Uinta Basin Baseline Water-Quality Study

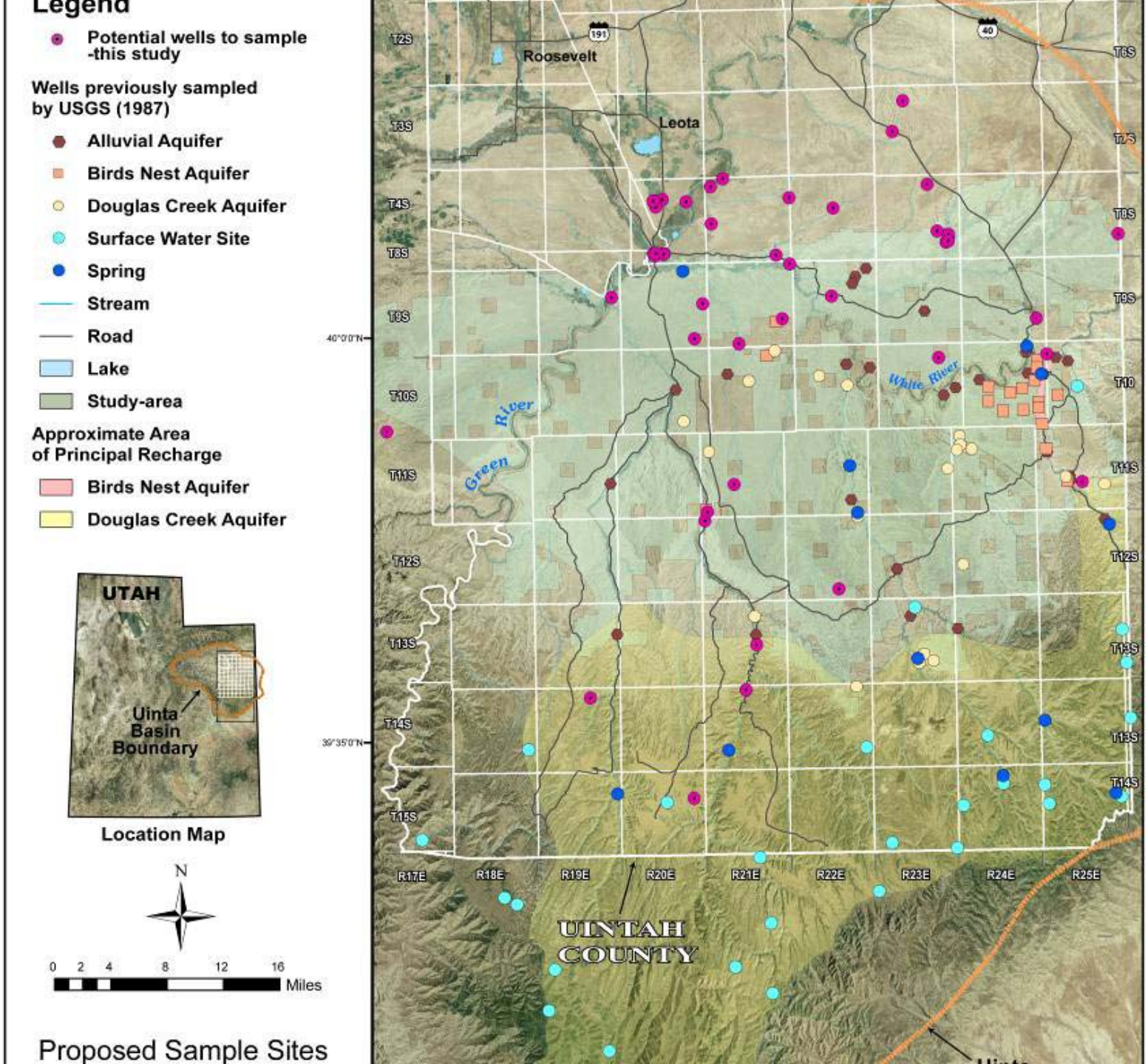
Janae Wallace

January 2011 update

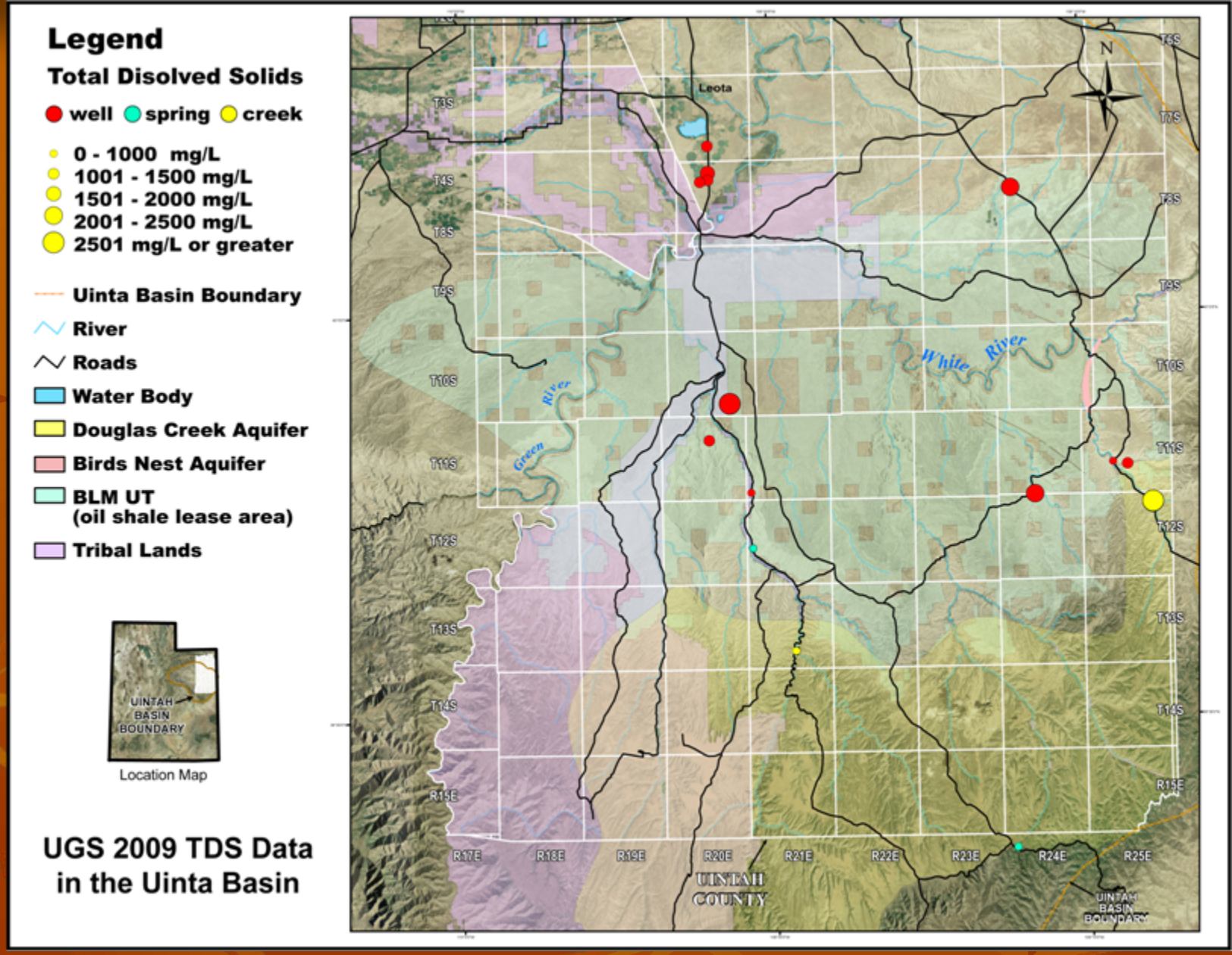
OBJECTIVES

- Create database of springs, creeks, wells
- Create database of water quality
- Create GIS data- chemistry maps
- Create baseline water quality (spatially and temporally)- 2009, 2010, 2011
- Document changes in water quality

Map produced pre-study showing potential well and springs to sample-field investigation shows most of the sites are unavailable to sample



Proposed Sample Sites



Sample sites for data collected during spring of 2009

2010 Events

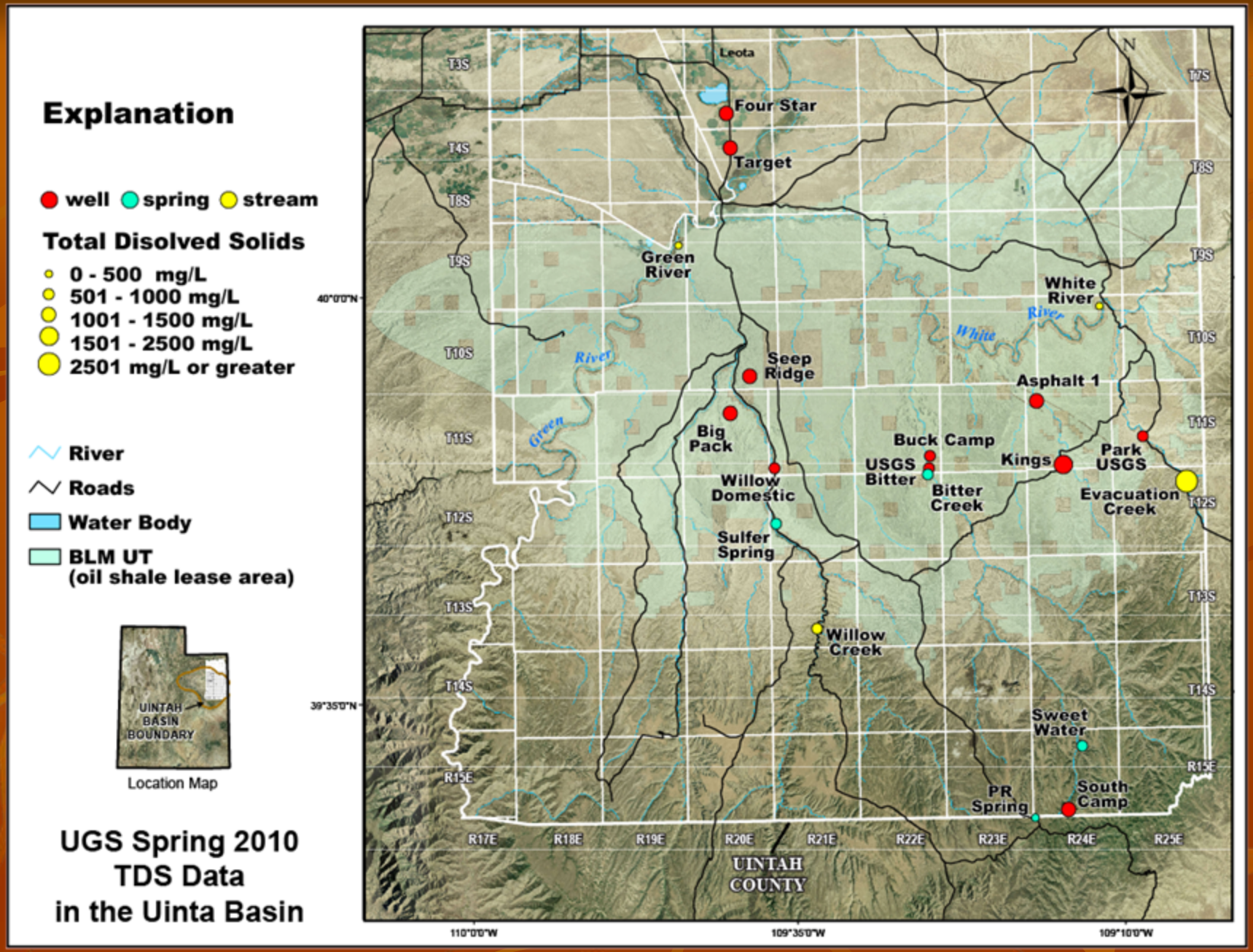
15 sites- 2 springs, 2 creeks, 11 wells

- Resample October 2009
- Added 1 well site plus Green & White Rivers
- Spring 2010- added 2 wells (USGS testholes), 1 spring (unable to sample 3 well sites)
- Autumn 2010- 2 unavailable sites from spring now functioning

Total current sampling sites: 20

Table of status of sites sampled to date includes the site ID, well depth (if known), water level in ft (if known), # indicates number of times site was sampled NO_3 is nitrate concentration TDS is total-dissolved-solids concentration both in mg/L; Fm indicates formation where water likely derives; black indicates no longer available to sample

