

Dry, Dusty and Determined: Nevada's Bioassessment Program During Drought Years



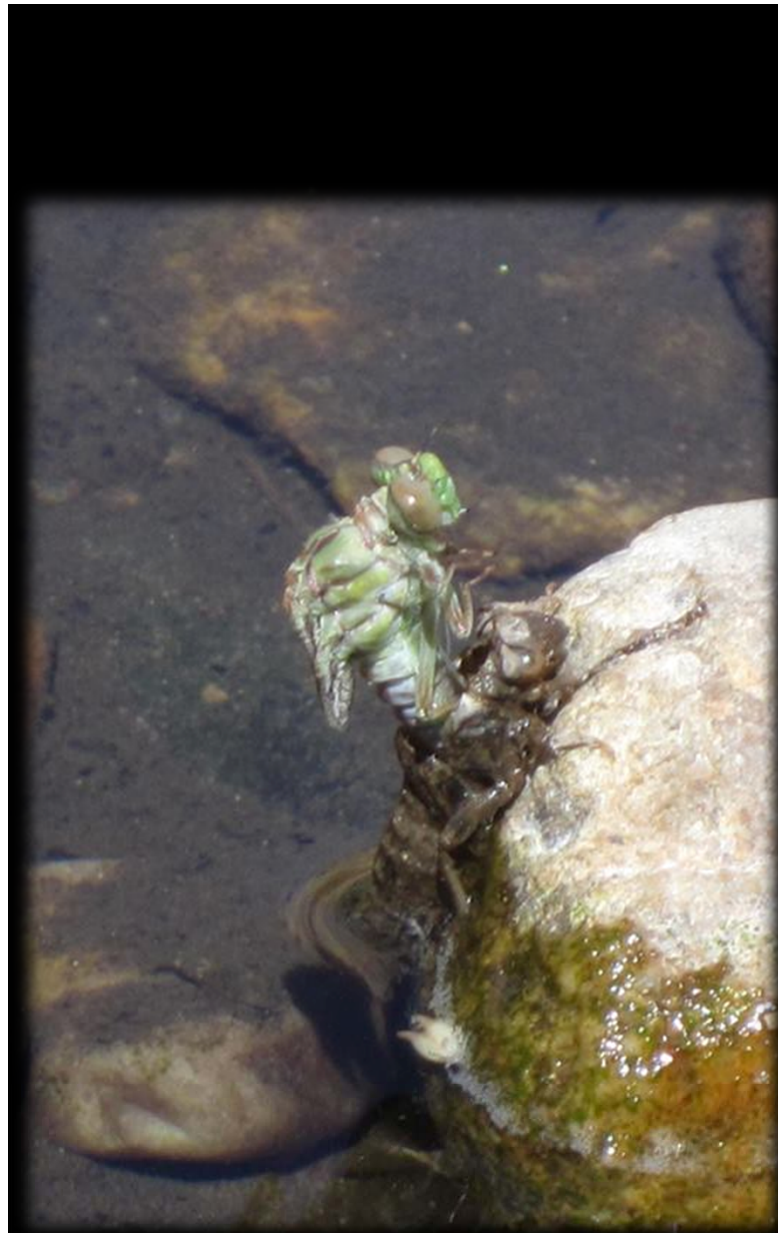
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Bureau of Water Quality Planning, Nevada Division of Environmental Protection

Special Gratitude To...

- 2013 Summer Interns
- Zack Blumberg
- Karen Vargas
- Western Center for
Monitoring &
Assessment of
Freshwater Ecosystems
- EPA Region IX









