MEMORANDUM

TO: Parr/Fairfield Hydro Relicensing Instream Flow TWC

FROM: Shane Boring

DATE: January 8, 2014

RE: Mesohabitat Assessment

A mesohabitat assessment of the Broad River downstream of Parr Shoals Dam was completed by biologists from Kleinschmidt (Shane Boring), SCANA (Milton Quattlebaum) and the South Carolina Department of Natural Resources (Ron Ahle) during October and November of 2013. The assessment was conducted in support of the ongoing Parr/Fairfield Hydroelectric Project relicensing effort, and more specifically, in preparation for the upcoming Instream Flow Incremental Methodology (IFIM) and other studies. The purpose of the assessment was to classify and determine the quantity and spatial distribution of different mesohabitat types within the study area previously outlined by the Instream Flow Technical Working Committee (TWC) (Figure 1). These data will be used to weight the Weighted Usable Area (WUA) output from individual representative transects and study sites according to the relative abundance and distribution of the mesohabitat types throughout the study area.

"Mesohabitats" are generalized habitat types that are commonly used to describe stream habitat (i.e. riffle, run, pool). Acceptable mesohabitat definitions were determined in consultation with the Instream Flow TWC (See July 30, 2013 meeting notes), and include the following:

RIFFLE	Shallow, with moderate velocity, turbulent, high gradient, moderate to large substrates (cobble/gravel). Typically > 1% gradient.
GLIDE	Moderately shallow, well-defined non-turbulent laminar flow, transition from low to moderate velocity, lacking a definite thalweg, typically flat stream geometry, typically finer substrates, transitional from pool.
RUN	Moderately deep, well-defined non-turbulent laminar flow, range from low to moderate velocity, well-defined thalweg, typically concave stream geometry, varying substrates, gently downstream slope (<1%).
POOL	Deep, low to no velocity, well-defined hydraulic control at outlet.
RAPID/SHOAL	Shallow, with moderate to high velocity, turbulent, with chutes and eddies, high gradient, large substrates or bedrock. Typically >2% gradient.
BACKWATER	Varying depth, no or minimal velocity, off the primary channel flow.

ASSESSMENT METHODS

For purposes of the mesohabitat assessment, the approximately 18 mile-long study area was broken into the two reaches agreed upon during the June 2013 field reconnaissance: Reach One – extending from the Parr Shoals dam downstream to the Palmetto Trail trestle crossing and Reach Two – extending from the trestle to the downstream end of Bookman Island (Figure 1). The study area was traversed by canoe/kayak or on foot at flows ranging from approximately 1,000 to 2,200[1] cubic feet per second (cfs), and mesohabitats occurring in each reach were classified into one of the six categories described above.

Upstream and downstream boundaries of each mesohabitat segment were documented using a Garmin 60cs Global Position System (GPS). Although not included in this report, field observations regarding dominant substrate, overall cover quality[2], and approximate channel width were recorded should this information be needed at a later date (e.g., during IFIM modeling efforts). Reference photos for each mesohabitat type were also taken at selected locations. GPS data were incorporated into a Geographic Information System (ArcGIS) and area polygons constructed and calculated for each mesohabitat segment (Figure 2).

RESULTS

Area and proportion of mesohabitats occurring in each reach are illustrated below in Figures 2-6 and summarized in Table 1. Reach One is dominated by run habitats, with an abundance of shoal habitat associated primarily with the bedrock outcroppings at the base of the Parr Shoals Dam (Table 1; Figure 3). Reach Two, which is depicted as Reaches 2a, 2b and 2c for illustration purposes (Figures 4-6), is dominated by pool habitats, with the remainder primarily consisting of nearly equal proportions of shoals, riffle and run habitats (Table 1). No significant backwaters were observed during the survey.

Table 1. Proportions of Mesohabitats Occurring Downstream of Parr Shoals Dam

	Glide	Pool	Riffle	Shoal	Run
Reach One	**4%**	**18%**	**0%**	**31%**	**47%**
Reach Two	**6%**	**28%**	**21%**	**25%**	**20%**

[1] Small portions of Reach One were also observed at approximately 4000 cfs during wrap-up of field work in late-November 2013.