Well ID	Depth	Level	#	NO_3	TDS	Fm
Park	750	57/350	1	<0.1	1428	Bird's Nest?
Park-USGS	193+	Flowing	3	<0.1	796	Green R
Big Pack	6900	Flowing	3	<0.1	1298	Wasatch
Willow-domest	711	Flowing	3	<0.1	936	Green R?
Willow creek	Surface	Surface	3	<0.1	562	Alluvial
Sulfur spring	Spring	Flowing	3	<0.1	578	Green R?
Evacuation	Surface	Surface	3	<0.1	2832	Alluvial
4-star	172	70	3	12.6	1260	Alluvial
Kings	70-82?	67	2	9.5	2114	?
Windmill	1382+?	Flowing?	2	<0.1	2394	?GR? M?
Target	53	23	2	9.95	1442	Alluvial
R&N	80&60	49&23	2	7.65	1016	Alluvial
Batty	**83**	**28**	**1**	**18.8**	**1908**	**Alluvial**
Seep ridge	>2510	Flowing	2	<0.1	3056	Green R
PR Spring	Spring	Flowing	2	0.4	420	Green R?
Sweet H2O	Spring	Flowing	2	0.6	996	Green R?
South Camp	98	78	2	<0.1	1172	Green R
USGS Bitter	1497	824	2	<0.1	886	Douglas
USGS Asphalt	2650	1092	2	<0.1	958	Douglas
Green River	Surface	Surface	2	<0.1	410	Alluvial
White River	Surface	Surface	3	<0.1	400	Alluvial
Buck Camp	?	?	1	0.6	834	?



Sample sites for data collected during spring of 2010

Legend

Nitrate Concentration

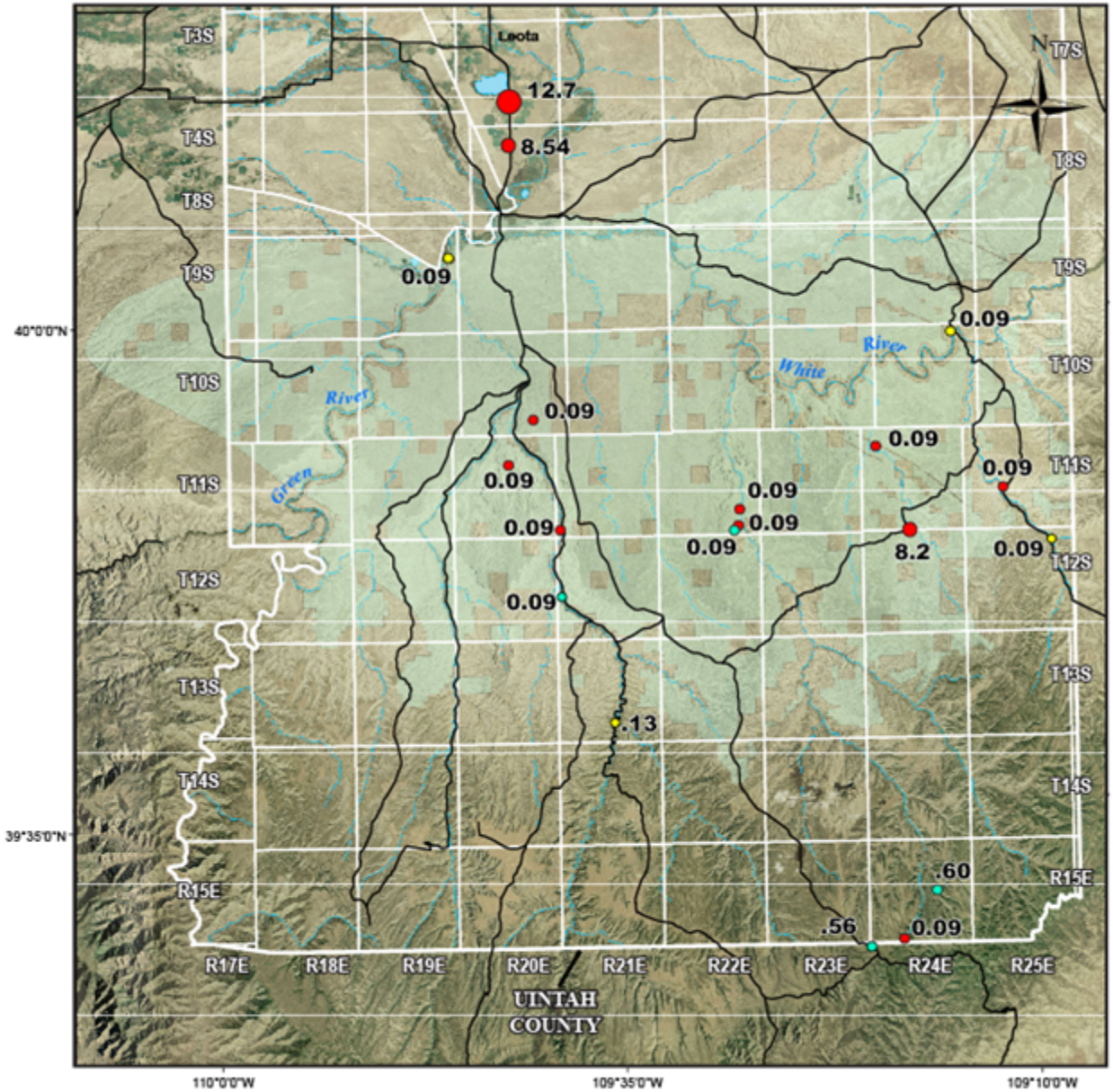
- Well
- Spring
- Creek

- 0 - 5.0 mg/L
- 5.1 - 10.0 mg/L
- 10.1 - 20.0 mg/L

- River
- Roads
- Water Body
- BLM UT (oil shale lease area)

Location Map

UGS Spring 2010 Nitrate Data in the Uinta Basin



Sample sites for data collected during spring of 2010

South Camp water well located in southernmost part of the study area near PR Spring and Sweet Water Spring; well is likely solar powered

Sweet Water Spring located near South Camp

Kings Well

Use of nearby pond is unknown; source of water likely from diverted USGS Testhole #6 well due south; &/or adjacent Bitter Creek

Compound near Bitter Creek used by seasonal workers

USGS Testhole #6 located near Bitter Creek and due south of Bitter Creek Coral

Bitter Creek Coral; several spigots exist at this site along with a housing compound; source of water unknown


Bitter Creek Coral

Bitter Creek Coral Compound (including satellite dishes; source of water is unknown)

USGS Testhole #1 in Asphalt Wash; runoff/piped water feeds pond for wildlife

Another USGS testhole not available for sampling located southwest of Kings well


Another USGS testhole not available for sampling located in the southern part of Willow Creek drainage

