

Tech Committee Report June 2014

Do-It-Yourself RF Coverage Mapping Revisited

In October 2012, I drove around the Lenfest Mountain repeater site with a GPS unit and a VHF receiver to map the 549 repeater's coverage. With the repeater transmitting for 3-seconds of each minute, I recorded the position and signal strength. (Roadside stops every mile were required).

I soon learned police are trained to think *heart attack victim* at the sight of a stopped vehicle with the driver slumped over. Fortunately, a smile and a wave sent them on their way, avoiding uncomfortable moments trying to explain to an Officer (whose eyes are glazing over) what I was doing with all those electronic gadgets in the car. (Is this either a *nut* or a *terrorist plot*?) On arriving home, I used the data in a mapping program to map my trip with color-coded signal strength spots. This appeared in PBARC's October 2012 newsletter.

The article inspired KB1DBL to suggest using an Arduino microprocessor to automate this process without drawing any Official Notice. After designing and building an Arduino-controlled GPS / logging unit and an 8-week "Learn to Write Programs in C" effort, I repeated the RF survey. This trip was much easier: Motoring along with a quiet *beep* to mark each log entry.

This involved much trial-and-error (mostly *errors*). I learned a little about many things: Arduino memory shortages (2K of RAM), Program "flow charts", Race Conditions (Nasty!), Yaesu squelch / S-meter circuits, and changes in GPS mapping software since *MapTech Pro* was written in 2001.

Accompanying this Report are two RF Survey maps for the 549 repeater. More are planned for the 706 Simulcast system. Combined, these will document the coverage available from the Lenfest and Benner Hill towers. The first two clearly show how 549's coverage has changed from 2012 to 2014. The color-coded dots show signal strength at each point. (Note the color "key" in the center of each map). These first tests were run with the



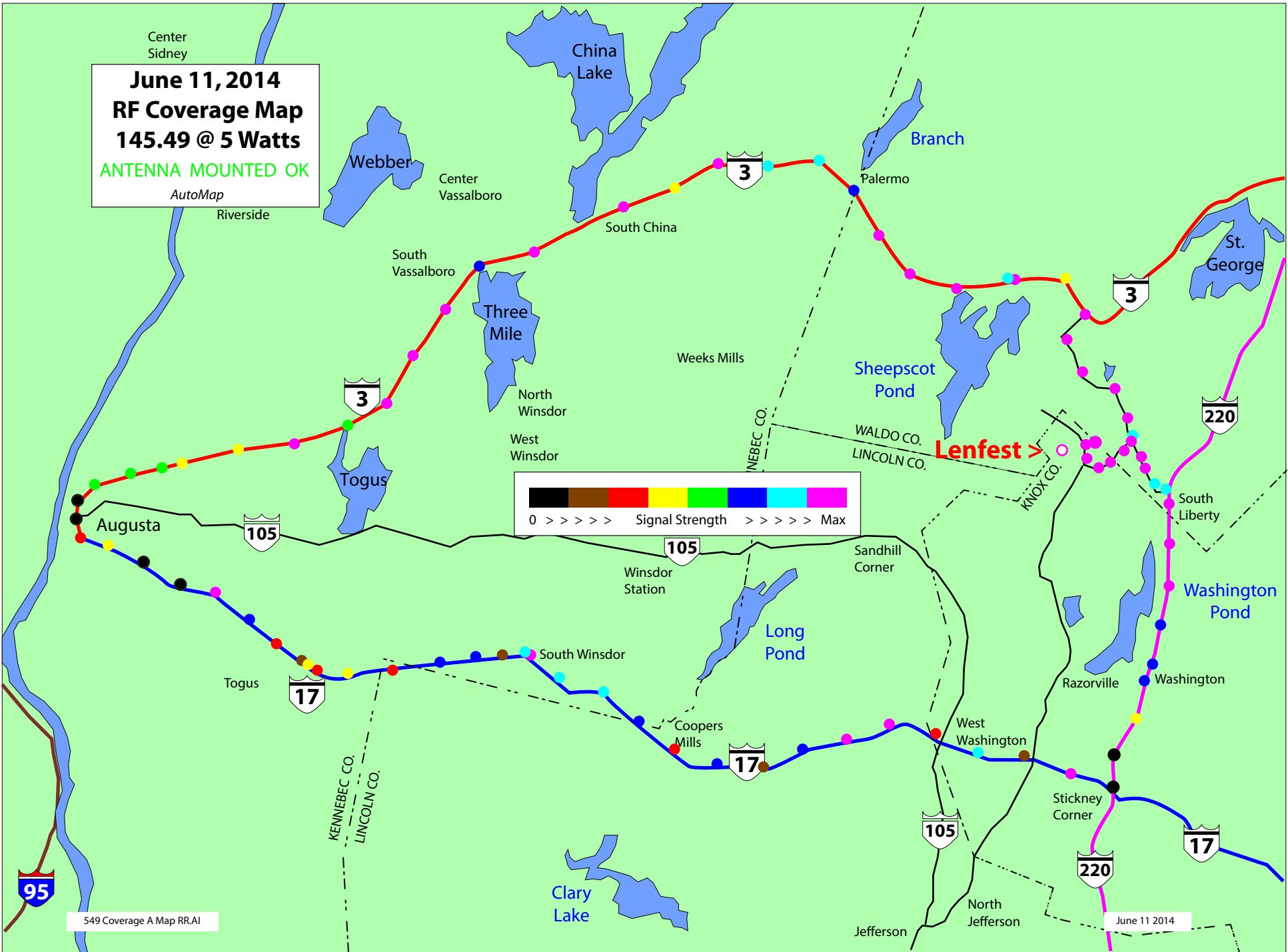
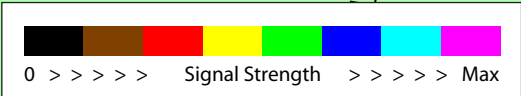
repeater transmitting at low power (Five Watts to the antenna feed-line). That's barely enough to reach from Lenfest to Augusta. If we used normal (140-Watt) power, the mobile receiver would be *saturated* over much of the route. (A saturated receiver's S-meter is "pinned" at maximum and can't show signal variations until it's far enough from the repeater). When we're ready to document our coverage limits, we'll use normal transmit power.

As noted before, 549 serves users West of Lenfest while 706 serves Eastern areas. 549's antenna pattern should also extend NE and SW into areas 706 doesn't cover well. 706 Simulcasts Eastward from both Benner and Lenfest to cover coastal areas 549 can't reach. Since the 706 Simulcast and 549 are linked, accessing any one of the sites connects the user to all of them.

There are two versions of this Report. The large JPEG Topographic Maps increase report size (3MB+ vs. 220K) so there's a "compact" version with a much smaller map. (Data compression makes Topo maps useless so the smaller alternative is needed).

KC1CG

June 11, 2014
RF Coverage Map
145.49 @ 5 Watts
ANTENNA MOUNTED OK
AutoMap



October 2, 2012
RF Coverage Map
145.49 @ 5 Watts
ANTENNA AIMED EAST
 First Survey (Not Automated)