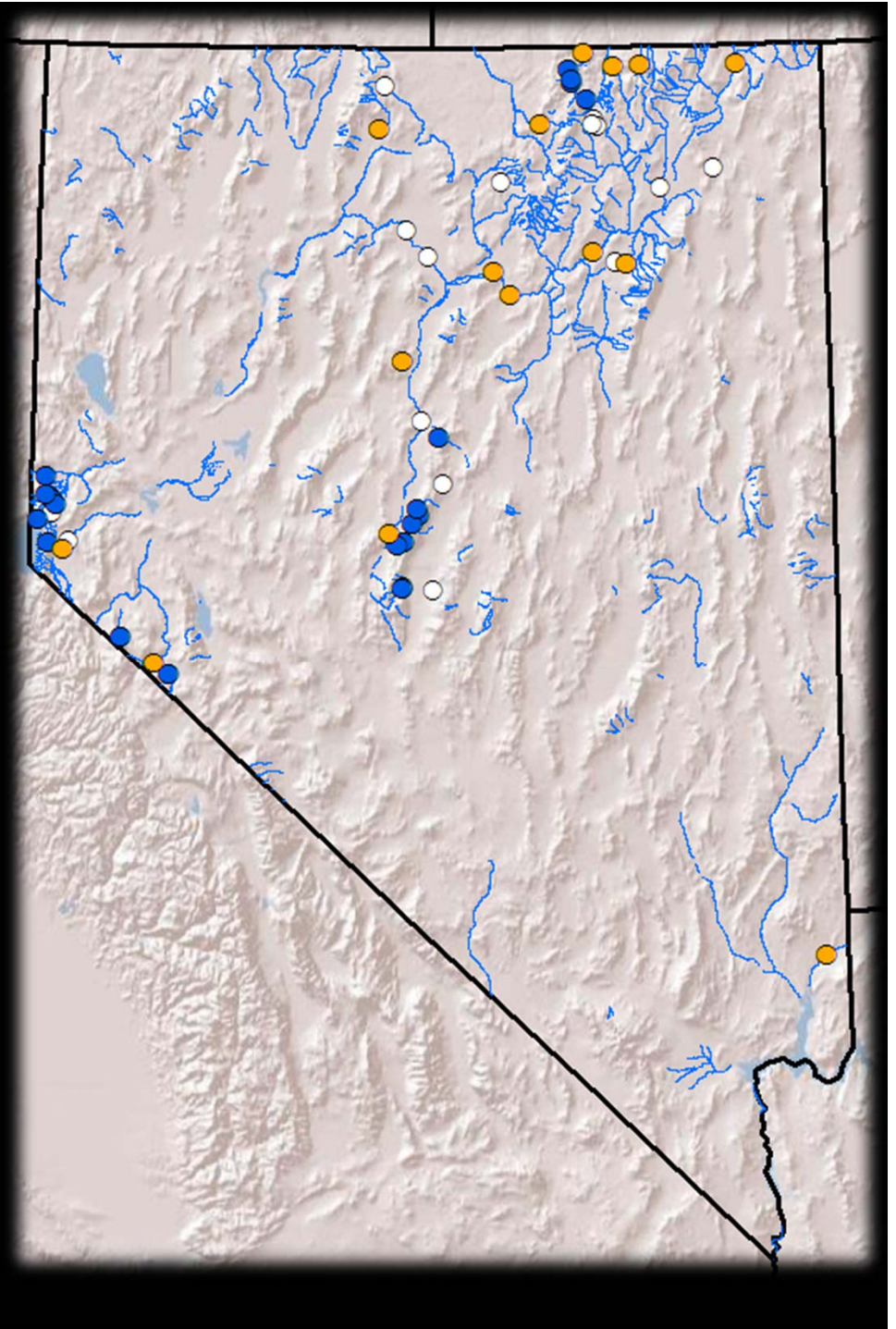
All Around Nevada

- Where We Went
- Where We've Been
- What We Know
- What We're Going to Learn

Where We Went

“Since May 27, 2013, I have put 11,386 miles on my work truck. That means I have seen a beautiful 11,386 miles of Nevada.”