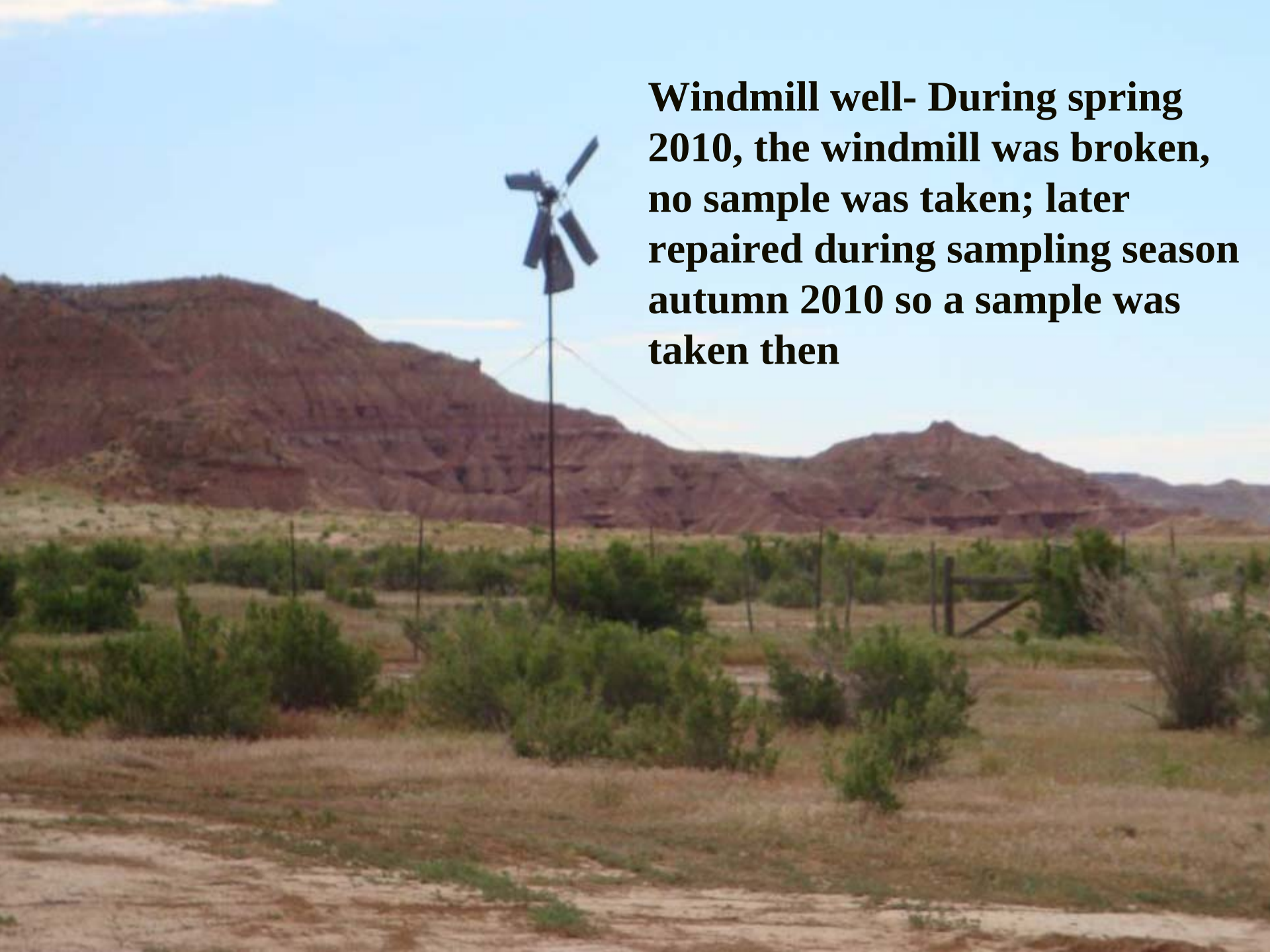
Pack Mountain- Willow Creek- flowing DOGM well, water once allowed to flow to surface (left of slide) during 2009 sampling

Pack Mountain- Willow Creek- flowing DOGM well, water once allowed to flow to surface now is siphoned through a pipe for 2010 sampling

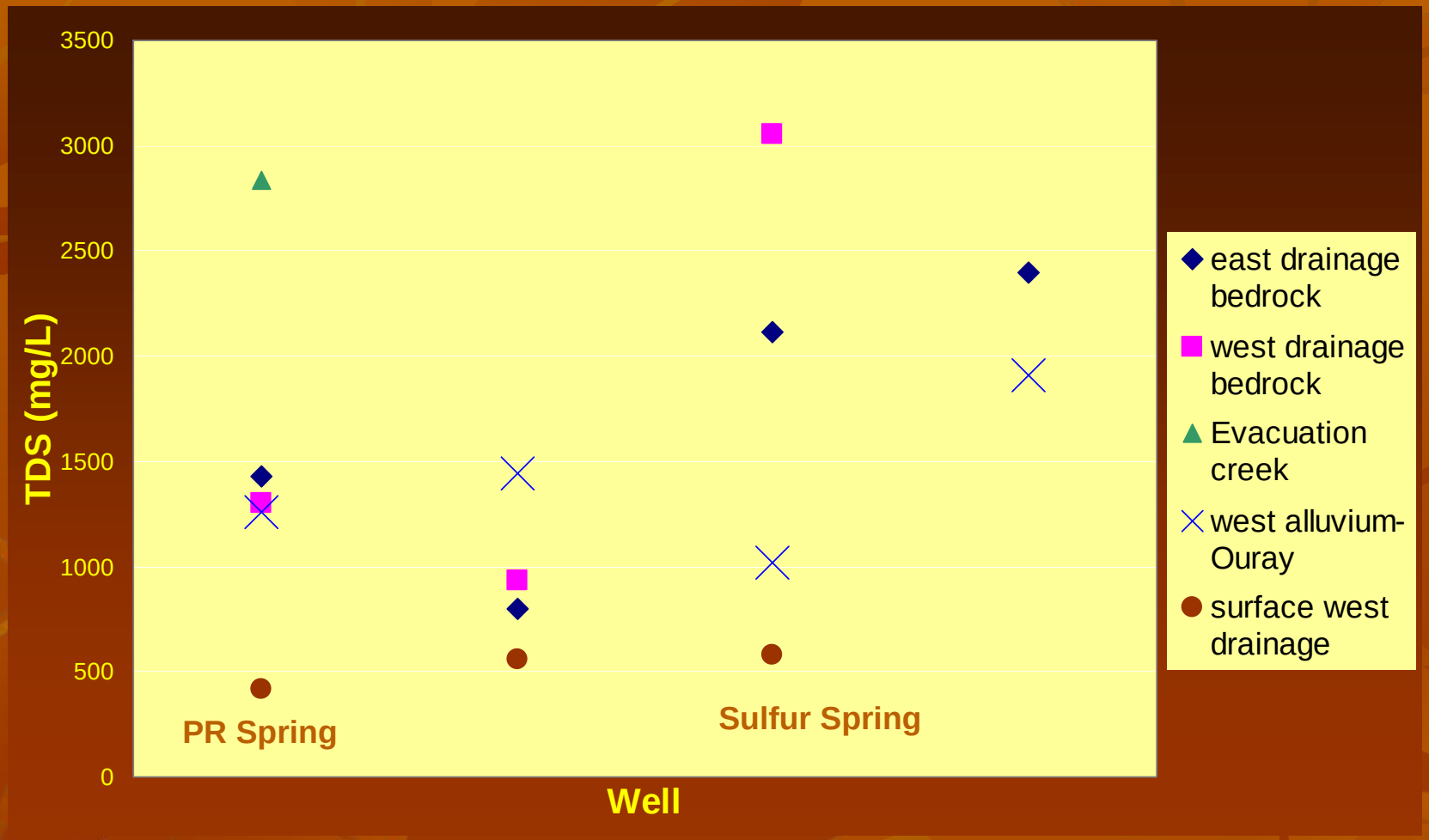
Seep Ridge- samples originally obtained from pond draining away from pipe directly from well; pond used for wildlife

