Table of Contents

Page | Corresponding Map Number

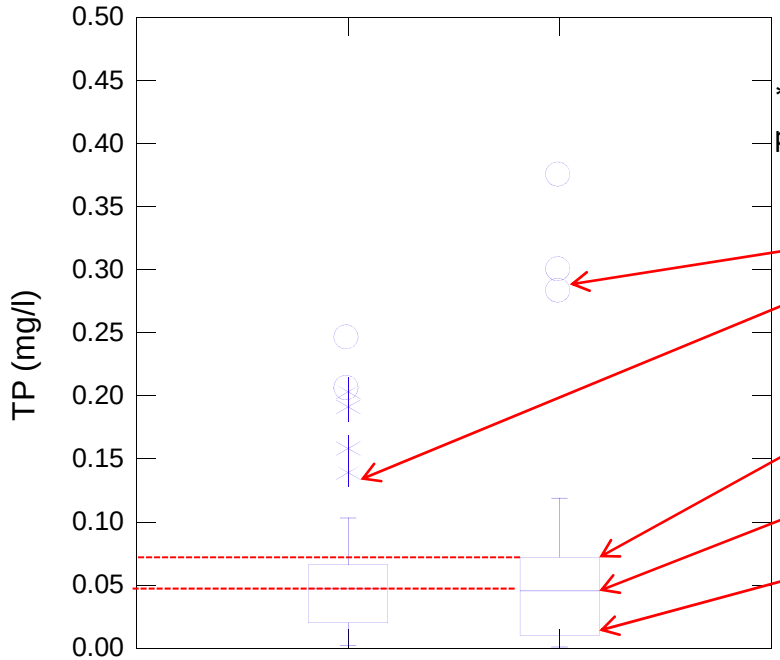
1
2…..Guide to Reading Graphs
3…..Definitions
4…..Utah Statewide Reference Stream Sites (boxplot)
5…..Statewide Randomly Selected Stream Sites (boxplot)
6…..Statewide Randomly Selected Stream Sites (CDF)
7…..Reference Stream Sites by Level II Ecoregion (boxplot) ……Map # 1
8…..Reference Stream Sites by Level II Ecoregion (CDF) ……Map # 1
9…..Randomly Selected Stream Sites by Level II Ecoregion (boxplot) ……Map # 1
10…Randomly Selected Stream Sites by Level II Ecoregion (CDF) ……Map # 1
11…Reference Stream Sites by Level III Ecoregion (boxplot) ……Map # 2
12…Randomly Selected Sites by Level III Ecoregion (boxplot) ……Map # 2
13…Reference Stream Sites by Benifical Use, 1C (Domestic Water) vs All Others (boxplot) ……Map # 3
14…Randomly Selected Stream Sites by Beneficial Use, 1C (Domestic Water) vs All Others (boxplot) ……Map # 3
15…Reference Stream Sites by Aquatic Wildlife Uses (boxplot) ……Map # 4
16…Randomly Selected Stream Sites by Aquatic Wildlife Uses (boxplot) ……..Map # 4
17…All Western US Reference Stream Sites by Level II Ecoregion (boxplot)
18…All Western US Reference Stream Sites by Level II Ecoregion (CDF)
19…Randomly Selected Stream Sites by Watershed Management Unit (boxplot) ……..Map # 5
20…Randomly Selected Stream Sites by Watershed Management Unit (CDF) ……..Map # 5
21…Utah Lakes by Level II Ecoregion (boxplot) ……Map # 1
22…Utah Lakes by Aquatic Wildlife Uses (boxplot)……Map # 6
23…Utah Lakes by Size (Area)

This Color Title Indicates Reference Streams

This Color Title Indicates Randomly Selected Streams

This Color Title Indicates Lakes

Guide to Reading This Handout and Associated Graphs



Boxplots

*Some extreme values may not be shown for clarity purposes

Outliers, extreme values given this dataset

75th percentile, 75% of samples are below this value, indicated by dashed line (~0.075)

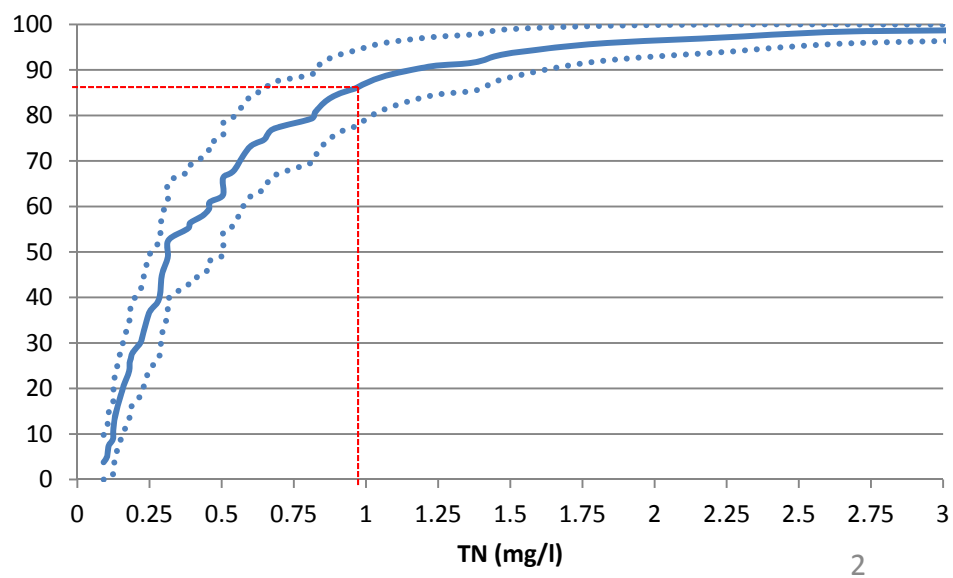
Mean value of all samples, indicated by dashed line (~0.5)

25th percentile, 25% of samples are below this value

Cumulative Distribution Functions

Find 1 mg/l of TN on X-axis, move vertically until you cross the solid CDF line (see red dashed line). Then move horizontally until you reach the Y axis (here, at 85). Read as, 85% of samples have a concentration of less than 1 mg/l TN (conversely, 15% have a concentration greater than 1). Dashed lines indicate 95% Confidence Interval.

Note *Some CDFs are representative of the sample population (not weighted) and some are representative of the entire State or Watershed (weighted).



Definitions

TN…Total Nitrogen in water, here always reported as mg/l

TP…Total Phosphorus in water, here always reported as mg/l

DIN…Dissolved Inorganic Nitrogen in water. Often thought of as the fraction of TN that is most readily available to algae and bacteria. Although, newer research has emphasized that much more of the Dissolved Organic Nitrogen is available than previously thought, especially for bacteria. Utah DWQ historically collected DIN instead of TN so much of our data for nitrogen is presented as DIN for comparison purposes

Category 1 Waters…Protected for domestic water sources

Category 2 Waters…Protected for recreational use and aesthetics

Category 3 Waters…Protected for use by aquatic wildlife

- 3A…Coldwater gamefish and other aquatic life, including all necessary aquatic organisms in their food chain
- 3B…Warmwater gamefish…
- 3C…Non gamefish…
- 3D…Waterfowl…
- 3E…Severely habitat limited waters, narrative standards will apply

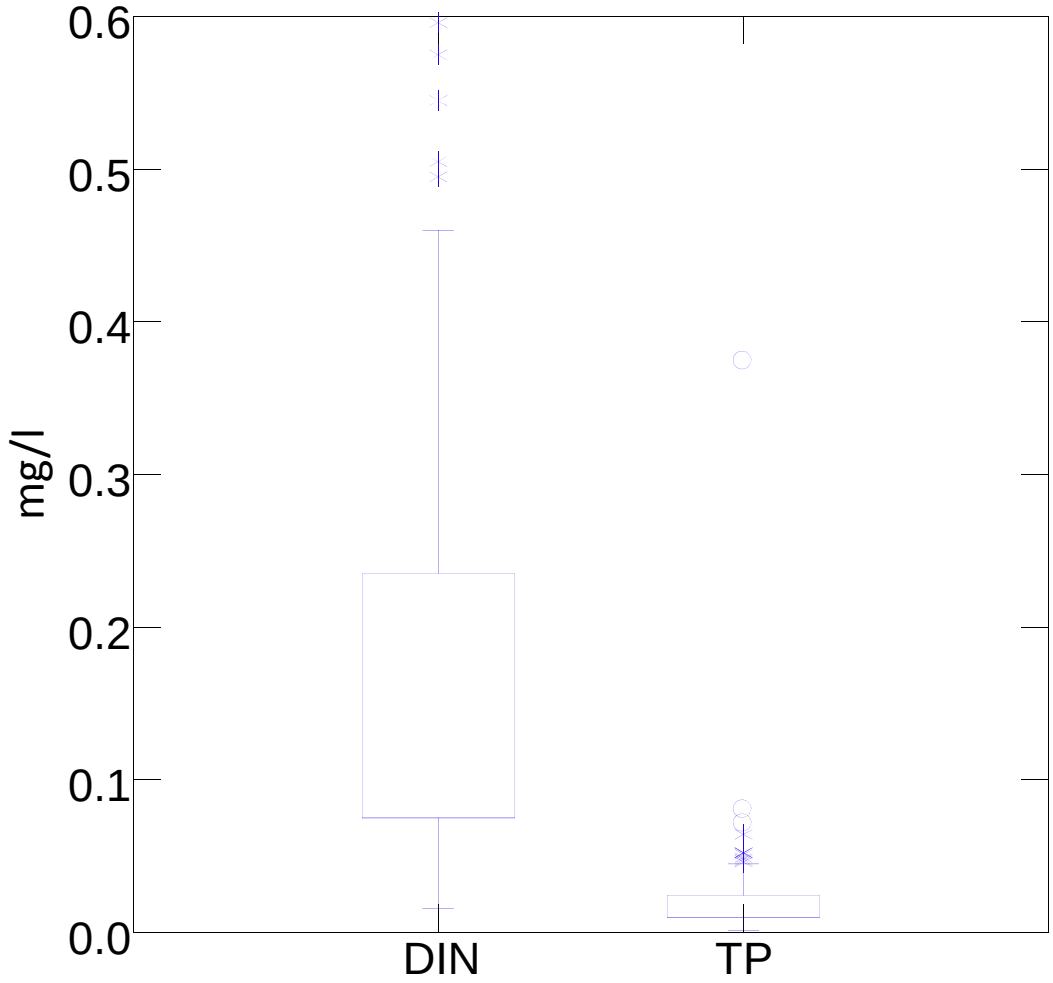
Ecoregions…denotes areas within which ecosystems (the type, quality, and quantity of environmental resources) are generally similar. These phenomena include geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology.

Reference Site…Hand picked sites that are thought to represent the most pristine woderbodies, least disturbed by human activities.

Randomly Selected Sites…Sites chosen at random with a known probability (weight) that most accurately reflect the current conditions of a given area (Statewide, watershed-wide, etc.).

Watershed Management Units…The State is divided into six (6) Watershed management Units (WMU) based on hydrologic characteristics.

Statewide Reference Stream Sites



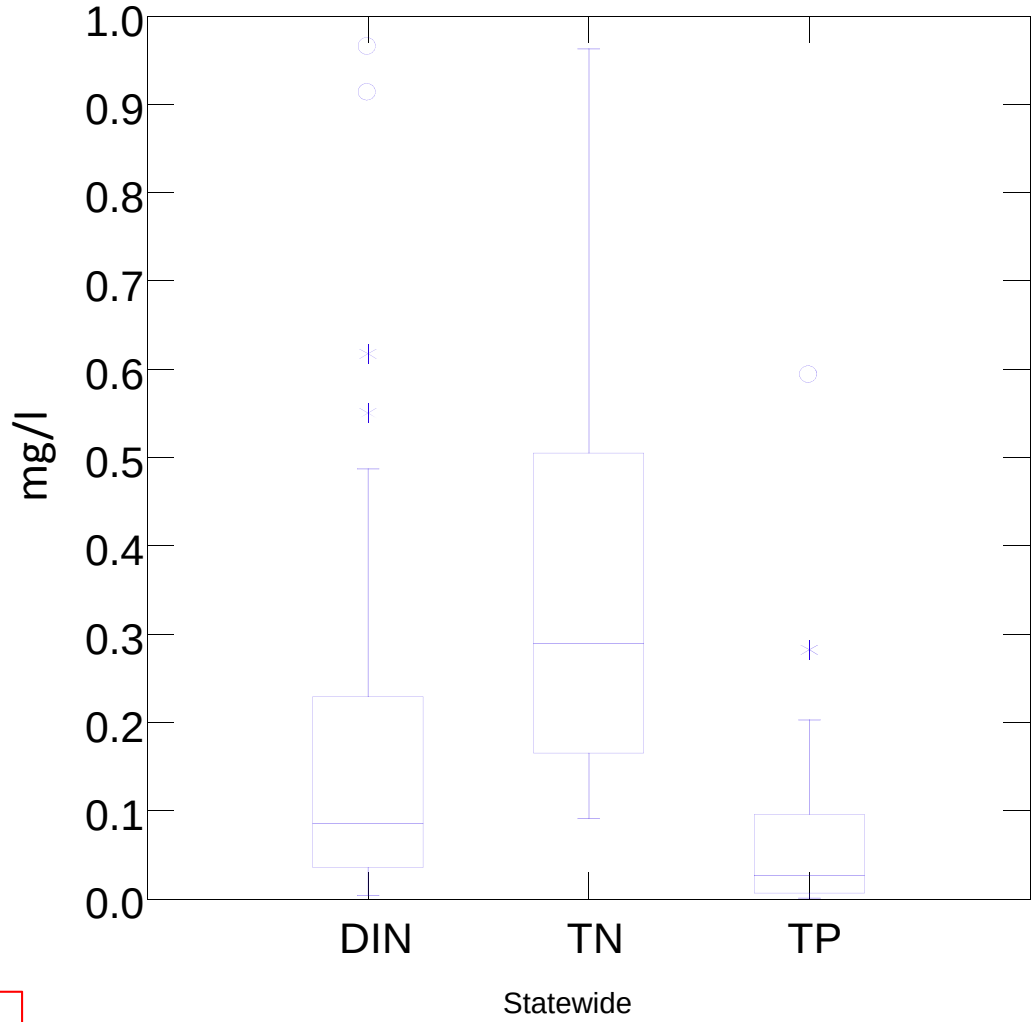
Statewide Reference

*Notice-Scale on Y-axis may change between Reference and Random sites for clarity

