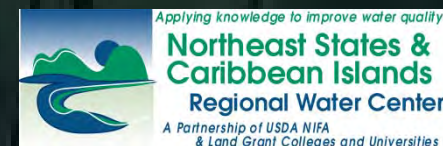


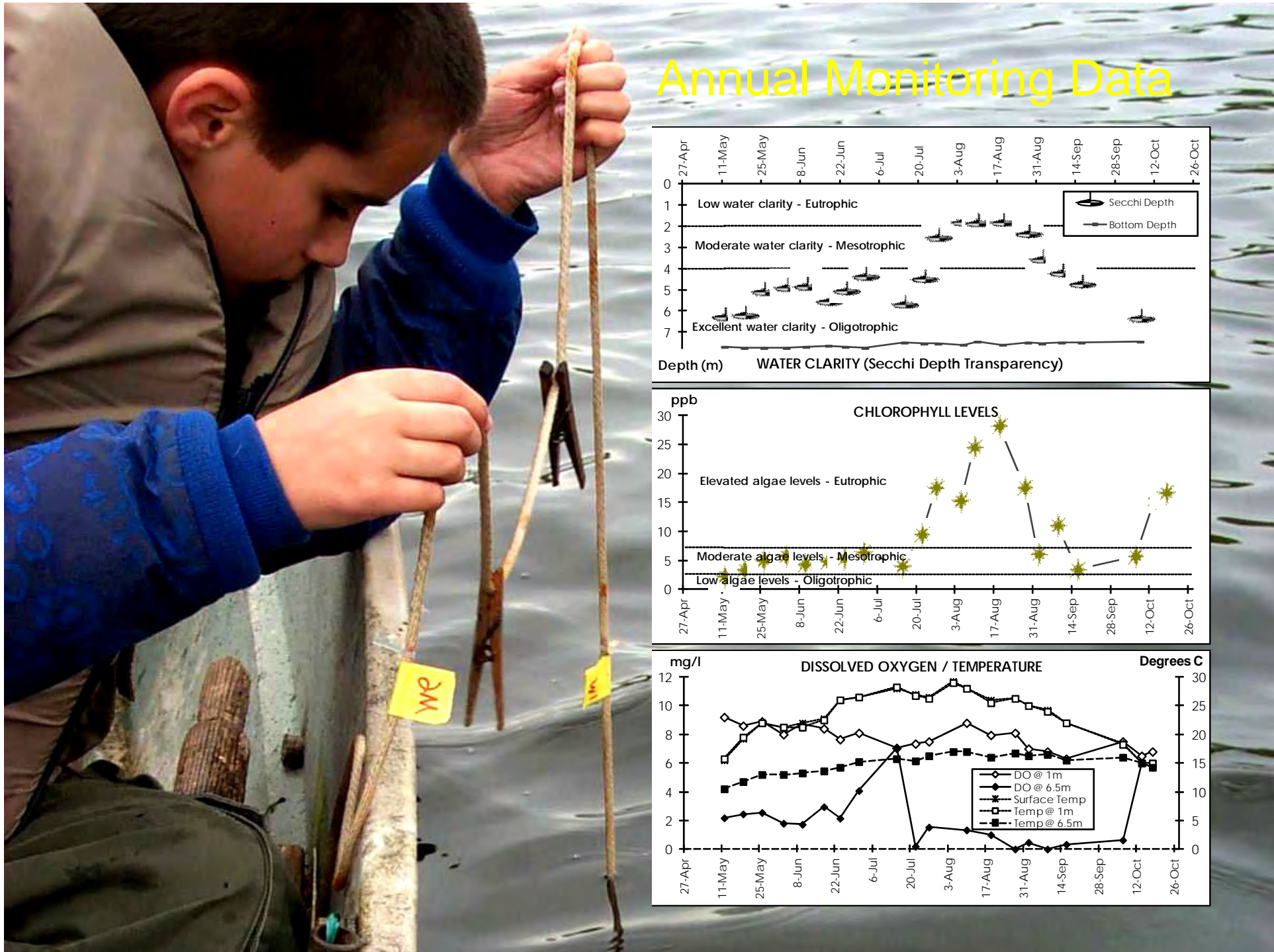
URI Watershed Watch: 25 Years of Documenting RI's Waters

Elizabeth Herron
Linda Green
Arthur Gold

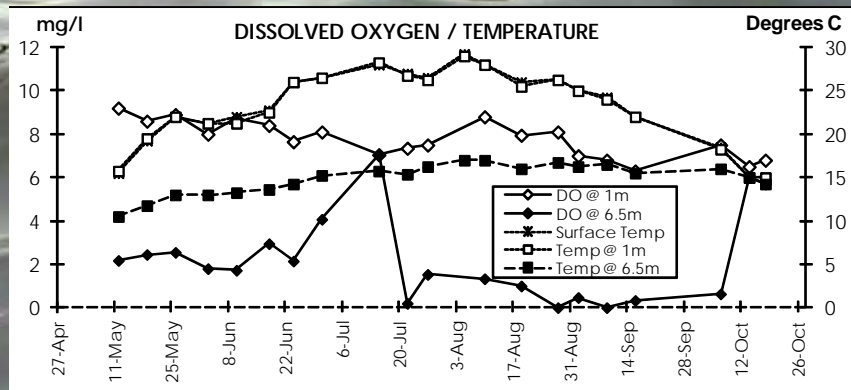
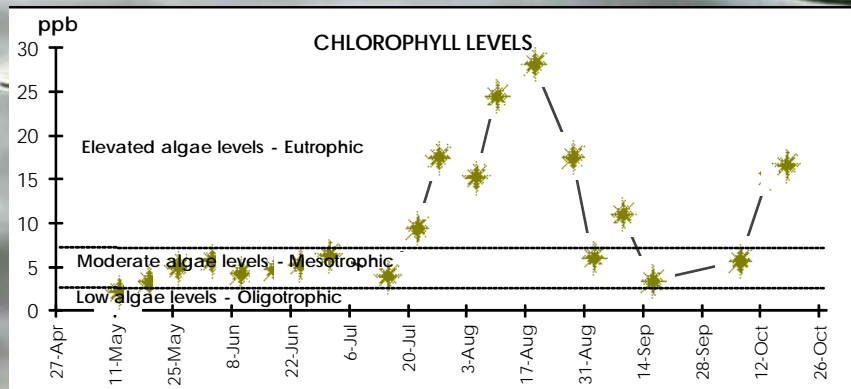
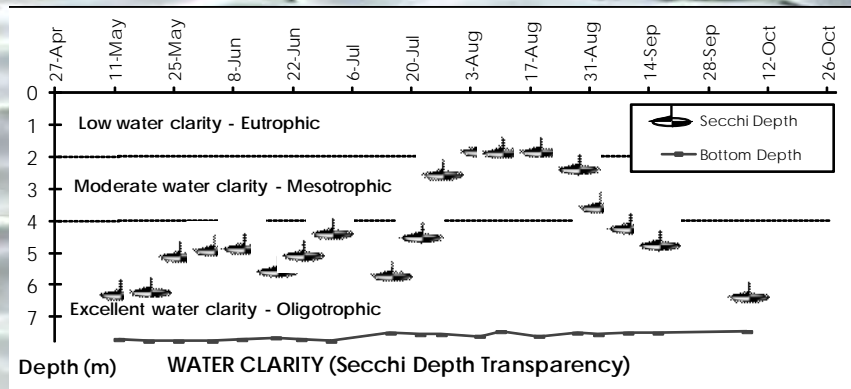
University of Rhode Island - Natural Resources Science
URI Cooperative Extension

