

# Keelhauler's Ka-news JUNE, 2015



**Next Club Meeting Tuesday June 9th**  
*at Wendy Park*  
*Near Edgewater Park on Lake Erie*

**Program: No Program**

Bring your kayak and paddle behind the breakwall to the mouth of the Cuyahoga and  
upstream as far as you have time for.  
Or just have a nice after work get-together

[Map to Wendy Park](#)

All meetings are open to guests. Invite a prospective member!

## **MESSAGE FROM THE PRESIDENT By Karl Nelson**



There are a lot of either or questions one faces in life:

Q: Ford or Chevy? Ans: Toyota

Q: Coke or Pepsi? Ans: I'd rather go thirsty than drink a Pepsi

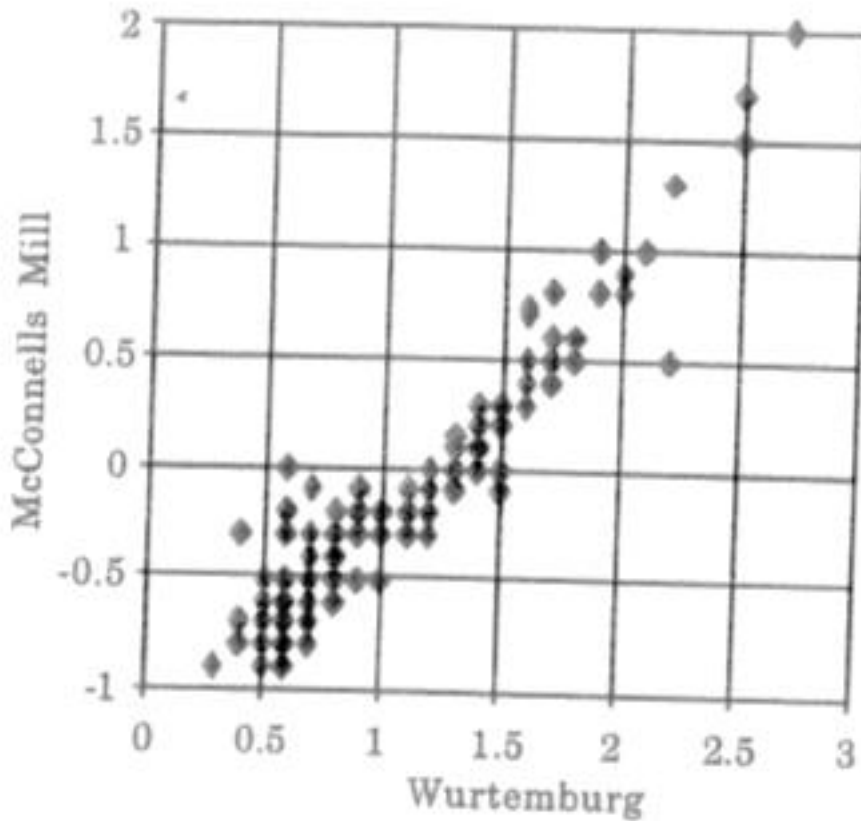
Q: OSU or Michigan? Ans: Who cares

Q: Creek boat or playboat? Ans: Open boat

Q: CFS or Feet? Ans: Depends

Actually, I didn't have to answer the CFS or Feet question until I started paddling around here. When I was much younger than I am now and was just starting paddling the Hiwassee, it was how many generators are releasing—one or two? And for the Coosa it was how many CFS—2000, 4000, 6000, 8000, 10000. It is a big wide river and you did have to watch out for bass boats coming up the rapids.

Before we had access to the USGS gauges on-line, we had to depend on someone driving over the bridge and looking at something painted on the bridge. Now we just look at the Keelhauler website for the river level and make our decision about whether to stay home or go paddling.