	DIN	TP
N	111	113
Min	0.016	0.001
Max	2.25	0.374
Median	0.135	0.010
Mean	0.260	0.022
SD	0.401	0.037

*Some outliers not Shown

Statewide Randomly Selected Stream Sites

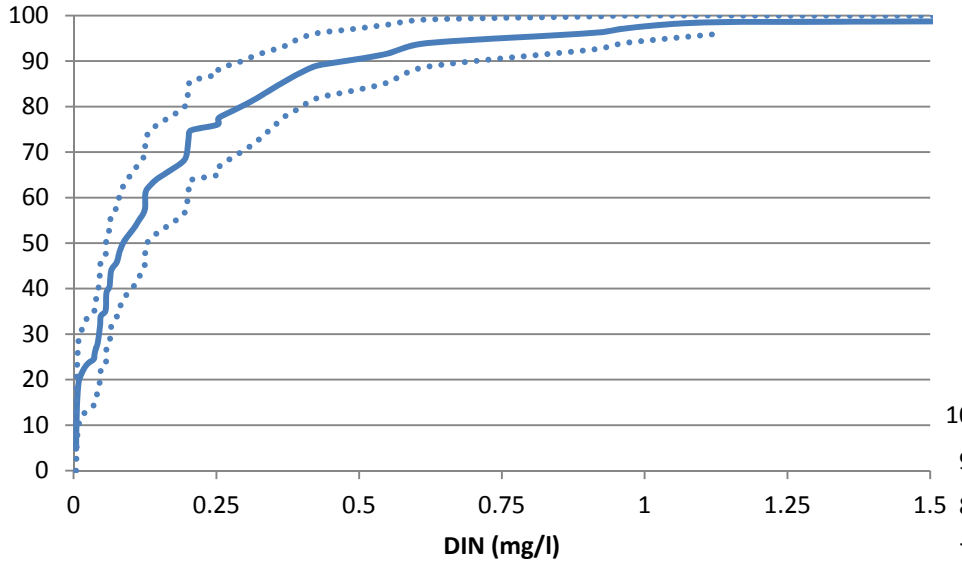


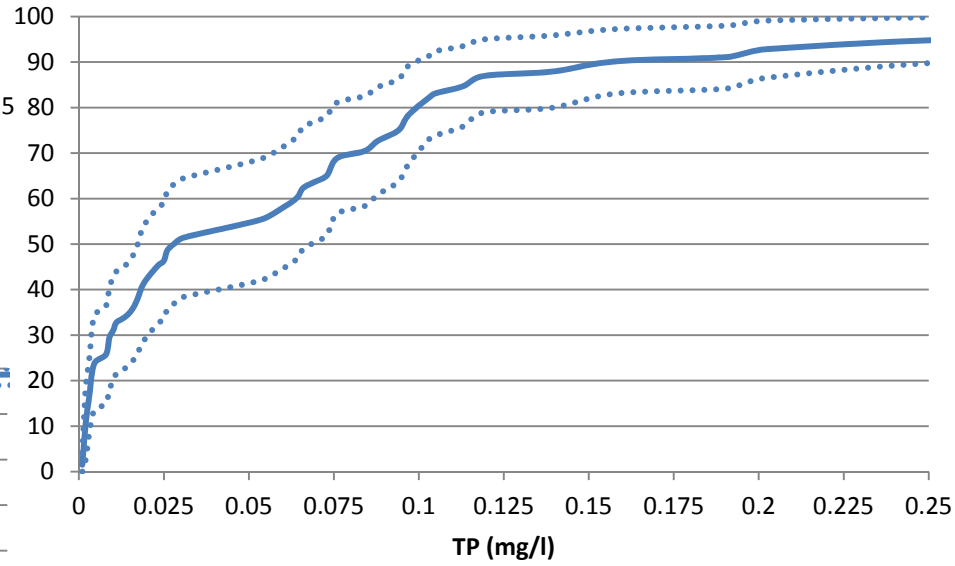
*Notice-Scale on Y-axis may change between Reference and Random sites for clarity

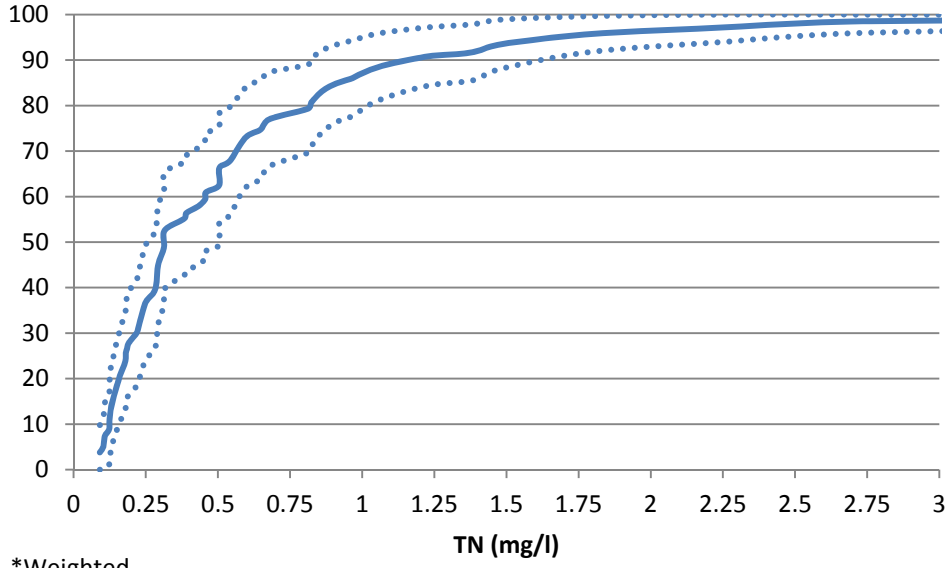
	DIN	TN	TP
N	50	50	50
Min	0.004	0.091	0.001
Max	6.193	6.381	1.965
Median	0.097	0.350	0.029
Mean	0.328	0.676	0.138
SD	0.968	0.998	0.364

*Some outliers not Shown

Statewide Randomly Selected Stream Sites



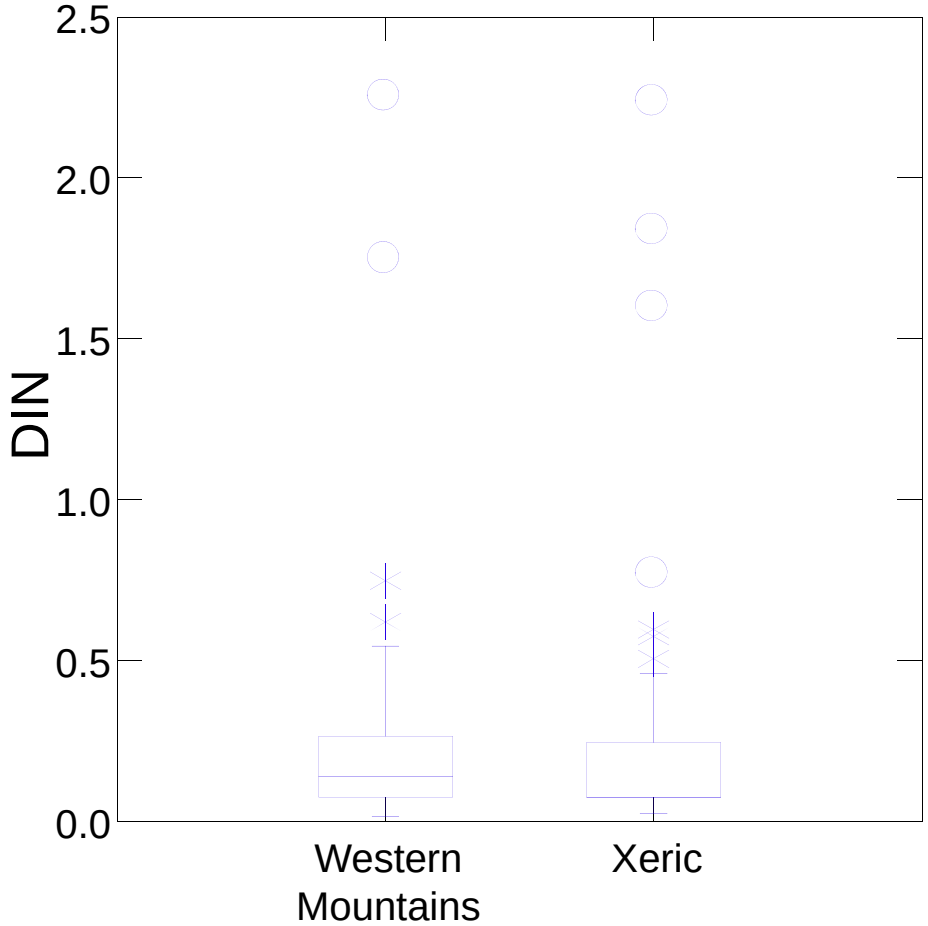


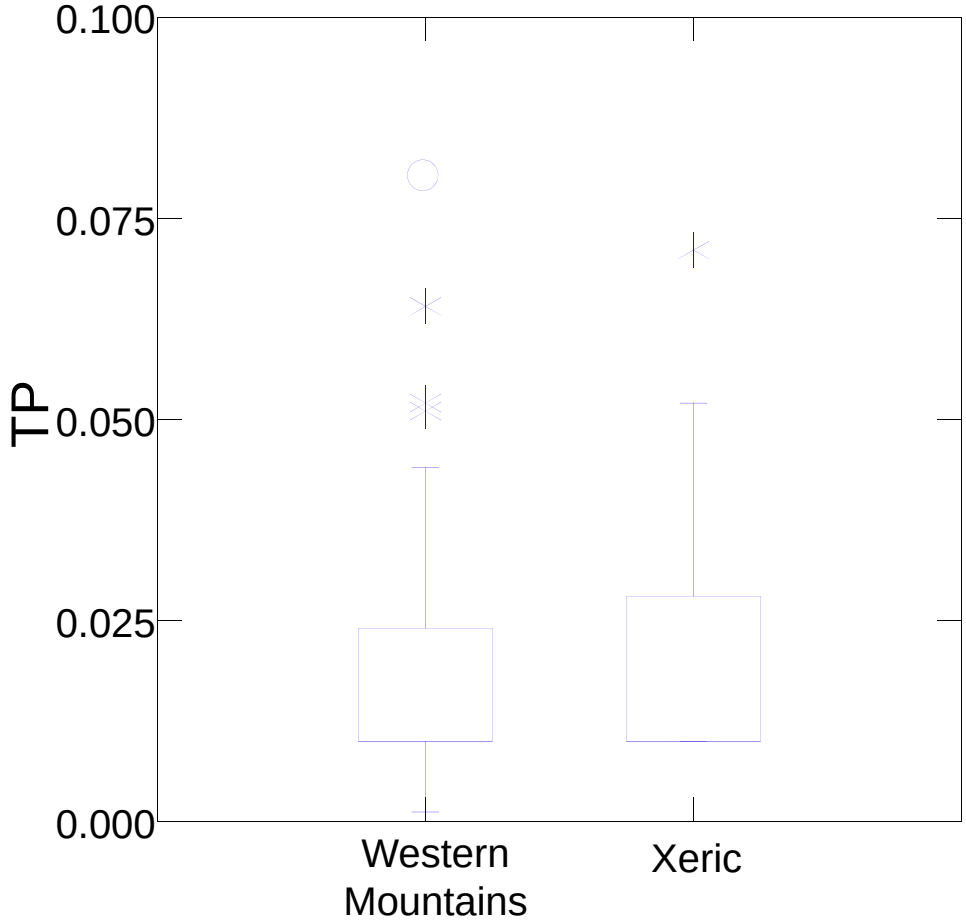


*Weighted

Reference Stream Sites by Level II Ecoregion

See Map # 1





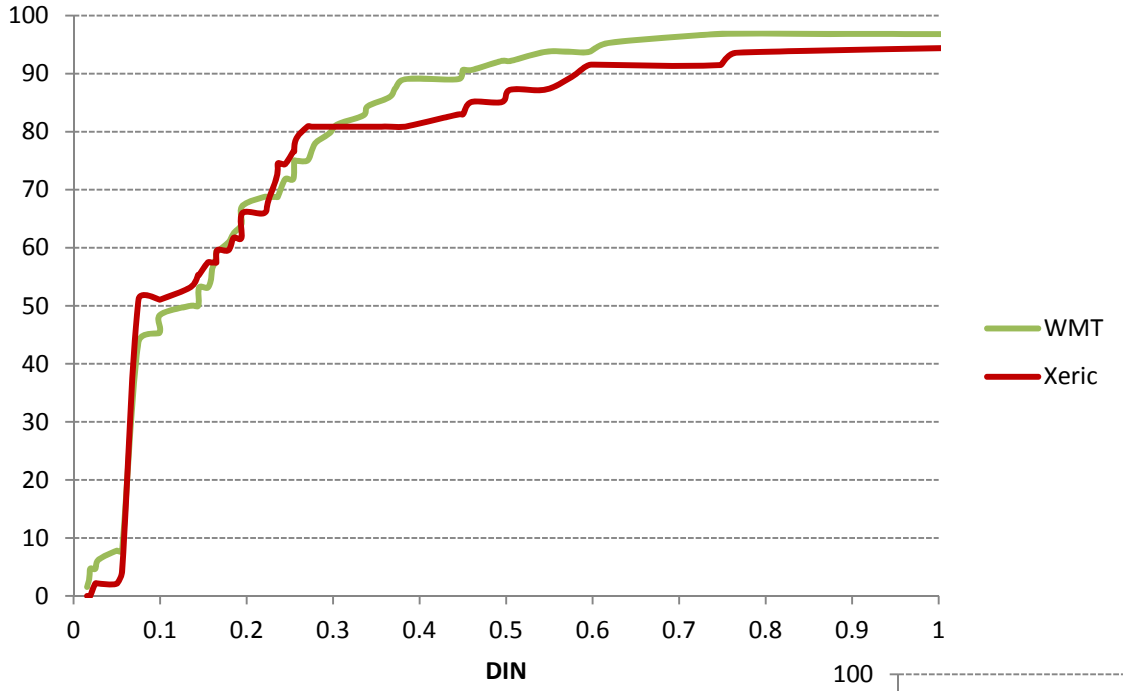
	Western Mountains	
	DIN	TP
N	64	66
Min	0.016	0.001
Max	2.25	0.08
Median	0.14	0.01
Mean	0.237	0.017
SD	0.356	0.015

