Cebolla Creek Wetland Restoration Monitoring:

Status Report, December, 2009. Geomorphology Monitoring

Steve Vrooman Restoration Ecology, December 9, 2009

Introduction:
Steve Vrooman Restoration Ecology has been contracted by the Rio Puerco Alliance to perform vegetation, geomorphology, and wetland delineation monitoring to assess the success of the project. Geomorphology monitoring was completed in fall, 2009. Baseline vegetation monitoring and wetland delineation baseline will be completed in Spring 2010.

Description of Project:
Steve Vrooman worked closely with Matt Schultz of the NMED and Bill Zeedyk, the restoration designer. A series of conversations were held on the appropriate locations for the monitoring to occur, as the pre-monitoring for geomorphology (this data) will also be used for the restoration design.

Monitoring Methods:
One unique challenge was the more than 9500 feet of longitudinal profile to be measured in Reaches 1-6. This challenge was met by a new technique involving the use of the Trimble sub-meter GPS and a laser level. Rather than laying out 9500 feet of measuring tape in 300-foot intervals, the project involved using the GPS to survey the location of each surveying point, and using the comments field to enter the elevation. This involved taking a large number of points, especially to measure any sinuosity in the stream channel.

This data was tied together with the creation of a route feature in ArcGis 9.2 to assign a longitudinal profile "distance" to the elevation point features. Basically, ArcGis was able to draw a line through the points that has a measureable length, and then use this line to assign profile locations to the elevation measurements. Another useful feature is that any elevation measurements off of the longitudinal profile line (on a terrace) were assigned a distance as well, another strength of the "Route" tool. Data management was performed with the assistance of Earth Analytic's Wetherbee Dorshow, a local and regional expert in GIS.

The very useful portion of this process is that the data can be displayed on top of the aerial photo and the longitudinal seen in 2D. The usual process is to create a GIS map with unique features and the location of proposed structures, but to leave the longitudinal profile in Excel or another graphing program. The designer goes back and forth between the map and the excel file to measure and calculate slopes and dimensionless ratios for stream geomorphology. With this new advance, the slope between any two points can be determined on the map with the scale.

This advance is especially important for Cebolla Canyon. The portion of Cebolla Creek near Reach 1 and Big Cebolla Spring is geomorphically very active and aggrading rapidly. Because of this, the course of the Creek changes yearly or less, and repeating a longitudinal profile over three years with a measuring tape would have been very difficult. With this GIS mapping, the elevations of many locations across the valley will be able to be re-measured , no matter if the location of the channel changes, by using the latitude and longitude of each point.

In addition to the longitudinal profile, the valley cross sections were taken with the Trimble sub-meter GPS. This allows the cross sections to be drawn on top of the longitudinal profile, and the shape and elevation of the valley to be evident on the map. This adds a degree of functionality to the data that would not be available if the data were in excel.

An on-going collaboration with Bill Zeedyk and Matt Schultz will occur to ensure the usability of the GIS mapping data for the design process. Maps will be created as needed to display the separate reaches and the associated elevations. ArcView and Excel will be used in collaboration with the designer to assist in determining design parameters and elevations.