This figure is from the *Canoeing Guide to Western Pennsylvania and Northern West Virginia* (8<sup>th</sup> Ed, 1991). The USGS moved the gauge at Wurtemberg. That made the conversion to the height at the Mill all out of whack. Mark Russell and some of his compadres made comparisons of the flow at the Wurtemberg gauge and the height at the Mill. Mark used the relationship between CFS at Wurtemberg and the eyeballed height at the Mill to calculate a formula to predict the height at the Mill. The formula that is now on the Keelhauler website will give the height at the Mill—and 95% of the predictions should be within 2 inches of the height at the Mill. The paddling community owes them a large debt of gratitude.

**Treasurer's Report  
and Vermilion Race Report  
By Pam Poljak**

**Keelhaulers Canoe Club  
Treasurer's Report, 10-May-2015**

CDs (3)	\$6,773.90
Checking	<u>\$4515.48</u>
<b>Total</b>	<b>\$11289.38</b>

**2015 Vermilion Race Report**

<b>INCOME</b>	
Refreshment stand	95
Registration fees	517
<b>TOTAL INCOME</b>	<b>612</b>
<b>EXPENSES</b>	
Awards*	1,042
Donation	100
Insurance	128
Membership	30
Miscellaneous	57
Postage	67
Refreshments	81
<b>TOTAL EXPENSES</b>	<b>1504</b>
<b>OVERALL TOTAL</b>	<b>-892</b>
*Adjustment (purchased 3 year's supply of awards)	695
<b>ADJUSTED TOTAL</b>	<b>-197</b>

**Slippery Rock  
April 18, 2015  
By Mark Spang**

Cold weather may not always keep Keelhaulers from the Slip, but warm weather sure brings them out. Dave Chapek and I arrived at Rose Point on Friday night on April 17 with plans to take a quick peek at the river and then set up camp at the Cheeseman farm campground. We began to chat on the bridge with some trout fisherman camping at Rose Point who were looking forward to the opening day of trout fishing the next morning.

I suggested that because they were such good fisherman they would likely have their limit of five trout before our little kayak group arrived to set up shuttle at 10 a.m. They laughed and we boaters and the trout fishermen agreed we'd try to stay out of each others' way.

While we were talking, two kayakers from the Pittsburgh area arrived to put in for a quick after-work run. When they offered to give one of us a ride back to the put-in if we wanted to make a run ourselves, Dave and I scrambled into our gear with a little more than an hour before sundown.

We estimated the level on Friday night to be about 1.5 to 2 feet. With little warm up, and it being one of my first runs of the season, the Slip welcomed me back by slapping my little Wavesport EZG50 around pretty good. A couple of enders, flips and (fortunately) rolls reminded me to work at keeping my weight forward. I even got to practice an eskimo rescue. (Thanks, Dave.)

It was exhilarating prelude to what promised to be a brighter and less rushed trip down the river on Saturday morning.

As trip organizer, I had a list of about a dozen strong paddlers, so it promised to be a great day. We had a new member, Fr. Gabriel Lavery, making his first Slip trip in his Sea Eagle inflatable and we had Matt Jackson coming with his GoPro camera gear.

Meanwhile, the weather report kept getting better and better. Early in the week we were supposed to be starting out with temps in the upper 50s, then it was raised into the mid-60s and by Saturday morning we were told to expect sun and temperatures in the mid-70s!

Texts and calls to my phone continued Friday night and Saturday morning as the group grew to 20 paddlers. Granted, we had to compete with fishermen for parking – and eddy – spaces, but the sunny day seemed to have everyone in a good mood. We even cheered on one angler as he landed a rainbow trout as we watched from the beach below Eckert Bridge.

With 20 paddlers, we stretched out along the river for quite a ways and a lunch break at the Mill looked a bit like a flash mob, but we certainly added to the excitement of a warm spring day at McConnell's Mill Park.