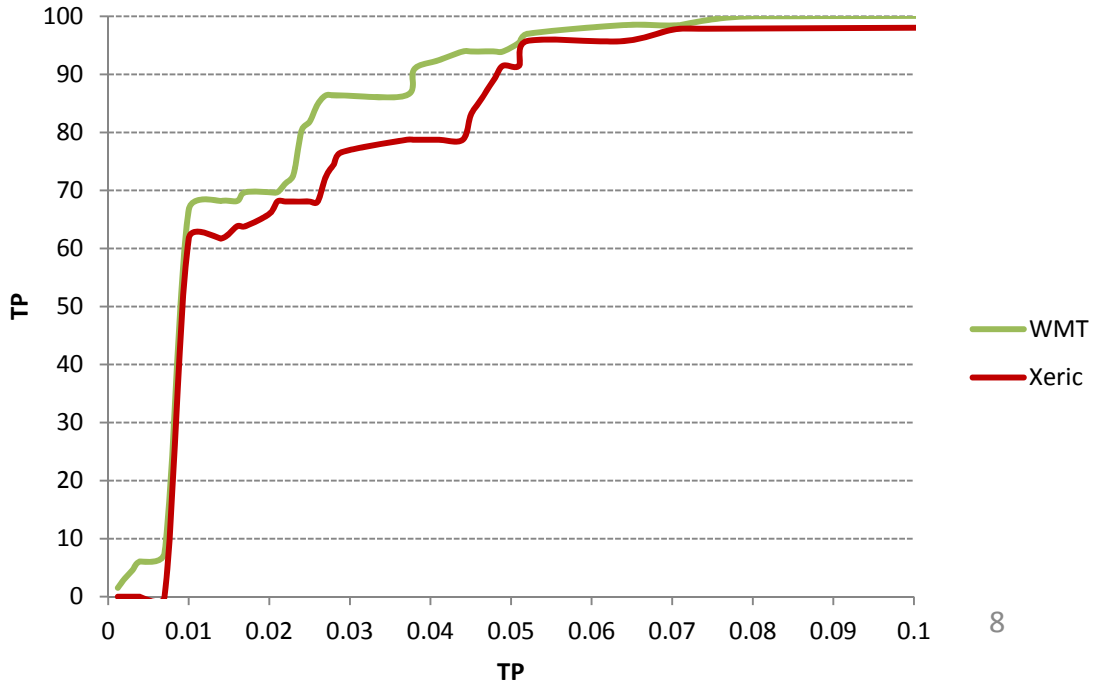
	Xeric	
	DIN	TP
N	47	47
Min	0.025	0.010
Max	2.235	0.374
Median	0.075	0.01
Mean	0.29	0.028
SD	0.458	0.054

*Some outliers not Shown

Reference Stream Sites by Level II Ecoregion

See Map # 1

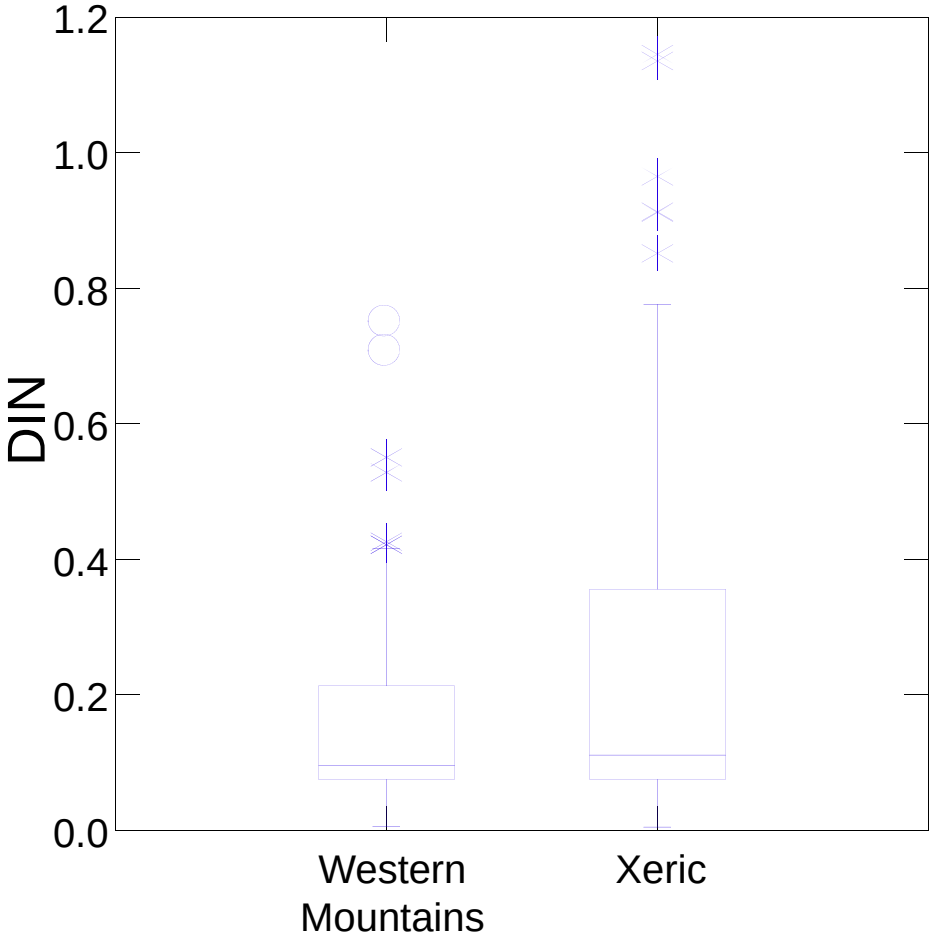


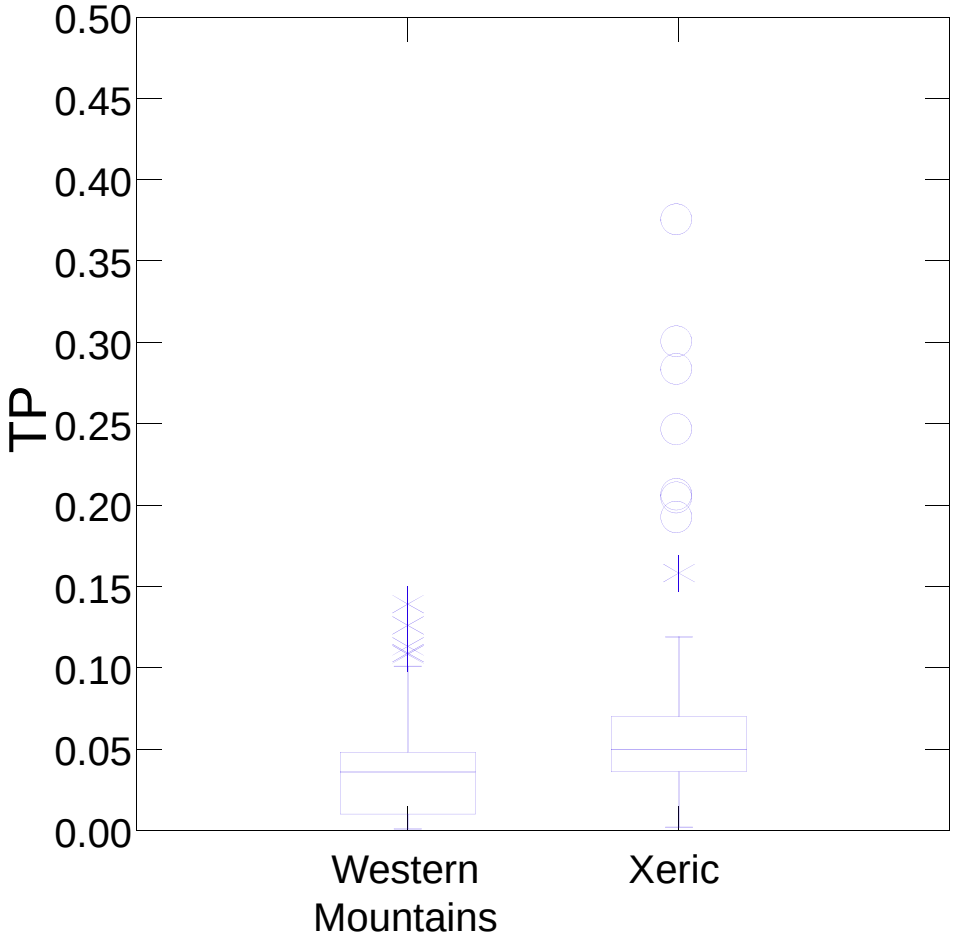


*Not Weighted

Randomly Selected Stream Sites by Level II Ecoregion

See Map # 1





Western Mountains

	DIN	TP
N	121	121
Min	0.006	0.001
Max	9.35	1.84
Median	0.114	0.038
Mean	0.30	0.058
SD	0.890	0.174

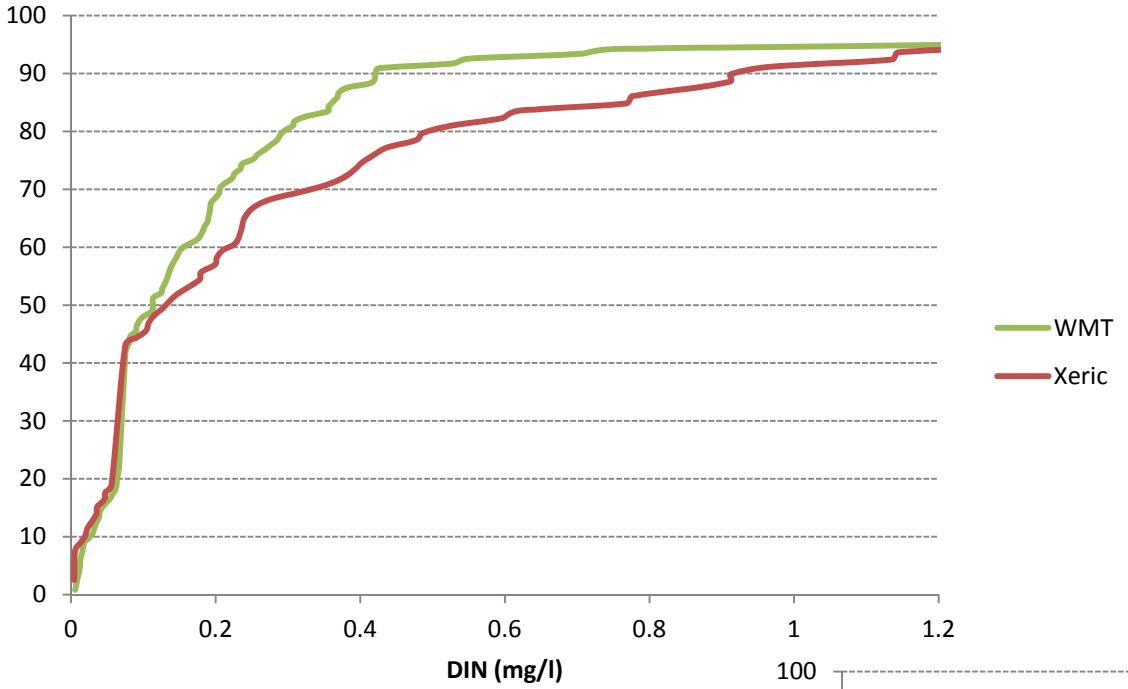
Xeric

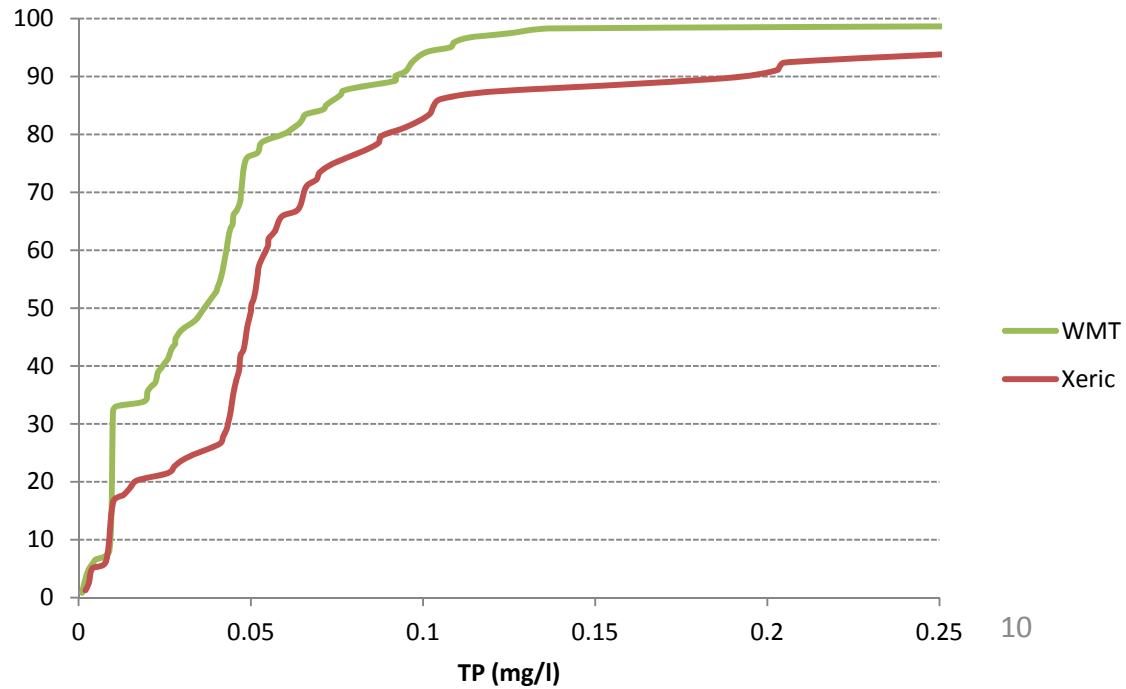
	DIN	TP
N	79	79
Min	0.004	0.002
Max	6.793	1.965
Median	0.136	0.050
Mean	0.439	0.113
SD	0.949	0.289