Seep Ridge- DOGM abandonned well where samples originally obtained from pond draining away from pipe directly from well; samples now obtained near pipe end shown in top photo

Windmill well - water in pond is generated by power from the windmill; samples taken in 2009 when windmill was in operation



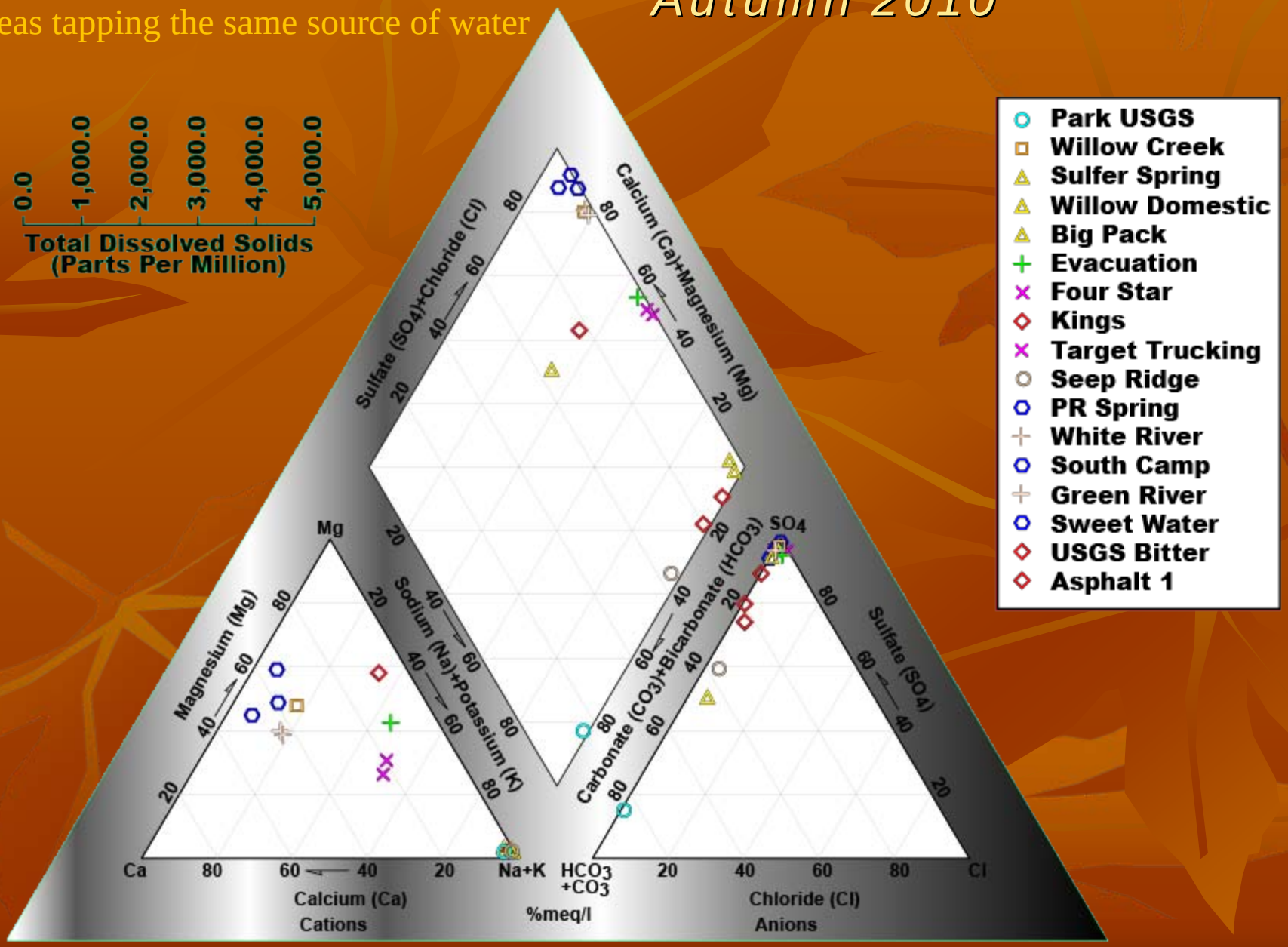
Windmill well- During spring 2010, the windmill was broken, no sample was taken; later repaired during sampling season autumn 2010 so a sample was taken then



