State of Oklahoma

OWRB

WATER RESOURCES BOARD

the water agency

Effects of Drought on Monitoring in Oklahoma

National Water Quality Monitoring Council Webinar Series

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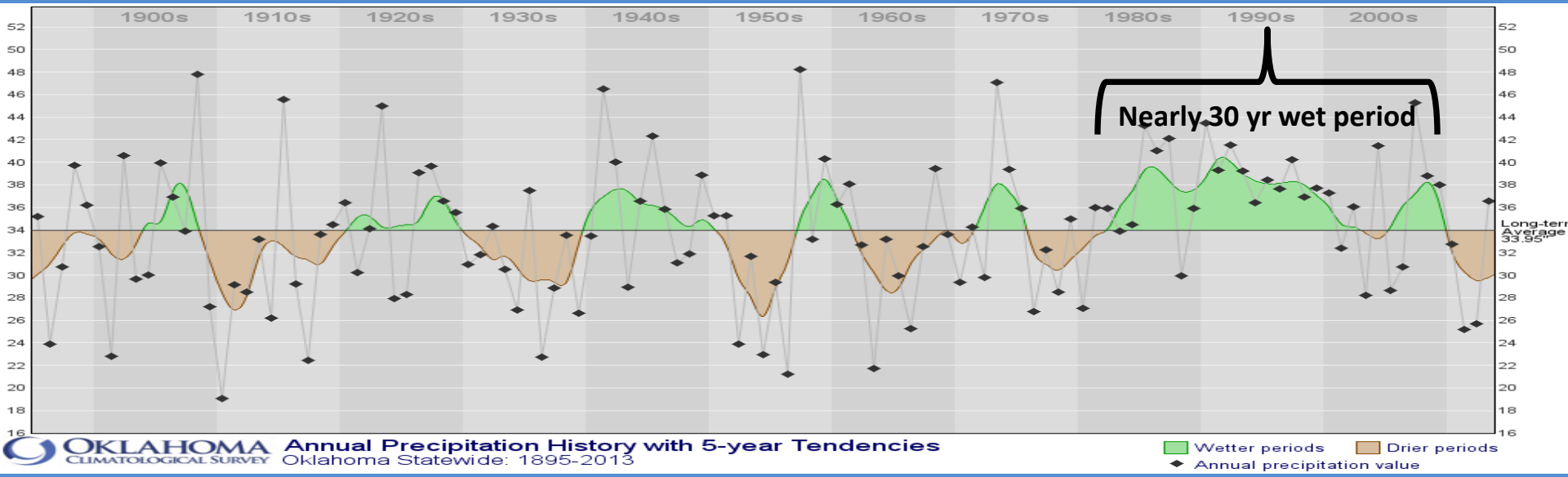
Monty Porter, Technical and Quality Manager

