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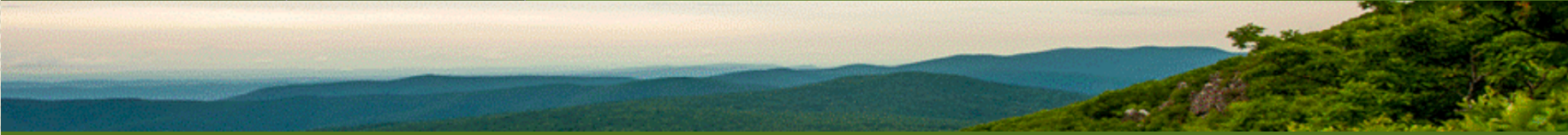
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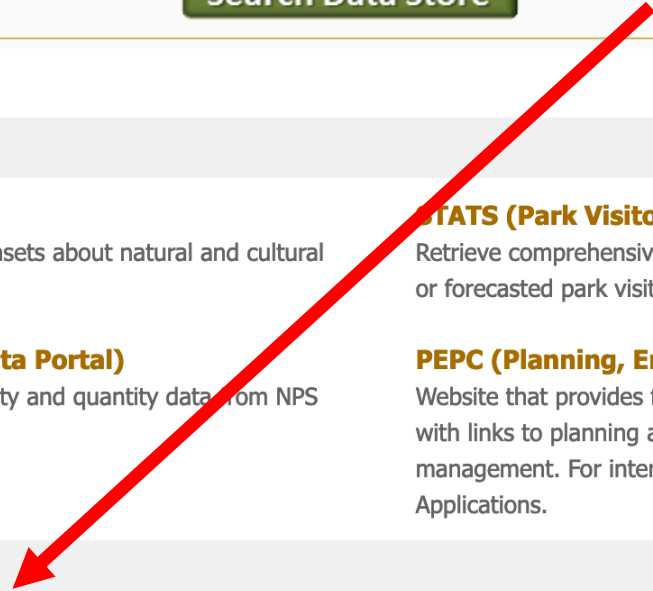
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44705	INDU	2007	INDU-2006-SCI-0023	Eberhardt, Laurie	Yellow-bellied Sapsucker (<i>Sphyrapicus varius</i>) feeding preferences for Shagbark Hickory (<i>Carya ovata</i>) in re...
46736	INDU	2008	INDU-2008-SCI-0007	Drake, John Henry	Karner Blue Butterfly Controlled Propagation, Augmentation and Reintroduction Plan.
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52860	INDU	2009	INDU-2009-SCI-0008	Sacerdote, Allison	Feasibility of wood frog (<i>Rana sylvatica</i>) reintroduction in a restored flatwoods wetland in northern Illinois.
53239	INDU	2009	INDU-2009-SCI-0037	Pfister, Catherine	Censusing insects and small mammals in wooded and sand dune habitats of the park.
53443	INDU	2009	INDU-2008-SCI-0005	Resetar, Alan	Amphibian, reptile, fish and crayfish surveys in the Miller Woods Subunit of the Indiana Dunes National La...
55976	INDU	2010	INDU-2010-SCI-0004	Brodman, Robert	Amphibian response to climate change
55978	INDU	2010	INDU-2010-SCI-0006	Brodman, Robert	Amphibian Response to Climate Change
91284	INDU	2011	INDU-2010-SCI-0006	Brodman, Robert	Amphibian Response to Climate Change
91333	INDU	2011	INDU-2011-SCI-0009	Pavlovic, Noel	The Cascading impacts of White-tailed Deer on Oak Savanna groundlayer, wild lupine, and the Karner blue...
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99349	INDU	2012	INDU-2011-SCI-0046	Pfister, Catherine	Censusing small mammals in wooded and sand dune habitats of the park.
103136	INDU	2013	INDU-2013-SCI-0021	Pfister, Catherine	Censusing small mammals in wooded and sand dune habitats of the park.
104038	INDU	2014	INDU-2014-SCI-0024	Byrne, Caroline	ACOUSTIC BAT SURVEY AT THE INDIANA DUNES NATIONAL LAKESHORE
107588	INDU	2015	INDU-2015-SCI-0007	Strang, Carl	Singing Insects of Northeast Illinois and Northwest Indiana
107862	INDU	2016	INDU-2015-SCI-0002	Brodman, Robert	Amphibian Response to Climate Change
108114	INDU	2015	INDU-2015-SCI-0008	Lehman, Taylor	The Distribution of the Massasauga (<i>Sistrurus catenatus</i>) in Indiana Dunes National Lakeshore
110197	INDU	2016	INDU-2015-SCI-0008	Lehman, Taylor	The Distribution of the Massasauga (<i>Sistrurus catenatus</i>) in Indiana Dunes National Lakeshore

