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**RE: 401 Certification and the Biological Opinion for Formal Section 7 Consultation; the Roanoke logperch**

Dear Director Paylor, Ms. Stanhope, Ms. Schulz, and Mr. Fernald,

### ***Opening Remarks***

As a scientist, I was encouraged by Director Paylor's words when he addressed the public at the VDEQ, Giles County Open Forum on August 10, 2017 on the 401 Certification for the Mountain Valley Pipeline project (MVP). He stated the VDEQ based their decisions/certifications upon "the law and **science**." I assume the same applies for the VDGIF and the USFWS.

### ***Background***

As an Intervenor, I submitted several letters to the MVP docket on the Threatened & Endangered Species (TES) the Roanoke logperch: #20170221-5333; #20170314-5045; #20170317-5115; #20170413-5160, #20170424-5241, #20170630-5179, and #20170712-5097. In addition, I provided verbal comments for the record at the Radford VDEQ Open Forum on August 8, 2017. I am willing to provide any documents that you request.

As you know, the Roanoke logperch was listed as an endangered species in 1989.

All of the existing populations of Roanoke logperch are threatened by road projects, water projects, catastrophic spills, and siltation from agricultural runoff. Populations in the Roanoke River drainage are further threatened by urbanization and industrial development. Recent studies of the distribution and habitat use of Roanoke logperch suggest that this species is subject to riverwide stochastic processes and has strict microhabitat requirements. The distribution of habitat types and pathways of dispersal are critical for maintenance of healthy populations.<sup>1</sup>

Dr. Paul Angermeier, a Professor at Virginia Tech who has studied the logperch for 28 years, attended the Open Forum in Radford on August 8<sup>th</sup>, and stated:

Its reliance on unembedded substrate for feeding and reproduction make the logperch vulnerable to excess fine-sediment deposition. Recovery strategies for the species emphasize reducing chemical pollution and spills, and particularly reducing sediment loading into its streams.

<sup>1</sup> USFWS 2007 Update to the Roanoke Logperch Recovery Plan; Rosenberger, Gloucester, VA

Construction and maintenance of the MVP along the preferred route outlined in the Environmental Impact Statement will pose a grave threat to RLP because of elevated risk of episodic chemical pollution (e.g., herbicides, hydrostatic test water, diesel fuel) and long-term chronic loading of fine sediment (i.e., silt and sand). The preferred route will make >100 crossings of perennial streams in the Roanoke River basin that could potentially support RLP. Each crossing will involve extensive de-vegetation, which will exacerbate current erosion rates and sediment loading into RLP habitats.<sup>2</sup>

Without question the Biological Assessments (BA) from Environmental Solutions & Innovations (ESI) and FERC have determined the project, "is likely to adversely affect"<sup>3,4</sup> the species because it "will traverse a large portion of the Roanoke River basin within the geographic distribution of the federally endangered Roanoke logperch."<sup>5</sup> While it is not uncommon for the habitat of a TES to be disturbed by construction projects with approval by the USFWS, it is an unacceptable practice if the science indicates that the proposed mitigations will not be effective.

## Science

Empirical evidence is required to prove a hypothesis; it is either supported or contradicted by the data collected through observation or experimentation. Erosion and sedimentation from upland deforestation, riparian buffer destruction, and waterbody crossings will increase sediment loads in the logperch habitat and pose a significant threat.<sup>6</sup>

FERC required the applicant (MVP/ESI) assess construction related sedimentation into waterbodies. The original *Hydrological Analysis of Sedimentation* submitted by ESI<sup>7</sup> required a subsequent revision at the request of the US Forest Service (USFS) and the USFWS.<sup>8,9</sup>

**Comments on the *Hydrological Analysis of Sedimentation*, germane to the protection of the logperch and its habitat are:**

- ESI's use of a 79% containment is largely based upon a flawed Master's Thesis entitled, *Performance Evaluation of Two Silt Fence Geosynthetic Fabrics During and After Rainfall Event*, and
- Hydrological Study Area indicates the downstream cumulative effects of construction; i.e., erosion and sedimentation, will likely threaten the logperch habitat.