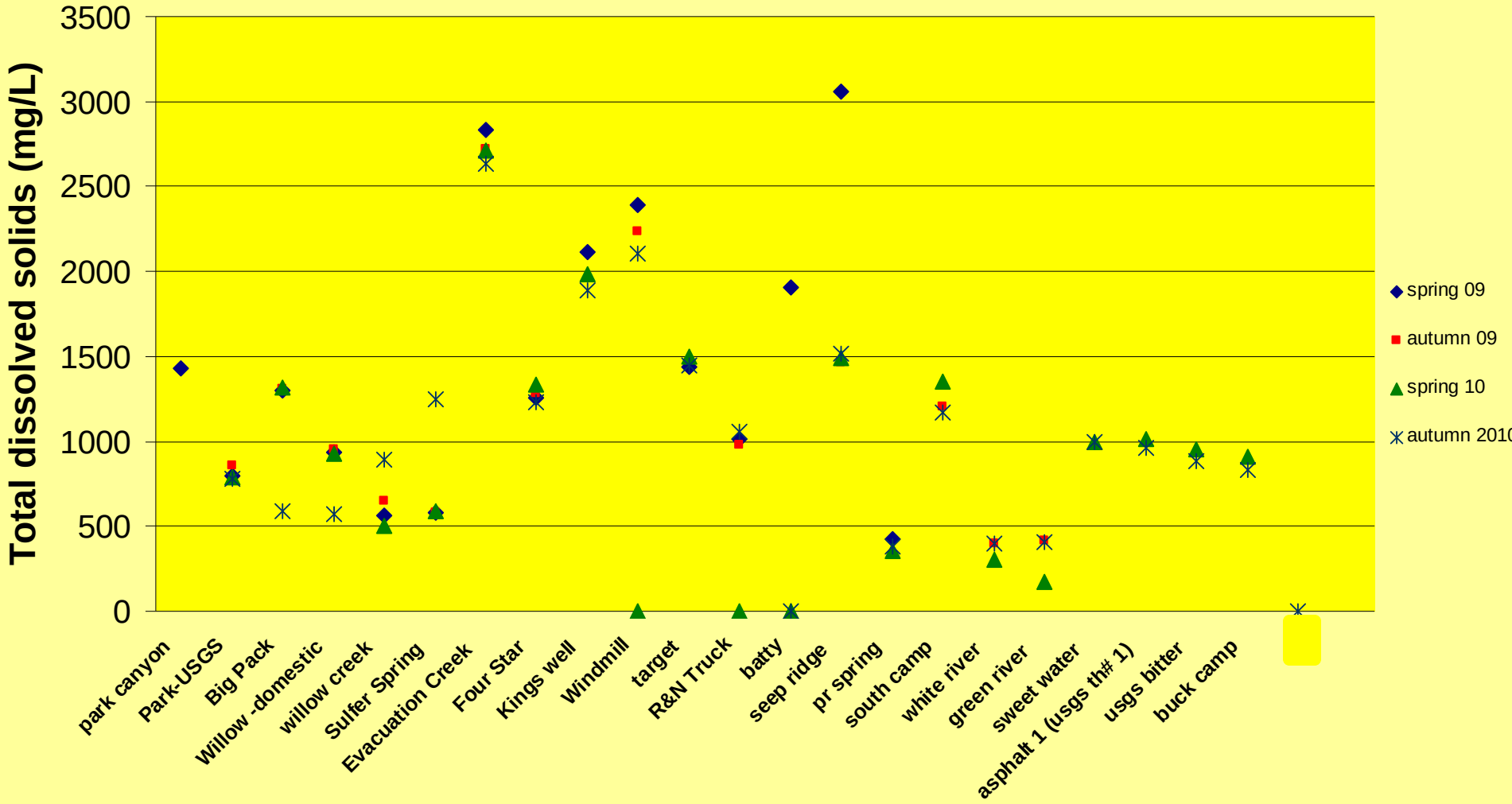
Total-dissolved-solids concentrations plotted by drainage area for data collected during 2009

Piper plot showing ionic chemistry for Autumn 2010 samples; like symbols are likely areas tapping the same source of water