THE
UNIVERSITY
OF RHODE ISLAND
COOPERATIVE
EXTENSION

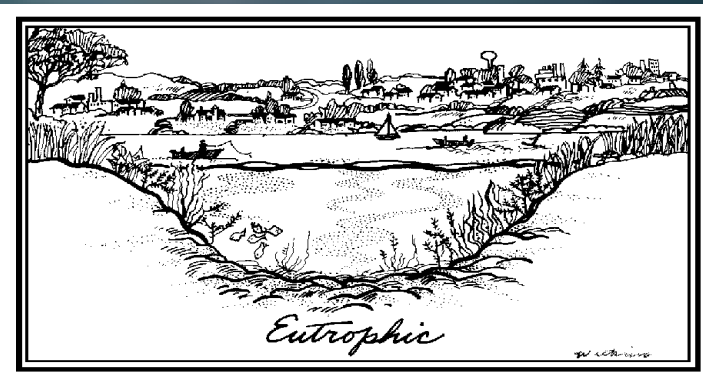
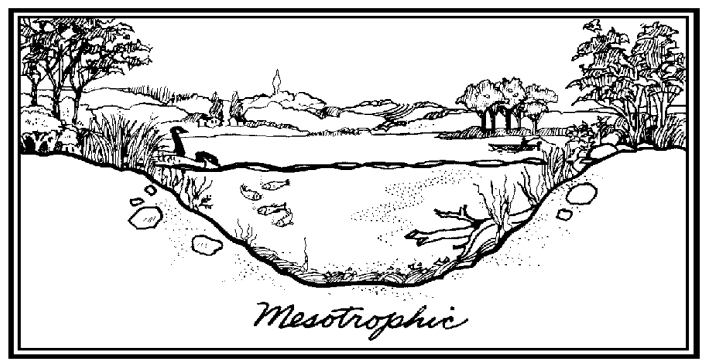
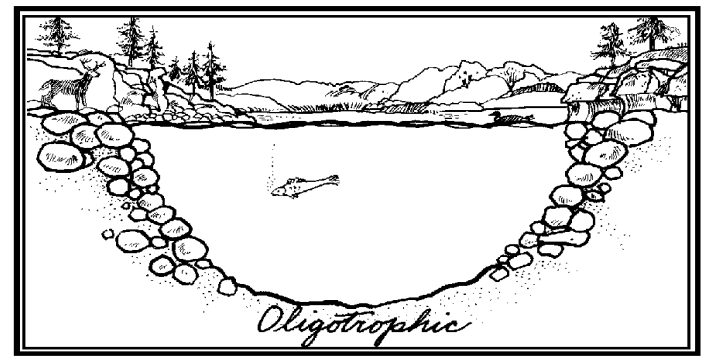
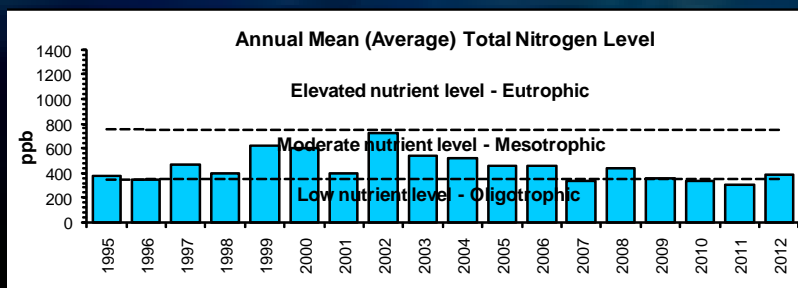
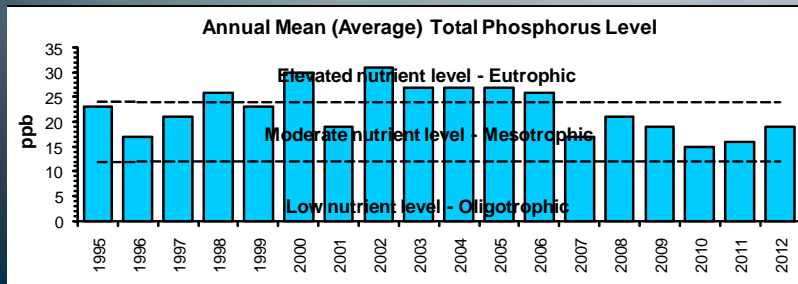
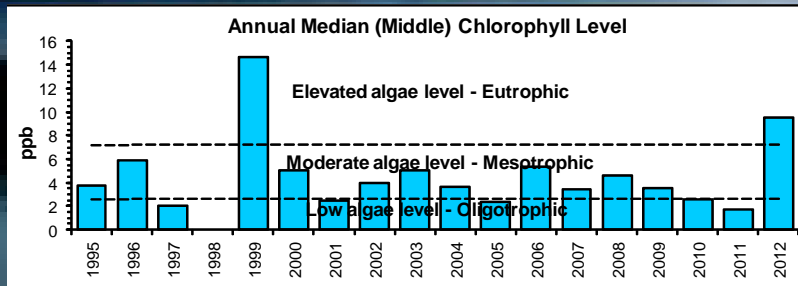
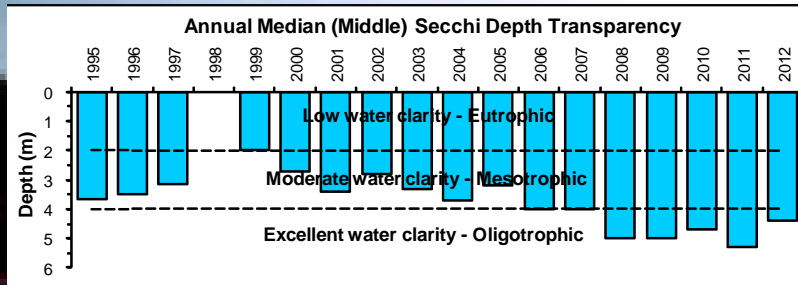




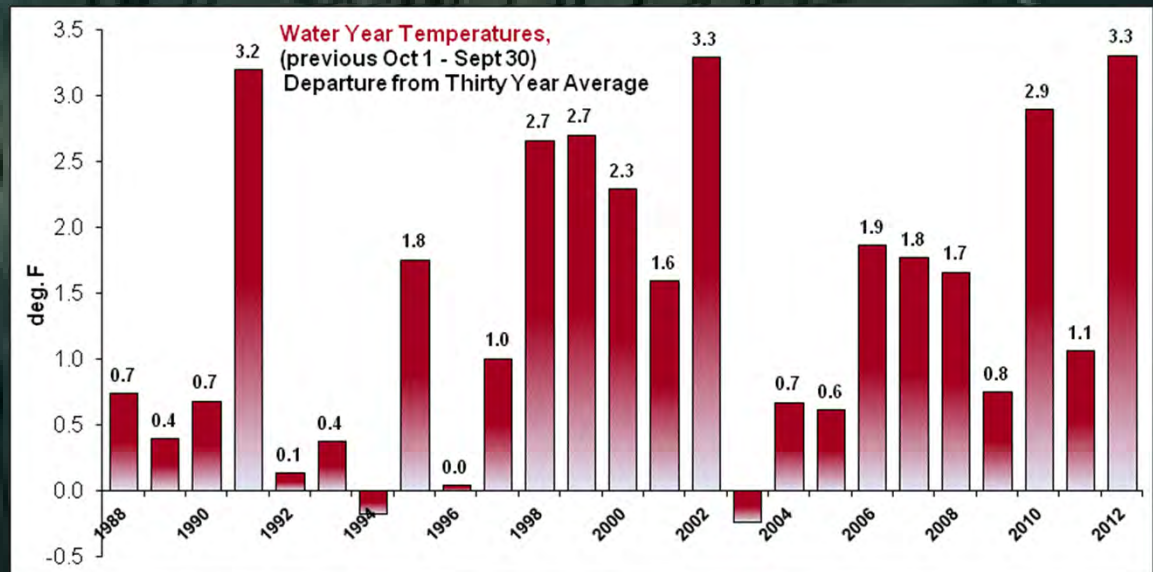
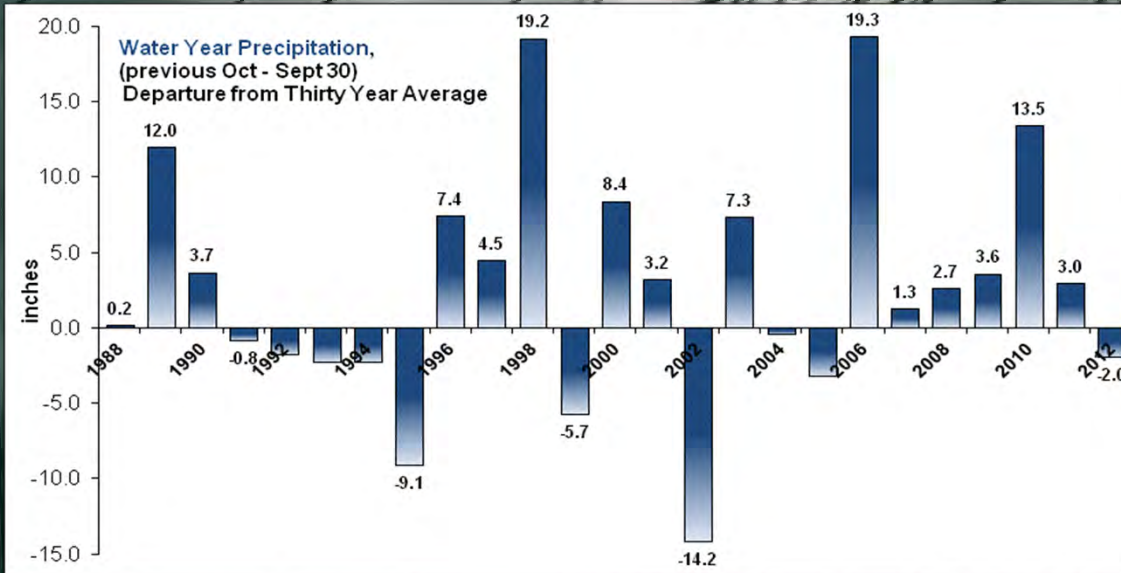
Annual Monitoring Data



