Evaluation of Nine Projects for Prioritization of Water Enhancement

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Problem Statement

- TSSWCB requires a numeric ranking of sites throughout Texas for potential water enhancement activities such as brush control and management
  - Nine projects evaluated so far in this cycle
  - Prioritization based on (Mace, 2012):
    - *Firm yield augmentation to (municipal) water supplies*
    - Reliance on a specific source by population

Approach (Mace, 2012)

- Step 1: Water supplies expected to benefit
- Step 2: Firm yield benefit to water supplies
- Step 3: WUGs relying on water supplies
- Step 4: Percent of augmented water supply used by WUGs
- Step 5: Population of WUG
- Step 6: Ranking Index (RI)

Ranking Index

- Ranking Index (RI) gives a measure of the yield benefit per capita
- RI basis:

$$RI = Reliance\ on\ source \times \frac{Yield\ Benefit}{Population}$$

  - Yield Benefit per population
    - Larger acre-ft/yr/capita increases index
  - Reliance of a population on a specific supply
    - Larger reliance increases index

Reliance on source = (% water being supplied from a specific source)
Higher priority is given to those populations who rely solely on the specified water supply source

Contributing Drainage Areas

- Six reservoirs were identified by TSSWCB personnel for the nine sites
- Contributing areas delineated using 8-HUC from USGS Spatial Gateway

Major Cities and Associated Municipal Water User Groups (WUGs)

- GIS analysis identified major cities and municipal WUGs for each reservoir
- River Authorities contacted for verification

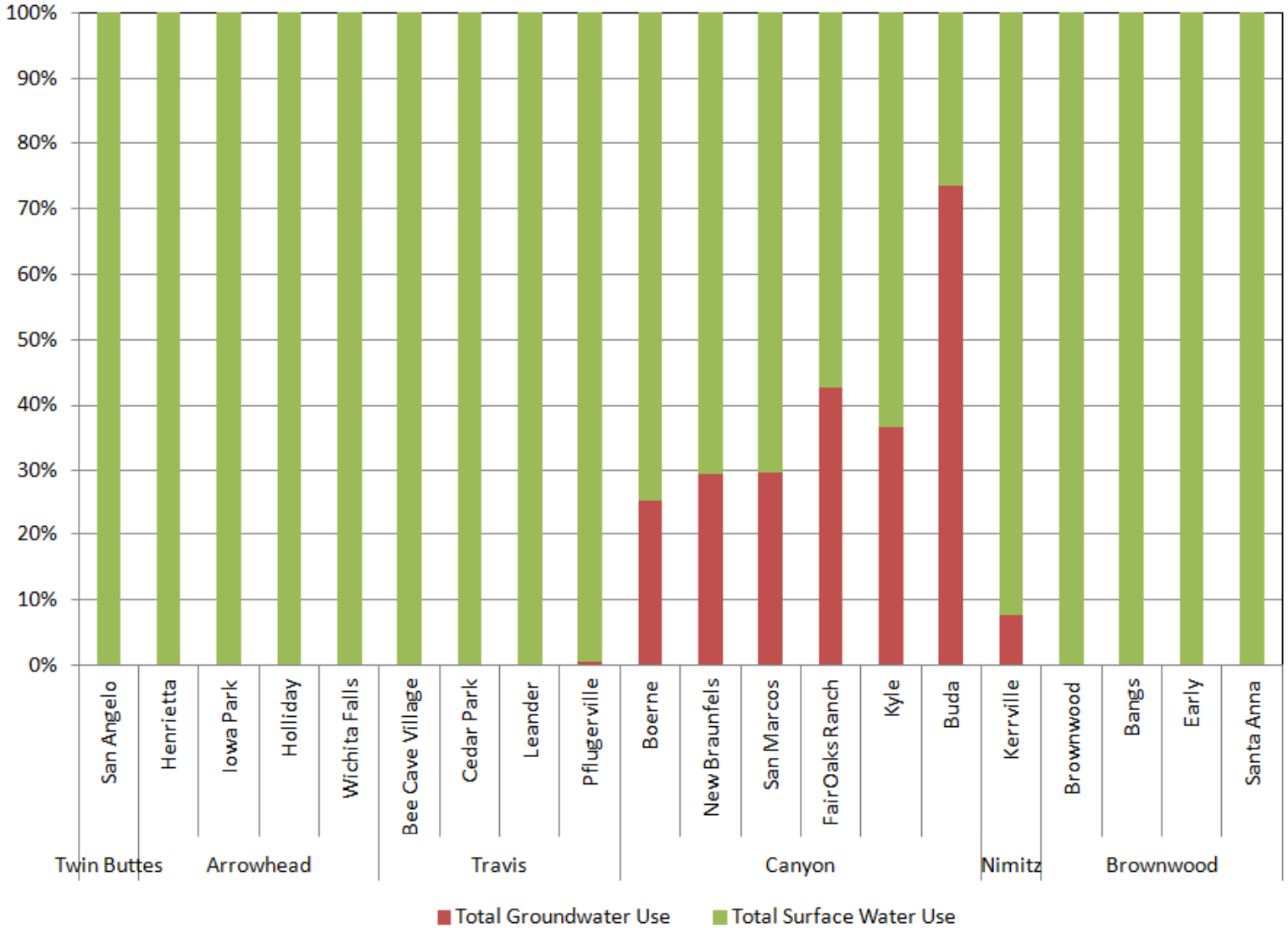
Arrowhead
Henrietta
Holliday
Iowa Park
Wichita Falls
Brownwood
Bangs
Brownwood
Early
Santa Anna
Canyon
Boerne
Buda
FairOaks Ranch
Kyle
New Braunfels
San Marcos
Nimitz
Kerrville
Travis
Bee Cave Village
Cedar Park
Leander
Pflugerville
Twin Buttes
San Angelo