Mark Spang's Slippery Rock Group

## New USGS to Slippery Rock Mill Gage Formula

Mark H. Russell — :{ Fiends Paddling Club}:- mill.gage@yahoo.com

New Keel-Hauler Slippery Rock Calculator

### Abstract

Whitewater boaters use a conversion formula to estimate Slippery Rock Creek McConnell's Mill gage levels using USGS Wurtzburg, PA gage data. Due to a fall of 2013 USGS gage relocation; the formula no longer estimates the Mill gage. A new formula was developed statistically using matched Mill and USGS gage data.

### Introduction

The whitewater community uses the Slippery Rock Creek (Slip) McConnell's Mill water level gage, called a staff gage, to check Slip water levels. U.S. Geological Survey (USGS) water level gage readings, USGS' terms are gage height or stage, from Wurtzburg, PA are used to estimate the Mill gage using a conversion formula. One common formula is Mill gage  $\approx$  (USGS  $\cdot$  1.4) - 1.7.

At the beginning of the 2014 whitewater season, it was apparent the formula no longer estimated Mill levels. Since there was no change to the Mill gage, this suggested a change to the USGS Wurtemberg gage. Mr. Clinton Hittle, Supervisory Hydrologist, U.S. Geological Survey, PA WSC was contacted inquiring about changes. He emailed the following, "...The streamgage was moved upstream about 50' (at the bridge) last fall due to safety issues with accessing the old streamgage. The old gage intakes were located below a rock riffle and the current orifice is located above the rock riffle in line with the downstream bridge deck ... the water surface (gage height) is going to relate differently to your upstream staff gage. In order to utilize your staff gage you will need to establish a new relationship through time ... I find that the paddling community is some of the most avid supporters of the streamgage network and we value your feedback." Subsequent phone conversations with Mr. Hittle provided additional information on the complexities of USGS stream gaging.

The purpose of this project was to develop a new conversion formula using statistical methods to provide as accurate a formula as possible. The formula is intended for the general whitewater community; and to provide American Whitewater with a new formula to replace the outdated one used to calculate the Slip virtual gage provided on their web site.

### **USGS Stream Gaging**

It is important to know several things about USGS' stream gaging to understand decisions made in developing the formula. USGS' web site provides both gage height and discharge. Discharge is USGS' term for flow, and gage height is also called stage. USGS' primary purpose is to provide the stream's flow, in cubic feet per second (cfs). Flow is more useful at describing conditions along the length of a stream than is gage height at a single location. The following is needed to calculate flow: velocity of the water, in feet per second (ft/s), and cross sectional area of the water in the stream channel, in square feet (ft<sup>2</sup>):  $\text{ft/s} \times \text{ft}^2 = \text{ft}^3/\text{s}$  or cfs. Gage height is used to determine the cross sectional area at varying levels. USGS uses this data to convert gage height to discharge using graphical analysis to develop the stage-discharge relationship called a base rating, or just rating.

See: <http://help.waterdata.usgs.gov/faq/surface-water/how-to-interpret-gage-height-and-streamflow-values>

The relocated Wurtemberg gage is in a naturally occurring pool created by the above mentioned rock riffle. USGS refers to the rock riffle creating the pool as the control. Every whitewater boater knows rock riffles, streambeds and banks can change over time due to high water events and scouring, bank erosion, fallen trees, etc. A change to the control could change gage height without actually changing flow. This would also change the mathematical relationship between gage height and discharge, resulting in inaccurate discharge results.

USGS accounts for stream changes by re-measuring the velocity and contours of the streambed and banks at the gage location about every six weeks. The information is used to adjust; USGS' term is shift, the rating, thus providing accurate discharge data. When studying historical data, identical gage heights can sometimes result in different flows. Shifts to the rating can account for this.

See: <http://waterwatch.usgs.gov/wwhelps/ratings.html>

One concern with the new gage location was the stability of the control over time. If the control proved to be unstable, the gage would have to be relocation yet again. A second relocation would compromise any formula based on data collected with the gage at the first relocation. New data would have to be collected if there were a second relocation. The control has now survived four seasons and some high water events, so is likely stable. Development of a formula

could then proceed with data from a stable gage location. This is why it has taken some time to develop a new formula.

