

2008 State Symposium Presentation

Using dissolved gases to explore biogeochemical relationships of a small baseflow dominated central Wisconsin stream.



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Advisor: Dr. Bryant Browne

Abstract:

Traditional water quality studies focus primarily on dissolved solids. However, much less attention is generally given to the many dissolved gases present in surface and ground waters. Together, dissolved gases and solids can enhance our understanding of the biogeochemical processes affecting stream water quality. In this study, we investigated the Little Plover River a baseflow dominated stream in a predominantly agricultural sand plain watershed. We measured a suite of dissolved gases (oxygen, carbon dioxide, methane, nitrous oxide, chlorofluorocarbons, and noble gases) in conjunction with major and minor ions. Measurements were obtained at 350 meter intervals along the thalweg of a meandering 8 km stretch of stream into headwater tributaries.

Many dissolved solids act fairly conservatively in streams. However, dissolved gases do not act conservatively for several reasons (e.g., evasive losses to the general atmosphere, atmospheric inputs, and temperature changes). We exploited these behavioral differences to draw inferences about the biogeochemical connection of the stream with the landscape. Losing sections of stream had dissolved gas concentrations near atmospheric equilibrium (CFCs, nitrous oxide, and methane). Gaining sections had dissolved gas concentrations both supersaturated (nitrous oxide, methane, and carbon dioxide) and under saturated (CFCs and oxygen) with respect to atmospheric equilibrium. Entrance of nitrate into the stream was accompanied by high concentrations of nitrous oxide. We will describe these findings and present a further analysis of the biogeochemical footprints and movement of dissolved gases as they relate to the stream's water chemistry and its physical connection to the landscape.

2008 State Rotunda Presentation

Seed bank density and species richness in duff layer compared to soil in a northern mesic white pine (*Pinus strobus*) plant community.



MARY BARTKOWIAK
Senior,
Biology

Advisor: Dr. James Cook

Abstract:

Seed bank in both soil and duff is important to the secondary succession of any northern mesic white pine (*Pinus strobus*) plant community. However, we know very little about the seed bank under white pine communities. Most studies have focused on fire effects on soil. Because a fire always burns at least part of the litter, the impact on the seed bank could be substantial. Duff and soil samples were collected from a mature white pine forest in Menominee County, WI during summer and early fall of 2006 in order to compare density and richness of the seed bank. The study includes a comparison of the effects of fire and mechanical disturbance on the understory regrowth in these forests, which was sampled in 1m² quadrats in August. Determination of seed bank density and richness is ongoing with preliminary data indicating that the duff has significantly greater seed per volume than soil ($p=.003$). The median number of seed per duff sample = 6.00, whereas the median per soil sample = 2.50. Identification of emergent plant is ongoing, and will allow a comparison of species richness between the two seed banks. In addition, a comparison will be made to soil samples collected in 2001 prior to the treatments. A comparison between the composition of the seed bank and above ground vegetation will be conducted, along with the identification of any invasive exotics found in the seed bank.

Managed wetlands versus non-managed wetlands for two species of cavity nesting waterfowl in Wisconsin.



Abstract:

Wood ducks (*Aix sponsa*) and hooded mergansers (*Lophodytes cucullatus*) are two cavity nesting waterfowl species in Wisconsin. In February and March 2007 we, with assistance from the University of Wisconsin – Stevens Point student chapters of The Izaak Walton League and The Wildlife Society, collected data on wood duck and merganser use of 183 artificial nest boxes placed at both managed and unmanaged wetland sites. Our objective was to test the hypotheses that use of artificial nest boxes and nest success of both species, was higher at managed wetland sites when compared to unmanaged wetlands. Use of nest boxes by other species as well as nest predation rates also were compared between managed and unmanaged wetland sites.

LUKE FARA

Junior,
Wildlife Management and
Ecology. Biology.

-Picture not available-

JOE SCHULTZ

Sophomore,
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Advisor: Dr. Kevin Russel

Assessing the effectiveness of 4 scent lures in attracting and eliciting rubbing behavior in cougars (*Puma concolor*).



JOE WELCH

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Wildlife-Ecology and
Management & Biology. Water
Resources

Advisor: Dr. Eric Anderson

Abstract:

Cougars (*Puma concolor*) were extirpated from the state of Wisconsin around the turn of the 20th century. For years now, accounts of sightings have increased and the possibility that the large cat has returned to the state has become more debatable. We are conducting research using hair snares and DNA analysis to confirm their presence in Wisconsin, specifically sampling areas where sightings have been most commonly reported. As part of this search, 4 lures were tested for their effectiveness in attracting and eliciting desired rubbing behavior in captive cougars. We used: 1) Powder River Cat Call, a commercial feline lure, 2) commercial mountain lion urine, 3) commercial mountain lion urine containing levels of Beta Estradiol-17 at or above levels expected in a female mountain lion in estrous, and 4) the perfume Untamed® by Avon, which was purportedly of interest to some captive cougars. The 4 lures were applied to four cotton cloths affixed to 20cm x 20cm plywood boards. These were attached to a 3.7m x 0.6m board, evenly spaced apart and hung inside of cougar pens. Eight cougars were allowed to approach the lures. Behavior was recorded every 10 seconds for 120 seconds from the time the board was approached by the cat. The Powder River Cat Call was the most effective lure both in terms of time spent at the lure ($\bar{x} = 79.73\%$, $X^2 = 118.65$, $p\text{-value} < .001$) and in eliciting rubbing behavior (28.8% of time spent at cat call was spent rubbing with 4 out of 8 cats rubbing at least once).