

Cross-Country Madness: Run for Your Life

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Abstract

Athletic facilities at Redwood Fields in Eureka, CA are assessed for potential use of dirt trails as workout routes for the Eureka High School Cross-Country team. Trails are tracked using a Garmin GPSmap 60CSx and data acquired is spatially analyzed in ArcMap 10.1. A 5000-meter official competition course is proposed if results prove that there is the needed distance of trails at Redwood Fields.

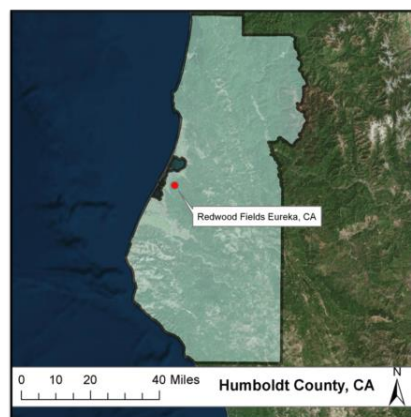
Introduction

The goal of the MaPsterbators is to map the workout routes of the Eureka High School Cross-Country team. Emma Lundberg is the assistant coach of the Eureka High School male and female cross country teams. In addition to practice courses, a 5000-meter (m) official competition course will be created for proposed future use. The need for a new competition course is an opportunity that has been discussed multiples occasions throughout this fall season. Since Redwood Fields in Eureka, CA is a primary location that is utilized during practice sessions for fun adventure practices, as well as speed workouts and tempo adjustments; it makes sense as a potential site location for a new course. The Eureka High School athletes would be very familiar with the trails.

The Redwood Fields location has a large parking area, which would be an important requirement for a location to host an event. This athletic facility also has restroom utilities. To host an athletic event at any location requires that specific regulations are met. These regulations are not yet known, but will be the next step in addressing the possibility of moving the location of the home meets for the Eureka High School cross country team.

Figure 1 shows the location of Redwood Fields, the current practice area of the Eureka High School Cross-Country team. Unnamed trails behind Redwood Fields in Eureka, CA are tracked using a Garmin GPSmap 60CSx. Workout routes are constructed at varying distances for interval training practice. Through spatial analysis trail distances are calculated and the local elevation variation assessed.

(Figure 1: Redwood Fields location in Eureka, CA shown within Humboldt County)



Methods

Routes are established and mapped using the track feature on a Garmin GPSmap 60CSx. Data collected is exported from the handheld into ArcMap 10.1 for analysis. The tracked trails are exported into ArcMap then digitized. The digitized trails also included point data marking the trails intersections. Basic map layout is created in ArcMap. Figure 2 shows the first map created from the data collected at Redwood Fields.

(Figure 2: Initial map layout created in ArcMap 10.1 from data collected at Redwood Fields.)



Data Collection

Unnamed trails are established using the track feature on a Garmin GPSmap 60CSx device on October 22, 2014. Data collected is downloaded from the device and imported into ArcMap 10.1. The polyline and point data is converted into two shapefiles; one polyline shapefile showing paths, one point shapefile showing trail intersections. The data is checked via a Quality Assurance, Quality Control (QAQC) process for errors, incompatibility issues, or gaps in spatial data. Attached QAQC forms accompany the data collected and in use throughout this project.

Results

Trails tracked at Redwood Fields using a Garmin GPSmap 60CSx device on October 21 and 22, 2014 are digitized and the distances of each segment are calculated. Table 1 shows length of trails in meters with trail ID numbers given based on time of collection.

Trail ID Number	Distance (meters)
1	81.8
2	70.0
3	68.1
4	413.8
5	70.2
6	85.9
7	144.0
8	452.2
9	380.7
10	133.3
11	293.9
12	138.2
13	194.4
14	57.6
15	48.4
16	72.6
17	149.1
18	80.3
19	432.6
20	589.8
21	135.8
22	307.9
23	91.2
24	205.2
25	159.0
26	120.2
Total Distance (m) of Trails:	4976.2

(Table 1: Length of numbered trails (left))

(Figure 3: Trail segments of Redwood Field (below))

