



Novel treatment of white-nose syndrome in *Myotis lucifugus* populations

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Introduction

- White-nose syndrome (WNS) is a fungal disease characterized by visible white fungus (*Pseudogymnoascus destructans*) found on the tissue of the face, ears, and wings of hibernating, cave-roosting bats.
- The little brown bat (*Myotis lucifugus*) is known to be particularly sensitive to WNS and populations have declined by over 90% since introduction of the fungus to the US.
- Rhodococcus rhodochrous* strain DAP 96253 (RRDAP) is a bacteria commonly found in soil and has been found to inhibit *P. destructans* growth *in vitro*, but whether the activity is consistent *in vivo* remains unknown.
- In this study, we aim to determine whether RRDAP is a viable way of inhibiting *P. destructans* in infected little brown bats and improving survival.

Methods

- Little brown bats with characteristic infection of WNS were captured at Devil's Icebox cave (Columbia, MO) and monitored in the lab between November 23, 2015 and May 10, 2016.
- Bats were treated with vapor RRDAP once at the beginning of the study.
- Upon intake, the wings were swabbed, and UV illuminated photographs were taken of left- and right-wing lesions. Bats were processed every 2 weeks for further sample collection and mortality checks.
- Swabs were sent to the Center of Forest Mycology Research in Madison, WI to determine *P. destructans* load.
- Active wing lesions were quantified using R Countcolors.

