

2021 Sediment/Phosphorus Loading Project Additional Analysis of Potential Tributary Based Best Management Practices

ISSUE:

Lake Committee (LC) request for Board Approval to fund a Stream/Watershed Assessment (Issacs's, Yeiders and Miller Run) during May 2021.

BACKGROUND:

The Lake Committee (LC) and Board have worked diligently the past four (4) years to further understand the nutrient loading (sediment/phosphorus, etc.) impacts on Lake Holiday's water quality, the trigger point for potentially toxic Blue Green Algae (BGA) blooms and finally the most cost-effective Best Management Practices (BMP's) to protect LHCC's most valuable resource for the future.

LHCC's 250 acre lake is approximately 49 years old and unfortunately during the past 10+ years has been subjected to a series of events resulting in the need for the above referenced work. The 10'-12' lake draw down during dam construction, emergence of invasive vegetation, overstocking of grass carp, eradication of all lake-based vegetation by this overstocking and 49 years of internal/external phosphorus loading/sediment impacts have negatively impacted the lake's ecosystem. Lake Holiday's 8,487 acre watershed (34:1 watershed/lake ratio compared to a 10:1 norm) is comprised of three (3) primary land uses (deciduous forest, agriculture, and developed open space/low intensity development) each of which drains into our lake. Beginning in 2017, LHCC contracted with Princeton Hydro (PH) to collect comprehensive lake/tributary water quality data, track weather/precipitation variables, study tributary (watershed) related impacts (sediment, phosphorus, other nutrients/contaminants), develop a Mass Balance Analysis, all of which would assist in determining the specific contributions of internal/external phosphorus loading. The work to date has confirmed that the 8,487 acre watershed and tributaries (external loading) are the major source of Lake Holiday's phosphorus/sediment concerns.

As a means of further understanding the watershed/tributary impacts and developing corrective measures, LHCC awarded a "2019 Best Management Practice (BMP) Analysis" contract to PH. During the past several years, we have worked closely with PH as they have conducted/provided Survey/Engineering work, installed Floating Wetland Islands, placed Carp Exclusionary Zones (underwater barriers) to facilitate/monitor the return of Submerged Aquatic Vegetation, and continued Annual Water Quality Sampling, etc. The Lake Committee (LC) is currently evaluating PH's work which includes recommendations on various types of BMP structure(s), sizing, placement location, construction/installation methods, and maintenance/permit requirements required to control/reduce watershed/tributary (sediment, phosphorous, other nutrients/contaminants) impacts to Lake Holiday. At the conclusion of this review, the LC is proposing a 2021 Board Presentation to request "next step funding" from the previously established Replacement Reserve Fund (Lake Elements). **To ensure that all BMP options have been adequately vetted, the LC is currently requesting approval to conduct the above mentioned "Preliminary Stream/Watershed Assessment (Issacs's, Yeiders and Miller Run)."**

RECOMMENDATION/SUMMARY:

The LC and more specifically, the Fishery/Habitat Sub Committee volunteered their time to walk Issac's Creek during February 2021 to observe this area (topography/contribution to streamflow's, runoff from snow melt/several days of rain, use of a drone to provide aerial documentation of the various tributary aspects, etc.) and further understand the potential for upgradient/in-stream (potentially less costly) BMP's. If feasible, this BMP approach would include in-stream barriers, stream channel stability, stream bank restoration, off-line wetlands, etc.

The information gathered during the Issac's reconnaissance then prompted contact with Princeton Hydro (PH). Significant information exchange occurred during the call between LHCC's Sub Committee personnel, Princeton Hydro's two (2) Hydrologists/Fluvial Geomorphologists and Mike Hartshorne our PH Lake Management contact. Based on the data reviewed, PH has recommended a one-day "Preliminary Stream/Watershed Assessment of Issacs's, Yeiders and Miller Run. The purpose of this one-day site visit will be the determination of additional sediment and nutrient sources within the Isaacs Creek, Yeiders Run and Miller Run watersheds. The focus of the site visit will include the assessment of stream channel stability, agricultural activities, and any other observed sediment and nutrient producing activities within these watersheds. Prior to the site visit, Casey Clapsaddle (PH Hydrologist/Fluvial Geomorphologist) will provide LHCC with Google Earth.KMZ location files of the focus areas for the preliminary site visit. LHCC will be responsible for obtaining access to these areas for entry and observation. At the conclusion of the on-site visit and data computation, PH will provide LHCC with a written summary and a follow-up call to discuss the best future approach for Lake Holiday's nutrient management efforts (additional in-stream studies/data collection. preliminary placement locations for BMP's, nutrient management BMP's, addition of erosion control/streambank stabilization) or continuation of the current lake based BMP approach.

PROPOSED MOTION/ACTION:

Motion to Approve the attached "Princeton Hydro 2021 Lake Holiday Preliminary Review of Existing Stream Stability and Watershed Condition Proposal" at a cost of \$4,422.00. Funding for this Project is available in the **Replacement Reserve Fund (Lake Elements): "Yeiders/Issac's Environmental Studies and Permits Reserve Component Description"** or from other sources based on a decision of the Board. This project will provide additional insight into LHCC's best/most cost effective BMP's moving forward.