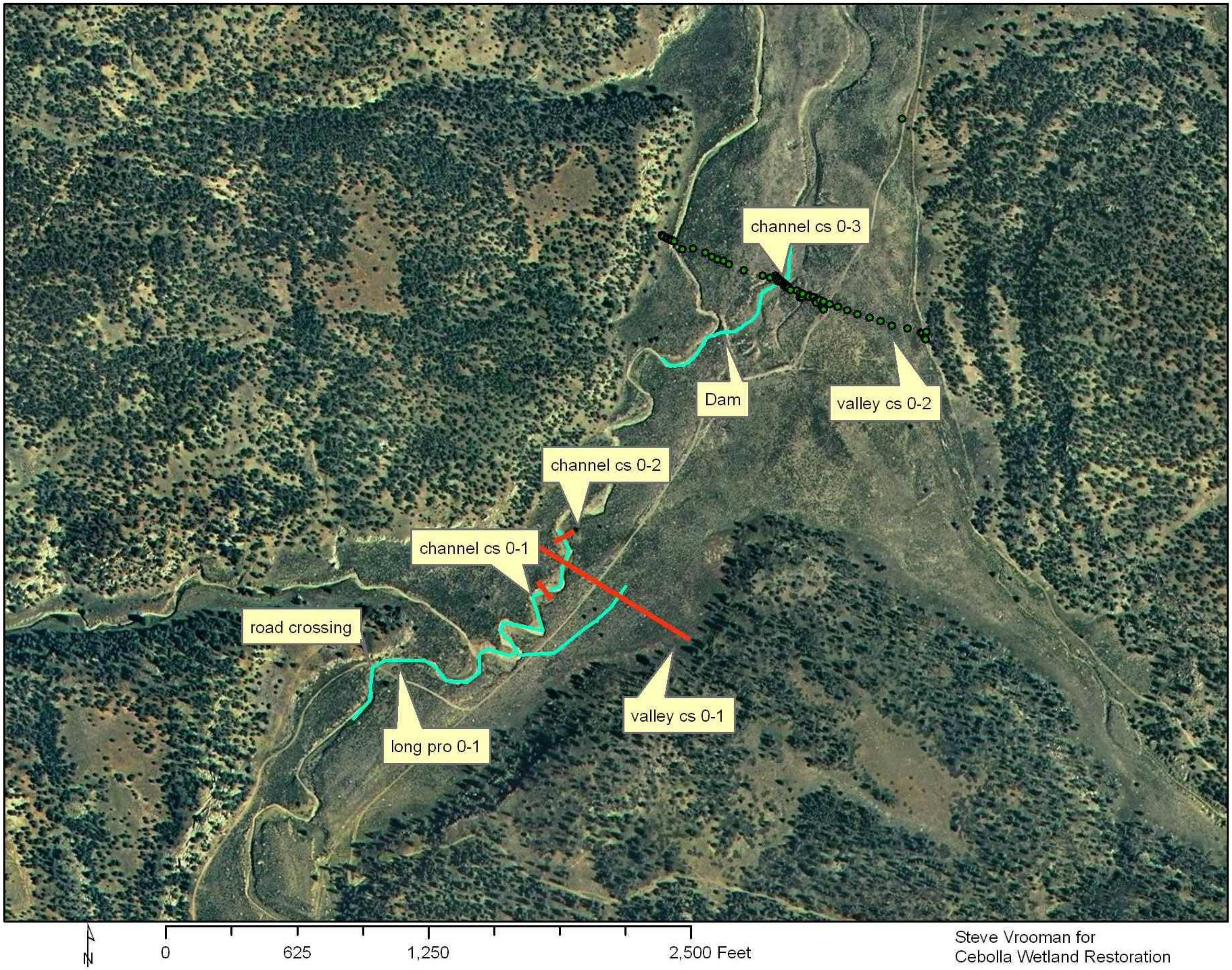
List of Data Collected in Fall 2009:
Reach 0-1, road crossing through confluence: 2100 feet of longitudinal profile (in excel) with 600 feet of terrace elevations.
Cross sections 0-1, 0-2, Valley Cross Section 0-1.
Reach 0-2: (through dam): 1050 feet of longitudinal profile.
Valley Cross Section 0-2 (GIS), Channel Cross Section 0-3.

Reach 1-6
Longitudinal profile: 9500 feet.
Cross Sections:
Reach 3: Valley CS 3-1,3-2. Channel CS 3-1, 3-2.
Reach 4: Valley CS 4-1, Channel CS 4-1.
Reach 5: Valley CS 5-1
Reach 6: Valley CS 6-1.

Reach 7: 3000 feet of longitudinal profile
Cross Sections: Channel Cross Section 7-1(used for calculation of 50 year flood), and 7-2.

All Data from Reach 0 through Reach 6 has been “tied together” through Benchmarks at the left pin of the valley cross sections. In addition, Reach 0 is “tied” to Reaches 1-6 by a monumented Benchmark at the Section 1/4th Township 15N Range 10W.

