



Geomorphic Assessment. Photo courtesy Seaquest Productions.com

Knife River Habitat Restoration

By Kevin J. Bovee

Phase I

The major philosophy used by the LSSA to develop this grant was to start up near the headwaters and work downstream. Logic tells us that what happens upstream in the watershed will have some affect on what will happen further down in the system. Our top priority was to assess, and eventually rehabilitate, the riparian corridor of the Main West Branch (MWB) and all the unnamed tributaries. Assessing water temperature in the system was another key element in understanding the health of the watershed.

One area of the initial assessment that appears to be of major importance was documenting and map-

ping (use of LIDAR and field proofing) the presence of black ash stands throughout the watershed. Field notes, GPS coordinates and photos were compiled as the fieldwork progressed. These records may become more important because the emerald ash borer (EAB) was just discovered on the Minnesota side of the St. Louis River estuary in October of 2015. The EAB was first confirmed over in Superior, WI back in August of 2013.

The LSSA also contracted with the Natural Resources Research Institute (NRRI) in 2013 to perform a project titled "Assessment of Habitat and Biota in the West Branch of the Knife River, MN." NRRI assessed

seven reaches of the MWB for the Habitat Survey where they assess water quality, in stream habitat and a macro invertebrate survey. This phase of the work was conducted between September 3 and 10, 2013. Also included in this phase of the project was a fish survey of the same seven reaches. Electro fishing was conducted between September 30 and October 9, 2015. Brook trout were found in all seven reaches and rainbow trout were found in six of the seven reaches.

In 2014 the LSSA contracted with the Conservation Corps Minnesota (CCM) to plant hundreds of deciduous trees in a long stretch of beaver meadow on the MWB. Tree spe-

cies planted were silver maple, river birch and swamp white oak. The primary reason for this project was to incorporate deciduous trees into this stretch where an earlier planting of mostly white spruce occurred about 15 to 20 years earlier. A mix of coniferous and deciduous trees in the riparian zone is now considered the best management practice. The CCM crew worked two four-day sessions and did a fabulous job.

The last major project of Phase I was the restoration of the Second Falls on the Knife River in late summer of 2013. Several years back, the MN DNR placed a small cement weir at the site, which blew out in either a high water event or the spring ice out process. Consequently the jumping pool was too shallow for anadromous fish to make the ascent in many flow conditions. After approaching the LSOHC committee to make the change in the grant language and after receiving its approval, the LSSA worked closely with the MN DNR for the design of the project. Huge rocks were donated by Cliffs Natural Resources-North Shore Mining and trucked to a staging area on Shilhon Road. DNR personnel made the choice of several donated rocks and two were chosen to be placed at the site in the Knife River where the old weir had previously been. Immediately the water began to pool behind the rocks

just as everyone was hoping. We have been in to monitor the passage of steelhead over the rehabilitated falls in many spring flow conditions and are very happy to report that the fish are easily negotiating the falls in most flow conditions in much better shape than previously.

These are just the major projects to come out of the LSSA's first LSOHC grant. Thousands of trees have been purchased and placed into the watershed via the grant; miles of stream have been assessed; beaver impacts recorded and water temps monitored and recorded. The baseline data obtained in this work will be very valuable in years to come as work progresses throughout the watershed. Phase I is due to close out in June of 2016.

Phase II

The Lake Superior Steelhead Association (LSSA) secured its second Lessard Sams Outdoor Heritage

Council (LSOHC) grant beginning in July, 2014—Minnesota's fiscal year. The LSOHC recommended projects totaling \$ 102 million that year and the LSSA's project was part of the bill signed into law by the MN legislature.

Two major changes occurred in the second grant; the project would be conducted in the entire Knife River watershed and work was extended to private property with a state or county easement in place, in addition to all public lands in the watershed. This opened up all the tributaries; including Stanley, McCarthy and Captain Jacobson creeks, the Little West Branch, the east branch of the Knife River and several unnamed, minor tributaries to the Knife River. But our focus did not change nor did the project title: 'Knife River Habitat Rehabilitation Phase II.'

As the title states, habitat rehabilita-

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tion is at the core of the project. This habitat rehabilitation not only applies to the stream but also to the riparian zone habitat. Since we cannot reasonably work on the entire 70 miles of the Knife River watershed, the key to our rehabilitation project is to identify stream impacts within critical trout habitat. This allows each project undertaken to maximize its effectiveness for trout in the watershed. To identify and ultimately restore these key trout habitat areas, we perform thorough stream assessments, temperature monitoring, riparian impacts and geomorphic analysis.

Stream Assessments

One thing that we have learned from the past couple years is that stream blockages can occur in very short time frames. These blockages are usually in the form of logjams or beaver dams. Logjams materialize after each high water event and beaver dams appear each spring when young are displaced from their lodges. These blockages hinder or even totally block fish passage. The Main West Branch, along with two of its smaller, unnamed tributaries—Debolt and Udesen creeks (named by the LSSA) along with Stanley Creek are walked each spring and fall to assess stream passage conditions.

