Garrity, Marty

From:	drpdrp@windstream.net
Sent:	Friday, May 01, 2020 2:08 PM
To:	BLR Rules
Subject:	Comments for the Public Health, Welfare, and Labor Meeting, May 4, 1:30
Attachments:	Health committee, Changing Rules 5 and 6.docx

To whom it may concern:

Please forward the following comments to the members of the Public Health, Welfare and Labor Committee prior to the 1:30 meeting on May 4, 2020.

Thank you.

David Peterson, 56 Ridge Drive, Greenbrier, AR 72058

Regarding rule changes to Rules 5 and 6

David Peterson, President, Ozark Society, 56 Ridge Drive, Greenbrier, AR 72058 501-679-2935, drpdrp@windstream.net

The Ozark Society supports the changes to Rules 5 and 6 which would make permanent the current moratorium on medium and large swine CAFO's in the Buffalo River watershed. This is a needed protection of our first national river.

We make three primary observations:

I. **Statistical evidence** from the Big Creek Research and Extension Team (BCRET), USGS, and the Buffalo River National Park (BRNP) shows significant increases in nutrient loads in Big Creek in the 2.5 mile stretch of Big Creek as it passes C&H hog farm, and almost continual exceedance of acceptable E. coli levels on Big Creek during the last 5 years. The evidence is strong that C&H hog farm is the major contributing factor. See below.

II. The C&H hog farm, like all CAFO's, subjects its pasture land to a very intensive nutrient load – the waste of one million lbs of hogs (the impact of 5,000+ people) on one square mile of land. About 6,900 gallons a day. But at the USGS monitoring point below the farm at Mt. Judea, this effect is diluted by stream flow from 40 other square miles in the Big Creek drainage, mostly forest with some lower intensity grazing. Still, even with this dilution, the nitrate concentration in Big Creek goes up 116% while passing the farm. When Big Creek merges with the Buffalo River itself, the excess nitrate is further diluted with 395 square miles of upstream flow. But while the intense nutrient discharges on a single one square mile CAFO might be reduced somewhat by dilution and denitrification, dilution is not a pollution solution. Several medium or large CAFO's on each tributary could overwhelm the river, like on the Illinois River. A moratorium is a primary step to protect Buffalo River water quality.