Cebolla Reach 0 geomorphology monitoring



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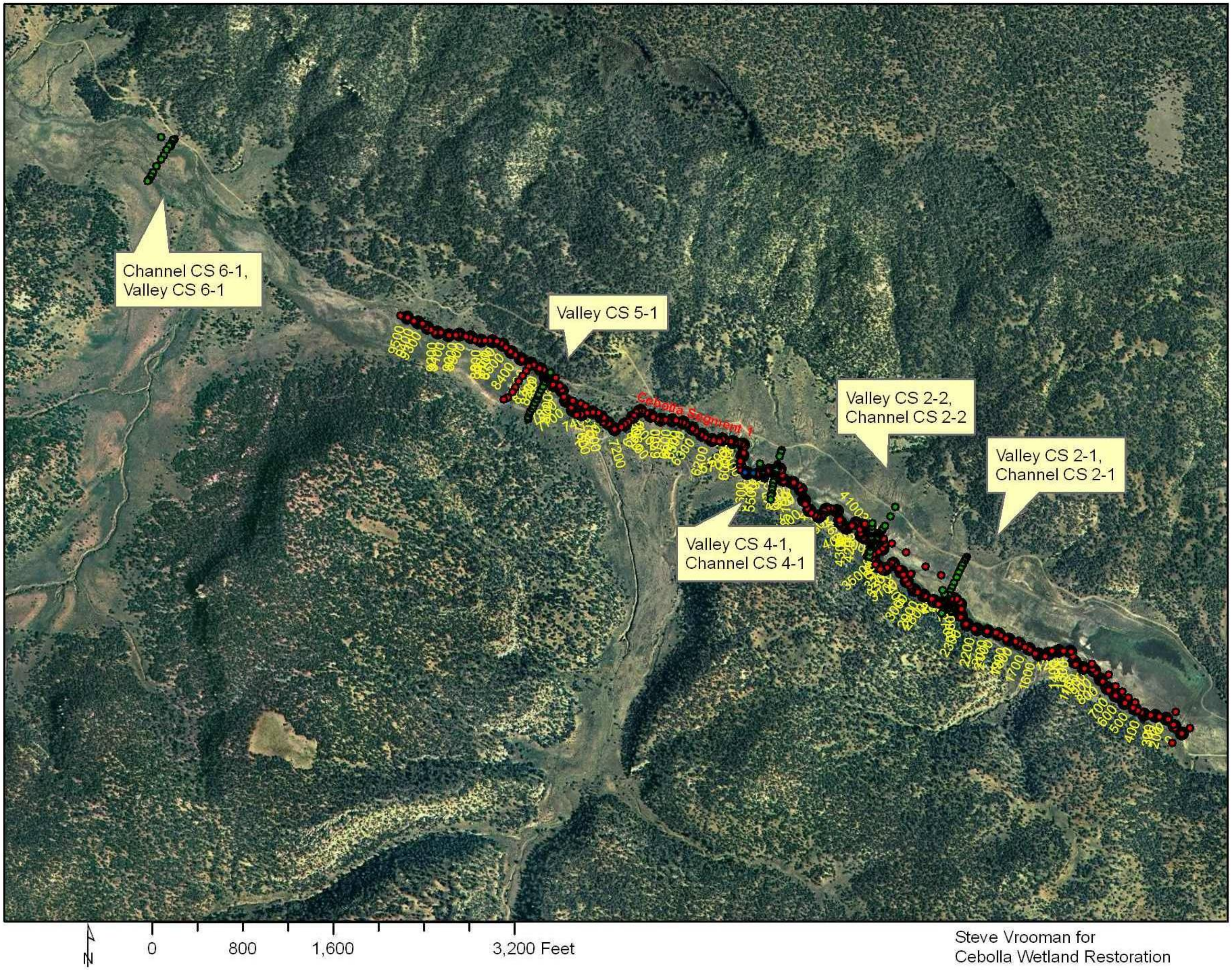
Cebolla Reach 1-6 geomorphology monitoring



