

# TESTING FOR THE POTENTIAL EFFECTS OF *KARENIA BREVIS* ON SCHOOL ABSENCES

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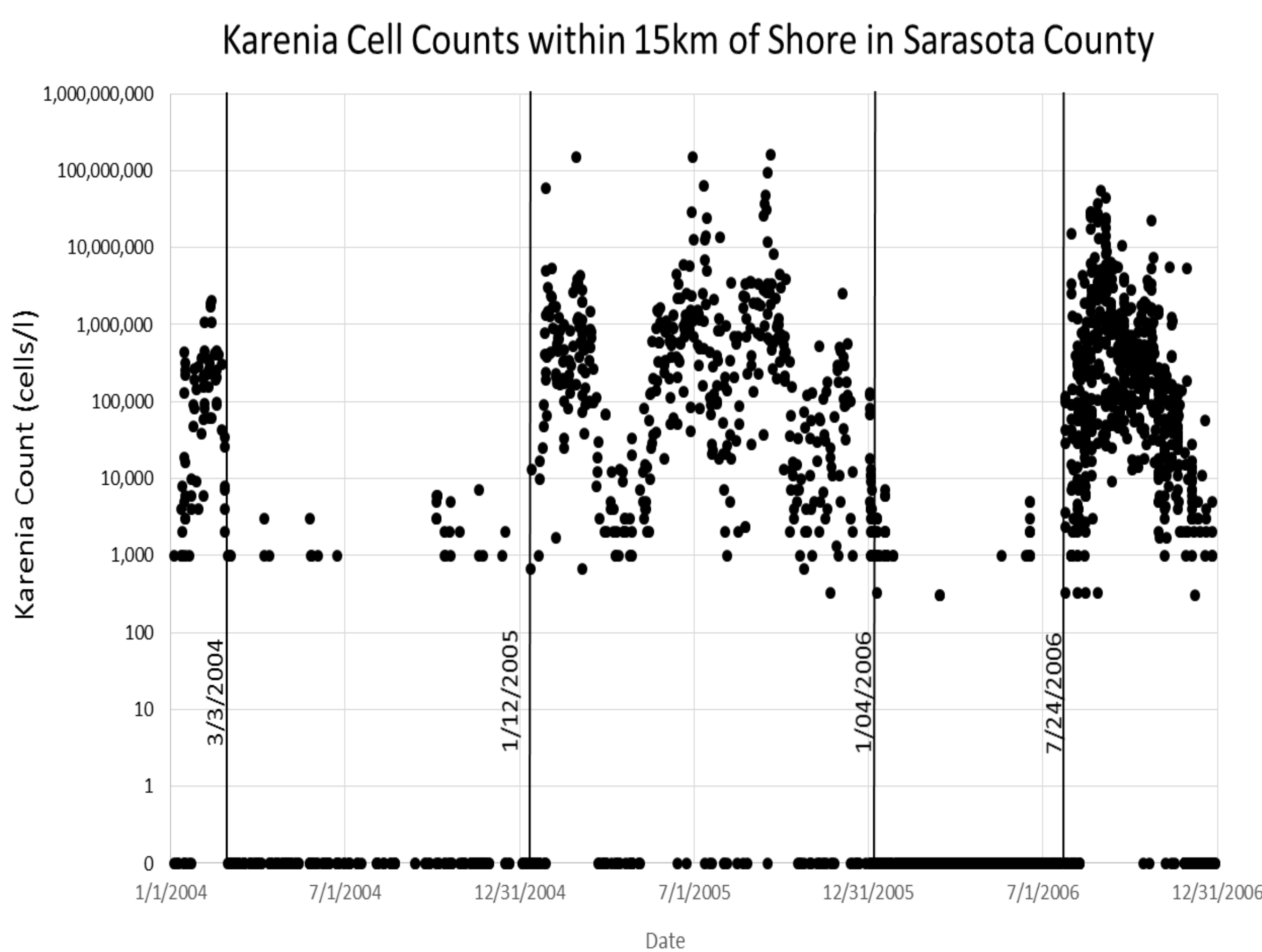
## Background

*Karenia brevis* (KB), commonly referred to as Florida red tide (FRT), is a harmful algal bloom (HAB) that produces potent toxins called brevetoxins, which are known to affect marine life, human life, and the local economy.<sup>1</sup> These marine toxins can be aerosolized and travel several kilometers inland, exposing animals and humans when inhaled.<sup>1</sup> Therefore, the study of *Kb* outbreaks is critical importance for public health.