SPONSOR:

Jon Reedy
Lake Committee Board Liaison

March 23, 2021

Lake Holiday Country Club
Mike Goodwin, General Manager
1045 Lakeview Drive
Cross Junction, VA 22625

Re: Proposal for Lake Holiday Site Visit for Preliminary Review of Existing Stream Stability and Watershed Condition

Dear Mr. Goodwin,

Princeton Hydro is pleased to submit this proposal letter to the Lake Holiday Country Club (LHCC) for our Hydrologist/Senior Fluvial Geomorphologist, Casey Clapsaddle, to visit Frederick County Virginia and the Lake Holiday Reservoir Watershed for a one-day preliminary stream and watershed assessment.

The purpose of this one-day site visit will be the preliminary determination of additional sediment and nutrient sources within the Isaacs Creek, Yeiders Run and Miller Run watersheds. The focus of the site visit will include the assessment of stream channel stability, agricultural activities, and any other observed sediment and nutrient producing activities within the watershed. Prior to the site visit, Casey will provide LHCC with Google Earth .KMZ location files of the focus areas for the preliminary site visit. LHCC will be responsible for obtaining access to these areas for entry and observation. We realize that it may not be possible to gain right of entry to all the sites for this visit. After this site visit, Casey will send an email to LHCC regarding the best approach in moving forward with respect to nutrient reduction into Lake Holiday from stream and watershed sources. This email will be coupled with a one-hour conference call with LHCC members. The recommendations will include additional studies or data collection required to determine sources of nutrients entering Lake Holiday. The recommendations may also include preliminary locations for the implementation of best management practices for nutrient management in addition to erosion control or streambank stabilization within the watershed.

The best time of the year to complete this site visit is in the spring before leaf-on conditions when ground vegetation is at a minimum. Casey would be available for a site visit during the week of March 29th or April 5th. These would be the most desirable times for the site visit due to existing commitments. The next opportunity would be a site visit the week of May 3rd.

The total cost for this site visit will not exceed \$4,422.00 and includes travel time to Virginia, hotel, rental car and per diem. If you have any questions regarding our proposal, please contact us at your earliest convenience. We are excited to continue working with you on this project.

Sincerely,

A handwritten signature in black ink that reads "Michael Hartshorne". The signature is written in a cursive style with a long, sweeping underline that extends to the right.

Michael Hartshorne
Senior Project Manager - Aquatics; Senior Aquatic Ecologist

Cc: Casey Clapsaddle, Hydrologist /Senior Fluvial Geomorphologist
Paul Woodworth, Senior Project Manager/Fluvial Geomorphologist

Education:

- B.S., 1997. Watershed Science, Colorado State University, Fort Collins, CO
- B.A., 1991. Religion, Colorado College, Colorado Springs, CO

Professional Training:

- "Natural Rivers: Mechanics, Morphology, and Management, Wildland Hydrology Consultants," Richard Hey, 03/03
- "Process Based Channel Design, Inter-Fluve Inc.," 10/99
- "River Restoration Design, Wildland Hydrology Consultants", Dave Rosgen, 10/98
- "Applied Fluvial Geomorphology, Wildland Hydrology Consultants", Dave Rosgen, 8/96
- "Hydrologic Engineering Center 1 (HEC-1)" and "Hydrologic Engineering Center 2 (HEC-2)", University of Wyoming, Tony Anderson/Dan Eastwood, 8/96
- "River Assessment and Monitoring, Wildland Hydrology Consultants", Dave Rosgen, 9/96
- "River Channels", Central Wyoming College, Bill Trush, 8/93
- "Stream Health Assessment (T-Walk)", USFS, Coryel Ohlander, 5/93

Areas of Experience:

- Hydrology
- Geomorphology
- River Restoration Design
- Stream Health Assessment
- Grant Writing
- Construction Supervision
- Budget Monitoring
- Hydraulic Modeling
- Rosgen Training
- USFWS Stream Function Assessment Methodology
- Watershed data collection for stream and watershed assessment
- Stream stabilization monitoring
- Construction supervision and coordination for stream restoration projects

Summary of Qualifications:

Mr. Clapsaddle has over twenty years of experience in hydrology, hydraulic studies, geomorphology, river restoration design, river stabilization design, habitat improvement and watershed management/restoration. This experience includes the development, management, and completion of comprehensive technical studies for a full range of private and public sector clients. Mr. Clapsaddle specializes in the development of environmentally sound management and restoration plans for rivers and watersheds. These restoration plans often include best management practices for farms, ranches, and riparian corridors. These studies often involve the coordination of many disciplines by including biological sciences, hydraulic engineering, land use planning, economic development, landscape architecture, and environmental planning. Prior to working at Princeton Hydro, Mr. Clapsaddle was the principal of Rivers Unlimited for 15 years. During this time, he worked on a wide range of projects that required a wide variety of tasks which included geomorphic assessments, hydraulic modeling, topographic surveys, sediment transport analysis, flow monitoring, project design development, project permitting, grant writing, construction cost estimates, construction supervision, construction cost monitoring, and long-term project monitoring. He has also taught classes on river restoration construction techniques and basic river restoration principles for government agencies and nonprofit organizations involved in river restoration efforts. Throughout Mr. Clapsaddle's Career, he has continually developed bank stabilization, habitat improvement, and river restoration design techniques and construction approaches using natural materials that provide projects with a more natural looking aesthetic. He strives to make all completed projects enjoyable places for relaxation, recreation, and connection with the natural environment.

