# DOWNSTREAM NAVIGATIONAL FLOW ASSESSMENT

# AND

# DOWNSTREAM RECREATIONAL FLOW USER SURVEY MEMO

**PARR HYDROELECTRIC PROJECT**
**(FERC NO. 1894)**

***Prepared for:***

## South Carolina Electric & Gas Company
## Cayce, South Carolina

***Prepared by:***

Kleinschmidt

Lexington, South Carolina

www.KleinschmidtGroup.com

January 2018

# EXECUTIVE SUMMARY

South Carolina Electric & Gas Company (SCE&G), Licensee for the Parr Hydroelectric Project (FERC No. 1984) (Project), is currently seeking a new license from the Federal Energy Regulatory Commission (FERC), as their current license is set to expire on June 30, 2020. The Project is currently engaged in a relicensing process which involves collaboration with a variety of stakeholders including state and federal resource agencies, state and local government, non-government organizations (NGOs) and interested individuals. SCE&G has established Technical Working Committees (TWCs) which include many of the interested stakeholders. The Recreation TWC was created to identify and resolve Project-related issues regarding recreation and is composed of representatives from the South Carolina Department of Natural Resources (SCDNR), the South Carolina Department of Health and Environmental Control (SCDHEC), the National Oceanic and Atmospheric Administration (NOAA), American Rivers, and the Congaree Riverkeeper, among others. Per request of the Recreation TWC, SCE&G performed two studies that addressed recreational resource issues downstream of the Project. These were:

- the Downstream Navigational Flow Assessment, and
- the Downstream Recreational Flow Assessment.

During issues scoping, the TWC identified two areas downstream of the Parr Dam as potential areas for navigational concern. SCE&G developed a study plan in consultation with the TWC to assess one-way navigation at these sites, and the results of this study are presented in the Downstream Navigational Flows Assessment, included herein.

The Recreation TWC also requested that a study be designed and implemented that would assess flows downstream of the Parr Shoals Dam that provide quality recreational experiences, and identify preferred flows for recreational activities, specifically wade angling, canoeing and kayaking. The Downstream Recreational Flow Assessment Study Plan was developed with consultation from stakeholders and the results of this assessment are included in the attached Downstream Recreational Flow User Survey Memo.

The Recreation TWC convened a meeting on May 10, 2016 to discuss the results of these two assessments. This report is an accumulation of the original study plans, study reports, and Recreation TWC meeting notes that will be used to develop flow recommendations for SCE&G to consider in developing a new license proposal.

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**SOUTH CAROLINA ELECTRIC & GAS COMPANY**

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**PARR HYDROELECTRIC PROJECT**
**(FERC NO. 1894)**

**SOUTH CAROLINA ELECTRIC & GAS COMPANY**

# 1.0 INTRODUCTION

South Carolina Electric & Gas Company (SCE&G) is the Licensee for the Parr Hydroelectric Project (FERC No. 1894) (Project). SCE&G is currently seeking a new license from the Federal Energy Regulatory Commission (FERC), as their current license is set to expire on June 30, 2020. The Project consists of two developments: the Parr Shoals Development and the Fairfield Pumped Storage Development.

The Parr Reservoir, located in Fairfield and Newberry counties, South Carolina, is a 4,400 acre impoundment formed by the Broad River and the Parr Shoals Dam and serves as the lower reservoir for the Fairfield Pumped Storage Development. Monticello Reservoir, a 6,800 acre impoundment is formed by a series of four earthen dams and serves as the upper reservoir for the pumped storage development. While the stretch of the Broad River downstream of the Parr Shoals Dam (Parr Dam) is not included in the Project Boundary, Project operations do influence this area. For this reason, the downstream reach of the Broad River was studied during the Instream Flow Incremental Methodology (IFIM) study to determine if downstream flows currently facilitate one-way navigation at identified points of constriction.

# 2.0 AGENCY CONSULTATION AND STUDY OBJECTIVES

The Project is currently engaged in a relicensing process which involves cooperation and collaboration with a variety of stakeholders including state and federal resource agencies, state and local government, non-governmental organizations (NGOs), and interested individuals. SCE&G has established Technical Working Committees (TWCs) which includes many of the interested stakeholders. The objective of each TWC is to identify, discuss, and propose options for resolution of Project-related issues, which will be evaluated for inclusion in the new Project license.

The Recreation TWC is composed of representatives from the South Carolina Department of Natural Resources (SCDNR), the South Carolina Department of Health and Environmental Control (SCDHEC), the National Oceanic and Atmospheric Administration (NOAA), American Rivers, and the Congaree Riverkeeper, among others. During issues scoping, the TWC identified two areas downstream of the Parr Dam as potential areas for navigational concern. SCE&G developed a study plan in consultation with the TWC to assess one-way navigation at these sites. The study plan is included in Appendix A.

The criteria for one-way navigation can be defined as a "minimum depth of one foot across a channel 10 feet wide or across 10 percent of the total stream width, whichever is greater. Minimum depth does not need to occur across a continuous 10 percent of the stream width, but each point of passage must be at least 10 feet wide." One-way navigation criteria are based on the passage of a 14 foot Jon-boat without a motor in the downstream direction only (SCWRC, 1988).

## 3.0 STUDY AREA

The navigational analyses evaluated flows within the Broad River at areas of navigational constriction downstream of the Parr Dam. Recreation TWC participants identified two areas of potential constriction. These areas, identified as "Ledge 1" and "Ledge 2" (Figure 3-1), were further investigated during preliminary field work for the IFIM study and are described in greater detail below.

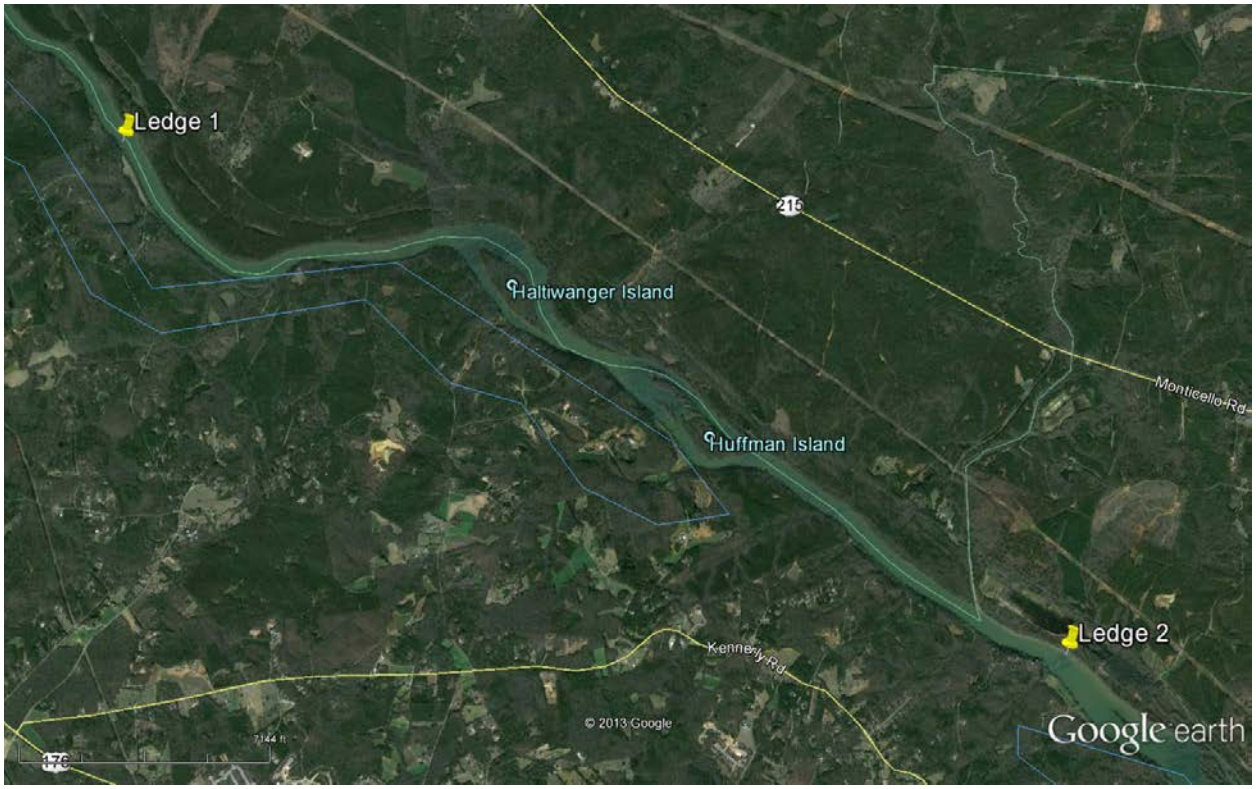


**FIGURE 3-1 POTENTIAL POINTS OF NAVIGATIONAL CONSTRICTION**

## LEDGE 1

Ledge 1 consists of a bedrock ledge located at a lat/long of 81°15'46.507"W, 34°12'49.999"N, approximately 2.4 miles upstream of Haltiwanger Island. The study plan originally identified a primary navigational passage point on river left (looking upstream); however, a secondary passage point, located near mid-channel, was also noted during execution of the field effort (Figure 3-2).


**FIGURE 3-2 LEDGE 1 IDENTIFICATION AND AREAS OF NAVIGATIONAL PASSAGE (CIRCLED IN RED)**

## LEDGE 2

Ledge 2 consists of a bedrock ledge located at a lat/long of 81°10’15.941”W, 34°10’18.154”N, 1.3 miles upstream of Hickory Island and approximately 0.5 miles downstream of the mouth of Little River. Field investigations identified the primary navigational passage point on river left (looking upstream) (Figure 3-3).


**FIGURE 3-3 LEDGE 2 IDENTIFICATION AND AREA OF NAVIGATIONAL PASSAGE (CIRCLED IN RED)**

## 4.0 METHODOLOGY

Bathymetric data within the navigational passage points were collecting using a Sontek M9 Acoustic Doppler Current Profiler (ADCP) and Sontek's HydroSurveyor software. Field data were collected in January 2016, with river flows at approximately 6,500 cfs to allow sufficient depth for the ADCP to map the critical ledge features. Measured ADCP water depths were converted to bed elevations utilizing water surface elevations (WSELs) measured during the bathymetry survey. WSEL profiles were collected during the bathymetric survey by Glenn Associates Surveying, Inc. (Jenkinsville, SC) using a survey-grade Topcon GR3 Global Positioning System Rover paired with Spectra Ranger External Antenna. WSEL data were collected relative to the 1988 North American Vertical Datum (NAVD88), with the surveyor estimating vertical accuracy at < 0.1 ft. Following completion of the field effort, the HydroSurveyor software was used to create three-dimensional bathymetric models of each of the

passage points (Figure 4-1 through 4-3). The three-dimensional bathymetric models were then reviewed and the most limiting cross-section within each passage point was identified and exported to Microsoft Excel.

Stage-discharge relationships were developed for both ledges based on stage data obtained from Solinst Levellogger® dataloggers (level-loggers) deployed throughout the study area in support of the IFIM and Operations Modeling studies (See Kleinschmidt 2014 for additional detail regarding dataloggers). At Ledge 1, stage data were taken directly from a level-logger located at the ledge. At Ledge 2, level-loggers were located upstream and downstream of the ledge (as opposed to directly at the ledge), and as such, the HEC-RAS Model developed in support of the Operations Model was refined using the WSEL and bathymetry data collect for this study and used to interpolate between the level-loggers.

The exported cross-sectional bed profiles for each of the passage points was then overlain with WSELs corresponding to selected low-flow releases (500, 700 and 1000 cfs) and evaluated relative to navigational passage criteria.

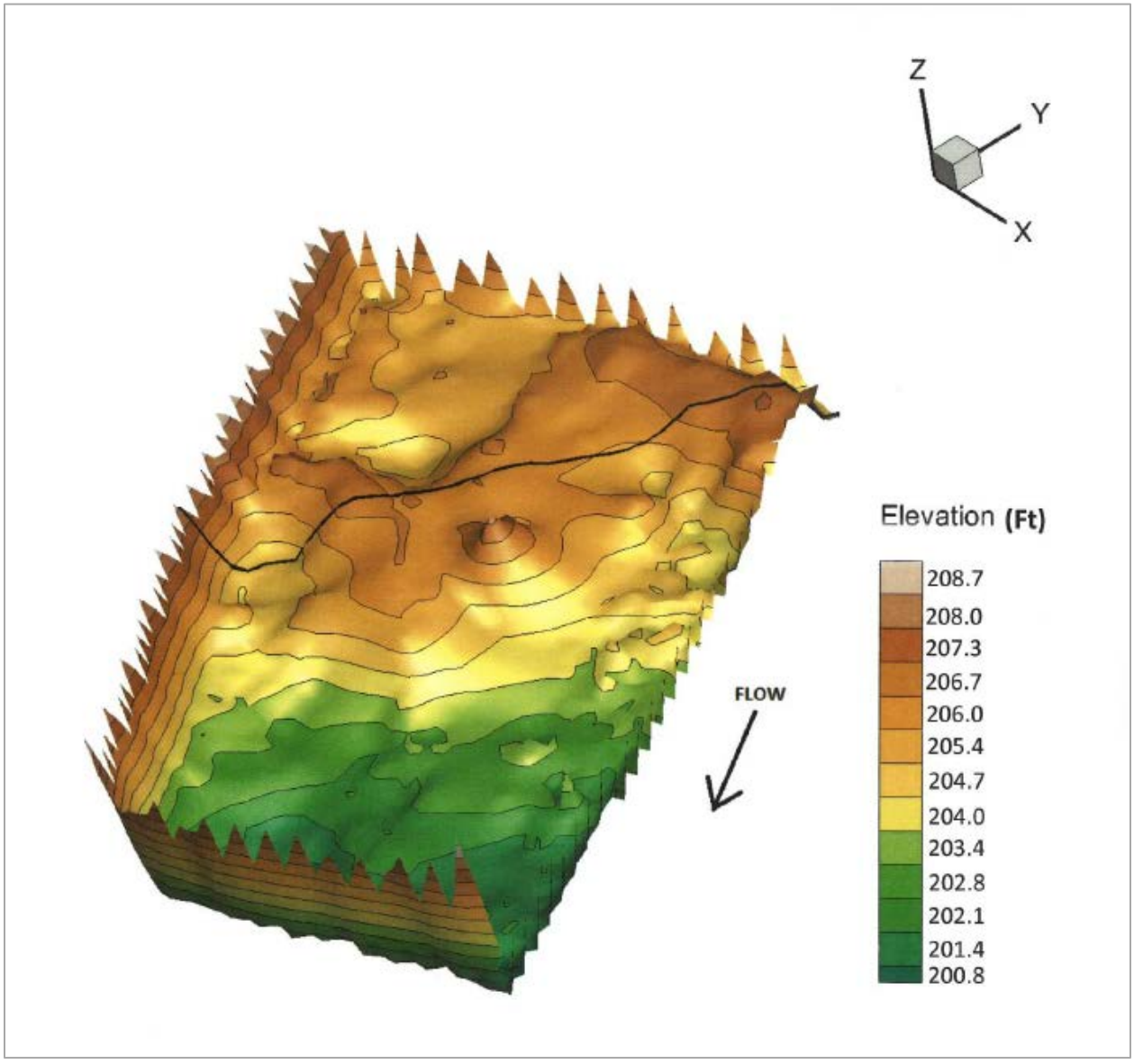


**FIGURE 4-1 THREE-DIMENSIONAL UPSTREAM VIEW OF LEDGE 1 RIVER LEFT PASSAGE POINT (BLACK LINE DENOTES EXPORTED TRANSECT)**

