South Carolina Department of Health and Environmental Control

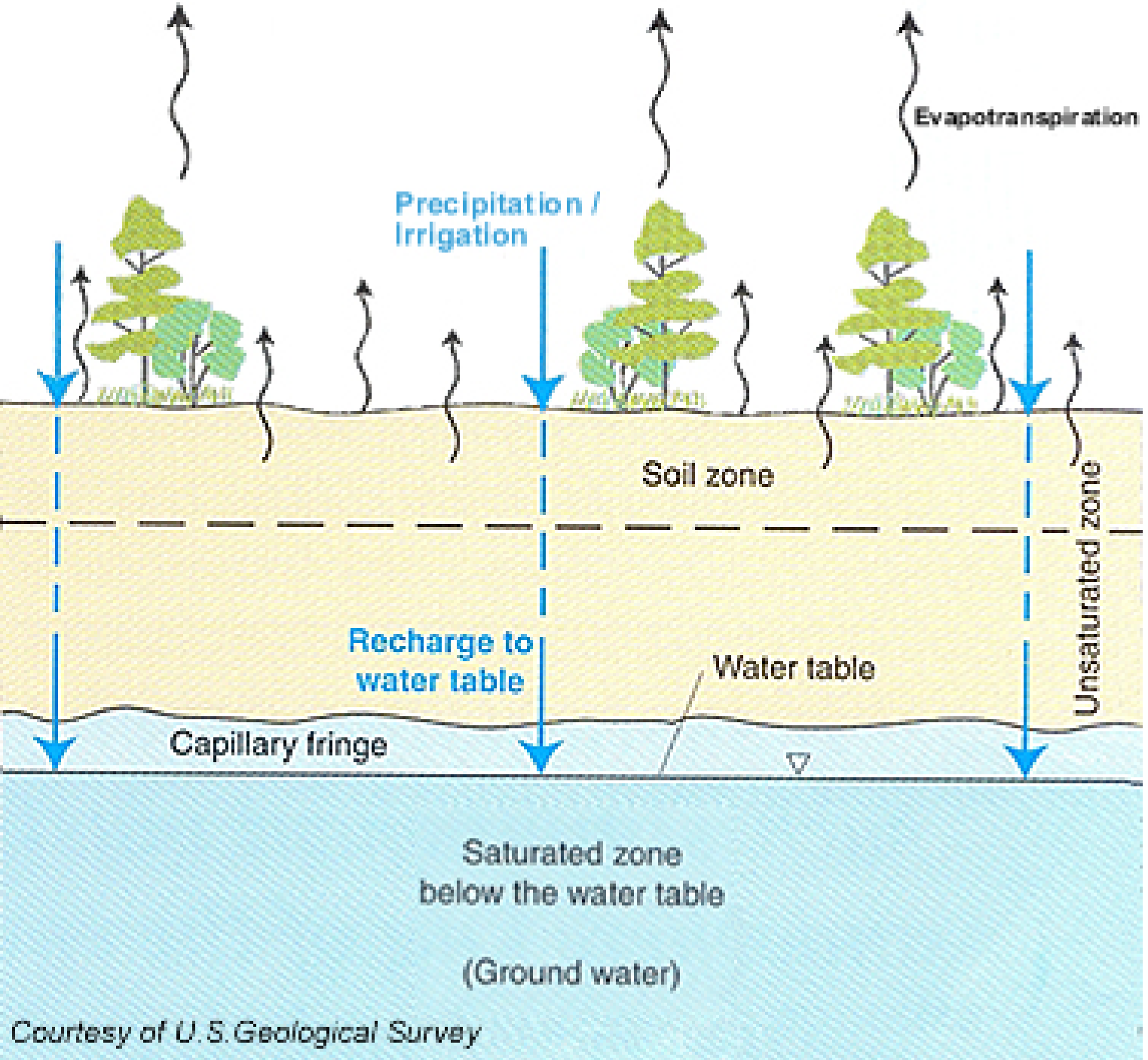
Impact of Land Use / Land Cover on Water Availability