Total Municipal Water Use by WUG

Lake	City	Total Use	Total Groundwater Use	Total Surface Water Use
		(acre-ft/year)		
Twin Buttes	San Angelo	14792	0	14792
Arrowhead	Henrietta	448	0	448
	Iowa Park	797	0	797
	Holliday	168	0	168
	Wichita Falls	12584	0	12584
Travis	Bee Cave Village	976	0	976
	Cedar Park	10512	0	10512
	Leander	3223	0	3223
	Pflugerville	3322	13	3309
Canyon	Boerne	1827	456	1371
	New Braunfels	13286	3907	9379
	San Marcos	7349	2182	5167
	FairOaks Ranch	1385	592	793
	Kyle	2222	816	1406
	Buda	1205	887	318
Nimitz	Kerrville	4963	378	4585
Brownwood	Brownwood	3149	0	3149
	Bangs	193	0	193
	Early	293	0	293
	Santa Anna	149	0	149

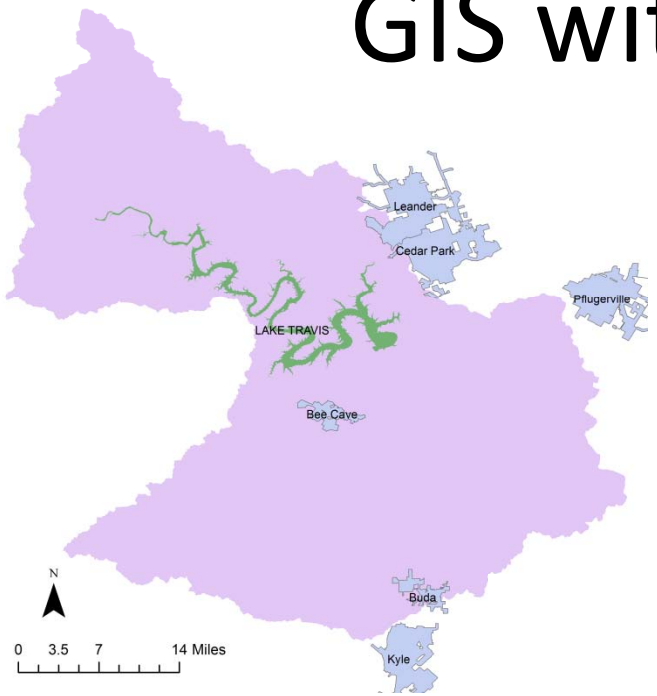
Data from TWDB 2010 water use surveys

Fraction of Surface Water Use

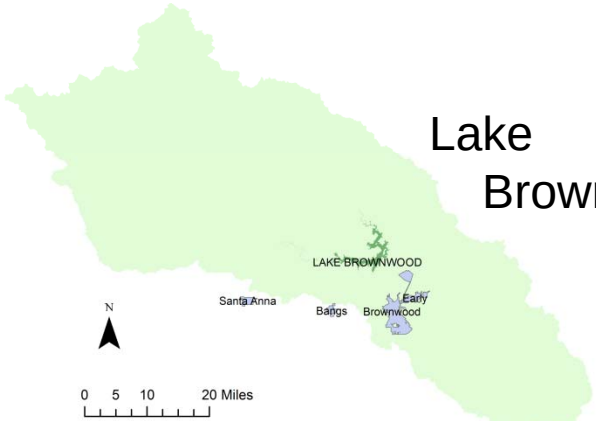


Data from TWDB 2010 water use surveys

GIS with Urban Centers

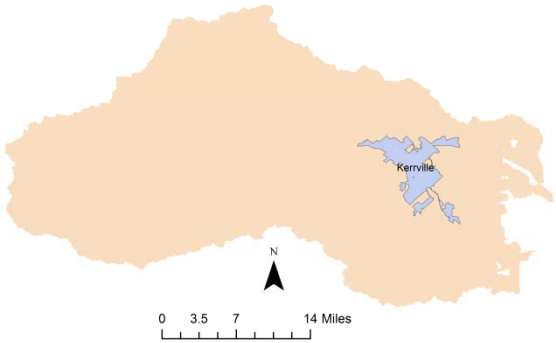


Lake Travis



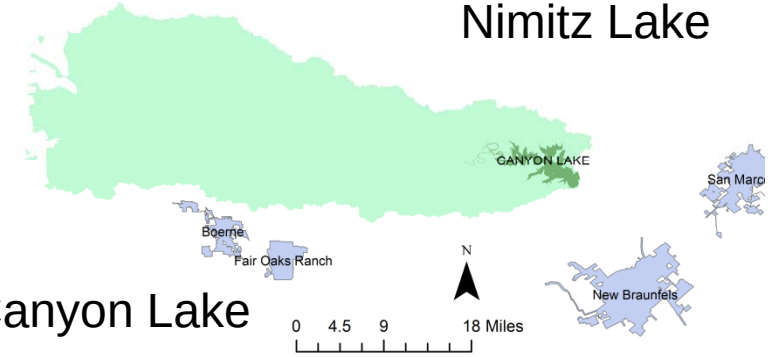
Lake Brownwood

Lake Arrowhead



Nimitz Lake

Twin Buttes Lake



Canyon Lake

Population Estimates

Lake	Watershed Population	WUG Population
Arrowhead	14246	115807
Brownwood	57335	24752
Canyon	45504	154402
Nimitz	48980	22347
Travis	974700	126319
Twin Buttes	56952	93200

**The contributing areas of Arrowhead, Canyon, and Twin Buttes are more rural with population centers crossing watershed boundaries

**Austin will only use a fraction of water from Lake Travis during dry years; otherwise, Austin pulls no water from Lake Travis

Lake	City	Population