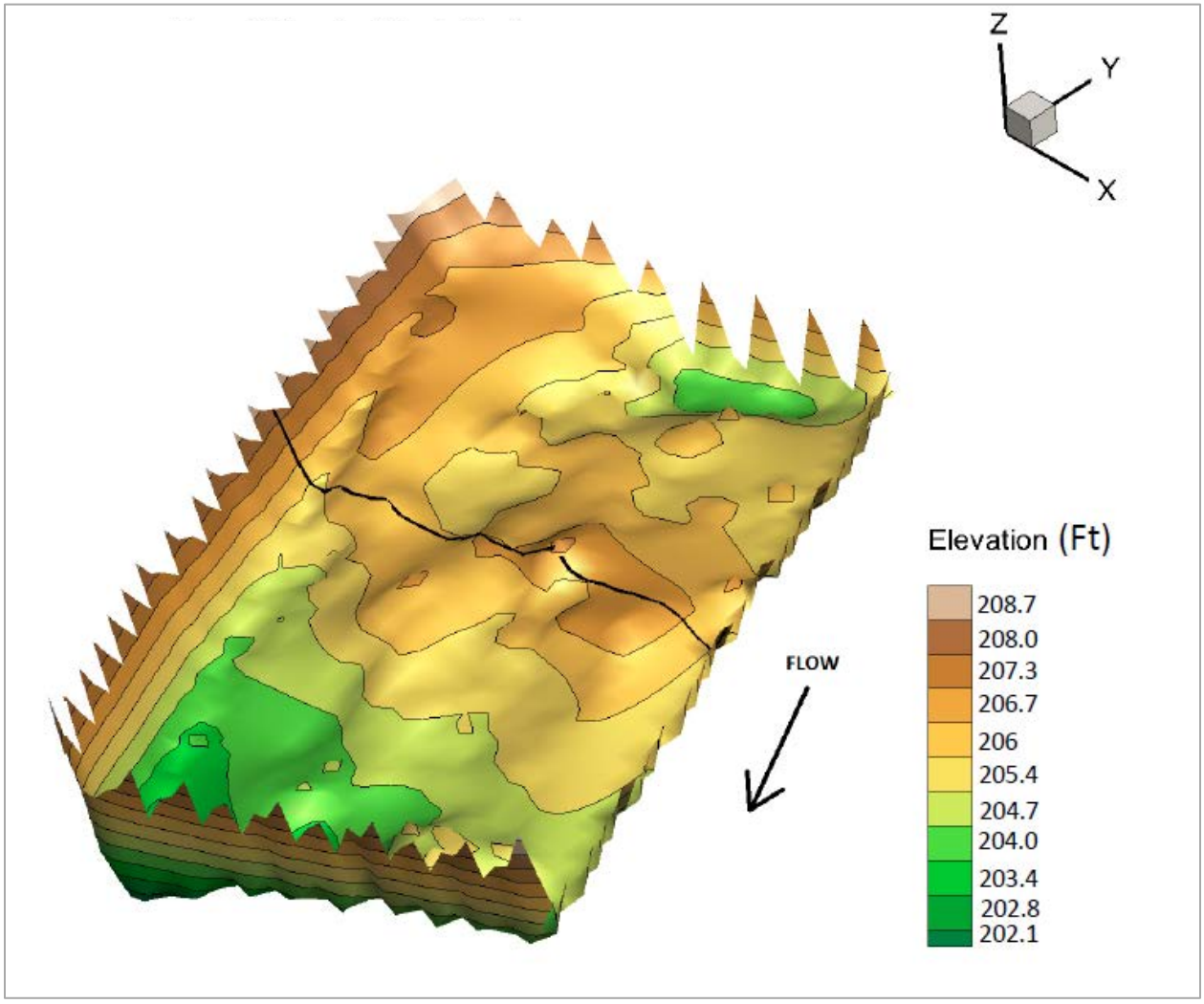


**FIGURE 4-2 THREE-DIMENSIONAL UPSTREAM VIEW OF LEDGE 1 MID-CHANNEL PASSAGE POINT (BLACK LINE DENOTES EXPORTED TRANSECT)**

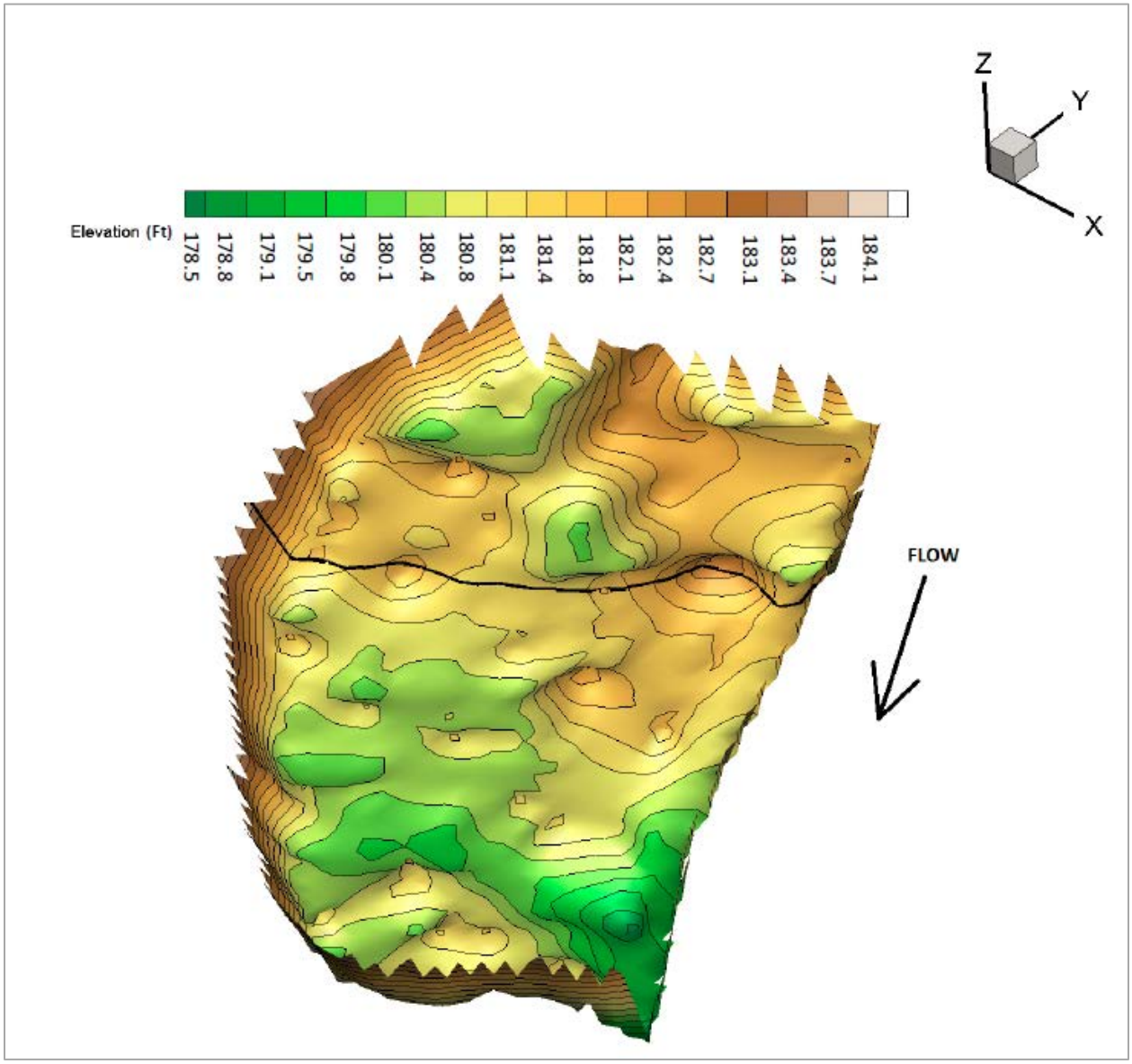


**FIGURE 4-3 THREE-DIMENSIONAL UPSTREAM VIEW OF LEDGE 2 PASSAGE POINT (BLACK LINE DENOTES EXPORTED TRANSECT)**

# 5.0 RESULTS AND DISCUSSION

## 5.1 RESULTS BASED ON MODELING

The Broad River is approximately 650 ft wide at Ledge 1, meaning that a minimum depth of 1 ft is needed across a minimum cross-sectional distance of 65 ft in order to meet the navigation criteria. Data from this study indicate that a flow of 500 cfs meets the passage criteria from both the depth and width perspective, with approximately 205 ft (32 %) of cross-sectional passage provided collectively by the two passage points (Figure 5-1 and Figure 5-2). These data suggest that navigation passage is not a limiting factor at Ledge 1 for flows as low as 500 cfs.

At Ledge 2, the Broad River is approximately 800 ft wide, which means that a minimum depth of 1 ft is needed across a minimum cross-sectional distance of 80 ft in order to meet the navigation criteria. Data from this study indicate that a flow of 1000 cfs meets both the minimum depth and width aspects of the criteria, with approximately 82 ft (10 %) of cross-sectional passage provided collectively by the two passage points (Figure 5-3). However, we do note that the intent of the navigation passage criteria is to provide one-way downstream navigation of a 14 ft Jon-boat without a motor. Our study data suggest that flows as low as 500 cfs provide the "1-foot" passage criteria through a notch that is approximately 30 ft wide (Figure 5-4). Although this does not meet the exact navigation criteria, it does provide a passage point that should be more than sufficient for one-way passage of a 14 ft Jon-boat.

## 5.2 FLOW VERIFICATION OF THE NAVIGATION MODELING RESULTS

Navigation passage at each of the ledges was verified through field observations on October 17, 2017 and November 09, 2017 at a flow of approximately 1,000 cfs. Although the modeling results indicate that flows as low at 500 cfs provide several notches at each of the ledge sites, it was apparent during the flow observations that flows of 1,000 cfs or higher would be necessary to completely meet the SCDNR navigation policy. The 1,000 cfs flow proposed as a minimum flow for aquatic habitat provided wetted habitat and passage notches at locations along the river that were satisfactory for canoe and kayak passage. However, it would be difficult for jon-boat passage at the 1,000 cfs flow or a lower flow.

During the November 7, 2017 stakeholder meeting, the results of the October 17, 2017 flow observations were discussed. Reasons why the modeling results do not clearly show the navigation passage difficulties as observed in the field at 1,000 cfs and lower flows, is because those results are presented as a straight-line transect and bed profile that does not capture the shallowest profile affecting passage at the ledge. Because the physical structure of the rock ledge is irregular, it requires a meandering transect line to measure and present the most shallow bed profile across the river channel. SCE&G reminded the stakeholders that navigation flows should be viewed within the context of flow duration for the Broad River downstream of Parr Dam. A review of historic flow duration data by month (Table 5-1) shows that the minimum low flow target of 1,000 cfs is often exceeded during many months of the year. Because the Project is not a storage project, the flow duration data indicates that flows would often be higher than the 1,000 cfs low minimum flow. This would increase navigation passage in the river to approach the SCDNR policy for navigation.