[2] Refers to the relative density of object cover such as boulders, logs, etc.

FIGURES

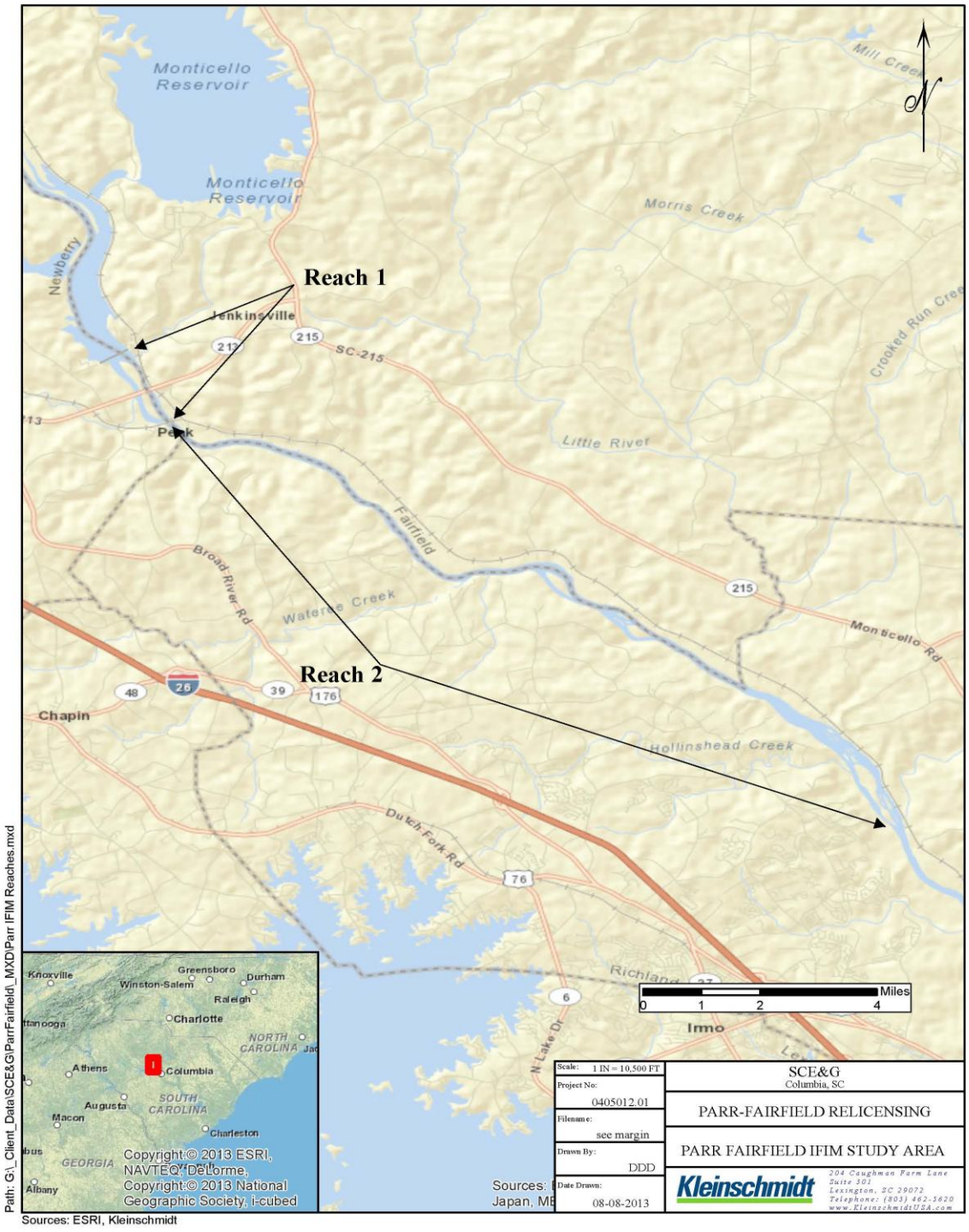

FIGURE 1 PARR-FAIRFIELD PROJECT, BROAD RIVER INSTREAM FLOW STUDY. IFIM STUDY REACHES