Alex Butler

Water Balance / Hydrologic Budget

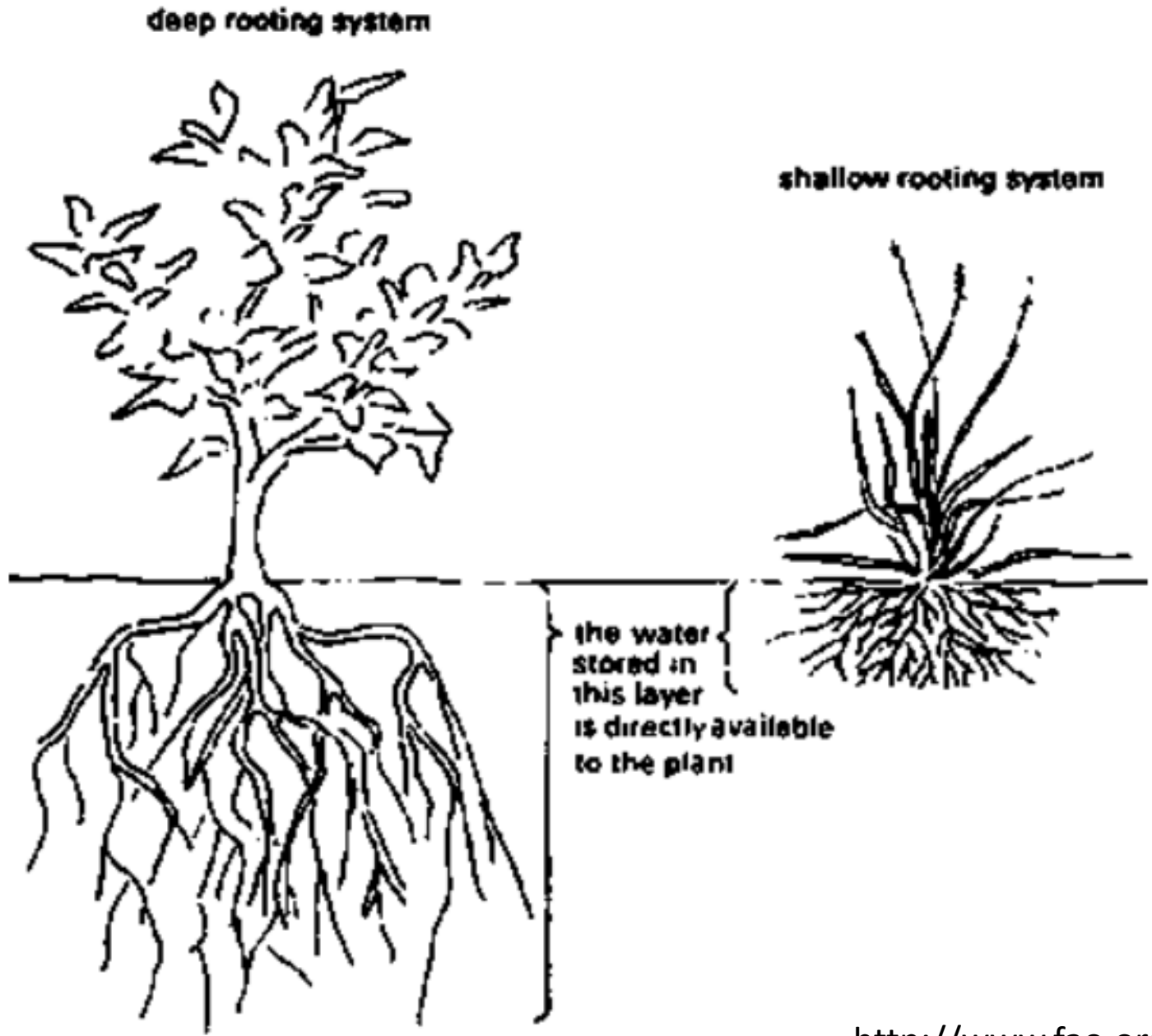
$$P = Q + E + \Delta Ss + \Delta Sg$$

where P= Precipitation Q= Discharge E= Evapotranspiration ΔSs = Change in Storage of Surface Water Reservoir and ΔSg =Change in the storage of the groundwater reservoir (Freeze & Cherry, 1979).



