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Accumulation of Poly- and Perfluoroalkyl Substances (PFASs) in a Freshwater Food Web from the Great Lakes Region

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Background/Objectives. PFASs comprise a large group of chemicals that are used in many industries, i.e., aerospace, apparel, auto, construction, chemicals and pharmaceuticals, electronics, energy, healthcare, oil and gas, and semiconductors. Aqueous film forming foams (AFFFs) were developed in the 1960s and contained multiple classes of PFASs. The former Wurtsmith Air Force Base (WAFB) is situated in northeastern Michigan and only two miles west of Lake Huron. PFAS contamination at WAFB has been attributed primarily to use at AFFF. South of WAFB, Clark's Marsh (composed of wetlands and small lakes) in the Huron National Forest, has been contaminated with PFASs. The highest concentration of PFASs to the Clark's Marsh originates from a former fire-training area (FT-02) that was active between 1958 through 1991. Background concentrations of different PFASs could be found in many media and wildlife across the globe and in almost 100% of human serum samples (Kato *et al.*, 2011). Due to their unique chemical properties the PFASs are persisted in the environment and some of them have been found to be bioaccumulative.

Approach/ Activities. Extensive remedial activities have been carried out to address fuel and chlorinated solvent contamination at WAFB. Recently, the United States Air Force (AF) installed the first system on a former AF base to treat PFASs. The treatment system was design to capture the PFAS groundwater plume that originated at the FT-02 and discharges into Clark's Marsh system and the Au Sable River. PFASs were first discovered at WAFB in the groundwater collected in 1998 and 1999 (Moody *et al.*, 2003). Many samples at WAFB from groundwater, soil, sediments, fish, and birds show some of the highest concentrations of PFAS reported in literature. Out of more than 60 sites from the Great Lakes Basin, tree swallows at WAFB had more than twice the highest concentrations of PFASs found anywhere else in the Basin. Fish sample analysis resulted in a "Do Not Eat" fish advisory for the Clark's Marsh ponds and resident fish from the Au Sable River and Van Etten Creek.

Results/Lessons Learned. The concentration of PFASs in different media along with the bioconcetration from the Clark's Marsh food web will be presented. Few PFASs were found to bioconcentrate through the food chain. The short-chain carboxylates have a high detection frequency compared to long-chain carboxylates in surface water. At WAFB possible limiting factors that prevent the bioconcetration factor (BCF) for PFOS from increasing through the trophic level in fish have been observed. The data from WAFB for different PFASs will be compared against concentrations presented in literature.