An adult spawning survey was conducted this year to determine where steelhead prefer to spawn in the watershed. This survey is critical so we do not restore juvenile stream habitat in areas where juveniles do not exist or where they exist in low numbers. This survey was conducted in the main stem of the Knife River, West Branch and Stanley Creek. The project team walked the stream to observe and map where spawning activity existed. Some very interesting and important data was obtained that will help in prioritizing future rehabilitation projects in the watershed.

Two important watershed/riparian zone observations came from the 2015 stream walks. First, while walking Stanley Creek during the spring, the extent of the damage caused by spruce budworm was brought to light. Balsam and spruce are the major riparian cover in this watershed and the existing damage is quite alarming. Further monitoring of the decimation is a necessity. Also, in one of the reaches surveyed on the main stem of the Knife River above Valley Road, a very large stand of buckthorn was discovered. Buckthorn is an invasive nonnative species in our area. Remedial action will be required at some point on this stand. Both of these situ-



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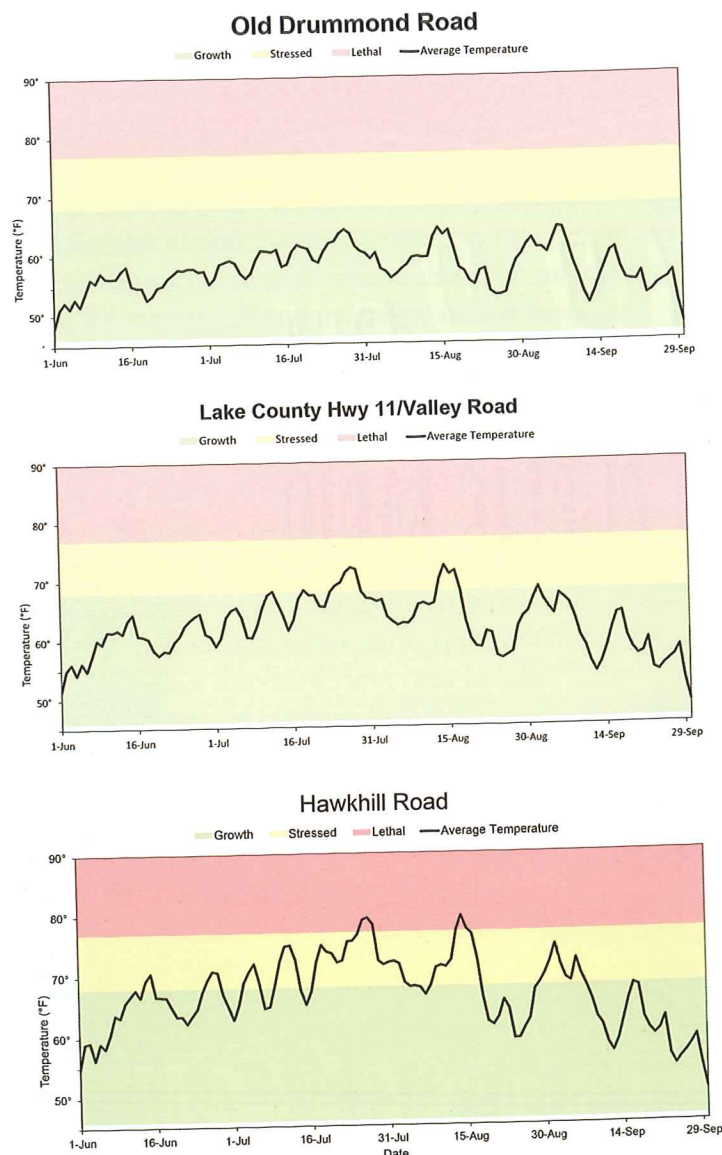
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Old Drummond Road 20 miles from Lake Superior		
Brook Trout Ranges :	Hours	%
Range below which growth occurs (45.9°F)	12	0.4
Range of growth (46-67.9°F)	2913	99.5
Range of thermal stress (68-76.9°F)	3	0.1
Lethal threshold (77°F)	0	0

Lake County Hwy 11/Valley Road 14.5 miles from Lake Superior		
Brook Trout Ranges :	Hours	%
Range below which growth occurs (45.9°F)	2	0.1
Range of growth (46-67.9°F)	2434	83.1
Range of thermal stress (68-76.9°F)	482	16.5
Lethal threshold (77°F)	10	0.3

Hawkhill Road 5.6 miles from Lake Superior		
Brook Trout Range :	Hours	%
Range below which growth occurs (45.9°F)	0	0
Range of growth (46-67.9°F)	1592	54.4
Range of thermal stress (68-76.9°F)	1066	36.4
Lethal threshold (77°F)	270	9.2

Temperature ranges represent brook trout biological sustainability.

ations will require future monitoring and possible under planting projects.

In the coming year we will add Captain Jacobson Creek, Little West Branch River and the East fork of the Knife River to the assessments.