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Reporting Year: 2016	Park: Indiana Dunes	Permit Type: Monitoring	
Name of principal investigator or responsible official: Dr Robert Brodman		Office Phone: 219 866-6215	
Mailing Address: 525 Park Ave Rensselaer, IN 47978		Office Fax: Office Email: bobb@saintjoe.edu	
Additional investigators or key field assistants			
Project Title Amphibian Response to Climate Change			
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Brodman et al.—Amphibians and Habitat Restoration



INFLUENCE OF HABITAT RESTORATION ON AMPHIBIANS AT COWLES BOG, INDIANA DUNES NATIONAL LAKESHORE

Robert Brodman, Jacob Villalpando, and Jesscia Nagel

Biology Dept, Saint Joseph's College, Rensselaer, IN

Abstract.—The purpose of this research is to assess and interpret the direct impacts of habitat restoration at Cowles Bog on amphibian diversity, abundance, and reproductive success. The data presented here is baseline data from the restoration site and a reference site that will be compared to data collect post-restoration.

Key Words.—Amphibians, habitat restoration, Cowles Bog IDNLS

INTRODUCTION

Removal of invasive plants and canopy cover, and the reintroduction of fire are important manipulations used to restore wet prairie habitat. Amphibians are bioindicators of wet prairie and marsh habitat quality. Reseeding wet prairies can be beneficial to amphibians (Brodman et al. 2006; Lannoo et al., 2009; Balas et al., 2012). However removal of canopy even if coarse debris is left in place has had mixed results with trade-offs between benefits and harm to amphibians (Patrick et al., 2006; Owens et al., 2008; Rittenhouse et al., 2008; Semlitsch et al., 2009; Todd et al., 2009; Wagner et al., 2009; Popescu et al., 2012). To assess the responses of amphibians to habitat restoration from a wood lot with invasive species to native wet prairie, we collected baseline data in 2014 that will be compared to post-management data that we collected in 2015.

METHODOLOGY

The restoration site includes sampling plots within wetlands and surrounding upland on the south side of Cowles Bog that have been actively managed for habitat restoration. The reference site includes sampling plots within wetlands and surrounding upland forest on the north side of Cowles Bog that has not been recently managed (Fig. 1). Amphibians have been surveyed in the reference site annually since 2009.

Forest surveys primarily included time-constrained cover object surveys for terrestrial salamander adults and juveniles. Amphibian breeding activity was assessed by frog call surveys, and aquatic surveys of amphibian eggs and larvae in wetlands. A songmeter was set at Cowles Bog on March 14, 2014 and March 13, 2015 to record frog calls every night until the two 16GB sound cards filled in June. Wetlands were sampled by time-constrained visual searches for egg masses, and larvae were sampled by minnow

Brodman et al.—Amphibians and Habitat Restoration

Together, these data from 2014 represent base-lines of the amphibian community and the data from 2015 is used to assess community responses post-habitat restoration.

