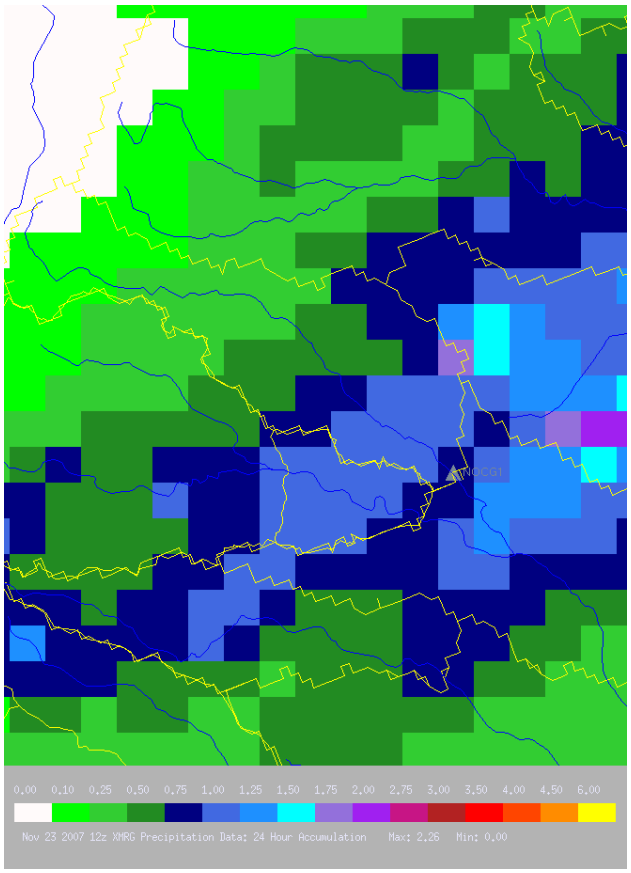
The Initiation of Runoff
A Focus on the North Oconee River near Athens

November 29, 2007

After a prolonged dry spell, rivers lower to a “base flow” with minimal direct runoff. There can be some interflow into the river due to ground water however, in drought situations such as the exceptional drought of 2006/2007, very little flow at all is making it into area rivers.

Upper soils are extremely dry. Once we receive rainfall, the process of runoff is fairly complex. This SERFC Journal will focus on a case study along the North Oconee River near Athens.



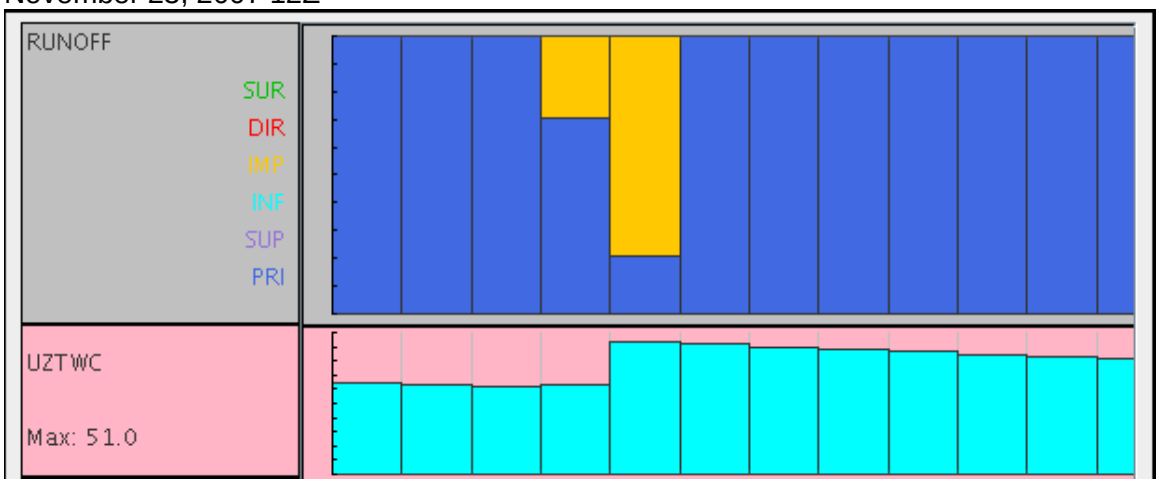
The graphic to the left is a multi-sensor rainfall estimate of the North Oconee River basin upstream from Athens. It is a 24-hour estimate from 12Z Thursday 11/22/2007 through 12Z Friday 11/23/2007.

