"Impact of Bio-solids Application at Deer Park Ranch on Lake Washington"– Developing a Collaborative Methodology to Arrive at a Consensus of Impact

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Introduction: Summer of 2019 a blue-green cyanobacteria, *Dolichospermum circinale*, bloomed in Lake Washington, generating questions about the safety of a primary drinking water supply for Brevard County. Based on available data at the time, land application of biosolids and commercial fertilizer was likely the source. The Brevard County Commission placed a 6-month moratorium on any new permits. Brevard Natural Resources was instructed to test for nutrients, metals, and contaminants of emerging concern, such as Perfluoroalkyl Substances (PFAS), pharmaceuticals, and personal care products know to accumulate in bio-solids

Objective: Build consensus between multiple agencies on the cause of the algae bloom in Lake Washington summer of 2019.

Determine the sources of pollutants entering Lake Washington, determine if land application of bio-solids at Deer Park Ranch contributed to declining water quality in Lake Washington.

Can additional phosphorus be added to pastureland at Deer Park Ranch be made without increasing the runoff into Lake Washington.

Materials and Methods: A consortium of agencies included University of Florida Brevard Extension Service, Brevard Natural Resources, Brevard Soil and Water Conservation District, Florida Department of Environmental Protection, St. Johns River Water Management District, United States Department of Agriculture Natural Resources Conservation Service, and Deer Park Ranch collaborated to collect 50 soil samples from Deer Park Ranch where bio-solids had been used in place of commercial chemical fertilizer over 20 years. Samples were taken from several soil types at 3 depths and Soil Phosphorus Holding Capacity was calculated. Applied Ecology, Inc., collected 11 water samples and 3 grass tissue samples that were tested for multiple forms of nitrogen, phosphorus, 7 heavy metals, 24 polyfluoroalkyl (PFAS), and 58 pharmaceuticals, personal care products and other contaminants of emerging concern at Deer Park Ranch, upstream of and within Lake Washington, and in residential drainage canals entering Lake Washington.

Brief Results: No manmade chemicals suggestive of human health concerns were found leaving Deer Park Ranch. Metals leaving the ranch were below drinking water threshold values. Most PFAS levels were below laboratory detection limits. Canals from draining developed areas east of the ranch had PFAS levels higher than water exiting the ranch.

Water exiting the ranch after high rain events shows P exiting the ranch and entering the marsh leading to the lake.

Soils samples reveal some pastures have exceeded their Soil Phosphorus Holding Capacity. The fine sands soil types show lower capacity to hold phosphorus.

Implications: Multi-agency approach to investigation can resolve issues in a timely manner, provided all parties remain open minded and accept science-based evidence. Recycling nutrients in bio-solids can provide a low-cost method of turning an urban liability into a low-cost input to certain agricultural entities when properly used and monitored.