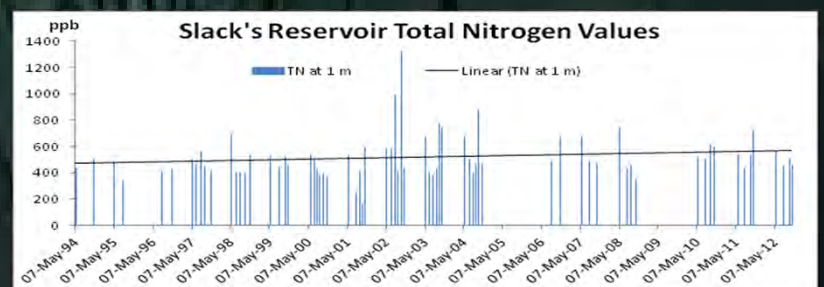
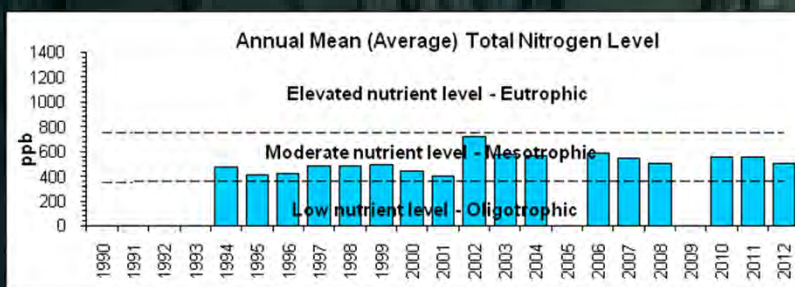
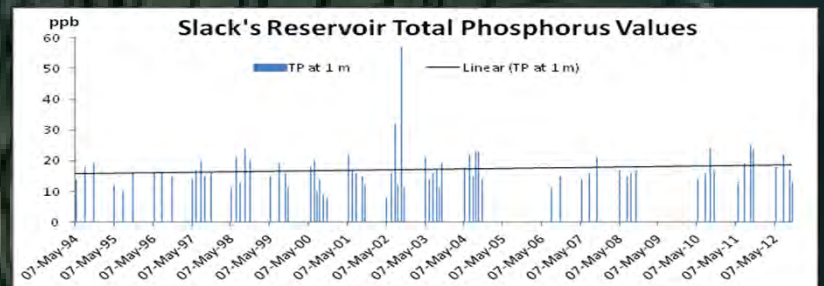
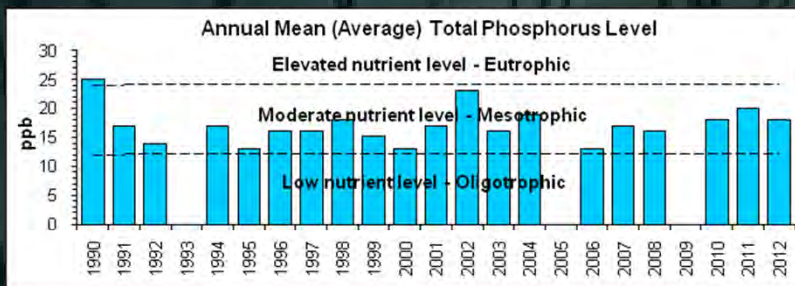
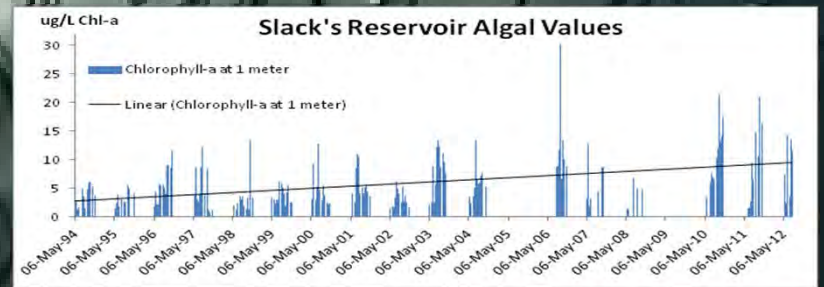
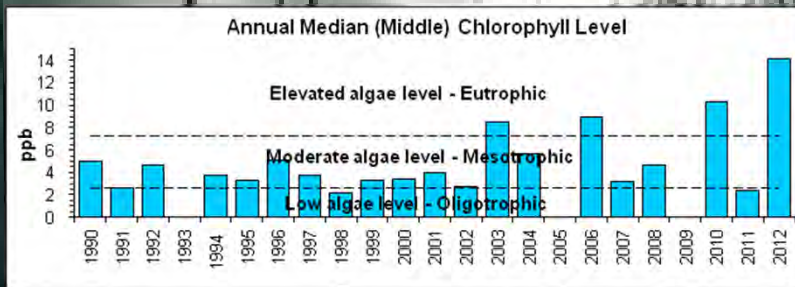
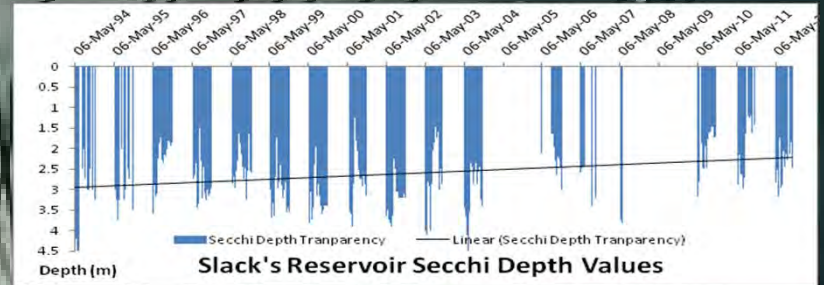
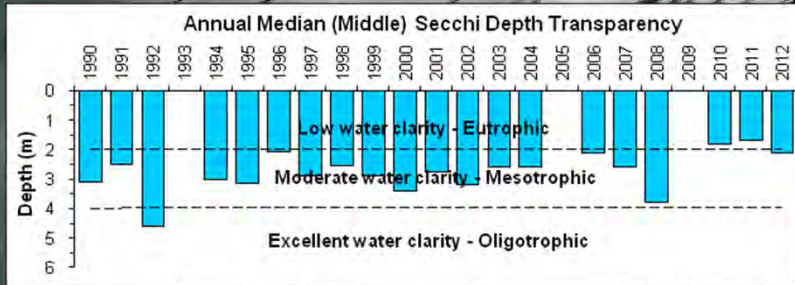
Multi-Year Trophic State



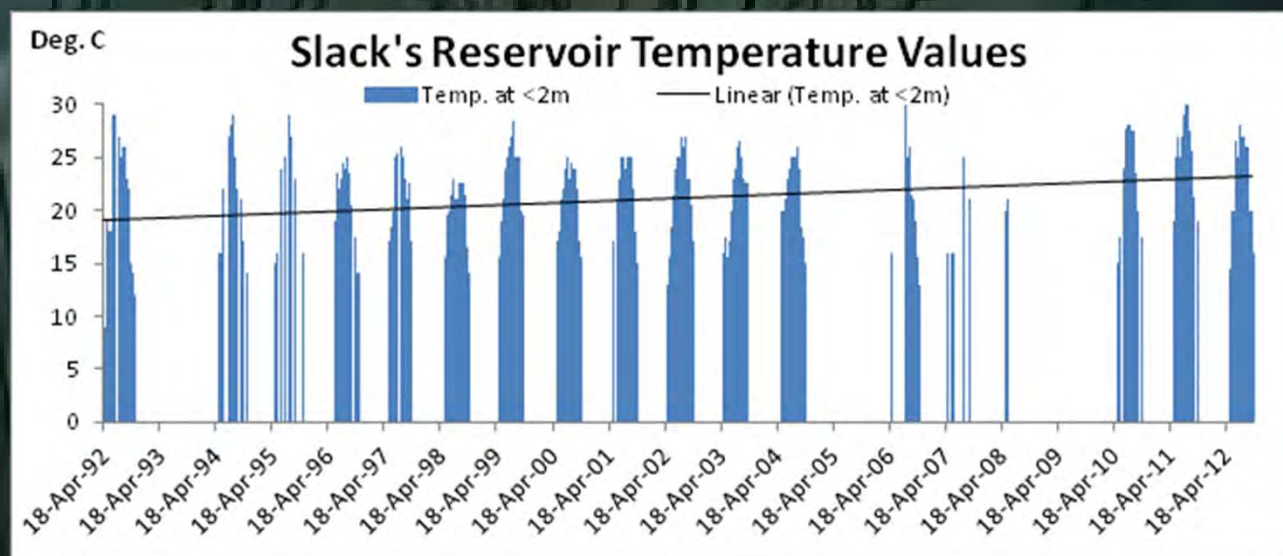
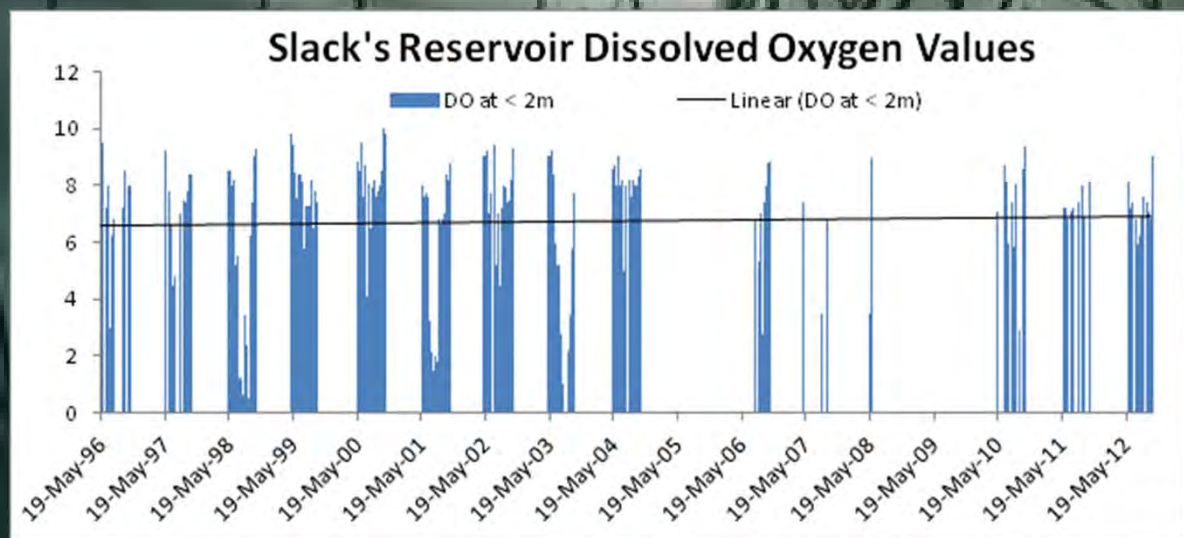
Weather