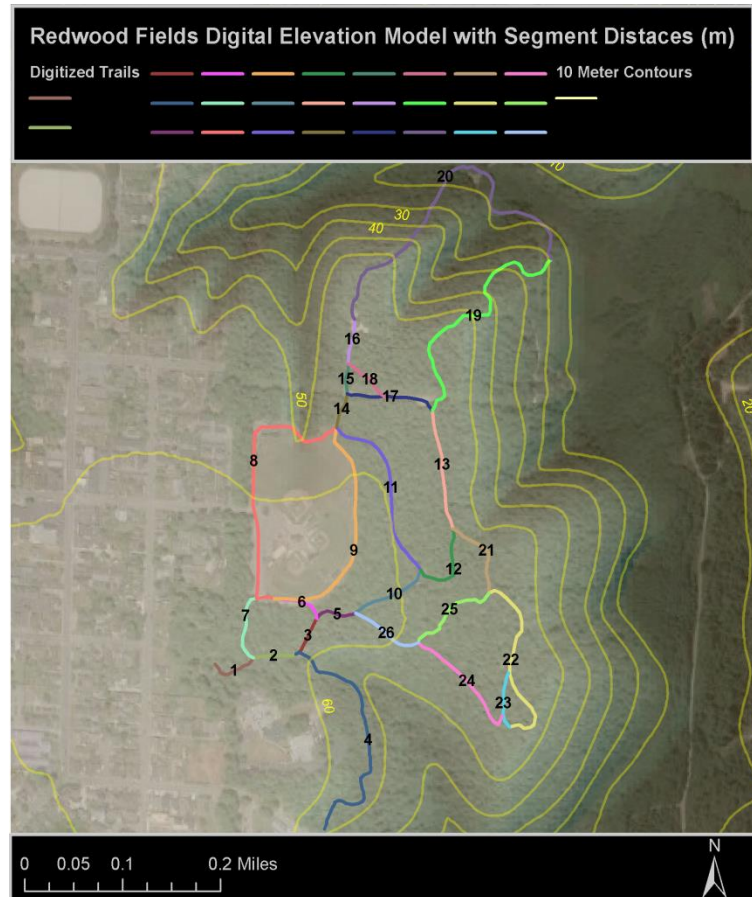
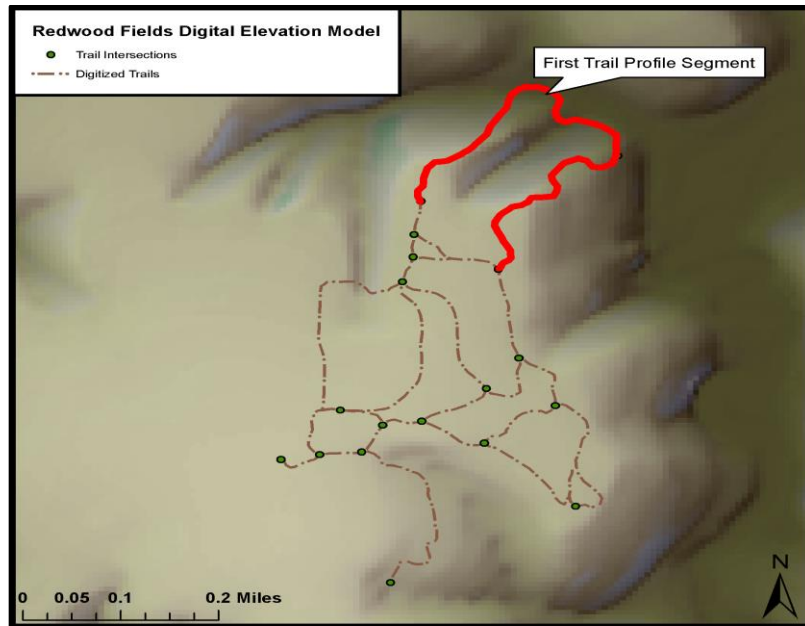
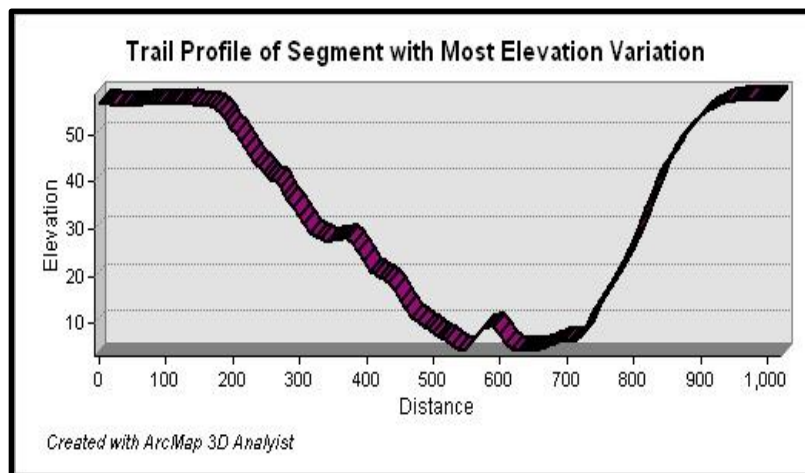


Table 1 shows 26 different trail segments that are tracked on October 2014 with the distances per labeled segment. As is shown in the table, the length of the segments totals less than 5,000m, which is the current limiting factor for a possible official competition course. Data is taken from the attribute table in ArcMap and created into a table in Excel to be exported into this document. Figure 3 shows the 10m contours at Redwood Fields, as well as the trail segments, which are labelled using the number ID associated with Table 1. This visual is composed of a transparent digital elevation model, a georeferenced TIFF (commonly used image format), as well as the segments illustrated with the use of different colors.

(Figure 4: Digitized trails at Redwood Fields shown over a DEM with a hillshade. Trail profile segment illustrated in red.)



(Figure 5: Trail elevation profile of line segment illustrated in red, measured in meters.)



A trail profile is shown above (Figure 5) and was created using the segment (shown in Figure 4) with the most elevation variability. The 3D Analyst tool was used to create this profile. The trail segment is digitized using the Interpolate line tool, and then the profile (Figure 5) is created from the digitized segment. Since there was not a significant amount of variability throughout the rest of the proposed trail segments, it was not necessary to incorporate a full trail profile.

Error

Through errors of omission, or other possible operator errors, a competition practice route will not be achievable at this particular time. This cannot be accomplished since there is a 24 m deficit in tracked

trails without doing multiple laps. There is always the potential for georeferencing errors within the GPS device, therefore leaving accuracy uncertain.

Conclusion

Although an official competition course will not be possible with the data collected, this processes taken in developing this report will be an important tool to be used in future planning for the Eureka High School athletic department as well as the facilitators of Redwood Fields. A return site visit and assessment would verify if the deficit of trail length was from an operator error or if there is in fact 24 meters of missing usable trail. Future analysis could show where more potential trail lengths could be added to compensate for the 24 meter shortfall. It has also been suggested by Lundberg to input a pylon within one trail segment to run around to account for the missing distance.

Acknowledgements

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Bibliography

All data generated is self-collected.

Base maps for the Figure 1 and Figure 2 were supplied by Esri.

DEM used in Figure 3 and Figure 4 was retrieved from the Humboldt GIS Data Portal.

A Google Earth TIFF image was made partially transparent and used with the DEM and contours to create Figure 3.

All maps are projected in NAD83 UTM Zone 10 North.