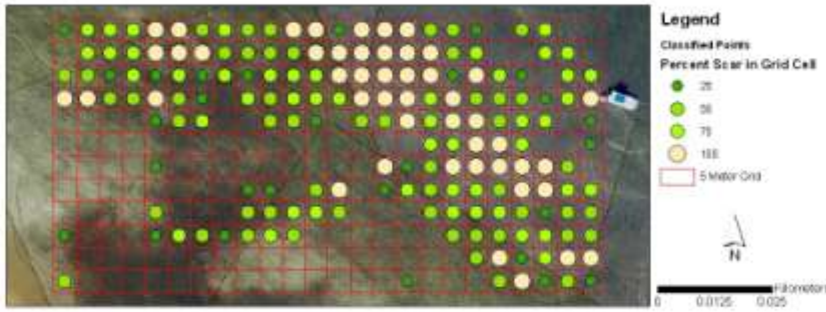
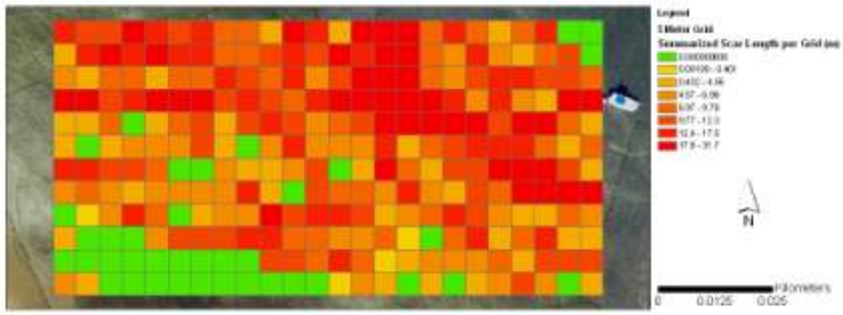
METHODS

Aerial Photography

Aerial surveys were conducted using a tethered helium balloon that carried a digital camera, with a 35mm focal length lens, to an altitude of 100-125 meters. Each photograph encompassed an area approximately 70 m x 40 m. Within each monitoring plot, five photo plots were selected. Within each plot, four semi-permanent stakes were installed at the corners of a square with sides approximately 20 m long. A Trimble® (model: GeoXH; sub-foot accuracy) handheld device was used to obtain the geographic coordinates of each stake and the distances between stakes. Prior to each set, tall stakes were installed adjacent to the semi permanent stakes, and colored, floating targets were slipped over the tall stakes. The targets serve two purposes for geo-interpreting the photographs. They 1) provide variations in the color-coded identification of individual photo plots, and 2) serve as references for known distances between targets offering appropriate scale to rectify the imagery. Although the features are visible, they are not always easily identifiable. In this case, geo interpreting the balloon photographs involved identifying the individual prop scars and digitizing them onto a map. This provides a record of the locations and morphologies of each scar that is identified. Final analysis was conducted to show the changes in the number, length, and cover of prop scars providing evidence of increasing or decreasing prop scars within identified monitoring plots.

The low-altitude aerial photographs were taken at the project site in November 2008 and October 2009 by staff from FWC-M/ESS and FWC-FWRI. All aerial photographs were geo-referenced, and scar patterns were analyzed and interpreted by FWC-FWRI staff.





In addition to the low altitude balloon photography, prop scar analysis was also completed on 2007 and 2008 Florida Department of Transportation's geo-referenced aerial photography of the area. The aerial photography data were analyzed using a grid approach.

All classifications were conducted at 1:250 resolution. Project site A (the Cove) was classified using a 5-meter grid with Hawths-tools in ArcGIS (ESRI, Ver. 9.3) and then coverted to a point centeroids using XTools. To aid in the classification and interpretation of the scars, a 2.5-meter grid was produced with Hawths tools. At project site B (the Point), the images were classified in the same manner, but with the addition of a 15-meter grid on the periphery of the 5-meter grid. To aid in the interpretation of this site , another grid at a size of 7.5 meters was generated with Hawths Tools.

Table 1: Classification Categories

Value	**Percent Scar Present/Description**
None	No scars present within grid
Low	25% scars present, a scar running through one section of interpretation grid
Medium	50% scars present, a scar running through two sections of interpretation grid
High	75% to 100% scars present, a scar running through three sections of interpretation grid

A second classification approach was also used categorize the data. Seperate polyline shapefiles generated for both study areas. Once the prop scars were digitized the Identity tool within ArcGIS (Ver 9.3, Yr) was used to relate the polyline data to the five meter grid employed in the grid classification approach. The lines were clipped to the grid cells and the total length of scar in each grid cell was calculated. Total scar length (in meters) for each cell was multiplied by 0.5 m to calculate total impact area within each cell and divided by 25 m2 to calculate percent scarred area for each cell. Aerial prop scar data was then classified into the following categories.

