

Hello all,

At the suggestion of attendees of the NCPARC RIMM meeting on October 30, 2008, we have summarized our concern for *Acris gryllus*, the Southern Cricket Frog, in North Carolina and to suggest some steps to take in response. A manuscript of this research is in review. We have both recently graduated and may take jobs out-of-state, so we want to involve more scientists in this effort. We'd be happy to see new data that contradicts our evidence of decline. Please pass this along and do not hesitate to contact us.

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#### Background on cricket frogs (*Acris*)

- 2 or 3 species (and up to 5 subspecies) occur in eastern North America.
- 2 taxa have declined in northern areas of their ranges (in the upper Midwest and the Northeast)
- There are probably multiple causes of these declines. The ecology of *Acris* may make them unusually vulnerable in comparison with other wide-ranging anurans. Some suggested factors:
  - *Acris* over-winter in preexisting cracks and cavities in the terrestrial surface. Increased winter mortality may result from new weather patterns influenced by global climate change.
  - Male *Acris* call from aquatic macrophytes and larvae feed on algae. Plants and algae are controlled in many wetlands, sometimes by accidental runoff of herbicides.
  - *Acris* are highly mobile and use upland habitat extensively. Degradation of upland habitat likely increases the high mortality of juveniles in autumn and eliminates wintering sites.
  - *Acris* have extremely low annual survival and short population turnover time (ex. 5% and 1.5 years in one case). One poor breeding season could lead to the collapse of a population.

#### *Acris* in North Carolina

- *Acris gryllus* (Southern Cricket Frog) and *A. crepitans* (Northern Cricket Frog) occur in NC.
- Identification of the two species is problematic because they look and sound similar.

- According to published range descriptions, *A. gryllus* is a Coastal Plain species, *A. crepitans* is a Piedmont species with isolated populations along rivers in the Coastal Plain, and they co-occur at breeding sites (syntopy) around the Fall Zone.
- North Carolina is near the northern limit of *A. gryllus*. Changes in its distribution may be obscured by sympatry with *A. crepitans* and the difficulty of identifying the species.

#### Our early research

- JPM began the project in 2002 with a focus on evolutionary and behavioral issues in syntopy, but could not find syntopic sites near the Fall Zone in the northern half of the state.
- In response, JPM surveyed *Acris* across NC and developed means to identify the species morphologically and acoustically.
- The survey suggested that *A. gryllus* was missing from the upper Coastal Plain in the Roanoke, Tar, and Neuse River basins, or alternatively, that its accepted range description was wrong.

#### Evidence for decline of *A. gryllus*

- The NCSM holds a large collection of *Acris* made by Peter N. Bartlett in 1962-1963 in the Fall Zone and upper Coastal Plain. We identified 163 Bartlett specimens from 36 sites by measuring extent of toe webbing and diameter of anal tubercles.
- Bartlett occasionally misidentified individuals from syntopic sites. He described four syntopic sites as containing only one species. At two sites that had only *A. gryllus*, Bartlett incorrectly identified each frog as *A. crepitans*.
- In 1962-1963, *A. gryllus* occurred throughout the upper Coastal Plain, including the Roanoke, Tar, and Neuse River basins up to the Fall Zone (see map).
- In 2008, we surveyed *Acris* choruses in the upper Coastal Plain. We found *Acris* at 12 sites that Bartlett surveyed. Many other Bartlett sites were inaccessible or did not have any calling *Acris*, so we also surveyed other wetlands nearby.
- We identified *Acris* at 3 sites in the Roanoke basin, 8 sites in the Tar basin, 8 sites in the Neuse basin, 14 sites in the Cape Fear basin, 3 sites in the Lumber basin, and 2 sites in the Pee Dee basin.
- In 2008, choruses in upper Coastal Plain areas of the Roanoke, Tar, and Neuse River basins had only *A. crepitans*. Choruses in the Cape Fear and Pee Dee River basins had either or both species. Three sites in the Lumber River basins at the edge of the Sandhills had only *A. gryllus*.
- Our work indicates that *A. crepitans* is widespread in the upper Coastal Plain areas of the Roanoke, Tar, and Neuse River basins, while *A. gryllus* has disappeared from these areas. Both

species may be extirpated in the Tar basin south of Rocky Mount because of habitat loss; the area is mostly farmland now.

- Our 2004-2008 data (see map) provides valuable information but may not be sufficient to convince everyone that *A. gryllus* is in trouble. Survey work must continue.