*Some outliers not Shown

Randomly Selected Stream Sites by Level II Ecoregion

See Map # 1

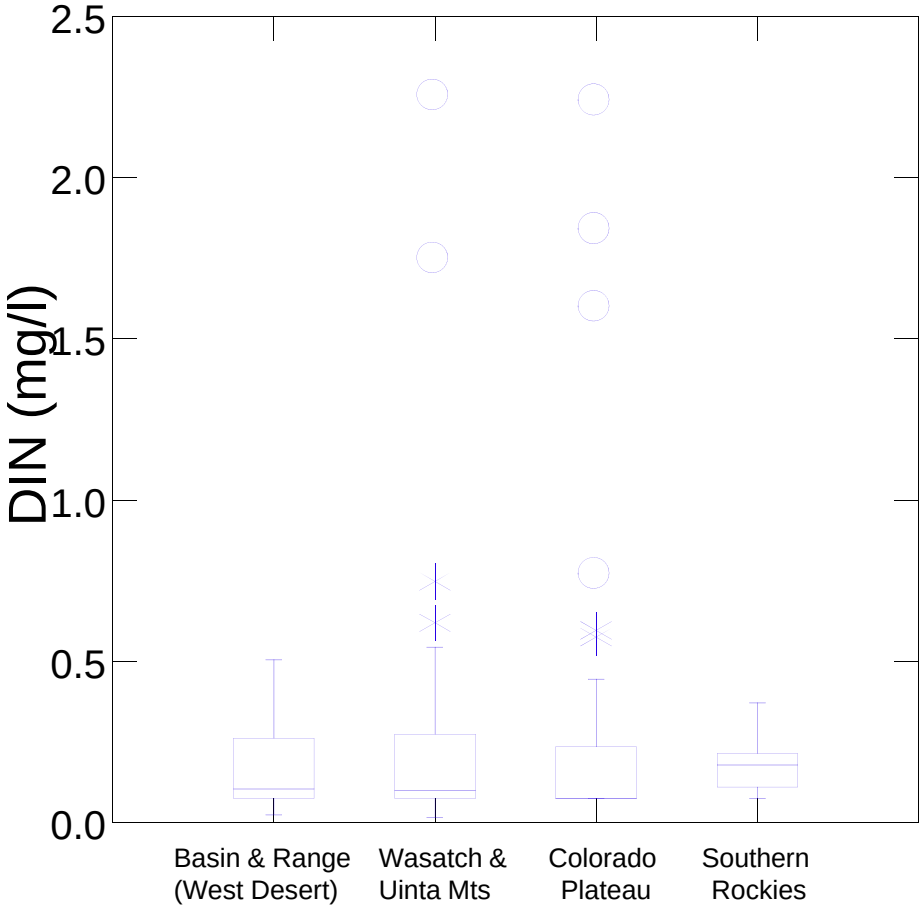


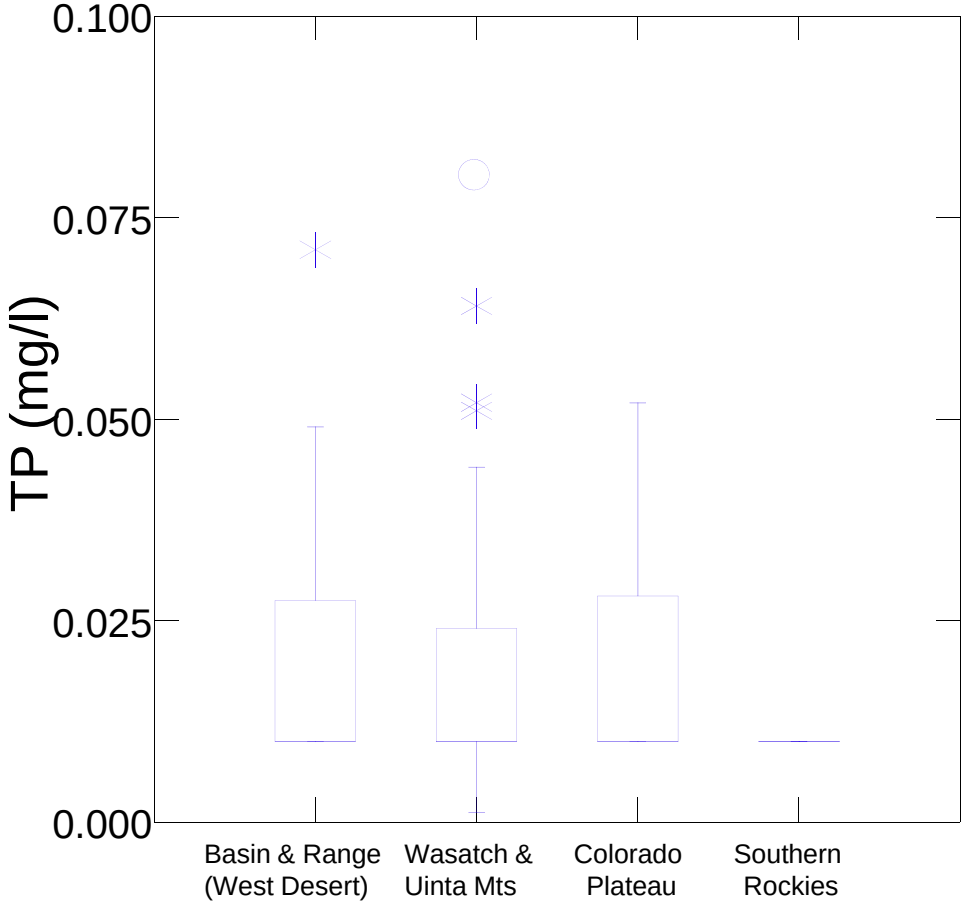


*Weighted

Reference Stream Sites by Level III Ecoregion

See Map # 2





Basin & Range (West Desert)

	DIN	TP
N	12	12
Min	0.025	0.01
Max	0.505	0.071
Median	0.105	0.01
Mean	0.186	0.021
SD	0.161	0.021

Wasatch & Uinta Mountains

	DIN	TP
N	57	59
Min	0.016	0.001
Max	2.25	0.08
Median	0.1	0.01
Mean	0.244	0.018
SD	0.375	0.016

Colorado Plateau

	DIN	TP
N	35	35
Min	0.075	0.010
Max	2.235	0.374
Median	0.075	0.01
Mean	0.326	0.031
SD	0.520	0.062

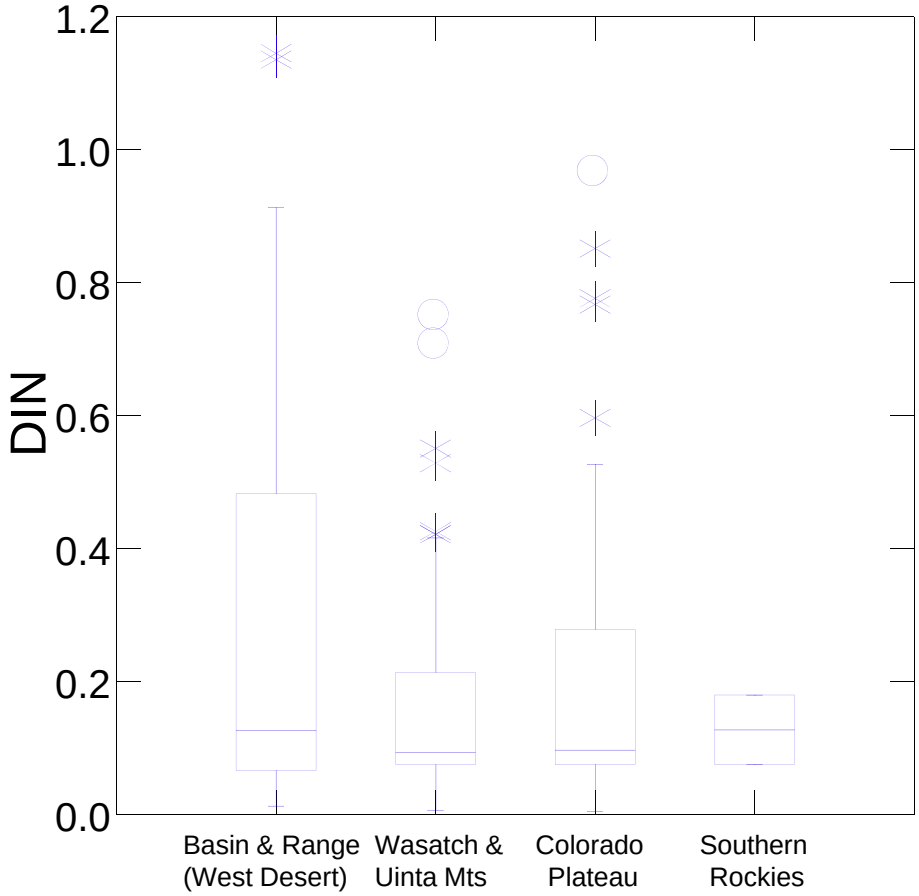
Southern Rockies

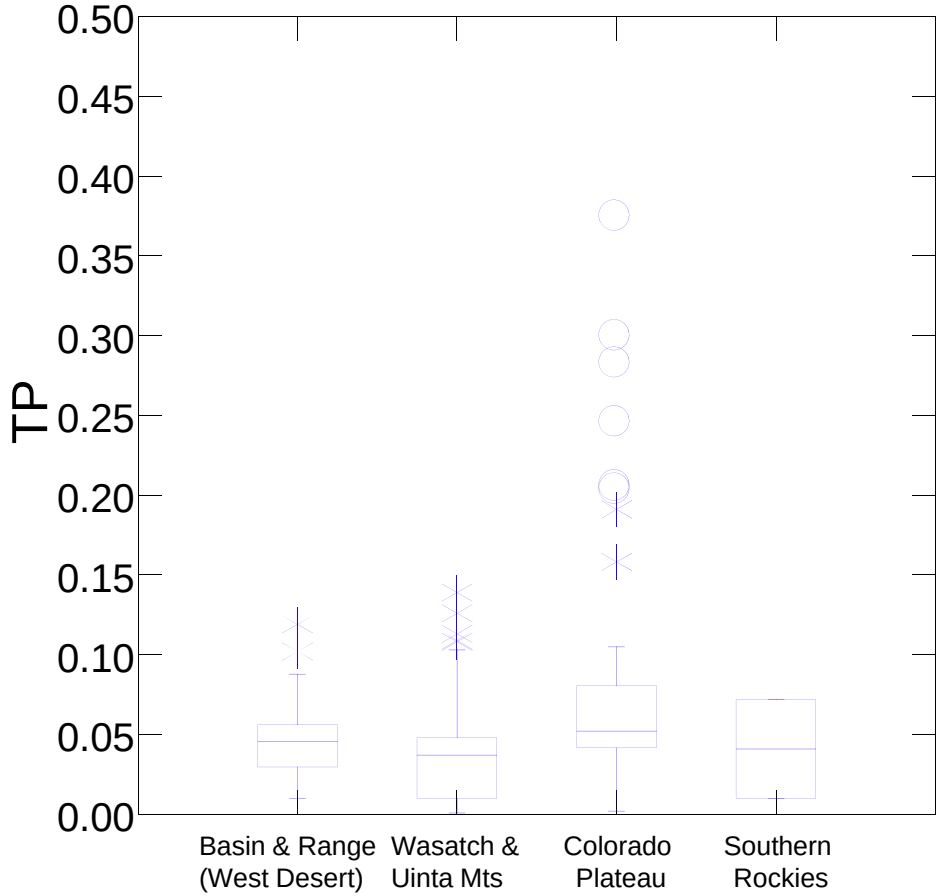
	DIN	TP
N	7	7
Min	0.075	0.01
Max	0.372	0.01
Median	0.179	0.01
Mean	0.182	0.01
SD	0.104	0.00

*Some outliers not Shown

Randomly Selected Sites by Level III Ecoregion

See Map # 2





Basin & Range (West Desert)

	DIN	TP
N	26	26
Min	0.013	0.010
Max	6.793	1.965
Median	0.158	0.048
Mean	0.768	0.186
SD	1.517	0.488

Wasatch & Uinta Mountains

	DIN	TP
N	120	120
Min	0.006	0.001
Max	9.35	1.840
Median	0.113	0.038
Mean	0.300	0.058
SD	0.894	0.174