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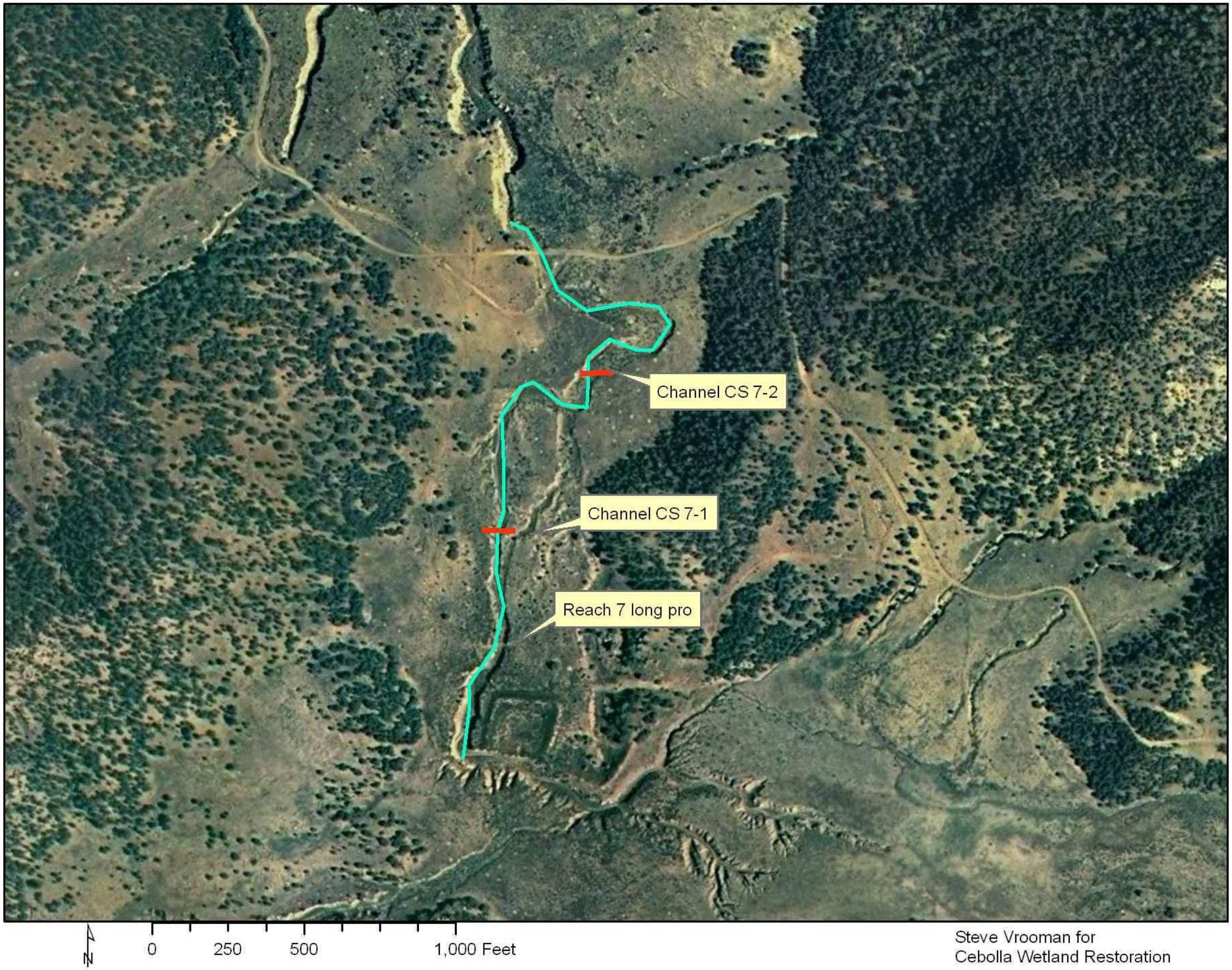
Cebolla Reach 7, geomorphology monitoring



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Cebolla Reach 1, geomorphology monitoring