Reforestation can lead to reduced streamflow as a result of increased ET (Yao, et al, 2010)

Analysis of basins in the piedmont of the southeast indicated that reforestation of areas previously planted with row crops led to statistically significant reductions in stream flow. (Trimble and Weirich, 1987)



http://www.fao.org/

https://foresthistory.org/

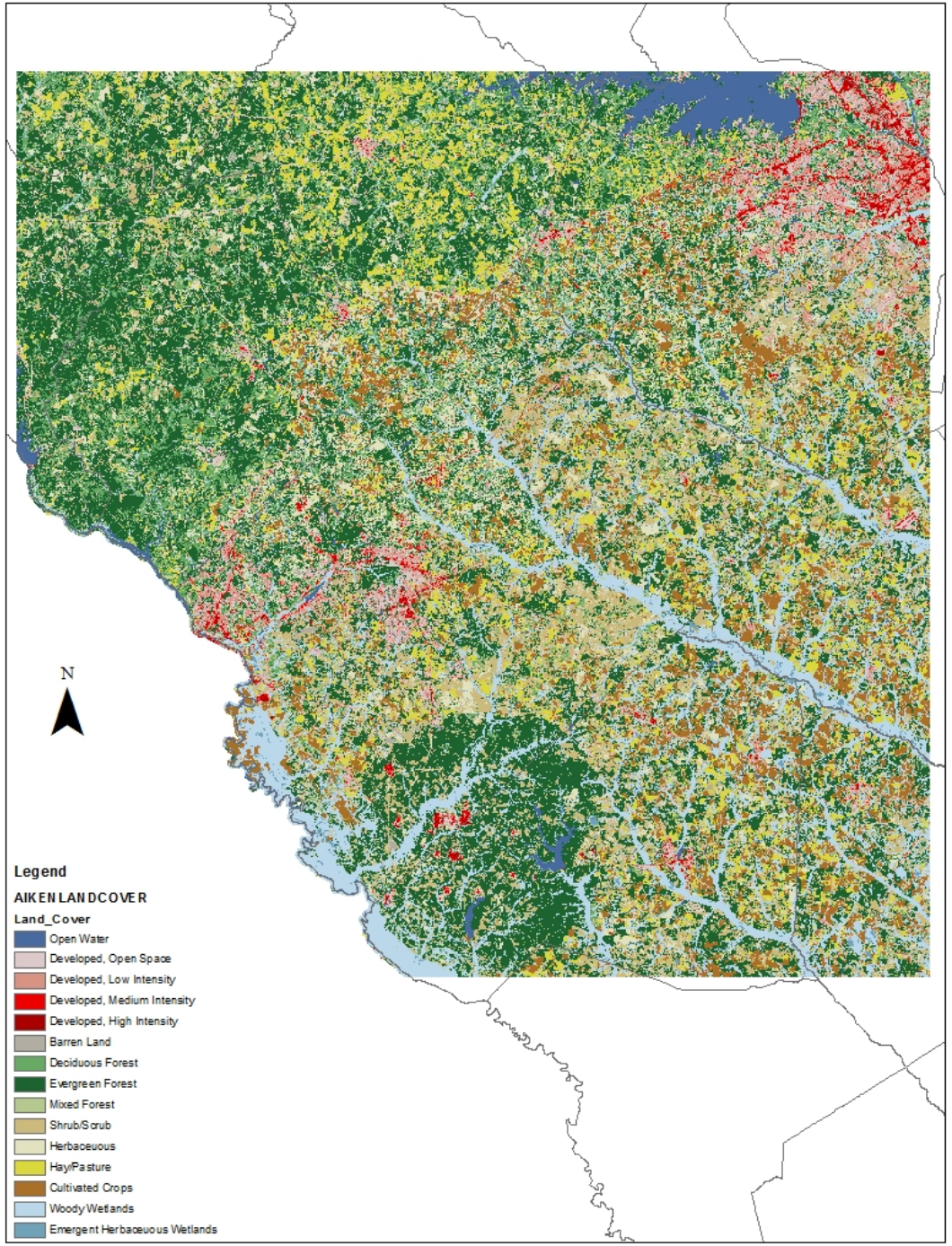
Table 2. Maximum rooting depths (in inches) of irrigated crops grown in North Carolina soils.