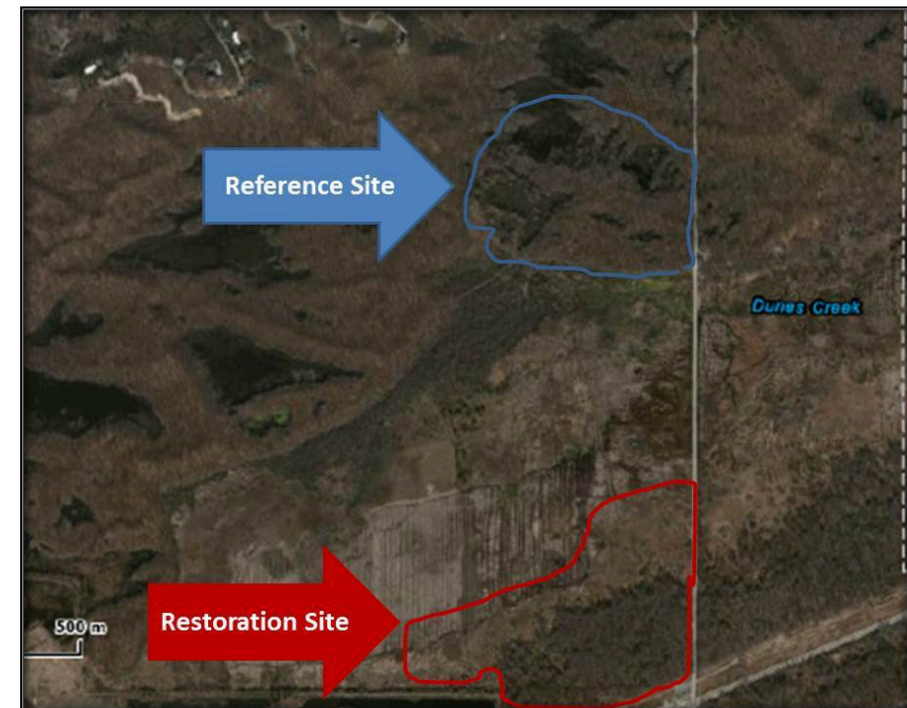


FIGURE 1. Map of study area within Cowles Bog. The reference area is indicated in blue and the restoration site is indicated in red.

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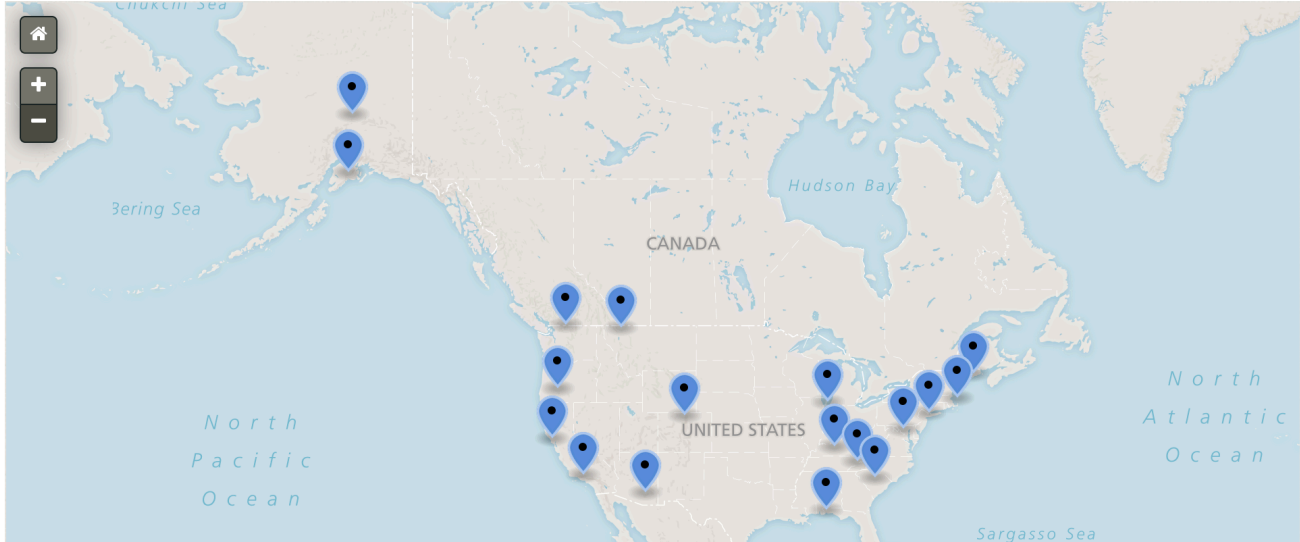
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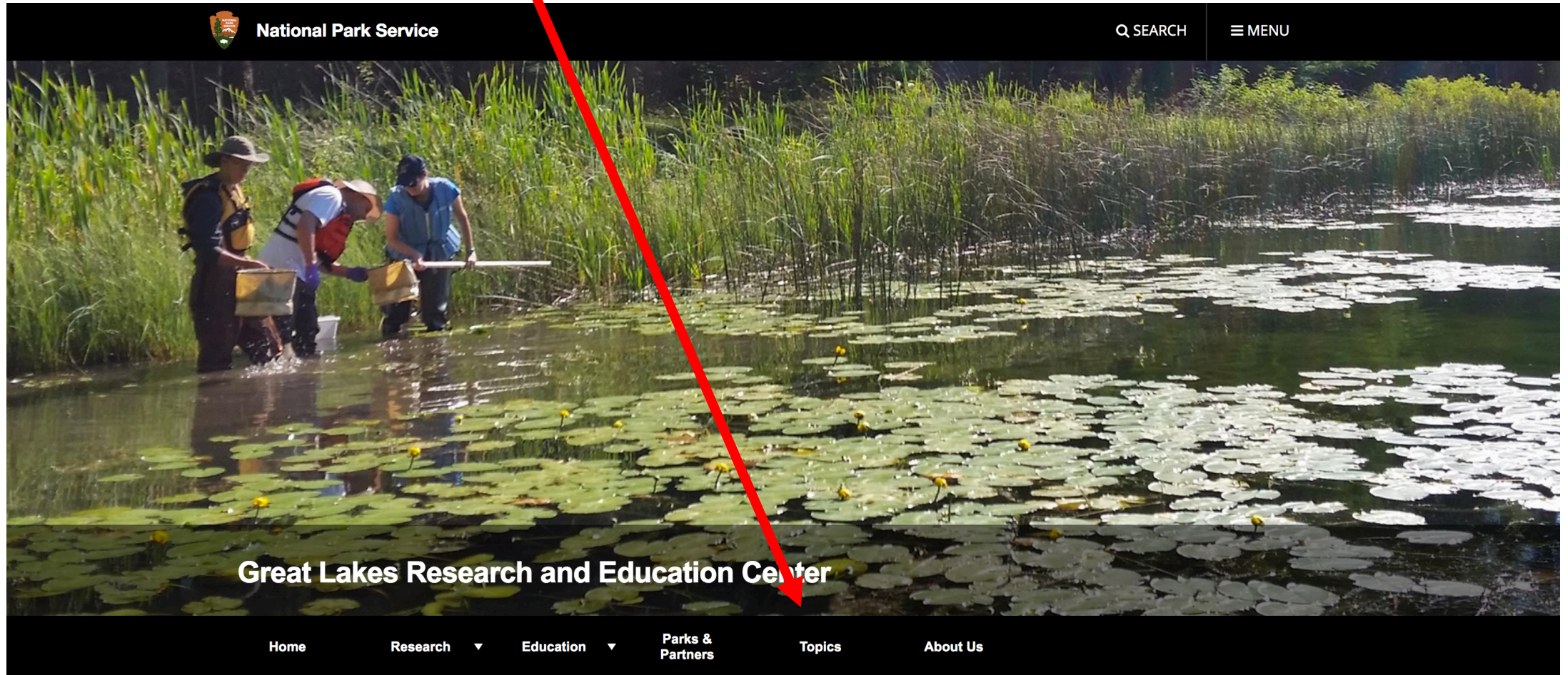