Note that upper reaches of the basin received between 0.25 and 0.50 inches whilel lower portions received higher amounts from 0.75 to 1.0 inches.

As the ground was so dry, one might suspect that the soils would soak up much of the rain. However, rain can get into the river in other ways as well. Let’s take a look at a hydrologic model that the SERFC uses. It is called the National Weather

Service River Forecats System (NWSRFS). The component of NWSRFS that we will focus on is the runoff component or Sacramento Soil Moisture Accounting (SAC-SMA) model.

November 23, 2007 12Z



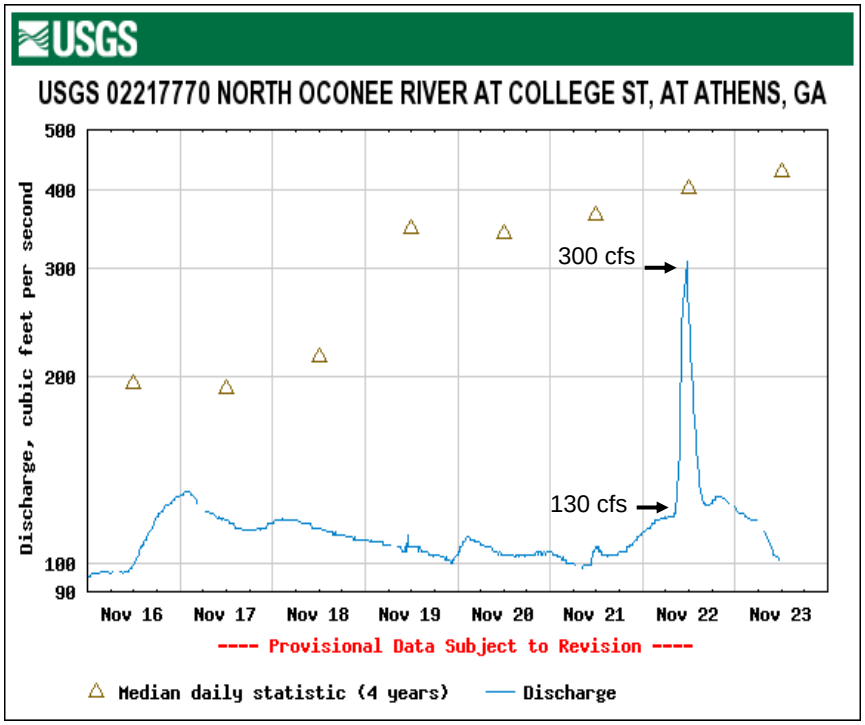
SAC-SMA has many layers of soil to model. In fact, there are XX separate layers. We will look at two. The top layer above describes calculated runoff. The model calculates six separate types of runoff.

SUR – Surffacr Runoff.
DIR – Direct Runoff
IMP – Impervious Runoff
INF
SUP
PRI

After the November 22nd rainfall, note that the model only calculated impervious runoff, or runoff that came from impervious surfaces such as parking lots.

If you look at the lower graph you will note that the green boxes never reach the top of the scale. These light green boxes indicate “Upper Zone Tension Water – UZTWC” which closely represents the upper soils. Note that this rain event did help raise or recharge these upper soils, but not quite to the degree to produce surface runoff.

So, what happened to the river?



The North Oconee USGS River gage saw slight bump from 130 cfs to a little over 300 cfs or about a rise of one foot.

Remember, as the ground was so dry, most of the rain was absorbed by upper soils. The rains tended to “recharge” these soils. The rise, to a large degree was produced by runoff from impervious surfaces.