Who am I?

- Shameless plug

Outline

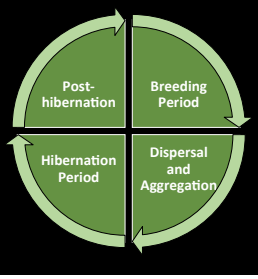
- General species information
- Threats
- Conservation efforts

Intro

Cutaneous Respiration is the sole respiratory mode

- *Aneides aeneus*
- Family*: Plethodontidae*
- Lack lungs, laterally compressed, associated with rock outcrops, arboreal, and have cool markings

Annual cycle

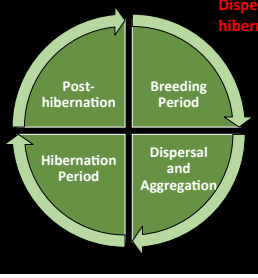


- Breeding period: late May to late September
- Dispersal: late September to November

(Gorden 1952)

Annual cycle

4-stage annual life cycle—Breeding period, Dispersal period, Hibernation period, and Post-hibernation period



- Hibernation period: November to late April
- Post-hibernation dispersion period: late April and early May

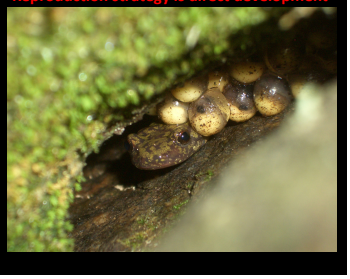
(Gorden 1952)

Breeding period

- Breeding is poorly documented
- Spring through early autumn
- 10-30 eggs deposited on the ceiling of rock crevices in June and July

(Niemiller and Reynolds 2011)

Reproduction strategy is direct development



Preferred Habitat

- shaded rock outcrops (typically sandstone and granite)
- Cracks, crevices, and under rotting tree bark

(Niemiller and Reynolds 2011)

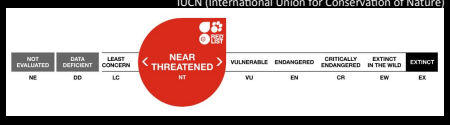
Preferred Habitat

- Moss filled crevices and ledges that are well concealed
- Seasonally can be arboreal
  - Deforestation hypothesis

(Gorden, 1957, Walldron and Humphries 2005)

Conservation Status

IUCN (International Union for Conservation of Nature)



"Listed as Near Threatened because this species is in significant decline, possibly because of habitat loss, over-harvested, disease, and drought, with a risk that these decline could in the future spread to the main range of the species"

(Hammerson 2004)

Conservation Status

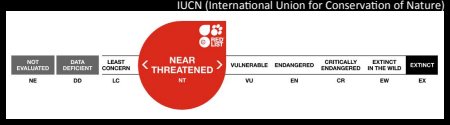
IUCN (International Union for Conservation of Nature)

"To assist its conservation, better information on its current status is needed, as is information on the threats that it faces….and whenever feasible a forested buffer of at least 100m should be left around occupied rock outcrops"

(Petranka 1998, Hammerson 2004)

Conservation Status

IUCN (International Union for Conservation of Nature)

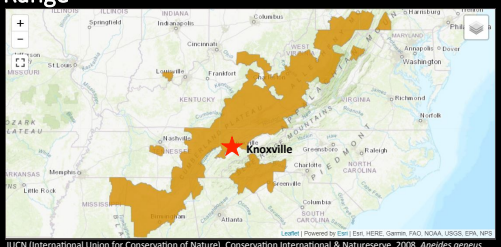


The IUCN conservation ranking is "NEAR THREATENED"

The global population trend (according to the IUCN) is consider to be "DECREASING"

(Petranka 1998, Hammerson 2004)

Range



IUCN (International Union for Conservation of Nature), Conservation International & Natureserve. 2008. *Aneides aeneus*. The IUCN Red List of Threatened Species. Version 2018-2

Threats

- Habitat loss and fragmentation
  - logging, mining, road construction, water impoundments, and chemical contamination

(Newman et al. 2018)

Threats

- Climate Change
  - Expected loss of climatically suitable habitat in the next half-century

(Newman et al. 2018)

Threats

- Fungal and viral threat
  - Ranavirus
  - *Bd*
  - *Bsal**

(Newman et al. 2018)

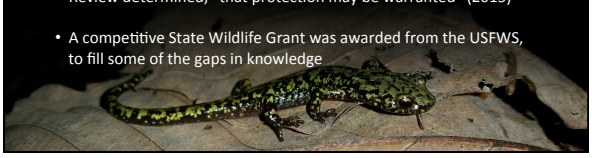
Threats

- Over collection
  - continual collection of egg-brooding Green Salamanders from the same site over consecutive years can result in population decline

(Newman et al. 2018)

