

# **Effectiveness of Pile Savers in Preventing Biofouling of Pier Piles**

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## Summary

The effectiveness of Pile Savers to prevent the accumulation of organisms on pier piles was evaluated during the months of May to October, 2013 in the Intracoastal Waterway, Oak Island, NC. Organisms were scrapped from twenty pier piles (10 on north side, 10 on south side). Pile Savers were applied to half of the piles (5 north (replicate A), 5 south (replicate B) alternating between the piles containing no Pile Savers. Organisms were counted on the piles in June, July, August, and October and identified to taxon. Organism accumulation consisted almost exclusively of barnacles with the intermittent occurrence of mobile gastropods and arthropods. On piles containing no Pile Savers, a significant accumulation of organisms had occurred by July. By August, these piles appear to have reached their carrying capacity. In contrast, piles equipped with Pile Savers exhibited no significant accumulation of organisms throughout the study. Spurious accumulation of organisms on piles equipped with Pile Saver was due to jamming of the Pile Saver or accumulation of organisms within depressions in the piles. Results demonstrate that Pile Savers are highly effective in preventing the surface accumulation of sessile barnacles on pier piles.

## **Purpose**

The purpose of this study was to evaluate the effectiveness in Pile Savers to prevent the accumulation of organisms on pier piles. The study was performed on an approximately 8 year-old pier located in the Intracoastal Waterway, Oak Island, NC. The study was initiated in May and ended in October, 2013.

## **Methods**

Twenty piles were scrapped free of sessile organisms prior to the initiation of the study. Five piles on the north side and five piles on the south side of the pier were equipped with Pile Savers. The remaining piles were provided no means to inhibit organism accumulation. Piles on the north side of the pier that were equipped with Pile Savers were designated P1A through P5A. Piles on the south side of the pier that were equipped with Pile Savers were designated P1B through P5B. Piles on the north and south sides of the pier that were not equipped with Pile Savers were designated N1A through N5A and N1B through N5B, respectively. Piles alternated between those containing Pile Savers and those not containing Pile Savers. Based upon assignment order, piles designated with a number 1 were most shallow and those designated number 5 extended most into the waterway.

The first signs of accumulation of organisms on the piles were noted in June. Thus, quantitative assessments of organism accumulation began in this month and continued to October. The study was ended in October since no significant changes were noted in organism accumulation between August and October.

Four assessments of organism accumulation were made, one each in June, July, August, and October. Assessments were made of the outer face of each pile at low tide. The length of the pile face was determined at each enumeration (from the cross plank which prevent further upward movement of the Pile Savers down to the water level). The total number of organisms on the pile face was counted if this value was  $\leq 200$ . If the pile face contained more than 200 organisms, then the length of the pile face that held 200 organisms was determined and used along with the total length of the pile face to calculate the total number of organisms present. The total number of organisms present and the dimensions of the pile face enumerated were used to calculate the number of organisms per 100 square centimeters (sq. cm.).

Significant differences ( $p \leq 0.05$ ) in organism accumulation between piles equipped with and not equipped with Pile Savers were determined using Student's t Test of pairs where the pairs consisted of piles located at the same water depth (e.g. P5 versus N5). Significant differences ( $p \leq 0.05$ ) among multiple values within a parameter (e.g. differences in organism accumulation with position of the piles for a specific month) were determined using Analysis of Variance.

## **Results**

There were no significant differences between organism accumulation on the north (replicate A) versus the south (replicate B) sides of the pier except among piles not equipped with Pile Savers during the month of July. Here, replicate B piles had accumulate significantly more organisms

than replicate A ( $p=0.02$ , Fig. 1 A&B). Also during the month of July, there was an increasing trend in organism accumulation with increasing distance out into the waterway (Fig. 1 A&B). By August, these differences were no longer apparent and the piles appear to have reached their carrying capacity for barnacles. Organism loads on piles not equipped with Pile Savers were comparable between the months of August and October.

There were no significant trends in organism accumulation among piles equipped with Pile Savers (Fig. 1 C&D). Some piles remained free of organisms throughout the study (P1A, P5A, P5B). Piles equipped with Pile Savers that accumulate organisms either experienced jamming of the Pile Saver or possessed indentations in which organisms could attach and be free of the action of the Pile Saver. Piles equipped with Pile Savers accumulated significantly fewer organisms as compared to piles not equipped with Pile Savers during the months of July ( $p=0.00006$ ), August ( $p=0.0000003$ ), and October ( $p=0.0000003$ ) (Fig. 2). Images of representative piles equipped with a Pile Saver and not equipped with a Pile Saver are depicted in Figs. 3A and 3B, respectively. Fig. 3C depicts a pile equipped with a Pile Saver (P2A) that contained a groove in the wood in which organisms could accumulate.