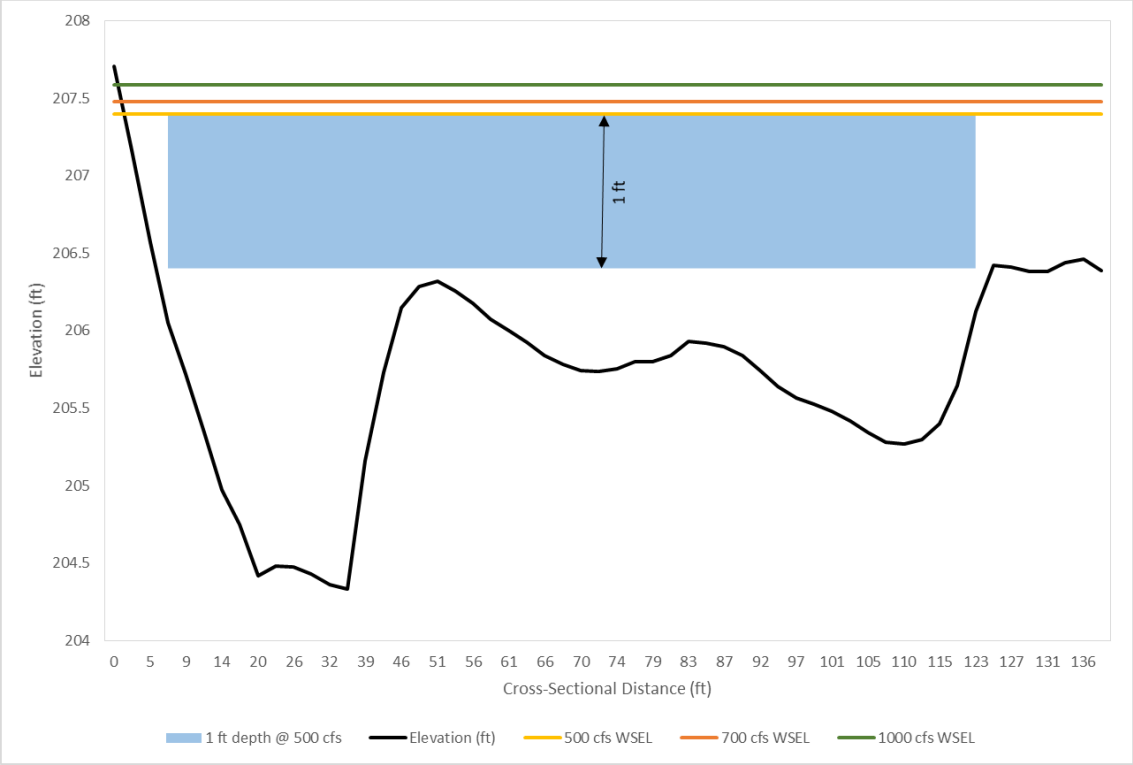


**FIGURE 5-1 BED PROFILE AND WATER SURFACE ELEVATIONS AT THE RIVER LEFT PASSAGE POINT AT LEDGE 1 (UPSTREAM VIEW)**

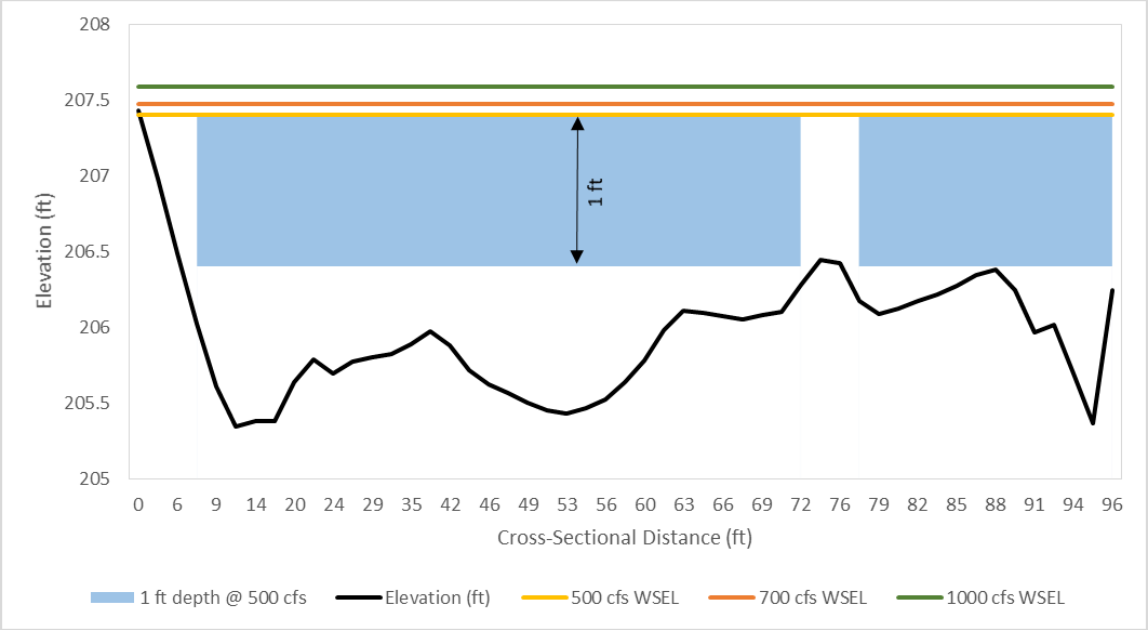


**FIGURE 5-2 BED PROFILE AND WATER SURFACE ELEVATIONS AT THE MID-CHANNEL PASSAGE POINT AT LEDGE 1 (UPSTREAM VIEW)**

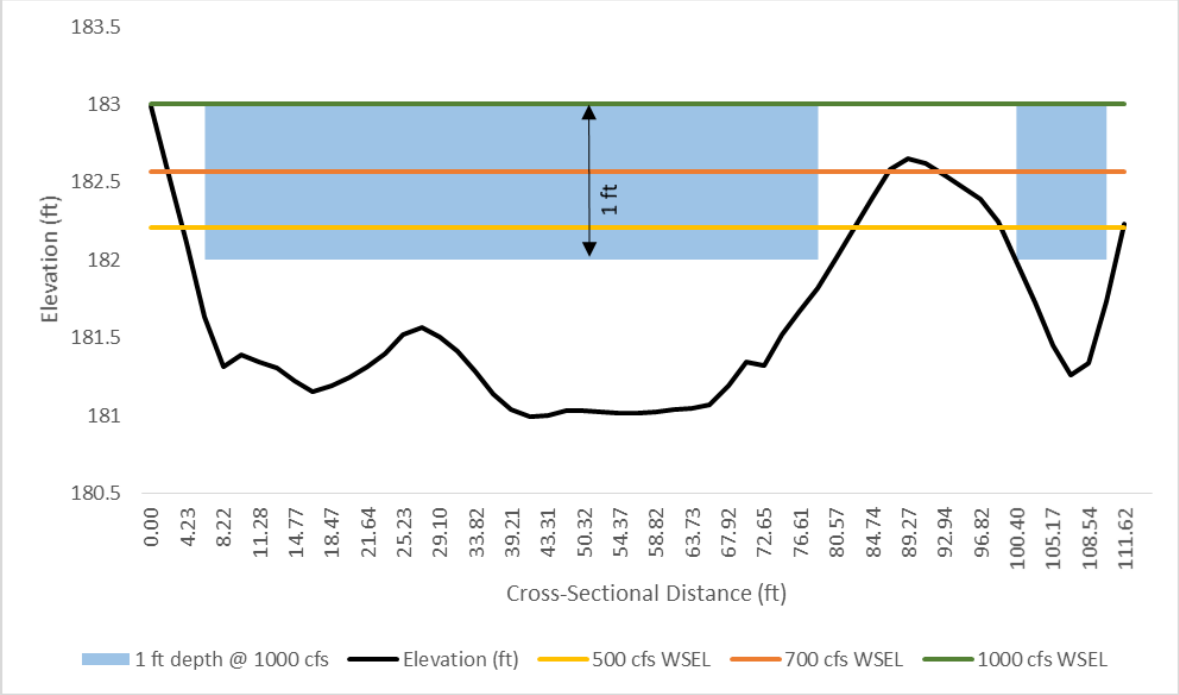


**FIGURE 5-3 LEDGE 2 BED PROFILE SHOWING NAVIGATION PASSAGE AREA AT 1000 CFS (UPSTREAM VIEW)**

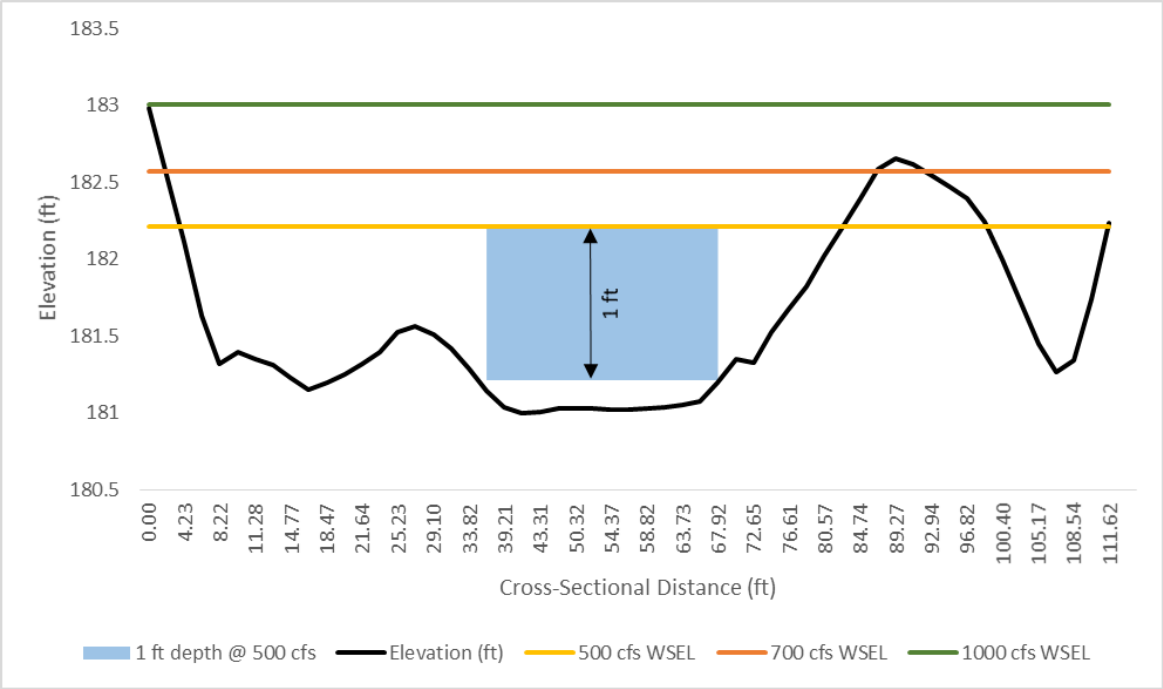


**FIGURE 5-4 LEDGE 2 BED PROFILE SHOWING NAVIGATION PASSAGE AREA AT 500 CFS (UPSTREAM VIEW)**

**TABLE 5-1. MONTHLY FLOW EXCEEDANCE FOR THE BROAD RIVER DOWNSTREAM OF PARR SHOALS DAM (USGS ALSTON GAGE 02161000, PERIOD OF RECORD 1981-2015)**

| | Percent of Time Flow Exceeded During Each Month | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow (cfs) | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
| 500 | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 99.8% | 97.6% | 95.1% | 97.3% | 99.3% | 99.5% | 100.0% | 99.0% |
| 1,000 | 99.8% | 100.0% | 100.0% | 100.0% | 100.0% | 92.4% | 85.2% | 79.0% | 80.3% | 87.6% | 90.8% | 97.6% | 92.6% |
| 1,500 | 97.2% | 97.8% | 99.8% | 99.2% | 96.5% | 80.3% | 68.2% | 63.8% | 62.7% | 66.0% | 80.3% | 93.3% | 83.6% |
| 2,000 | 92.6% | 94.6% | 98.9% | 96.8% | 85.9% | 69.8% | 54.4% | 51.7% | 49.2% | 49.5% | 68.2% | 85.6% | 74.6% |
| 2,500 | 86.1% | 88.7% | 95.9% | 91.6% | 73.5% | 59.7% | 44.6% | 41.6% | 36.8% | 38.5% | 53.6% | 77.3% | 65.5% |
| 3,000 | 78.0% | 81.5% | 90.6% | 82.3% | 61.1% | 50.4% | 34.3% | 30.8% | 26.1% | 30.8% | 44.0% | 69.4% | 56.4% |
| 3,500 | 71.2% | 75.7% | 81.6% | 73.2% | 50.2% | 42.8% | 26.6% | 25.7% | 20.5% | 25.2% | 36.3% | 62.9% | 49.1% |
| 4,000 | 64.7% | 68.0% | 73.6% | 64.4% | 42.2% | 34.5% | 21.1% | 21.7% | 14.9% | 19.1% | 30.0% | 54.6% | 42.2% |
| 4,500 | 56.4% | 61.4% | 67.3% | 54.7% | 36.4% | 27.4% | 17.2% | 17.8% | 10.7% | 15.3% | 23.9% | 47.2% | 36.1% |
| 5,000 | 49.1% | 53.9% | 61.1% | 48.4% | 30.0% | 20.7% | 13.6% | 15.2% | 8.6% | 12.2% | 19.3% | 39.1% | 30.7% |

# 6.0 REFERENCES

South Carolina Water Resources Commission (SCWRC). 1988. Instream Flow Study Phase II: Determination of Minimum Flow Standards to Protect Instream Uses in Priority Stream Segments: A Report to the South Carolina General Assembly. Available Online. [URL]: http://scwaterlaw.sc.gov/Instream%20Flow%20Study%20ph2.pdf. Accessed August 2013.

Kleinschmidt Associates. 2014. Parr-Fairfield Operations Modeling System Final Report. Prepared for South Carolina Electric & Gas, Co. December 2014.

# APPENDIX A

# DOWNSTREAM NAVIGATIONAL FLOW STUDY PLAN

# DRAFT

## DOWNSTREAM NAVIGATIONAL FLOW ASSESSMENT STUDY PLAN

# PARR HYDROELECTRIC PROJECT

## (FERC NO. 1894)

***Prepared for:***

**South Carolina Electric & Gas Company**
**Cayce, South Carolina**

***Prepared by:***

Kleinschmidt

Lexington, South Carolina
www.KleinschmidtUSA.com

December 2013

DRAFT

# DOWNSTREAM NAVIGATIONAL FLOW ASSESSMENT STUDY PLAN

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*Prepared for:*

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*Prepared by:*

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**DOWNSTREAM NAVIGATIONAL FLOW ASSESSMENT STUDY PLAN**

**PARR HYDROELECTRIC PROJECT**
**(FERC NO. 1894)**

**SOUTH CAROLINA ELECTRIC & GAS COMPANY**

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# 1.0 INTRODUCTION

South Carolina Electric & Gas Company (SCE&G) is the Licensee of the Parr Hydroelectric Project (FERC No. 1894) (Project). The Project consists of the Parr Hydro Development and the Fairfield Pumped Storage Development. Both developments are located along the Broad River in Fairfield and Newberry Counties, South Carolina.

The Project is currently engaged in a relicensing process which involves cooperation and collaboration among SCE&G, as licensee, and a variety of stakeholders including state and federal resource agencies, state and local government, non-governmental organizations (NGO), and interested individuals. The collaboration and cooperation is essential to the identification of and treatment of operational, economic, and environmental issues associated with a new operating license for the Project. SCE&G has established Technical Working Committees (TWC's) with members from among the interested stakeholders with the objective of achieving consensus regarding the identification and proper treatment of these issues in the context of a new license.

The Recreation TWC has requested that flows downstream of the Parr Shoals Dam (Parr Dam) be assessed during planned Instream Flow Incremental Methodology (IFIM) studies to determine if downstream flows currently facilitate one-way navigation at an identified point of constriction in the Broad River, downstream of the Project. Although the primary purpose of the IFIM study is to develop an understanding of key habitat-flow relationships for aquatic species in the Broad River, the IFIM study also provides an appropriate means of determining consistency with navigational goals under various flow scenarios.

## 2.0 STUDY OBJECTIVE

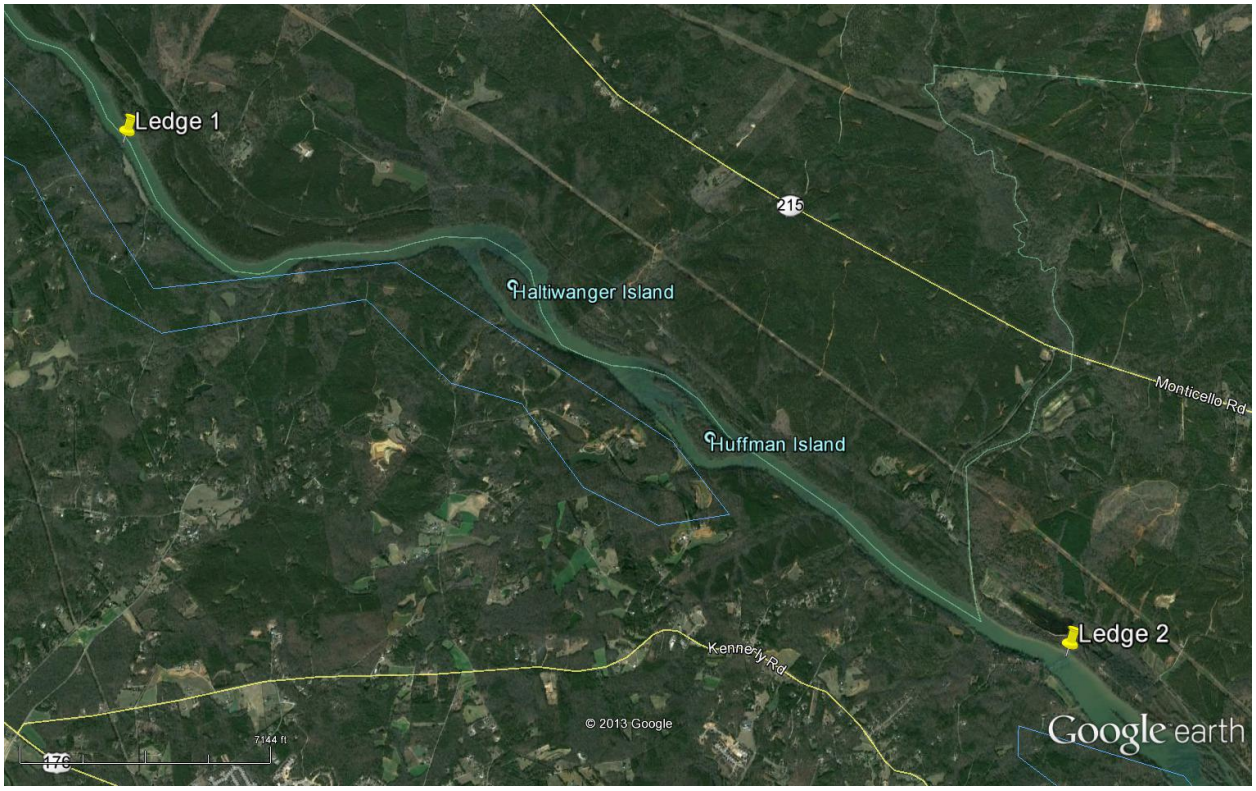
The objective of the navigational analysis is to assess the flow levels within the Broad River, at identified points of constriction, needed to facilitate one-way navigation. The criteria for one-way navigation can be defined as a "minimum depth of one foot across a channel 10 feet wide or across 10 percent of the total stream width, whichever is greater. Minimum depth does not need to occur across a continuous 10 percent of the stream width, but each point of passage must be at least 10 feet wide." One-way navigation criteria are based on the passage of a 14 foot Jon-boat without a motor in the downstream direction only (SCWRC, 1988).

Although not included within scope of this study, two-way navigation is defined as a "minimum depth of two feet across a channel 20 feet wide or across 20 percent of total stream width, whichever is greater. Minimum depth does not need to occur across a continuous 20 percent of stream width, but each point of passage must be at least 10 feet wide." Two-way navigation criteria are based on the passage of a 14 foot Jon-boat with a motor in either direction (SCWRC, 1988).

## 3.0 GEOGRAPHIC AND TEMPORAL SCOPE

The navigational analyses will evaluate flows within the Broad River at points of navigational constriction downstream of the Parr Dam. Recreation TWC participants initially identified two points of potential constriction. These points, identified as "Ledge 1" and "Ledge 2", were further investigated during Parr mesohabitat studies and are defined below. See Figure 1 for location of the two points of navigational constriction.

**FIGURE 1 POTENTIAL POINTS OF NAVIGATIONAL CONSTRICTION**



***Ledge 1***. Ledge 1 is located at a lat/long of 81°15'46.507"W, 34°12'49.999"N, approximately 2.4 miles upstream of Haltiwanger Island. Field investigations have identified a navigational passage point on river right (looking downstream) that is approximately 45 ft wide with an approximate elevation change of 1.5 feet. Please see Figure 2; the passage point is within the red circle.

**FIGURE 2 LEDGE 1 IDENTIFICATION AND AREA OF NAVIGATIONAL PASSAGE**

***Ledge 2.*** Ledge 2 is located 1.3 miles upstream of Hickory Island and approximately 0.5 miles downstream of the mouth of Little River. Ledge 2 has a lat/long of 81°10'15.941"W, 34°10'18.154"N, and an approximate elevation change of 1.5 to 2.0 feet. Field investigations have identified a navigational passage point on river right (looking downstream) that is approximately 60 ft wide. Please see Figure 3; the passage point is within the red circle.

**FIGURE 3 LEDGE 2 IDENTIFICATION AND AREA OF NAVIGATIONAL PASSAGE**


The navigational analyses will be conducted during the summer of 2015 concurrent with IFIM study efforts.

## 4.0 METHODOLOGY

IFIM study transects will include the representative locations of navigational constriction identified in Section 3.0, to allow the characterization of hydraulics (wetted depth and width) during a range of flows. The transect locations will be field blazed with flagging, recorded via GPS, or other appropriate means. The study sites will be mapped sufficiently to quantify the areas represented by the transects. Consistent with IFIM survey protocol, transect headpin and tailpin ends will be located at or above the top-of-bank elevation, and secured by steel rebar or other similar means. A measuring tape accurate to 0.1-foot will be secured at each transect to enable repeat field measurements, if necessary. Stream bed and water elevations tied to a local datum will be surveyed to the nearest 0.1-foot using standard optical surveying instrumentation and methods. If USGS gage data is not available, a staff gage may be placed at the study site to confirm stable flow during measurements. Survey activities are anticipated to take place at a flow of 400 cfs. A water level logger will also be placed at the transect locations to gather water surface elevation data under various flow events. Water surface elevations will be used to develop stage-discharge relationships for the site and the stage-discharge relationships will be assessed on whether one-way navigation is achieved.

Information obtained during survey activities will be included within the draft IFIM report that will be submitted to the study team for review and comment. The report will document the methods and results as encountered in the field. Supporting data will be presented in graphic and tabular form and appendices will include cross-sectional survey data and reference photographs of study sites.

The methodology for this analysis may be revised or supplemented based on consultation with the Instream Flow TWC and other interested stakeholders, or if field efforts so dictate.

## 5.0 SCHEDULE AND REPORTING

Data will be gathered during the IFIM study, anticipated to occur in 2015. A final report summarizing IFIM study findings, including an analysis of impediments to one-way navigation under various flow conditions, will be issued subsequent to the completion of field work.

## 6.0 USE OF STUDY RESULTS

Study results will be used as an information resource during discussion of relicensing issues and developing potential Protection, Mitigation and Enhancement measures with the South Carolina Department of Natural Resources, USFWS, the Instream Flows TWC, and other relicensing stakeholders.

## 7.0 REFERENCES

South Carolina Water Resources Commission (SCWRC). 1988. Instream Flow Study Phase II: Determination of Minimum Flow Standards to Protect Instream Uses in Priority Stream Segments: A Report to the South Carolina General Assembly. Available Online. [URL]: http://scwaterlaw.sc.gov/Instream%20Flow%20Study%20ph2.pdf. Accessed August 2013.