An added benefit to the delay was 75% of USGS discharge data used was revised for accuracy, changing status from Provisional to Approved. This process takes USGS about six months. Though the revisions made little difference, the mean change was only 36 cfs. All were for less flow.

### **Methods**

Mill gage levels, with times read, were collected 26 times from 6-22-2014 through 4-26-2015. To reduce measurement error, readings were taken in a prescribed manner by three individuals. The gage was observed from a position as low and in front of the gage as practical. Observations from the walkway above and to the side of the gage are surprisingly different from those taken as described above.

The Mill gage reads from 0 to 7.5 ft with only 0.25 ft divisions. It is also located in the downstream turbulent out wash of a dam, and has no stilling well. This poor location results in water pulsating on the gage about 2 inches at low levels and 0.75 ft or more at higher levels. This makes accurate observations challenging. The suggested method for this situation is to visually estimate an average between high and low observations, or use the lowest observed level.

No attempt was made to account for the time delay between the Mill and the downstream Wurttemberg gage location. This would have required timed dye testing that seemed unnecessary for a formula meant only for an approximation.

Mill reading times were used to obtain matching discharge data from USGS' web site (see Appendix II). Online linear regression calculators were used to provide statistical information using Mill level and discharge data pairs.

See: <http://onlinestatbook.com/2/regression/intro.html>

### **Results & Statistics**

Two online calculators were used for statistical analysis, and can be found at:

[http://vassarstats.net/corr\\_stats.html](http://vassarstats.net/corr_stats.html)

<http://www.alcula.com/calculators/statistics/linear-regression/>

Statistical methods cannot provide good raw data. They can only interpret the data collected and help determine its quality. In this case, graph a scatterplot of the data, its regression line (See Appendix I), derive that line's mathematical formula, help identify bad data, called outliers, and show the strength of the correlation, or co-variance, between the two gages.

Appendix II shows the actual Mill levels read, the matching levels predicted by the new formula (Calc Mill) and the difference in inches between the two (Actual v Calc Error), these differences are also called residuals (see Appendix III). For 79% of the data, the predicted levels are an inch or less different from actual Mill levels, with a maximum error of 2.4 inches. The standard error of estimate ( $s_e$ ) = 0.0903 ft or about 1.1 inch (see Appendix III); it is the amount of the typical error between an actual Mill level and a level predicted by the new formula.

The coefficient of determination ( $r^2$ ) = 0.986 (see Appendix III); it describes the strength of the correlation between the two gages. It can only vary from 0 (no correlation) to 1 (perfect correlation). This means 98.6% of the predicted Mill level is due to the co-variance or linear

relationship between the two gages. Conversely, only 1.4% of a calculated Mill level is not due to the corresponding USGS discharge value.

Appendix II shows Mill levels are not perfectly consistent with USGS discharge values. There are several potential sources of error that include the time delay between gage locations, Provisional v Approved data, and, most likely, measurement error due to the crude Mill gage, and how observers interpreted that gage.

Because of the likelihood of measurement error, several methods were used to identify data outliers. These included high residual values, a residual plot, and multiple regression calculations with and without suspect data. For each regression calculation, increases and decreases to regression line slope,  $s_e$  and  $r^2$  were evaluated. Criteria used to identify outliers were data with residuals greater than three times the mean of all residuals, in addition to actual v calculated error values over 4 inches. Four inches is enough to affect whitewater conditions on the Slip. ID# 19 and 26 were identified as mild outliers, excluded from data used to derive the formula and are ~~marked~~ in Appendix II.

Both the old and new formulas describe a linear relationship between the USGS and Mill gages. They take the classic form:  $y = mx \pm b$ .

