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Enteric Bacteria Monitoring Research

2020-22 Multiple-year Proposal

2021 Addendum & Contract

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2021 Modifications (in red)

Sampling and Imaging Protocols

Sample Collections

Water samples (duplicates) will be collected from both ground water (well) and surface water (lake) at 8 resident locations in June, July, and August each year (96 samples/lake/year total). Sample sites (residences) will be selected in coordination with an association biologist or appointed volunteer with approval and full cooperation from the landowner. Sites with positive enteric bacteria samples identified in 2018-2019 in Leelanau County will receive preferential selection. In addition, "suspect" sites, as identified through casual observation and/or analysis of government records, should be given priority in 2021. Association biologist or appointed volunteer will be fully trained by FWS on proper sample collection protocol and will be equipped to secure all samples.

qPCR Analysis and Sample Archiving

Every water sample will be processed (DNA extraction) and analyzed (qPCR) under the direction of FWS/UA for presence, quantity, and source of both enterococcus (modified EPA Method 1611) and human Bacteroides (HF183), if possible. All remaining extracts will be archived at the University of Alberta until cold storage capabilities become available in NW Michigan. For validation purposes, we need to collect and analyze every sample in duplicate in 2021. This will increase costs, most of which will be encumbered by FWS/UA. However, we will need to add $8/extra sample to the 2021 costs for lake associations. If there is interest in re-sampling some 2020 sites again in 2021, FWS/UA will coordinate and conduct those analyses at $100/sample.

Imaging Protocol

GPS coordinates for each septic drain field will be obtained during the June water sample collection. An IR image of the drain field will be captured utilizing drone technology when conditions are appropriate (likely in July). Images will be analyzed and electronically archived. Due to pandemic-related supply chain issues, 2020 sites and 2021 sites will all be analyzed in 2021. Reduced drone billing in 2020 will be added to 2021 billing.

2021 Lake Association Cost

$4,450/year + $500 (2020 drone costs) + $8/extra sample increase = **$5,334**
*Additional samples @$100/sample

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Project Contract Addendum
2021 Enteric Bacteria Monitoring Research

This agreement between Little Traverse Lake Association (LTLA) and Freshwater Solutions LLC (FWS) will begin on May 15, 2021 and end on August 31, 2021. FWS agrees to perform the activities starting May 1, 2021 as described in FWS's previously submitted 2020 proposal entitled **"Enteric Bacteria Monitoring Research"** along with changes described in this addendum**.** LTLA agrees to pay FWS $5,334 (total) and $100/sample for any additional samples, and support the project with LTLA personnel and volunteers where needed.

FWS will coordinate its activities with the LTLA through its watershed biologist, Kelsey Froelich, and will provide written reports as may be requested by Ms. Froelich or another representative.

FWS will invoice for its services in June 2021 (50% = $2,667) and upon completion of the 2021 field work in September (50% = $2,667). LTLA will pay these invoices within 30 days of receipt.

LTLA President _____ Date _____

FWS Owner Richard L Diviney _____ Date 1/18/21