## Literature Cited

ESI briefly discussed references with very high containments efficiencies, stating "that many of the studies cited within this section come from laboratory investigations (e.g., Farias et al [2006], Faucette et al. [2008], Faucette et al. [2009]).<sup>10</sup> They conceded that, "because of the uncontrollable nature of real storm and rain events on the landscape, containment studies involving field testing are difficult and have had mixed results."

Regrettably, ESI predicated much of their sediment containment efficiency of 79%, upon a Master's Thesis that they provide in Attachment I, stating:

<sup>2</sup> VDEQ Open Forum Radford, VA August 8, 2017

<sup>3</sup> Submittal #20170314-5145(32030563)

<sup>4</sup> Submittal #20170707-4008(32255229)

<sup>5</sup> Submittal #20170314-5145(32030563); p. 31-33 of 314

<sup>6</sup> Submittal #20161220-5120

<sup>7</sup> Submittal # 20170303-5014(32002950)

<sup>8</sup> Submittal #20170426-5200(32130921)

<sup>9</sup> Submittal #20170518-5149(32172302)

<sup>10</sup> Submittal #20170518-5149(32172302); p. 29 of 44

The chosen practice factor supporting 79% containment is not the best-case scenario, but rather the mean reported value, for both silt fences and compost filter socks, two predominant controls proposed to be used on the Mountain Valley ROW. The 79% containment is directly related to a study conducted by Dubinsky (2014) that predicts containment performance using a field-scale test. Field-scale tests represent a compromise between laboratory and field tests, allowing for the ability to incorporate conditions relevant to typical installations while operating in a controlled environment that allows for standardized testing procedures.<sup>11</sup>

and

A recent study involving field-scale testing conducted by Dubinsky (2014) evaluated containment at a variety of slopes and rainfall events and found that overall average projected performance efficiency ranged from 48 to 87 percent with a mean and median of 79 and 86 percent, respectively. The 79 percent from Dubinsky (2014) represents a reasonable expectation of overall performance efficiency.<sup>12,13</sup>

Even though the slopes used in the study were 10%, 25% and 33%, respectively, many slopes in the proposed MVP project are much steeper; this was not discussed by ESI. In the FERC Final Environmental Impact Statement (FEIS), Appendix K, Steep Slopes Table, there are 60 pages with slope listings in two categories, a 15-30% grade and a greater than 30% grade. There are 120 miles of steep slope as defined by MVP for the 303-mile-long project, which is 39% of the route.<sup>14</sup> There is nothing "typical" about MVP's proposed construction project and during construction there are many factors that the company cannot control. Construction on slopes greater than 30% will require enhanced and specialized engineering procedures, such as winching. Enhanced construction techniques require an increased workspace, which will result in greater clearing of vegetation for the right of way (ROW) ultimately exacerbating erosion and sedimentation. There are sections of Virginia that have steep slopes ranging from 40% to 89%, like the Eastern side of Brush Mountain down to the UNT Mill Creek (HUC 03010101005175), a waterbody that feeds into the North Fork of the Roanoke River, which is a known logperch habitat.<sup>15</sup>

Dubinsky's study indicated there were **silt fence failures**:

Due to the trend of decreasing flow-through rate with increasing embankment slope and the decreased storage volume on the higher slopes, the ponding depth behind the silt fence reached high levels during testing with both fabrics on the 33 percent slope. The high ponding depths increased the chance of silt fence failure by means of both tearing and ripping of the silt fence or by failure of the wooden stakes due to the increased hydrostatic pressure brought on by the high ponding depth. In addition, low flow-through rate of the silt fence caused it to fail by means of overtopping. Throughout the field scale testing with both fabrics, five silt fence failures and two overtopping events occurred over the span of all tests. For the woven fabric, it was observed that high slopes (33%) and high intensity (sic) (127 mm/h) caused the ponding water to overtop the silt fence during each rainfall event in less than 30 minutes.<sup>16</sup>