Where:  $y$  = the dependent variable = Mill level in ft  
 $m$  = the slope of the regression line  
 $x$  = the independent variable = USGS discharge in cfs  
 $b$  = the  $y$  axis intercept of the regression line

Because of this linear relationship, the formula should work at both lower and higher levels than those used to derive the formula.

The derived conversion formula using USGS Wurtemberg, PA discharge in cfs is **Mill gage (ft)  $\approx$  (cfs  $\cdot$  0.00247622079) - 0.7066612082**. Of course, rounding for a shorter formula will increase error. However, **Mill gage (ft)  $\approx$  (cfs  $\cdot$  0.00248) - 0.71** only increases the mean error over using the entire formula by 0.0075 inch with a maximum increase of 0.08 inch, which is negligible. The shortest acceptable formula is **Mill gage (ft)  $\approx$  (cfs  $\cdot$  0.0025) - 0.7**, increasing mean error 0.05 inch with a maximum error of 0.4 inch, which is little difference. Rounding "m" further, from 0.0025 to 0.002, giving Mill gage (ft)  $\approx$  (cfs  $\cdot$  0.002) - 0.7 is not recommended. This increases mean error by 2.1 inches with an unacceptably high maximum increase of 6.5 inches.

### Discussion

No claim is made this is an ideal formula. With higher quality raw data better estimates could be developed. It would be particularly helpful if the gage at the Mill were properly located in the pool above the dam. Experience will show if the formula is adequate for its intended purpose or should be adjusted.

Although, assuming the collected data is reasonably good, and considering a standard error of estimate of only 1.1 inch, with the linear correlation coefficient (see Appendix III) and coefficient of determination both close to their maximum value of one; this new conversion formula should be more than adequate for whitewater boaters to estimate the Mill gage.

Previous conversion formulas used USGS gage height in feet to estimate the Mill gage. There are two major benefits to using USGS discharge in cfs instead of gage height:



1<sup>st</sup> - As explained under USGS Stream Gaging above, discharge is corrected by shifts to the rating to account for changes in the stream. Therefore, a discharge-based formula provides a more accurate estimate of the Mill level.

2<sup>nd</sup> - More importantly: Providing consistent discharge data from the Wurtemberg location is USGS' primary goal. Therefore, as long as the Wurtemberg gage is not relocated radically, above or below a tributary, discharge will not change regardless of future gage relocation. Because of this, there will never again be a need to develop a new formula!

This conversion formula is available to anyone and sharing with all whitewater boaters and organizations is encouraged. It would be better to provide this entire paper, not just the formula, so the formula's development and limitations can be understood.

Distributed to: American Whitewater, Three River's Paddling Club, Keel Haulers, Ben's Creek, Erie Whitewater Paddlers, Canoe Club of Greater Harrisburg, numerous individual boaters.

—:{ ENJOY ! }:—

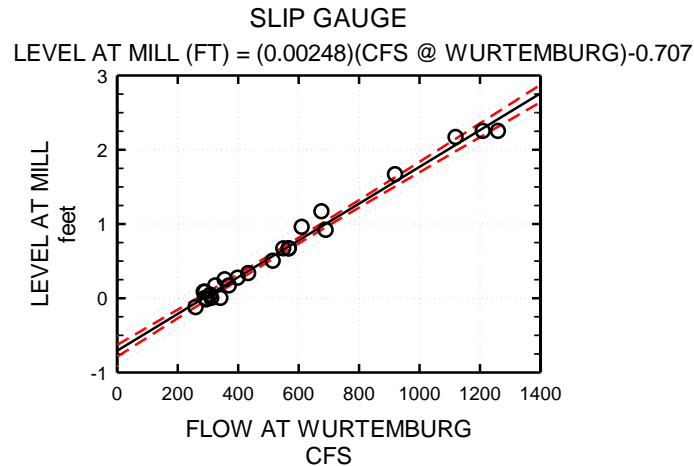
Paddle Safe

Acknowledgments

Clinton Hittle, Supervisory Hydrologist, USGS, PA WSC, 1000 Church Hill Rd, Suite 200, Pittsburgh, PA 15205      cdhittle@usgs.gov

> For editing & education on the complexities of USGS stream gaging Courtney Russell, mathematician & niece > For general & math editing, providing calculator and knowledge to use it, reminding me of math not used for decades

Bruce McClellan & Charlie Brown > For help collecting Mill readings.