Cebolla Reach 2, first 1/2, geomorphology monitoring

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Cebolla Reach 2, second 1/2, geomorphology monitoring

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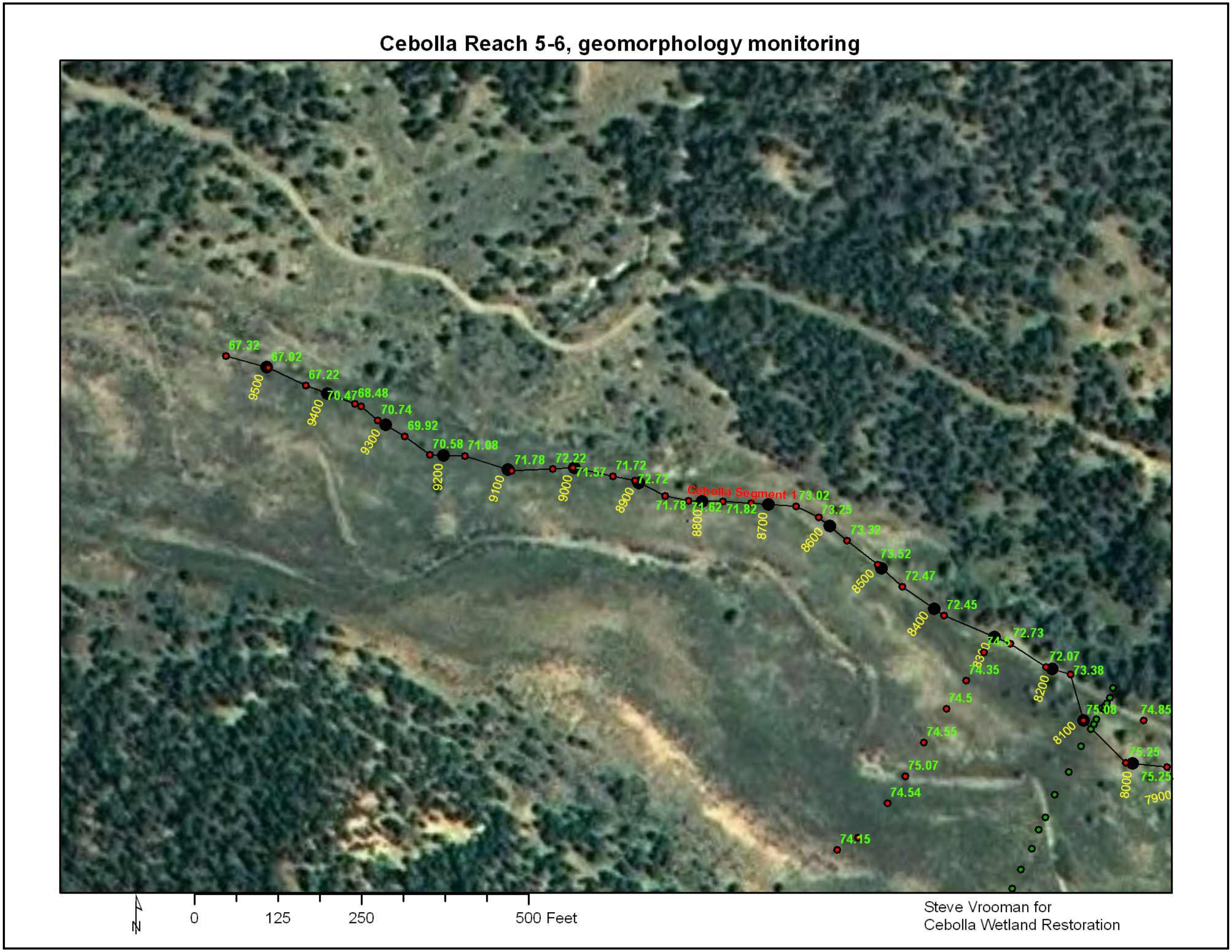
Cebolla Reach 4, geomorphology monitoring

Cebolla Reach 5-6, geomorphology monitoring



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