- Nineteen NRSA 2013/14 sites
- Twenty Nevada-specific sites
- Sixteen dry sites

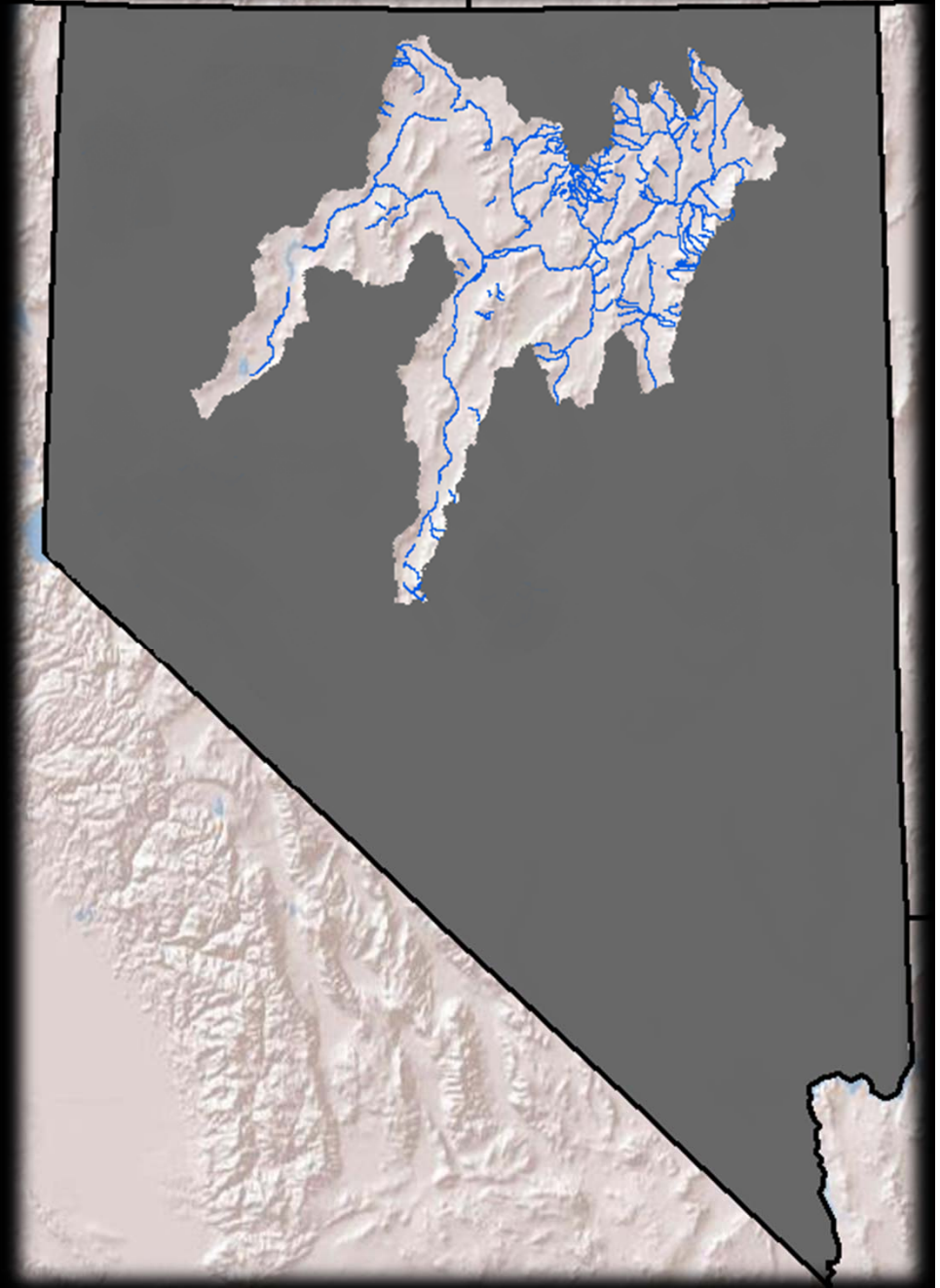


The Mighty Humboldt Basin

“Last season the abundance of fine trout in this portion of the Humboldt furnished the followers of Isaac Walton ... Now, there are scarcely any fish to be found ... slaughtered with nets, traps ... result has been the destroying of small trout and spawn...”

Elko Independent, October 19, 1870

- 16,840 square miles
- Humboldt River 310 miles
- 107 Biosites



Ecoregions in the Humboldt Basin

Ecoregions in the Humboldt Basin

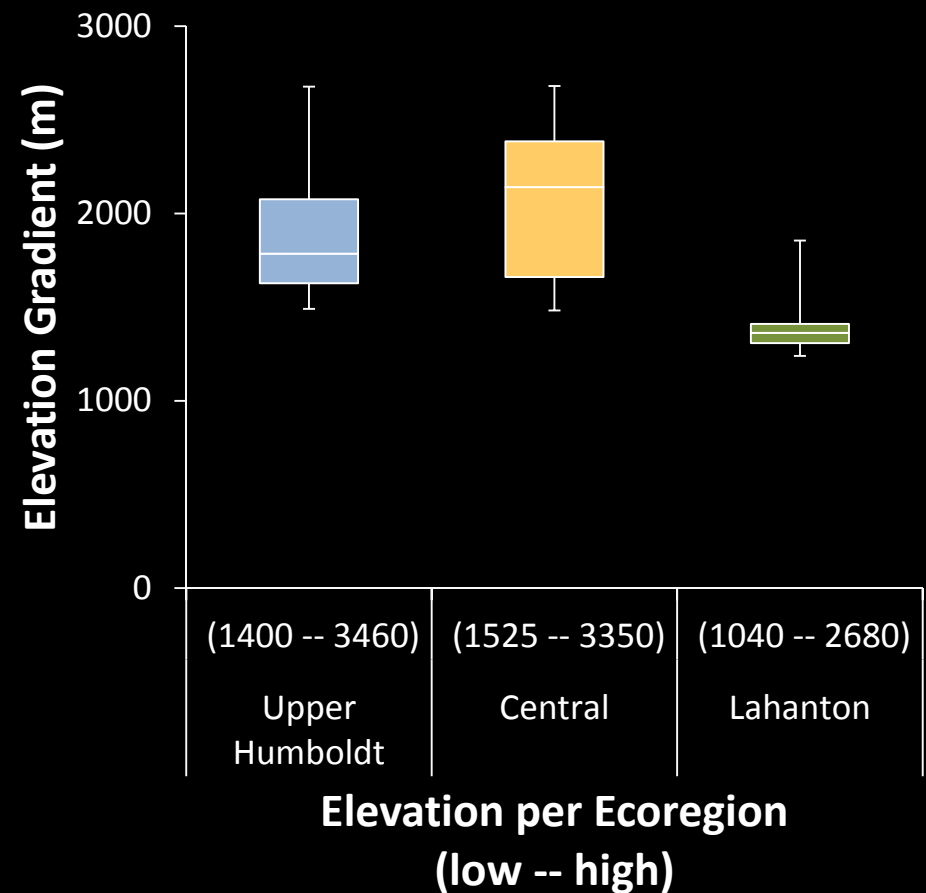
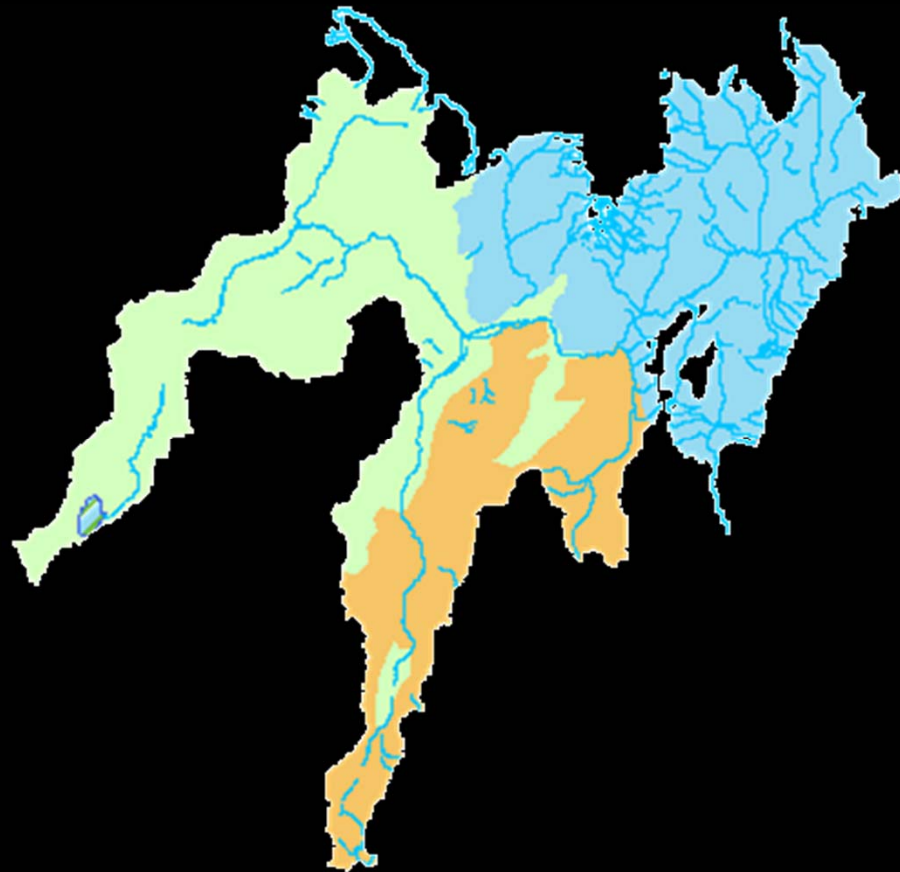
Upper
Humboldt
(n=53)

