The file 092507_30min.mov is a quicktime movie. This movie shows experiments conducted in the big basin (6.1 m X 17 m) in Fall 2006 with an initial bed slope of 0.046. Empirical studies indicate that meandering channels occur under a specific range of width-depth ratio, slope and Froude number. We hypothesize, however, that meandering rivers also require: 1) bank strength from either cohesive material or vegetation, 2) overbank flows to attach bars to their floodplains, and 3) fine sediment to fill the downstream end of bars and chutes. These latter conditions place significant additional constraints in gravel bedded channels, especially ones designed to be self-maintaining while laterally shifting. We tested whether these conditions were sufficient in a sand-bedded laboratory flume using alfalfa as model vegetation and a non-cohesive lightweight plastic as fine sediment.

There are three colors visible in the movie. The brown is the sand that makes up the floodplain (D50 is approximately 0.8 mm), the blue is identical to the brown sand, but it has been fed from upstream. The white sediment is a lightweight plastic (intended to be model fine sediment) with a median diameter of approximately 0.35 mm and a specific gravity of 1.5. The hydrograph was intended to be a simple two-stage hydrograph consisting of a bankfull flow and an overbank flow, although short tests of higher duration flows were conducted early in the experiments.

Notice that bars are constructed from sediment eroded from upstream banks, not from the feed (they are brown rather than blue). The fine sediment filled the downstream end of the bars, and helped to plug the chutes that form between the channel and the floodplain. Blocking these chutes was a key component in these experiments, because the chutes would initiate braiding in previous experiments. By the end of the video, the channel is entirely self-formed. One second in the video corresponds to 2 hours of experiments (pictures were taken every 30 minutes, and there are 4 frames per second). There is a cutoff toward the end of the experiment in the second bar downstream.