



# Bloom and bust: Toxic algae's impact on nearby property values



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## ABSTRACT

Over the past decade harmful algal blooms (HABs) have become a nationwide environmental concern. HABs are likely to increase in frequency and intensity due to rising summer temperatures caused by climate change and higher nutrient enrichment from increased urbanization. Policymakers need information on the economic costs of HABs to design optimal management policies in the face of limited budgets. Using a detailed, multi-lake hedonic analysis across 6 Ohio counties between 2009 and 2015 we show capitalization losses associated with near lake homes between 11% and 17% rising to above 22% for lake adjacent homes. In the case of Grand Lake Saint Marys, we find one-time capitalization losses exceeding \$51 million for near lake homes which dwarfs the State of Ohio's cleanup expenditure of \$26 million.

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## 1. Introduction

On August 2nd, 2014, the city of Toledo, Ohio issued a warning to its 500,000 metro residents advising them not to drink, bathe in, or boil their tap water. Later that same day approximately 60 people were hospitalized with abdominal pain, the governor of Ohio, John Kasich, declared a state of emergency and the National Guard was called in to distribute thousands of gallons of bottled water to residents. What was at the heart of this commotion? Massive blue green algae (cyanobacteria) blooms which formed near the public water intake pipe. Although not all algae are dangerous, the blooms near Toledo produced a freshwater toxin called *microcystin* which can be harmful to humans and animals if ingested (Carmichael, 1992). Symptoms of cyanobacteria poisoning include skin irritation, vomiting, diarrhea, acute liver toxicosis, gastrointestinal disturbances, fever, pneumonia, and even death.

In addition to being a public health concern, cyanobacteria blooms are becoming increasingly expensive for water treatment facilities to manage. After an algal bloom spread 650 miles across the Ohio River in early fall of 2015, the Greater Cincinnati Water Works was reportedly spending \$7500 a day to remove the harmful toxins (Arenschild, 2015a). The Celina water treatment plant, which pumps its untreated water from Grand Lake Saint Marys (GLSM) in Ohio, recently upgraded its facility to address worsening water conditions found at the lake. Initial construction and installation costs for the new plant were \$7.2 million while the annual operating costs have remained steady around \$500,000 over the past seven years (Raymond, 2012). The city of Celina has passed along some of these costs to consumers by charging an additional \$7.50 fee on utility bills (Miller, 2015).

As a result of both health warnings and aesthetic concerns, the general public has taken notice of deteriorating water conditions associated with harmful algal blooms (HABs). Lakeshore residents across multiple states have reported anecdotal evidence of significant declines in their property values with some even suggesting a 30–50% drop due to the presence of HABs (Arenschild, 2015b; Rathke, 2015). Highlighting the increase in public awareness of blue green algae, a nationwide LexisNexis search for the keyword “blue green algae” found 304 popular press articles relating to the topic published between 2009 and 2010. This number has steadily risen since 2009, reaching 347 in 2011 and 2012 and 438 in the 2013–2014 period. Public concern over HABs is

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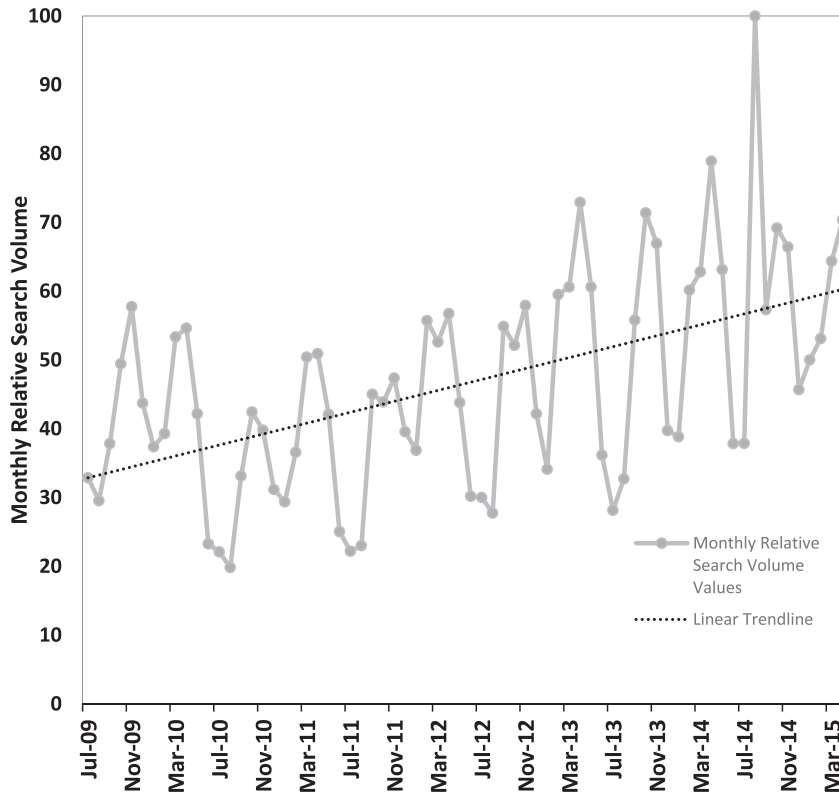