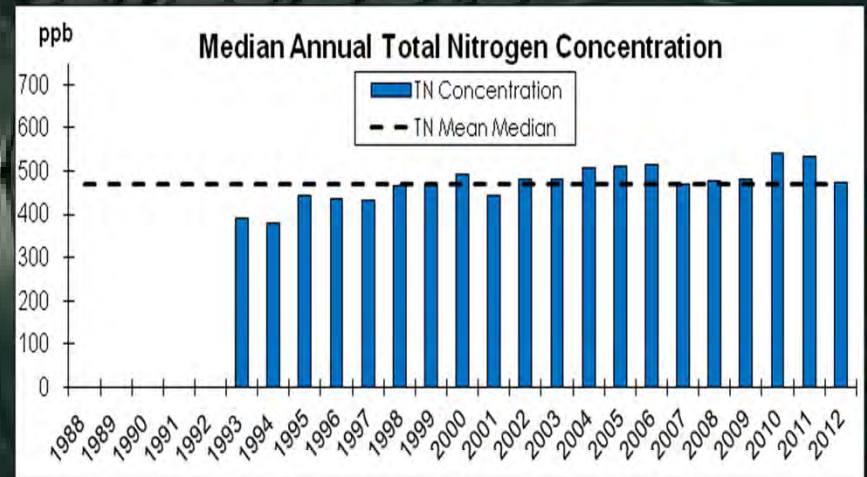
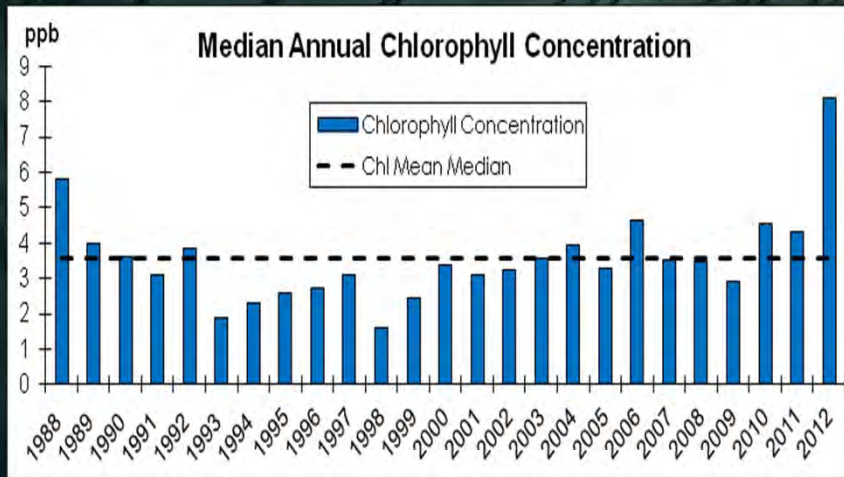
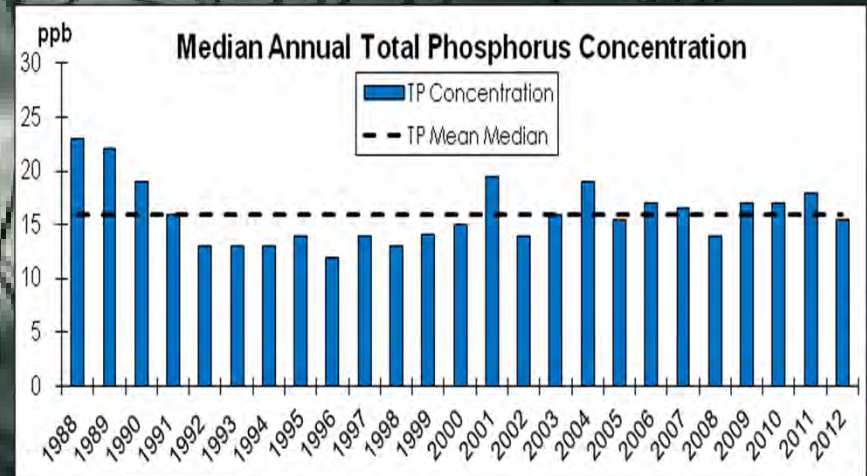
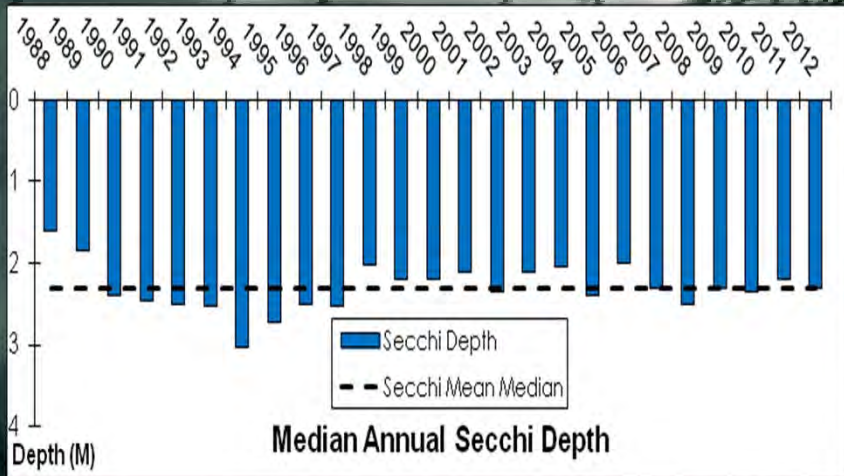
Multi-year



Other Long Term Data

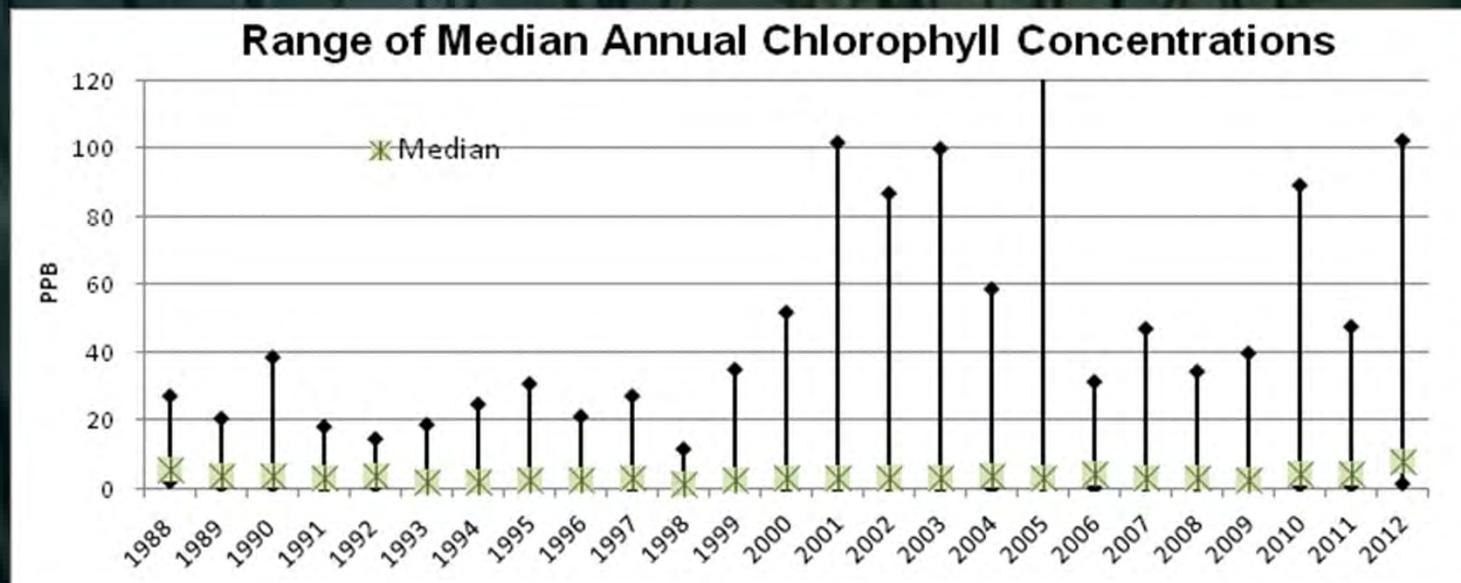
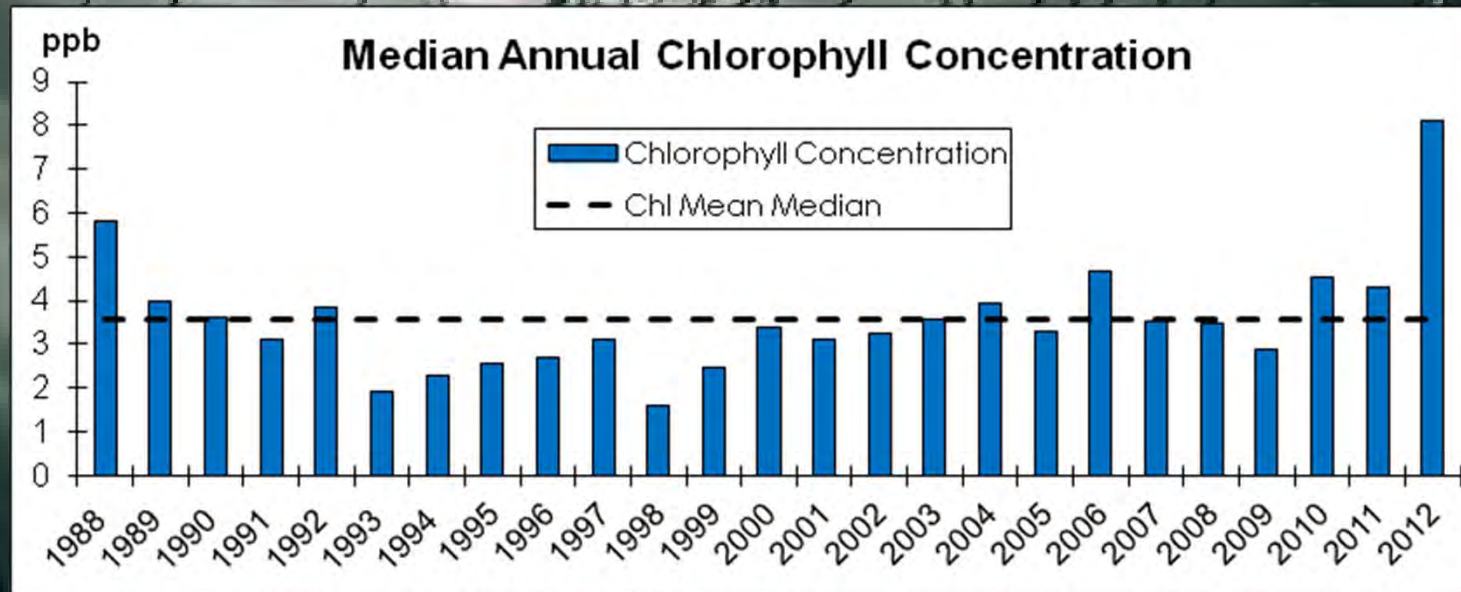


