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Modeling Nitrogen and Phosphorus Loading from Tate's Hell State Forest into the Apalachicola Bay System Using Pollutant Loading Estimator (PLOAD)

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Abstract Text:

As water drains from land surface, it transports residues in the form of surface runoff which is an important source of non-point source pollution. Movement of contaminants into streams and downstream destinations is water-quality issue of national concern. Even when constituent concentrations in a stream are within desirable limits, large quantities of contaminants can be transported downstream to sensitive environments where they can accumulate through sedimentation, evaporation, or biological uptake. The Apalachicola Bay and East Bay collectively called the Apalachicola Bay System (ABS) located in Franklin County, Florida, are of significant environmental and economic resources for Florida and the United States. Commercial and recreational fisheries are dependent upon the productivity of these estuaries. Continuous monitoring of the ABS water column have shown instances of impacted water quality, assumed to be caused by run-off from Tate's Hell State Forest, located in northwest Florida. To quantitatively characterize the transport of nutrients from an impacted site in Tate's Hell State Forest, into the ABS, a model was generated using BASINS 4.0 and PLOAD. Export coefficient (EC) and event mean concentration (EMC) approach were used to estimate nitrogen and phosphorus loading into the ABS. The ECs (kgha-1yr-1) of TN and TP used to drive the model was obtained from various literature, while those for the EMCs were actual measurements (mgL-1) observed from the impacted site. Estimated pollutant loading rates for the EC method were 2.2 and 2.06 for kgha-1yr- TN and TP respectively and for the EMC method was 15.2 and 0.38 kgha-1yr- TN and TP respectively. With the exception of TN for the EMC model, the loading rates of the pollutants for both models are comparable to loading rates found in the literature. Excess nutrient in water and sediment can lead to an overabundance of aquatic flora and an imbalance in aquatic fauna.

Impact Statement:

This research has not improved water quality but provide a baseline assessment of the amount of nutrient in runoff that eventually gets to surface water. The data however, can be useful to the forest conservation officers to help them in their silvicultural and other best management practices and the staff at the Apalachicola National Estuarine Research Reserve site can have this added information and incorporate it into their monitoring tool of the Bay.