This paper introduces a physical modeling method for synthesizing flageolet tones played on string instruments. Flageolet tones are generated when a player gently damps the vibrating string at a certain location, so that only those modes that have a nodal point at the damping location remain ringing. A physical model of the spatially damped string is implemented using a wave digital resistor connected to a digital waveguide string. Also, a commuted waveguide version is derived and analyzed. The model is able to realistically synthesize flageolet tones with both static and time-varying damping parameters. Synthesis results are presented and analyzed.