Saluda River in Greenville, Pickens, and Anderson Counties

The following information demonstrates that a 14-mile section of the Saluda River downstream of the Saluda Lake Dam, including parts of Greenville, Pickens, and Anderson Counties, is impaired due to hydrologic alteration. We request that the Department of Health and Environmental Control (DHEC), and Region 4 of the Environmental Protection Agency designate this section of the Saluda River as a hydrologically impaired waterbody under Category 4C of South Carolina’s 2018 Integrated Reporting Document.

About the Saluda River

The waterbody proposed for listing is a 14-mile section of the Saluda River below Saluda Lake in Greenville, Pickens, and Anderson Counties (Figure 1). It extends from the Saluda Lake Dam at Saluda Dam Road to the headwaters of the Piedmont Dam impoundment. The Saluda River in the proposed reach is classified freshwater. Designated uses include contact recreation, aquatic life, and industrial uses. It is a popular section for fishing, boating, tubing, and swimming.

A variety of water quality impairments exist for the Saluda and tributaries within this reach. A SCDNR research fisheries biologist indicated that collections from a recent fish sampling at the Dolly Cooper Park within this reach appeared diminished in terms of fish diversity and assemblage structure (personal communication), suggesting that the aquatic life use may be compromised. Quantitative analysis of this fish sampling is pending. (We will to follow up and forward information that may be applicable.)

Priority fish species known to occur in the reach are given in Table 1.
Table 1. Fish species of Conservation Priority known to occur in the Saluda River from Saluda Lake Dam downstream to Piedmont (source: SCDNR).

<table>
<thead>
<tr>
<th>Species</th>
<th>Common Name</th>
<th>Conservation Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Moxostoma collapsum</em></td>
<td>Notchlip Redhorse</td>
<td>Moderate</td>
</tr>
<tr>
<td><em>Moxostoma pappillosum</em></td>
<td>V-lip Redhorse</td>
<td>Moderate</td>
</tr>
<tr>
<td><em>Micropterus sp. cf. cataractae</em></td>
<td>“Bartram's” Bass</td>
<td>Highest</td>
</tr>
<tr>
<td><em>Clinostomus funduloides</em></td>
<td>Rosyside Dace</td>
<td>Moderate</td>
</tr>
<tr>
<td><em>Cyprinella chloristia</em></td>
<td>Greenfin Shiner</td>
<td>Moderate</td>
</tr>
<tr>
<td><em>Cyprinella labrosa</em></td>
<td>Thicklip Chub</td>
<td>Moderate</td>
</tr>
<tr>
<td><em>Cyprinella pyrrhomenas</em></td>
<td>Fieryblack Shiner</td>
<td>Moderate</td>
</tr>
<tr>
<td><em>Cyprinella zanema</em></td>
<td>Santee Chub</td>
<td>High</td>
</tr>
<tr>
<td><em>Hybopsis hypsinotus</em></td>
<td>Highback Chub</td>
<td>Moderate</td>
</tr>
<tr>
<td><em>Hybopsis rubrifrons</em></td>
<td>Rosyface Chub</td>
<td>Moderate</td>
</tr>
<tr>
<td><em>Notropis scepticus</em></td>
<td>Sandbar Shiner</td>
<td>Moderate</td>
</tr>
<tr>
<td><em>Ameiurus brunneus</em></td>
<td>Snail Bullhead</td>
<td>Moderate</td>
</tr>
<tr>
<td><em>Ameiurus catus</em></td>
<td>White Catfish</td>
<td>Moderate</td>
</tr>
<tr>
<td><em>Ameiurus platycephalus</em></td>
<td>Flat Bullhead</td>
<td>Moderate</td>
</tr>
<tr>
<td><em>Etheostoma thalassinum</em></td>
<td>Seagreen Darter</td>
<td>High</td>
</tr>
<tr>
<td><em>Percina crassa</em></td>
<td>Piedmont Darter</td>
<td>High</td>
</tr>
</tbody>
</table>

Additional information on these species and the criteria for Priority status can be found in the State Wildlife Action Plan: [http://dnr.sc.gov/swap/index.html](http://dnr.sc.gov/swap/index.html).

The Saluda Lake dam is used for hydropower (modified peak), but is not regulated by the Federal Energy Regulatory Commission (FERC). The lake provides source water for the greater Easley area. Headwaters in the South Saluda and North Saluda Rivers provide source water for the greater Greenville area (a combined withdrawal capacity of 93 MGD), much of which is “lost” through interbasin transfer to the Reedy River and the Enoree River watersheds through wastewater discharges. Other surface water withdrawals upstream of the proposed reach include those for golf course and agricultural irrigation. Domestic and industrial wastewater discharges exist upstream and within the reach proposed for hydrologic impairment. There are other upstream reaches not included in this petition that have historically had episodic flow impairment issues that could be candidates for future consideration for listing as hydrologically impaired.