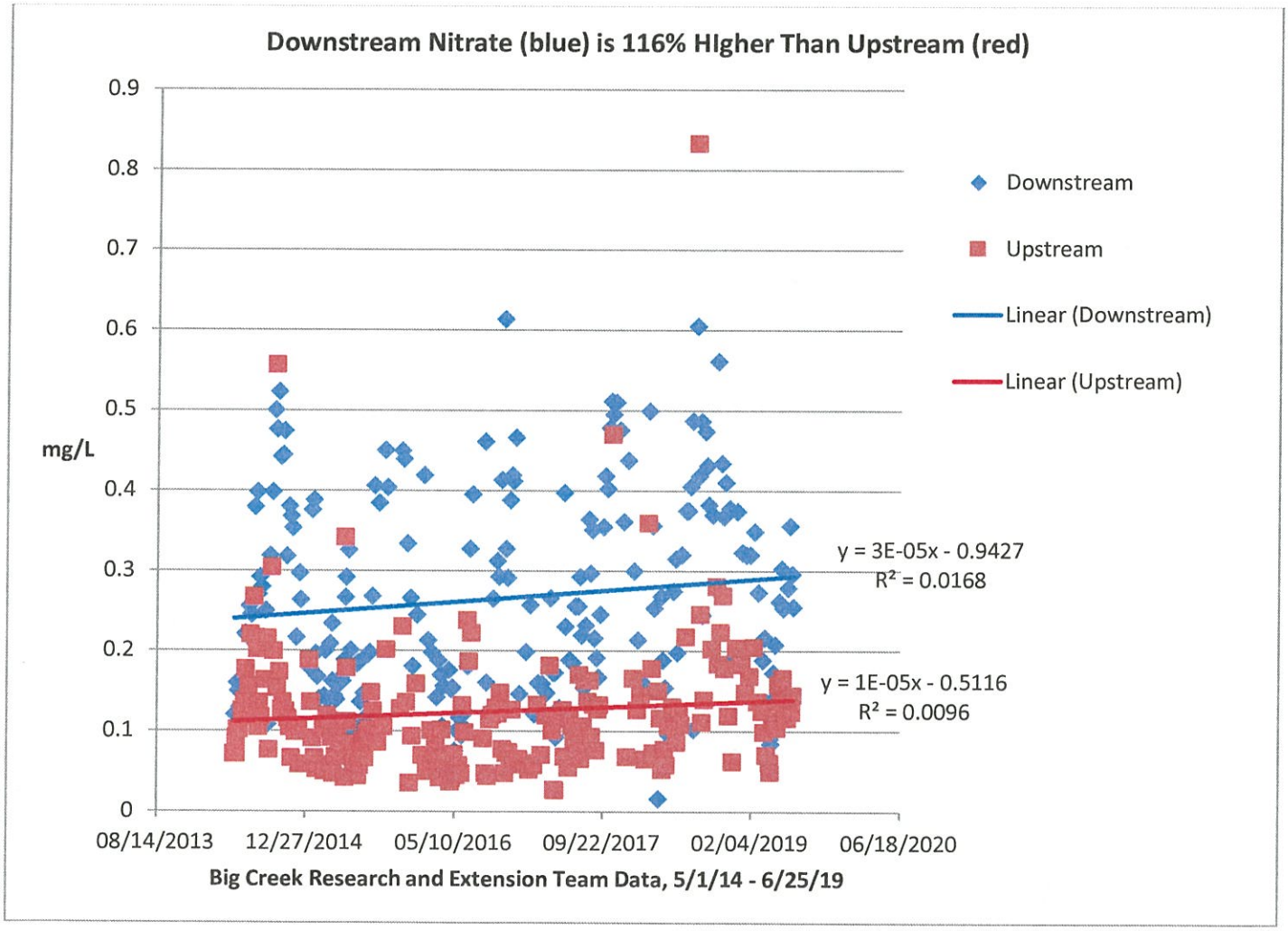
III. The Buffalo National River is a just that – national in scope. The river provides recreation and beauty for 1.3 million visitors per year, along with the many millions of dollars for a region needing hard cash.

Statistical Evidence (in brief):