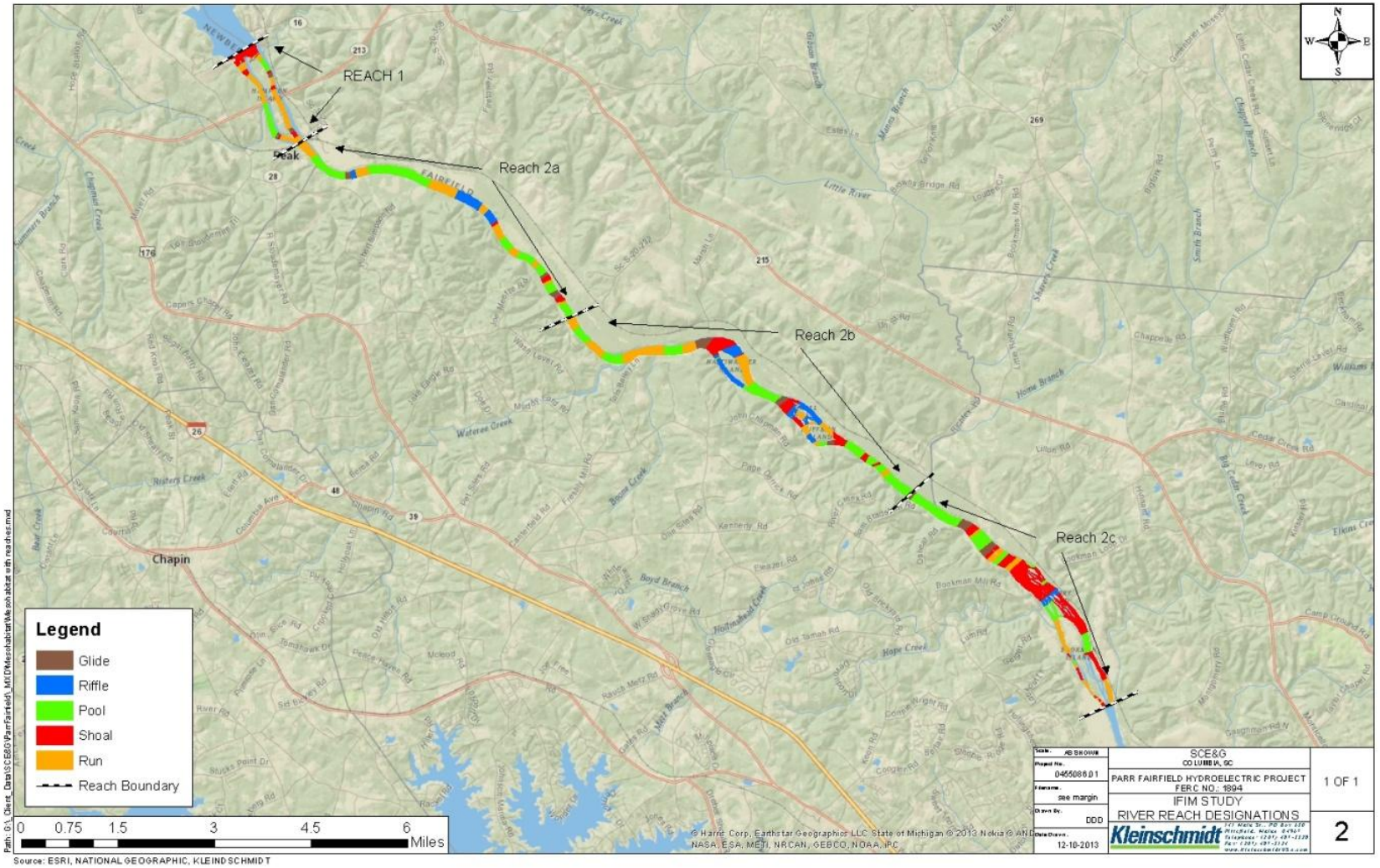

FIGURE 2 IFIM STUDY RIVER REACH DESIGNATIONS

