Deriving Harvestable Area in Arcata Community Forest

By: Kittens with Mittens
Corey Humphrey and Taylor Jensen

Abstract

The Arcata Community Forest (ACF), along with education and recreation, is used for sustainable redwood timber harvest. The city of Arcata uses the revenue generated from harvest to invest in more recreational land for the residents. The city needs to have certain information in order to harvest sustainably, ergo Team Kittens with Mittens set out to find the harvestable are of the ACF according to the state of California's Forest Practice Rules.

Introduction

Timber harvests on forested lands are regulated by the state of California according to the Forest Practice Rules (FPR). Team Kittens with Mittens has set out to find the harvestable area within the Arcata Community Forest according to these rules in regards to buffer zones set around water bodies, streams, and fragile riparian zones. FPR requires that all watercourses and lakes be protected since harvesting has the potential to directly impact due to road construction, skid trails, landings, and unstable erodible banks and slopes. To ensure properly ecologically performing waterways and riparian zones, protection zone widths and protective measures must be made. However these protective zones are dependent upon side slope, stream size, species present within the stream, and potential habitat for aquatic species. These buffer zones can have a large impact to the harvestable area of a unit. Being able to accurately predict where these buffers will occur can save a forester time in marking these zones while also ensuring more accurate flagging to protect the area. An analysis was conducted to find where the protective zones within the Arcata Community Forest would occur while also seeing the amount of area within the ACF would still be harvestable from the difference taken by the buffer zones.

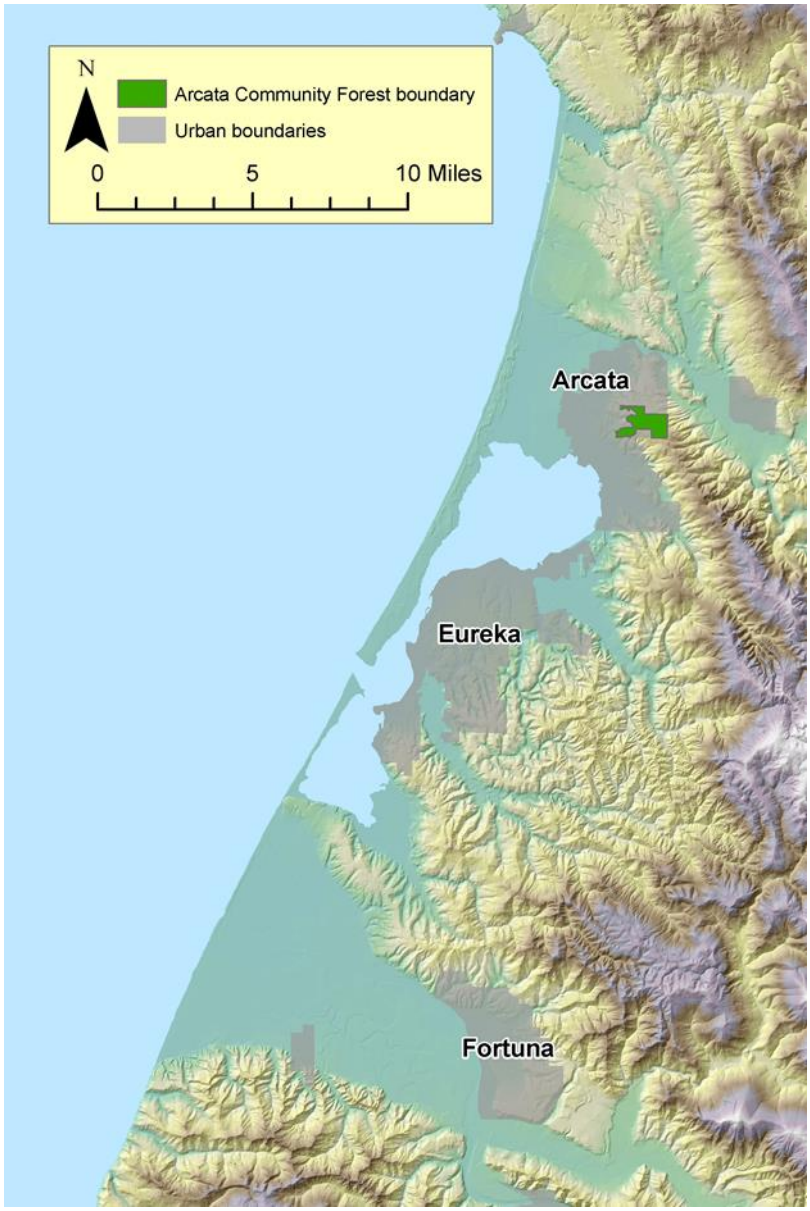

Figure 1: The above map shows the location of the Arcata Community Forest within Humboldt County.