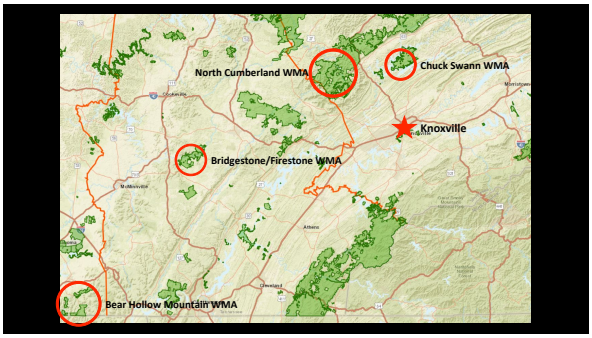
TN Conservation – Backstory

- U.S. Fish and Wildlife Service (USFWS) was petitioned to federally protect the green salamander (2012)
- Review determined, "that protection may be warranted" (2015)
- A competitive State Wildlife Grant was awarded from the USFWS, to fill some of the gaps in knowledge



TN Conservation – Backstory

- Tennessee Wildlife Resources Agency (TWRA) will conduct surveys WMAs, State Parks, State Natural Areas, State Forest, and private lands for occurrence data
- TWRA partnered with University of Tennessee Knoxville for disease aspect of study
- TWRA partnered with University of Alabama Huntsville for the genetic analysis



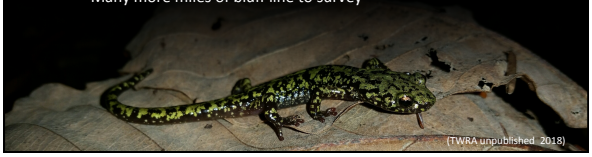
TN Conservation

- Bear Hollow Mountain WMA, Franklin county
  - 7 historical occurrence records investigated
  - 61 new occurrences documented
  - Individuals were found at every site except 3

(TWRA unpublished 2018)

TN Conservation

- Bridgestone-Firestone WMA, White county
  - 1 historical occurrence record investigated
  - 24 new occurrences documented
  - Many more miles of bluff line to survey

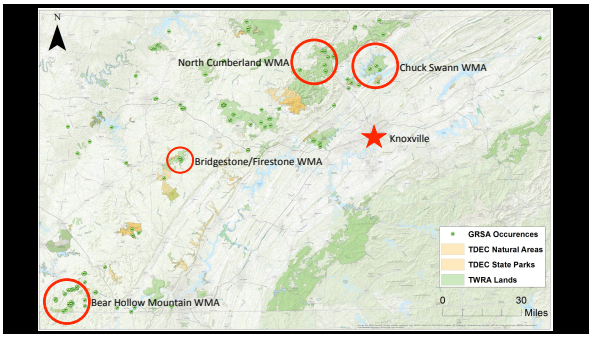


(TWRA unpublished 2018)

TN Conservation

- Chuck Swann WMA
  - 1 historical occurrence records investigated
  - 4 new occurrences documented
- North Cumberland WMA
  - 4 new occurrences documented

(TWRA unpublished 2018)



NC Conservation

North Carolina Wildlife Resources Commission (NCWRC) and Conservation partners

- Annual surveys for the species since 2002
- Analysis of all known populations in NC (2018)

(NCWRC unpublished 2018)

NC Conservation

- 25% of populations are in decline and 72% have a zero growth rate
- Populations have been crashing since the early 2000s

(NCWRC unpublished 2018)

NC Conservation

Currently part of a MONOPHYLETIC genus

- describing a new species out of the lineage that will be a new micro-endemic
- Studying effects of controlled burning on populations

(NCWRC unpublished 2018)

Summary

- Green salamanders are globally ranked as Near Threatened by the IUCN
- State agencies are working hard to fill the knowledge gaps defined by the USFWS assessment

Future Directions for Conservation

- Ongoing survey efforts
  - Historic occurrences
  - new occurrences
- Working through partnerships to assess disease and genetics
- Examining controlled burn effects on isolated populations

Photo Sources

1) Madison Terry 2018, http://newsstand.clemson.edu/recent-clemson-alums-chapter-accepted-for-publication/
2) Scott Hollis, personal collection, UTK
3) Daniel Istvanko, personal collection, TWRA
4) Daniel Istvanko, personal collection, TWRA
5) Friends of DuPont Forest, https://www.dupontforest.com/green-salamander-walk-talk/
6) Todd Pierson, http://herpsofnc.org/green-salamander/
7) Ohio DNR, Division of Wildlife, http://wildlife.ohiodnr.gov/species-and-habitats/species-guide-index/amphibians/green-salamander
8) Daniel Istvanko, personal collection, TWRA
9) Todd Pierson, http://herpsofnc.org/green-salamander/

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Smith, W., Slemp, S., Stanley, C., Blackburn, M., & Wayland, J. (2017). Rock crevice morphology and forest contexts drive microhabitat preferences in the Green Salamander (Aneides aeneus). Canadian Journal of Zoology, 95(5), 353-358.

Tennessee State Wildlife Action Plan Team. 2015. Tennessee State Wildlife Action Plan. Tennessee Wildlife Resources Agency. Nashville, Tennessee, USA.

Conservation efforts – TWRA VLOG