Additionally, flow through rates of both fabrics tested declined as the slope increased. Dubinsky found as the woven fabric was used, the pore spaces "were stretched and enlarged from Test 1 to Test 2."<sup>17</sup> Because previous studies also found the same, he postulated "the pore spaces could have been enlarged due to the stress brought on by the ponding volume on the silt fence from the previous test."<sup>18</sup>

<sup>11</sup> Submittal #2017-0518-5149(32172302); p. 29 of 44

<sup>12</sup> Submittal #20170630-5393(32242490); p. 14 of 54

<sup>13</sup> Submittal #20170518-5149(32172302); p. 29 of 44

<sup>14</sup> Submittal #20170623-4000(32228877); Appendix K

<sup>15</sup> Id., p. 55 of 60

<sup>16</sup> Submittal #20170630-5393(32242487); p. 96 of 225

<sup>17</sup> Id., p. 82 of 225

<sup>18</sup> Id.



Dubinsky also found that silt fence performance efficiencies changed with embankment slope. "The increasing trend was due to the increase in the rate of erosion caused by increasing degree of slope; as the degree of slope increased, erosion rate increased, and more particles were available to runoff through the silt fence."<sup>19</sup> Not surprisingly, both the turbidity and sediment concentrations were significantly higher on the 33% slope. **This is of great concern for the logperch, because its habitat lies below many steep slopes on Poor Mountain and Bent Mountain in Roanoke County.**

As with any Master's research project, the student typically discovers errors; in the section entitled, '*Limitations of Field Scale Testing*', Mr. Dubinsky stated:

- For the most part, as will be discussed in Chapter 4, the field scale testing method was not repeatable between tests.<sup>20</sup>
- Changes in the initial field density and moisture content affected both the erosion rate of the soil and percolation of water through the soil. It was not possible to obtain the same exact initial conditions from test to test.<sup>21</sup>
- It was assumed turbidity and sediment concentration of the sample represented the average concentration of suspended sediment of the entire ponding volume. However, due to human error in taking sample by hand and the unknown vertical concentration gradient of suspended solids within the pond, this sample may not have adequately represented the concentration within the ponding volume.<sup>22</sup>
- The accuracy of the turbidity measurement decreases as the dilution factor is increased.<sup>23</sup>
- The overtopping events or fence failures, such as stake breaking and fabric pullout of the fence from the staples, caused the test to be cancelled during the rain event, and no post rainfall samples were collected.<sup>24</sup>
- These results show that it is difficult to obtain the constant initial conditions sought after for each test and that the erosion rate and the downstream discharge concentrations varied from test to test; and were thus, not very repeatable.<sup>25</sup>
- No post rainfall samples were taken for the woven fabric for test on a 33 percent slope and 127 millimeter per hour (5 inches per hour) rainfall event due to overtopping of the silt fence during all testing. For the non-woven fabric, a stake breaking in half on a 33 percent slope and a 76 millimeter per hour (3 inches per hour) rainfall also caused no after rain event samples taken.<sup>26</sup>

The overall performance efficiency of Dubinsky's study was only a calculated projection, not a tested and proven hypothesis.

Field-scale testing procedure allowed for only 1-hour sampling time. The projected hydraulic detention time of the ponding volume was as high as 15 hours. Much of the turbidity and SCC [sic] removal will occur during the long hydraulic detention time after rainfall has ended due to settling and increased filtration. The focus of this section is to **calculate an overall projected performance efficiency of silt fence** which takes into the removal which occurs during the entire hydraulic detention time of the system.

Two assumptions are needed in order to calculate the projected performance efficiency.

1. The entire ponding volume upstream of the silt fence would have discharge through the silt fence. This assumption negates water losses through infiltration of the soil and evaporation.