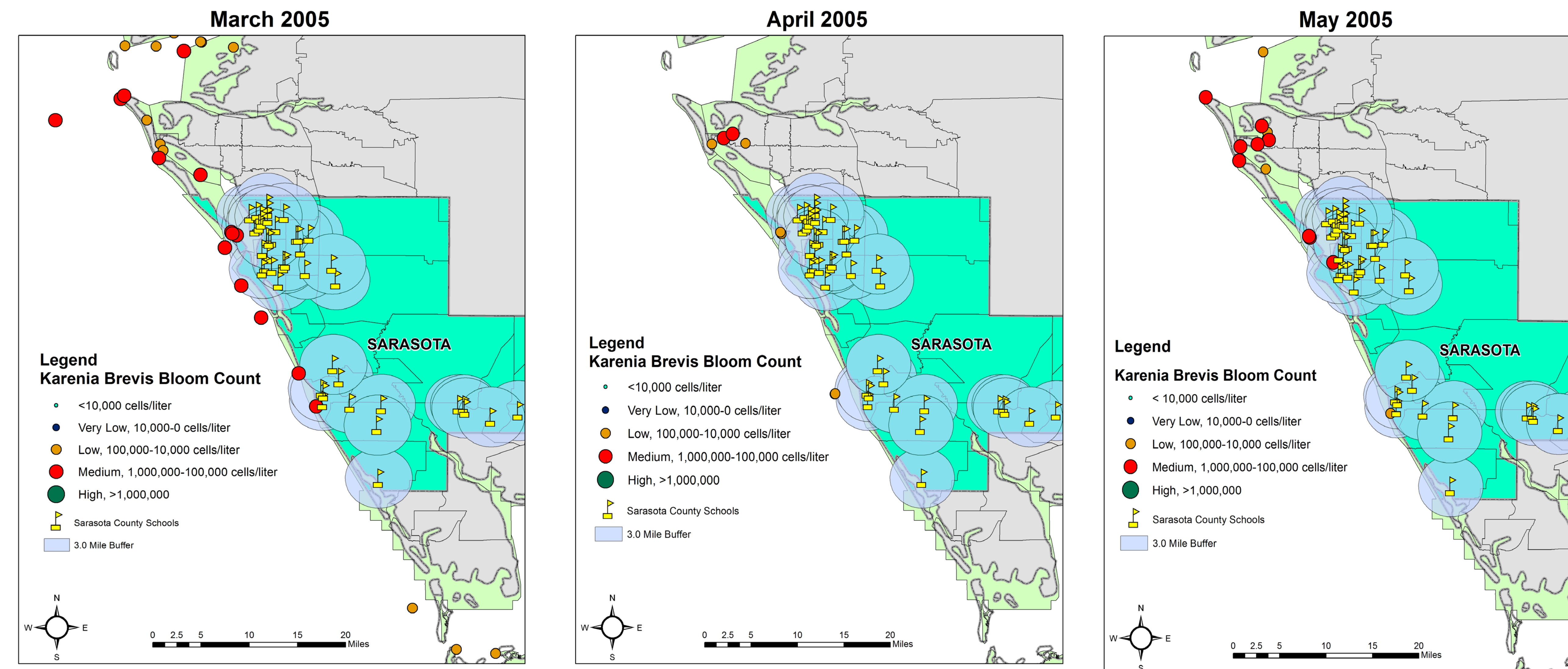
## Purpose and Hypothesis

The literature confirms that *Kb* outbreaks are associated with an increase in respiratory disease.<sup>2</sup> Therefore, we hypothesize that an increase in school absences may be due to *Kb* outbreaks. Specifically, during the *Kb* bloom, Sarasota County schools closer to the coast may exhibit a higher absence rate than schools further away from the coast.

We also test whether school absence is associated with time-lagged exposure to *Kb* blooms.