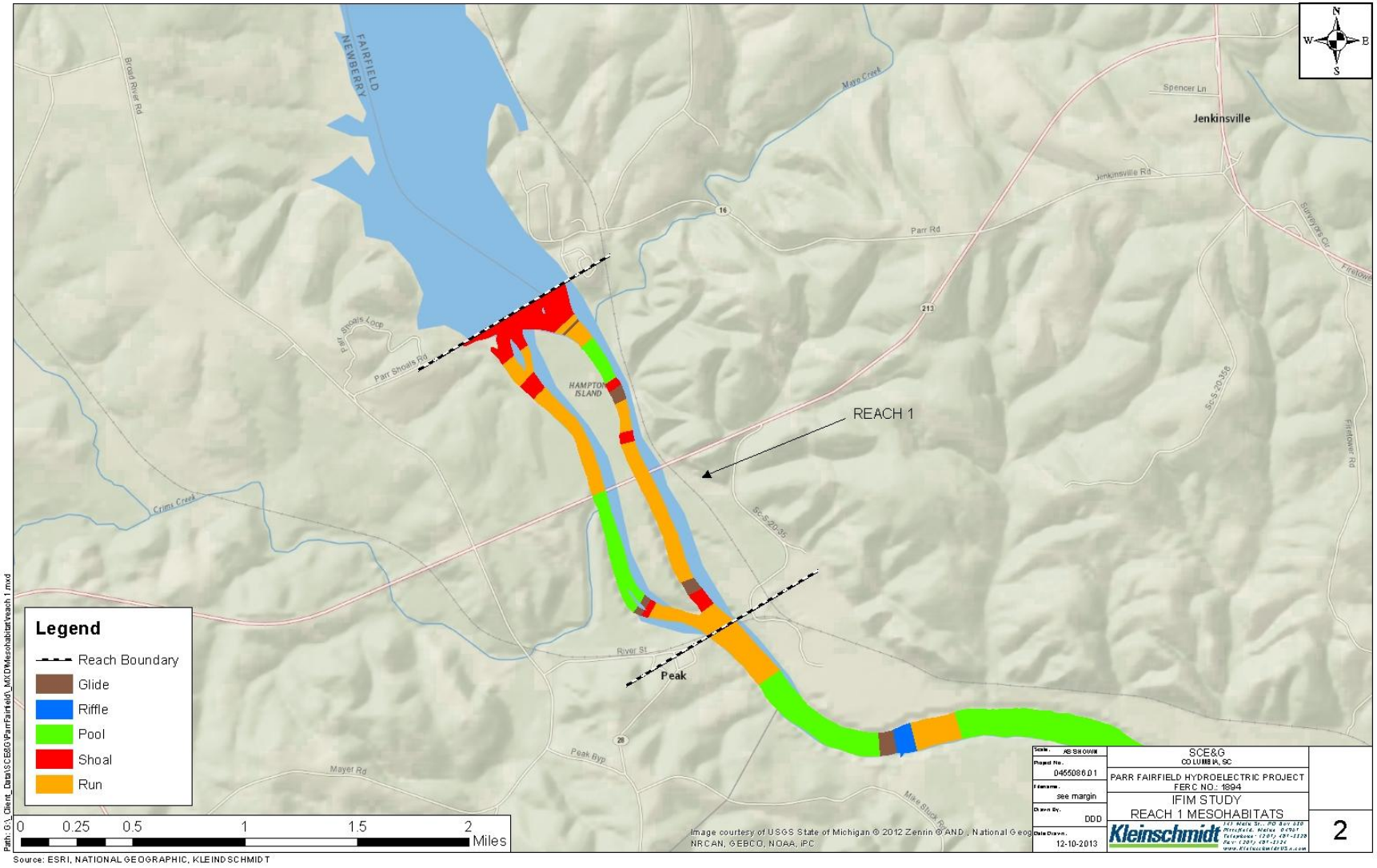

FIGURE 3 IFIM STUDY REACH 1 MESOHABITATS

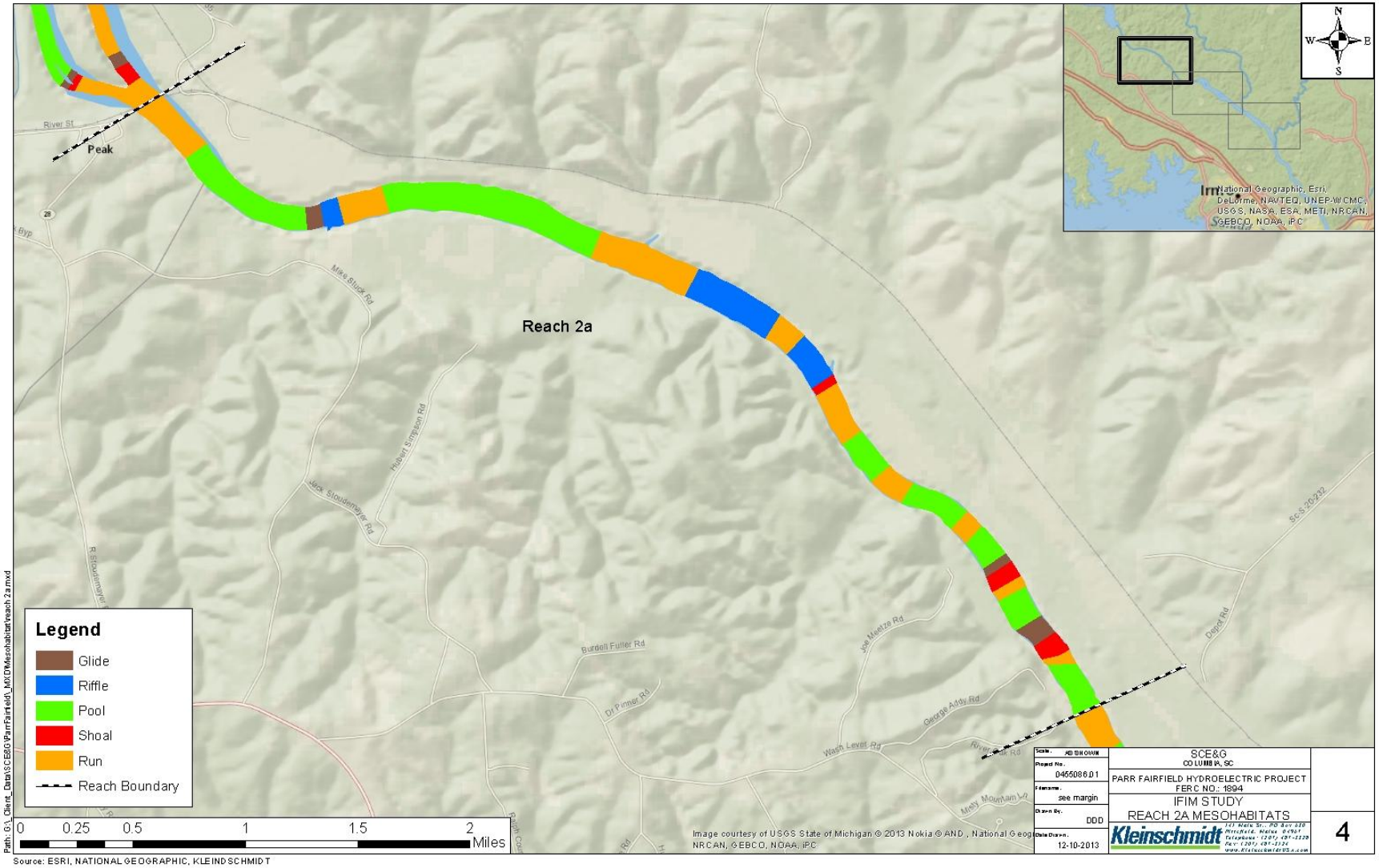