The black line is the regression line, i.e., a plot fit to the data.

The red dashed lines are the 95% confidence lines, i.e., if someone were to collect 100 data sets and calculate a regression line, 95 would be within the 95% confidence lines.

The blue dotted lines are the 95% prediction interval. This means that if the flow is 700 cfs, that 95% of the time the height at the Mill will be within about 2 inches of a foot.

## Dangerous Flatwater by Matt Muir

Where I live now, there's no good whitewater really nearby. No Cuyahoga or Tinker's or anything like that. So to get my paddle jones satiated, I often hit up the local reservoir. It's got cool birds, I can get in half an hour or so before work, and it got me in shape for the Gauley Marathon last year. And sometimes it has its own unique hazards.

Recently, I went for a good 1.5-hour paddle before my weekend commitments intruded. Saw a cormorant, the first green heron of the year, and...and...

And I encountered Psycho Swan.

I got past the bridge into the little cove, where I've seen swans before. This guy came from, like,



Here he comes! (Cues *Jaws* music.)

50-100 feet away, to swim right next to me. His feathers were all fluffed out; I took all that as a sign of territorial aggression (doubtless protecting a nest). I kept paddling along, toward the next bridge.

When I hit some shallows and had to turn around, I gave him a *wide* berth. He changed direction to (sorta) cut me off at the pass. In that shallow water, he was swimming faster than I could paddle.

As I got to deeper water, I started pulling away. I heard some flapping, and the critter flew at me! He came within a foot or two of my head, and landed within a couple inches of the bow of my boat. Don't tell ME that's not an aggressive action.

I just kept paddling. What else could I do? He set up for another flying charge at me. I splashed him as hard as I could with my paddle. (I figured

that might anger him further, but I had precious few arrows up my sleeve, so to speak.) He backed off. I kept paddling. He gathered for another run at me; I splashed hard, and he backed off again. We were several hundred feet from his initial location by then, and he finally gave up the chase.

A few daze later, on one of my pre-work runs, I saw the guy with the racing shell. He saw me heading for the bridge, and he warned me of the swan. Dude's got a reputation!

Swans are beautiful, and they look all peaceful, quietly swimming and minding their own business. However, they do have a reputation for being territorial and aggressive. I'm here to testify to that. I actually read an article about a paddler in a Chicago suburb, who flipped his boat when



Psycho Swan and his mate, in a happier time.

attacked by a swan. He tried to swim to shore, but the swan kept attacking him, and he drowned. That's some scary stuff. Me? I'll keep paddling in that reservoir; but any time I'm fixin' to go past that bridge, I'm going to be on my guard.

## Paddle Skills Volunteers Needed by Mark Spang

Hi all,

I know about 30 middle school students who want to learn to paddle canoes, kayaks and SUP and I'm seeking some volunteer help. The classes are on three Mondays in June at Whiskey Island, June 15, 22 and 29. The program is [Spirit of America](#) sponsored by Bay Village Schools. It is a fun and rewarding experience to see kids, some who've never had a chance to paddle before, learn the basics. No professional teaching experience is necessary, though volunteers do need to be fingerprinted to protect the kids.

Think you can help? Right now I am in desperate need for help on the 29<sup>th</sup>, and need at least one more on the 22<sup>nd</sup>, please.

