Resource Overlap and Potential Competition Between Invasive Red-eared Slider Turtles and Native Red-bellied Turtles in Pennsylvania

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INTRODUCTION:

- **Threats to Biodiversity in the Delaware Estuary:**
  - Habitat Degradation/Conversion
  - Disease and Parasitism
  - Invasive Species
  - Over-harvesting
  - Environmental Pollution
  - Global Climate Change
- **Invasive Species Impact Native Species by:**
  Predation - Consumption of native species
  Competition – Reduces growth, reproduction and survivorship
  - Exploitative Competition - (Indirect Interactions)
  - Interference Competition - (Direct Interactions)

The Invasive Red-eared Slider Turtle

- **Native to the Mississippi River Valley**
- **Introduced to all continents except Antarctica**
- **Implicated in the decline of turtles species world-wide**

The Threatened Red-bellied Turtle

- **Native range from Southern MA to Northern NC**
- **Current range central New Jersey to North Carolina**
- **Population declines due to over-harvesting and habitat loss**

METHODS:

Fig. 1. A baited hoop net trap being checked for turtles.

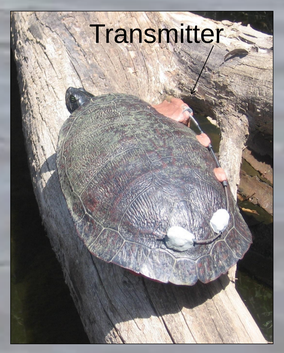

Fig. 2. A basking red-bellied turtle fitted with a radio-transmitter.

Trapping:

- Baited hoop traps and basking traps
- All turtles are uniquely marked, measured, and weighed.
- All turtles are released at the point of capture.

Dietary Overlap:

Red-eared slider turtles and red-bellied turtles are sampled to determine diets.

- Short term dietary intake:
  Stomach flushing & fecal samples
- Long term dietary intake:
  Stable isotope analysis – Blood is drawn and then separated by centrifuge into red blood cells and blood plasma and a tail clip is taken. Tissues are analyzed for δ13C and δ15N composition

Spatial Overlap:

- Radio transmitters are attached to adult turtles.
- Tracked to determine locations and movement.

OBJECTIVES:

1. To determine the extent of dietary overlap between red-bellied turtles and red-eared slider turtles in different freshwater wetland types.
2. To determine the extent of habitat overlap between red-bellied turtles and red-eared-slider turtles in different freshwater wetland types.

Study Sites:

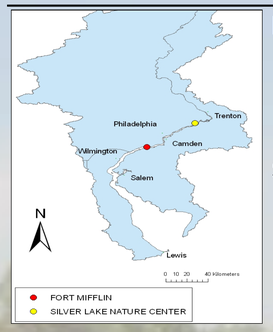

Fig. 3. Map displaying study site locations

Fort Mifflin – Highly fragmented and degraded wetland complex. Consist of 3 small lacustrine wetlands and an adjacent riverine wetland.

Silver Lake Nature Center – Connected wetland complex. Wetlands are surrounded by park-land and upland forests. Consists of 2 large lacustrine wetlands connected by a riverine wetland.

RESULTS: DIETARY RESOURCE USE.

Table 1. Summary of dietary components found in fecal and stomach flushing samples.

Percentage of Tissue Type in Diets				
	Fort Mifflin		Silver Lake Nature Center	
	Pr	*Ts*	*Pr*	*Ts*
Total Vegetation	**86%**	**87%**	**94%**	**83%**
Filamentous algae	2%	0%	30%	2%
Fruit	2%	12%	8%	33%
Lemna	37%	31%	8%	0%
Phragmites	7%	18%	5%	0%
Total Animal	**14%**	**12%**	**7%**	**17%**
Annelid	9%	0%	0%	2%
Bivalve	0%	5%	4%	8%
Bird	0%	2%	0%	0%
Fish	0%	0%	1%	2%
Gastropod	0%	2%	0%	2%
Insect	5%	5%	1%	2%

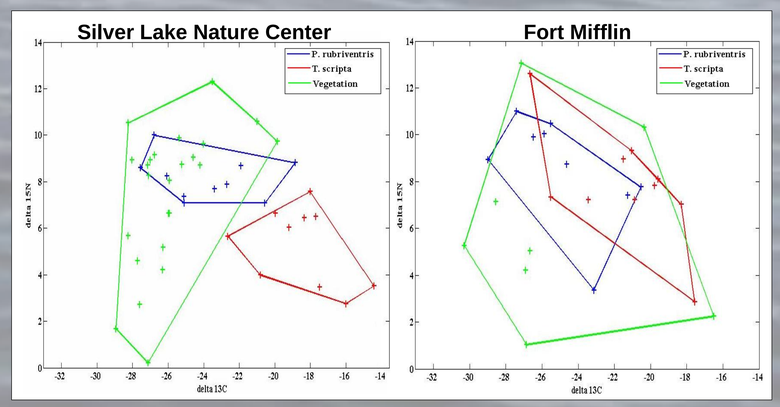

Fig. 4. C and N stable isotope blood plasma from 2010. Results from Silver Lake Nature Center show little overlap for vegetative dietary resources. Results from Fort Mifflin suggest that the potential for overlap of dietary resources exist .

RESULTS: SPATIAL RESOURCE USE.

Fig. 5. A red-bellied turtle being fitted with a radio transmitter.

- For spatial resources red-bellied turtles and red-eared slider turtles overlap extensively in two areas
- These two areas are characterized by thick aquatic vegetation and numerous basking sites.

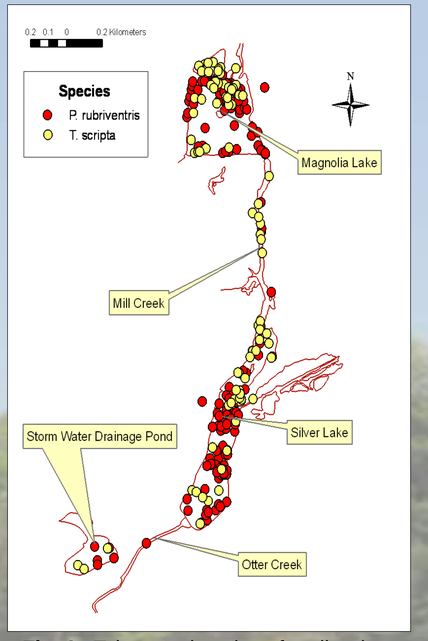

Fig. 6. Telemetry locations for all red-bellied and red-eared slider turtles at the Silver Lake Nature Center in 2008.

CONCLUSIONS:

- **In wetlands where sympatric populations of red-eared slider turtles and red-bellied turtles exist, overlap of spatial resources occurs.**
- **Dietary resource overlap is greater in smaller, more fragmented wetlands compared to larger connected wetlands.**
- **Diets of Red-bellied turtles and red-eared slider turtles overlap extensively at Fort Mifflin.**
- **Both species of turtles overlap spatially where food resources are most concentrated.**
- **Potential for competition is greatest in small fragmented wetlands.**

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