FIGURE 4 IFIM REACH 2A MESOHABITATS

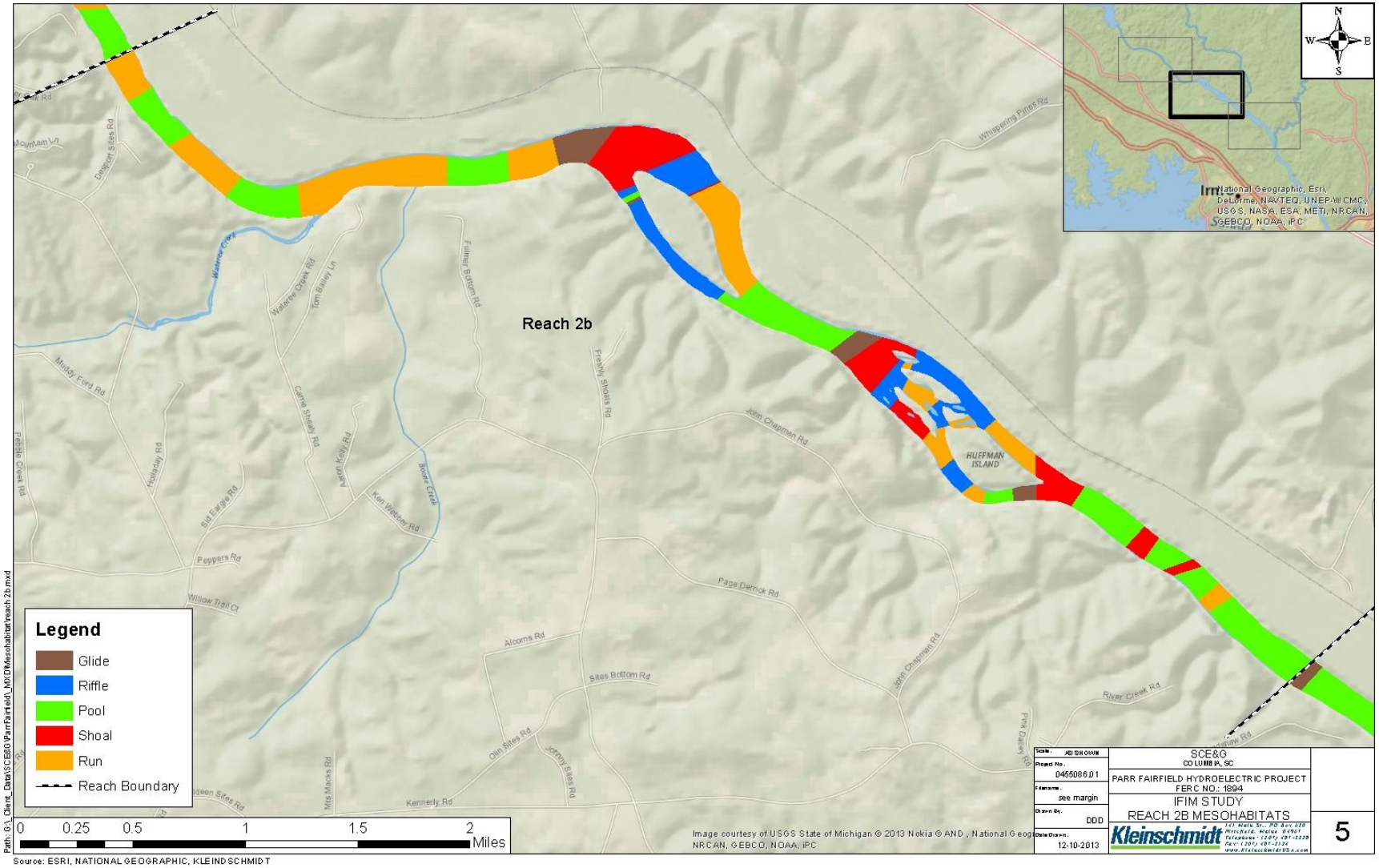

FIGURE 5 IFIM STUDY