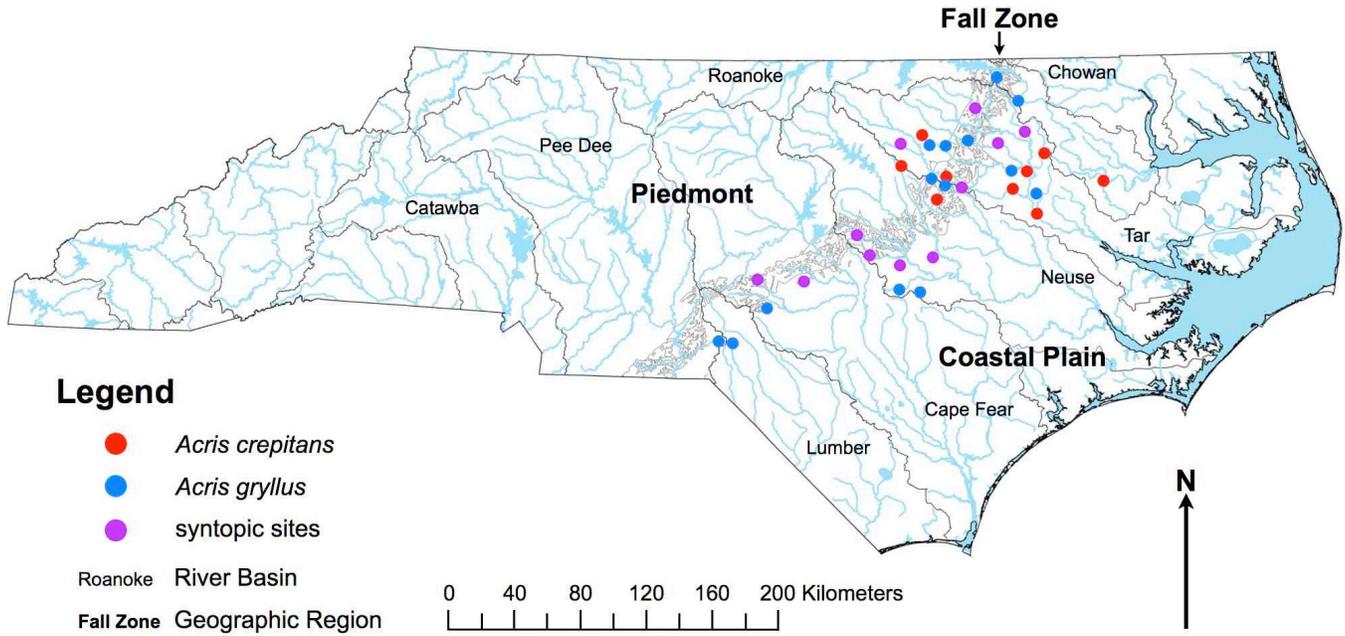
#### What to do in 2009

- In order to collect convincing evidence that *A. gryllus* is no longer present in an area, a survey protocol that differs from CASP must be followed.
  - Mike Dorcas suggested a protocol developed by the USGS Amphibian Research and Monitoring Initiative: [www.mbr-pwrc.usgs.gov/software/doc/presence/presence](http://www.mbr-pwrc.usgs.gov/software/doc/presence/presence)
  - Survey efforts in 2009 should target the Raleigh-Fayetteville-Roanoke Rapids-Raleigh quadrilateral to determine if *A. gryllus* is indeed missing.
  - Each route should include sites where Bartlett once found *A. gryllus* and should be surveyed at least 3 times (ideally in mid-May, the 3rd week of June, and mid-July).
  - Route runners should be able to identify and discriminate *Acris* species by ear. This is a tough skill to acquire but an easy one to apply. Visit [www.unc.edu/~micancin](http://www.unc.edu/~micancin) for help.
  - A digital recorder and directional microphone should be used to document choruses and allow easy identification using free sound analysis software. Equipment (especially mics) can be expensive. Without a directional mic, the recorder needs to be close enough to the chorus so that individual calling males can be distinguished in the recording.
  - Much of the area where we are concerned about *A. gryllus* has little public land. Stopping on public roads to listen to frogs at night will result in antagonism from rural residents. No mention should be made of a species that may be in trouble in NC.
  - A discriminant function developed by JPM identifies preserved specimens using anal tubercle diameter and extent of hind-foot webbing. Measurements on more specimens in the NCSM collection could develop a more detailed range history of the two species in North Carolina.

#### What to do later

- Continue monitoring *Acris* in the upper Coastal Plain.
- Introduce *Acris* to the public (ex. JPM plans to pitch an article to *Wildlife in North Carolina*).
- If *A. gryllus* is indeed missing from a large area in the upper Coastal Plain, future research could determine why. Projects could address the determinants of habitat use (*A. gryllus* may thrive in sandy, acidic habitat), why some sites support both species, what role competition plays between the species, and how changes in landscape use, climate, etc may affect *Acris*.

## Cricket frogs around the Fall Zone of North Carolina, 1962-1963



## Cricket frogs in North Carolina, 2004-2008