## **Conclusion**

Based upon results of this study, Pile Savers are highly efficient at preventing the accumulation of sessile barnacles on pier piles.

Fig. 1 Barnacle accumulation on piles not equipped with Pile Savers (**A**: replicate A, **B**: replicate B) or equipped with Pile Savers (**C**: replicate A, **D**: replicate B).

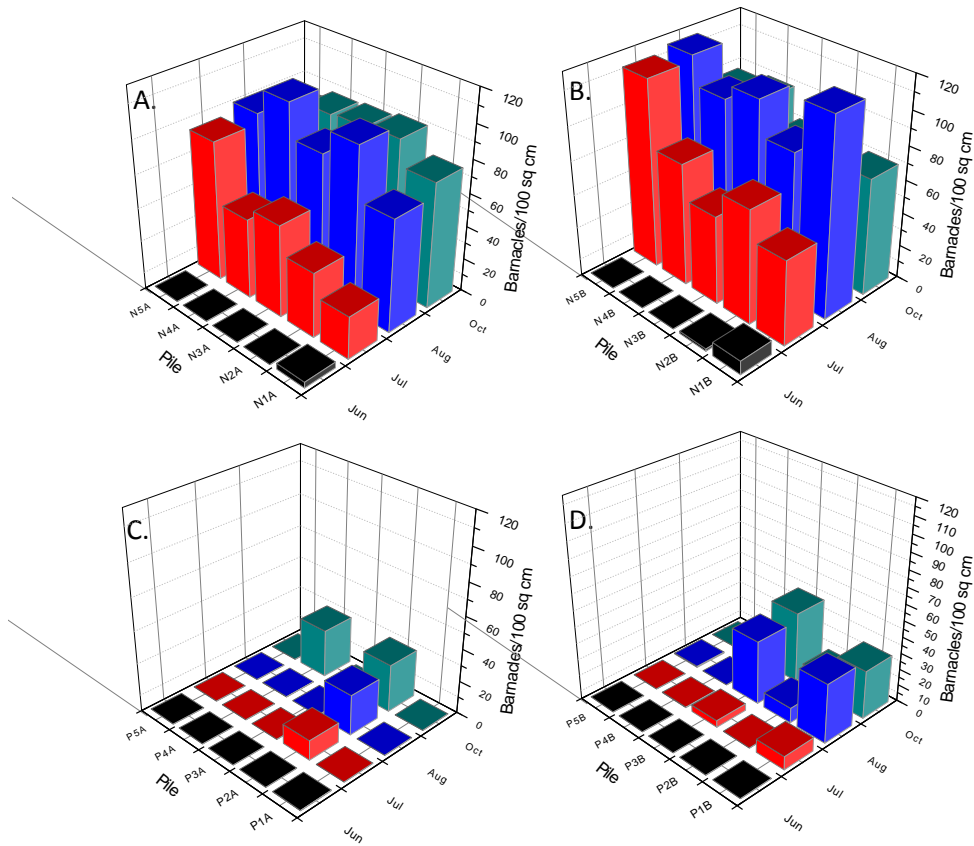


Fig. 2 Mean (error bars=standard deviation, n=5) accumulation of barnacles on piles equipped with Pile Savers (black) or not equipped with Pile Savers (red). Asterisks denote significant ( $p \leq 0.05$ ) differences in barnacle accumulation between treatments for the given month.

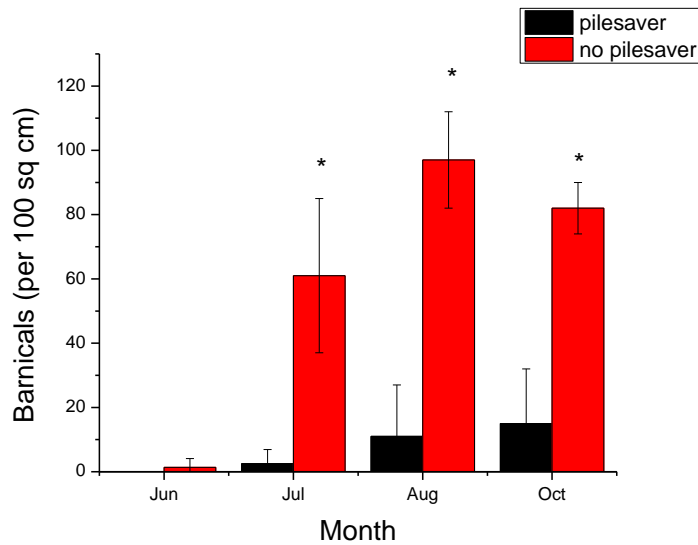




Fig. 3 Organism accumulation on piles after five months equipped with Pile Savers (**A**), or not equipped with Pile Savers (**B**). Frame **C** depicts a pile (P2A) equipped with a Pile Saver but containing an indentation in which organisms accumulated.