Central
(n=35)

Lahontan
(n=23)

Northeast
(N/A)

Carbonate
(N/A)

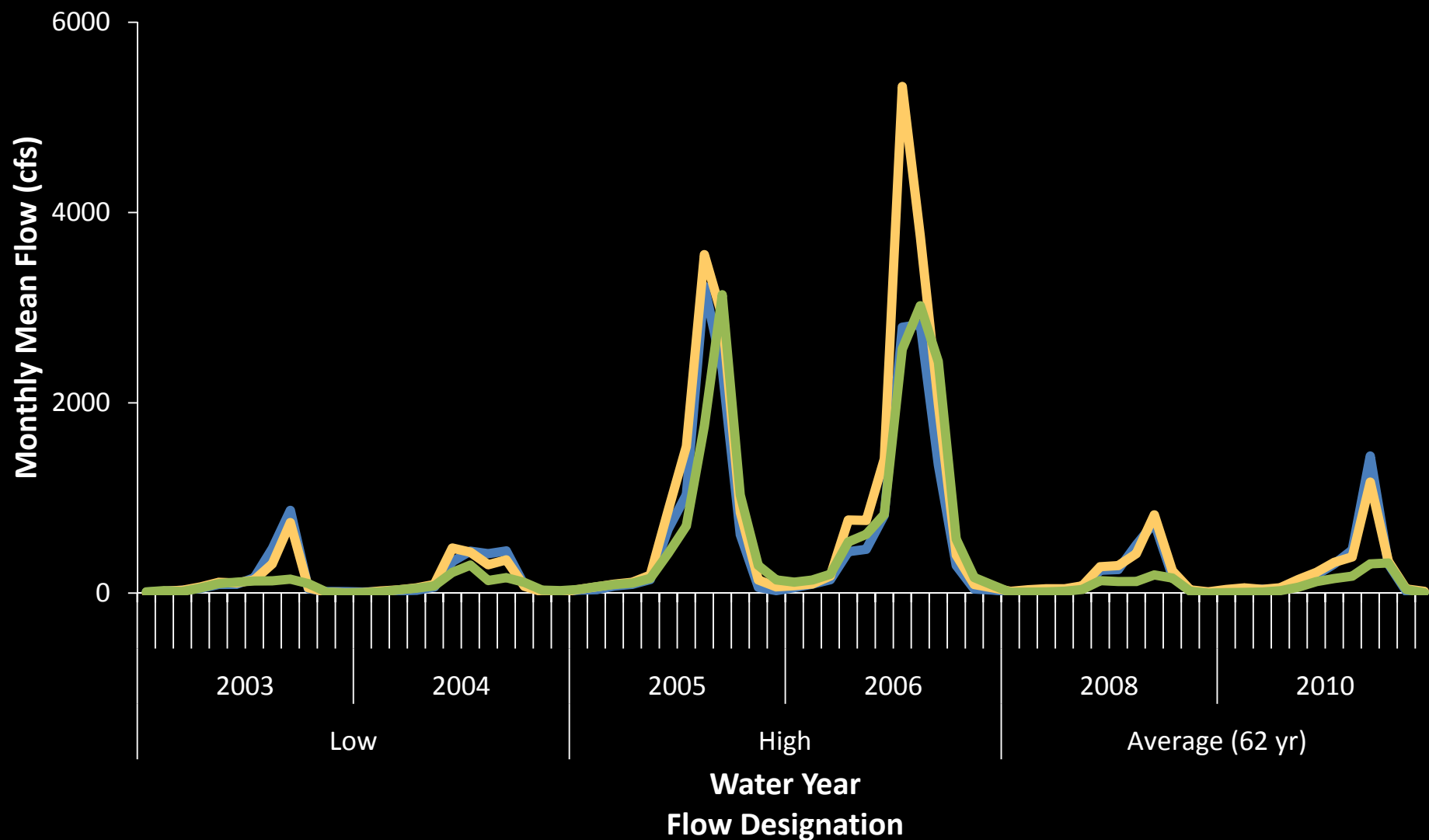




Flows for Select Water Years

(USGS Gages on the Humboldt River)

— Carlin (4,310) — Battle Mtn (11,200) — Imlay (15,500)

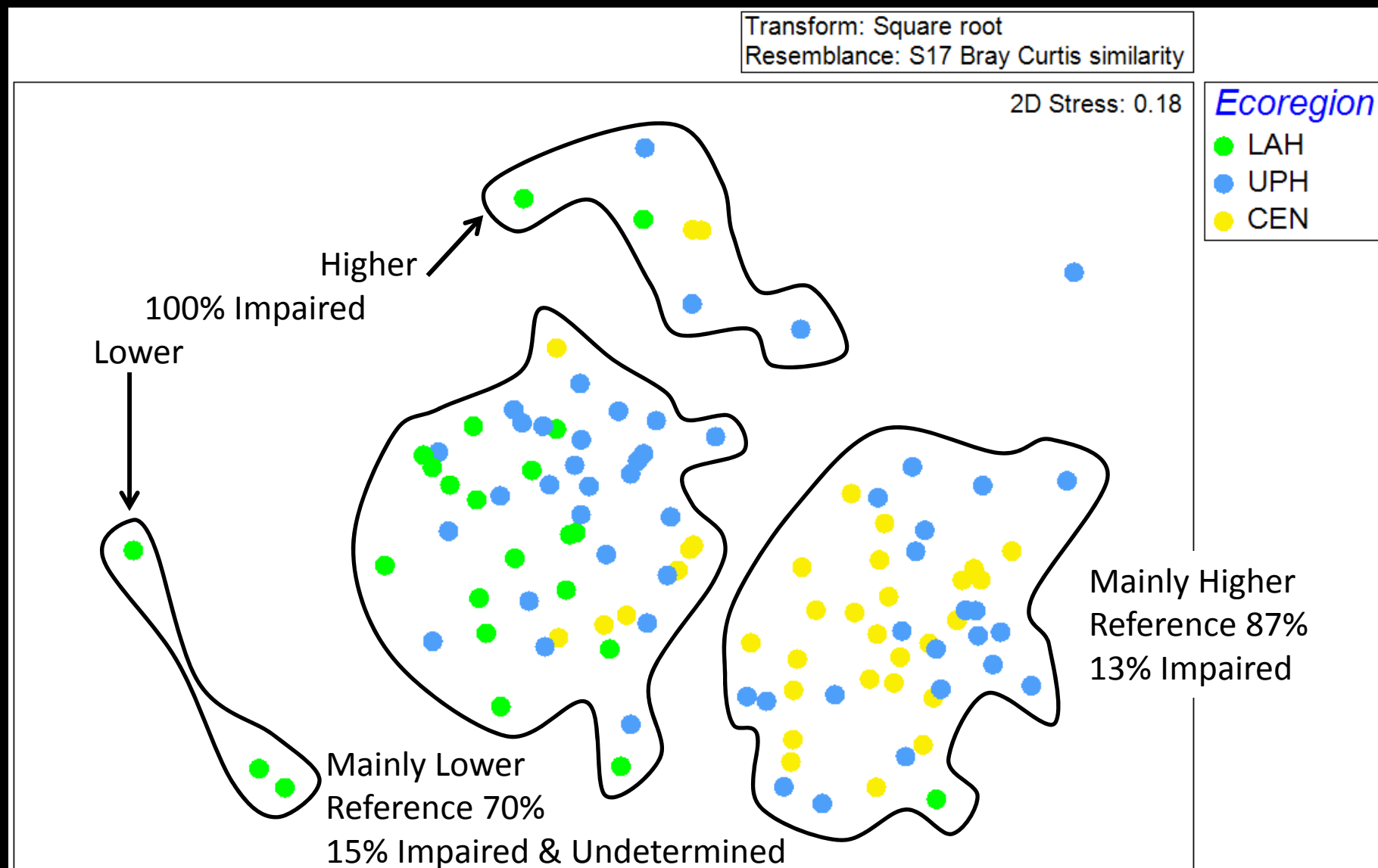


A Little About...