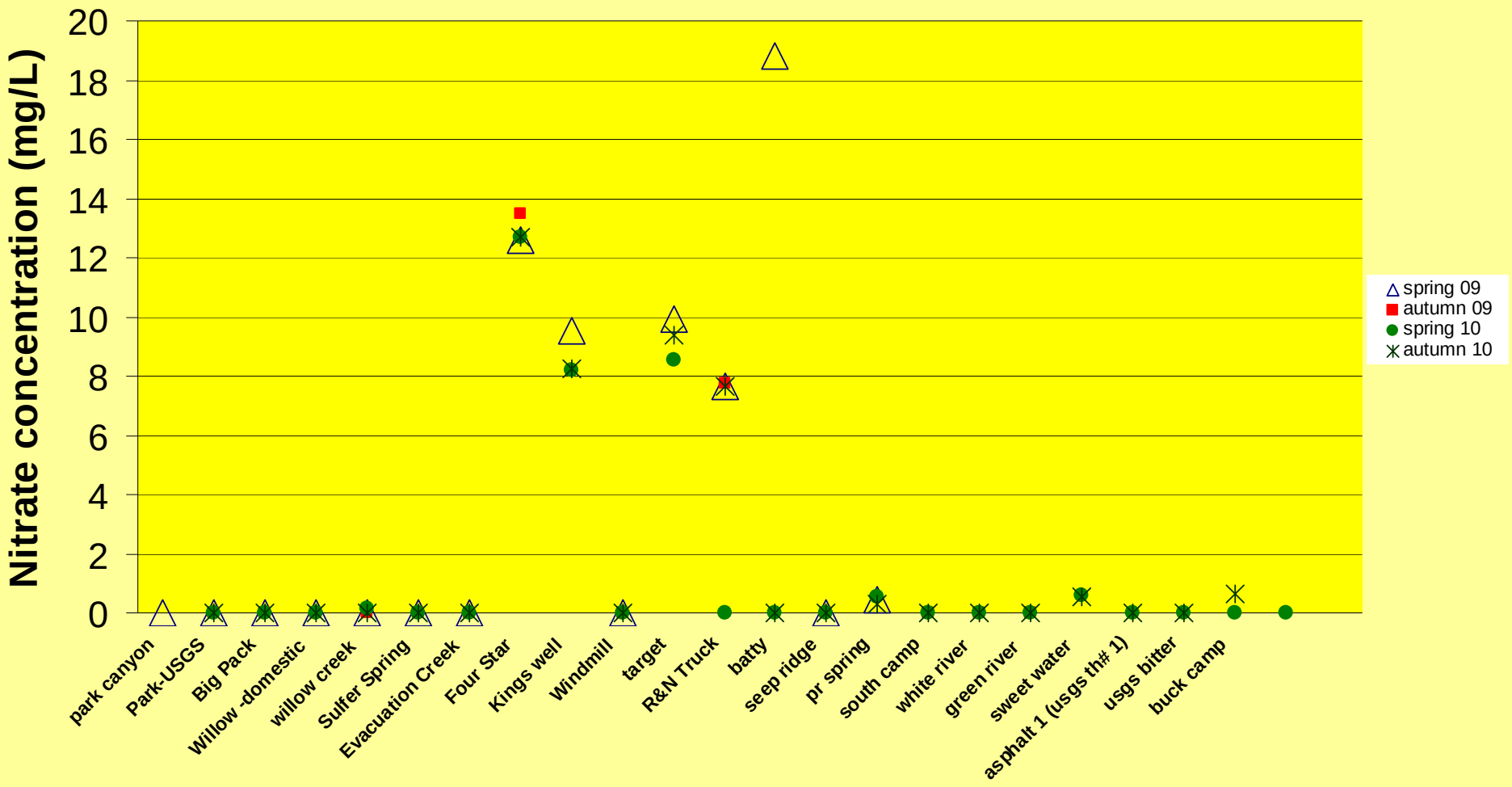
Autumn 2010



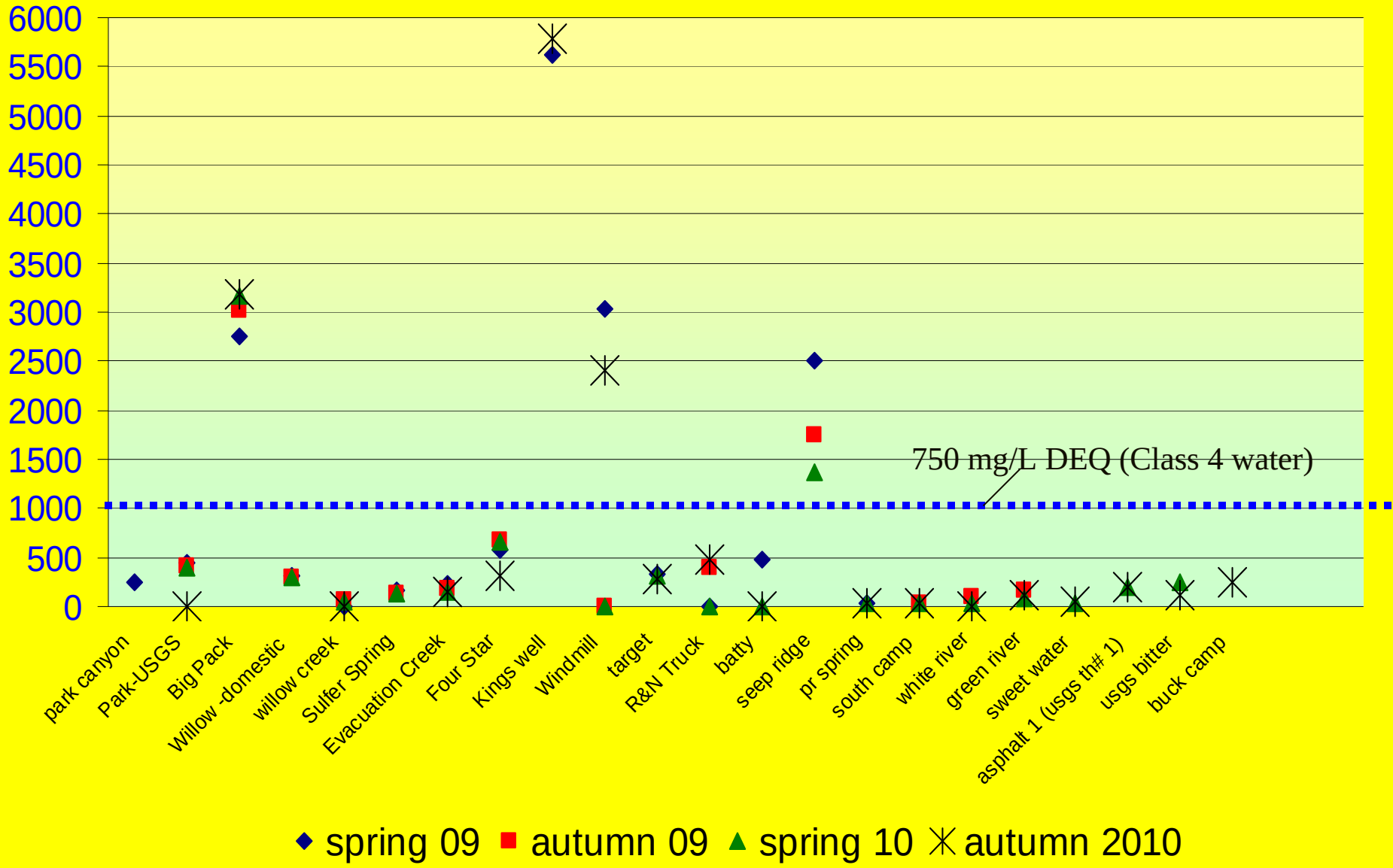
TDS seasonal plots; “0” value plot on the x-axis are for times when the well was not sampled (available for sampling); overall, no seasonal change is detected for the sites with the exception of 3 sites