# APPENDIX B

# COMMENTS FROM STAKEHOLDERS

April 8, 2016

Mr. William R. Argentieri
South Carolina Electric and Gas Company
Mail Code A221
220 Operations Way
Cayce, SC 29033-3701

Subject: Comments and Recommendations: Downstream Navigational Flow Assessment
Parr-Fairfield Hydroelectric Project (FERC No. 1894)

Dear Mr. Argentieri:

Ensuring downstream navigation and recreation needs are met through a new license for the Parr-Fairfield Hydroelectric Project is fundamental to American Rivers' interests in this relicensing and for the future of the Broad River which is directly affected by project operations. We are a member of the Recreation Technical Working Committee, and participated in numerous meetings and the development of the study plan for assessing downstream flows to meet the state's minimum standards for recreational navigation. American Rivers has reviewed the April 2016 Downstream Navigational Flow Assessment report and offer the following comments and recommendations.

The flow assessment report clearly indicates that a flow of 1,000 cfs is needed to satisfy the State of South Carolina's navigation requirements as a determined by state guidance (South Carolina Water Resources Commission 1988: Instream Flow Study Phase II: Determination of Minimum Flow Standards to Protect Instream Uses in Priority Stream Segments: A Report to the South Carolina General Assembly. The Water Resources Commission is now part of the South Carolina Department of Natural Resources which has adopted this method for determining navigation flow requirements.)

Despite the findings of the navigation assessment, the report recommends a flow of 500 cfs for navigation requirements. A flow of 500 cfs clearly does not meet the state's criteria for determining minimum navigation flows. We are baffled why the report recommends a flow which is clearly in conflict with the state's method and study results.

American Rivers recognizes that based on the findings of the Downstream Navigation Flow Assessment a flow of at least 1,000 cfs is needed to meet navigation requirements. We recommend that the report be changed to conclude that a 1,000 cfs flow, not a 500 cfs flow, is needed to meet navigation requirements.

Sincerely,

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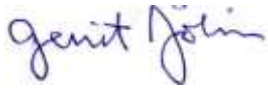
f 803.771.7580
www.AmericanRivers.org



Gerrit Jöbsis
Senior Director, Southeast Conservation

cc: SC Department of Health and Environmental Control
SC Department of Natural Resources
Recreation Technical Working Committee

| | |
|---|---|
| **From:** | Bill Marshall |
| **To:** | Kelly Kirven; Alex Pellett; Alison Jakupca; ARGENTIERI, WILLIAM R; Bill Stangler (CRK@congareeriverkeeper.org); BRESNAHAN, AMY; btrump@scana.com; Caleb Gaston (caleb.gaston@scana.com); Charlene Coleman (cheetahtrk@yahoo.com); Chuck Hightower (hightocw@dhec.sc.gov); Dick Christie (dchristie@comporium.net); Edye Joyner; Erich Miarka (erich.miarka@gillscreekwatershed.org); Frank_Henning@nps.gov; Gerrit Jobsis (gjobsis@americanrivers.org); Greg Mixon; Henry Mealing; J. Hagood Hamilton Jr. (jhamilton@scana.com); Jaclyn Daly (Jaclyn.Daly@noaa.gov); Jay Maher; Jeff Carter (jmcarter00@sc.rr.com); Joe Wojcicki; John Fantry (jfantry@bellsouth.net); Jon Durham (jondurham@bellsouth.net); Karen Swank Kustafik (kakustafik@columbiasc.net); Lorianne Riggin; Malcolm Leaphart (mwleapjr@att.net); Mark Davis; Merrill McGregor (merrillm@scccl.org); Pace Wilber (Pace.Wilber@noaa.gov); rammarell@scana.com; Randy Mahan (randolph.mahan@scana.com); randy mahan (rmahan@sc.rr.com); Robert Stroud; Rusty Wenerick (weneriwr@dhec.sc.gov); Scott Collins (secollins@scana.com); Steve Summer; STUTTS, BRANDON G; tboozer@scana.com; Wayne and Ginny Boland (wayneboland@bellsouth.net); William Hendrix (HendrixWB@dot.state.sc.us) |
| **Subject:** | RE: draft Downstream Navigational Flow Assessment |
| **Date:** | Thursday, April 14, 2016 3:15:37 PM |

Hi Kelly, I have a few comments to offer.
I think the Navigational Flow Assessment provides useful information, and DNR staff will want to consider these results in combination with the Instream Flow Study findings as we further evaluate future flow needs below Parr hydro.
In addition, I think this navigational flow assessment at the two ledges may not capture the more complicated navigational obstruction presented in shoal complexes such as those in the upper Bookman Island complex, particularly the shoals just upstream of Hickory Island (see attached image). I'd be interested in seeing how the Instream Flow Study data collected for Study Site 10 (Bookman Island Complex, 2D data collection) might help us to evaluate navigational flow conditions for that area. Please let us know if those other data might be useful to further evaluating the navigation issues.
Thank you,
Bill Marshall
SCDNR
803-734-9096

**From:** Kelly Kirven [mailto:Kelly.Kirven@KleinschmidtGroup.com]
**Sent:** Friday, April 01, 2016 10:37 AM
**To:** Alex Pellett ; Alison Jakupca ; ARGENTIERI, WILLIAM R ; Bill Marshall ; Bill Stangler (CRK@congareeriverkeeper.org) ; BRESNAHAN, AMY ; btrump@scana.com; Caleb Gaston (caleb.gaston@scana.com) ; Charlene Coleman (cheetahtrk@yahoo.com) ; Chuck Hightower (hightocw@dhec.sc.gov) ; Dick Christie (dchristie@comporium.net) ; Edye Joyner ; Erich Miarka (erich.miarka@gillscreekwatershed.org) ; Frank_Henning@nps.gov; Gerrit Jobsis (gjobsis@americanrivers.org) ; Greg Mixon ; Henry Mealing ; J. Hagood Hamilton Jr. (jhamilton@scana.com) ; Jaclyn Daly (Jaclyn.Daly@noaa.gov) ; Jay Maher ; Jeff Carter (jmcarter00@sc.rr.com) ; Joe Wojcicki ; John Fantry (jfantry@bellsouth.net) ; Jon Durham (jondurham@bellsouth.net) ; Karen Swank Kustafik (kakustafik@columbiasc.net) ; Kelly Kirven ; Lorianne Riggin ; Malcolm Leaphart (mwleapjr@att.net) ; Mark Davis ; Merrill McGregor (merrillm@scccl.org) ; Pace Wilber (Pace.Wilber@noaa.gov) ; rammarell@scana.com; Randy Mahan (randolph.mahan@scana.com) ; randy mahan (rmahan@sc.rr.com) ; Robert Stroud ; Rusty Wenerick (weneriwr@dhec.sc.gov) ; Scott Collins (secollins@scana.com) ; Steve Summer ; STUTTS, BRANDON G ; tboozer@scana.com; Wayne and Ginny Boland (wayneboland@bellsouth.net) ; William Hendrix (HendrixWB@dot.state.sc.us)
**Subject:** draft Downstream Navigational Flow Assessment

Good morning,

Attached is the draft Downstream Navigational Flow Assessment. Please review and submit any comments or edits by Friday, April 15th. We will discuss this document at the upcoming Recreation TWC meeting, to be scheduled for some time in May.

Thanks,

Kelly

**Kelly Miller Kirven**
**Regulatory Coordinator**
Kleinschmidt
**Office: 803.462.5633**
**Cell: 803.917.4528**
**www.KleinschmidtGroup.com**

April 15, 2016

Attn: Bill Argentieri
South Carolina Electric & Gas Company

Re: Downstream Navigational Flow Assessment – Parr Hydroelectric Project

Mr. Argentieri,

The following comments are in response to the Downstream Navigational Flow Assessment that was prepared as part of the relicensing of the Parr/Fairfield hydroelectric projects and was sent to members of the Recreation Technical Working Committee on April 1st.

- The transects used to determine navigability of a shoal should not follow a straight line, but rather should follow the top of the shoal (the shallowest area) to better reflect the possible blockages to navigation. We suggest the committee make an effort to verify the results by attempting to actually navigate the shoals at the recommended flows.

- The assessment states that a flow of 1,000 cfs meets the established criteria for navigation at ledge two, but goes on to recommend a navigational minimum flow of 500 cfs which the assessment clearly states does not meet the criteria. The assessment should not include a recommendation the author feels "should be more than sufficient" when we have clearly defined criteria to determine navigability.

- Additionally, as there should be supplementary data available from the IFIM study we recommend navigational flows be assessed at other sites including the Bookman Shoals area suggested by the DNR.

As we continue to review the assessment and the stage-discharge rating curves used in the analysis we may have additional questions or comments.

Thank you.

Sincerely,

Bill Stangler

Bill Stangler
Congaree Riverkeeper

**Post Office Box 5294 • Columbia, South Carolina 29250**
**(803) 760-3357 • www.congareeriverkeeper.org**

# DOWNSTREAM RECREATIONAL FLOW USER SURVEY MEMO

**MEMORANDUM**

**TO:** Recreation TWC and Downstream Recreational Flow Focus Group

**FROM:** Alison Jakupca – Kleinschmidt Associates

**DATE:** January 20, 2016

**RE:** Downstream Recreational Flow User Survey

---

During relicensing issue identification meetings, the Recreation Technical Working Committee (TWC) requested that a study be designed and implemented that would do the following: 1) assess flows downstream of the Parr Shoals Dam (Parr Dam) that provide quality recreational experiences, and; 2) identify preferred flows for recreational activities, primarily as they relate to wade angling, canoeing and kayaking. In accordance with the Downstream Recreational Flow Assessment Study Plan designed to fulfill this request, a panel of stakeholders that are knowledgeable about the Project area was identified and convened as a focus group. The focus group provided information regarding quality recreation opportunities (to fulfill objective 1), potential flow effects on recreation on the Broad River, downstream of the Parr Dam (Area of Interest [AOI]), and preferred flows for recreational activities (to fulfill objective 2). The focus group meeting was held on December 11, 2014.

As a follow-up to the focus group meeting, an on-line survey was distributed to focus group members via SurveyMonkey on November 9, 2015 (see Appendix A for a copy of survey questions). The primary purpose of this survey was to gather user opinions on recreational use and preferred river flows for the AOI in 2015. Four focus group members responded to the on-line survey. This memorandum summarizes the contents and results of this survey which will be discussed further in the Recreation TWC, assessed in conjunction with navigational and environmental flows, and may be used in Settlement Agreement negotiations.

## METHODS

The focus group meeting provided a good baseline of information regarding type of recreation activity, time of recreation activity, preferred flows for recreation activity, and access issues for the AOI. A summary of discussions from the focus group meeting is available at the following link: Recreation Focus Group Discussions Summary. The 2015 on-line survey was intended to gather additional information regarding potential quality recreation opportunities and preferred flows based on specific user experiences during 2015. Data gathered through this activity is intended to provide guidance in addressing recreational flow needs in the AOI, as recommended by the Recreation TWC and through Settlement Agreement negotiations.

As shown in Appendix A, survey Questions 1 through 4 and Question 6 focus on the frequency and timing of recreation activities. These questions were designed to help determine the timing of recreational use for the development of potential recreational flow recommendations for the Settlement Agreement. Question 5 and Question 7 focus on the type of recreational activity and preferred flows associated with that activity. The goal of the study is to focus on preferred flows for wade-angling, canoeing and kayaking. In addition to these activities, boat fishing, bank fishing, and hunting were also provided as choices in the survey. These options were provided in

the survey because boat fishing, bank fishing and hunting were identified as popular activities during the 2014 focus group meeting. Questions 8 and 9 focus on additional comments and contact information, which was optional information.

## RESULTS

The survey was sent to the thirteen members of the Downstream Recreational Flow Focus Group of which four responded to the survey. Three of the four respondents indicated that they recreated in the AOI during 2015 (Figure 1). The fourth respondent indicated that they had not recreated in the AOI during 2015 and did not provide responses to the subsequent survey questions.

### FREQUENCY, TYPE AND TIMING OF USE

Two of the three respondents indicated that they recreated in the AOI one to five times during 2015. One respondent indicated that they had recreated in the survey area 6-10 times in 2015 (Figure 2).

When asked about the time of day and day of the week (Questions 3 and 4) in which recreation in the AOI took place, respondents indicated that they recreated all day during daylight hours (Figure 3) and generally on the weekends (Figure 4). Respondents indicated that they participated in all five activities listed under Question 5 (canoeing/kayaking; boat fishing; hunting; wade fishing, and; bank fishing) (Figure 5). One participant added swimming under "other activity". Canoeing/kayaking and fishing (boat, wade and bank) were the most popular activities in 2015 among the respondents who answered this question.

Question 6 of the survey focused on the months in which the selected activities took place in 2015. The intent of this question was to narrow the time of year when the primary recreation activities take place. Respondents noted that canoeing/kayaking took place during the months of May through September, with May and June having the greatest response rate (Figure 6). Boat fishing activities occurred during the months of April through September with May and June receiving the highest response rate (Figure 7). Hunting was noted for the months of January and April (Figure 7). Respondents indicated that wade fishing occurred during May through October, with May, June and July receiving the highest response rate (Figure 8). Bank Fishing was noted as occurring during May through September, also with May, June and July receiving the highest response rate (Figure 8). One respondent noted that swimming took place May through August (Figure 9).

### PREFERRED FLOW RANGES

Three respondents provided answers for Question 7, which served to identify preferred flow ranges for recreation activities. Preferred flow ranges for canoeing/kayaking were indicated as ranging from 3,000 – 4,999 cfs by one respondent and a stage of 3.5 to 5 feet by a second respondent (Figure 10). For reference purposes, stage ranges from 3.5 to 5 feet on the USGS Gage located on the Broad River at Alston, SC (02161000) are equal to approximately 1,450 to 4,000 cfs.

All three respondents provided preferred flow ranges for boat fishing. One of the respondents indicated that preferred flows ranged from 2,000-2,999 cfs; 3,000 – 4,999 cfs, and; 5,000 cfs and above (Figure 11). A second respondent indicated that preferred flows for boat fishing were lower, ranging from 500 to 1,499. The third respondent noted that a stage of 3.5 to 5 feet (1,450 to 4,000 cfs) was preferred for boat fishing.

One respondent indicated that flow ranges preferred for hunting ranged from 500 cfs to 2,999 cfs (Figure 11). Two respondents provided preferred flows for wade fishing. One respondent noted that wade fishing could take place in flows from 500 to 1,999 cfs. The second respondent noted that flows from 500 to 999 cfs were preferred for this activity (Figure 11).

Preferred flows for bank fishing were indicated as being fairly inclusive by one respondent, ranging from 0 to 4,999 cfs. The second responded noted that bank fishing was preferred from 500 to 999 cfs (Figure 12). One respondent noted that acceptable flow ranges for "other activity" (swimming) ranged from 0 to 1,999 cfs (Figure 12).

### RESPONDENT COMMENTS

Question 8 and Question 9 served to gather general comments about recreation in the AOI and the contact information of the respondents (optional). Personal contact information is not being published in this memo; however, general comments regarding recreation are provided in Figure 14. A general theme among respondents' comments is that additional access downstream of the Project is needed. This was also a key topic of conversation during 2014 focus group discussions. Focus group attendees indicated that recreational opportunities would increase with improved access. One respondent suggested limits on motorized boat usage. Another respondent indicated that flows below a stage of 3.5 (1,450 cfs) are too shallow for paddling in some areas of the river.

## DISCUSSION

Although more survey responses would be preferred, the survey information and the 2014 focus group input led to several general conclusions. As indicated through Question 4 responses and 2014 focus group discussions, recreation in the AOI primarily takes place on the weekends. Furthermore, the months of May, June and July were the most popular recreation months for the activities targeted in the study plan (canoeing, kayaking, and wade fishing). Bank fishing and boat fishing have similar temporal use patterns, with boat fishing beginning earlier in the spring (April). Hunting occurs in the winter/early spring (January and April). This is supported by 2014 focus group discussions where attendees noted that they "generally utilized the AOI during weekends and warmer seasonal temperatures. However, attendees indicated that the AOI was utilized by duck hunters and fishermen during colder seasons."

To fulfill study plan objectives, user preferences have been summarized into preferred flow ranges that provide the greatest recreational opportunity. These ranges, when combined with the temporal use patterns discussed above, may be considered in the context of a Settlement Agreement. Focus group input indicates that higher flows necessary for canoeing, kayaking and boat fishing are not always compatible with the generally lower flows needed for wade angling, bank fishing, hunting and swimming. Therefore, two preferred recreational flow ranges have resulted from focus group discussions and the 2015 survey results:

1. Responses indicate that a flow between **2,000 and 5,000 cfs** during the months of May and/or June would generally support canoeing, kayaking and those individuals that prefer a higher flow for boat fishing.

2. Responses indicate that a flow between **500 and 999 cfs** would generally support lower boat fishing flows, hunting, wade fishing and swimming. Although the preferred time period for these activities varies, May, June and July were the most popular months for these activities with the exception of hunting, which is generally confined by hunting seasons (September and January).