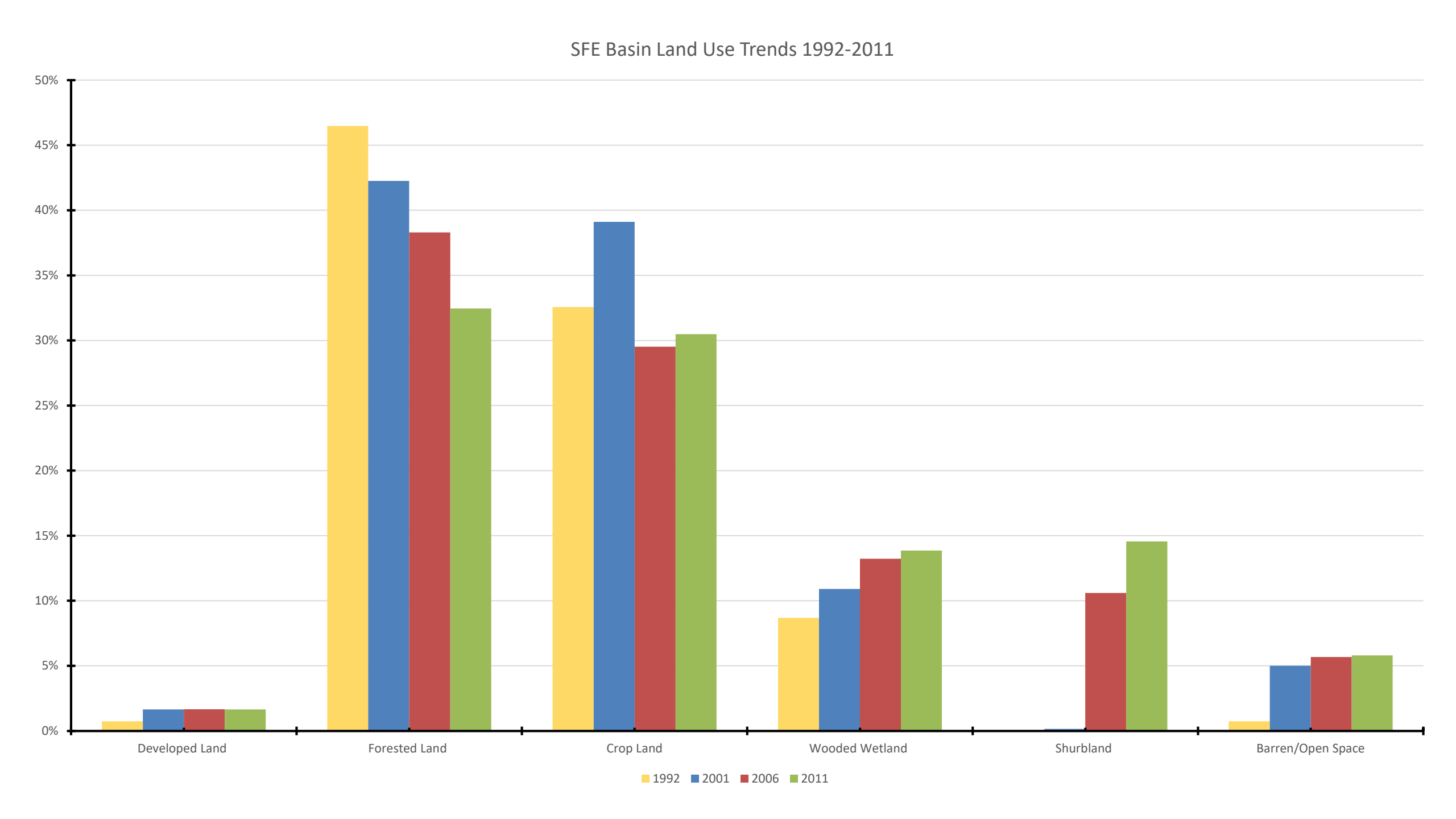
12	**18**
Flowers	Field peas
Strawberries	Potatoes
Kale	Tobacco
Lettuce	Beans
Mustard	Beets
Spinach	Broccoli
Onions	Cabbage
Peppers	Cauliflower
	Carrots
24	Collards
Peanuts	Peppers
Field corn	Turnips
Soybeans	Rutabegas
Asparagus	Cucumbers
Cantaloupes	Tomatoes
Sweet corn	
Eggplant	**30**
Okra	Alfalfa
Watermelons	Cotton