Methods

Data was collected from the City of Arcata, Environmental Services' website. Datasets that were downloaded included:

- Community Forest Boundaries
- Streams in Arcata
- Water Bodies
- Roads and Trails of the Community Forest
- Watersheds

A Digital Elevation Model (DEM) of Humboldt County was taken from the Humboldt County GIS data hub website.Buffer widths and measures are dependent upon the slope and stream classification defined within the California FPR (Table 1).

Table 1. Protection Widths as stated by the California FPR.

Water Class Description	-Fish always or seasonally present, includes habitat to sustain fish migration and spawning. -Spring or supply within 100 feet downstream	-Fish always or seasonally present off site within 1000 feet downstream - Habitat for non-fish aquatic species	-No aquatic life present, watercourse showing evidence of being capable of sediment transport to Class I and II waters under normal high water flow conditions after completion of timber operations.
Class	I	II	III
Slope Class (%)	**Width Feet**		
<30	75	50	50
30-50	100	75	75
>50	150	100	100

With all data collected analysis began creating a slope raster based from the DEM, which has been clipped to the ACF boundary layer. From the slope raster, we reclassified slope to the three FPR slope classes then converted into a shapefile. The streams layer was then clipped to the AFC boundary and intersected with the new slope shapefile . A buffer distance field was added to the new intersection layer. A selection by attributes was then ran to select stream segments in accordance to their stream class and side slope (Table 2). A distance was then added to the new buffer distance field. After all segments were given a distance the buffer tool was ran with the distance based from the buffer distance field. The rendered buffers were dissolved and the total area of the buffers was calculated then subtracted from the area of the ACF boundary layer to give the harvestable area.

Results

Table 2. Stream segments selected in accordance to stream class and side slope.

		Slope (%)		Total
Stream Class	**< 30**	**30-50**	**>50**	
I	1	46	21	68
II	0	39	16	45
III	0	2	2	4
Total	1	87	39	