Local Water Quality Trends

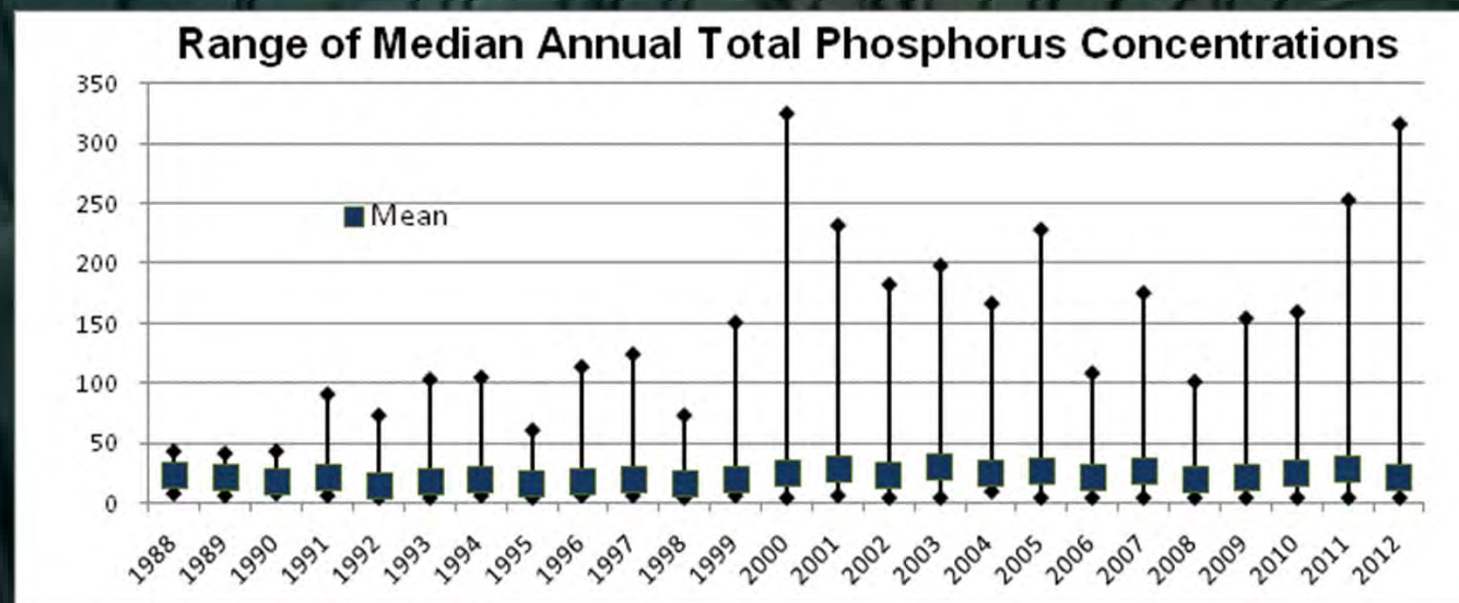
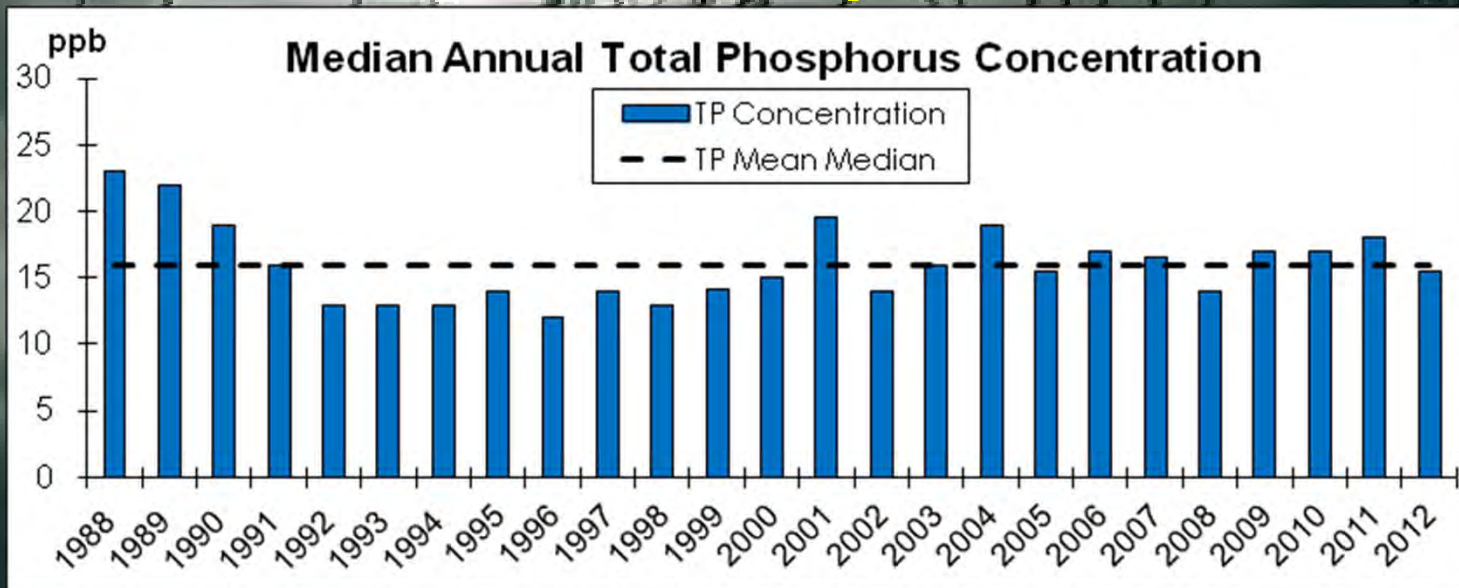


URIWW Locations with 3 or more years of data only

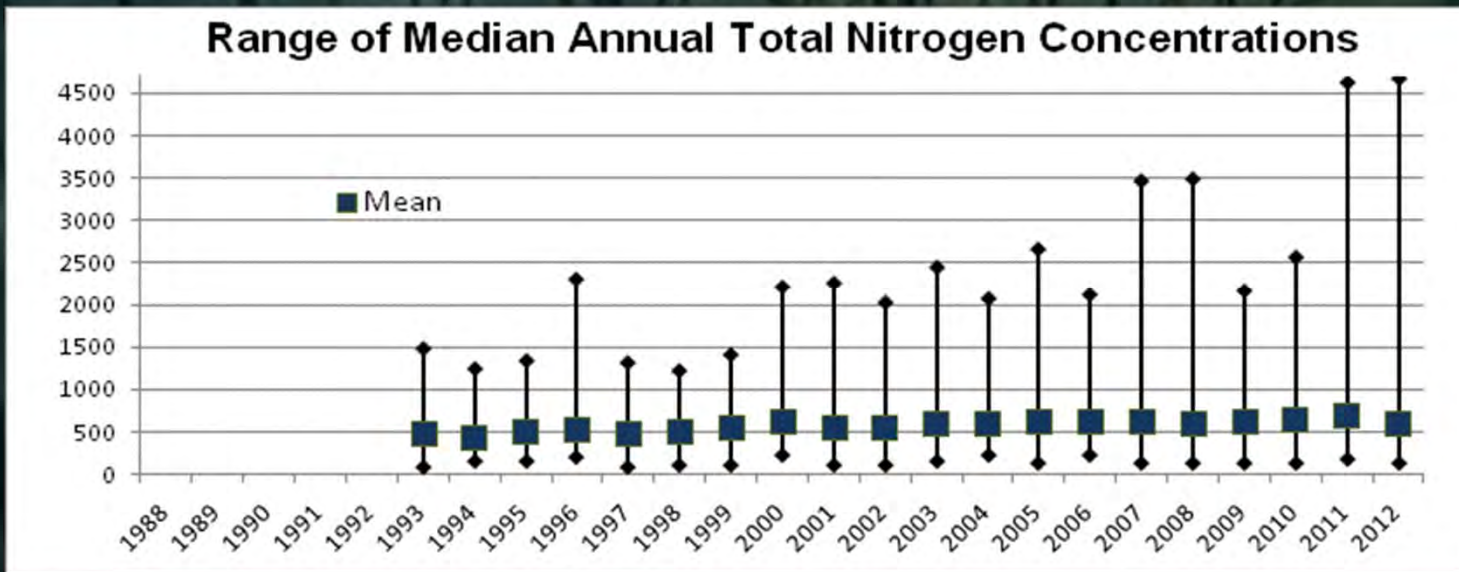
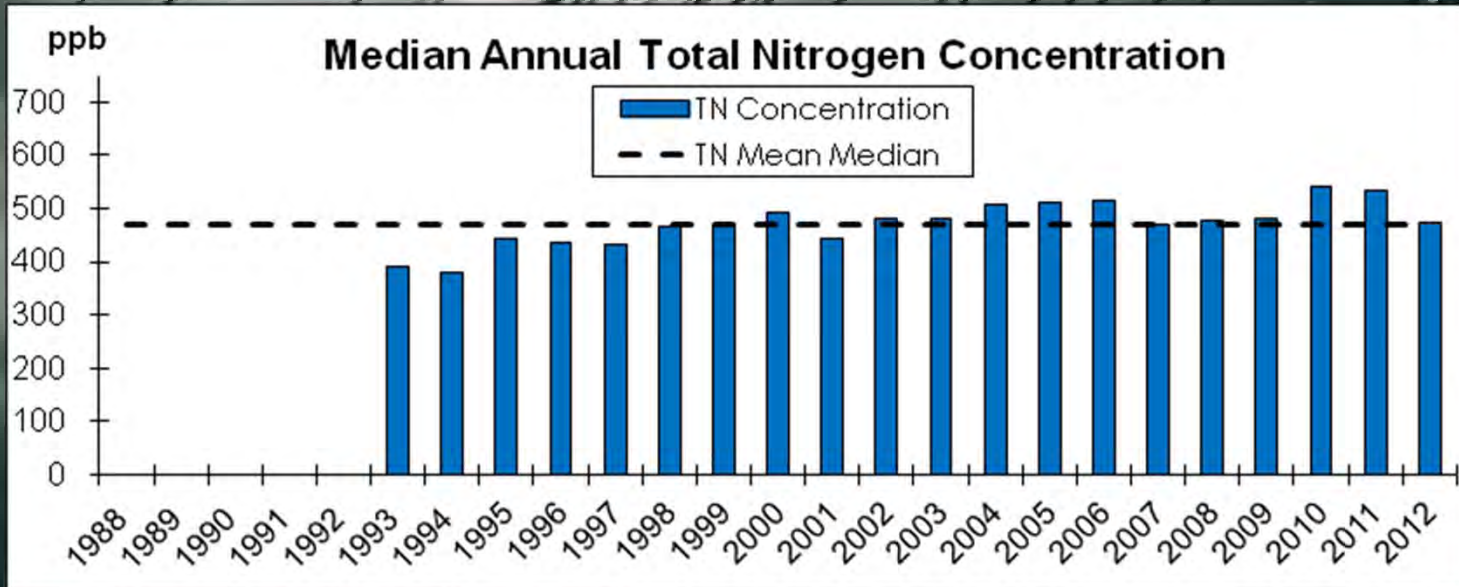
Chlorophyll - Algae