Give me a call at 440-522-0520. Mark Spang

## Swiftwater Rescue Clinic Taught by Charlie Walbridge June 27<sup>th</sup> and 28<sup>th</sup>, 2015

For the 8th year in a row Charlie Walbridge will be conducting a Swiftwater Rescue Clinic exclusively for our Club members. This Clinic has trained nearly 120 of our members and I'm sure that has made a big difference within our boating community. Registration for this year's clinic is now open and will close when full or by the end of April. There's a limit of 10 members and the cost is \$90 plus \$5 ACA insurance if you are not an ACA member. If we end up with any extra proceeds we'll donate to Friends of the Cheat as we have in past years.

### [More Information](#)

Contact Joe Marksz to sign up [joemarksz@gmail.com](mailto:joemarksz@gmail.com) ..... 216-533-0604

June	For More Trips - Check our <a href="#">Message Board</a>			
6/4,11,18,25	Thursday Rolling Practice at Nimisila Reservoir (OH) - 5:30-7:30PM but call Dennis first	20-28	<a href="#">Dennis Dukeman</a>	330-858-6270
6/6	Shenango River Paddle Fest 2015 (PA) <a href="#">Information Poster</a>		<a href="#">Hugh Clark</a>	724-342-5453
6/6,7	TRPC <a href="#">Slippery Rock Clinic Information</a> Membership in KHCC or TRPC REQUIRED	13-19	<a href="#">Joe Marksz</a>	216-533-0604
6/9	Club Meeting - <a href="#">Wendy Park on Whiskey Island</a>	SK/FW	<a href="#">Karl Nelson</a>	330-497-2483
6/13,14,27,28	(4) Stonycreek River Release (PA)	21	<a href="#">Needs organizer</a>	
6/13	(1) Cuyahoga River, Peninsula to Boston Mills (OH)	SK/FW	<a href="#">Ann Corey</a>	330-858-4841
6/13	Portage Lakes Paddle (OH)	SK/FW	<a href="#">David Johnson</a>	330-305-1565
6/19,20	Upper Yough (MD) First Saturday Release	32	<a href="#">Bill Warble</a>	412-651-0112
6/19 to 27	(4) Paddle Colorado - Arkansas Basin, Taylor, East, Roaring Fork (CO)	25-33	<a href="#">Jerry Spence</a>	614-561-3198
6/20,21	(4) Lower Yough (PA) <a href="#">Get Permit</a>	23	<a href="#">April Hollis</a>	703-915-6382
6/20	(2) Middle Yough (PA)	12	<a href="#">Needs organizer</a>	
6/26,27	Upper Yough (MD)	32	<a href="#">Michael Duvall</a>	216-513-5921
6/27,28	Mark Hanna and Carl Schneider Memorial Swiftwater Clinic (WV) <a href="#">More Information</a> Limited to 10, Register early only \$90/person		<a href="#">Joe Marksz</a>	216-533-0604

## 2015 Club Officers

President: Karl Nelson 330-497-2483  
VP: Dave Roush 440-623-9035  
Secretary: Donna Homberg 440-236-8360  
Treasurer: Pam Poljak 440-268-9194

Meeting Place: Middleburg Heights Recreation Center, 15700 Bagley Rd, on the second Tuesday of each month

Doors open at 7:00 P.M., meeting starts at 7:30 P.M.

Membership: \$20 per year. New memberships, renewals, change in address or phone, send directly to

Membership Chairman: **John Kobak, 440-871-1758**  
**1649 Allen Dr.**  
**Westlake, OH 44145**

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KHCC WEB PAGE URL: [www.keelhauler.org](http://www.keelhauler.org)

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Non- Commercial advertising is free to all members. To place an ad, send the information the way you want it to appear. Please write or call when item is sold. It will appear for 2 months unless canceled. Commercial ads may be submitted by club member's owned businesses four times each year with a maximum of four lines of copy per ad.

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**Please consider writing a trip report or article for the next newsletter! The deadline for the July issue of the newsletter is 6/23/15. Please remember that articles should be sent to Kelly Miller (Laubaugh) at [peetzaguy@aol.com](mailto:peetzaguy@aol.com).**

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**June, 2015**