**NEXT STEPS**

Preferred flow ranges will be discussed with the Recreation TWC and focus group. They will also be considered in the context of other flows evaluated through the relicensing process (e.g. navigational flows and environmental flows). If recreational flows are included as part of the Settlement Agreement, the specific timing and duration of those flows will be determined during settlement negotiations and evaluated with the Parr Hydroelectric Project Operations Model. The Operations Model will be used to determine if the requested flows are available under current operations, how often the requested flows are typically available (hydrologic year), and if the requested flows will result in lost revenues for the Project. These two recommendations will be forwarded for evaluation and the Operations Model results will be discussed with TWC members and summarized in a final report that will be used in development of a Settlement Agreement.

# APPENDIX A

# SURVEY QUESTIONNAIRE

**Parr Hydroelectric Project Relicensing**
**Downstream Recreational Flow User Survey**

**South Carolina Electric & Gas Company (SCE&G) is currently relicensing the Parr Hydroelectric Project, located on the Broad River in Fairfield and Newberry counties, South Carolina. As part of the relicensing process, stakeholders identified the need for information that characterizes non-motorized boating use and preferred river flows associated with reasonable and safe recreational use on the Broad River downstream of the Parr Shoals Dam, primarily as they relate to wade-angling, canoeing and/or kayaking. In 2014, SCE&G held a Focus Group meeting for selected recreational users to help identify these needs and preferences. This survey is a follow-up to the Focus Group meeting to help gather additional user opinions regarding use and flow preferences, subsequent to the 2015 recreation season.**

1. Did you recreate on the Broad River, downstream of Parr Shoals Dam, during 2015?

   ☐ Yes
   ☐ No (*If no, skip to Question 8*).

2. About how many times did you recreate on the Broad River, downstream of Parr Shoals Dam, during 2015?

   ☐ 1-5 times
   ☐ 6-10 times
   ☐ More than 10 times

3. About what time of day did you typically recreate on the Broad River, downstream of Parr Shoals dam, during 2015.

   ☐ Morning
   ☐ Noon/early afternoon
   ☐ Late afternoon/evening
   ☐ All day

4. Did you typically recreate on the Broad River, downstream of Parr Shoals dam, during the weekdays or on weekends?

   ☐ Weekdays
   ☐ Weekends
   ☐ Recreated on both weekdays and weekends equally

5. What activities did you participate in on the Broad River, downstream of Parr Shoals Dam, in 2015 (*Check all that apply*).

| | | |
|---|---|---|
| ☐ canoeing/kayaking | ☐ boat fishing | ☐ hunting |
| ☐ wade fishing | ☐ bank fishing | |
| ☐ other activity (please specify): _____) | | |

6. For each activity that you checked in Question 5, please indicate the month, or months, during which you engaged in this activity (Circle all the months that apply for each activity that you identified in Question 5).

Canoeing/kayaking –

( JAN FEB MAR APR MAY JUN JULY AUG SEP OCT )

_____

Boat fishing –

( JAN FEB MAR APR MAY JUN JULY AUG SEP OCT )

_____

Hunting–

( JAN FEB MAR APR MAY JUN JULY AUG SEP OCT )

_____

Wade fishing–

( JAN FEB MAR APR MAY JUN JULY AUG SEP OCT )

_____

Bank fishing–

( JAN FEB MAR APR MAY JUN JULY AUG SEP OCT )

_____

Other activity–

( JAN FEB MAR APR MAY JUN JULY AUG SEP OCT )

_____

7. For each activity that you identified in Question 5, please indicate what flow level (in cubic feet per second ["cfs"]) you would consider "preferred" for that activity. If a wider range of flows is acceptable for that activity, please check all flow ranges that apply. If you only know river stage, please identify the river stage under "Other flow or river stage". If you do not know flow in cfs or river stage, please skip to Question 8.

Canoeing/kayaking –

- ☐ 0-499 cfs
- ☐ 500-999 cfs
- ☐ 1,000-1,499 cfs
- ☐ 1,500-1,999 cfs
- ☐ 2,000-2,999 cfs
- ☐ 3,000 – 4,999 cfs
- ☐ 5,000 cfs and above
- ☐ Other flow or river stage (please list) _____

Boat fishing –

- ☐ 0-499 cfs
- ☐ 500-999 cfs
- ☐ 1,000-1,499 cfs
- ☐ 1,500-1,999 cfs
- ☐ 2,000-2,999 cfs
- ☐ 3,000 – 4,999 cfs
- ☐ 5,000 cfs and above
- ☐ Other flow or river stage (please list) _____

(Question 7 continued on next page)

Hunting–

- 0-499 cfs
- 500-999 cfs
- 1,000-1,499 cfs
- 1,500-1,999 cfs
- 2,000-2,999 cfs
- 3,000 – 4,999 cfs
- 5,000 cfs and above
- Other flow or river stage (please list) _____

Wade fishing–

- 0-499 cfs
- 500-999 cfs
- 1,000-1,499 cfs
- 1,500-1,999 cfs
- 2,000-2,999 cfs
- 3,000 – 4,999 cfs
- 5,000 cfs and above
- Other flow or river stage (please list) _____

(Question 7 continued on next page)

Bank fishing–

- 0-499 cfs
- 500-999 cfs
- 1,000-1,499 cfs
- 1,500-1,999 cfs
- 2,000-2,999 cfs
- 3,000 – 4,999 cfs
- 5,000 cfs and above
- Other flow or river stage (please list) _____

Other Activity– (please list activity) _____

- 0-499 cfs
- 500-999 cfs
- 1,000-1,499 cfs
- 1,500-1,999 cfs
- 2,000-2,999 cfs
- 3,000 – 4,999 cfs
- 5,000 cfs and above
- Other flow or river stage (please list) _____

8. Do you have any comments about recreational use on the Broad River, below Parr Shoals Dam? (*Please fill in blank and be as specific as possible.*)

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

9. Contact Information (*optional*):

Name: _____

Organization: _____

Phone Number or Email address: _____

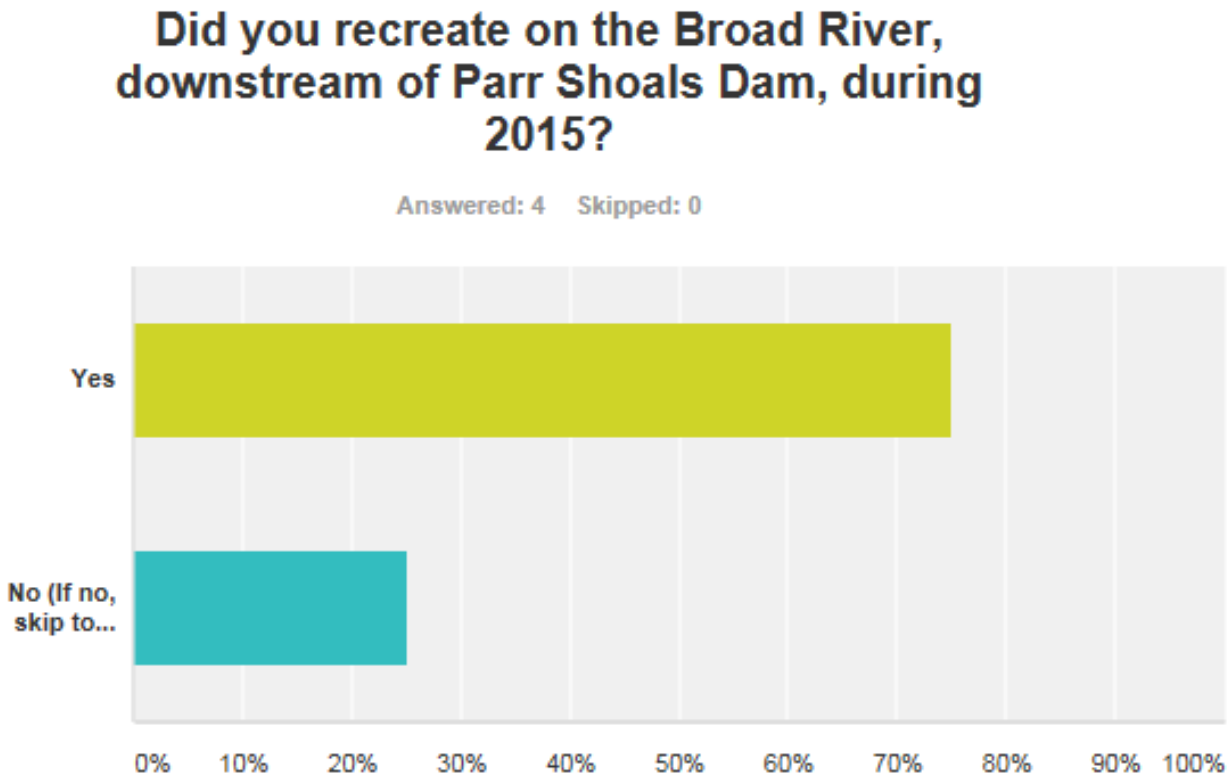
_____

**THANK YOU FOR YOUR HELP!**

# APPENDIX B

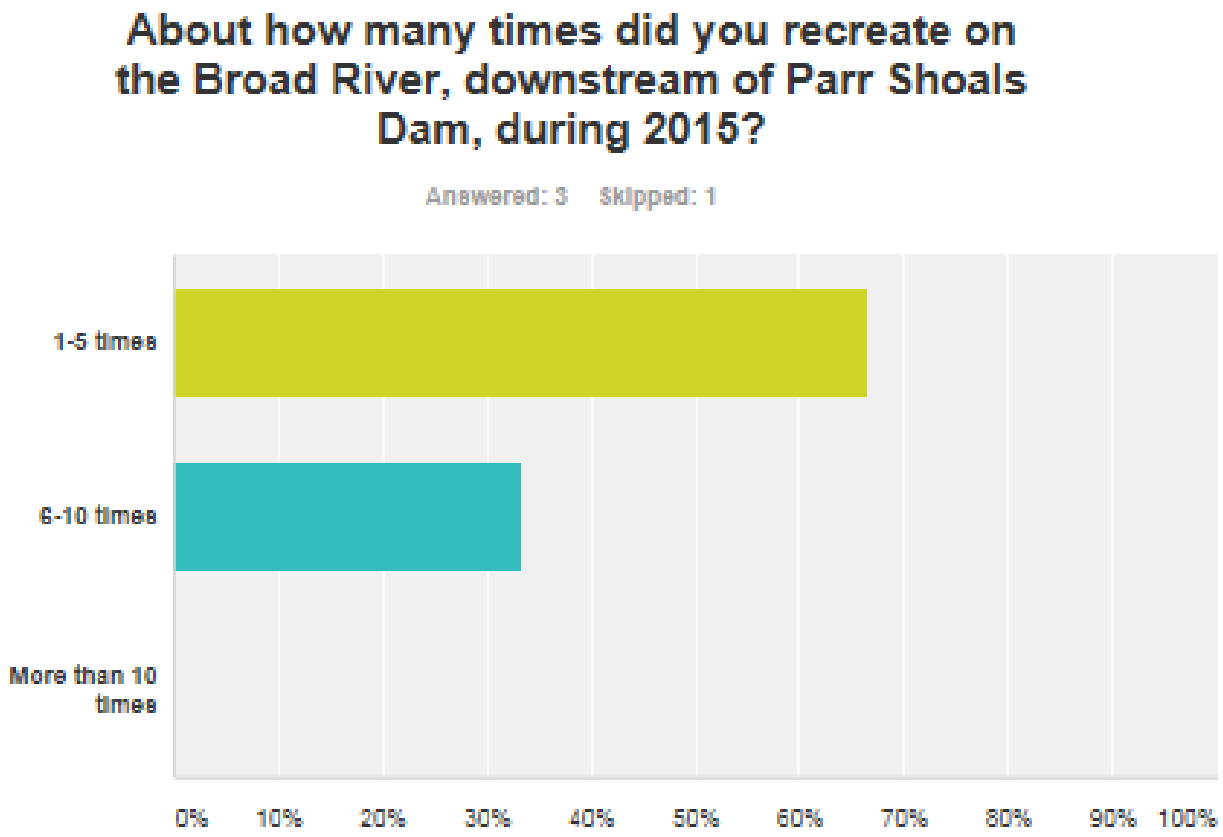
# SURVEY RESPONSE FIGURES

**FIGURE 1 – SURVEY RESPONSE FOR QUESTION 1**



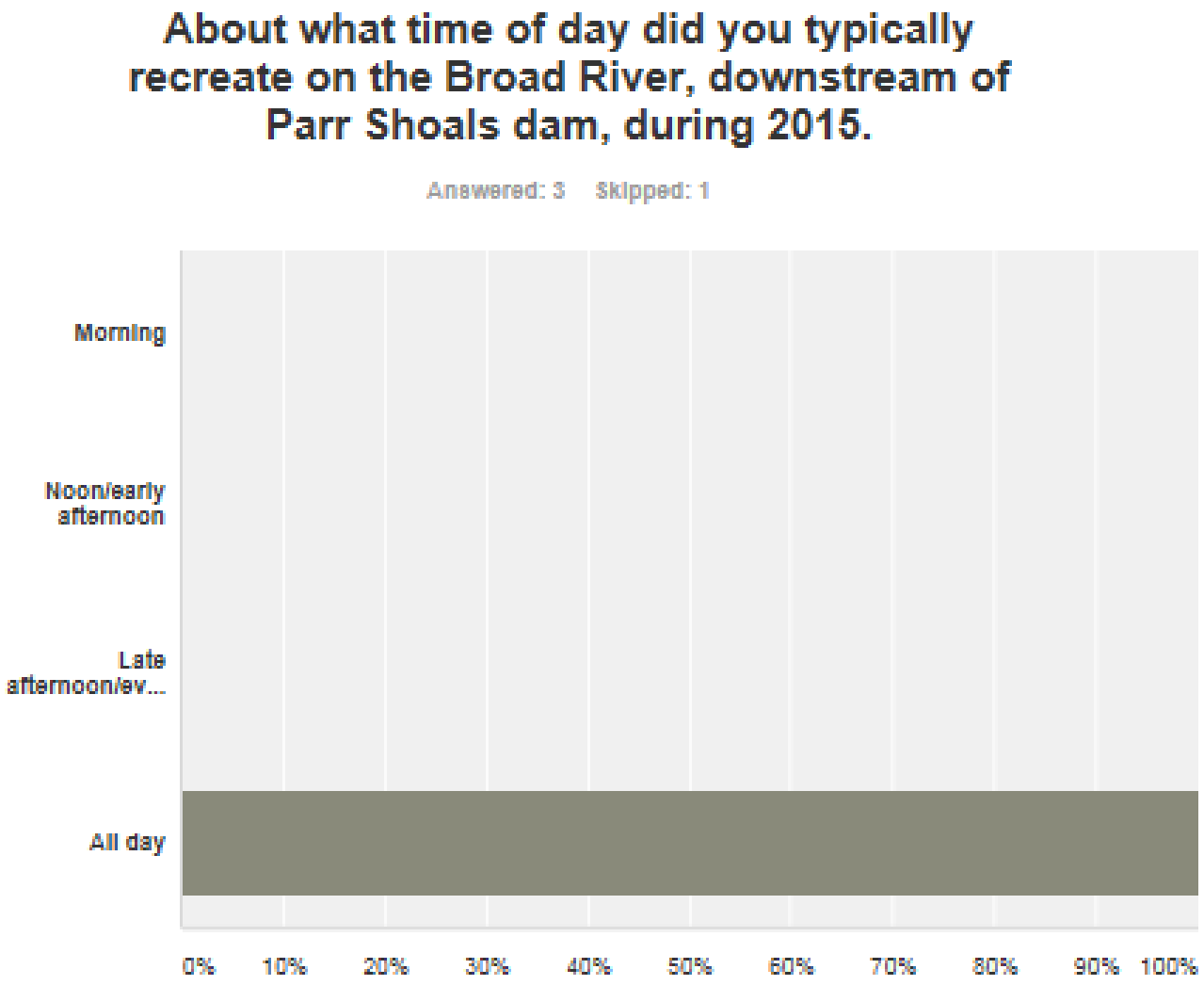

| Answer Choices | Responses | |
|---|---|---|
| **Yes** | **75.00%** | 3 |
| **No (If no, skip to Question 8)** | **25.00%** | 1 |
| Total | | 4 |