Colorado Plateau

	DIN	TP
N	52	52
Min	0.004	0.002
Max	2.235	0.374
Median	0.125	0.052
Mean	0.282	0.076
SD	0.407	0.081

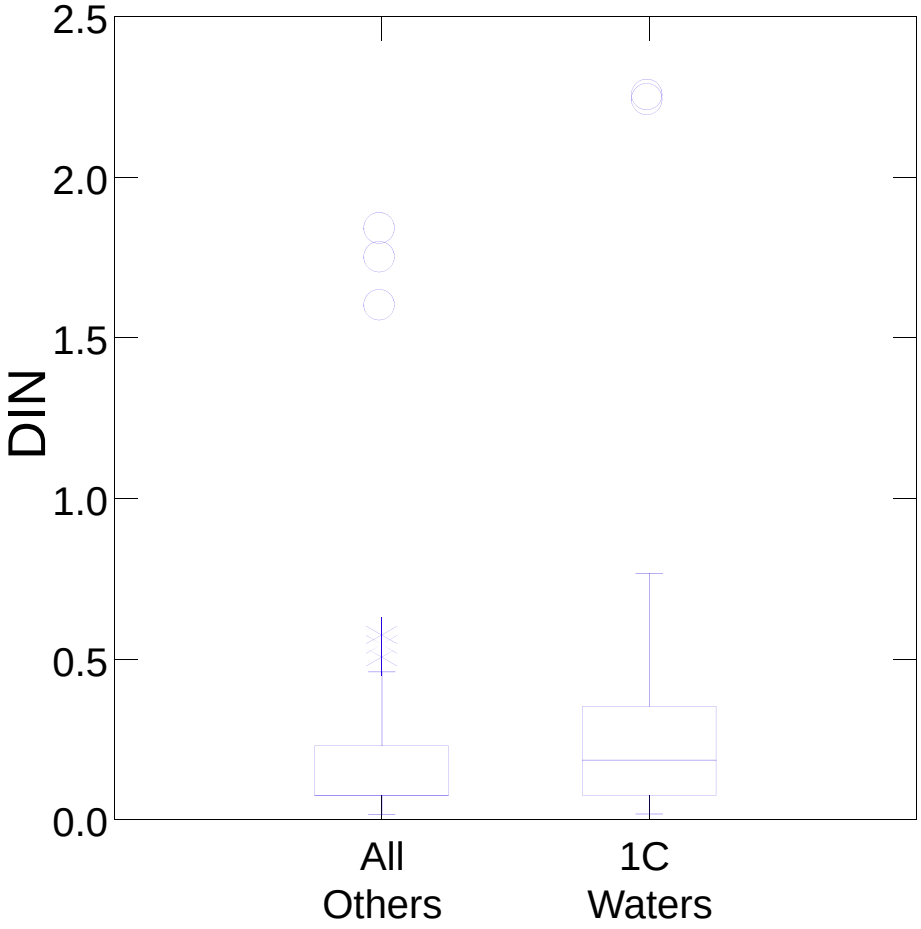
Southern Rockies

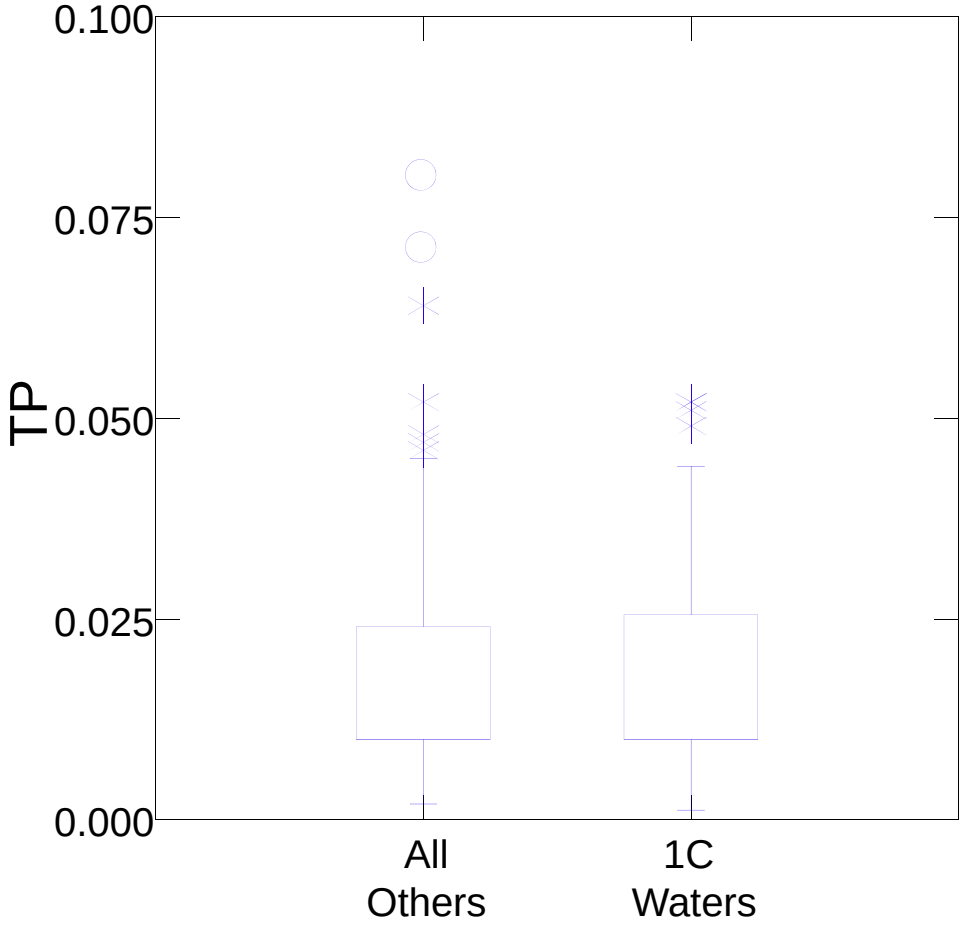
	DIN	TP
N	2	2
Min	0.075	0.010
Max	0.179	0.072
Median	0.127	0.041
Mean	0.127	0.041
SD	0.074	0.044

*Some outliers not Shown

Reference Stream Sites by Beneficial Use, 1C (Domestic Water) vs All Others

See Map # 3





All Others

	DIN	TP
N	75	77
Min	0.016	0.002
Max	1.835	0.08
Median	0.075	0.01
Mean	0.217	0.019
SD	0.334	0.016

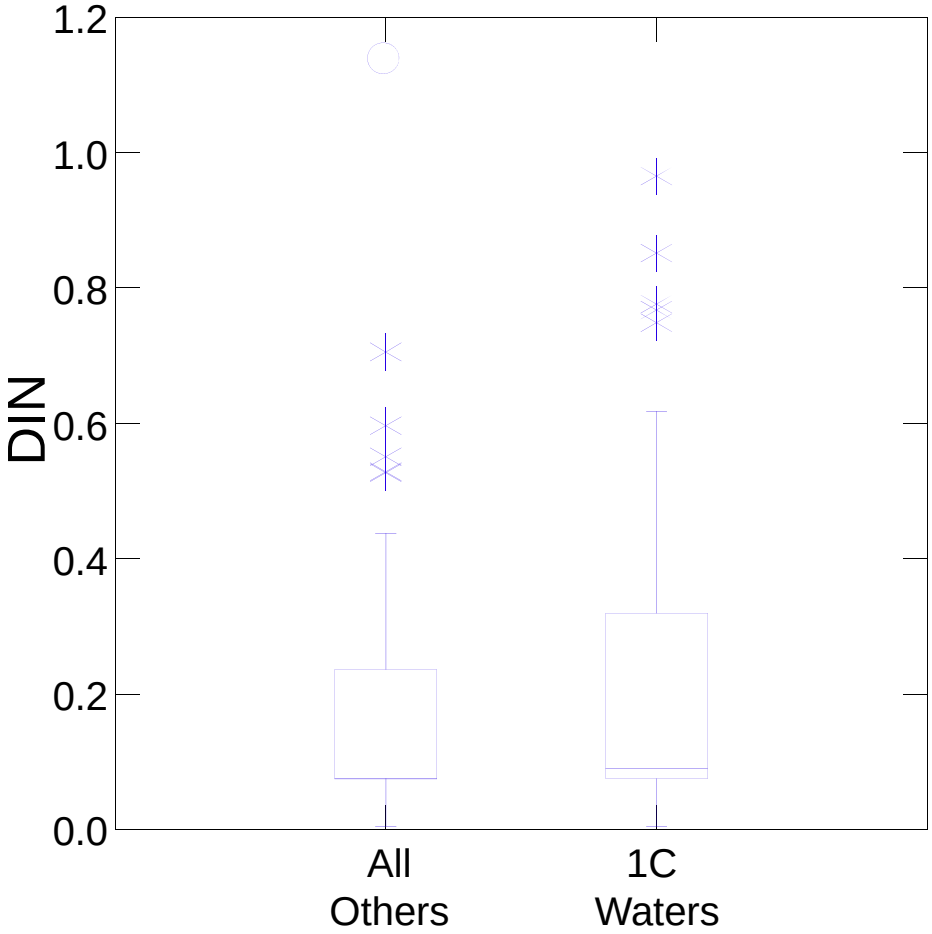
IC Waters

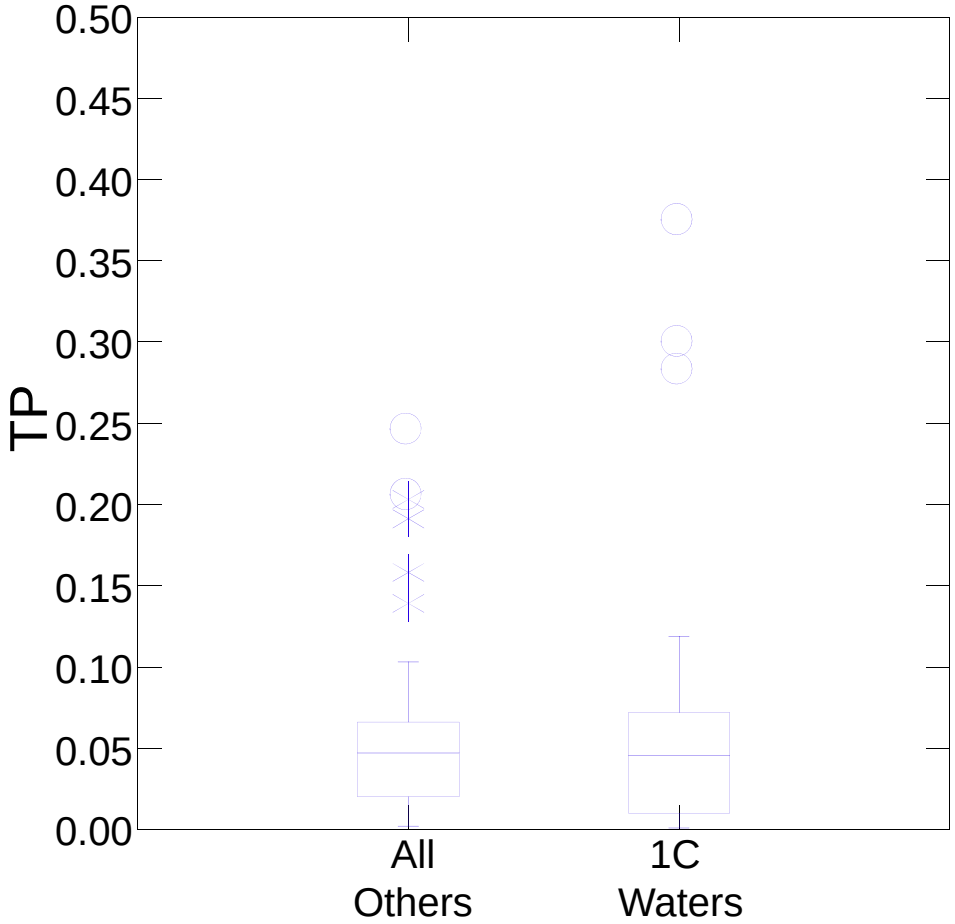
	DIN	TP
N	36	36
Min	0.018	0.001
Max	2.25	0.374
Median	0.185	0.01
Mean	0.348	0.029
SD	0.507	0.061

*Some outliers not Shown

Randomly Selected Stream Sites by Beneficial Use, 1C (Domestic Water) vs All Others

See Map # 3





All Others

	DIN	TP
N	75	75
Min	0.004	0.002
Max	6.793	1.707
Median	0.081	0.048
Mean	0.336	0.085
SD	0.838	0.206