Temperature Monitoring

The work of monitoring the water temperatures throughout the entire watershed continued in 2015. The LSSA had 27 Hobo Temp Loggers that were deployed according to MN DNR protocol in 2015. The loggers are in place no later than June 1 each year and remain in place through September 30. The data that is collected from our loggers will coincide with that data collected by the MN DNR with their loggers, making direct comparisons possible. The DNR has far fewer temp stations than the LSSA within the Knife River watershed so the temperature data that we collect annually is the most comprehensive of its kind in the watershed.

The LSSA has collected enough temperature data over the last three years that we are starting to learn where the cool sections of the watershed occur, where the water is slightly warmer but still able to accommodate trout and where very warm sections could be lethal to trout. As is the information gathered from the stream assessments, the data collected from the watershed-wide temp monitoring will aid in prioritizing future rehabilitation projects.

Please see the three graphs (left) that show 2015's water temperatures, all from the main stem of the Knife River, at three different locations. One thing you will note is that the cooler water temps occur in the upper section of the river. The water warms slowly as it moves downstream and then enters into the temp zone lethal for trout existence. One long-term goal is to move that critical temp zone farther down in the watershed, increasing the area that trout can exist in. This can be accomplished over time as our riparian zone rehabilitation efforts continue and mature, the stream channel is restored to a narrow/deeper profile and large woody debris is installed to provide shade and holding water for juvenile trout.

Riparian Habitat Rehabilitation

The update on Grant #1 mentioned the 2014 Conservation Corps Minnesota (CCM) project on the Main West Branch where they planted hundreds of deciduous trees. The planting site was assessed over the winter of 2014/15 and then again in the early spring of 2015. It was noted that the young deciduous trees planted the year be-

fore had suffered from vole and mouse damage. These rodents travel in the matted grass between the dirt layer and the top layer of snow. Damage can occur anywhere in that zone.

The LSSA contracted once again with CCM for the spring of 2015 to install 12 inch Miracle Tube Tree Protectors, along with 24-inch hardwood stakes, on all the trees that survived from the 2014 planting project. These tubes will not hinder the growth of the young trees but will indeed hinder the access to the trees by mice and voles. In addition to staking/tubing the existing trees the CCM gang replanted hundreds more deciduous trees to replace those destroyed over the winter. Species planted were silver maple, swamp white oak and river birch. An

assessment visit to the site in late fall confirmed that that the tubes were working as designed; not one tree that had been tubed was lost.

The CCM crew did a great job again for us. The young folks work hard and truly enjoy their work. This year's crew consisted of Willie Storm-crew leader, Cohasset, MN; Amanda Mauel, St. Cloud, MN; Sarah Bowman, Pewaukee, WI; Katie Petzel, Centuria, WI and Derrick Lederle, Central Square, NY.

Since our initial grant award the LSSA has planted hundreds and hundreds of trees in the riparian zone of both the Main West Branch and Stanley Creek. Species include white spruce, tamarack, silver maple, swamp white oak and river birch. We will be performing another large

planting again in 2016 with the able assistance of the Conservation Corps Minnesota young people.

Geomorphic Assessment

This segment of the update is probably the newest concept to understand, so a brief explanation on it is in order:

A geomorphic assessment is a survey to collect physical measurements on a stream channel's dimension (channel size), pattern (how many bends over length of stream channel), and profile (the change in elevation over a set channel distance). This data along with data on the size distribution of bed material (pebble counts) and qualitative measures of bank erosion and channel blockages is combined to paint a picture of how stable the channel is, what are some problems, and how they can be fixed. A geomorphic assessment is important because it

provides the data to help understand what is going on in the stream and the watershed and how solutions can be developed that work within the natural function of a stream. In other words, it provides the background on things like how large a channel should be given the watershed size and stream setting to transport sediment and maintain habitat elements like pools. What it also does is help provide the tools to design and complete a stream project that minimizes the chance that the project fails or has negative impacts on other parts of the stream, such as downstream. In the past, many stream projects completed without this type of data collection or analysis have failed over time or caused more problems than they have solved because it only addresses a local symptom and not the cause or provides a local treatment rather than a cure that benefits the entire stream system.

The above paragraph was offered by Mark Prancus, Senior Consultant/Engineering & Environmental Services Division; CARDNO-an engineering firm in Eau Claire, WI.

The LSSA has been working closely with the MN DNR in developing our strategies for future work in the watershed. The DNR has come to value the information obtained from geomorphic assessments and has requested that the entire watershed be assessed using this method. Over the fall of 2015, the LSSA walked the entire stretch of the Main Knife River from well up the Drummond Grade all the way down to Lake County Road 11 (Valley Road), including assessing McCarthy Creek. Twelve reaches were determined to warrant an assessment for possible future rehabilitation efforts.

As this magazine goes to press, the LSSA is working on a project to possibly rehabilitate at least one slumping clay bank identified by the initial assessment walk and follow up data collection. If the required permitting can be accomplished, plans drawn up, associated landowner support garnered and the RFPs returned in good order our hope is to have a construction project occur over the coming 2016 summer.

The LSSA would like to thank the LSOHC committee and staff for making this dream become reality. Great things are happening in the watershed! Stay tuned. ■



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