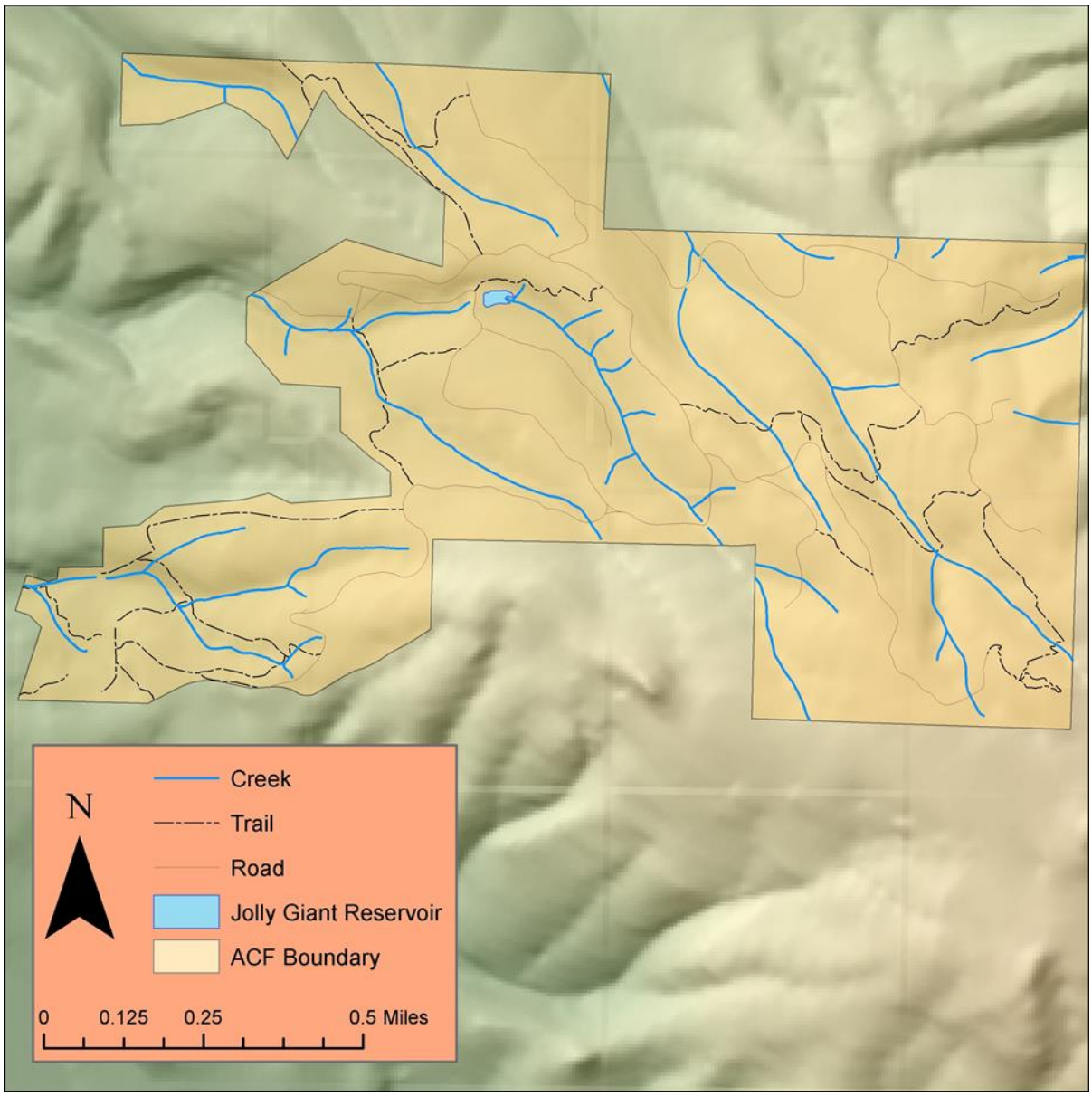

Figure 2: ACF boundary with buffer zones included.

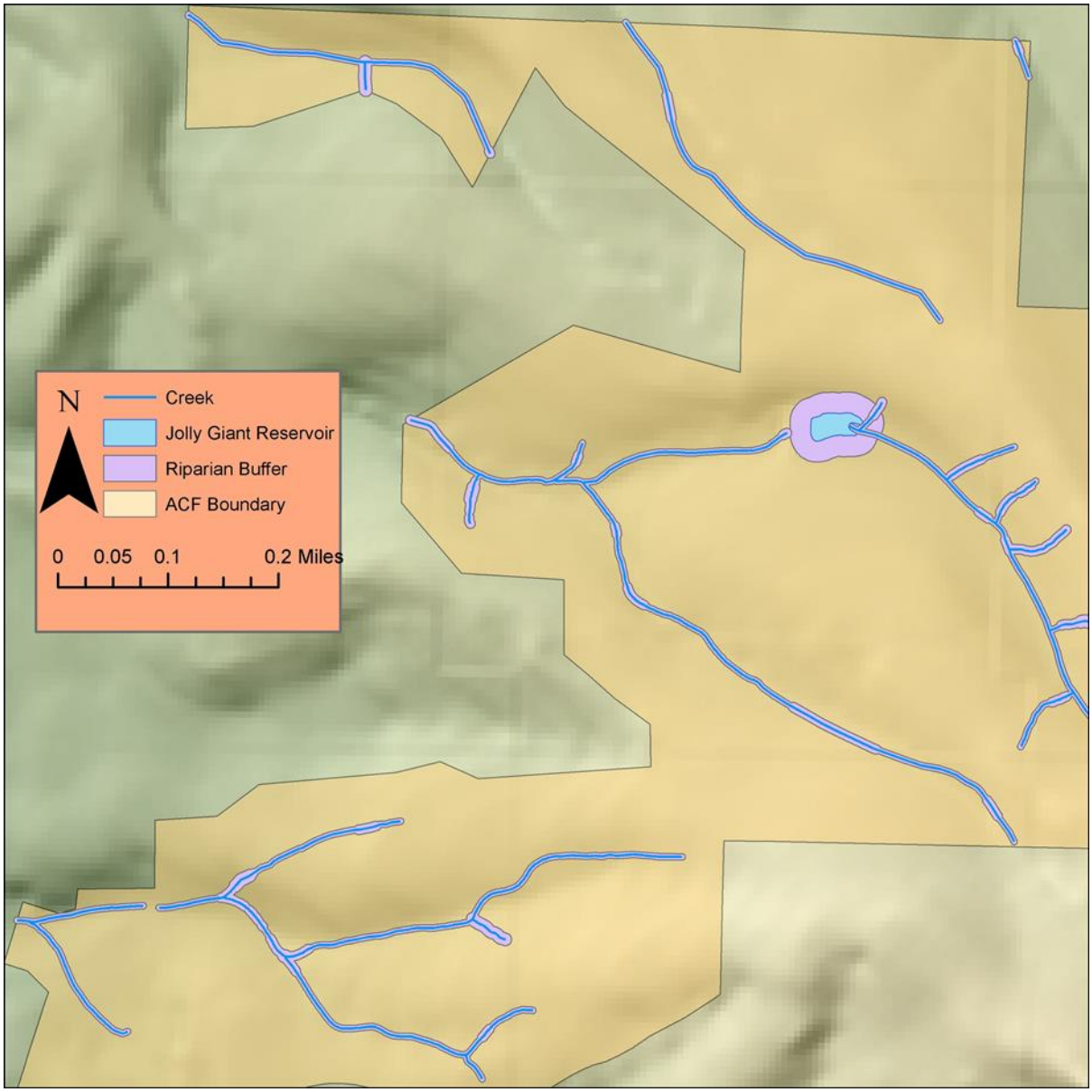

Figure 3: The western portion of the ACF showing the varying widths of the buffer zones around the streams.