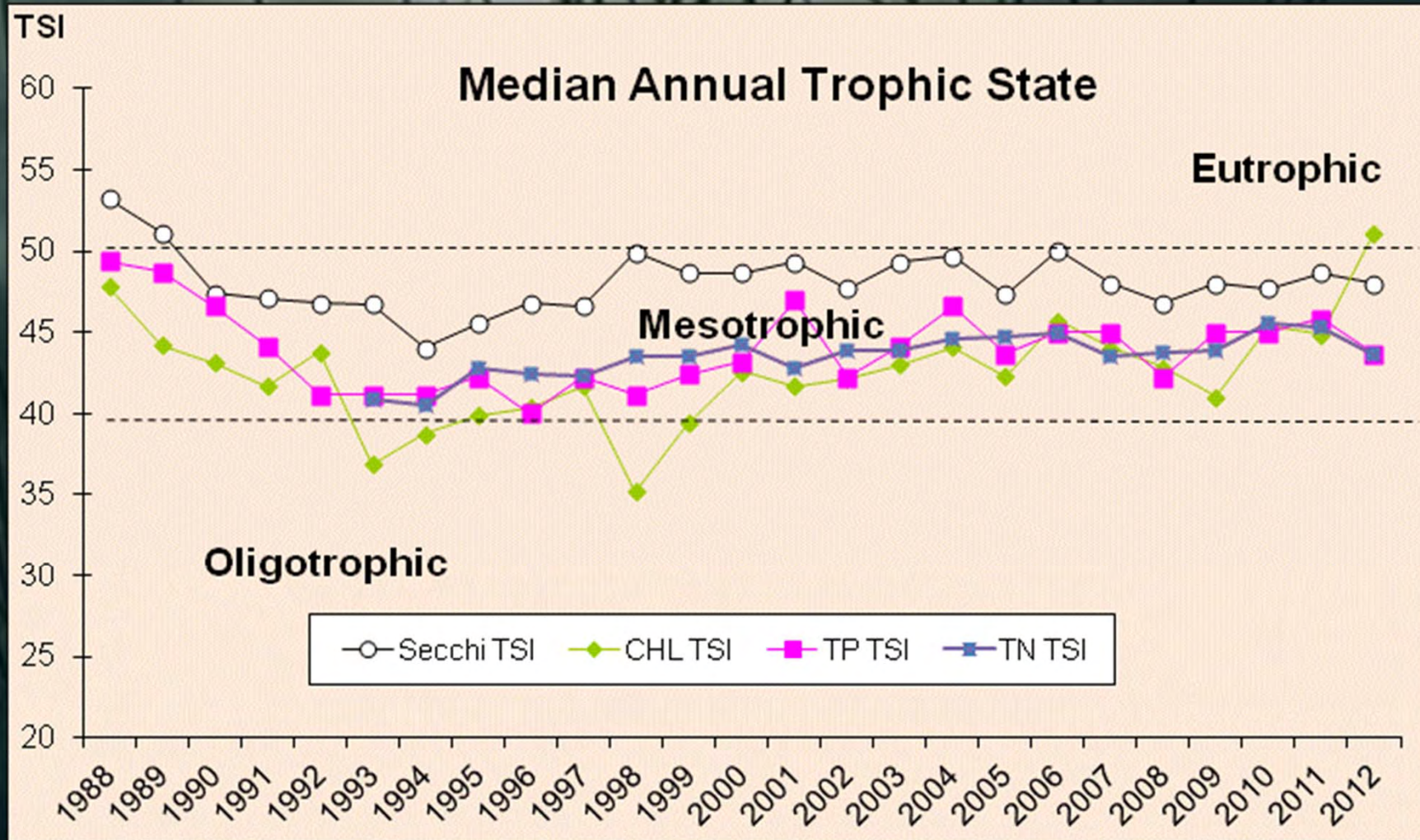
Total Phosphorus



Total Nitrogen

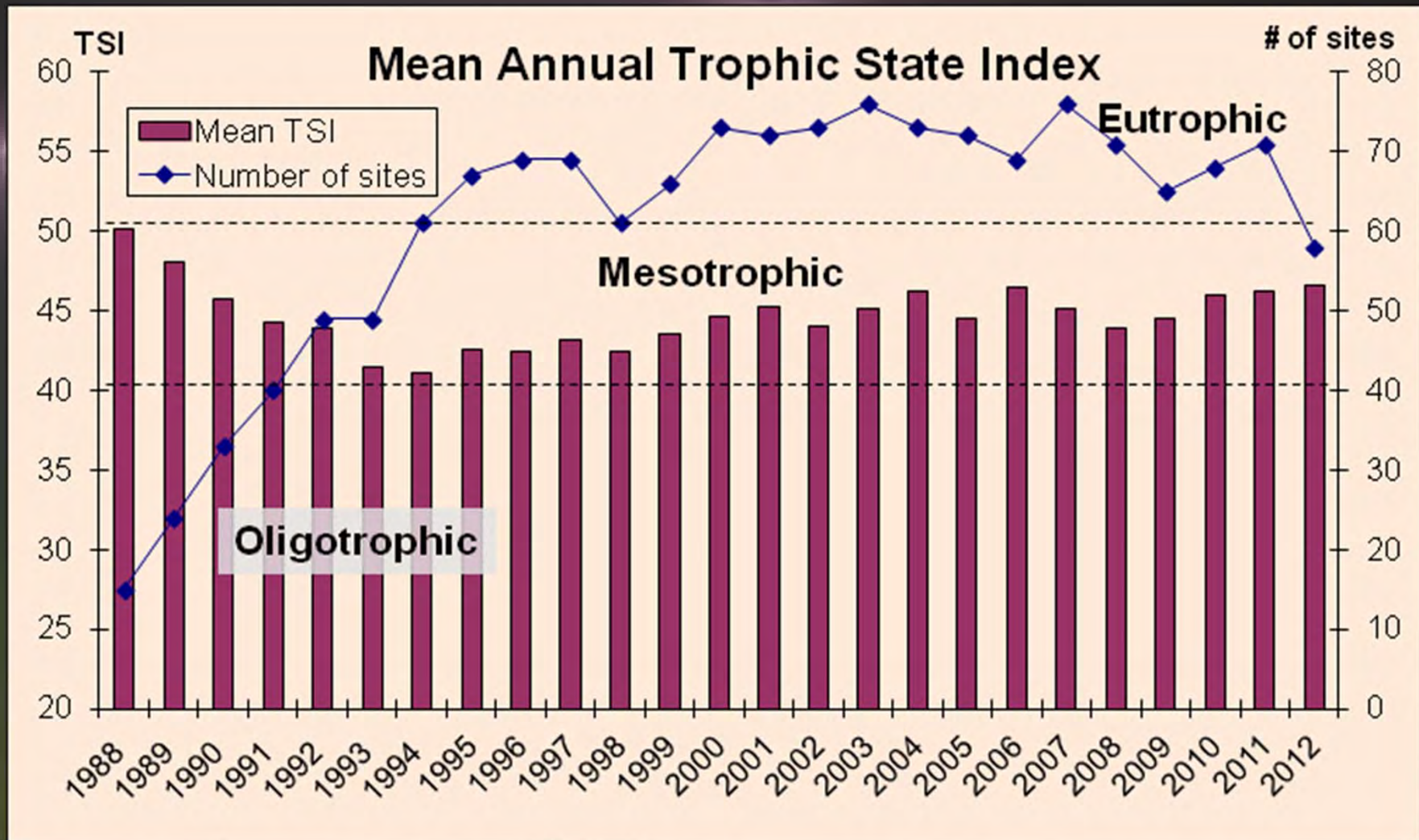


Trophic State Comparison



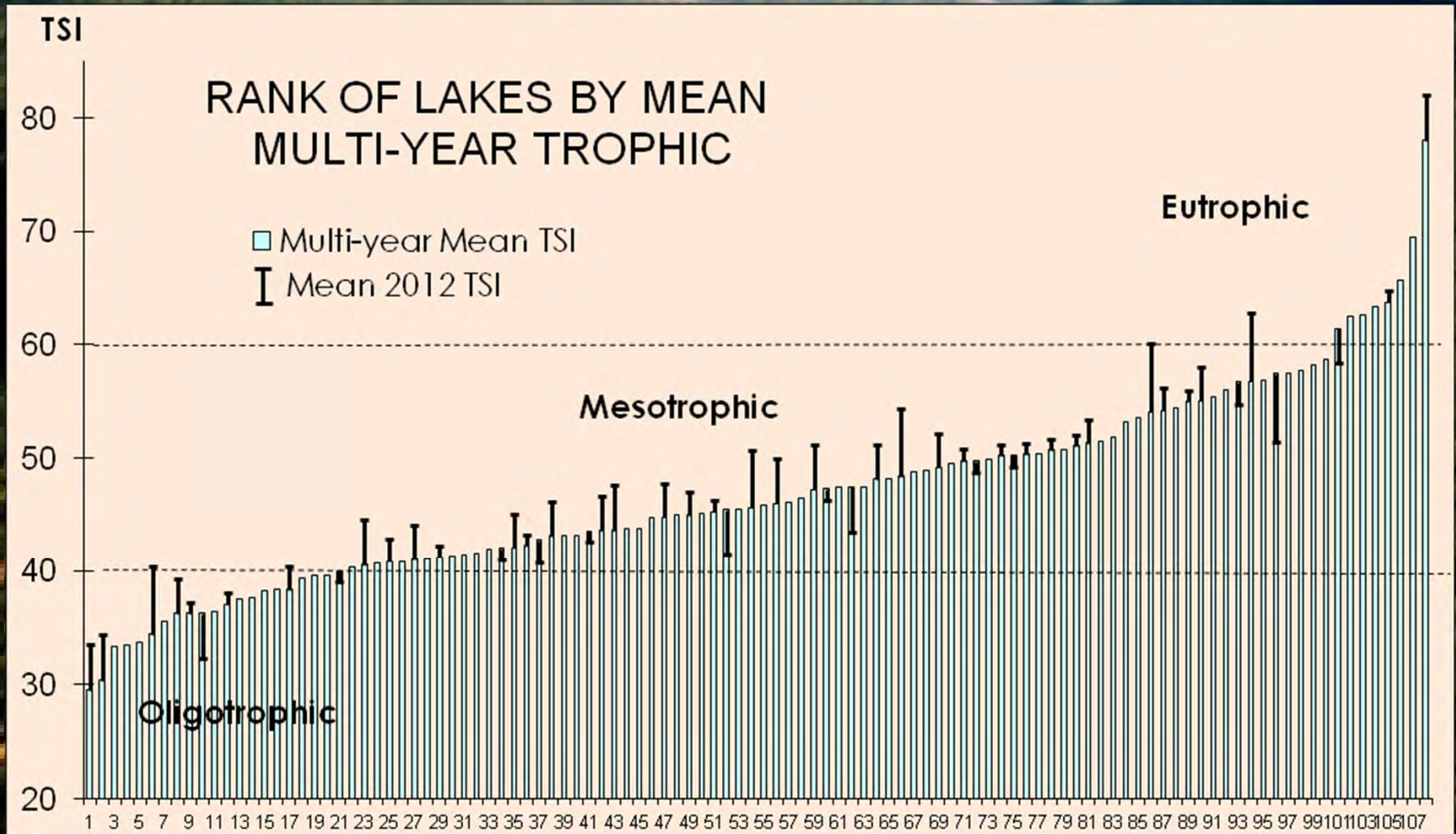
URIWW Locations with 3 or more years of data

Overall WQ Trends



URIWW Locations with 3 or more years of data