### About the impairment

Recreational uses are impaired in the proposed reach of the Saluda River primarily due to hydrologic alteration caused by the hydropower operation. This results in the lack of flow
downstream for certain periods, which is increasing with severity and frequency, and which restricts the use by boaters, anglers, tubers, and swimmers. Aquatic life use may also be impaired due to this hydrologic alteration.

Evidence

A. Data and Information

USGS gaging station 02162500 (Saluda River near Greenville) is situated approximately 1.6 miles downstream of the Saluda Lake dam within the subject reach. The period of record for this station is from 1942 to 2017, with a data gap from 1978 to 1990. The average daily flow for the entire period of record is 605 cfs. Hydrographs of historic mean daily flows show that the frequency and severity of low flows has increased in recent decades (Figure 2), particularly in more recent years (Figure 3).

Recreation Uses

The South Carolina surface water withdrawal law established a minimum instream flow criterion to meet designated uses for recreation and navigation at 20% of the mean annual daily flow. We used this criterion and the resulting flow of 121 cfs was used for analysis based on USGS gage 2162500. The percentage of days the average daily flow falls below the 20% criterion is given for recent years in Table 2. The low flow frequency increased significantly in 2016.

<table>
<thead>
<tr>
<th>Year</th>
<th>Min Avg Daily Flow (cfs)</th>
<th>Max Avg Daily Flow (cfs)</th>
<th>No. Days &lt; 121 cfs</th>
<th>Percent Days &lt; 121 cfs</th>
<th>No. Days &lt; 212 cfs</th>
<th>Percent Days &lt; 212 cfs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>42</td>
<td>3,330</td>
<td>42</td>
<td>12%</td>
<td>117</td>
<td>32%</td>
</tr>
<tr>
<td>2012</td>
<td>98</td>
<td>2,290</td>
<td>2</td>
<td>1%</td>
<td>23</td>
<td>6%</td>
</tr>
<tr>
<td>2013</td>
<td>279</td>
<td>3,930</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>2014</td>
<td>219</td>
<td>2,960</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>2015</td>
<td>38</td>
<td>4,130</td>
<td>9</td>
<td>2%</td>
<td>62</td>
<td>17%</td>
</tr>
<tr>
<td>2016</td>
<td>51</td>
<td>2,190</td>
<td>77</td>
<td>21%</td>
<td>162</td>
<td>44%</td>
</tr>
</tbody>
</table>

A site specific study conducted in the Saluda River just downstream of the reach we have proposed for listing suggests that flows higher than 20% may be needed to meet navigation for boating and fishing recreation uses. A 1988 Water Resources study assessed navigation flow needs for reaches of the Saluda River directly downstream of the subject reach (South Carolina Water Resources Commission, 1988). The assessment shows that for the immediate downstream

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1 Hydrologic studies from the Saluda-Reedy Watershed Consortium (SRWC) included analysis of historic precipitation data from nearby rain gages and did not identify a trend in precipitation from 1942 to 2005 (North Wind, 2007).
reaches Saluda 4(a) and Saluda 4(b), flows of 300 and 340 cfs were needed for navigation, and
that these flows represented 38 and 35%, respectively, of the mean annual flow calculated at that
time (Attachment A, Tables 5 and 8). If 35% of the mean annual flow for the current period of
record (212 cfs) is used as a minimum threshold for navigation to support boating and fishing
recreation, then the number and percentage of days with insufficient flow for navigation for
recreational use increases significantly, up to 44% for 2016. (Table 2)

In addition to the increase in frequency of low flows, the degree of fluctuation and severity of
low flows has also increased in the subject reach in more recent years. As an example, in 2015
flows at USGS 02162500 dipped from 250 to 32 cfs on July 1 and 2 (Figure 4), not returning to
previous levels until July 3. Similar trends were observed in 2016 and 2017 (Figure 5). In early
February 2017, flows dropped precipitously and repeatedly from approximately 240 cfs to 17 cfs
(Figure 6). Alteration of flows in June of this year resulted in repeated oscillations between 1300
and 60 cfs (Figure 7, Photos 1-3), which threatened the Saluda River Rally (see testimony below)
and affected the ability for SCDNR to conduct fish surveys (personal communication, SCDNR).

Other examples of significant oscillations in flows for which recreational and aquatic life uses
are impaired are:

- May 20 2014 – 910 to 60 cfs
- May 21 2014 – 918 to 55 cfs
- Sep 3 2014 – 868 to 41 cfs
- Oct 28 2015 – 961 to 40 cfs

Attachment B includes documentation of correspondence from the South Carolina Water
Resources Commission (SCWRC) during the FERC relicensing of Saluda Lake Dam in the early
1990s. This documentation included repeated and “extreme” concern for potential impacts of
hydropower operations at Saluda Lake Dam on recreational navigation. Insufficient data and
information were presented to demonstrate that the proposed hydropower operations (modified
peak) would protect navigability below the project; therefore, SCWRC recommended that the
project be operated as a run-of-river facility. However, in the 1990’s, FERC determined that the
Lake Saluda Dam hydropower project was not under their jurisdiction and relinquished its
authority. As a result, the dam continues to be operated as a peaking facility and not run-of river
as recommended by the SCWRC. (Note: A 1995 state government reorganization dissolved
SCWRC and partitioned its responsibilities between DHEC and SCDNR.)