- NMDS
 - Uses the ranks of similarities between samples.
 - Distances reflect the relative dissimilarity between samples.
- ANOSIM
 - Compares the variation in species abundance and composition among samples in terms of grouping factors.
 - R-Value statistic $-1 \leftarrow 0 \rightarrow 1$. Large values indicate separation between groups.
- SIMPER
 - Contribution of species to the average dissimilarity between samples.



Humboldt Basin Sites for Select Water Years



Humboldt Basin



ANOSIM (MMI)	R-value
All Ecoregions	0.215
UPH : CEN	0.100
UPH : LAH	0.189
CEN : LAH	0.541



SIMPER (MMI)			
Eco	UPH : CEN	UPH : LAH	CEN : LAH
	21.43%	18.75%	15.20%
Ref	REF : IMP	REF : UND	IMP : UND
	19.23%	21.75%	18.90%

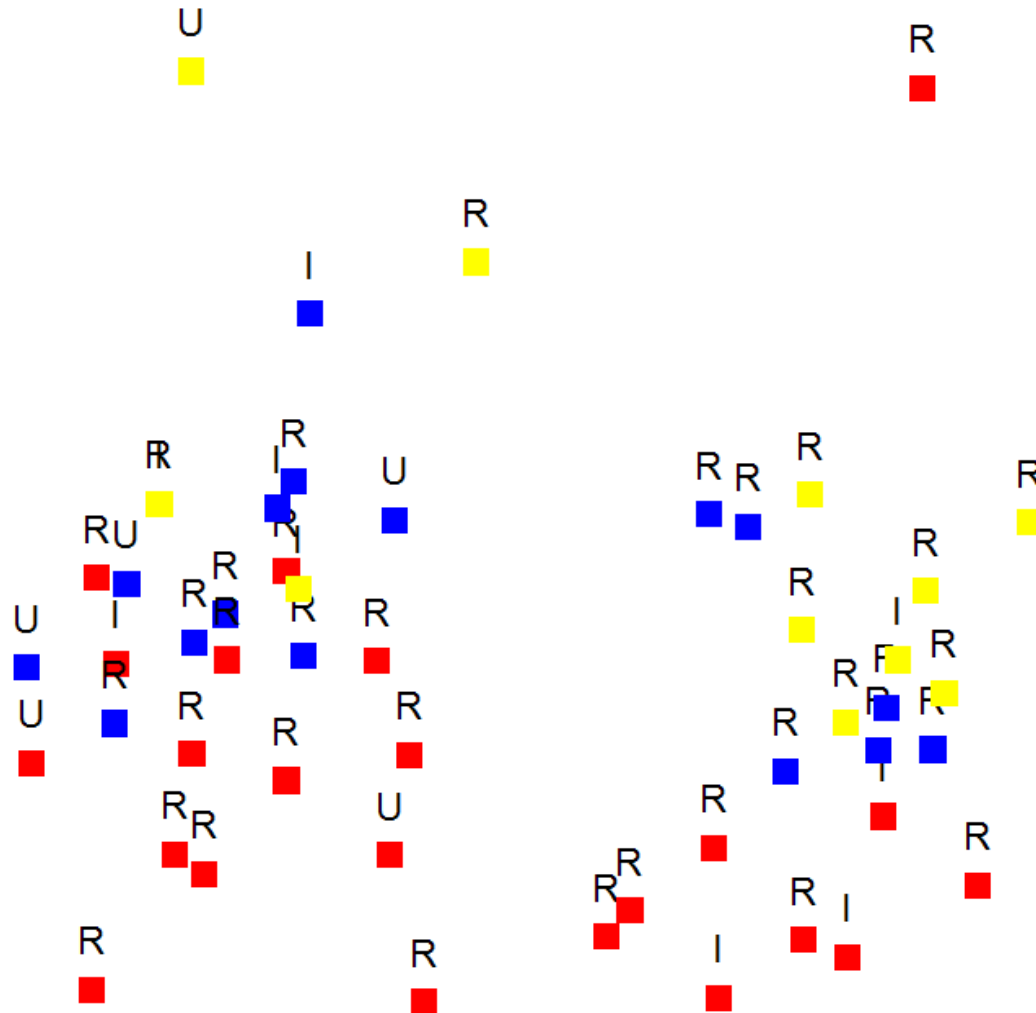
Upper Humboldt (Flow v. MMI)

Transform: Square root
Resemblance: S17 Bray Curtis similarity

2D Stress: 0.16

Flow

■ L
■ H
■ A



Upper Humboldt



ANOSIM (MMI)	R-value
REF : IMP	0.133
REF : UND	-0.055
IMP : UND	0.184
LOW : HIGH	0.139
LOW : AVERAGE	0.392
HIGH : AVERAGE	0.284