Fig. 1. Google trends relative search volume across time (United States).

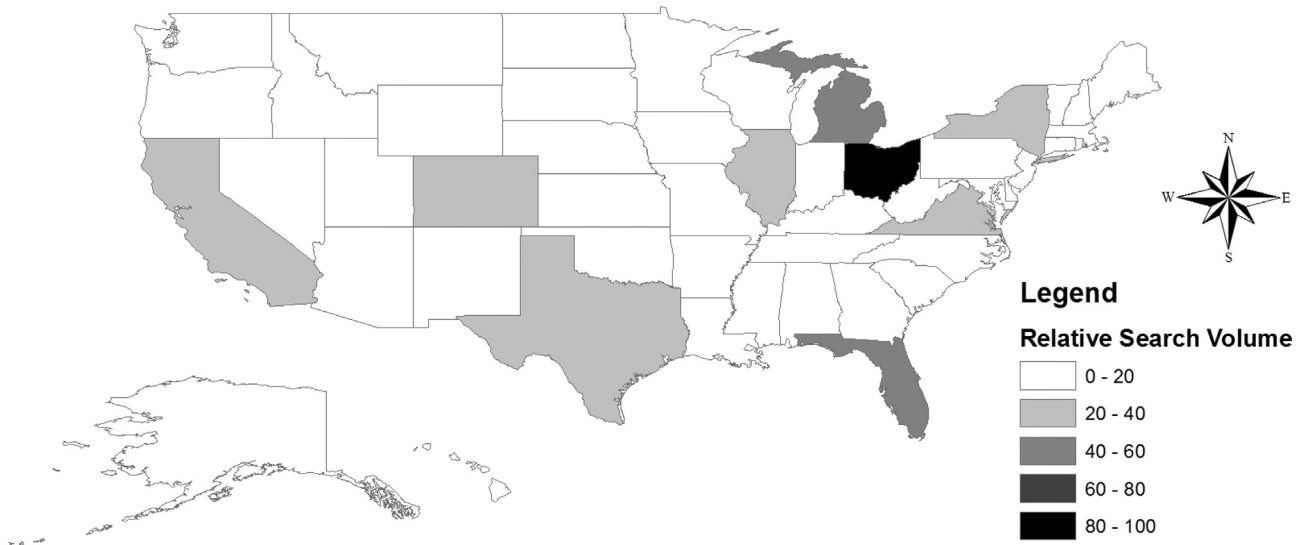


Fig. 2. Google trends relative search volume by State between July 2009 and April 2015.

also reflected in Google Trends data which is displayed in Fig. 1.<sup>2</sup> Google searches for the term “algal bloom” have been rising across time, with interest in the topic appearing to be cyclical corresponding to months when algal blooms are most prevalent. Across all 50 states, Ohio residents appear to be the most attuned to this topic, garnering a relative search volume value of 100 as shown in Fig. 2.

Building on the anecdotal evidence of negative property price impacts and the relatively high level of public awareness of blue green

<sup>2</sup> Google Trends data were collected between July 1st, 2009 and May 1st, 2015. This time frame corresponds with the sample time period.

algae in Ohio, this paper is the first to use revealed preference housing market data to obtain direct estimates of the potential housing price capitalization losses associated with blue green algae. To accomplish this we use a number of inland lake housing markets scattered across Ohio combined with time-varying *microcystin* levels obtained from in-lake monitoring stations to estimate hedonic models of blue green algae’s impact on nearby housing prices. Given the large sums of ongoing public expenditure allocated to mitigate algal blooms, it is imperative that policymakers have actual damage (cost) estimates associated with harmful algal blooms (HABs) as an input into cost-benefit decision making when confronting this public health and amenity threat.

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