Investigation of the Northern Range Expansion of the Virginia Opossum (Didelphis virginiana)

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The Virginia opossum (Didelphis virginiana) has a very wide geographic range and is found throughout the south and northwestern United States, as far south as Central America and recently a few sightings have been noted in southern Canada. Low temperatures play a significant role in defining the opossum distribution, as they do not forage when temperatures are below 24.8°F. In parts of the opossum range, where they are forced to endure the temperature minimum, many experience increased mortality rates as a result of frostbite due to their small body size and hairless ears and tail. It may also be possible for them to persist in the northern extreme of their range by metabolizing body fat stores during cold winter months. Opossums found further north typically have a thick layer of underfur, which serves a thermoregulatory function. Because the opossum does not hibernate, it must forgo year-round: however, this is difficult during the cold winters of upstate, New York. Typically the opossum stops foraging in temperatures less than 24.9°F, and avoid foraging in temperatures below 32°F. The goal of this study was to assess the progression of the northern migration of the opossum using a combination of qualitative roadkill and live sighting survey responses (i.e., bus drivers, mail collectors, Fed Ex drivers, hunters and hikers) and climate trends derived from long-term regional weather station records.

We do not predict that sustainable Virginia opossum populations currently reside in high-density urban areas. However, warming climate and increases in anthropogenic food sources may be making their northern migration possible in the near future.

SITE DESCRIPTION

**Northern Tier:**
- **Northeastern tier:** Burlington, VT; Lake Shore Rd., Colchester (Malbaett Bay)
- **Early April:** Saratoga Springs, NY

**Adirondack Park:**
- **Frisco Park:** Tupper Lake, NY
- **Frisco Park:** Indian Lake, NY
- **Frisco Park:** Danemore, NY
- **Frisco Park:** Lake Placid, NY

**South Hero, VT:**
- **Frisco Park:** Cameron, NY
- **Frisco Park:** Lincoln, VT
- **Frisco Park:** Comrad, VT

**Southern Tier:**
- **Saratoga Springs, NY:** Shaker, NY
- **Saratoga Springs, NY:** Troy, NY
- **Saratoga Springs, NY:** Albany, NY
- **Saratoga Springs, NY:** Gloversville, NY
- **Saratoga Springs, NY:** West Point, NY

**Site of Opossum Sightings:**
- Opossum sightings surveys were administered to:
  - Department of Transportation (DOT) employees
  - School and county bus drivers along the Route 9/Champlain Valley corridor
  - Postal carriers along the reporting area
  - Hunting clubs and nuisance wildlife officers in the reporting area

**Suites of questions aimed at roadkill:**
1. Do you recall seeing dead opossum along a road while on the job in the past year?
   - In which town and county, and on which road did you see the opossum?
   - In which season was the opossum observed?
   - In your experience, do you think the frequency with which you see opossums has changed in the past five years?
   - How confident are you that you correctly identified the opossum and not another animal?
2. Please draw an outline of the area in which you drive most frequently on the provided map.
3. While on the job, what times of day do you most often drive?
4. Can you identify any roadkill or wildlife hotspots along the roadways where you drive most frequently?

**SITE TRAVERSAL:**
- **Roadkill:** opossums have changed in the past

**RANGE:**
- **Abandoned Fiel:** A) northern tier, B) Adirondack Park, C) valley, and D) southern tier for 1900-2010.

**DISCUSSION:**
- **Roadkill:** opossums do not hibernate, and therefore must forage throughout the year in order to survive. Low temperatures play a significant role in defining the opossum distribution, as they do not forage when temperatures are below 24.8°F and try to avoid foraging at 32°F (Kanda, 2005).
- **Our climate data support warming winters in the Champlain Valley.**
- The opossum is thought to benefit in urban habitat over rural habitats which can be good for anthropogenic food sources. Opossums living in urban areas had an average body mass of 3.5 kg whereas opossums living in rural areas had an average body mass of 2.2 kg. 
- Observations of opossums are more common in Vermont and north of Burlington (dense residential suburbs) as compared to the Champlain Valley of New York, where major urban centers are fewer.
- Metapopulation dynamics might be facilitating expansion northward (source sink habitat), especially in areas farther from urban centers (Fig. 7).
- The opossum is typically associated with low elevations (< 120 m) and is absent from high elevations, which are also predominantly forested.
- We predict opossums to be rare occurrences in the Adirondack Park.
- **Populations of the Virginia opossum are currently unknown in Clinton County, New York** (M. B). We predict their rarity because thermoregulatory needs cannot be met in these rural areas. However, with a warming climate it is possible for these species to benefit in urban habitat over rural habitats.

**FUTURE DIRECTIONS**
- Administrators and government officials need to be educated on the various impacts the opossum has on the ecosystem and develop policies to mitigate these impacts.
- It is important to continue to monitor the population trends of the opossum in rural areas.

**LITERATURE CITED**
- Fine, Tupper Lake, Dannemore, Indian Lake, NY.
- Valley Tier (Malone, Canton, NY; Lincoln, Cornwall, VT).
- Southern tier (Saratoga Springs, Stillwater, Troy, Albany, Poughkeepsie, NY).
- Regions were identified based on location and elevation. The Valley tier was added because Lake Champlain and the St. Lawrence River valleys serve to moderate temperatures, and may be the most logical route of expansion.

**METHODS**
- **Roadkill and Live Animal Sightings:**
  - Opossum sightings surveys were administered to:
  - Department of Transportation (DOT) employees
  - School and county bus drivers along the Route 9/Champlain Valley corridor
  - Postal carriers along the reporting area
  - Hunting clubs and nuisance wildlife officers in the reporting area

**RESULTS**
- **Fig. 3b. Life History of the Virginia Opossum (Didelphis virginiana) (Kanda, 2005) (Fig. 3b).**
- **Fig. 3c. Virginia opossum range (Kanda et al., 2006) (Fig. 3c).**
- **Fig. 7. Virginia opossum range (Kanda et al., 2006) (Fig. 7).**
- **Fig. 4. Average daily temperatures for a, a northern tier, b) Adirondack Park, c) valley, and d) southern tier for 1900-2010.**
- **Fig. 5a-d, Fig. 6a-d.**

**ACKNOWLEDGMENTS**
- This work was supported by the National Science Foundation (Grant No. DEB 0610984 at SUNY Plattsburgh). We thank Joie Bruns and Prof. Susan Garneau for assistance in the field.

**Funding Sources**
- The authors thank the FSU Department of Earth and Environmental Science and the University of Massachusetts Boston for financial support.
- This work was supported by the National Science Foundation (Grant No. DEB 0610984 at SUNY Plattsburgh). We thank Joie Bruns and Prof. Susan Garneau for assistance in the field.