Big Creek Nitrate Concentrations More Than Double in Passing C&H

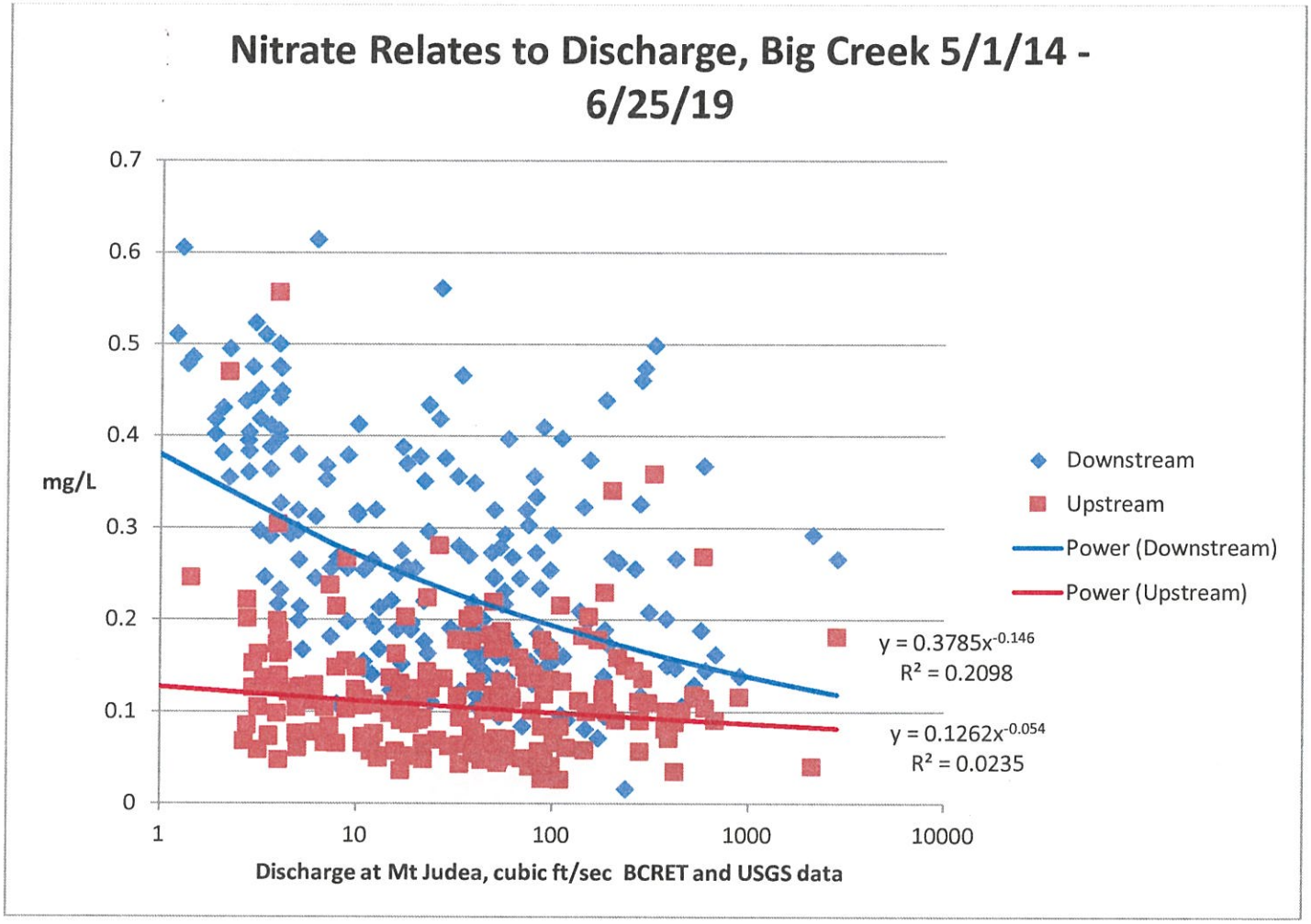
Stream eutrophication risk increases as nitrogen and phosphorus levels increase

The graph below clearly shows nitrate levels in Big Creek below the farm are significantly higher than before the creek encounters the farm (p level < 10^{-30}). Nitrate levels are not expected to show a longitudinal change if farm practices are stable because nitrate is water soluble and there is not much year-to year storage in fields. None-the-less, the regression lines suggest a rate of increase downstream (Bl) that is three times the rate upstream (Red). The high variation in concentrations (noise in the data) reflects biological activity in the stream, groundwater pollution and seasonal discharge changes in Big Creek (see next page).