**FIGURE 2 – SURVEY RESPONSE FOR QUESTION 2**



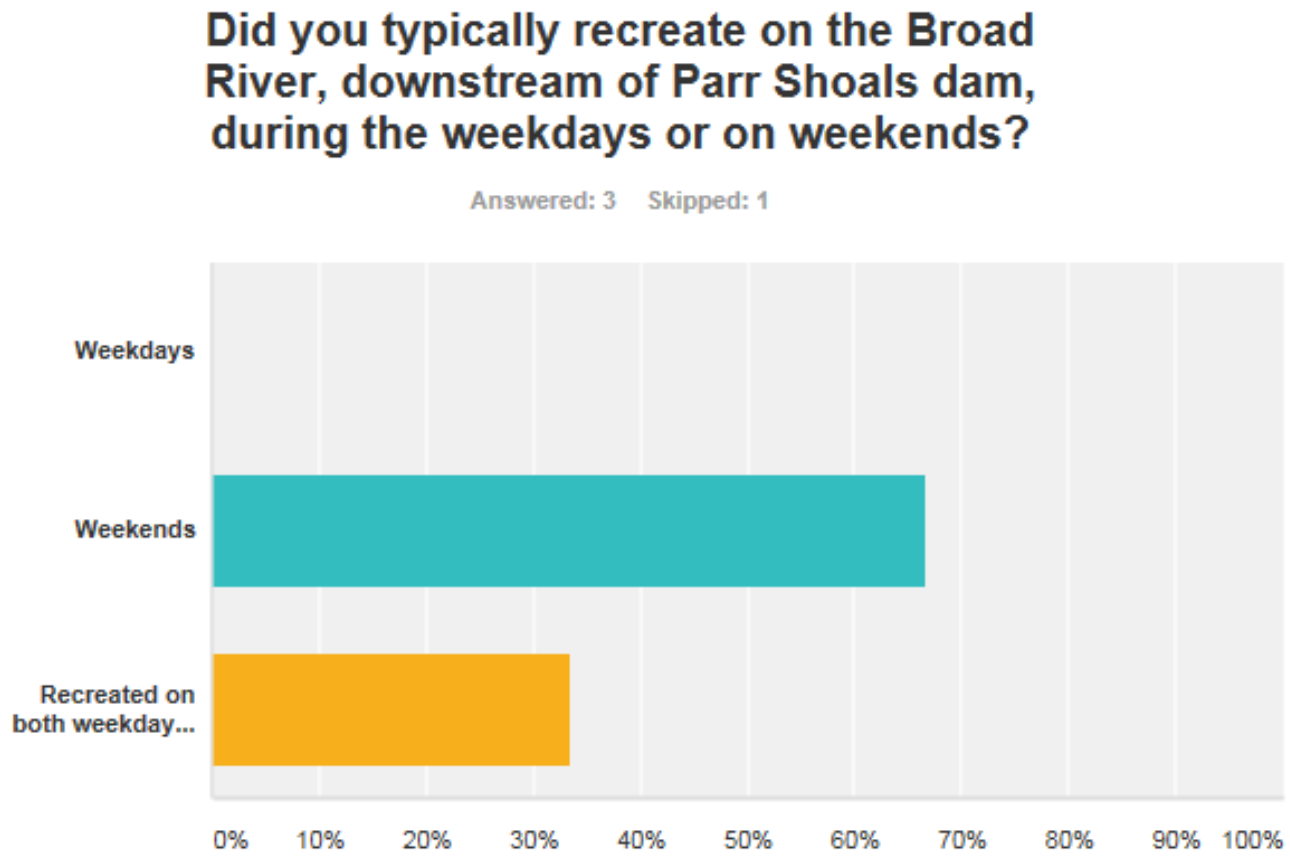

| Answer Choices | Responses | |
|---|---|---|
| 1-5 times | 66.67% | 2 |
| 6-10 times | 33.33% | 1 |
| More than 10 times | 0.00% | 0 |
| Total | | 3 |

**FIGURE 3 – SURVEY RESPONSE FOR QUESTION 3**



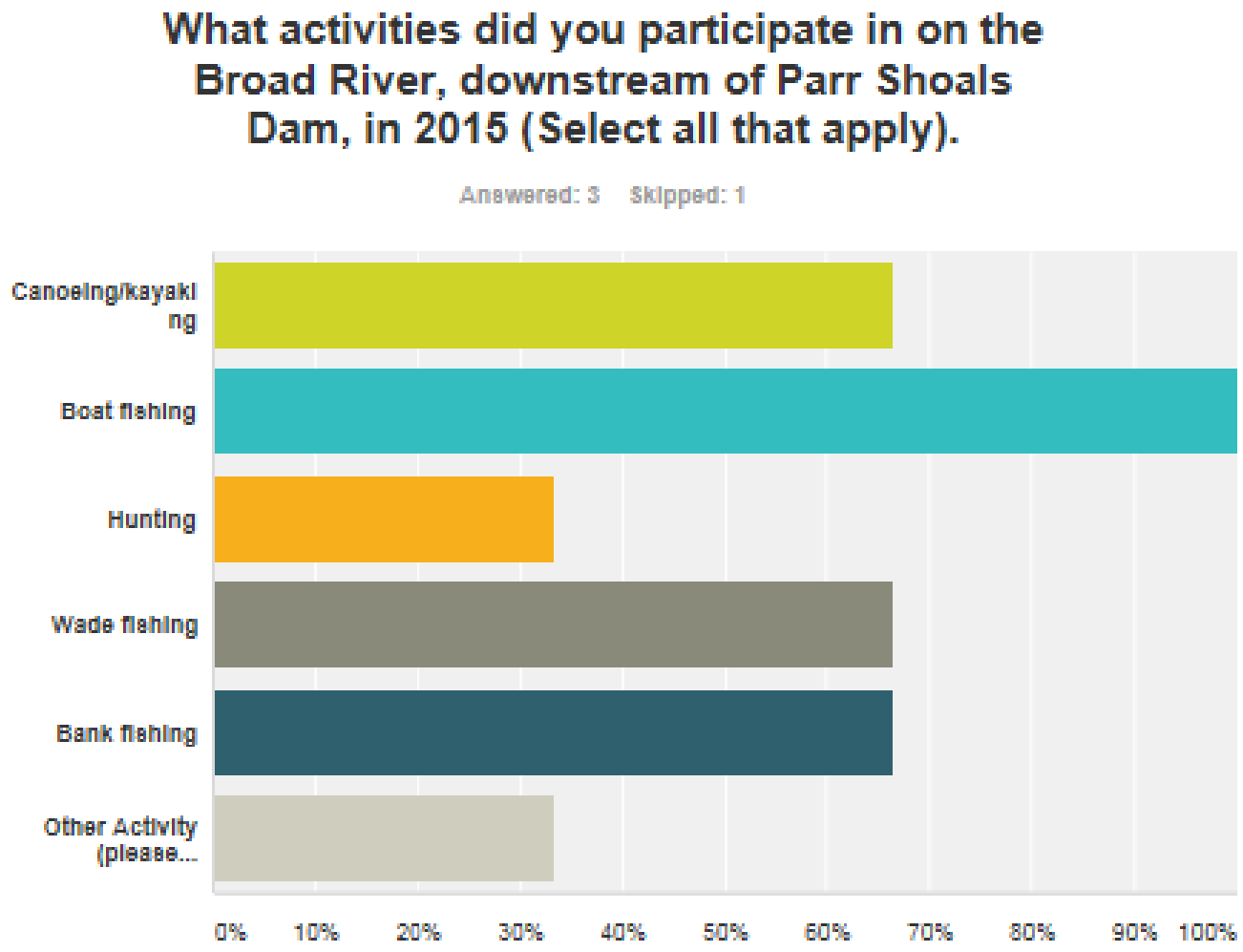

| Answer Choices | Responses | |
|---|---|---|
| Morning | 0.00% | 0 |
| Noon/early afternoon | 0.00% | 0 |
| Late afternoon/evening | 0.00% | 0 |
| All day | 100.00% | 3 |
| Total | | 3 |

**FIGURE 4 – SURVEY RESPONSE FOR QUESTION 4**




| Answer Choices | Responses | |
|---|---|---|
| Weekdays | 0.00% | 0 |
| Weekends | 66.67% | 2 |
| Recreated on both weekdays and weekends equally | 33.33% | 1 |
| Total | | 3 |

**FIGURE 5 – SURVEY RESPONSE FOR QUESTION 5**




| Answer Choices | | Responses | |
|---|---|---|---|
| Canoeing/kayaking | | 66.67% | 2 |
| Boat fishing | | 100.00% | 3 |
| Hunting | | 33.33% | 1 |
| Wade fishing | | 66.67% | 2 |
| Bank fishing | | 66.67% | 2 |
| Other Activity (please specify) | Responses | 33.33% | 1 |
| Total Respondents: 3 | | | |

