Development of a Physical/ Bioassessment Program on the Pyramid Lake Indian Reservation – NV

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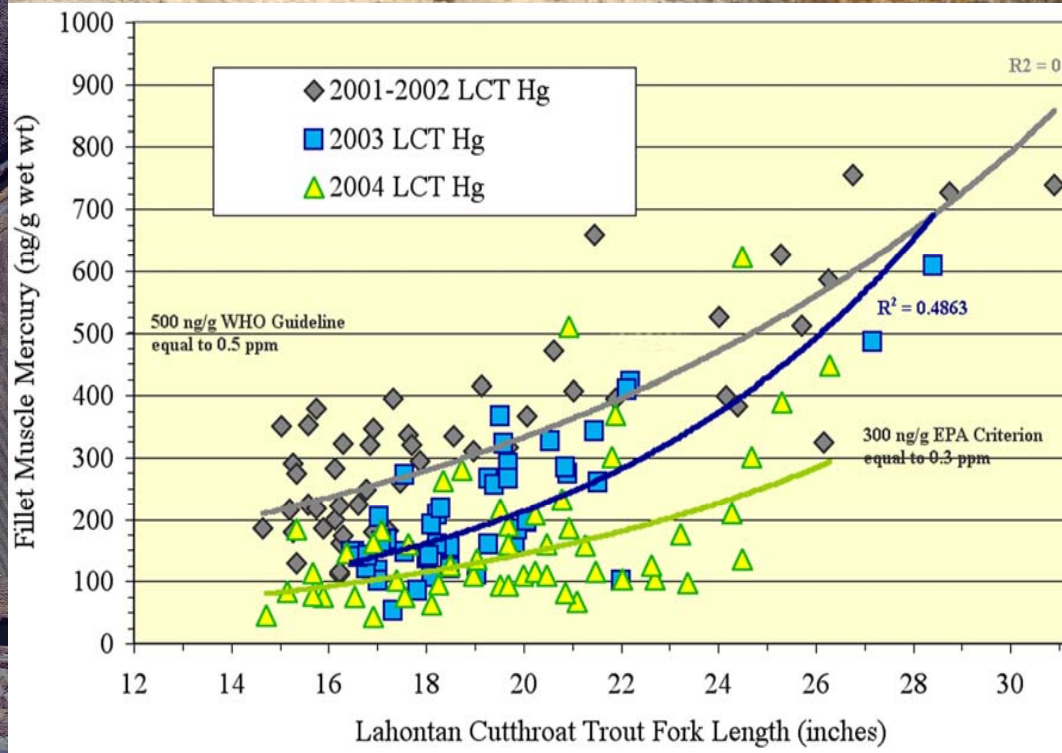
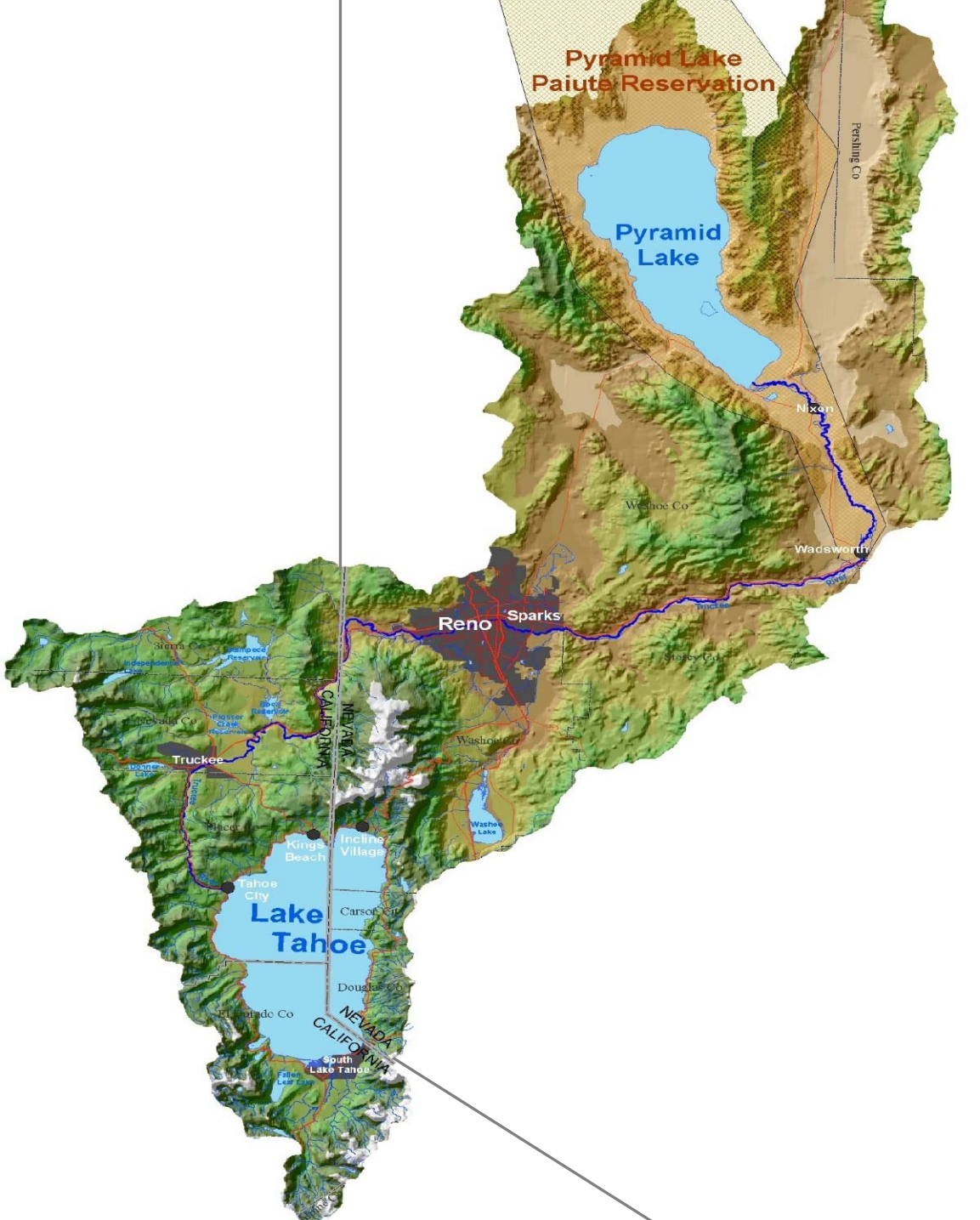
Pyramid Lake Paiute Indian Reservation
31 miles of the Lower Truckee River
12 perennial & 12 intermittent streams
Wetlands, springs,..., Pyramid Lake