Lakes by Overall TSI



URIWW Locations with 3 or more years of data only



Other findings.....

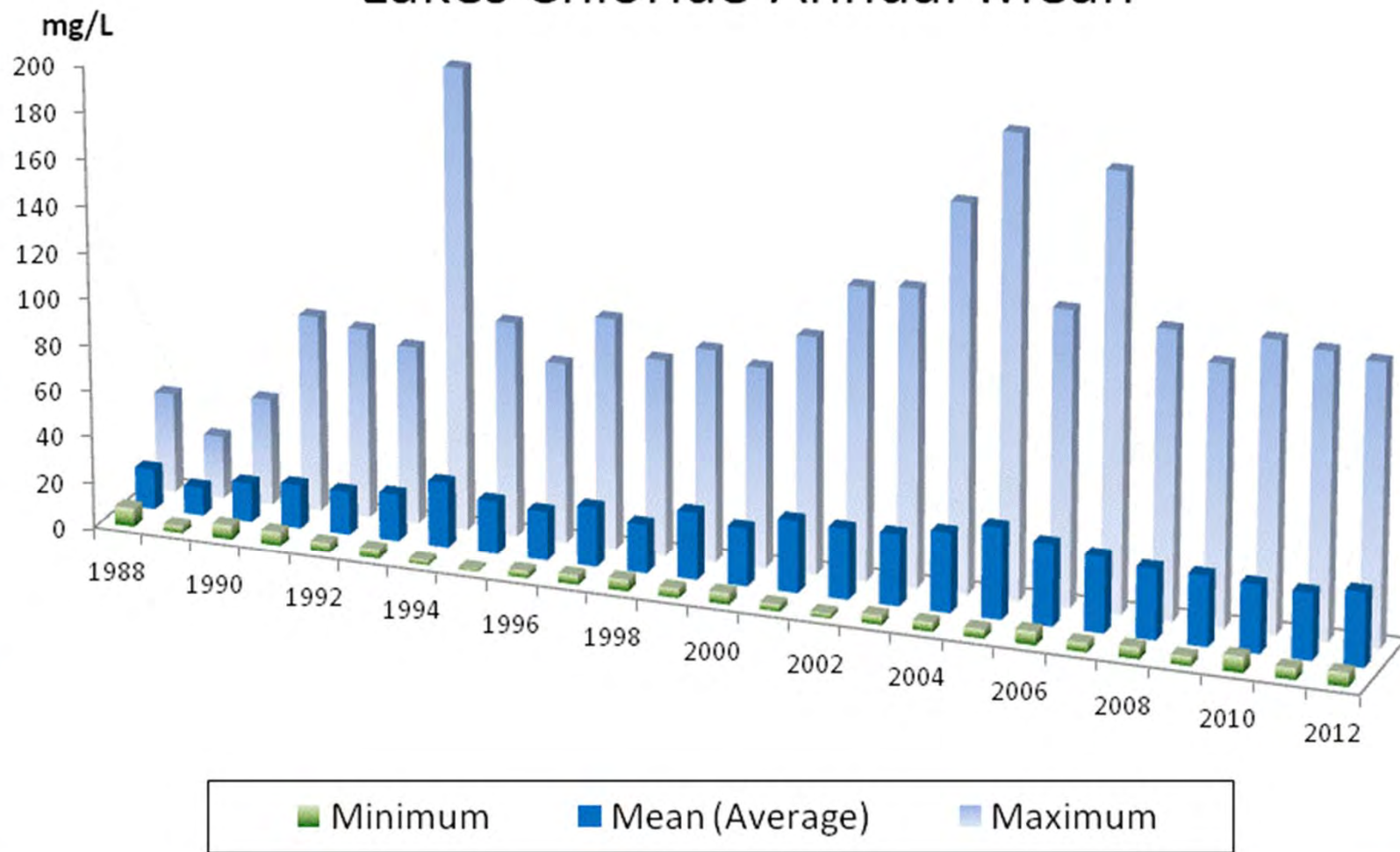
Bacteria

- Swimming areas generally good
- Rainfall increases bacteria levels beyond acceptable ranges
- Rural and urban watersheds