There is additional evidence that the extreme flow fluctuations resulting from hydropower
operations at Saluda Lake have affected and are continuing to affect recreational navigation in
the downstream reach is given below.

The Saluda River Yacht Club operates a tubing business on the Saluda River near the USGS
gaging station 02162500. Customers are shuttled upstream to the Saluda Dam Road and tube
downstream to the outfitter’s location at Highway 124. Some days they cannot operate their business due to the lack of water released from the dam (personal communication with staff at the Saluda River Yacht Club, August 2017). The days in which this happens are not predictable as there is no regular schedule of flow releases from the dam. Furthermore, the number of days during the spring and summer during which they cannot operate their business have increased in recent years. When asked how they are able to operate the tubing business with severe flow fluctuation and uncertainty of water levels, staff indicated that they can only issue low water warnings when it appears that water levels may be too low for tubing. At times customers have been stranded on the water and had to walk down the river to finish their trip. Furthermore, staff indicated that when the river levels drop precipitously due to lack of flow release from the dam, freshwater mussels and other sessile aquatic life become stranded and die. One staff person stated that during these low release periods he walks the riverbed behind the business and tries to save mussels that become stranded by relocating them to wetted areas.

Recent experience by a paddler following this year’s 8th annual Saluda River Rally provides additional compelling evidence that flow alterations due to hydropower operations are adversely affecting recreational navigation. The Saluda River Rally is an annual paddling event on the Saluda River downstream of Saluda Lake Dam sponsored by Anderson County. While there was sufficient flow for this year’s Rally (on June 3) thanks to coordination with the hydropower operator, there was not the next day when peaking operations resumed (see attached letter from Anderson County). The flow in the river that day at USGS 2162500 fluctuated between 328 and 130 cfs. Similar flow alteration occurred during the 2012-2016 period under review.

**Aquatic Life Use**

In addition to the testimony about stranded freshwater mussels and other sessile aquatic life, scientific literature is flush with studies that demonstrate impairment of aquatic life results from flow alteration of the magnitude occurring downstream of the Saluda Lake Dam (e.g. EPA Report 822-R-16-007). Richter et al. (2011) analyzed numerous ecological flow studies and summarized their findings under three flow alteration categories: (1) a high level of ecological protection would result if daily flows are altered less than 10% from natural flows, (2) a moderate level of protection would result if daily flows are altered from 11% to 20% and (3) alterations greater than 20% would likely lead to moderate to major changes in natural structure and ecosystem functions. It is obvious that flow alterations that occurred downstream of the Lake Saluda Dam during the 2012-2016 period under review fall far below the 20% daily alteration threshold that would likely lead to moderate to major changes in natural structure and ecosystem functions.
B. Photographs

Photo 1. Saluda Lake dam, June 9, 2017, 6:17 PM. Flow downstream at USGS 02162500 was 75 cfs at this time (down from 1,300 cfs earlier the same day), and dropped further in subsequent hours to 62 cfs, similar to the low flows documented in 2014 and 2015 that impair recreational and aquatic use.
Photo 2. Saluda River looking downstream from Saluda Dam Road, June 9, 2017, 6:18 PM. Under these extreme low water conditions caused by hydropower operations, the DNR was not able to conduct sampling using a boat.
Photo 3. Saluda River directly below at Saluda Dam Road, June 9, 2017, 6:19 PM. This photo shows that a substantial portion of the river channel was not wetted as a result of hydrologic alteration caused by hydropower operations.
C. Testimony

"The fluctuating river levels have greatly affected our business. When the river is low we are no longer able to operate as a tubing company. Beyond this, along the back of our property Saluda River Yacht Club staff has noticed a significant loss of water dependent wildlife (including freshwater mussels).”

- Jon Hall, General Manager, Salad River Yacht Club
- Saluda River Yacht Club Staff

Salad River Yacht Club
1307 Old Easley Highway (Hwy 124)
Easley, South Carolina 29640
(864) 399-4015

Testimony from Anderson County on recreation use impairment is found in Attachment C.

Conclusion

This information demonstrates that the Saluda River from Saluda Dam Road to 14 miles downstream is impaired for recreational and aquatic life uses due to hydrologic alteration and should be listed under Category 4C in the South Carolina 2018 Integrated Reporting Document.

Attachments

Attachment A – Instream Flow Study
Attachment B – South Carolina Water Resources Commission Correspondence
Attachment C - Anderson County letter

References