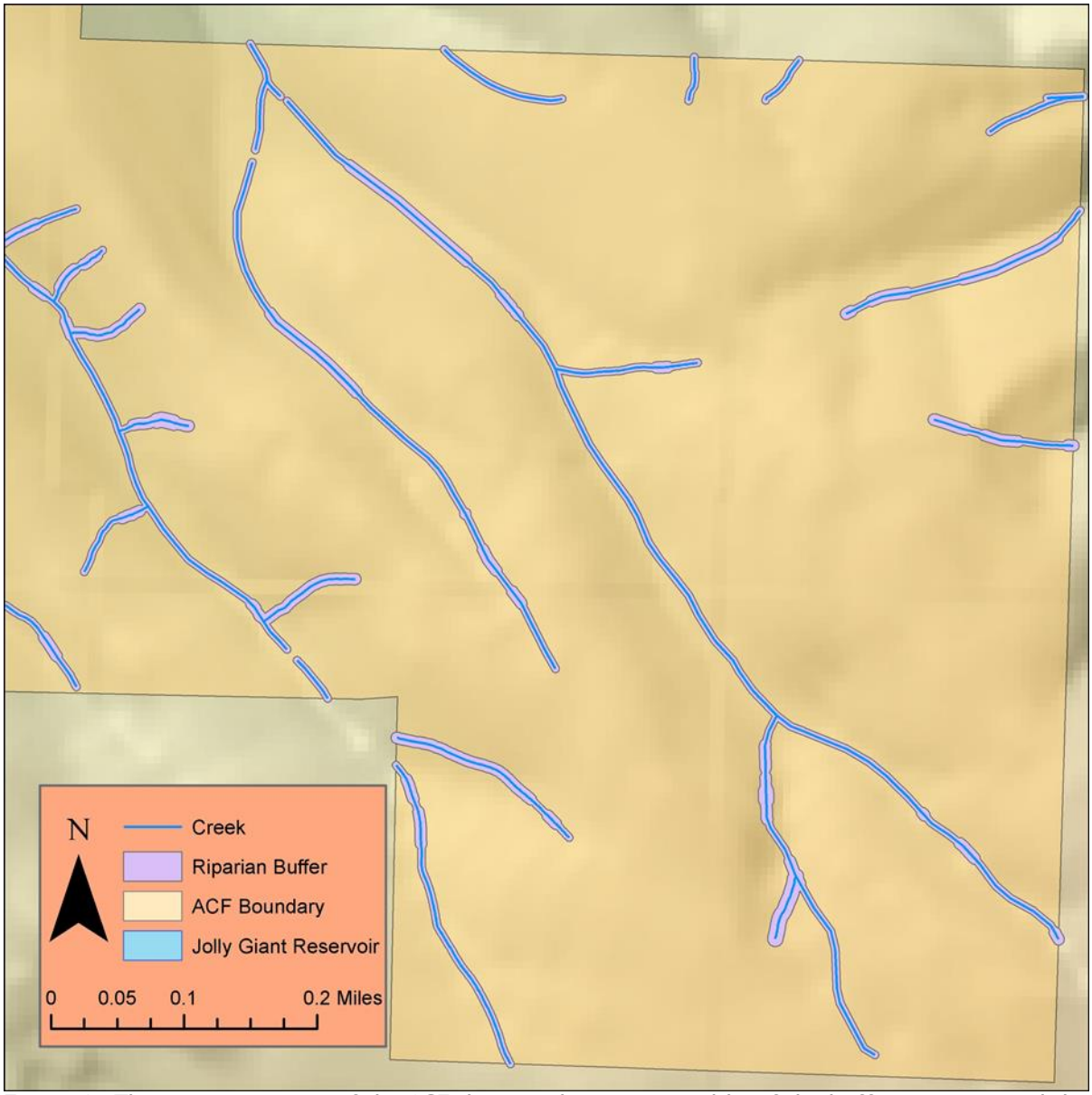

Figure 4: The eastern portion of the ACF showing the varying widths of the buffer zones around the streams.

Table 3. Total area of buffer zones and harvestable area.

Unit	**Acres**
ACF	633.8
Stream Buffers	29.4
Jolly Giant Reservoir Buffer	2.8
Harvestable Area	601.6

Conclusion

We have estimated based on California Forest Practice Rules that there are 601.6 acres of harvestable land in the Arcata Community Forest. This number could be used in future Timber Harvest Plans for the city.

References

Cal Fire. "California Forest Practice Rules." (2013): n. pag. Web.