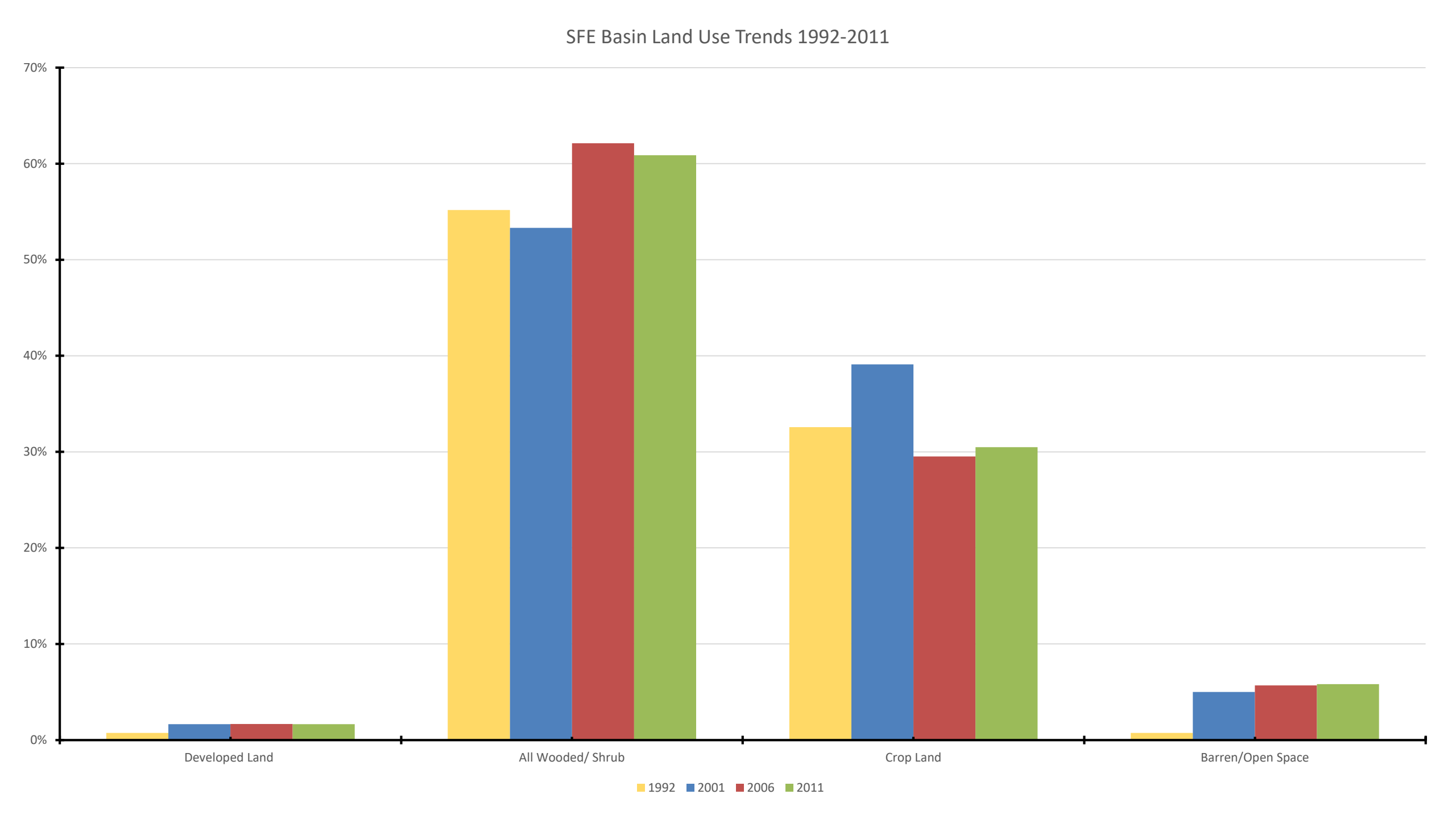
https://content.ces.ncsu.edu/soil-water-and-crop-characteristics-important-to-irrigation-scheduling

Land Use

- National Land Cover Data Sets (1992, 2001, 2006, 2011)
- Used in combination with soil water capacity to calculate surface runoff
- Used to determine rooting depth




SFE Basin Land Use Trends 1992-2011
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Developed Land
Forested Land
Crop Land
Wooded Wetland
Shurbland
Barren/Open Space
1992
2001
2006
2011


SFE Basin Land Use Trends 1992-2011
70%
60%
50%
40%
30%
20%
10%
0%
Developed Land
All Wooded/ Shrub
Crop Land
Barren/Open Space
1992
2001
2006
2011

Google Earth

Google Earth

Testing LU/LC Impacts

Initial SWB Model Run using actual climate and LU/LC compared to a Model Run with actual climate data but a static LU/LC (1992)