Endangered Cui-ui
(pronounced Kwee-wee)

Threatened Lahontan Cutthroat Trout


2001-2002 LCT Hg
2003 LCT Hg
2004 LCT Hg
R2 = 0
R^2 = 0.4863
500 ng/g WHO Guideline
equal to 0.5 ppm
300 ng/g EPA Criterion
equal to 0.3 ppm
Fillet Muscle Mercury (ng/g wet wt)
Lahontan Cutthroat Trout Fork Length (inches)
0
100
200
300
400
500
600
700
800
900
1000
12
14
16
18
20
22
24
26
28
30



Pyramid Lake
Paiute Reservation
Pyramid
Lake
Pershing Co
Nixon
Washoe Co
Wadsworth
Reno
Sparks
Truckee
Sierra Co
Nevada Co
Truckee
Washoe Co
Washoe Lake
Kings
Beach
Incline
Village
Tahoe
City
Lake
Tahoe
Carson City
Douglas Co
El Dorado Co
South
Lake Tahoe
CALIFORNIA
NEVADA

- 15 years of data collected over a span of 20 years, 1981-2000.
- 2 collection methods
  - Surber sampler (1981 to 1999)
  - 1 meter Kicknet (2 years, 1992-1993)
  - 10 x18 inch Kicknet(2001 to present)
  - Differing number of replicates each year (3 or 4)
- 3 counting/identification methods
  - Estimated counts (2 years, 1992 & 1993)
  - Presence/Absence (2 years, 1994 & 1995)
  - Total counts 1981, 1996 to present)

Station Names and ID Codes

- Abandoned House (AH)
- Big Bend (BB)
- Canyon (CN)
- Dead Ox (DO)
- I-80 Bridge (I80)
- Little Nixon (LNX)
- Marble Bluff Dam (MBD)
- Nixon Bridge (NB)
- Numana Dam (ND)
- Lower Nixon (NIX)
- Numana Wetland (NW)
- Painted Rock (PR)
- S bar S Ranch (SS)
- Wadsworth Bridge (WB)

Metric Selection

- EDAS calculates ~70 metrics
- To narrow focus decided to look at the metrics that are most recommended by the RBPs
  - 14 metrics
  - Chapter 7, Table 7-1
    - http://www.epa.gov/owow/monitoring/rbp/ch07b.html

RBP Recommended Metrics

Category	Metric	Predicted response to increasing perturbation
Richness measures	Total No. taxa	Decrease
	No. EPT taxa	Decrease
	No. Ephemeroptera Taxa	Decrease
	No. Plecoptera Taxa	Decrease
	No. Trichoptera Taxa	Decrease
Composition measures	% EPT	Decrease
	% Ephemeroptera	Decrease
Tolerance & Intolerance measures	No. of Intolerant Taxa	Decrease
	% Tolerant Organisms	Increase
	% Dominant Taxon	Increase
Feeding measures	% Filterers	Variable
	% Grazers and Scrapers	Decrease
Habit measures	Number of Clinger Taxa	Decrease
	% Clingers	Decrease

The PLPT Biological Index consists of 4 core metrics:

Taxa Richness

Percent EPT Individuals

Percent Tolerant Individuals

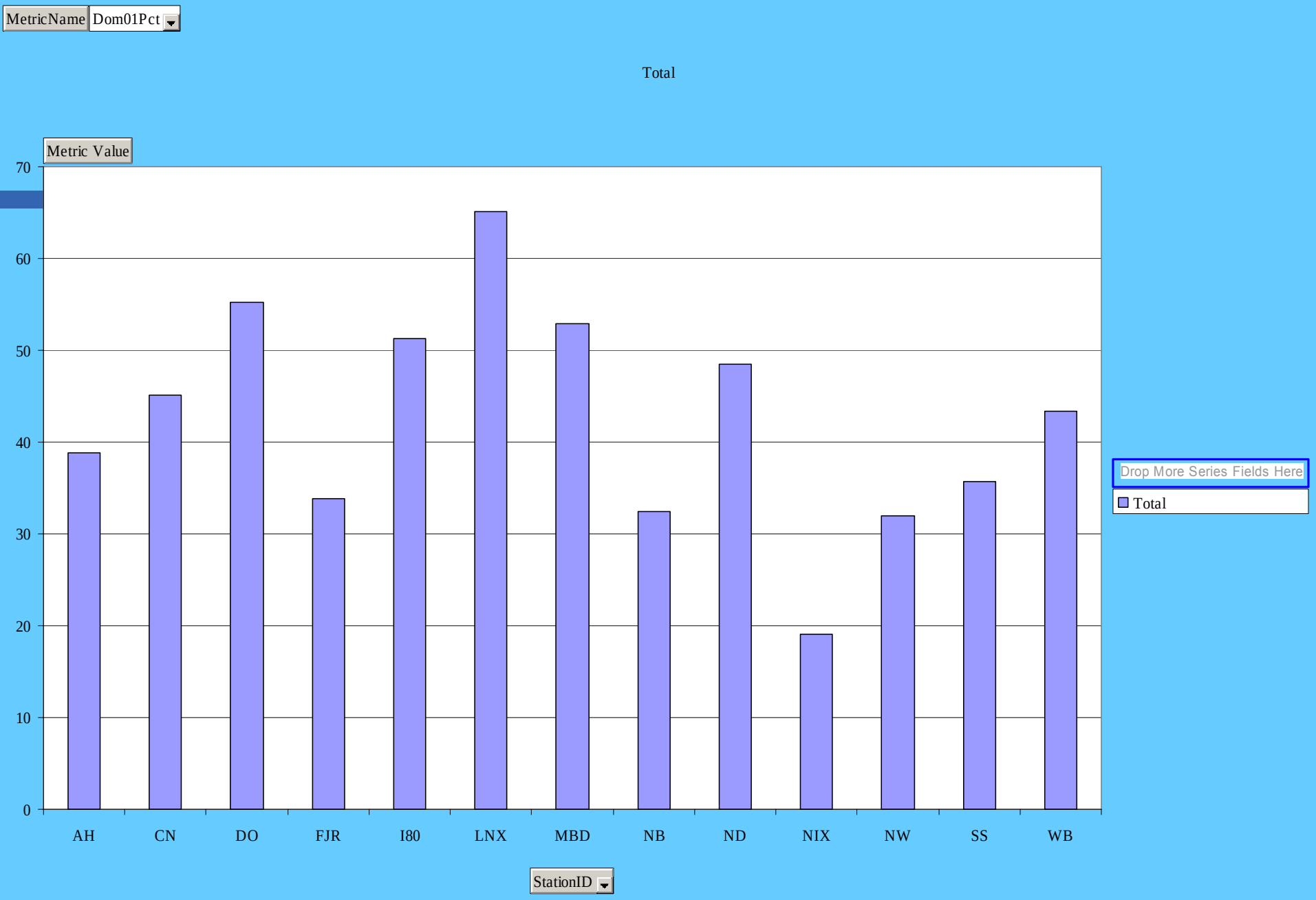
Percent Dominant Taxon

Approx. Upstream Distance (miles) from MBD	Station ID	Year							Average
		1981	1989	1990	1996	1999	2000	2001*	
22.5	**I80**	63.6			39.3	43.6	47.0	51.2	48.9
20	WB		18.7	35.8	46.5				33.7
19	AH				47.0	51.2			49.1
17.5	**FJR**	52.8	25.1				59.4	51.2	47.1
14.5	SS				47.3				47.3
11.5	NW		38.9		80.8				59.9
10.5	**DO**	60.5	39.0	59.3		52.7	45.9	*	51.5
8	**CN**	34.2		50.5	51.7	45.5	47.9	*	45.9
6.5	ND				40.1				40.1
5	**LNX**	73.8		35.3		55.1	54.1	*	54.6
3.5	NB		28.3		63.3				45.8
2	**NIX**	71.0		45.4		57.6	50.1	*	56.1
0	MBD	58.2	16.3	44.7	45.5	25.6			38.1
Average		59.2	27.7	45.2	51.3	47.3	50.7	51.2	47.5

*Only 2 of 6 sites for 2001 had been processed and ready for this analysis.
BOLD sites are sites that will be part of the future sampling scheme.