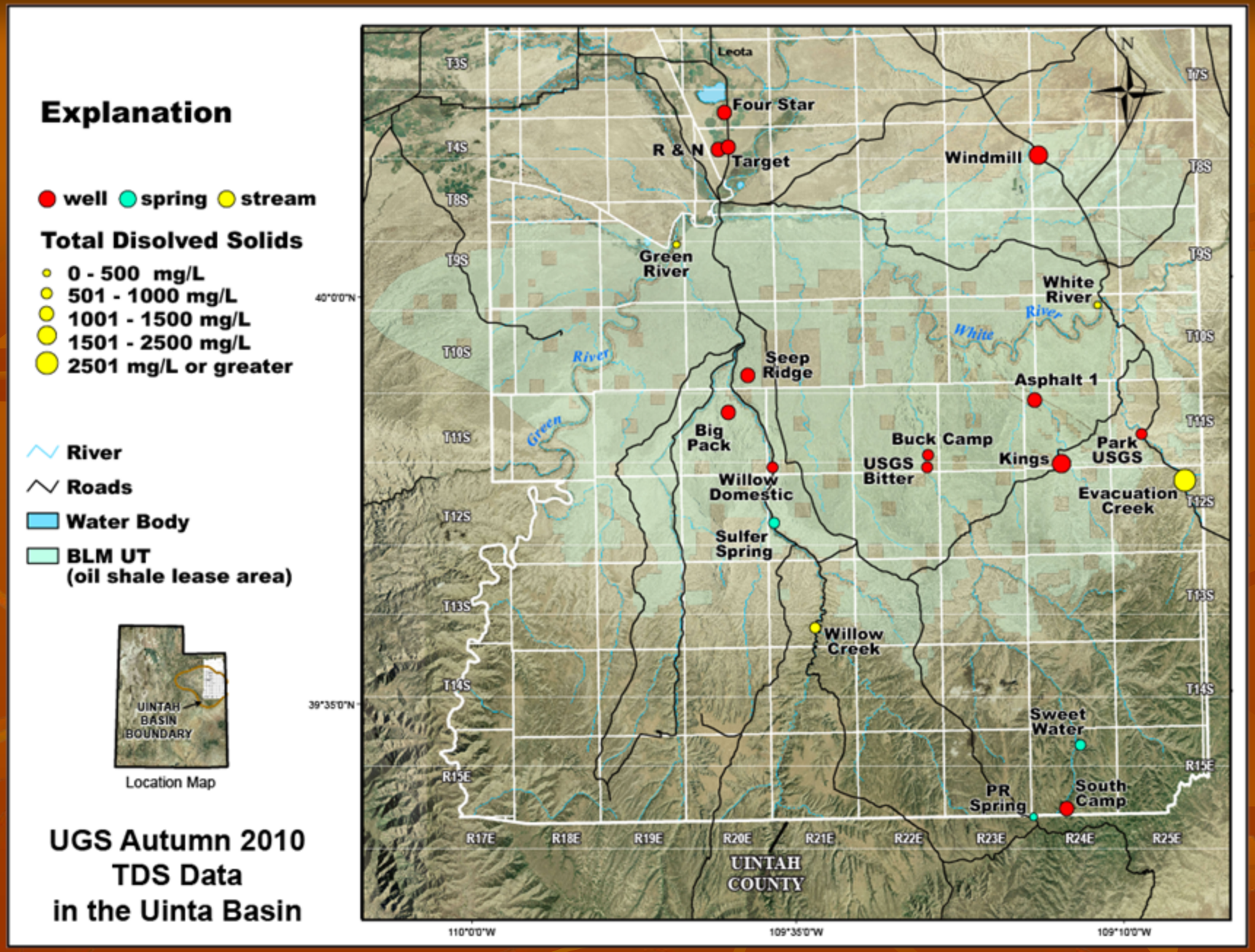


Nitrate concentration showing seasonal plots; "0" value plot on the x-axis are for times when the well was not sampled; slightly above the x-axis are values that had no detection of nitrate; overall, no seasonal change is detected for the sites

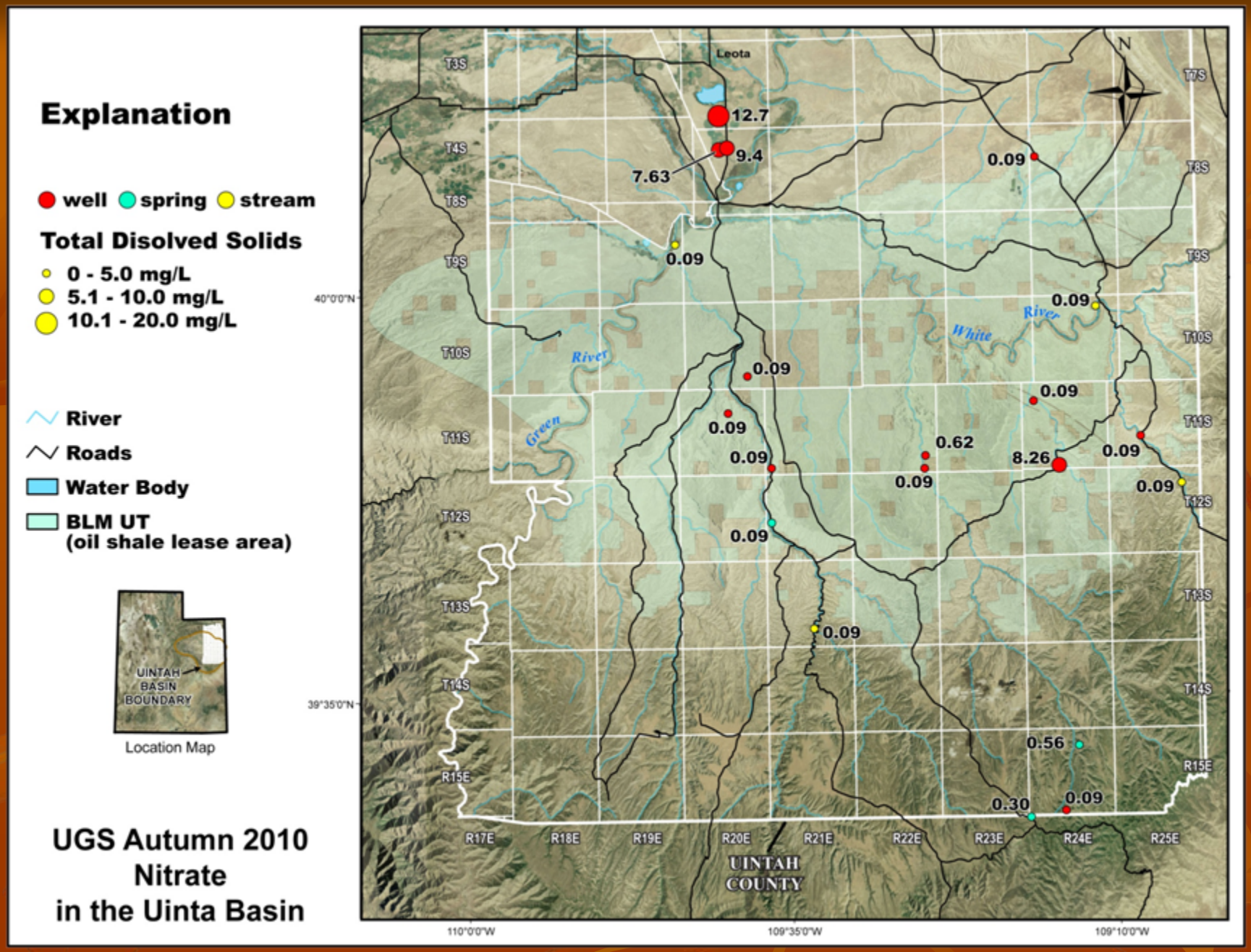


Seasonal plots of boron concentration; “0” plots on the x-axis are below detection limits; 750 mg/L class 4 water is based on Utah DWQ classification for boron limit for the Green River emptying into Flaming Gorge





Sample sites for the autumn 2010 season; TDS map



Sample sites for the autumn 2010 season; nitrate concentration map

Summary

- TDS – no remarkable seasonal/annual change
- Nitrate- no remarkable seasonal/annual change
- Boron – 4 sites exceed 0.75 μg/L UDWQ "Beneficial Use Designation for Class 4 Green River" water
- Source of B from dissolution of saline minerals in Green River Fm?
- 10 wells had detectable VOCs, none exceeded water-quality standards

View of Willow Creek Drainage taken from Seep Ridge (view to the southwest)