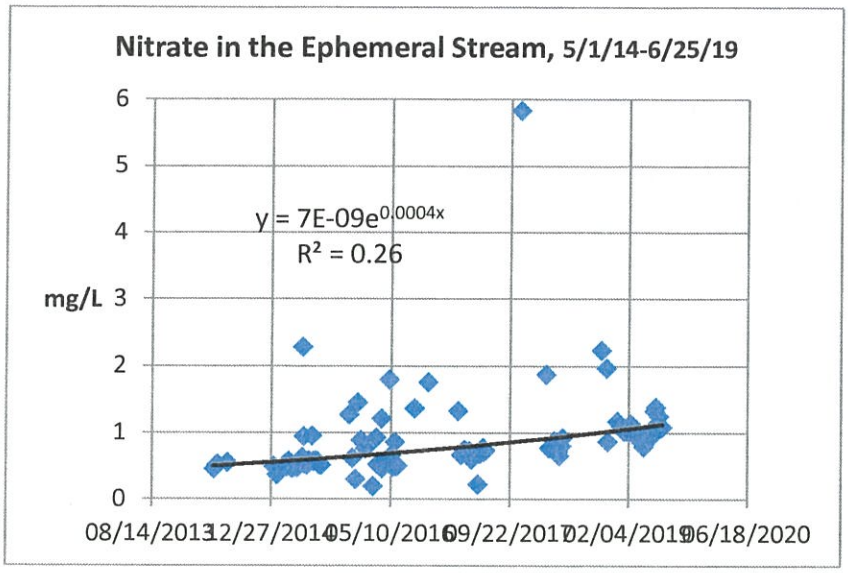
	Nitrate Concentrations		
	Mean	Median	Geomean
Above C&H	0.123 mg/L	0.110	0.105
Below C&H	0.266	0.252	0.235
% increase	116 %	129 %	*124 %*

Nitrate Response Curves to Discharge in Big Creek Reflects Groundwater Pollution Levels



As observed on the previous page, nitrate concentrations in Big Creek below C&H are much higher than above the farm (116% higher), but the above graph shows that the difference is flow (discharge) dependent. The upstream regression curve is essentially flat with little change between high flow and low flow (R^2= 0.0235). While the downstream regression curve is both higher and steeper (R^2 = 0.2098). Even so, this regression curve does not entirely capture the steep change when flow is low (< 20 cfs). The stream responses are different for a reason.

Groundwater flow predominates during low flow in Big Creek (for instance see, "Coupling High-Frequency Stream Metabolism ... Downstream Nitrate Delivery," Andrew Sharpley, et al, Environmental Sci. Technol. 2018, 52, 13798-13717). Thus, the groundwater nitrate levels adjacent to C&H are considerably higher (~ 0.4-0.5 mg/L) than above the farm (~0.12 mg/L). Possible sources of this excessive nitrate are the spread fields along Big Creek, leaky lagoons etc. at C&H, and the pervious karst. David Peterson, drpdrp@windstream.net, *(2019)*

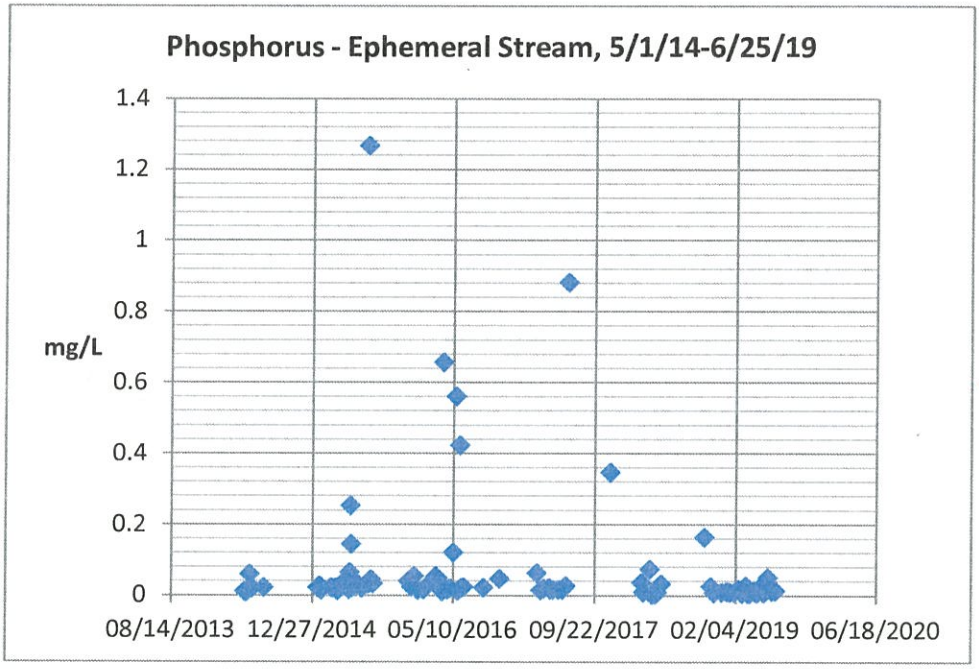


High Nitrate & Phosphorus Levels in the Ephemeral Stream

The ephemeral stream drains a steep draw directly south of C&H. It is short and flashy – dropping 409 ft in one mile and drains 0.17 square mile containing 36 acres of pasture (USGS StreamStats).