PLPT Biological Index Score and Narrative Rating

100-80	Excellent	69-60	Good	49-40	Poor
79-70	Very Good	59-50	Fair	39-0	Very Poor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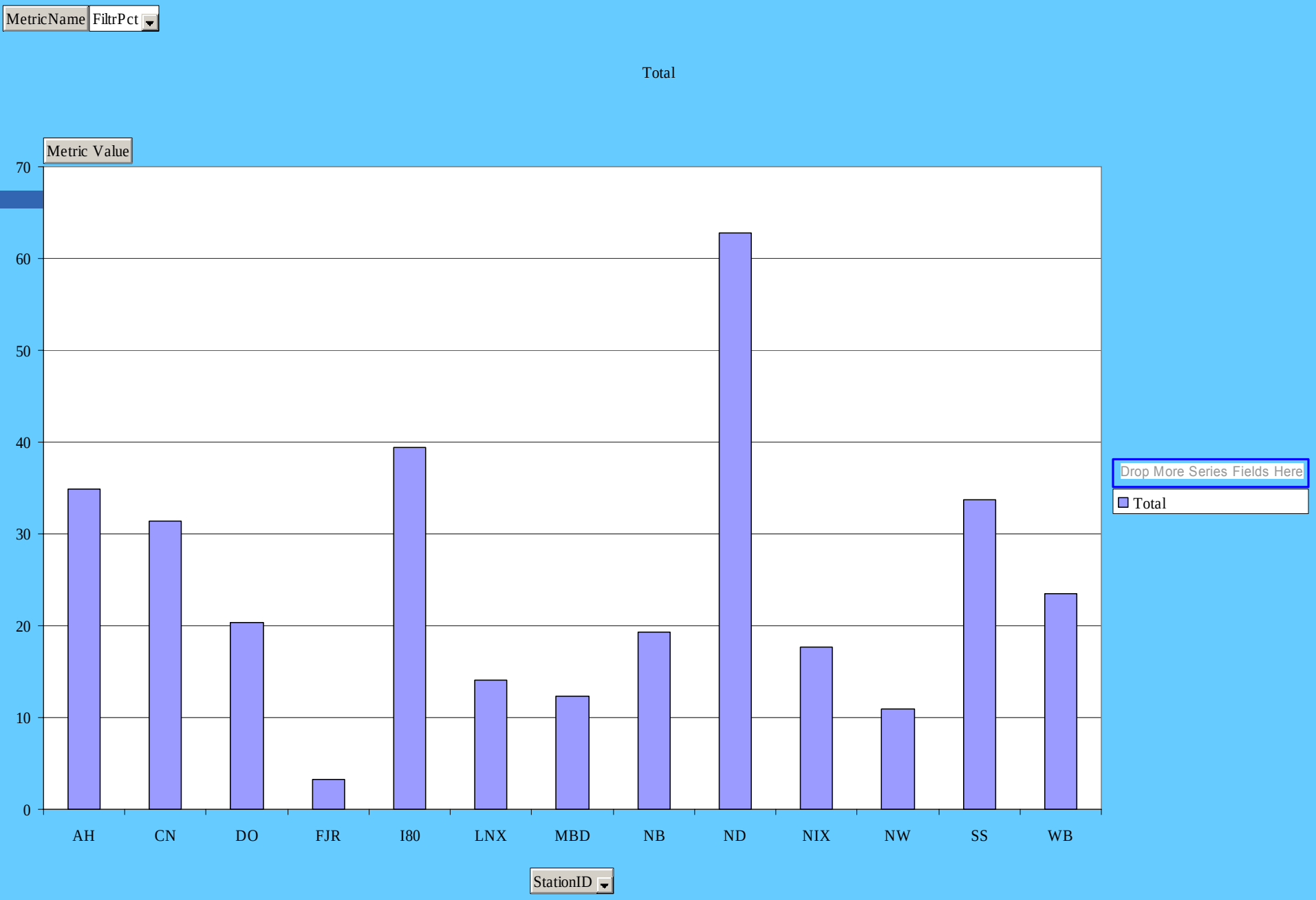
Dom01Pct
Total
Metric Value
70
60
50
40
30
20
10
0
AH
CN
DO
FJR
I80
LNX
MBD
NB
ND
NIX
NW
SS
WB