Watershed code	MONITORING LOCATION	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	GEOMEAN
		--- Most Probable Number of Enterococci per 100 mL ---						
A	Annaquatucket - Belleville @ RR Xing	232.4	165.8	150	60	274.8	84.4	141.6
NA	Buckeye Brook #1 @ Novelty Rd	82	6970	487	284	146	132	339.3
NA	Buckeye Brook #2 @ Lockwood Brk	185	857	1632.8	775	583	96	473.2
NA	Buckeye Brook #3 @ Warner Brook	170	3640	60	-	-	-	333.6
NA	Buckeye Brook #4 @ Mill Cove	-	6240	4155	498	435	-	1539.3
WD	Falls River D - Step Stone	22	31.2	285.1	66	59.8	69.7	61.4
WD	Falls River C - Austin Farm	14.8	68.3	144.5	118	117.9	30.6	63.0
WD	Falls River B - Sand Banks	29.2	75.4	200.5	201	95.9	22.2	75.7
WD	Falls River A - Twin Bridges	19.6	109.1	94.5	101	98.7	15	55.8
GB	GB #2 - Burger King	31	>2419.6	157.2	3106	399	17329	>795
GB	GB #3 - Pipe @ Rte 115	62	>2419.6	80.4	27	41	19863	>253
GB	GB #4 - Mill Creek	52	>401	448	394	272	1091	>320
GB	GB #5 - Hardig Upstream	63	3465.8	258.6	345	288	8664	604.1
GB	GB #6 - Tuscatucket Br	20.8	194.8	96.4	<2	30	47.2	21.9
GB	GB #7 - Southern Creek	132	1511.2	813	192	187	9804	620.4
A	Himes River	4	147.6	278.8	48.6	73.6	1918	102.0
H	HW #1A - Scrabbletown Brk @ Falls	12.6	83.1	251.8	120.4	186	1553	144.7
H	HW #1B - Scrabbletown @ Rte 4 Bridge	16.8	118.4	90.4	59	90	19865	163.3
H	HW #5 - Sandhill Brook (Saw Mill Inlet)	62	201.4	471.8	333	112	2005	275.8
H	HW #6 - Hunt River @ Forge Rd.	85	123.6	90.4	63	81	75	84.4
TH	Moosup Upstream	20	1445	100	551	1317	>24196	>608
TH	Moosup A - Fairbanks Bridge	40.2	1445	112.6	48	144.6	19863	310.4
TH	Moosup C - Deerfield Drive	21.8	885	91.4	51	76.6	7701	193.7
WD	Pawcatuck River @ Bradford	21.6	54.8	114.6	16.4	21.6	79.8	39.6
PA	Pawtuxet River - near Rhodes	97	840	94	43.6	10	32	68.9
WD	Queen River @ Locke Brk	6.2	-	40.6	-	-	-	15.9
WD	Queen River @ Sherman Brk	<2	118.4	1454	215.2	143.4	-	63.9
WD	Shickasheen Brook @ Rte 2	135.4	DRY	DRY	26.8	48.4	4839	170.7
WD	Shickasheen @ Miskiania Road	11.9	22.2	437.4	167.8	-	10	45.8
WD	Shickasheen @ Barber Pond Outlet	109.1	4.2	3.1	8.7	25.3	<2	6.3
WD	Shickasheen Brook @ Rte 138	74.6	200.5	176	50	258	31	101
WD	Shickasheen Brook @ Liberty Lane	43.2	47.8	215.4	64.6	96.4	73	76.6
WD	White Horn Brook @ Bike Trail	52	28.8	305	32.4	30	53.9	53.7
WD	White Horn Brook @ Ministerial Rd.	31	42.9	556	84.5	31	98.5	75.9
WO	Woonasquatucket R. @ Greystone Pnd	86	380	305	15	62	857	141
WO	Woonasquatucket River @ Donigian	161	429	520	54.4	231	>9678	>404
WO	Woonasquatucket River @ Waterplace	30	697	6488	161.8	216	19863	675
GB	GrBay #6 - Ponaug Marina	120	486	41	226	99	551	176
GB	GrBay #13 - EG Town Dock	42	<10	30	10	30	124	19
WD	Pawcatuck River - North of WWTP	111	64	42	<10	-	<10	23
WD	Pawcatuck River - South of WWTP	99	20	<10	10	-	20	13
WD	Pawcatuck River - At the Mouth	64	<10	<10	<10	-	344	<10
SK	Sapowet Marsh #1	>2005	327	345	171	-	10	>208
SK	Sapowet Marsh #2	>2005	52	<10	10	-	88	>39
SK	Sapowet Tributary #1	-	-	2489	-	-	-	-
SK	Sapowet Tributary #2	-	-	5475	3130	-	-	4140
NA	Wickford Cove - West of Loop Dr	<10	10	127	Lab error	20	406	25
NA	Wickford Cove - East of Loop Dr	<10	10	99	Lab error	10	124	17

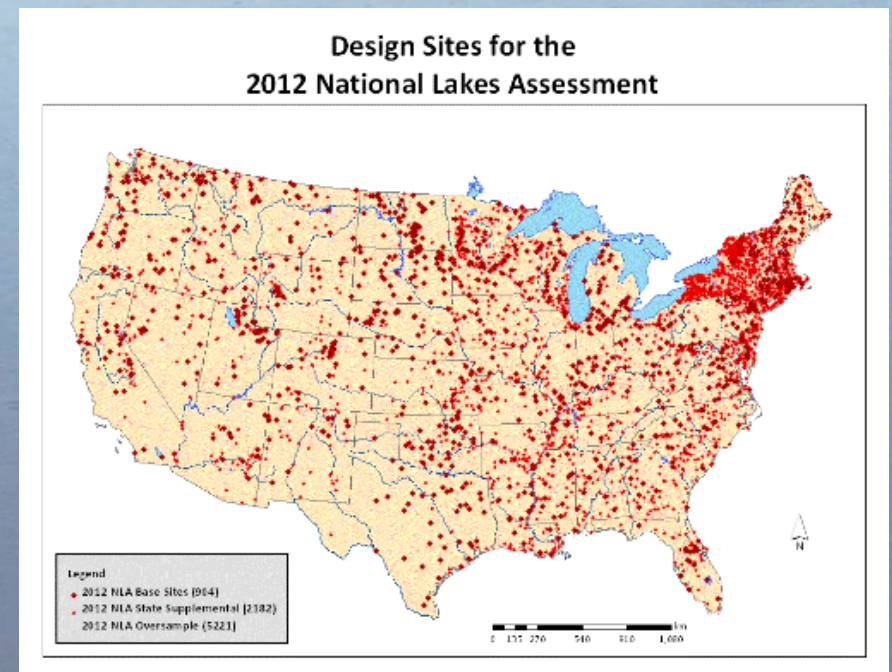
Chlorides

Lakes Chloride Annual Mean



How Does URIWW Data Compare??

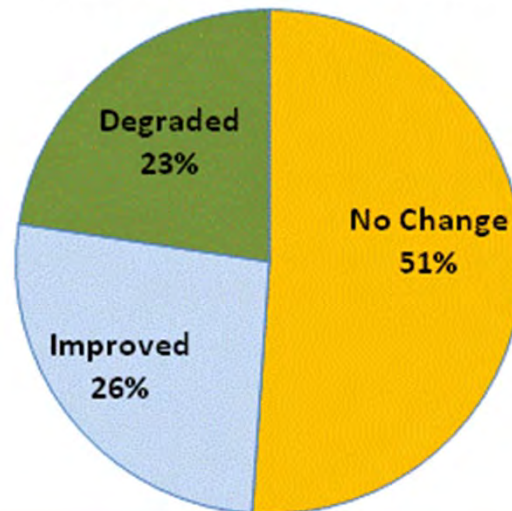
- National Lakes Assessment
- Statistical approach, assesses randomly selected locations
- Nationally consistent methods
- 5 year rotating cycle
- 2007, 2012
- Other water systems similar approach



2007 NLA compared 1972 NES

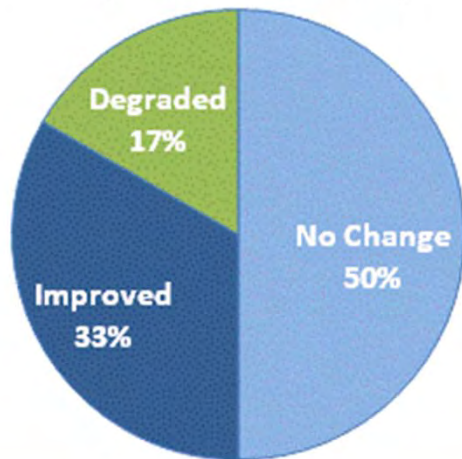
- National Eutrophication Survey
- Information of nutrient sources, concentrations, and impacts to lakes

Change in Trophic State (Chlorophyll *a*)
NES Lakes (1972 vs 2007)

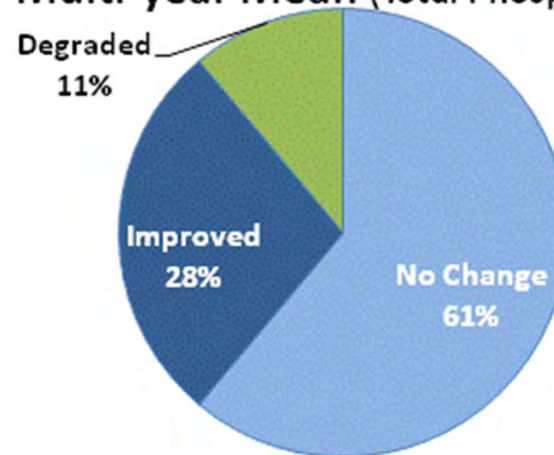


How Does URIWW Data Compare?

Change in Trophic State 1988/89 - 2007
(Total Phosphorus)



Change in Trophic State 1988/89 - Multi-year Mean (Total Phosphorus)

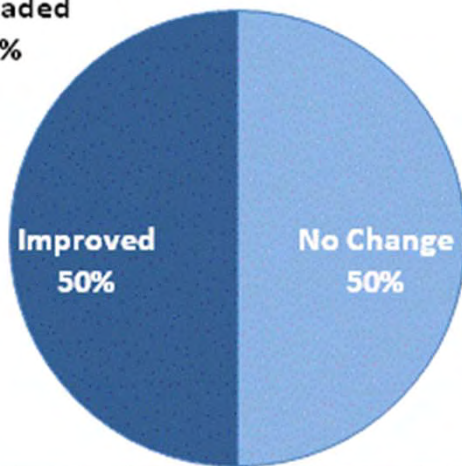


Chlorophyll TSI Comparison

Change in Trophic State 1988/89 - 2007

(Chlorophyll *a*)

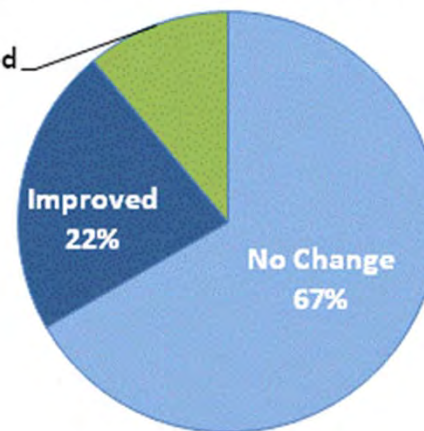
Degraded
0%



Change in Trophic State 1988/89 -

Multi-year Mean (Chlorophyll *a*)

Degraded
11%



URIWW Parameters

Field

- Secchi Depth
- Water Temperature
- Dissolved Oxygen
- Chl. - a Processing

Laboratory

- pH
- Alkalinity
- Total & Dissolved Phosphorus
- Total, nitrate and ammonium nitrogen
- Chlorophyll - a
- Chlorides
- Bacteria

Way too much information and too complex to summarize easily

Take Home Messages

- Bacteria levels after rainfall are high **EVERYWHERE** (urban drainages worse, but...)
- Algal blooms and water temperatures are increasing
- In general many of our waterways have been resilient – so far
- It's much more difficult to **RESTORE** than to **PROTECT**
- We **ALL** need to do our part