The C&H barns and lagoons sit on a ridge. In extended dry weather there is no surface flow. But the surface flow of nitrates is very high for the Buffalo River Tributaries (over 1 mg/L).

Likewise, phosphorus levels spike well above levels contributing to eutrophication (over 0.1 mg/L)



Mean Nutrient Levels in Surface Water

	Nitrate	Phosphorus
Above C&H, Big Creek	**0.12 mg/L**	**0.036**
Below C&H, Big Creek	**0.27**	**0.044**
Ephemeral Stream	**0.85**	**0.071**

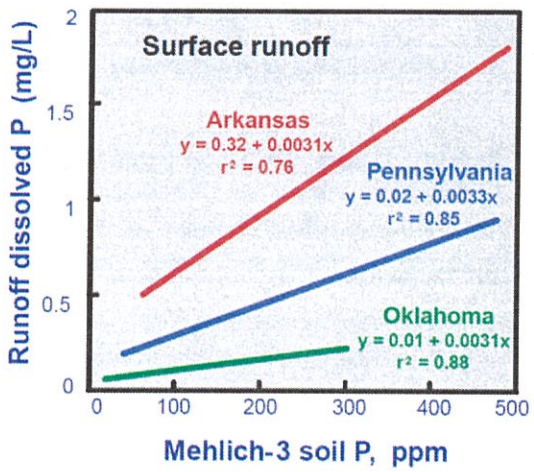
Nutrient Management Plans for C&H Hog Farm Recommended NO Phosphorus for 2015-2019, But They Applied At High Rates Anyway

Nutrient Management Plans (NMP) are required recommendations for nutrient applications for CAFO's in Arkansas. A NMP can:

- Alert the farmer that applications of phosphate fertilizer (P) are not needed and therefore would be a waste of money, which no *real* farmer wants to do.

- Prevent build-up of soil phosphate from excessive manure loading (legacy phosphate) which increases P runoff into streams (see graph below).

Field 7 at C&H is a classic example of a legacy P problem. Despite having field P levels of 330 lbs/acre which is many times agronomic needs (20-30 lbs/acre), C&H applied 258 more lbs/acre in 2018. Why? Because C&H is mainly paid to get rid of manure, not farm, and field 7 is close to their barns, the cheapest option. Other C&H fields show similar problems.