Select Project Experience:

Aquetong Stream Restoration Project, New Hope, PA (2019) - Princeton Hydro lead the design for the restoration of a spring fed Brook Trout fishery in an impoundment that was removed two years previously. Lead Hydrologist and Fluvial Geomorphologist for the data collection and design necessary to enhance and stabilize the existing channel that incised into impounded sediment to improve habitat for Brook Trout. Construction is expected to begin Spring of 2020.

West Branch Farmington River Streambank Stabilization Project, Town of Barkhamsted, Connecticut (2019) - Lead Hydrologist and Fluvial Geomorphologist to design streambank stabilization measures on The West Branch of the Farmington River which is designated as Wild and Scenic. The project entails the data collection, design development,

and project management necessary for bank stabilization structures that will prevent additional erosion of 150 feet of streambank. This project will protect the West River Road which is immediately adjacent to the existing bank erosion.

Tinkers Creek Stream Restoration, Prince George's County, MD (2018) – This project includes 38,000 linear feet of stream channel assessment and design for MS4 compliance in the state of Maryland. Mr. Clapsaddle is responsible for coordinating all aspects of field data collection, topographic survey, geomorphic assessment, sediment transport calculations, design coordination and construction detail coordination. The project has been under construction for one year and has one year remaining before the project is completed. Mr. Clapsaddle has been involved in construction oversight, supervising junior staff monitoring project construction and training of equipment operators to ensure correct implementation of the project design.

Larrys Creek Stream Stabilization Project, Piatt Township, Lycoming County, PA (2012) – Rivers Unlimited did this project as a sub-contractor for WHM Group. Mr. Clapsaddle developed and completed the project design, assisted with permitting and supervised all aspects of project construction. The project design involved a topographic survey, hydraulic modeling and sediment transport analysis. The design approach involved the utilization of boundary conditions to determine an appropriate pattern, dimension and profile. Effective sediment transport combined with bank stabilization was the primary objective of the design. Streambank and channel boundary stabilization was achieved through the installation of Toe Wood, Sod Mats, Soil Lifts, and Riparian Plantings. The total project cost for design, permitting, and construction was \$500,000.

Catchment Restoration, West Virginia (2015) - The entire upper part of a catchment in the steep mountains of West Virginia was blasted and excavated by an oil and gas company to create a large water containment pond. The objective of the project was to restore all 3.2 kilometers of six independent tributaries in these steep headwater areas. The Assessment and Design utilized the Rosgen approach, Regenerative Stormwater Conveyance principles in conjunction with the USEPA 2012 assessment protocol to appropriately determine channel dimensions, sediment transport and step-pool design parameters.

Phase II Assessment, Design, Permitting and Construction Supervision, Cumberland County, PA – For this project, a phase II assessment, design, permitting, and construction oversight were completed for 1,100 meters of Big Spring Creek for the Cumberland County Chapter of Trout Unlimited, Inc.

Restoration of Big Spring Creek, Cumberland County, PA (2013) - After the success of Phase I of this project in increasing the population of natural reproducing brook trout, the Pennsylvania Fish and Boat Commission in conjunction with the Cumberland County Chapter of Trout Unlimited decided to restore an additional 1,100 meters of Big Spring Creek. The project required the design of instream habitat features to specifically benefit brook trout. The design required changes in channel dimensions and gradient to facilitate a specific range of velocities and water depths that promoted fine sediment transport while providing optimal habitat and cover for brook trout.

Design, Permitting, and Construction Oversight for the Clear Creek Headcut Stabilization Project, Douglas County, NV (2008) – Design, permitting, and construction supervision to stabilize a 4-foot-high headcut on Clear Creek on Washoe Tribe lands near Carson City, Nevada. The project utilized 3 cross vanes to stabilize the headcut and the surrounding vertical eroding banks in sand and fine gravel. Native grass sod mats were utilized to stabilize the graded streambanks.

Geomorphic Assessment of Wysox Creek Watershed, Bradford County, PA (2005) – For this project, 102 square miles Wysox Creek Watershed was assessed. The project deliverables include a classification of stream reaches using Dave Rosgen's classification system, bank erosion hazard index rating of all the reaches of channel, cross-section monitoring for sediment transport and channel stability analysis, restoration recommendations, and project priority recommendations. The goal of the project is to improve bank stability in the numerous areas where excessive bank erosion and channel migration occur. Secondary goals include habitat improvement, and improvement in flood flow elevations as a result of improved sediment transport.