SIMPER (MMI)			
Ref	REF : IMP	REF : UND	IMP : UND
	19.23%	21.75%	18.9%
Flow	LOW:AVG	LOW:HIGH	HIGH:AVG
	15.30%	20.91%	20.39%
Elevation	1:2	1:3	1:4
	29.28%	18.01%	9.21%
	2:3	2:4	3:4
	20.40%	13.7%	23.54%

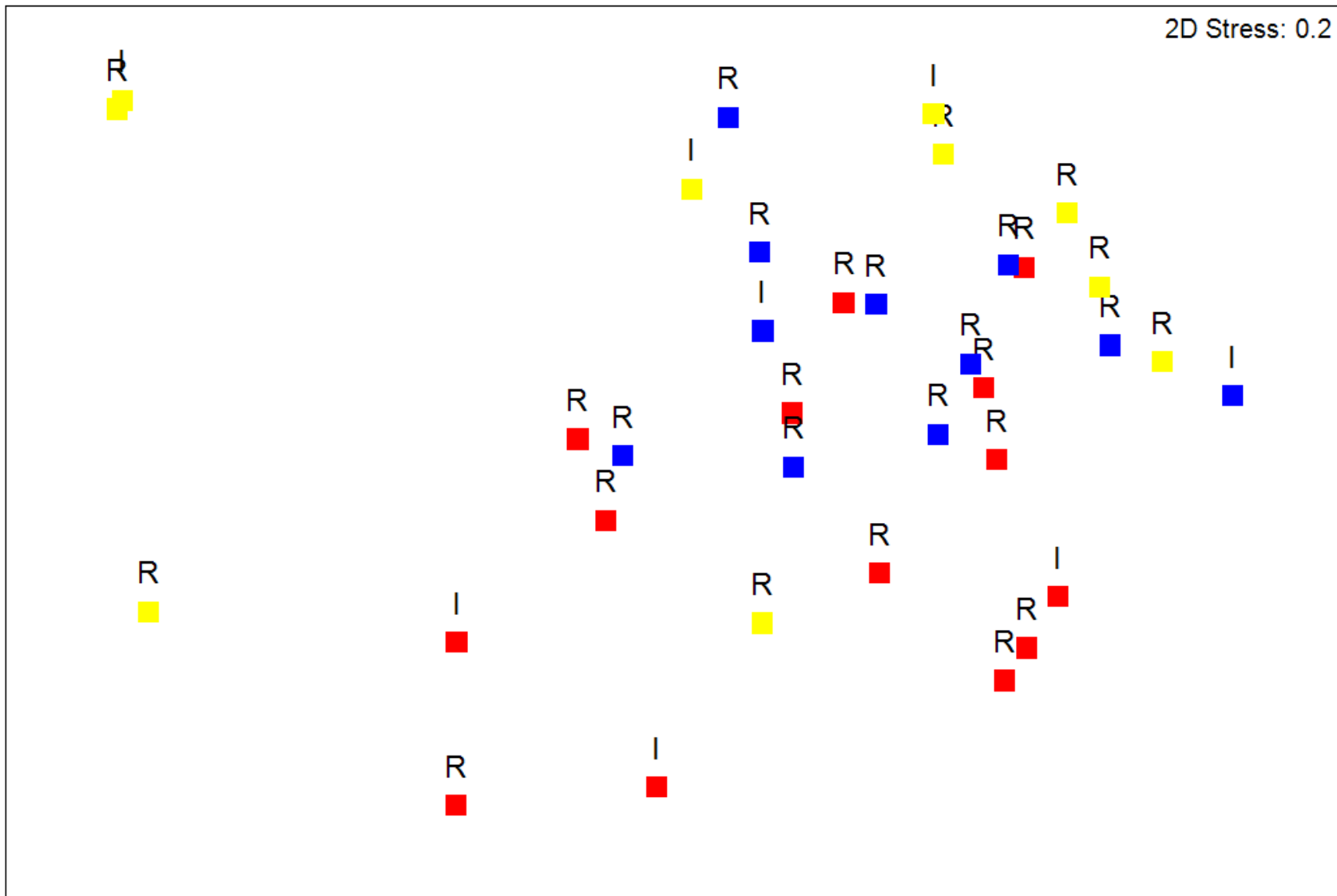
Central (Flow v. MMI)

