maintain some fidelity

Critical habitats are often communal

Camera monitoring network

II. LONG-TERM RARE SNAKE MONITORING

Little data exists on rare snake trends in the Pinelands

54 corn snake dens (50 are corralled)

27 kingsnake dens (13 corralled)

10 pine snake dens (8 corralled)

Add more pine snake dens and find hognose snake dens

Corral is non-invasive method to census snakes

No physical disturbance to dens or hibernating snakes

III. KINGSNAKE STUDY

Listed as SC for threats, declines, and unknown status

2019 tracked 13 snakes to prepare for a study

2020 PC, HA, and TCNJ started study

Radio tracked 30 snakes total so far

6 killed, one died mysteriously, one went missing

Roughly equal # of males and females

Activity range and habitat use

Timing of denning and nesting

IV. SNAKE FUNGAL DISEASE

Emerging fungal disease found in snakes

Caused by *Ophidiomyces ophiodiicola* (Oo)

Rutgers and HA has been excavating dens for 35+ years

Collaboration between Rutgers, HA, USGS, and PC

Opportunity to sample for Oo inside dens

Pilot sampling in 2018 and all snakes in 2019

Oo only in den soils and not in soil with other microbes

Manuscript being submitted for publication

V. CORN SNAKE & KING SNAKE GENETICS

Collaboration between Arcadia, TCNJ, ENSP, and PC

Natural extension of the current research

Sampling snakes from our studies and other snakes

Genetic diversity of each species

Potential impact of barriers such as roads

NJDEP recent focus on habitat connectivity

NJDEP Connecting Habitat Across NJ (CHANJ)

QUESTIONS?