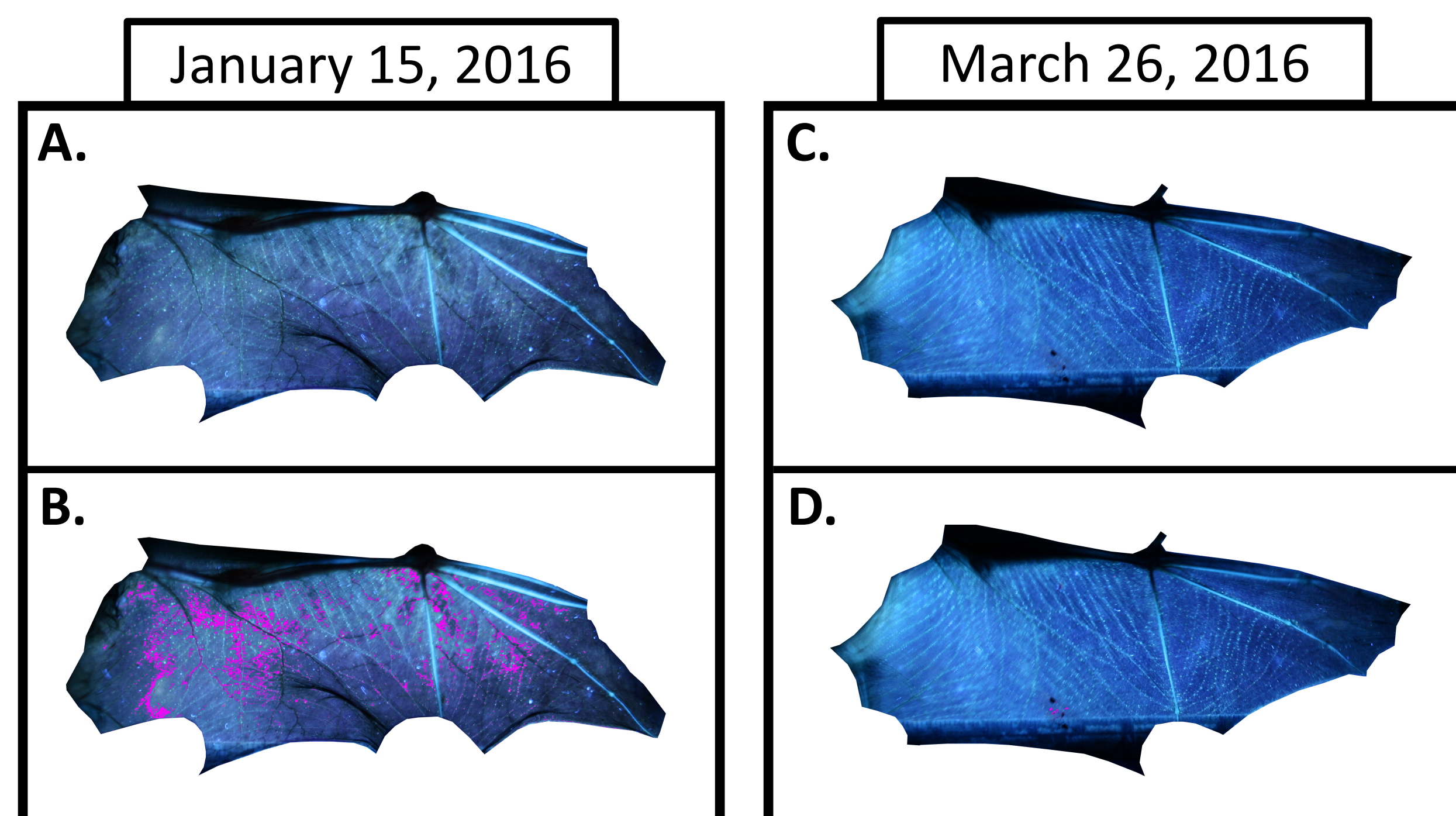


Fig 1. R package countcolors was used to determine the percent area of orange-yellow fluorescence caused by cutaneous *P. destructans* lesions in a little brown bat wing section transilluminated by 385 nm ultraviolet light (A.) UV image of the left wing of a bat taken on 1/15/16 (B.) Masked version of the original image produced by Countcolors for identification of *P. destructans*. (C.) UV image of the left wing of the same bat, taken on 3/26/15 and (D.) corresponding masked version.

Results

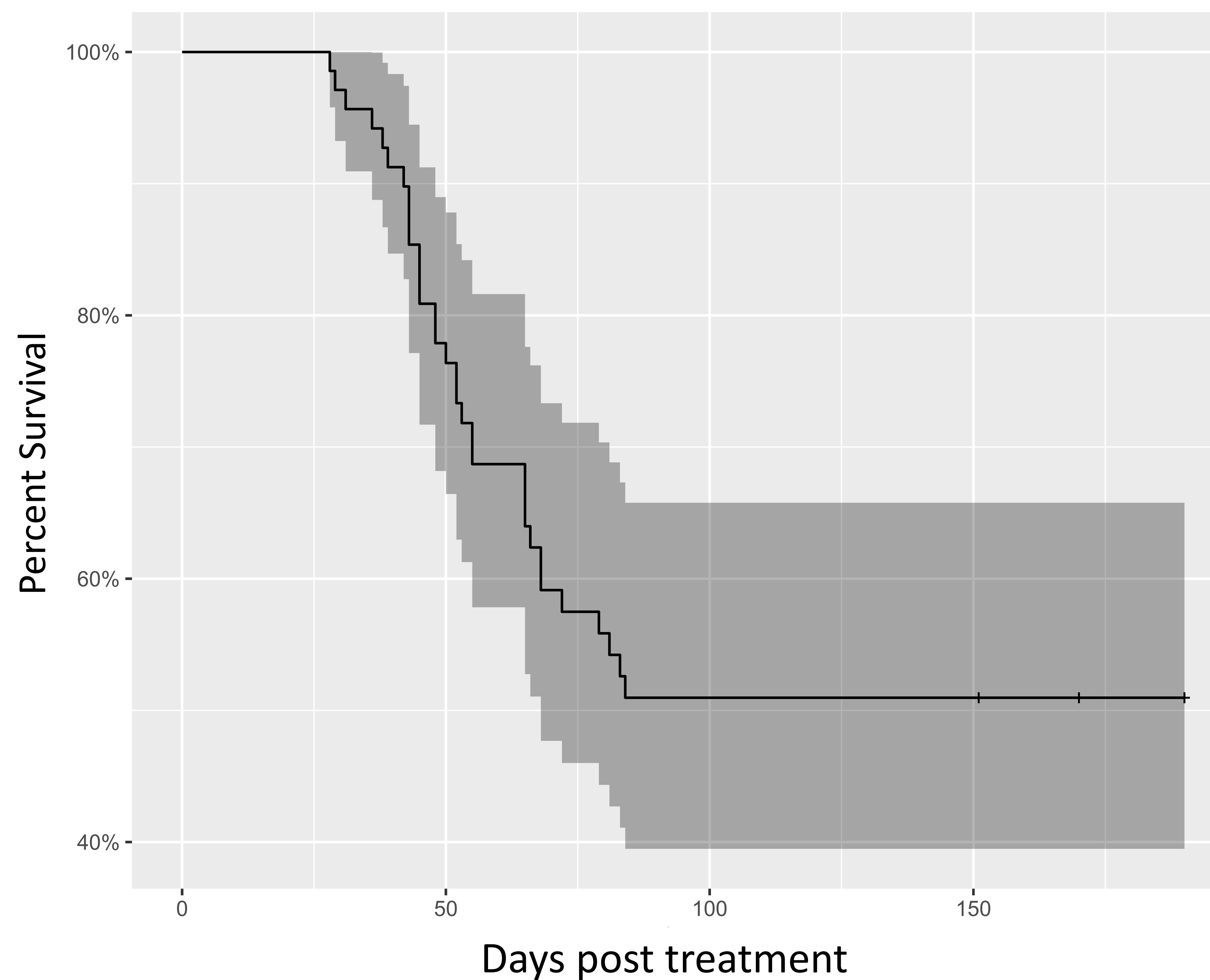


Fig 2. Kaplan Meier survival curve of bats positive for WNS treated with RRDAP, n = 64.