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<sup>19</sup> Submittal #20170630-5393(32242487); p. 77 of 225

<sup>20</sup> Id., p. 65 of 225

<sup>21</sup> Id.

<sup>22</sup> Id.

<sup>23</sup> Id.

<sup>24</sup> Id., p. 67 of 225

<sup>25</sup> Id., p. 68 of 225

<sup>26</sup> Id., p. 67 of 225

2. The concentration of the last downstream measurement taken during sampling would have continued to discharge through the silt fence.<sup>27</sup>

As a scientist, I contend that the projected data is an insufficient basis for a project of this magnitude. Considering the potential hazardous conditions and significant habitat destruction, the VDEQ, VDGIF and the USFWS should only accept empirical and proven data. The *Volume Weighted Turbidity and SSC Efficiency* is the percentage that should be utilized, even though "flow would have continued to discharge through the silt fence for upwards of 14 additional hours, and would have led to an increased overall efficiency."<sup>28</sup> **If data had been collected during the entire discharge period of the silt fences performance efficiency, it would have provided the empirical data necessary for a legitimate conclusion. This is a serious experimental design error.**

The experimental flaws of sampling frequency, admitted errors as outlined above, and the test failures in the 33% slope category indicate that the **projected mean of 79% sediment containment efficiency should not be utilized** by ESI/MVP, nor accepted by the VDEQ, the VDGIF, or the USFWS.

EIS's *Predicted Performance Efficiencies*, which includes all of the Erosion & Sedimentation Control Plan's that the applicant has submitted, belies direct observations of a recent natural gas pipeline installation in this area. In 2014, the Celanese Plant installed a 12-inch natural gas pipeline over Peter's Mountain in Giles County, VA, very close to where the proposed MVP is to be routed. After preparing an Environmental Assessment, the USFS determined there was 'No Significant Impact'. The VDEQ required the company follow the *Virginia Erosion Control Handbook*, and construction proceeded. They utilized silt fences, straw bales, water bars, ditching, diversion dikes, sediment traps, basins, and barriers, trench breakers, stormwater conveyance, riprap, groundcovers: topsoil, seeding, sodding, mulching, blankets and matting. These erosion control measures failed because the slope was untenable. The erosion and resulting sedimentation have proved problematic for both Giles County, VA and Monroe County, WV. See the Figure below.



<sup>27</sup> Id., p. 121 of 225

<sup>28</sup> Submittal #20170630-5393(32242487); p. 115 of 225

One additional reference that ESI provided in Attachment II was the USFWS sedimentation study of the Jewell Ridge Pipeline in Tazewell, Virginia. This study, properly designed and implemented, focused specifically on erosion and sedimentation and how it could affect the waterbody of several TES's. **However, there were significant differences between these two projects.** The Jewell Ridge Pipeline was a **20-inch diameter pipe**, the waterbody was crossed by **direct bore (HDD)**, and they had a **100' right of way (ROW)** with streambank buffers of 50' and 35' respectively. Contrastingly, the MVP project is a **42-inch diameter pipe**, waterbody crossings with the exception of the Pigg River will be **open-cut dry-ditch**, and the ROW is **125'** (the riparian buffer information on spreads 9 and 10 are unavailable for review). Both projects are in *similar terrain, with steep slopes that are predominantly forested*. The conclusions from the study indicate that the perturbation of the waterbody crossing did not affect water quality (via sedimentation) and **"upland runoff from the construction right-of-way was the primary source of turbidity detected in Indian Creek,"**<sup>29</sup> and I concur. However, if a waterbody is bored under its watercourse it will not affect the waterbody channel itself, unless there is inadvertent return of drilling mud (e.g. the 2-million-gallon spill on the Rover Pipeline in Richland County, Ohio, in April 2017).