StationID
Drop More Series Fields Here
Total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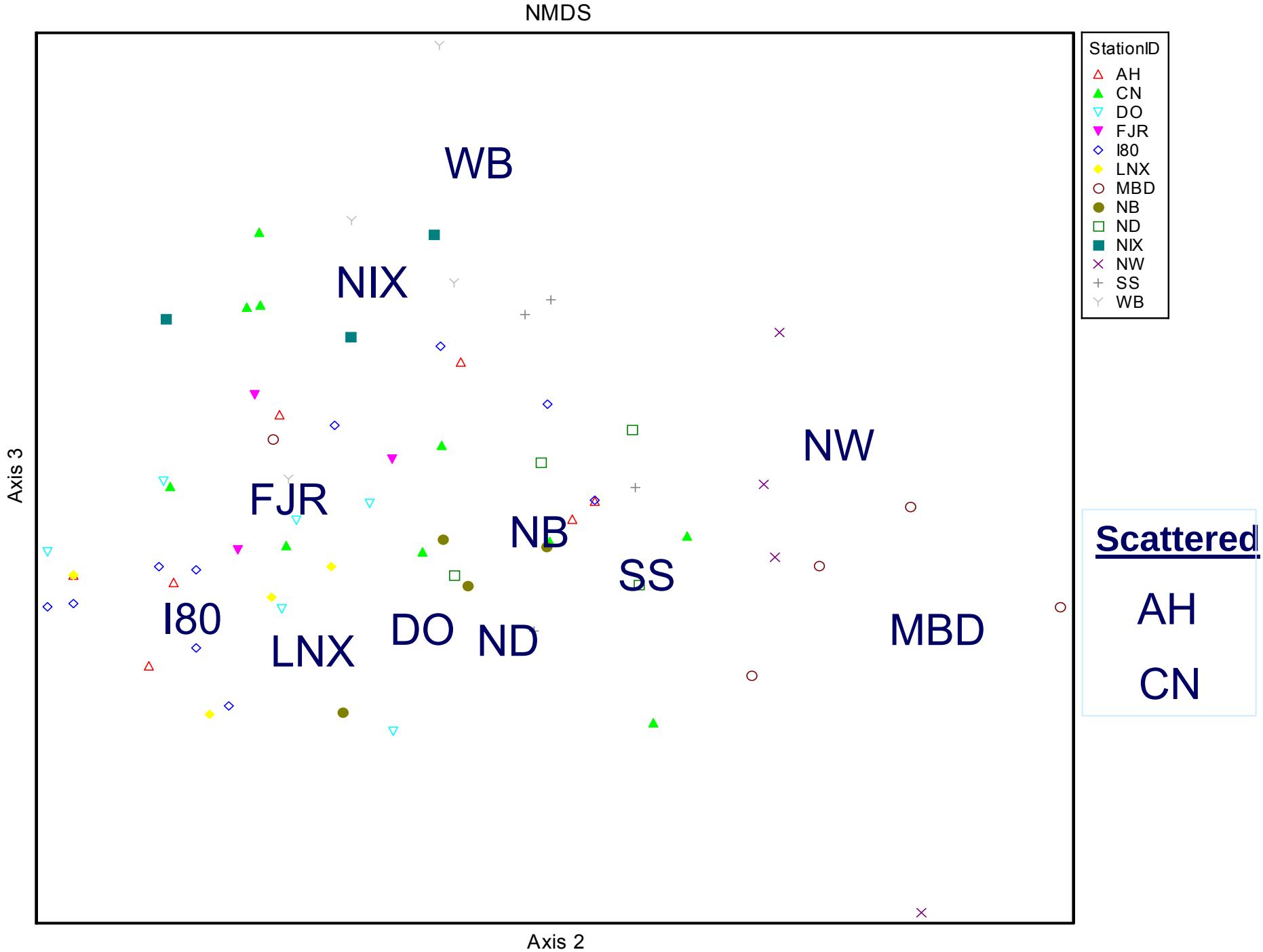
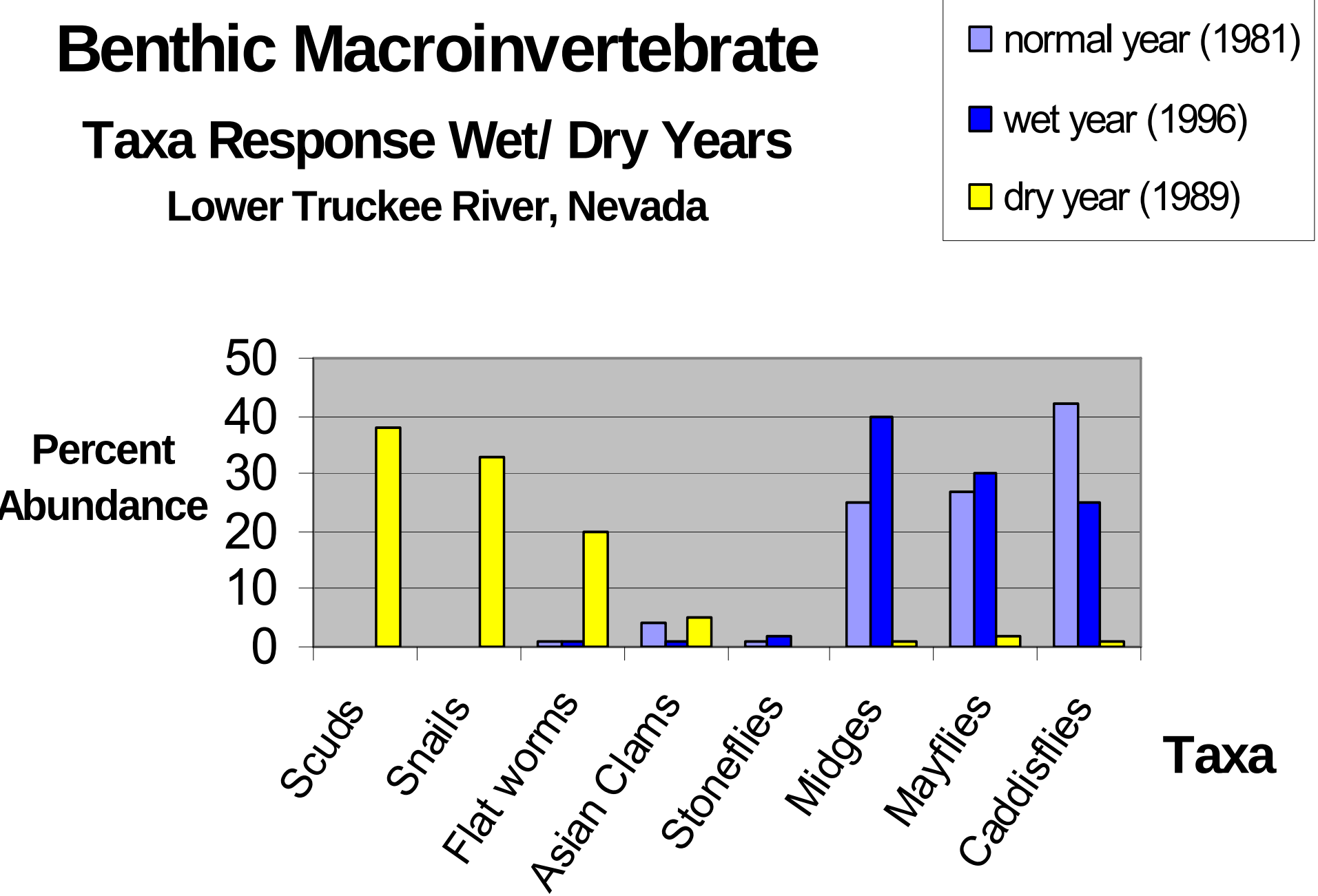
FiltrPct
Total
Metric Value
70
60
50
40
30
20
10
0
AH
CN
DO
FJR
I80
LNX
MBD
NB
ND
NIX
NW
SS
WB
StationID
Drop More Series Fields Here
Total