**FIGURE 6 – SURVEY RESPONSE FOR QUESTION 6**

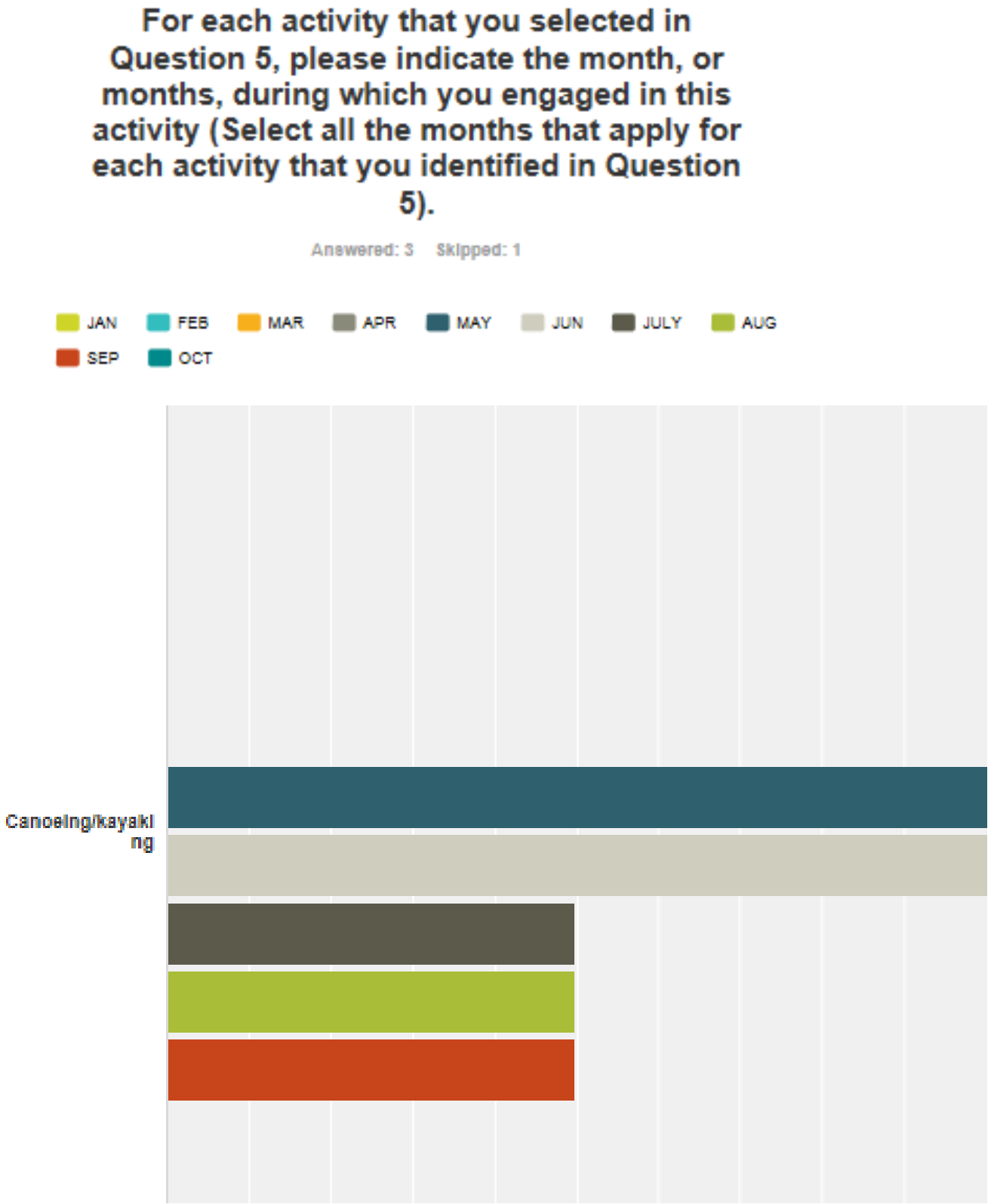


**FIGURE 7 – SURVEY RESPONSE FOR QUESTION 6 (CONT.)**

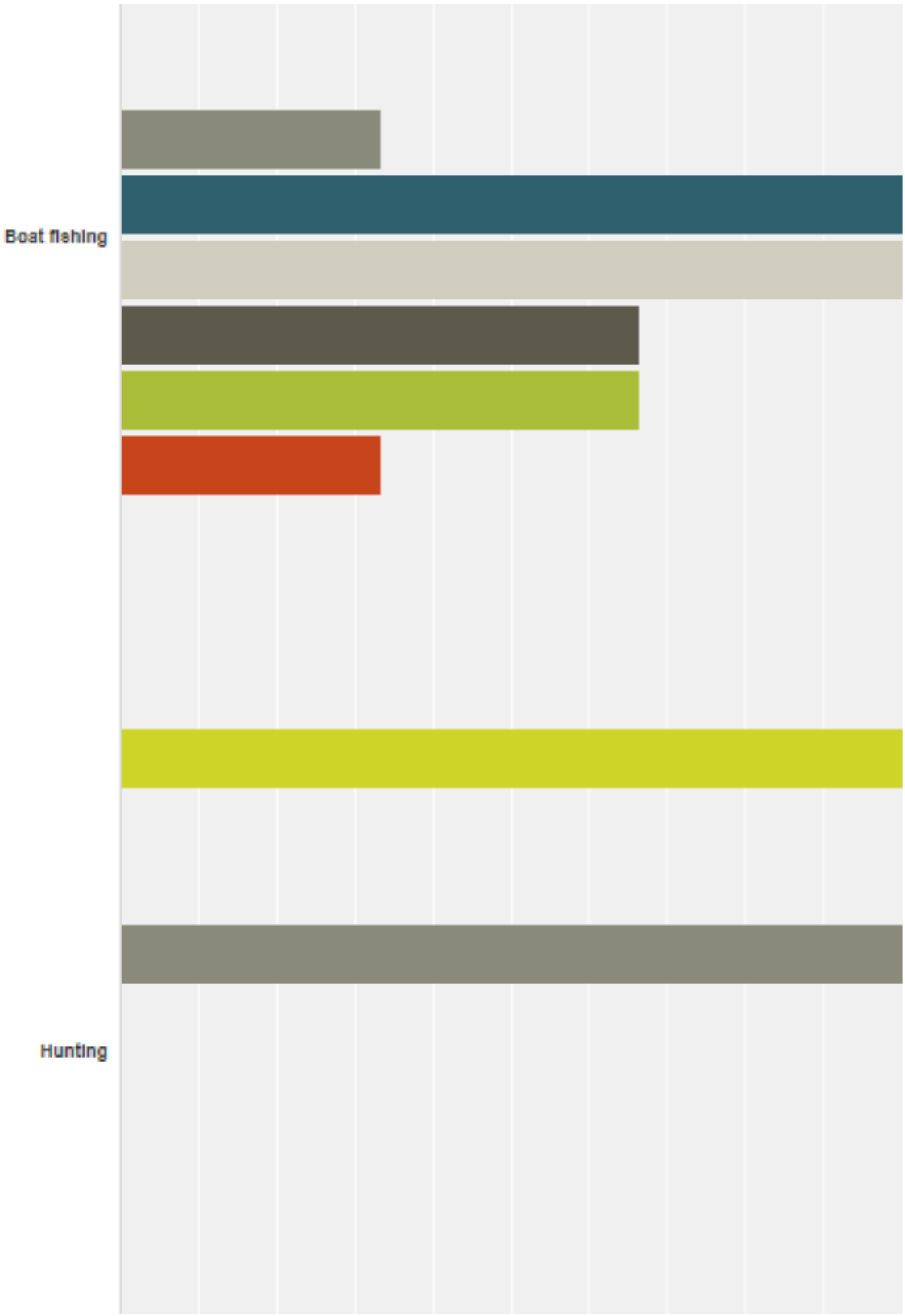


**FIGURE 8 – SURVEY RESPONSE FOR QUESTION 6 (CONT.)**

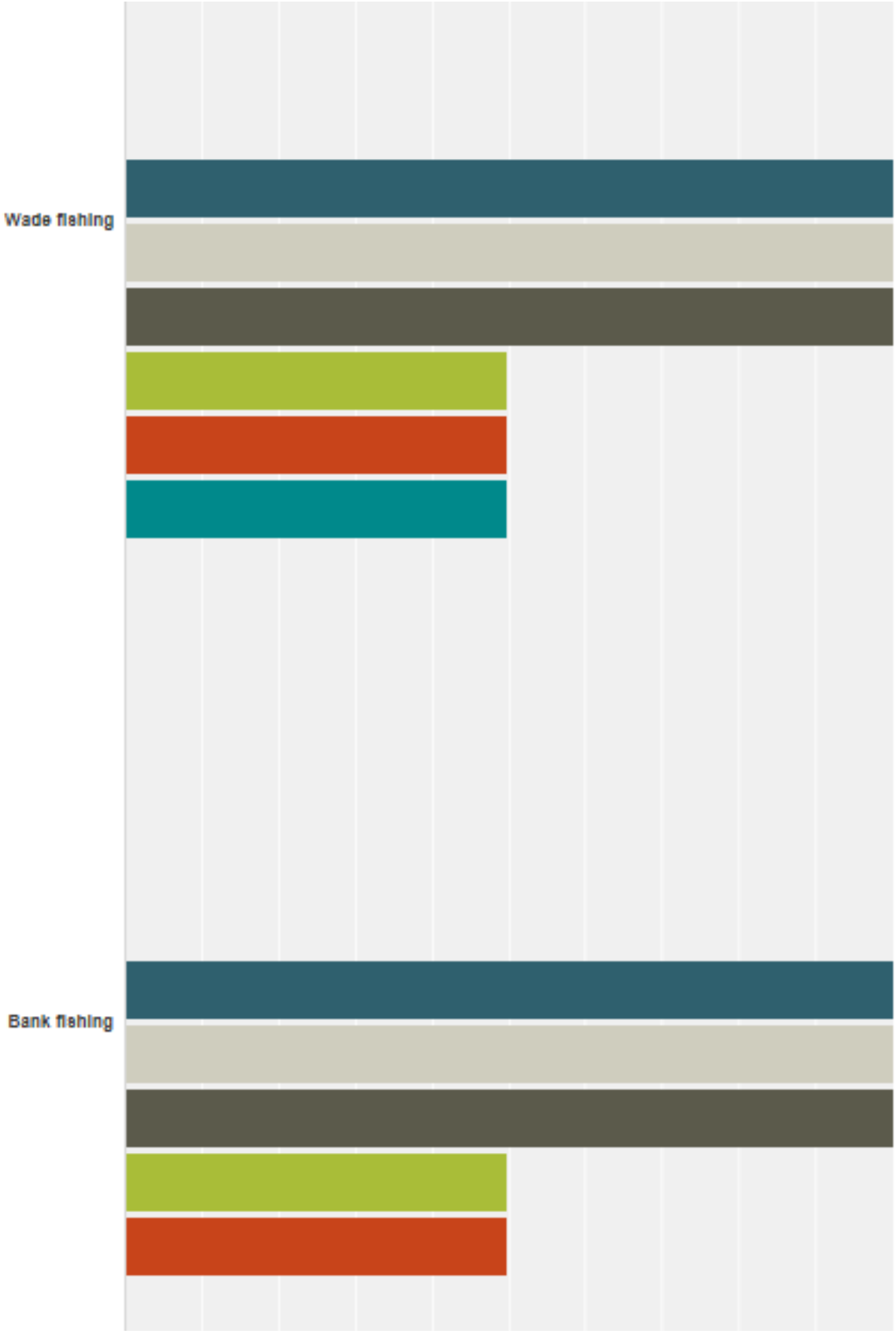
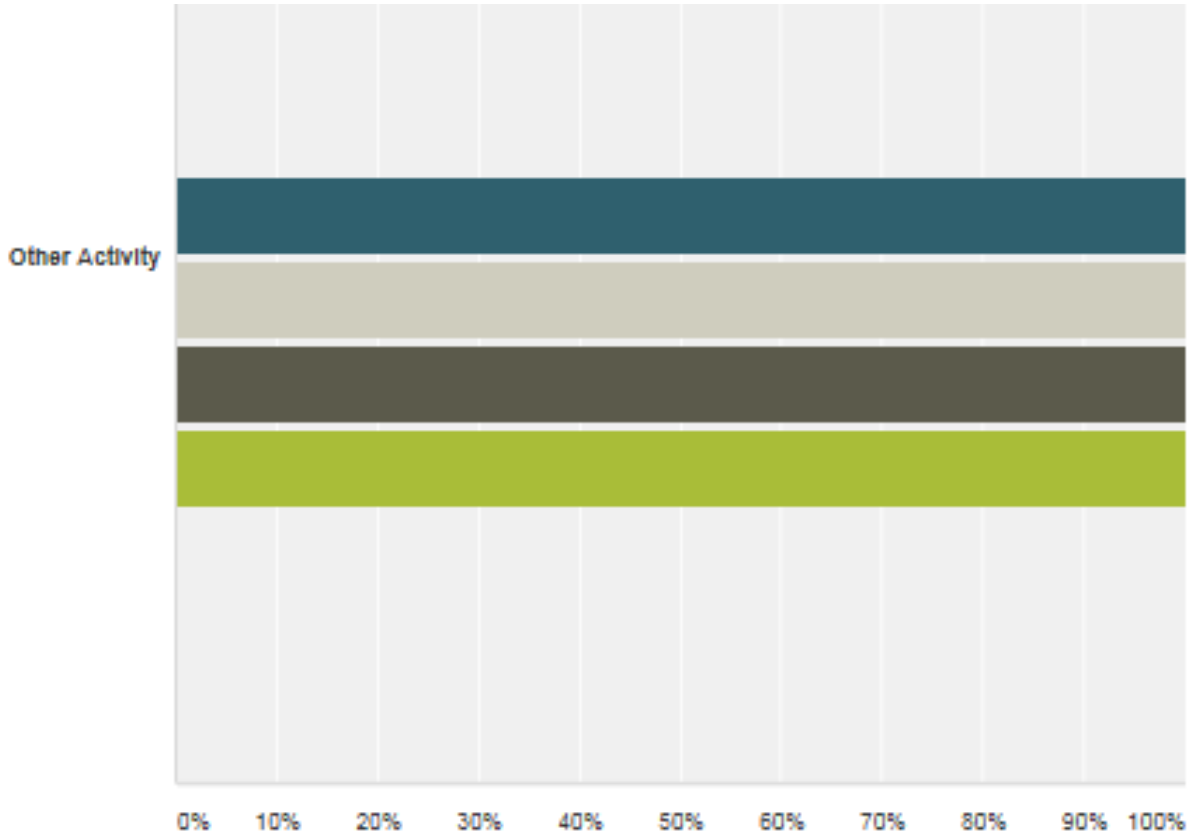


**FIGURE 9 – SURVEY RESPONSE FOR QUESTION 6 (CONT.)**




| | JAN | FEB | MAR | APR | MAY | JUN | JULY | AUG | SEP | OCT | Total Respondents |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Canoeing/kayaking | 0.00% 0 | 0.00% 0 | 0.00% 0 | 0.00% 0 | 100.00% 2 | 100.00% 2 | 50.00% 1 | 50.00% 1 | 50.00% 1 | 0.00% 0 | 2 |
| Boat fishing | 0.00% 0 | 0.00% 0 | 0.00% 0 | 33.33% 1 | 100.00% 3 | 100.00% 3 | 66.67% 2 | 66.67% 2 | 33.33% 1 | 0.00% 0 | 3 |
| Hunting | 100.00% 1 | 0.00% 0 | 0.00% 0 | 100.00% 1 | 0.00% 0 | 0.00% 0 | 0.00% 0 | 0.00% 0 | 0.00% 0 | 0.00% 0 | 1 |
| Wade fishing | 0.00% 0 | 0.00% 0 | 0.00% 0 | 0.00% 0 | 100.00% 2 | 100.00% 2 | 100.00% 2 | 50.00% 1 | 50.00% 1 | 50.00% 1 | 2 |
| Bank fishing | 0.00% 0 | 0.00% 0 | 0.00% 0 | 0.00% 0 | 100.00% 2 | 100.00% 2 | 100.00% 2 | 50.00% 1 | 50.00% 1 | 0.00% 0 | 2 |
| Other Activity | 0.00% 0 | 0.00% 0 | 0.00% 0 | 0.00% 0 | 100.00% 1 | 100.00% 1 | 100.00% 1 | 100.00% 1 | 0.00% 0 | 0.00% 0 | 1 |