### **Hydrological Study Area**

'Erosion and Soil Loss' will affect the logperch habitat. In the *Revised Hydrological Analysis of Sedimentation*, ESI examined the Dry Run–North Fork Roanoke River Subwatershed. This subwatershed, downstream of the JNF crossing of Brush Mountain, will have significant upland deforestation that will impact waterbodies below. The proposed project crosses several "headwaters," that drain to the logperch habitat in the Roanoke River basin. One first order stream is the UNT to Mill Creek (HUC 03010101005175) in Montgomery County. ESI notes, "increases in **excess of 75 percent** are also expected in unnamed tributaries to Mill Creek..."<sup>30</sup>

ESI noted:

This subwatershed is a headwater system of the Upper Roanoke that drains to the North Fork Roanoke River and contains Wright Branch, Smith Run, Slate Lick Run, Sites Branch, Pepper Run, Mill Creek, Indian Run, Gallion Branch, and Dry Run. Land cover is dominated by forest, which comprises 68.5 percent. Seven percent of land cover is developed and 23 percent is agricultural. The Project proposes to cross 138 acres (0.42%) of the subwatershed during construction, of which less than 1 acre occurs in the JNF.<sup>31</sup>

This area will receive "substantial increases in cumulative sediment loads (i.e., > 10%)"<sup>32</sup> Exceeding the EPA (2006) criteria of 10% above background is likely to harm the logperch habitat. ESI recognizes:

- 1) the amount of sediment inputs to streams exhibits substantial natural variation, 2) sedimentation regimes may differ in portions of the same stream based on highly localized factors such as riparian land cover, 3) sediments from different geological sources may have different physical properties and biological effects, 4) even closely related aquatic taxa may respond in markedly different ways to similar levels of sediment, and 5) different life stages of a single species may respond in markedly different ways to similar levels of sediment.<sup>33</sup>

Sedimentation is likely to be a repeated stressor to the logperch habitat according to ESI's expected soil yields for 5 years.

Although soil loss is moderate under baseline conditions, it is not expected that all sediment will reach streams immediately downgradient, but rather only a portion of the sediment produced will be transported to the stream (i.e., sediment delivery). Furthermore, this soil loss is out of context

<sup>29</sup> Submittal #20170630-5393(32242487); p. 178 of 225

<sup>30</sup> Submittal #20170630-5393(32242490); p. 26 of 54

<sup>31</sup> Id., p. 9 of 54

<sup>32</sup> Id., p. 7 of 54

<sup>33</sup> Id., p. 22 of 54



of other land uses within the catchment. When put into this context, sediment yields also vary substantially over the study area. **Expected soil yields (calculated at the study area outlet) are greatest within the Upper Roanoke portion of the study area (85 tons/mi<sup>2</sup> yr<sup>-1</sup>)...**<sup>34</sup>

The upper Roanoke catchment is an established habitat of the logperch, and "51 square miles"<sup>35</sup> drain to the Roanoke River. Of particular concern for the logperch, is the "sediment yield for several smaller order streams (n=8) continue to be in **excess of 50 percent over baseline** after the landscape has transitioned into a steady equilibrium (i.e., **year 5**; Table 4)."<sup>36</sup> Even though Mill Creek in Montgomery County is not a known habitat of the logperch, it is a significant tributary to the North Fork of the Roanoke River, and it has been identified as a segment that will have "potential areas for sediment deposition (Table7)."<sup>37</sup>

ESI's *Action Area* mapping in their Biological Assessment, Appendix B<sup>38</sup> is worthy of review, specifically **pages 26 through 34, which delineate waterbody crossings that will involve the logperch habitat.** It is important to note that Indian Run (MP 237.2) and both Bottom and Mill Creek in Roanoke County (not to be confused with the Mill Creek in Montgomery County) drain into the South Fork of the Roanoke River, which is a known habitat for the logperch. Sedimentation in these waterbodies does not appear in the narrative discussion on the logperch, and it should. I concede the distance to the Roanoke River from these waterbodies is not within the *action area criteria of 0.6miles*,<sup>39</sup> however, the USFWS Recovery Program indicated:

