Conservation and Management of Amphibian Populations

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Goal of the Lecture

To familiarize students with some conservation and management strategies for amphibians.

Reading Assignments:

Recommended:
1. Habitat Management Guidelines for Amphibians and Reptiles of the southeastern United States. PARC; http://www.parcplace.org/habitat_management_guide.html
2. Recommendations for Riparian Buffers: Salamanders (Crawford and Semlitsch 2007)
3. Recommendations for Wetland Buffers: Amphibians and Reptiles (Semlitsch and Bodie 2003)

No Required Readings

Lecture Structure

I. Aquatic and Terrestrial Habitat Needs

II. Aquatic Environment Strategies

III. Terrestrial Environment Strategies

IV. Wetland Buffers, Small Wetlands, and Roads
Aquatic and Terrestrial Needs

Aquatic Environment
- Breeding Habitat: Anurans & Salamanders
- Eggs, Embryos & Larvae
- Overwintering Sites

Life Cycle:
- Breeding Habitat: Salamanders
- Juvenile & Adult Foraging Sites
- Overwintering & Estivation Sites
- Dispersal, Migration, Home Range

Concerns:
- Shoreline Vegetation
- Hydroperiod (2-3 mos)
- Water Quality & Temp
- Fish
- Introduced Species

Terrestrial Environment

Temperature, Humidity, Predators

Life Cycle:
- Breeding Habitat: Salamanders
- Juvenile & Adult Foraging Sites
- Overwintering & Estivation Sites
- Dispersal, Migration, Home Range

Concerns:
- intact Vegetation
- Decomposing Logs
- Abundant Insects
- Dispersal Corridors: Connectivity

What can we do to ensure habitat needs are met?

Conservation and Management

Aquatic Environment: Shoreline Vegetation

1) Minimize Access by Cattle
- Electric Fence
- Grazing Rotation
- Needs to take
  > 3 months to be Effective
- Provide Water Troughs

2) Constructed Wetlands
- Gradual slope

3) Control Exotic Plants
- Herbicides
- 2,4-D: Broad-leaved
- Glyphosate: Non-selective
- Imazapyr (Invader Exotics)
- Biological Control

Schmutzer et al. (2008); Burton et al. (2009)

Conservation and Management

Aquatic Environment: Hydroperiod

1) Plug Ditch or Drain Tile

2) Managed Wetlands:
- February-August
- Multiple Species: Amphibians, Waterbirds

3) Provide Diverse Hydroperiods/Wetlands

4) Gradual Drawdowns
   (>2 weeks)


Joel Snodgrass

Amphibians, Waterbirds

Buffers for Amphibians
Semlitsch and Bodie (2003)

1) Wetland Buffers
- Terrestrial Habitat Use
  - I. Aquatic: Water
  - II. Core: Terrestrial Habitat
  - III. Buffer

2) Riparian Buffers
- Buffer: 200 m

3) Best Management Practices
- 15 m Buffer (10 m trees)
- Increase 0.75 m for every 1%

Inadequate to Cover Core Habitat

Importance of Small Wetlands
Gibbs (1993) and Semlitsch and Bodie (1998)

- Area of wetlands: < 4 ha
- Wetland area decreased by 10%
- Inter-wetland distance increased by 67%

Current Wetland Regulations:
- Tidal Rookery Overturned: Dredging Wetlands is Legal
- SWANCC Decision: Isolated Wetlands Not Protected

Effects of Roads

1) Direct Mortality
   - 2-18% Mortality Rates
   - Mortality rate of some species increases with traffic intensity (turtles)

2) Habitat Destruction
   - Loss of wetlands
   - Loss of suitable terrestrial habitat
   - Calling rate decreases at wetlands near roads
   - Distance to wetland is the best predictor of mortality rate
   - Low intensity impacts: 5-26 cars / hr

3) Habitat Fragmentation
   - Forest roads: deflected movement 51% of time

4) Petroleum Runoff
   - Loss of suitable terrestrial habitat
   - Distance to wetland is the best predictor of mortality rate

5) Acoustic Interference
   - Calling rate decreases at wetlands near roads

Maintain Only Necessary Forest Roads; Replace Others

A Possible "Benefit"

Ecological Trap

Ø Road-effect Zone: 35 m
Ø Maintained & Abandoned
Ø Reduced Habitat 1/3
Ø Ecological Trap
De-extinction

- The hot-topic of conservation
- Uses high tech solutions to bring species back from extinction
- No solid successes, but enough to show it’s feasible, likely in the next few years
  - [http://www.youtube.com/watch?v=TQ8TlUxiqgY&feature=player_embedded](http://www.youtube.com/watch?v=TQ8TlUxiqgY&feature=player_embedded)
  - [http://www.youtube.com/watch?v=a_hgCM8XZkk&feature=player_embedded](http://www.youtube.com/watch?v=a_hgCM8XZkk&feature=player_embedded)
- Amphibians are at the forefront of this research area
  - Gastric Brooding Frog from Australia
    - Recently, implanted nuclei into eggs, got cell division (embryo survived 36 hrs)

De-extinction Discussion

- Initial thoughts? Gut reactions?
- Ethics: should scientists bring back extinct species?
- Will viable populations be created?
- If de-extinction projects are successful, do you think this will affect on the ground conservation strategies or priorities?