Appendix 3

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"Ecosystem and community resistance..."

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Section A3.1 Characterizing Extreme Precipitation Amounts

Following the proposed methods of Lemoine et al. (2016), we calculated quantiles from the empirical distribution of growing season precipitation at Dubios, ID. We chose the 1% quantile to be indicative of extreme dry conditions (drought) and the 99% quantile to be indicative of extreme wet conditions (irrigation). The data consist of 91 yearly records, which we assume are approximately normally distributed. The R code below shows our procedure, and Fig. A3-1 shows the results.

```
library(ggplot2)
weather    <- read.csv("../data/weather/ClimateIPM.csv")
mean_ppt   <- mean(weather$ppt1)
quants_ppt <- quantile(weather$ppt1,probs = c(0.01,0.99))
quants_ppt[1]/mean_ppt*100 # percent of mean ppt for drought
```

```
##       1%
## 46.96351
```

```
quants_ppt[2]/mean_ppt*100 # percent of mean ppt for irrigation
```

```
##     99%
## 177.727
```

```
ggplot(weather, aes(x=ppt1))+
  geom_histogram(bins=20, color="dodgerblue", fill="dodgerblue", aes(y=..density..))+
  geom_line(stat="density", color="blue")+
  geom_vline(aes(xintercept=quants_ppt[1]), linetype=2)+
  geom_vline(aes(xintercept=quants_ppt[2]), linetype=2)+
  ylab("Density")+
  xlab("Growing Season Precipitation (mm)")+
  theme_bw()+
  theme(panel.grid.minor = element_blank())
```

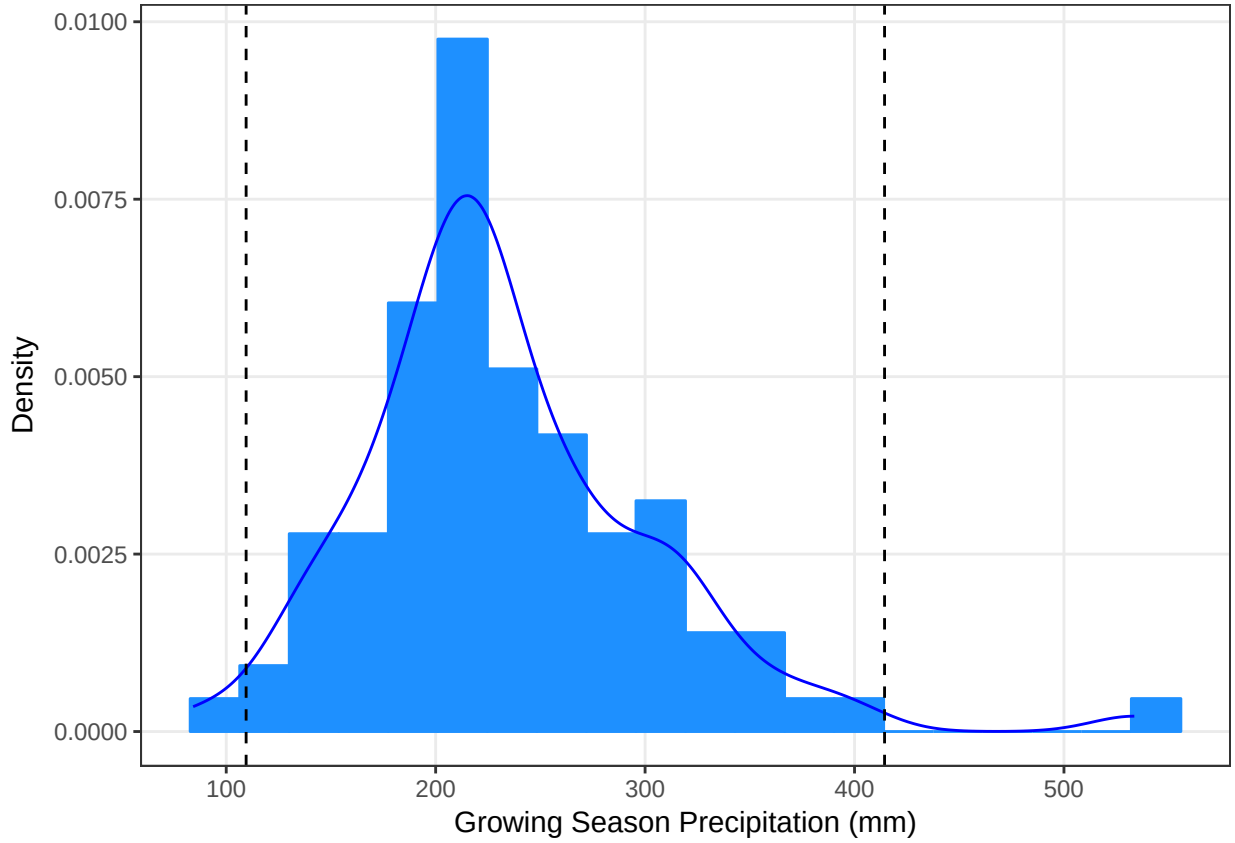

Figure A3-1 Density of the empirical distribution of growing season precipitation at Dubois, ID. Dashed vertical lines show the 1% and 99% quantiles, assuming a normal distribution.

References

Lemoine, N. P., J. Sheffield, J. S. Dukes, A. K. Knapp, and M. D. Smith. 2016. Terrestrial Precipitation Analysis (TPA): A resource for characterizing long-term precipitation regimes and extremes. Methods in Ecology and Evolution 7:1396–1401.