## Methods



We analyzed monthly averages of KB count data and the monthly Sarasota County school percent absent rate for the school years 2004-05, 2005-06, and 2006-07. Multiple regressions were used to test the hypothesis on two models: Model I with all schools and Model II with schools near the coast. An ANOVA was performed to test the hypothesis with the same datasets but only for the months of March, April, and May during the years 2004, 2005, and 2006. The schools were classified close to shore if they were < 1200 meters, mid-land if they were between 1200-5000 meters, and inland if they were >5000 meters.

## Results

Distance (m)	Mean ± 95 CI	n
Near Shore (< 1200)	8.62±0.78	385
Mid-land	7.64±0.60	630
In-land	6.01±0.33	490
All	7.36±0.34	1505

The overall percent absent rate for all Sarasota County Schools was 7.36 % (± 0.34% at 95% confidence interval).

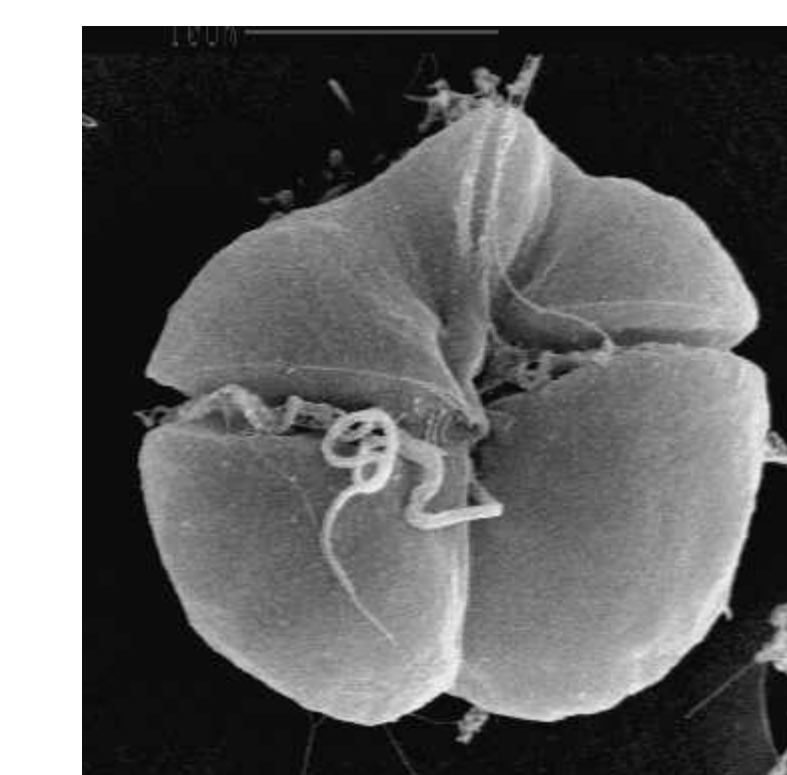
Sarasota county schools closer to the coast (i.e. < 1200 m) showed a higher percent absent rate (8.62% ±0.78) than the schools further inland or away from the coast (i.e. > 5000 m), (6.01 ± 0.33%).

The results of the baseline regression indicated that over 70% of the variation in the school percent absent rate could be explained by the latent characteristics of individual schools (such as variation in student populations across different schools), by school week, by month (such as the effects of flu outbreaks or and other seasonal factors), and by year.

The results of the baseline regression did not detect an association between *Kb* counts and student absences. In some cases, the direction of the effects were opposite to what would be expected (i.e. an increase in *Kb* count was associated with a reduction in percent absent rate).

## Conclusion

- We cannot reject the null hypothesis that *Karenia brevis* has no effect on student absences in Sarasota County public schools.
- Sarasota County schools near the coast have a higher percent absent rate than schools further away from the coast due to other factors. Uncovering these factors will be a task for future research.
- Even with the negative result for *Karenia brevis* effects, the models still may be of interest to the Sarasota County school system.



## Reference

1. Kirkpatrick, B., Fleming, L., Backer, L., Bean, J., Tamer, R., Kirkpatrick, G., Baden, D. et al. (2006) Environmental exposures to Florida red tides: Effects on emergency room respiratory diagnoses admissions. Retrieved November 13, 2015, from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2847280/>
2. Hoagland, P., Jin, D., Beet, A., Kirkpatrick, B., Reich, A., Ullmann, S., Kirkpatrick, G. et al. (2014). The human health effects of Florida Red Tide (FRT) blooms: An expanded analysis. Environment International, 144-153.