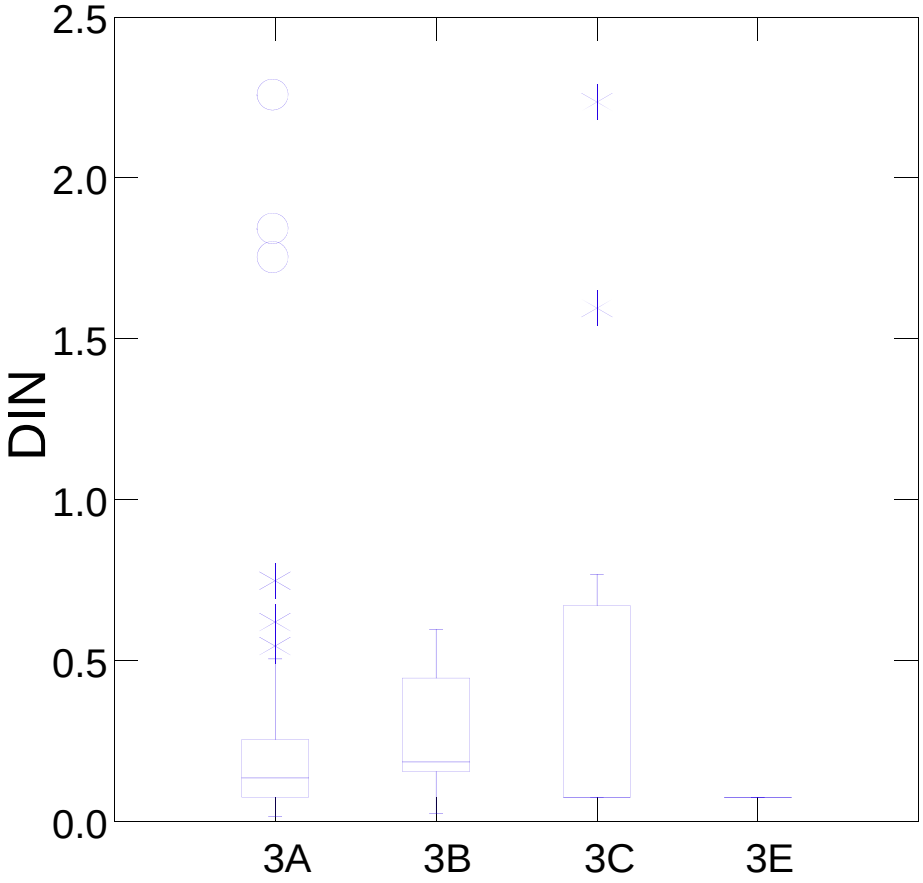
IC Waters

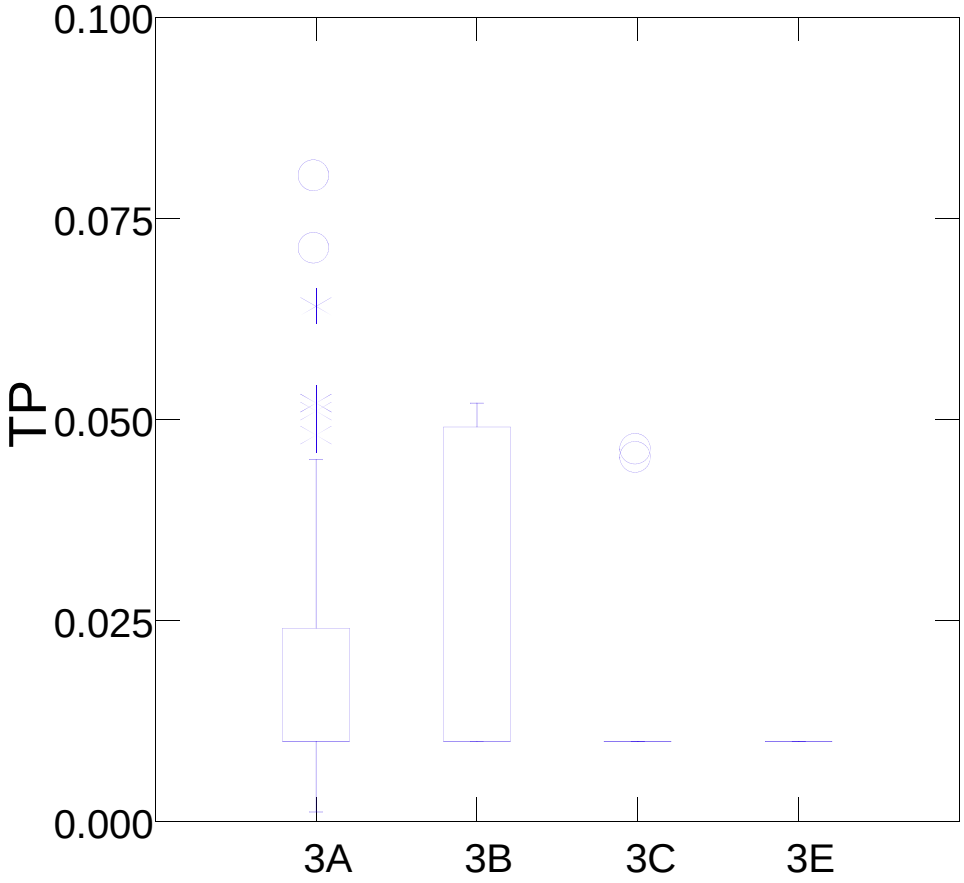
	DIN	TP
N	54	54
Min	0.004	0.001
Max	4.406	0.374
Median	0.128	0.045
Mean	0.363	0.056
SD	0.681	0.073

*Some outliers not Shown

Reference Stream Sites by Aquatic Wildlife Uses

See Map # 4





3A Coldwater Fishes

	DIN	TP
N	91	93
Min	0.016	0.01
Max	2.250	0.08
Median	0.135	0.01
Mean	0.232	0.019
SD	0.35	0.015

3B Warmwater Fishes

	DIN	TP
N	5	5
Min	0.025	0.01
Max	0.596	0.052
Median	0.185	0.01
Mean	0.281	0.026
SD	0.233	0.022

3C Non-Game Fish

	DIN	TP
N	11	11
Min	0.075	0.010
Max	2.235	0.374
Median	0.075	0.01
Mean	0.533	0.05
SD	0.737	0.109

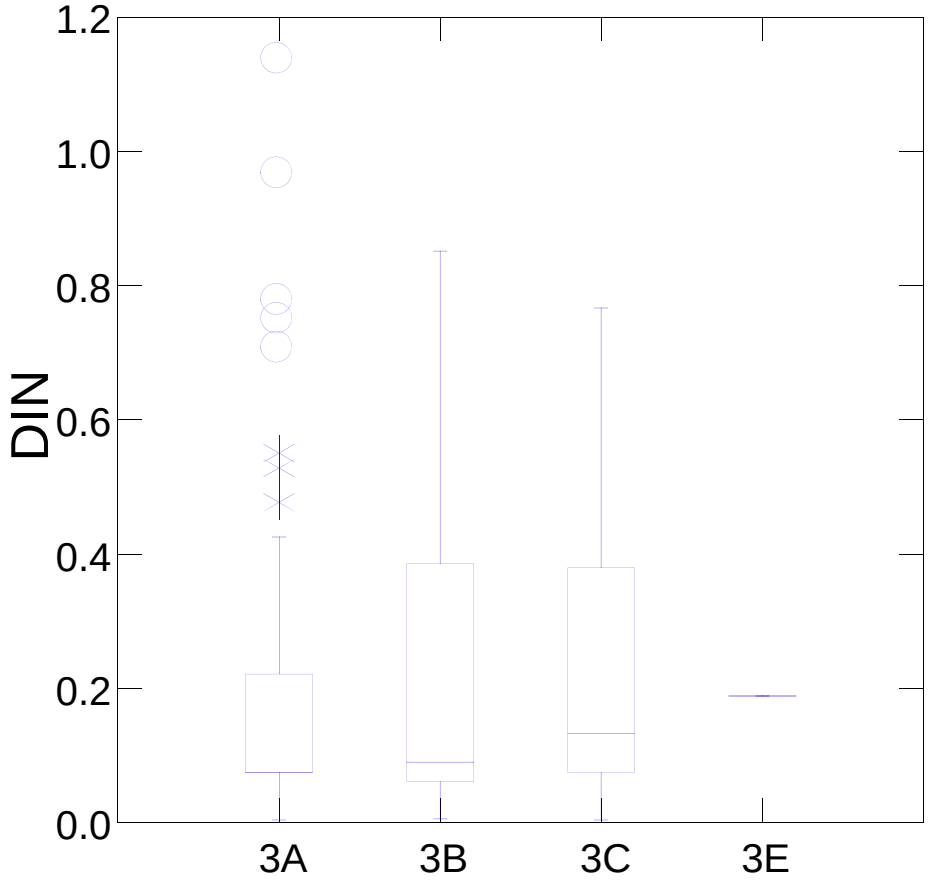
3E Waterfowl

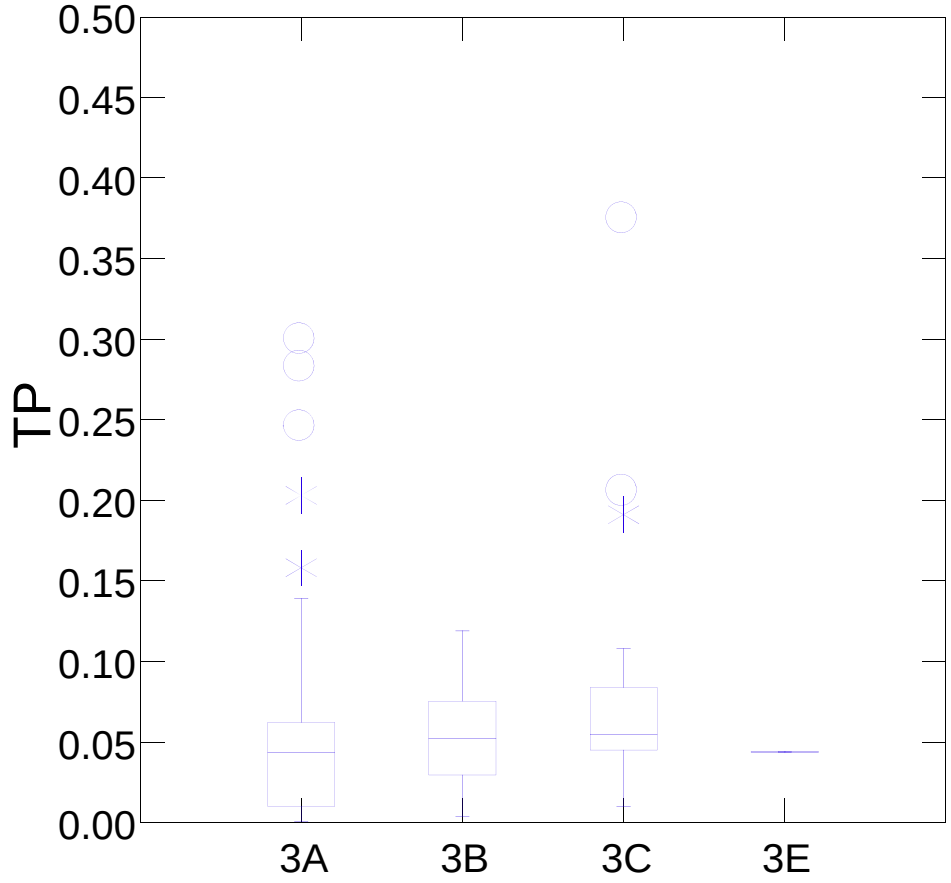
	DIN	TP
N	1	1
Min	0.075	0.01
Max	0.075	0.01
Median	0.075	0.01
Mean	0.075	0.01
SD	0.075	0.00

*Some outliers not Shown

Randomly Selected Stream Sites by Aquatic Wildlife Uses

See Map # 4





3A Coldwater Fishes

	DIN	TP
N	88	88
Min	0.004	0.001
Max	4.406	1.707
Median	0.077	0.044
Mean	0.291	0.076
SD	0.560	0.194

3B Warmwater Fishes

	DIN	TP
N	12	12
Min	0.006	0.004
Max	6.793	0.119
Median	0.159	0.052
Mean	0.797	0.054
SD	1.906	0.035

3C Non-Game Fish

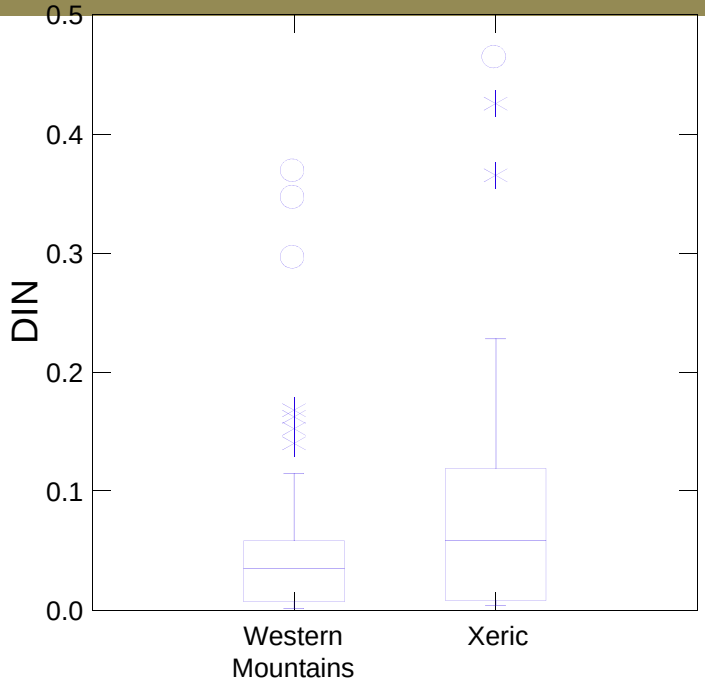
	DIN	TP
N	26	26
Min	0.004	0.010
Max	2.235	0.374
Median	0.187	0.055
Mean	0.353	0.076
SD	0.510	0.077