NMDS
StationID
AH
CN
DO
FJR
I80
LNX
MBD
NB
ND
NIX
NW
SS
WB
WB
NIX
NW
FJR
NB
SS
I80
LNX
DO
ND
MBD
Scattered
AH
CN
Axis 3
Axis 2

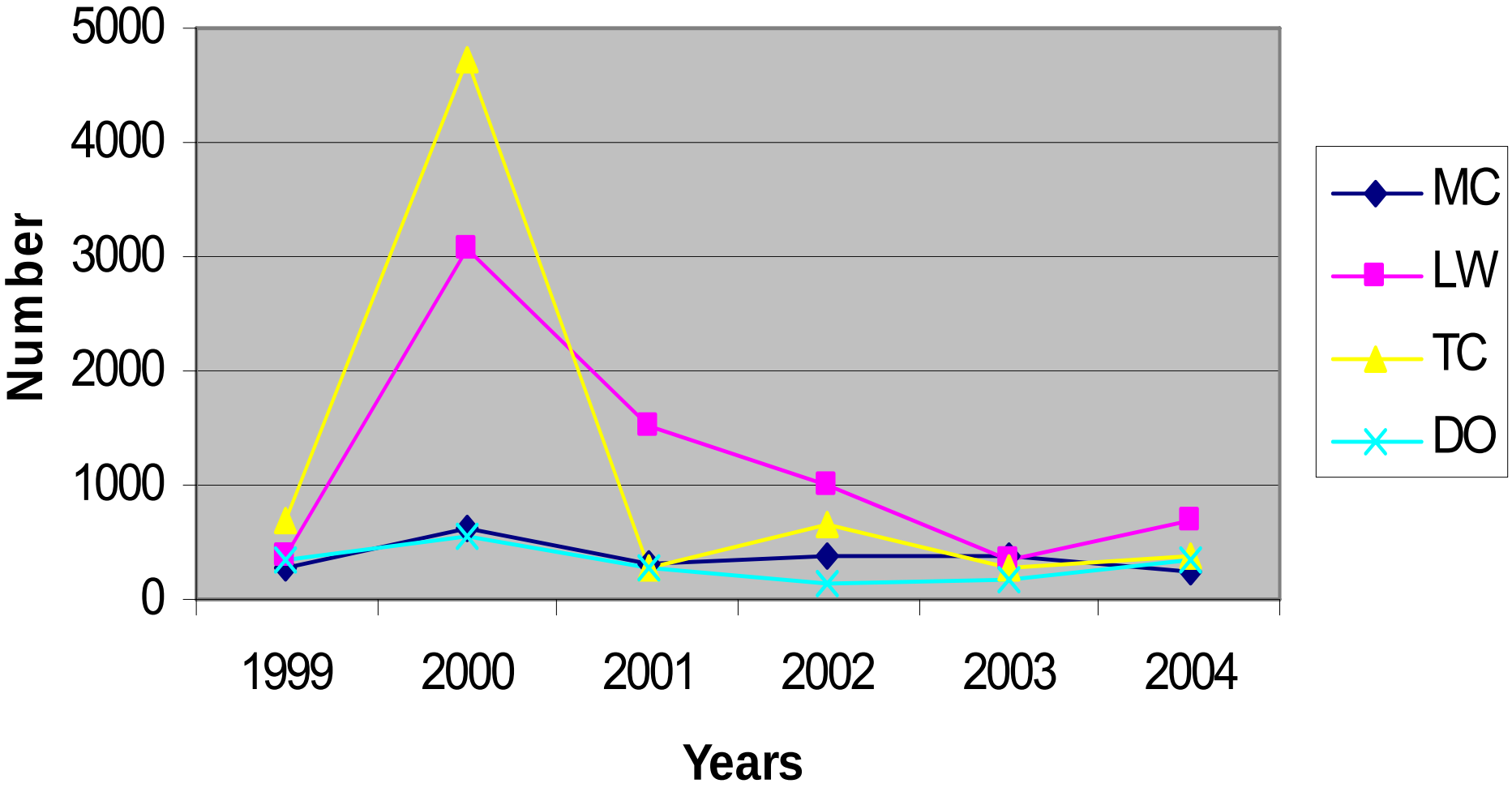
Benthic Macroinvertebrate

Taxa Response Wet/ Dry Years

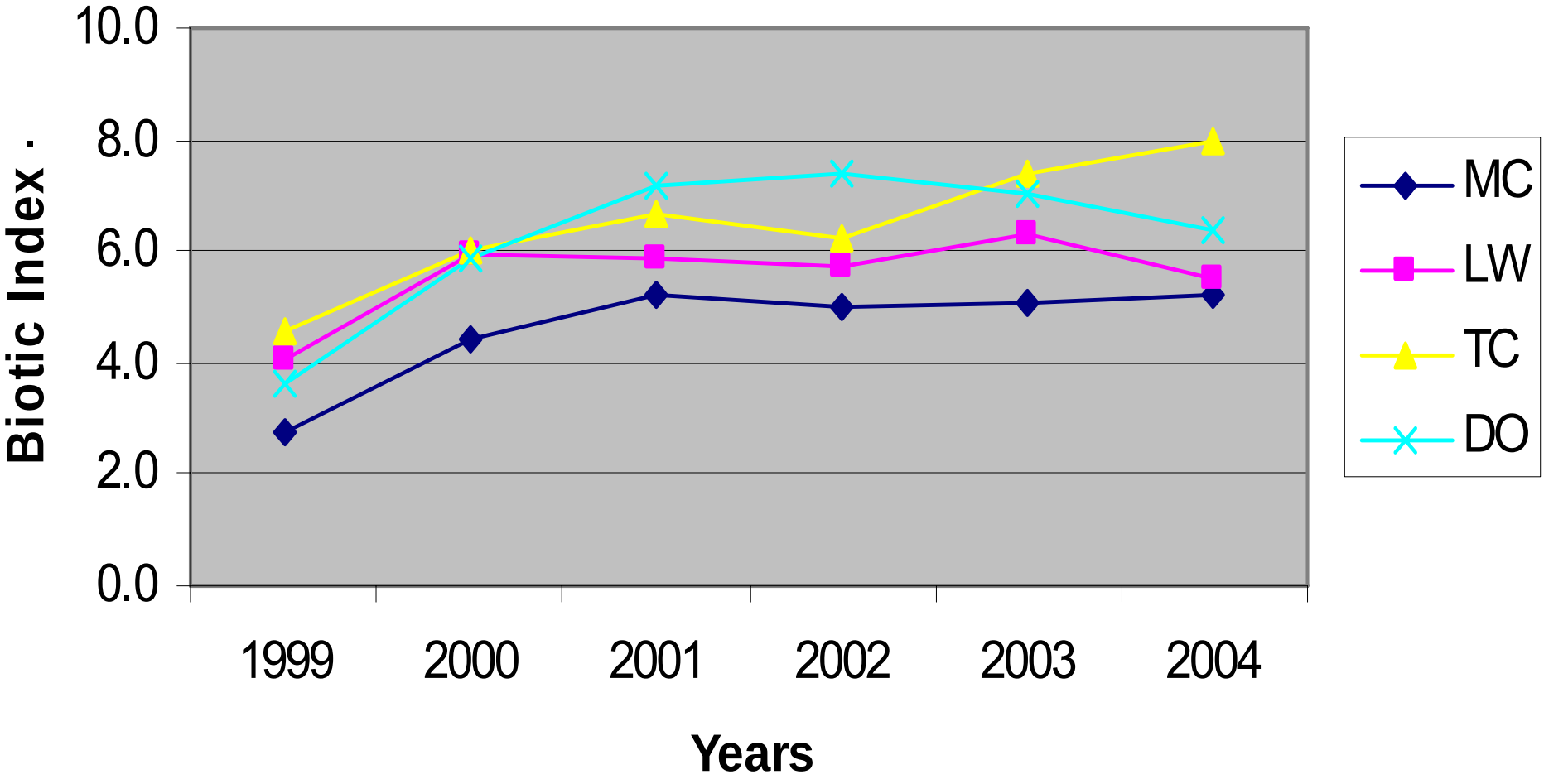
Lower Truckee River, Nevada



1999 - 2004 LTR BMI Survey
Total BMI / ft²

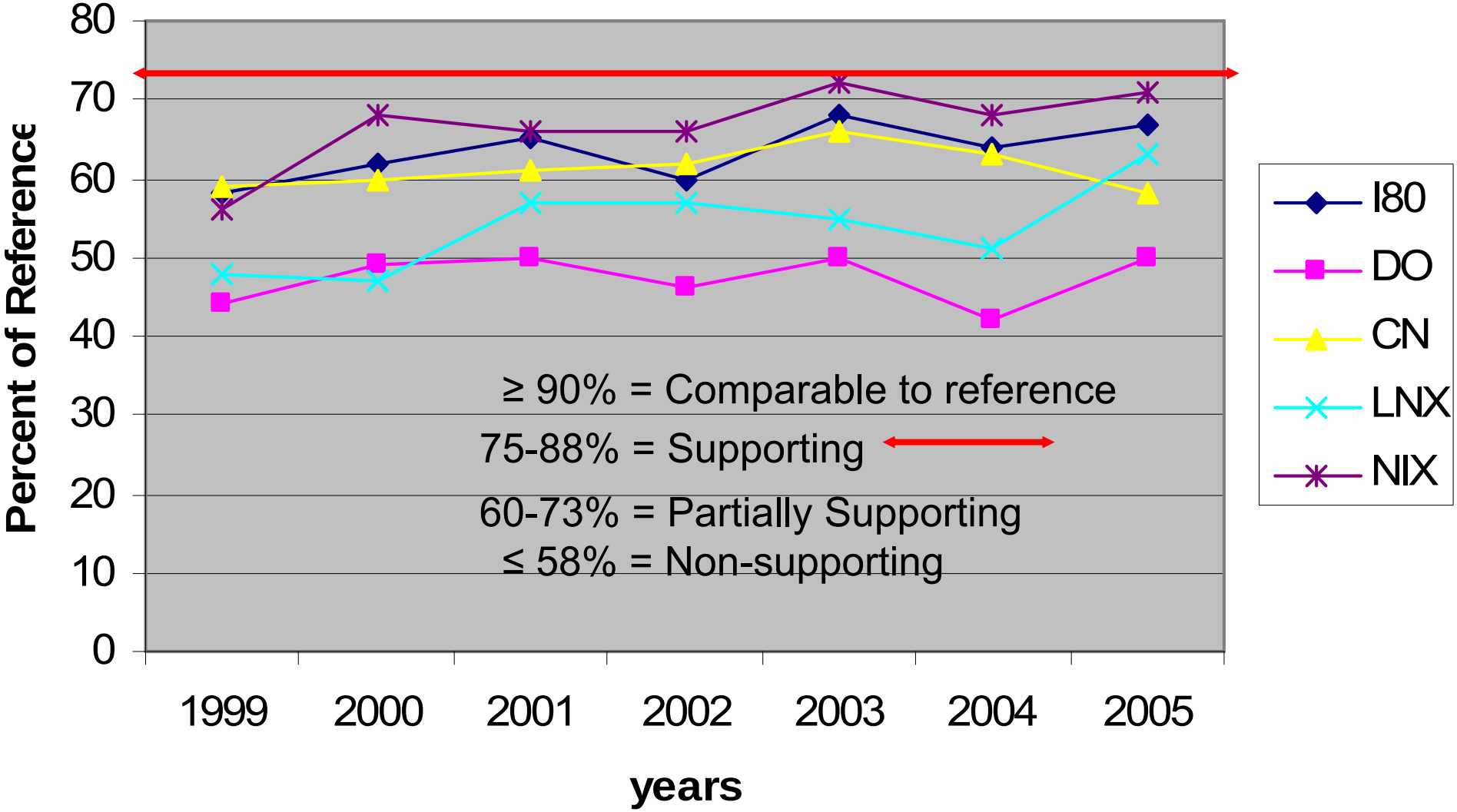


1999 - 2004 LTR BMI Survey
Biotic Index



Physical Habitat Assessment

Lower Truckee River



Recommendations

- Use a standard effort for collections
  - Equipment (Surber)
  - Replicates (3 reps)
- Use a standard effort for identification
  - Total Counts or a standard subsample size
    - Having a standard number of organisms (e.g., 200 or 300) would allow for other types of analyses (e.g., RIVPACS)
- Collect and record non-biological data
  - Physical Habitat assessments
  - Water Chemistry
    - Even just simple parameters would be good
      - pH, DO, Conductivity, & Temperature

Additional Analyses on the Truckee River - Nevada

- Finish PhyHab/ BA QA Project Plan
- BMI IBI development: Tetra Tech -Baltimore, MD (Michael Barbour, Eric Leppo)
- Fish IBI development: Oregon State Univ. (Dr. Robert Hughes, and Thomas Whittier/ Gregg Lomnicky, Dynamac Corporation).
- Algae IBI development: Desert Research Institute – Reno (Dr. Chris Fritzen and Clint Davis)
- Physical Habitat Index development: Tetra Tech - Baltimore, MD (Michael Barbour, Eric Leppo