Twin Buttes	San Angelo	93200
Arrowhead	Henrietta	3141
	Iowa Park	6355
	Holliday	1758
	Wichita Falls	104553
Travis	Bee Cave Village	3925
	Cedar Park	48937
	Leander	26521
	Pflugerville	46936
Canyon	Boerne	10471
	New Braunfels	57740
	San Marcos	44894
	FairOaks Ranch	5986
	Kyle	28016
	Buda	7295
Nimitz	Kerrville	22347
Brownwood	Brownwood	19288
	Bangs	1603
	Early	2762
	Santa Anna	1099

*Data from U.S. Census, 2010

Reliance per Capita

$$RI = Reliance\ on\ source \times \frac{Yield\ Benefit}{Population}$$

Lake	Reliance/Capita
Arrowhead	2.64E-02
Brownwood	4.87E-02
Canyon	4.23E-03
Nimitz	4.13E-03
Travis	8.35E-03
Twin Buttes	1.07E-03

- Ranking Index cannot be calculated without water yield benefits

- Lakes having largest reliance per capita will have higher rankings if all other factors are held constant

Ranking

Lake / Project Area	Gallons/Treated Acre	Sub-basin #'s	Ranking Index	Relative Rank
Lake Brownwood	118,778	28	5784	1
Arrowhead/Archer County	202,270	11	5340	2
Arrowhead/Clay County	199,036	24	5255	3
Lake Travis/Pedernales River	212,420	5	1774	4
Lake Canyon	73,275	19	310	5
Lake Nimitz/Upper Guadalupe	29,189	2	121	6
Twin Buttes/Eldorado Divide	61,184	SD 4	65	7
Twin Buttes/Tom Green County	51,328	SC 11	55	8
Twin Buttes/Middle Concho	41,189	SD 6	44	9

**Ranks increase with higher gallons/treated area and higher reliance/capita