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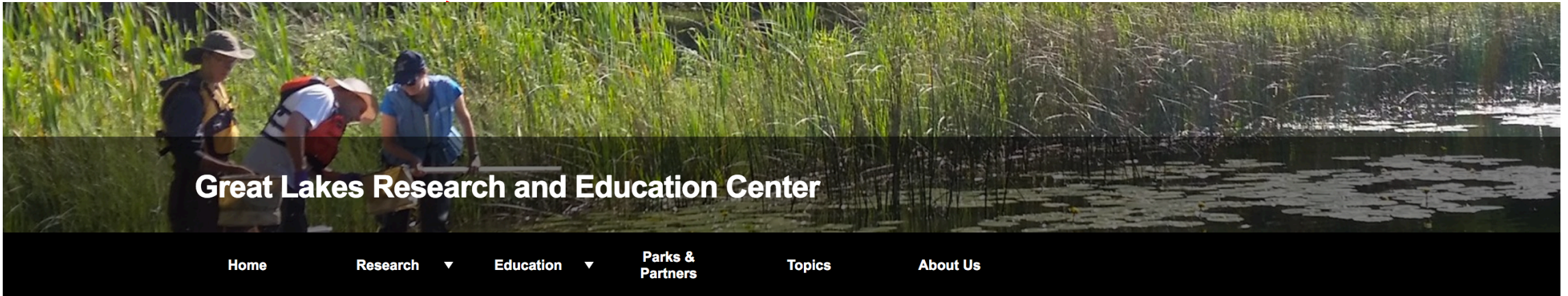
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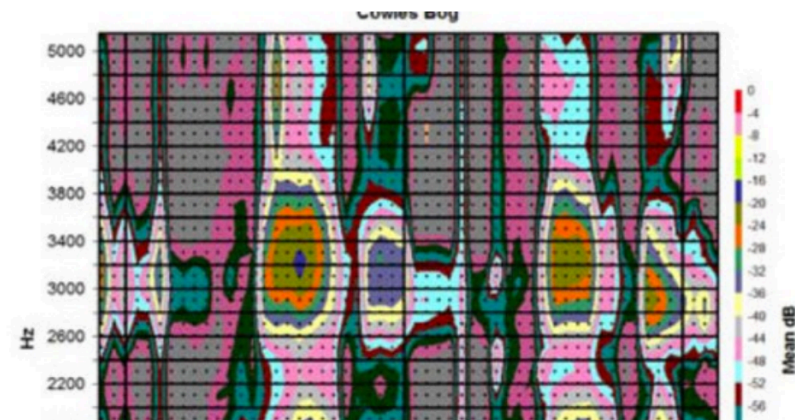
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How is Climate Impacting Amphibians at Indiana Dunes National Lakeshore?