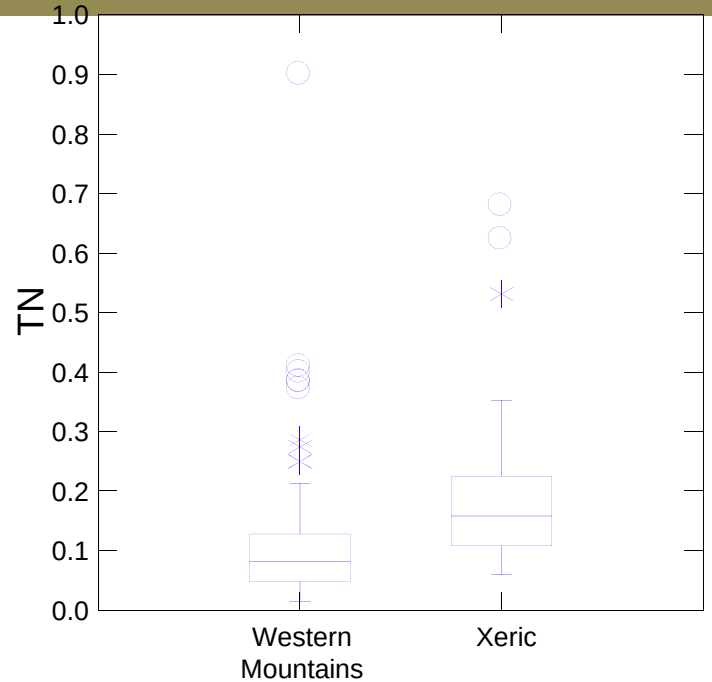
3E Waterfowl

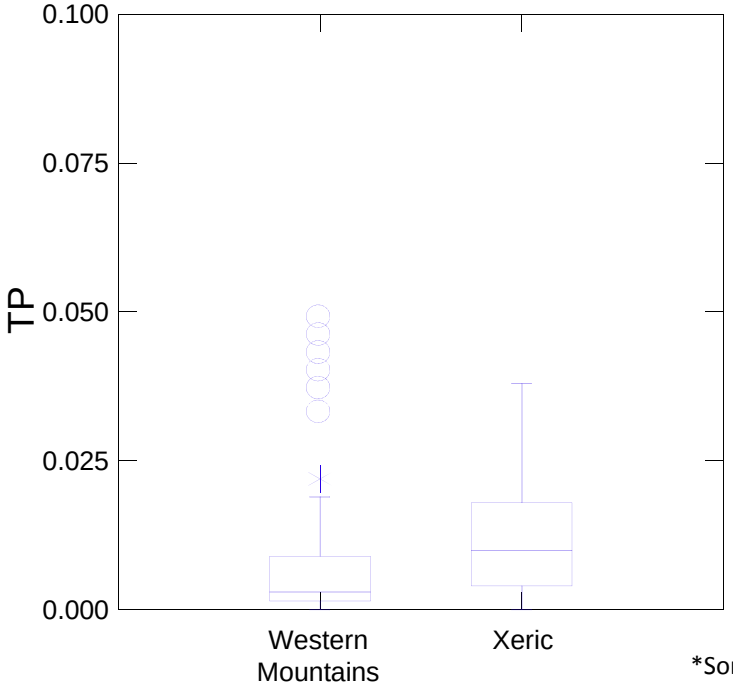
	DIN	TP
N	1	1
Min	0.189	0.044
Max	0.189	0.044
Median	0.189	0.044
Mean	0.189	0.044
SD	0.000	0.00

*Some outliers not Shown

All Western US Stream Reference Sites by Level II Ecoregion





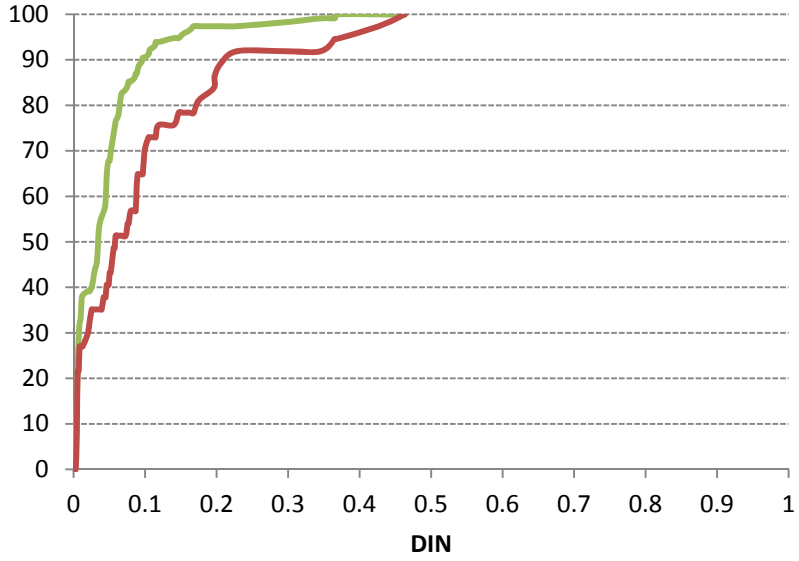


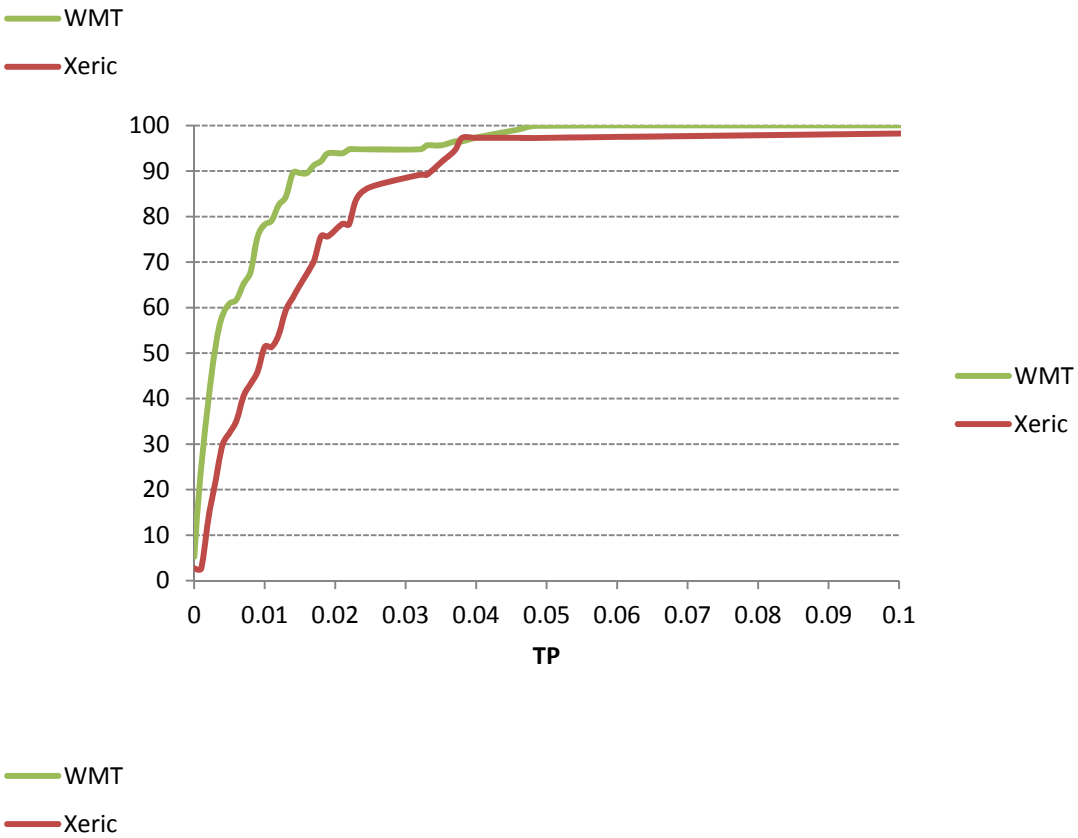
*Some outliers not Shown

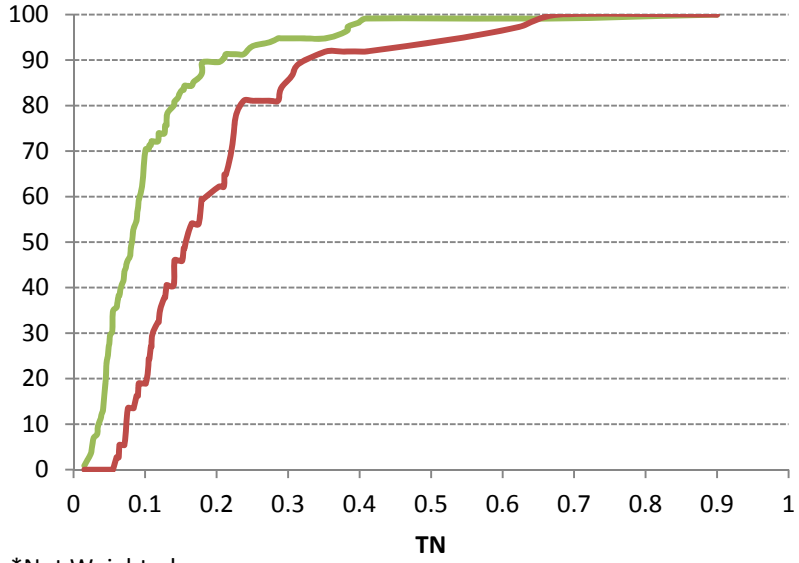
	Western Mountains		
	DIN	TN	TP
N	115	115	115
Min	0.001	0.015	0.001
Max	0.368	0.90	0.049
Median	0.035	0.082	0.003
Mean	0.047	0.110	0.007
SD	0.06	0.111	0.01

	Western Mountains		
	DIN	TN	TP
N	37	37	37
Min	0.004	0.06	0.001
Max	0.463	0.679	0.192
Median	0.059	0.159	0.01
Mean	0.10	0.201	0.018
SD	0.116	0.145	0.031

All Western US Stream Reference Sites by Level II Ecoregion



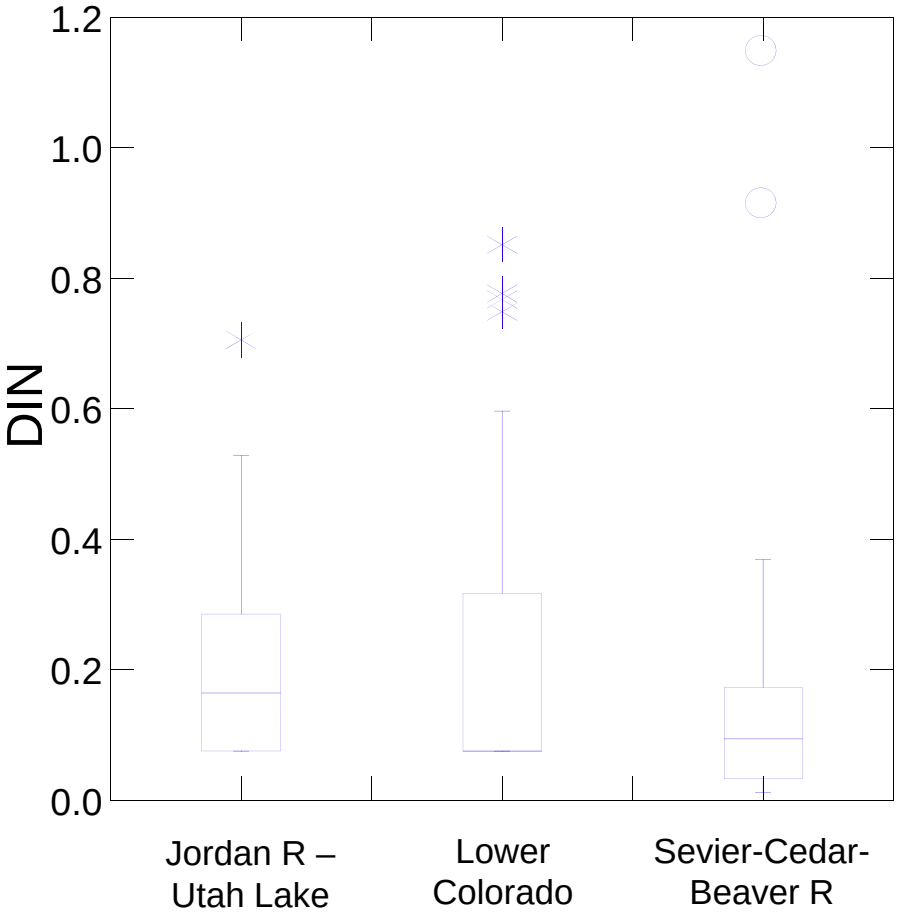


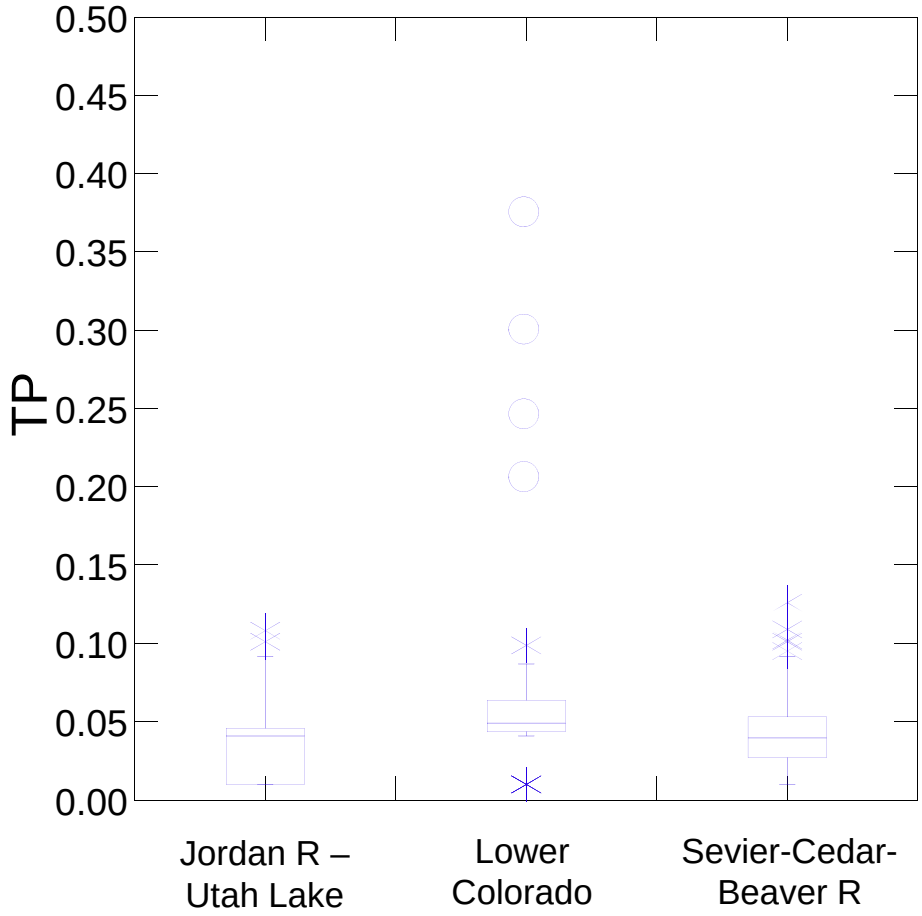


*Not Weighted

Randomly Selected Stream Sites by Watershed Management Unit

See Map # 5





Jordan R-Utah Lake

	DIN	TP
N	50	50
Min	0.075	0.01
Max	9.35	1.840
Median	0.204	0.042
Mean	0.626	0.071
SD	1.454	0.257