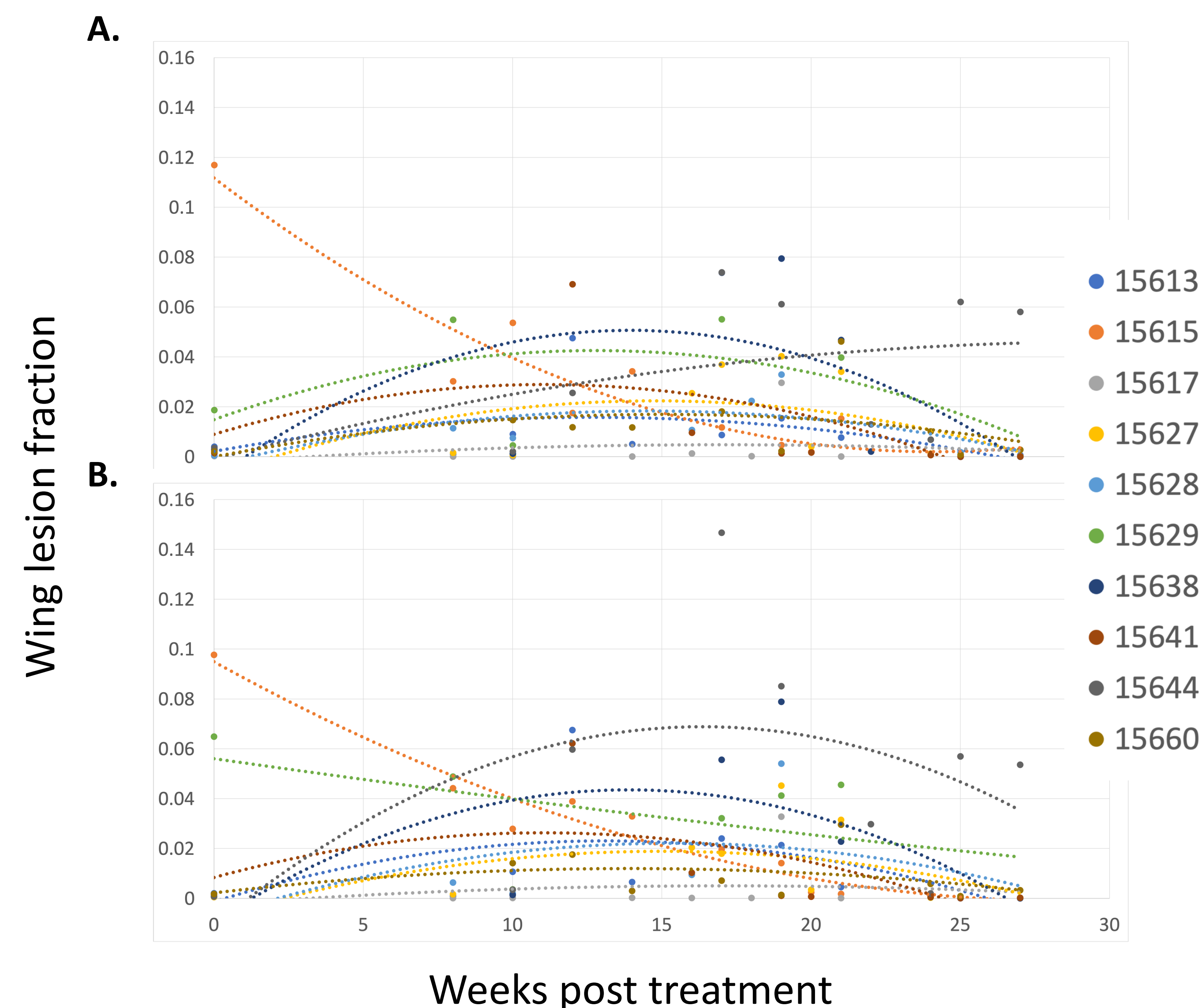


Fig 3. Quantification of active *P. destructans* associated wing lesions of left (A) and right (B) wings of 10 little brown bats over time

Summary and Conclusions

- WNS-infected populations of little brown bats average a mortality of greater than 90%.
- When treated with RRDAP, little brown bat populations averaged mortality rate of 50%.
- Wing lesion fraction increased from January to late February and declined until March to early April.
- The trends in wing lesions observed in this study is consistent with trends observed previously. However, the infection cycle seemed to be accelerated when bats were treated with RRDAP.
- In conclusions, trends suggest that RRDAP is a viable treatment targeting *P. destructans* on little brown bats and improving survival.

Future Directions

- Though RRDAP treatment improved survival of little brown bats, there is a lack of understanding in its impact on *P. destructans* load.
- Additionally, there is a major gap in understanding of the effect of *P. destructans* on the wing microbiome of infected bats.
- Future studies aim to quantify *P. destructans* load on wings following RRDAP treatment across time as well as its effect on the skin microbiome.

Acknowledgments

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