Dr. Bob Brodman, professor of biology at Buena Vista University in Iowa, is conducting research on amphibians at Indiana Dunes National Lakeshore. While Dr. Bob often counts the actual amphibians he finds in the field, he can also determine the presence of certain species by listening to the sounds they make. He and his research team can't be in the field every day to hear those sounds, so he uses recordings from sound meters placed strategically in the wetland he is monitoring.



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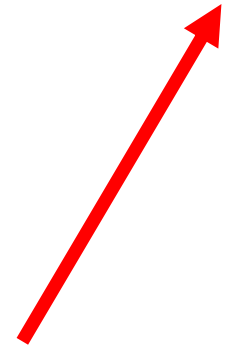
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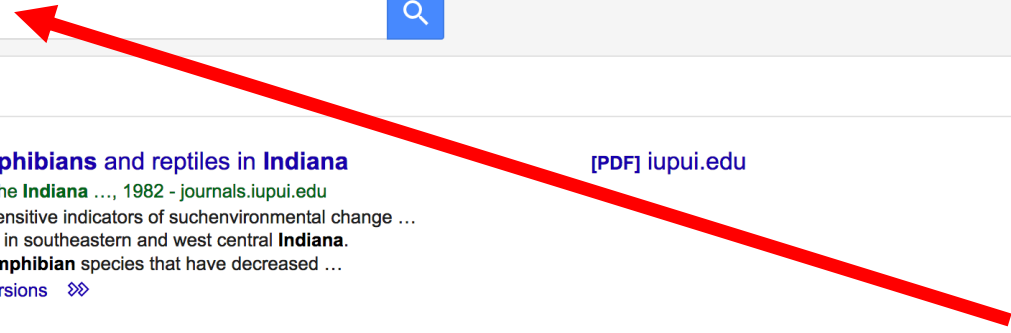
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Color Pattern Variation in a Cryptic Amphibian, *Anaxyrus fowleri*

Mohamad Rabbani¹, Brigette Zacharczenko¹², and David M. Green¹³
Redpath Museum, McGill University, Montréal, Québec, H3A 0C4, Canada

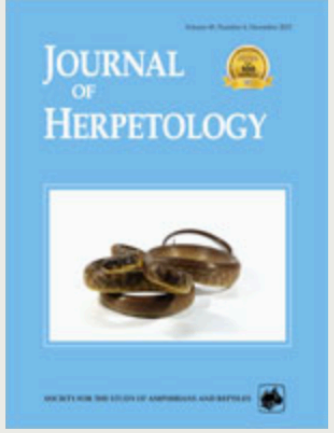
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Abstract

Many species of animals employ camouflage to render them inconspicuous. Selection to precisely match cryptic color patterns to the background substrate should result in geographic variation in relation to substrate type. We tested this premise by examining color pattern variation in relation to substrate surface in Fowler's Toad (*Anaxyrus fowleri*), a noxious and cryptically colored amphibian that is widespread in eastern North America and frequently associated with sandy habitats. We quantified total dorsal spot area, number of spots, and size of the four largest dorsal spots among 330 specimens of Fowler's Toads (89 live, 241 preserved) in 14 samples from Canada and the United States. We found no significant difference in the extent or number of spots between males vs. females or between living vs. preserved specimens after compensating for variation in snout-vent length. However, toads from freshwater habitats with extensive areas of open sandy terrain had significantly smaller and fewer dorsal spots than toads from either seacoast localities with open sands present or toads from freshwater habitats with open sands absent. Because saltwater seaside beaches and sand dunes are generally uninhabitable by amphibians, we take this as evidence consistent with the presence of adaptive background pattern matching coloration in this species.

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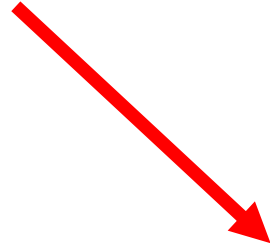
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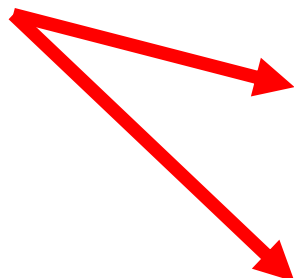
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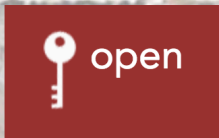
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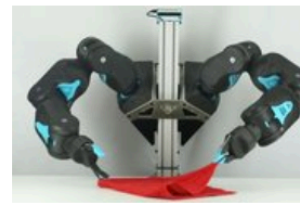
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