REACH 2B MESOHABITATS

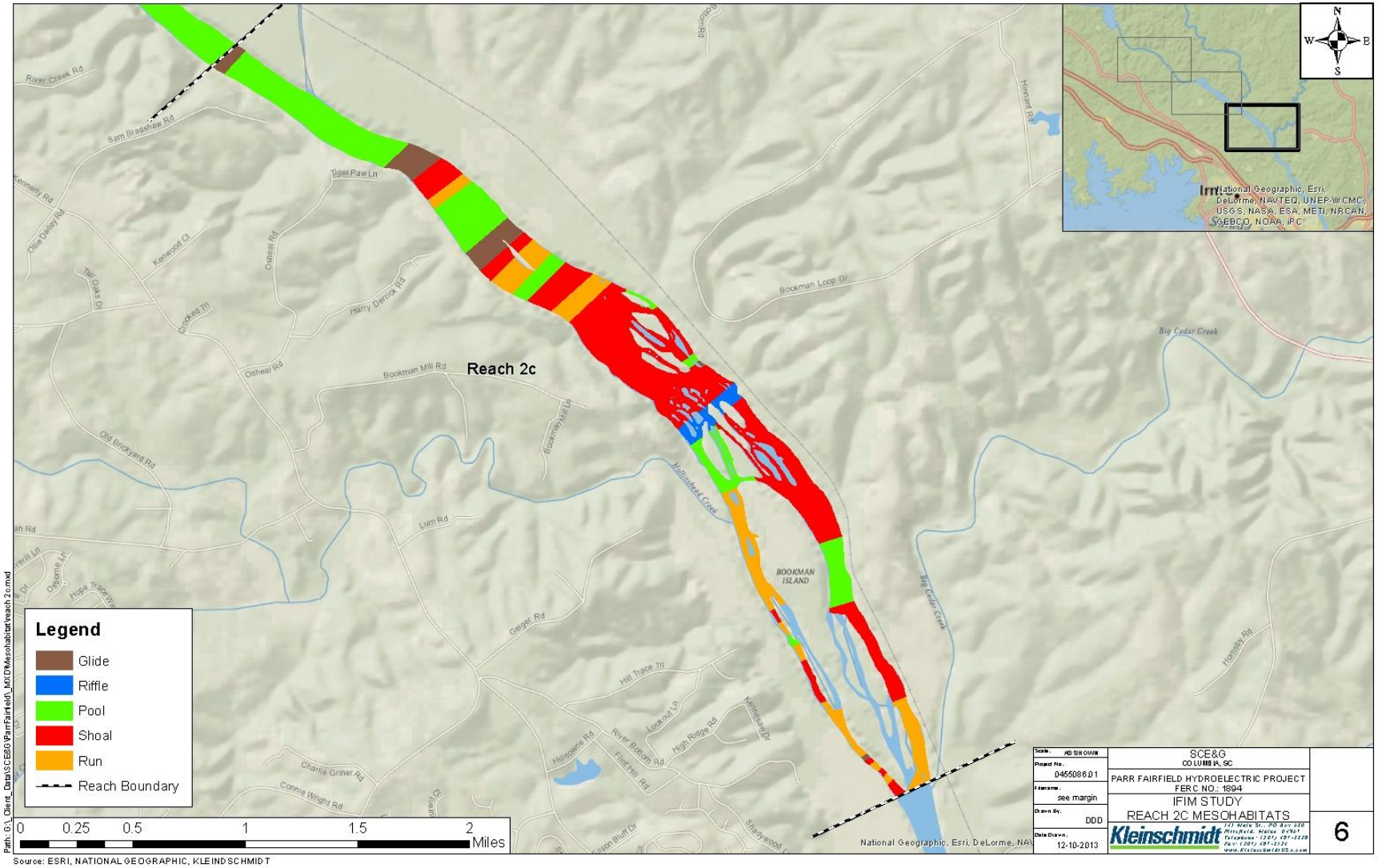

FIGURE 6 IFIM STUDY REACH 2C MESOHABITATS