Lower Colorado

	DIN	TP
N	50	50
Min	0.075	0.01
Max	2.235	0.374
Median	0.109	0.049
Mean	0.293	0.065
SD	0.403	0.070

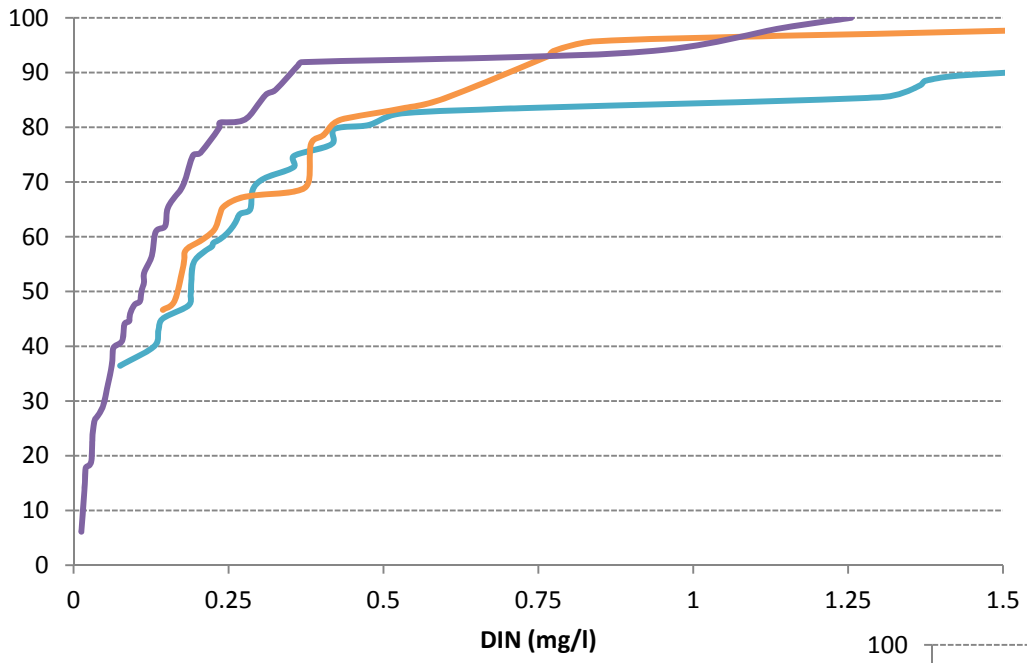
Sevier-Bearer-Cedar R

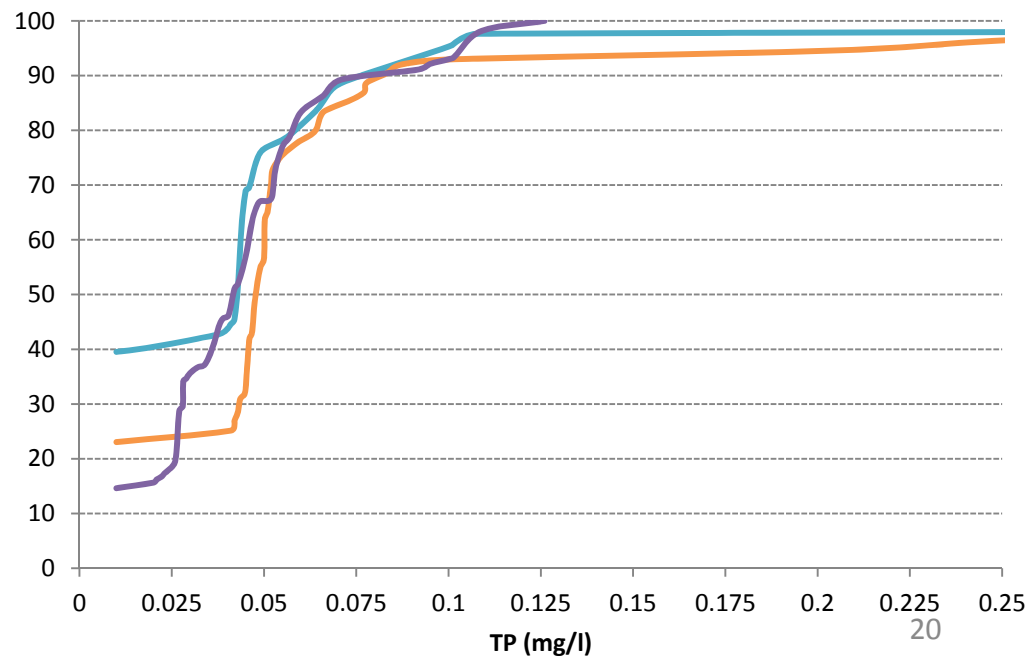
	DIN	TP
N	50	50
Min	0.013	0.01
Max	1.255	0.126
Median	0.096	0.04
Mean	0.172	0.044
SD	0.258	0.027

*Some outliers not Shown

Randomly Selected Stream Sites by Watershed management Unit

See Map # 5





Jordan R – Utah Lake

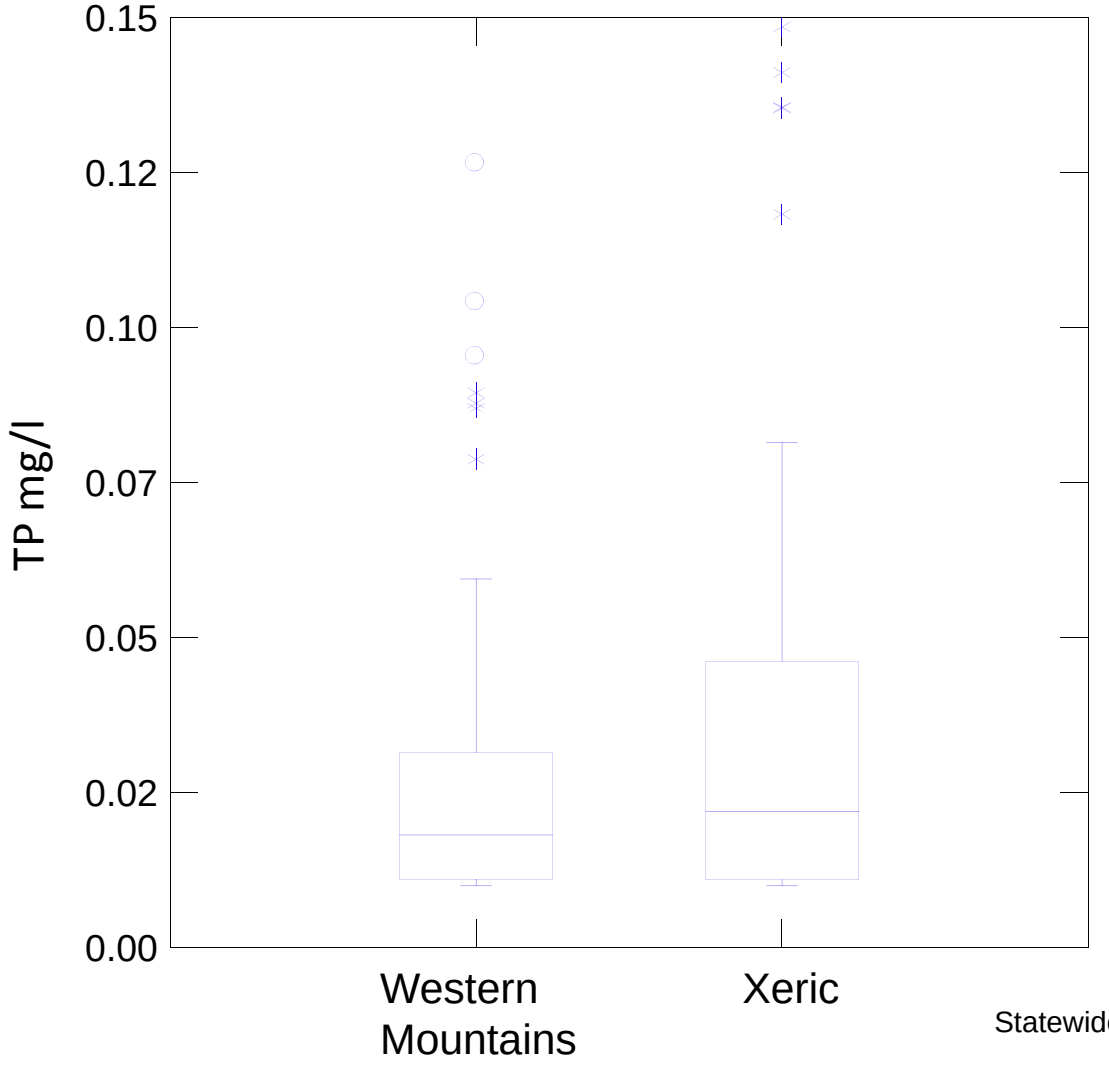
Lower Colorado River

Sevier-Cedar-Beaver River

*Weighted

Utah Lakes by Level II Ecoregion

See Map # 1



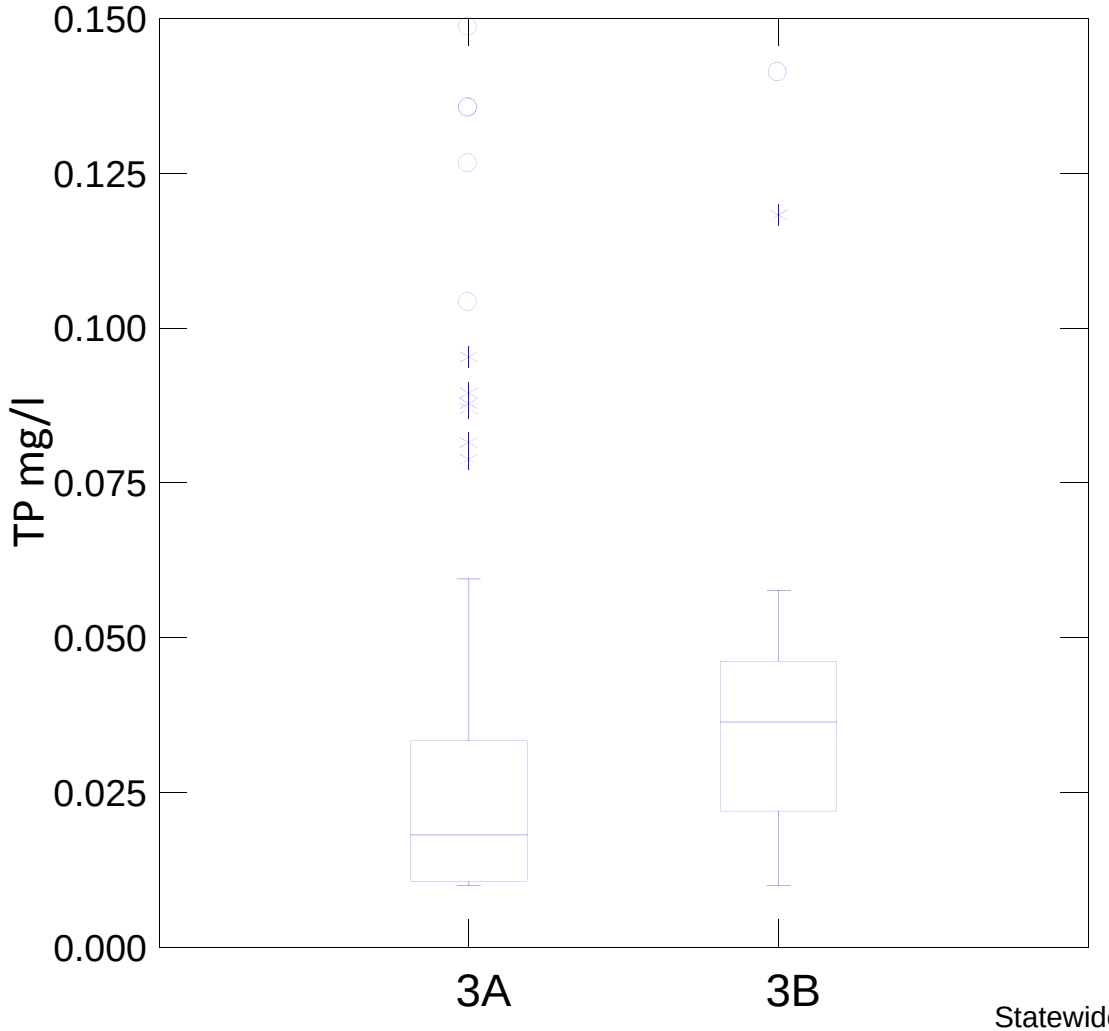
Statewide Lakes TP

	WMT	Xeric
N	67	46
Min	0.01	0.01
Max	0.126	0.342
Median	0.018	0.025
Mean	0.029	0.063
SD	0.026	0.083

*Some outliers not Shown

Utah Lakes by Aquatic Wildlife Uses

See Map # 1



Statewide Lakes TP

	3A Cold	3B Warm
N	93	15
Min	0.01	0.01
Max	0.148	0.215
Median	0.018	0.039
Mean	0.031	0.057
SD	0.031	0.057

*Some outliers not Shown

Utah Lakes by Size (Area)