Table 2: Classification Categories

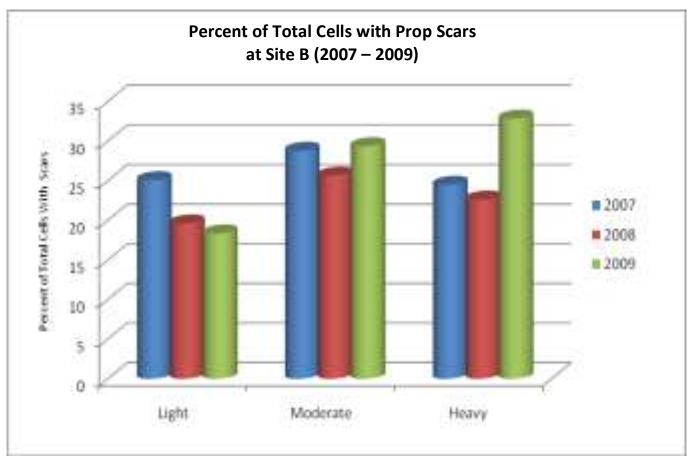
Category	**Description**
None	0.0% scar impact area for each cell
Light	0.01% to 10% scar impact area for each cell
Moderate	10% to 20% scar impact area for each cell
Heavy	>20% scar impact area for each cell

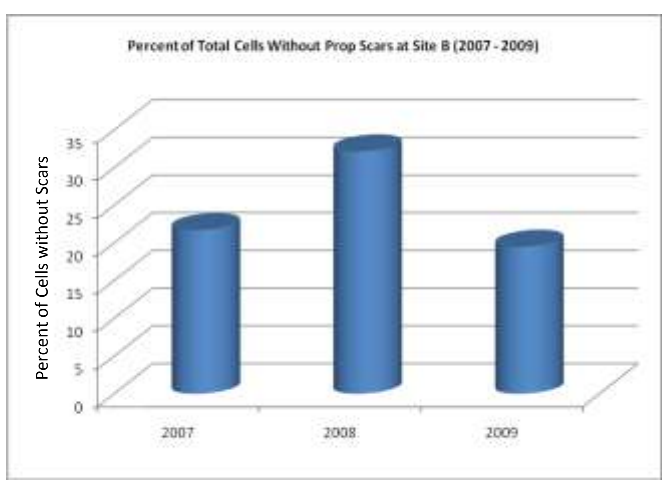
Need to include a discussion of the interpretation of the aerial survey data. "Means of % scarring within each cell of the plot were calculated….." % Scaring Impact data for the Point and Cove were analyzed using non-parametric Wilcoxon Rank Sign tests (Microsoft Excel or SAS??), etc. Need to have Paul help with this.

Results

Aerial photography:

Aerial imagery from 2007, 2008 and 2009 was acquired from an FWC-FWRI ground based helium balloon. Aerial imagery was then used to determine if the incident of prop scars increased or decreased at both Site A and Site B during the study period. Aerial imagery was analyzed for prop scars that occurred in individual cells created through the grid classification system that was used to document the annual occurrence of prop scars at known aerial photo stations. Prop scar data shown in Figure X indicates that light prop scaring decreased from 2007 to 2009, but moderate and heavy scaring increased over that same period. In

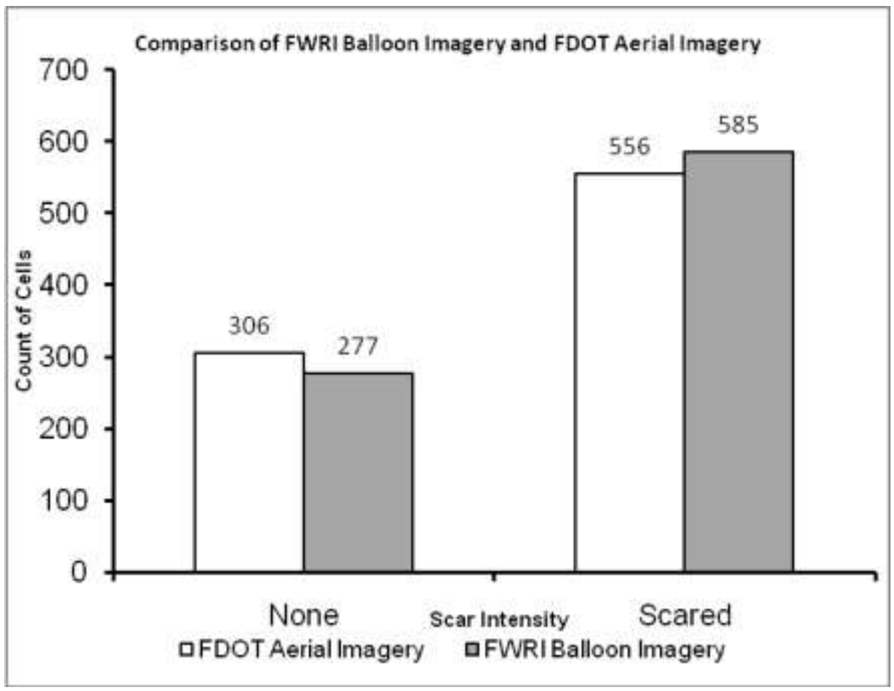




addition, the percent of cells that did not have prop scars decreased overall from 2007 to 2009, which also supports the premise that there was no reduction in the occurrence of prop scars during the study period (Figure ?).

Non-parametric statistics in the form of a Wilcoxon Signed Rank Test was used to determine if there was statistical validity to the premise that the occurrence of prop scars were unchanged over the course of the project. This analysis revealed that ?????????????

FWC-FWRI also acquired FDOT aerial imagery to determine if these products could be used in a similar fashion to analyze the occurrence of prop scars over time. A comparison of the FWRI balloon imagery and the FDOT aerial imagery was conducted to determine if there was a bias in either photographic methodology. Figure ?? illustrates that both techniques compared favorably in identifying prop scars within designated grid cells within known locations.



After analyzing the data from both the FWRI balloon imagery and the FDOT aerial imagery it was determined that there was no significant decrease in the occurrence of prop scaring or the intensity of prop scars in the study sites.