Amphibians in Agricultural Fields and Natural Areas in South Florida

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The Everglades Agricultural Area (EAA) is 280,000 hectares in south Florida dedicated to growing sugarcane, rice, sod and vegetables. The agricultural fields are situated on peat and muck soil deposited by pond apple and sawgrass swamps prior to 1948. Sugarcane encompasses the largest acreage followed by rice and sod. Vegetables, including leafy greens, are also grown. Rice is often grown in rotation with sugarcane. The fields are generally about 40 acres in size and surrounded by field ditches and canals. Fallow fields are often flooded during the summer for soil retention.

Methods

We surveyed for anurans in five types of agricultural fields in the EAA and in natural habitat of the Stormwater Treatment Areas and Everglades National Park. Surveys were conducted from roads or berms at night after sunset and incorporated both auditory and visual components. All counts were conducted with two observers, one designated the primary observer and one as a secondary observer. Counts lasted five minutes during which time any anurans heard were classified according to chorus size (small, medium, large or very large). Individuals were also recorded if observed. After the survey a visual search was conducted. Location of the chorus was recorded as field, canal or ditch, and edge or road. Environmental and vegetation measurements were also recorded. In natural habitat deeper open water with a linear pattern counted as ditches and marsh was counted as 'fields'. Analysis included location, season and temperature effects. For the five most abundant species, we analyzed effect of crop type, location, season, and temperature on group size using cumulative logistic regression. For two rarer species, little grass frog and cane toad, we used logistic regression to examine the same environmental effects on species presence/absence. Both analyses were conducted using GENMOD procedure in SAS 9.2. We present the results for land use type. There were not enough observations of Cuban tree frog, barking tree frog, southern chorus frog, eastern narrowmouth toad, and southern cricket frog for analysis.

Habitats

Sugarcane is grown throughout the year and harvested in the fall. Sugarcane tolerates temporary flooding and may sometimes retain water on the field for short periods of time. ***Rice*** is grown during the summer and fall in rotation with sugarcane and is flooded within 2 weeks of planting and generally maintained in a flooded state. ***Vegetables*** are most often corn and are grown in the winter. ***Leafy greens*** such as lettuce, celery and herbs are also winter crops and may be fenced to keep out anurans. ***Fallow fields*** may be flooded or not flooded and are generally present during the summer and fall. ***Natural habitat*** included both submerged and emergent aquatic vegetation.

Species	Fallow	Lgreen	Natural	Rice	Sugar	Veg
Southern Toad						
Southern Leopard Frog						
Squirrel Treefrog						
Green Treefrog						
Pig Frog						
Cane Toad						
Little Grass Frog						
Eastern Narrowmouth Toad						
Cuban Treefrog						
Barking Treefrog						
Southern Cricket Frog						
Southern Chorus Frog						

Table 1. All species observed during the study by land use type. White color indicates no individuals of a species were observed in a land use type, green indicates presence and darker colors indicate more observations.

Species	Sugarcane	Rice	Vegetables
Southern Toad	++	++	++
Southern Leopard Frog	--	-	-
Squirrel Treefrog	++	+	++
Green Treefrog	--	+	--
Pig Frog	--	--	--

Table 2. Effect of crop type on group size (none, small, medium, large) relative to natural vegetation for the five most common species. The model predicts group size. Significant effect ($p < 0.05$) is indicated by ++ or --. Leafy greens and vegetables were combined for this analysis. Leafy greens and vegetables were combined for analysis.

Species	Sugarcane	Rice	Vegetables
Little Grass Frog	--	-	-
Cane Toad	++	+	++

Table 3. Analysis of presence/absence for two species. The model predicts presence. Significant effect ($p < 0.05$) indicated by ++ or --.

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