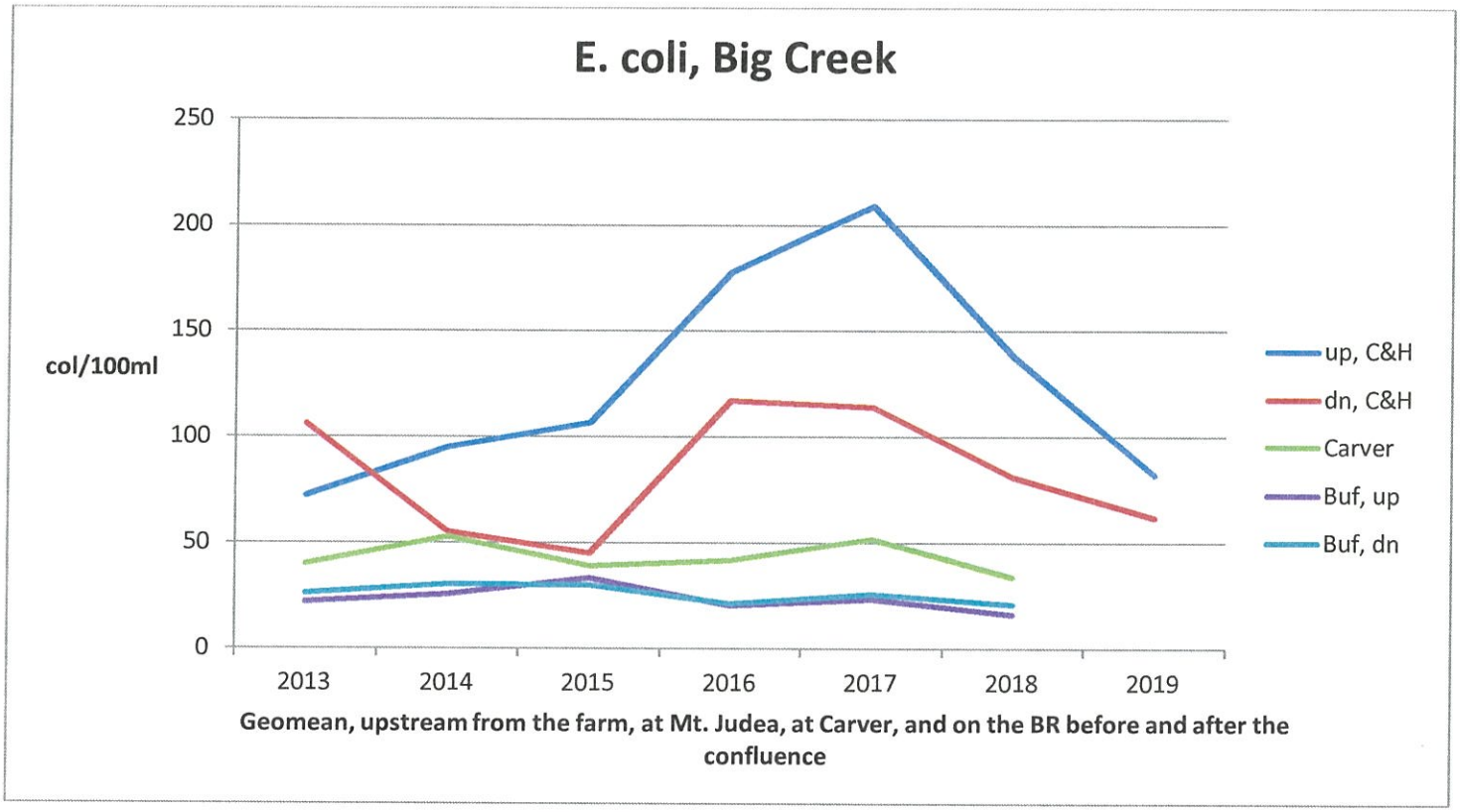


Legacy P leads to higher P runoff into streams and eutrophication.

The graph shows that as soil P levels increase (x axis), runoff of dissolved P increases (y axis). *Andrew Sharpley, et al, "The national phosphorus project..." Pub. No 273. IAHS Press, 2003 [Note: the graphical presentations as they appeared do not match the given formulas, but the gist is correct]*

"The past three decades have witnessed a dramatic increase in the role of diffuse phosphorus (P) pollution in eutrophication of surface waters... Growing evidence indicates that a major reason ... is the chronic release of P from 'legacy sources' ... which may impair future water quality, over time scales of decades, and perhaps longer." Andrew Sharpley, et al, "Water Quality... Legacy Phosphorus," Environmental Science and Technology, 2013

E. coli Problems on Big Creek



During the primary contact period (April – Sept.) streams are generally declared to be impaired for geomean levels above 104 colonies/100mg (over 5 successive readings). These yearly geomeans indicate that Big Creek has been generally impaired, especially compared to the main stem of the Buffalo River. There is an apparent significant upstream E. coli source on Big Creek which has not been studied.

All data is from BCRET, USGS, or BRNP. Analysis by David Peterson, PhD mathematician.