Transform: Square root
Resemblance: S17 Bray Curtis similarity

2D Stress: 0.2

Flow

■ L
■ H
■ A



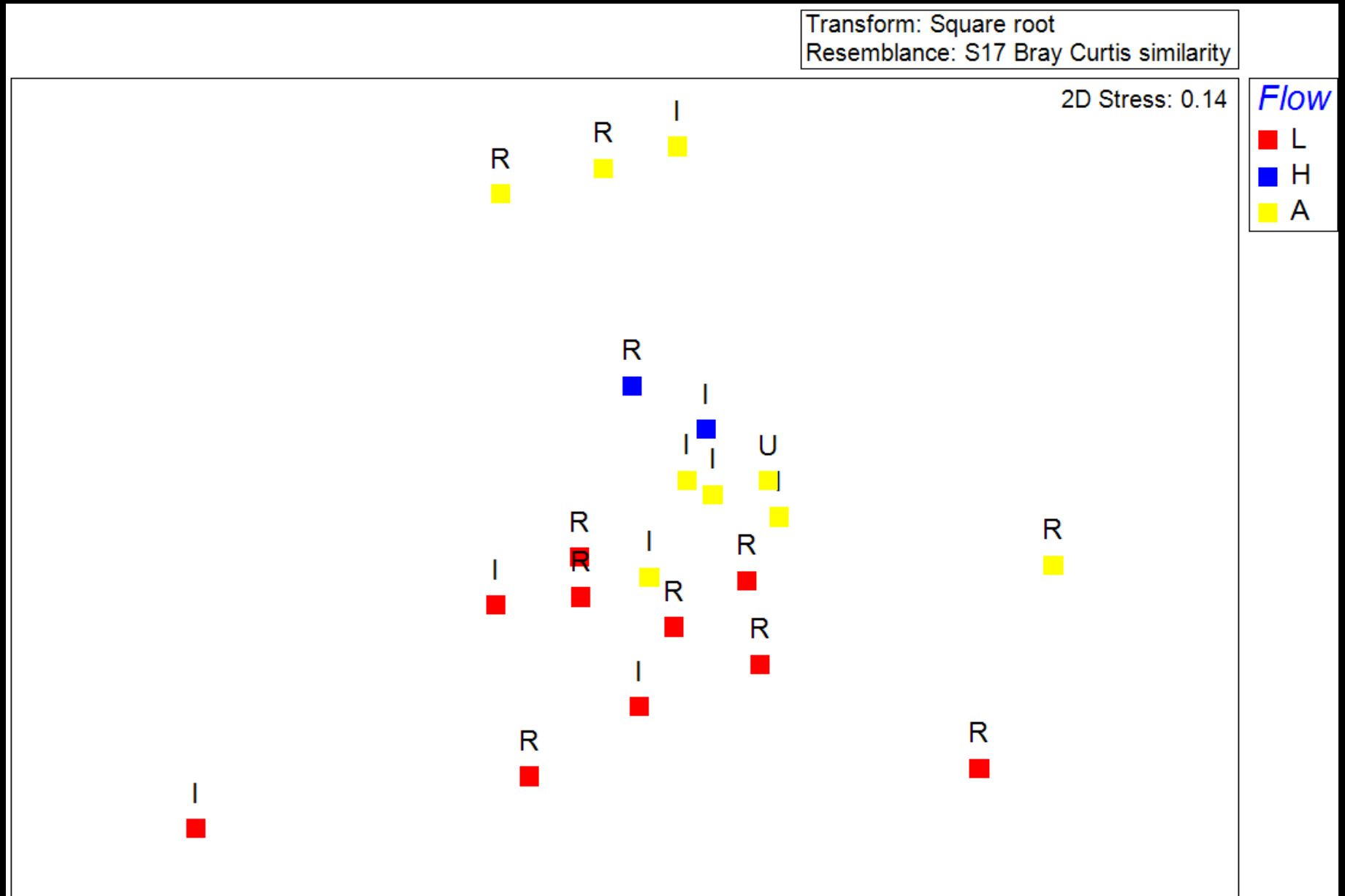
Central



ANOSIM (MMI)	R-value
REF : IMP	0.100
REF : UND	
IMP : UND	
LOW : HIGH	0.173
LOW : AVERAGE	0.272
HIGH : AVERAGE	0.210

SIMPER (MMI)			
Ref	REF : IMP	REF : UND	IMP : UND
	26.36%		
Flow	LOW:AVG	LOW:HIGH	HIGH:AVG
	22.55%	29.63%	24.94%
Elevation	1:2	1:3	1:4
	24.00%	24.66%	26.22%
	2:3	2:4	3:4
	30.83%	27.96%	27.22%

Lahontan (Flow v. MMI)



Lahontan



ANOSIM (MMI)	R-value
REF : IMP	0.161
REF : UND	-0.333
IMP : UND	-0.320
LOW : HIGH	0.244
LOW : AVERAGE	0.584
HIGH : AVERAGE	-0.323

SIMPER (MMI)			
Ref	REF : IMP	REF : UND	IMP : UND
	19.46%	13.78%	42.07%
Flow	LOW:AVG	LOW:HIGH	HIGH:AVG
	12.16%	17.07%	28.36%
Elevation	1:2	1:3	1:4
	20.05%	26.25%	16.89%
	2:3	2:4	3:4
	22.07%	16.05%	17.25%

What Does All This Mean?

- Segregating ecoregions is a valid idea.
- As long as there's water, there's variation in reference conditions...
- ...but drought conditions (by this analysis) does not affect reference condition scores.
- Elevation does not necessarily influence reference condition.



Until Next Time



- Integrate PHAB with Reference Condition to have an integrated score of Ecological Integrity
- Investigate developing a Periphyton MMI for Nevada
- Plan for 2014 Field Season
 - Complete the NRSA Nevada Sites
 - Nevada-Specific Sampling

Questions?