**FIGURE 10 – SURVEY RESPONSE FOR QUESTION 7**

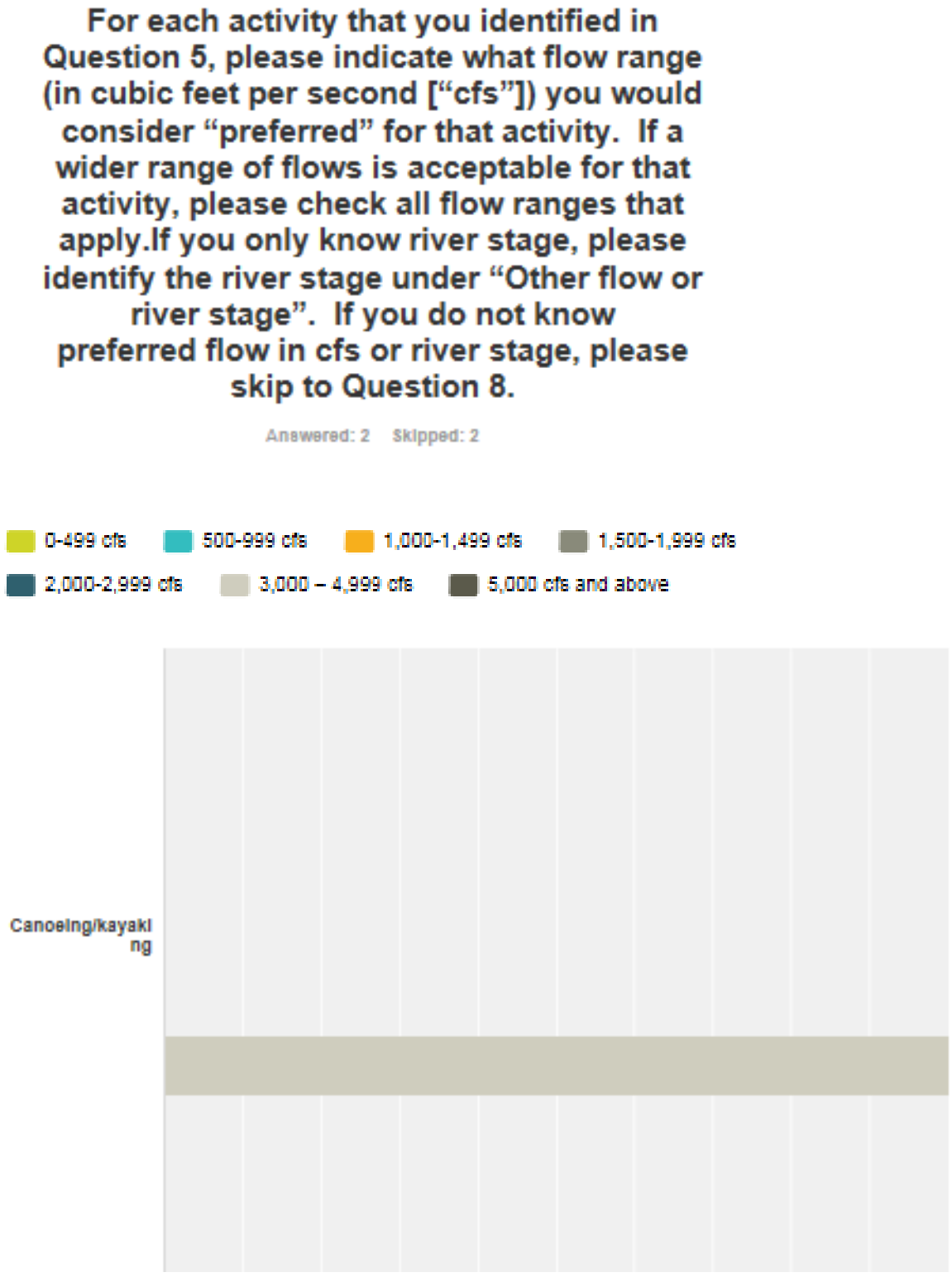


**FIGURE 11 – SURVEY RESPONSE FOR QUESTION 7 (CONT.)**

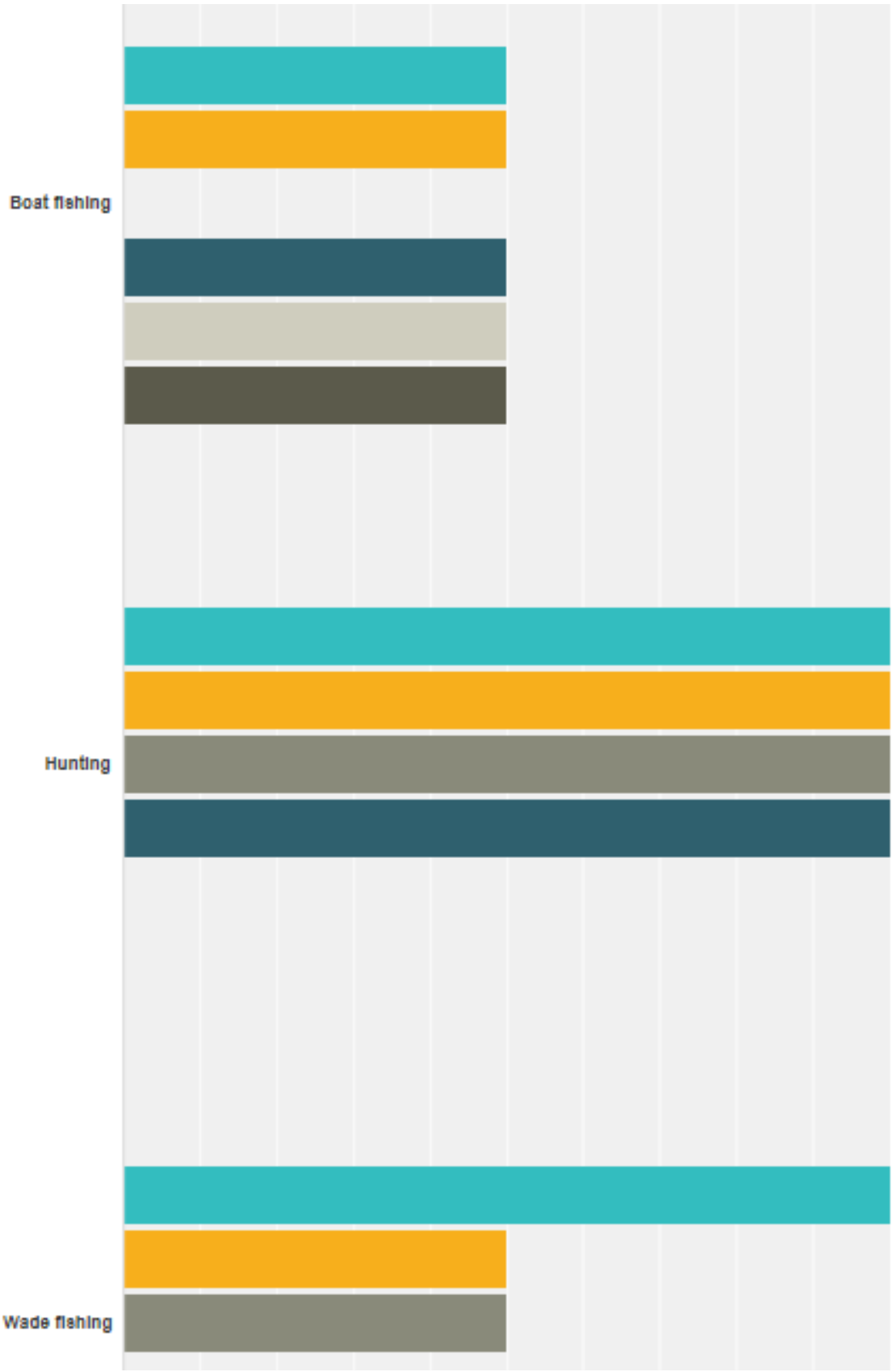


**FIGURE 12 – SURVEY RESPONSE FOR QUESTION 7 (CONT.)**

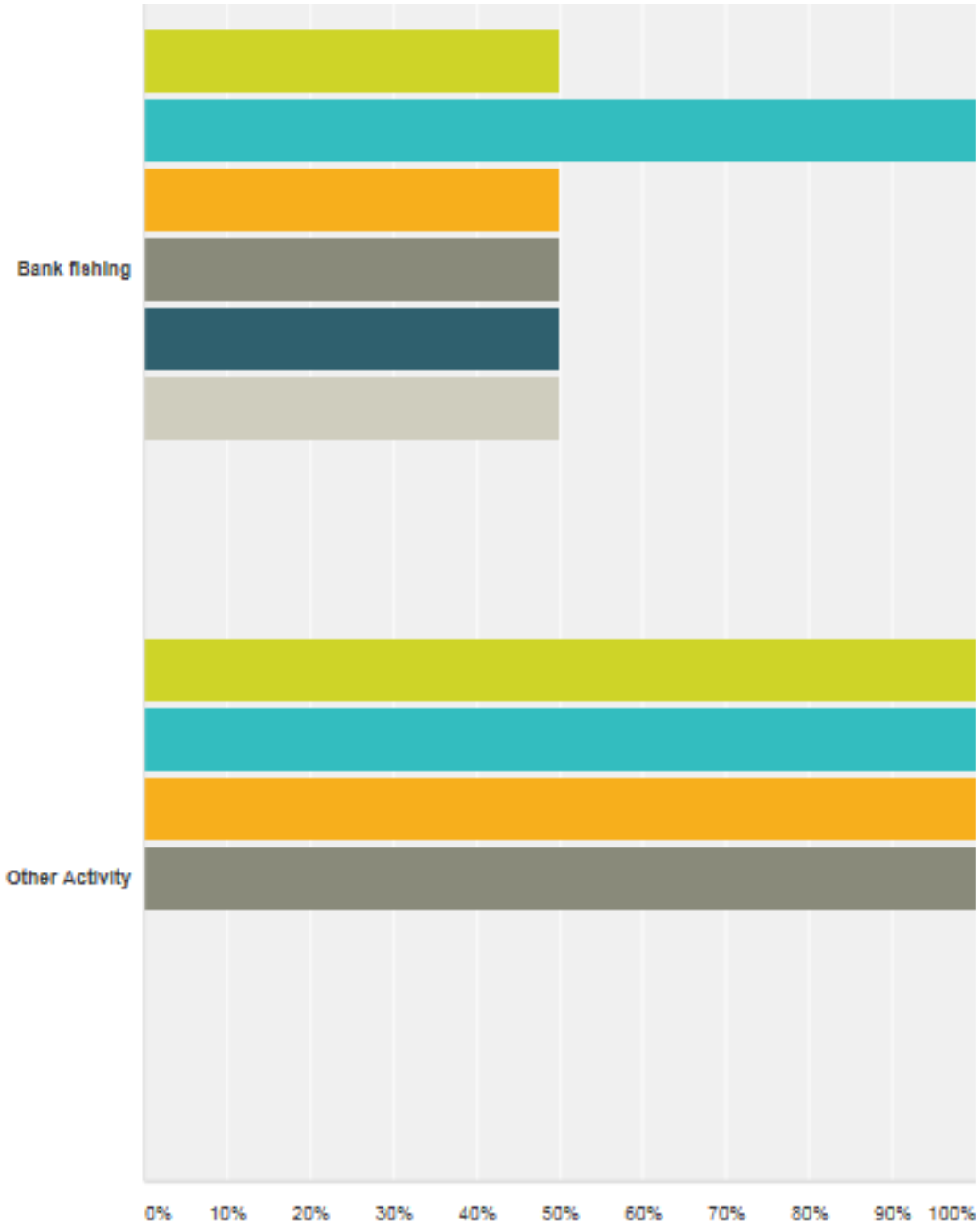


**FIGURE 13 – SURVEY RESPONSE FOR QUESTION 7 (CONT.)**

| | 0-499 cfs | 500-999 cfs | 1,000-1,499 cfs | 1,500-1,999 cfs | 2,000-2,999 cfs | 3,000 – 4,999 cfs | 5,000 cfs and above | Total Respondents |
|---|---|---|---|---|---|---|---|---|
| Canoeing/kayaking | 0.00% 0 | 0.00% 0 | 0.00% 0 | 0.00% 0 | 0.00% 0 | 100.00% 1 | 0.00% 0 | 1 |
| Boat fishing | 0.00% 0 | 50.00% 1 | 50.00% 1 | 0.00% 0 | 50.00% 1 | 50.00% 1 | 50.00% 1 | 2 |
| Hunting | 0.00% 0 | 100.00% 1 | 100.00% 1 | 100.00% 1 | 100.00% 1 | 0.00% 0 | 0.00% 0 | 1 |
| Wade fishing | 0.00% 0 | 100.00% 2 | 50.00% 1 | 50.00% 1 | 0.00% 0 | 0.00% 0 | 0.00% 0 | 2 |
| Bank fishing | 50.00% 1 | 100.00% 2 | 50.00% 1 | 50.00% 1 | 50.00% 1 | 50.00% 1 | 0.00% 0 | 2 |
| Other Activity | 100.00% 1 | 100.00% 1 | 100.00% 1 | 100.00% 1 | 0.00% 0 | 0.00% 0 | 0.00% 0 | 1 |

Comments (2)

Categorize as... | Filter by Category | Search responses

Showing 2 responses

Swimming
11/22/2015 8:22 AM View respondent's answers

3.5 to 5 ft stage for both
11/9/2015 1:59 PM View respondent's answers

**FIGURE 14 – SURVEY RESPONSE FOR QUESTION 8**

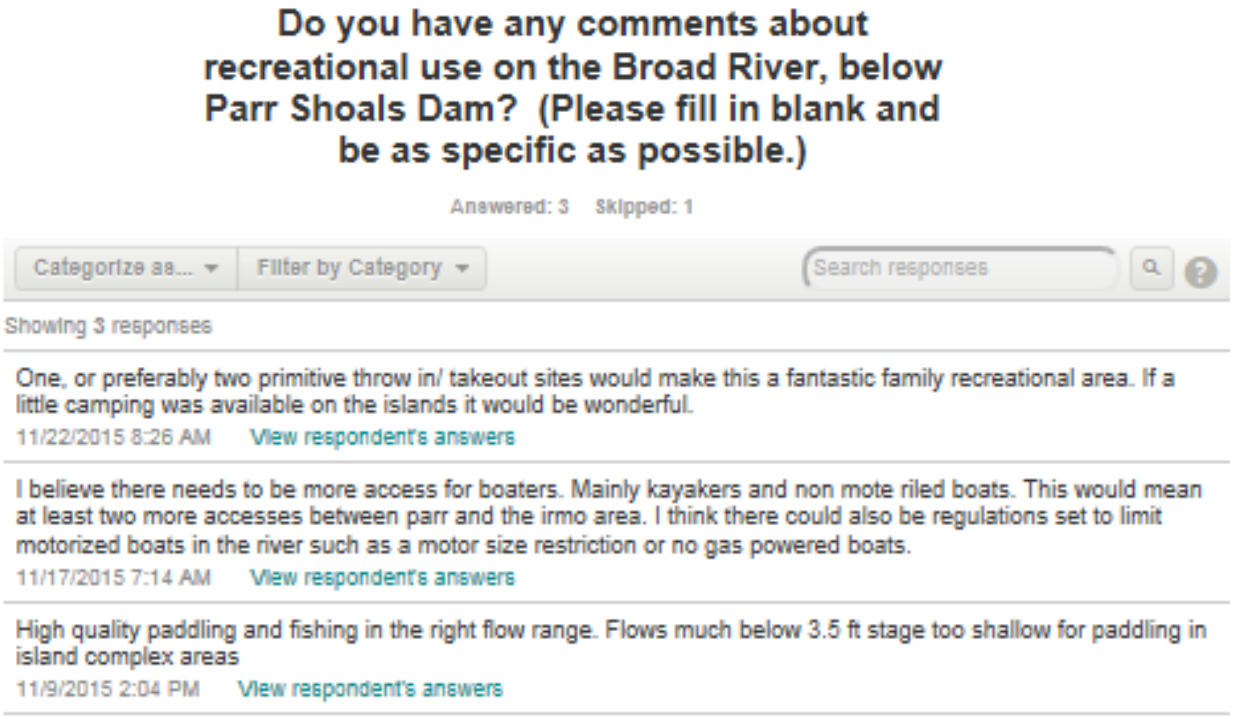


**FIGURE 15 – SURVEY RESPONSE FOR QUESTION 9**

## Contact Information (optional)

Answered: 3 Skipped: 1

| Answer Choices | | Responses | |
|---|---|---|---|
| Name | Responses | 100.00% | 3 |
| Organization | Responses | 100.00% | 3 |
| Address | Responses | 0.00% | 0 |
| Address 2 | Responses | 0.00% | 0 |
| City/Town | Responses | 0.00% | 0 |
| State/Province | Responses | 0.00% | 0 |
| ZIP/Postal Code | Responses | 0.00% | 0 |
| Country | Responses | 0.00% | 0 |
| Email Address | Responses | 100.00% | 3 |
| Phone Number | Responses | 100.00% | 3 |

# RECREATION TWC MEETING NOTES

## MAY 10, 2016

***MEETING NOTES***

***SOUTH CAROLINA ELECTRIC & GAS COMPANY***
***Recreation TWC Meeting***

***May 10, 2016***

Final KMK 06-03-16

*ATTENDEES:*

Bill Argentieri (SCE&G)
Ray Ammarell (SCE&G)
Steve Summer (SCANA)
Brandon Stutts (SCANA)
Caleb Gaston (SCANA)
Beth Trump (SCE&G)
Randy Mahan (SCE&G)
Bill Marshall (SCDNR)
Dick Christie (SCDNR)
Fritz Rohde (NOAA) via conference call
Gerrit Jobsis (American Rivers)
Bill Stangler (Congaree Riverkeeper)
Charlene Coleman (American Whitewater)
Stuart Greeter
Henry Mealing (Kleinschmidt)
Alison Jakupca (Kleinschmidt)
Shane Boring (Kleinschmidt)
Kelly Kirven (Kleinschmidt)

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*These notes are a summary of the major points presented during the meeting and are not intended to be a transcript or analysis of the meeting.*

Alison opened the meeting with introductions and then reviewed the two objectives of the meeting: (1) to discuss the final Downstream Navigational Flows Assessment Report and determine if any additional follow-up is needed; and (2) to discuss the Downstream Recreation Flow User Survey Memo and identify recreation flow recommendations for the operations model. Alison reminded the group that the TWCs and RCGs will need to work together to balance the flow recommendations for the various resources (e.g., aquatic, recreation, navigation).

*Downstream Navigational Flows Assessment Report*

Shane reviewed the Downstream Navigational Flows Assessment Study Plan with the group, and discussed the two ledges that were identified as potential areas where navigation could be an issue. He explained that Ledge 1 was originally identified during scoping of the IFIM study plan and Ledge 2 was added to the Navigational Flows study plan during the mesohabitat assessment. The criteria for one-way navigation is defined as a "minimum depth of one foot across a channel 10 feet wide or across 10 percent of the total stream width, whichever is greater. Minimum depth does not need to occur across a continuous 10 percent of the stream width, but each point of passage must be at least 10 feet wide." One-way navigation criteria are based on the passage of a 14 foot Jon-boat without a motor in the downstream direction only.

An Acoustic Doppler Current Profiler (ADCP) was used to collect bathymetry data at the two ledges when flows were at approximately 6,000 cfs. Shane showed the group a series of images that were included in the report. These images are attached to the end of these notes. Shane explained that the black line drawn across the first image of Ledge 1 maps out the most restrictive

portion of the ledge. ADCP data shows that Ledge 1 provides navigation passage that meets the SCDNR recommended criteria for one-way navigation at flows as low as 500 cfs. Shane stated that a 500 cfs flow provided a passage point that was 32% of the stream width.

According to the navigation criteria, Ledge 2 is navigable at flows as low as 1000 cfs. However, Shane pointed out that the ledge comes very close to meeting the criteria at a flow of 700 cfs and even 500 cfs. Although the criteria isn't met for providing navigation across 10 percent of the stream width, there are passage points that provide enough width for a 14 foot Jon-boat to pass through. Gerrit asked if there was a minimum width as part of the criteria and Shane said that it's either 10 feet or 10 percent of the stream width. So in the case of Ledge 2, there is a notch at 500 cfs that is wider than 10 feet, but it's not 10 percent of the stream width. Shane stated that at 1000 cfs the passage width is 82 ft (10% of the stream width); at 700 cfs the passage width is 67 ft (8% of the stream width); and at 500 cfs the passage width is 30 ft wide (4% of the stream width)

Bill Marshall mentioned that the Bookman Shoals complex is another area in the river where navigation can be difficult for paddlers at lower flows. Shane said that Bookman Shoals was considered for inclusion when the Navigational Flows study plan was being developed. However, this area will be studied in much greater detail during the IFIM study, so additional information will be coming with that report. Shane also mentioned that since Bookman Shoals is a very braided area of the river, although it is rocky, there are more navigation points than might be obvious at first glance.

Gerrit mentioned that the study plan allows for the possibility of a field assessment to verify the report results. He is interested in completing that component of the study. Alison said that the one-way navigation criteria also mentions that it shouldn't be necessary to get out and drag your boat in order to navigate an area of the river, and a field verification exercise would demonstrate if this is necessary at the recommended flows. Henry suggested that the field verification be scheduled after IFIM results are out. We will likely perform field observations for IFIM results and navigation passage at the same time later in August/September.

Steve asked how flows will be balanced if 1,000 cfs is agreed on as necessary for navigation but the 7Q10 is different flow. He mentioned that Parr Reservoir is not a storage reservoir that might allow for greater flexibility in downstream flows. Henry said that we will use the Operations Model to assist in balancing between flows and water availability. The TWC will use the Operations Model results to develop a recommendation for consideration by SCE&G. Henry agreed that this project does not have a storage reservoir, which means that recreation flows will be extremely difficult to schedule, unlike at Lake Murray. We also will likely have a caveat for downstream flows being linked to inflows as well.

Charlene asked how many Jon-boats are actually on the Broad River downstream of the Project. She believes that mostly kayaks and canoes are used on this area of the river, since access is not great for Jon-boats. Gerrit said there are actually quite a few Jon-boats that get out there, utilizing private access. Charlene said she would be interested in knowing navigation issues from people who actually use this area of the river versus what the navigational flows assessment showed. Alison said this is another reason for doing a field verification. The information collected during the field verification will be included in an addendum to the navigation study report.

Bill S. said that after talking with Steve de Kozlowski, he was concerned that in the report, a straight line of navigation was used, thus excluding the most restrictive navigation points in the ledges. Shane said that a straight line was not modeled, instead the ADCP was run back and forth over each ledge approximately 10-20 times. This captured a 3D image of each entire ledge. The one-way navigation criteria was then applied to the ledge, which is a linear criteria. The idea was to pick the most restrictive area within each ledge. The black line depicted in the 3D figures included in the report are then used as the bed profile in the second set of report figures and compared to the linear criteria.

Gerrit said that using this ADCP technology, in addition to finding the most restrictive point, you could also map out the best course for navigation at each ledge. Shane agreed, and said that a grid showing the entire ledge can be exported from the data collected and the navigation course could be depicted there. This would give a good representation of what the shoal actually looks like. The group agreed that it would be helpful to have maps of this information for the two ledges and for the Bookman Shoals complex (if possible) to use during the field verification.

The report will be modified to mention that a field verification will be completed. Comments received on the report from SCDNR, American Rivers and Congaree Riverkeeper will be added to the report in an appendix. Once the field verification is completed, an addendum will also be added to the report discussing the results.

*Downstream Recreation Flow User Survey Memo*

Alison began the discussion by giving some background information on the memo. The Downstream Recreation Flows Study Plan was developed and a Focus Group meeting was held in 2014 to discuss what experiences recreators were having on the river downstream of the Project and to identify preferred flows for various activities. During that meeting, flows were narrowed down to a few preferred ranges. The Operations Model needs more specific flows at a specific time for input, so the ranges need to be narrowed down.

A second Focus Group meeting was originally planned for 2015 to again gather information on recreation experiences, however a survey was developed and distributed as a way to capture additional information instead. Alison mentioned that only four people responded to the survey, with only three respondents indicating that they had recreated in the study area the previous recreation season. However, the results of the survey were similar to the Focus Group discussion from 2014. Flow recommendations coming out of the survey were 2,000-5,000 cfs during May and/or June for canoeing, kayaking and higher flow boat fishing, and 500-999 cfs during May, June and July for lower flow boat fishing, hunting, wade fishing and swimming. Alison asked the TWC if they agreed with these recommendations and said the goal is to narrow down the ranges to specific flows for the Operations Model. Henry mentioned that the lower flow recommendation of 500-999 cfs is very close to what the Navigational Flow Assessment recommended. He suggested the group focus on picking flows from the higher range to run through the Operations Model.

Ray mentioned that the flow duration curves in the PAD show historically what flows are available at specific times. For example, a flow of 5,000 cfs may only be available for 30 percent of the time in May. Bill A. also mentioned that the wording of the settlement agreement will need to have flexibility since these flows will only be available when inflows allow. Gerrit said the goal is to include something that allows for a specific flow on weekends during the recreation season during a

specific timeframe, such as 8 AM until 1 PM. Gerrit said the benefit of recreation flows is to have something that people can depend on and schedule around. Gerrit indicated that he would like to see an attempt by SCE&G to provide a scheduled recreation flow if the water is available. Bill A. said that having a window of 6 hours would be much more doable than a 12 hour window, or an entire weekend, if the water is available.

Henry suggested to the group that flows of 2,000, 3,500, and 5,000 cfs during a 6 hour window on the weekends of May, June and July be run through the model. After some discussion, the group excluded 5,000 cfs since this high flow is also unlikely to occur often and expanded the timeframe to include the recreation season (May through September). The group agreed on the following recommendation for recreation flows to be run through the Operations Model:

- Flows of 2,000 cfs and 3,500 cfs
- Focus on weekends and holidays during the recreation season (May through September)
- 6 hour window (approximately 8 AM until 2 PM)

The group agreed that IFIM recommendations will likely cover the lower ranges of flows which would be ideal for activities such as wade fishing.

The meeting adjourned and action items are listed below.

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*ACTION ITEMS:*

- Kleinschmidt will make maps for navigation through the two ledges and Bookman Shoals (if possible with the current data)
- SCE&G will schedule a field verification for navigation and fish habitat after the IFIM results are presented to the TWC for review.
- Kleinschmidt will add an appendix to the navigational flow report which will include the comments from SCDNR, American Rivers and Congaree Riverkeeper.
- Kleinschmidt will add an addendum to the Navigational Flows report which will include a report discussing the field verification results.