

## SECOND INTERNATIONAL SYMPOSIUM ON RANAVIRUSES

### EMERGENCE AND CONSERVATION OVERVIEW DISCUSSION SESSION

---

**LOCATION:** Medallion Room, Holiday Inn World's Fair Park, Knoxville, TN

**TIME AND DATE:** 17:00 – 18:00, July 27, 2013

**LEAD BY:** Dr. Trent Garner, Institute of Zoology, Zoological Society of London

**MINUTES TAKEN BY:** Dr. Jessica McGuire, Georgia Department of Natural Resources

#### POTENTIAL ACTION ITEMS:

##### 1. Research Needs

- Determination of the status of ranaviruses as emerging pathogens. Taxa or even species specific?
- Assessment methods to determine if ranaviruses are a conservation threat for a given species.
- Investigations into the factors that contribute to emergence.
- More studies that examine communities and ecosystems!
- Studies that examine in-host ecology of infection/disease.
- Identification of individuals who suffer from sub-clinical infections and their role in infection maintenance at population and community levels.
- Use of models to help structure and guide research in the field and in the lab.

##### 2. Outreach

- Identification of strategies for interdisciplinary work to make research, funding and results more applicable.
- Outreach to the public to make them aware of the situation and its potential implications. May even include citizen scientists.
- More effective communication to stakeholders including engaging the press more effectively

##### 3. Tasks

- Standardization of methods (e.g. surveillance study structure, ranavirus screening protocols, strain identification methods)

#### MEETING MINUTES:

The following points were discussed:

- When is an infection or a disease considered emerging?
- When is it a conservation issue?
- Is RV emerging or is it sampling?
- Are we just now picking it up or is it truly emerging? Assumptions are that it is not widespread, and only one virus is circulating.
- It becomes a conservation issue when the mortality is in adults. Possibly when there is mortality in tadpoles, but not adults. We need to define where it is clearly an issue in order to focus efforts.
- Is it an adult survivorship issue?
  - Hellbenders- larval form is impacted and it is hard to find young adults.
  - If juvenile have higher mortality then there needs to be a focus on the younger age classes. Younger age classes are harder to find. Need to add mitigating measures. What can we do about it? If it is a serious issue- we need to figure out what needs to be done?

- Turtle derbies need to be addressed as possible infection spreaders.
- Monitor and look at factors of emergence.
  - Natural mechanisms?
  - Do something about small areas?
  - Registered disinfectants?
  - Biosecurity recommendations?
  - Vegetation?
  - Invertebrates?
- Ecosystem services needs to be developed.
- Determination of acceptable infection rates in wild populations.
  - Will be species specific.
- Examination of factors that increase transmission.
  - Study multiple species and multiple taxa.
- Need to examine more than mortality. Sub-lethal effects?
- Recruitment or lack thereof needs to be monitored.
- Recurrent clinical disease and how it affects long term reproductive input.
- Loss of one individual (ex bog turtle) is a major issue for some species and needs to be investigated.
- Rare species that are associated with common species that is susceptible. Need to identify super spreaders. Community ecology, metacommunities. Species at low population levels- is RV and issue at all?
- Consumption- class transfer. Is intervention possible? Potential solution- put out more scavengers. Need more intact communities. Are carcasses sticking around?
  - However, fast decay in amphibians (especially larvae) may make the 'scavenging' option irrelevant.
  - Larger frogs/toads have been found in amplexus with dead (i.e. for several days) animals. Therefore, life history stage and location may be important.
  - Excluded scavenging in experiments- carcass in cages. Carcasses can be out there for days. This is based on pilot data.
  - Species assemblage. Think about invertebrates. We are missing an entire piece of the pie- ex water striders.
  - Mosquitoes role in transmission? Leeches? Mechanical? Replication of studies needed, especially in invertebrates.
  - Determination of the modes and mechanisms of transmission in multi-taxa communities.
- Better understanding of the basic ecology of ranavirus in multiple species is required.
- Identification and monitoring of disease/infection hotspots is needed.
  - Contaminants?
  - Patterns?
  - Co-infections?
- Probabilities of finding mortality events are low, simulate them with mesocosm experiments?
  - Need replicated design in a controlled setting.
  - Extrapolation to nature may be difficult.
- Regular surveillance studies
  - State agencies appear to like this information, but are unwilling to pay
  - Need to decide where and when these should happen.
  - First identify hot spots of infection/disease then begin more intensive studies.
    - Would attract more funding
- Strain identification is an issue that needs to be resolved.
- Standardization of methods for data comparison across studies.

- Using models to help identify places where ranavirus are likely to be found (e.g. landscape level).
  - Need for more modelers.
- Investigation of the causes of decline, what occurs within a population and/or community when infection/disease emerges? Use of models to help guide research in this area as well.
- Funding issues were discussed:
  - Not necessarily a priority for state agencies.
  - Mortality events promote interest and cash.
  - Focus on focal species for state wildlife action plans
  - Surveillance needs to be more cost effective
    - Use of modeling and generation of relevant numbers of samples.
  - Conservation funding of any sort is currently difficult to obtain and perhaps an ecosystem level approach is needed.
    - Or link mortality with decline etc.
  - Use of citizen science for identifying potential outbreaks.
    - Start to get people thinking and involved.
    - Good for raising awareness and increasing funding opportunities.
    - Educate the public on what is happening.
  - Funding via multiple agencies and use an interdisciplinary approach for research.