Abstract Sample #1

TESTING THE EFFECTS OF BLADE TWIST ON A WIND TURBINE GENERATOR

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The consumption and pollution of fossil fuels and other nonrenewable resources has led to a search for alternative sources of energy. The wind, though intermittent, could be bettered to supply the world with a renewable solution to this crisis. The purpose of this research was to determine whether a twist in the blade shape of a wind turbine would produce greater amounts of wattage compared to a straight bladed turbine. It was hypothesized that the wind turbine with twisted blades would produce greater amounts of wattage compared to a straight bladed turbine. Data was collected by testing both turbines on a generator at all three fan settings. The amount of voltage and amperage produced by the turbines was recorded and multiplied together to discover the wattage outputs of the turbines. Drag and Lift tests were conducted in a wind tunnel to determine the lift to drag ratios of the turbine blades. A relatively high lift to drag ratio is the prime objective in wind turbine design. The lift to drag ratio for the twisted blade (877/283) was higher than that for the straight blade (397/209). The turbine with the twisted blades produced the greatest amount of wattage at all three wind speeds (setting 1: 12.5; setting 2: 67.5; setting 3: 263) compared to the straight bladed turbine (setting 1: 8.01; setting 2: 29.8; setting 3: 78.7) thus supporting the original hypothesis. This was thought to have happened because the angle of attack was less at the tip of the twisted blade than at the base of it which caused the tip to produce less drag as it rotated around the hub of the turbine allowing the turbine to rotate faster, thus producing greater amounts of wattage.

Abstract Sample #2

NITROGEN AND SEDIMENT LOADING TO THE UPPER MISSISSIPPI RIVER: ASSESSMENTS OF 27 WATERSHEDS IN MINNESOTA AND WISCONSIN

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This study was designed to test the hypothesis that Southeastern Minnesota and West Central Wisconsin tributaries are contributing disproportionately more sediments and nutrients to pools 5-8 of the Upper Mississippi River during summer, and that these pools would be retaining sediments and exporting nutrients. Turbidity and nitrates were measured monthly at each of 25 tributaries and Lock and Dams 4-8. Discharges were measured at 21 tributaries, whereas discharges at four tributaries and the Lock and Dams were obtained online. GIS watershed and land use data were used to determine percentage row crops in each watershed, and then compared to sediment and nitrate loads to determine if row crop agriculture increased sediment and nitrate stream loads. Tributary drainages comprised 11.8% of the watershed area upstream of Lock and Dam 8, but contributed 22.1% of sediments and 12.4% of nitrates delivered to Lock and Dam 8. When percentages of row crops per watershed were compared to sediment and nitrate loads, no significant ($P>0.40$) correlations were found either on a monthly or total summer basis. Pools 5-8 were exporting sediments, with output (107 metric kilotons) exceeding inputs (100 metric kilotons). Nitrates also were exported, with outputs (17.9 metric kilotons) equaling inputs (17.9 metric kilotons). Disproportionate contributions of sediments and nitrates from the Southeastern Minnesota and West Central Wisconsin tributaries to pools 5-8 of the Mississippi River are degrading the river environment by increasing sediment load and contributing additional nutrients to the Gulf of Mexico Dead Zone.

Abstract Sample #3

THE IMPACT OF GRASS HEIGHT AND DENSITY ON DUCK NESTING SUCCESS

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The Prairie Pothole Region of the United States and Canada is North America's single most important waterfowl breeding area. Dotted with millions of shallow wetlands formed by glaciers 10,000 years ago, the Prairie Pothole Region encompasses over 250,000 square miles and supports more than 50% of the continent's ducks. In some portions of the region, potholes and their associated prairie uplands support over 100 breeding pairs of ducks per square mile. The purpose of this study was to determine the impact of grass height and density on duck nesting success. Duck nests are greatly affected by predation. Mammalian and avian predators are destroying thousands of duck eggs each year (Ducks Unlimited). It was hypothesized that duck nests in denser and taller habitat will be more effective. It is believed to be so because in a denser habitat, the hen can hide in the grass and predators will be less likely to find her and her eggs. All data was collected between June 9, 2003 and June 30, 2003. The Long Lake and Beck Game Production areas, consisting of 3,160 acres were located in the counties of Codington and Brookings, South Dakota. Thirty-five nests were located on the Game Production Areas by either using a 6-foot willow switch or a 25-foot chain (Vaa, 2003). Grass height (cm) and density (stalks per $10cm^2$) were measured. A comparison was made, examining the success of nests in different grass heights, and the nest distance to water. The odds of a nest being successful in high grass height (above 60 cm) were eight times more likely than in low grass. This was statistically significant at .03, using a logistics regression test. The standard p value (.05) was used in this study. Duck nests in high grass height were more successful than nests in low grass height. This is probably due to the fact that visibility is restricted in high grass height. In a high-density situation, nests were more likely to be depredated, than in a low density. The majority of the data collected did support the original hypothesis.