The upper Roanoke River population of logperch is continuously distributed throughout the North Fork, **South Fork** and mainstem Roanoke River... A detailed report of logperch distribution in the North Fork Roanoke River indicates that logperch can extend 35.6km upstream of the confluence of the North and South Forks with the mainstem River (Ferguson et al. 1994).<sup>40</sup>

Therefore, if logperch have been found **22 miles upstream in the South Fork**, from its confluence with the Roanoke River, they would be well within the 'Action Area' that would incur sedimentation from upland deforestation activities. Dr. Steven Powers, a Professor at Roanoke College, who studies the ecology of stream fishes in the southeastern US, submitted a comment on the logperch following the Draft Environmental Impact Statement (DEIS). He expressed concern about the South Fork of the Roanoke River:

It should also be noted that the previous analysis does not include increases from the South Fork Roanoke River and its tributaries. As the currently proposed route for the pipeline crosses South Fork Roanoke tributaries more times than tributaries to the North Fork Roanoke River, it is a reasonable assumption that a comparable increase in sediment load will also occur in the South Fork Roanoke above its confluence with the North Fork Roanoke where the Roanoke River proper begins.<sup>41</sup>

The Blackwater River, which was crossed numerous times in an earlier routing (2015), was modified to decrease crossings, but the routing now parallels many UNT's to the North Fork of the Blackwater River (Mile Posts [MP] 250 to 255). Teels Creek is both crossed and paralleled (MP 258 through 264). Paralleling a waterbody increases opportunities for sedimentation to negatively impact the waterbody below. Both the North Fork of the Blackwater River and Teels Creek are known logperch habitat.

<sup>34</sup> Submittal #20170630-5393(32242490); p 26 of 54

<sup>35</sup> Id., p 23 of 54

<sup>36</sup> Id., p. 26 of 54

<sup>37</sup> Id., p. 29 of 54

<sup>38</sup> Submittal #20170314-5145(32030564)

<sup>39</sup> Id., p. 98 of 314

<sup>40</sup> USFWS 2007 Update to the Roanoke Logperch Recovery Plan; Rosenberger, Gloucester, VA

<sup>41</sup> Submittal # 20161220-5120(31850793)

## Summary Remarks

Construction spread's 9 and 10, which include the logperch habitats of Montgomery and Roanoke Counties, will not be available for review until September 8<sup>th</sup>; however, all public comments for the 401 certifications must be submitted by August 22<sup>nd</sup>. Is this appropriate?

Both ESI and FERC conclude that the TES, the Roanoke logperch **"is likely to be adversely affected;"** the applicants purchase of mitigation credits to provide improvements to riparian buffers is small compensation for the possible extirpation of this species. ESI's use of a flawed research study with unproven, predicted erosion and sedimentation efficiencies could prove catastrophic for the Roanoke logperch.

This TES habitat within the city of Roanoke makes it very vulnerable, as evidenced by a recent chemical spill in Tinker Creek that occurred on July 29, 2017. The Roanoke Times, noted that this was the "Roanoke regions worst fish kill in recent years."<sup>42</sup> Larry Willis of the DEQ reported "40,198 fish were killed along an eight mile stretch."<sup>43</sup> Even though Tinker Creek is not a known habitat of the logperch, it does flow into the Roanoke River. This darter is already "threatened by road projects, water projects, catastrophic spills, and siltation from agricultural runoff."<sup>44</sup> Now, we must add to the list the pollutants and choking sedimentation from upland deforestation by the construction of a large natural gas pipeline.

I respectfully request that the VDEQ, the VDGIF, and the USFWS base their decision upon the implementation of the **scientific method** and the utilization of accurate data in order to save this species from extinction.

Respectfully Submitted,

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<sup>42</sup> Roanoke Times 29, 2017

<sup>43</sup> Id.

<sup>44</sup> USFWS 2007 Update to the Roanoke Logperch Recovery Plan; Rosenberger, Gloucester, VA



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