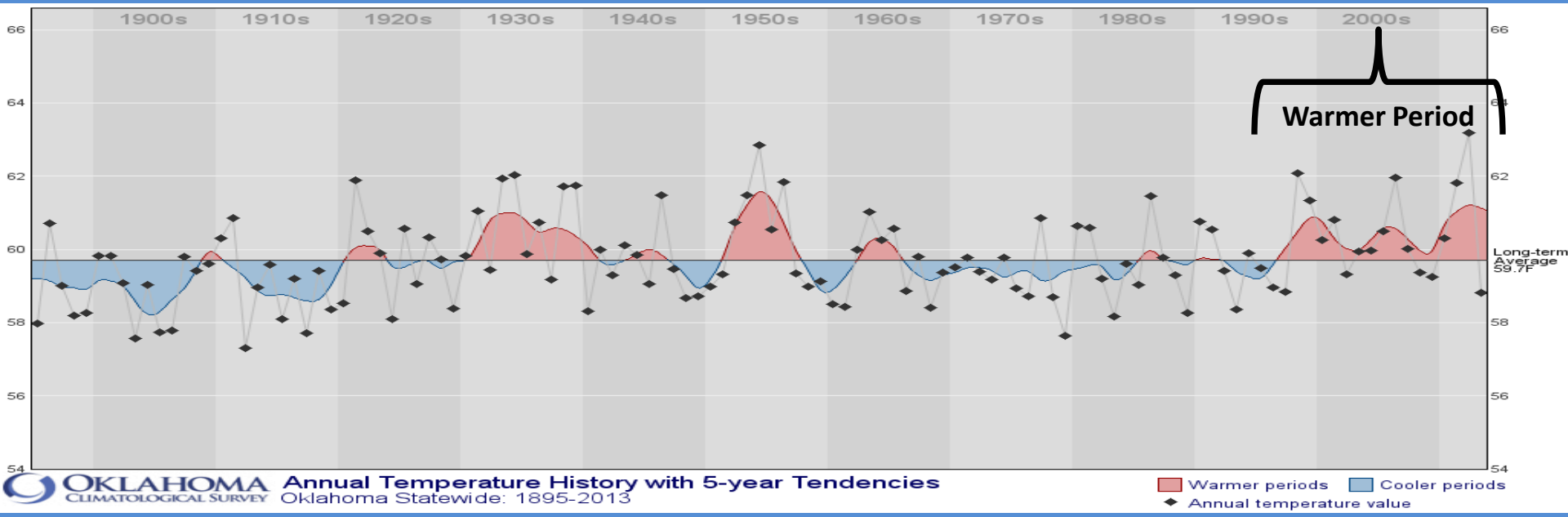
OWRB Water Quality Programs Division

Effects of Drought

- Persistent, chronic effects
- Periodic acute, toxic effects
- All uses affected
- Data Quality
  - Representative Data
  - Data Trends
  - Sampling Logistics

OK Annual & 5-year Tendencies (Precip and Temp)





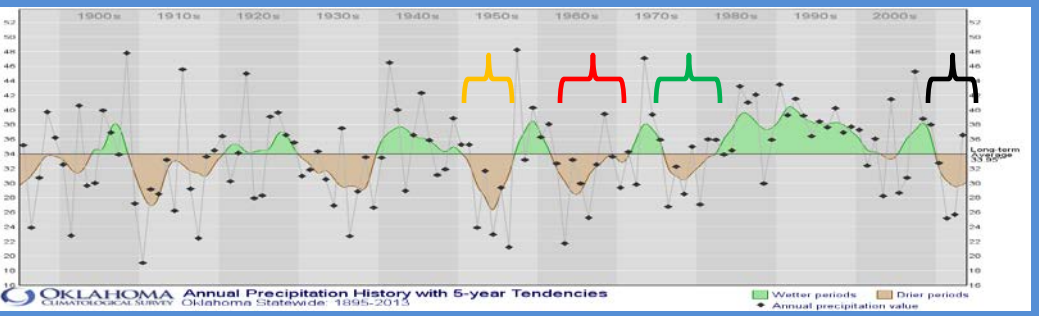
Representative Data

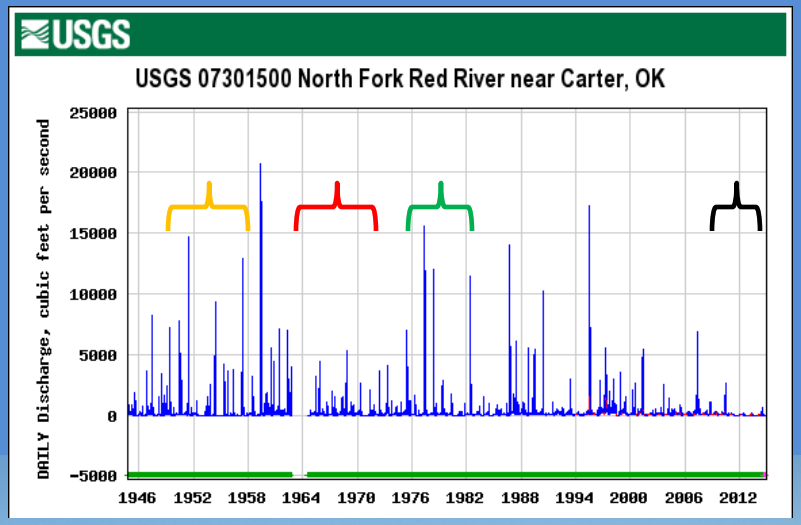
Persistent Hydrological Effects

Pooling vs. Flowing Water

Record Interruption

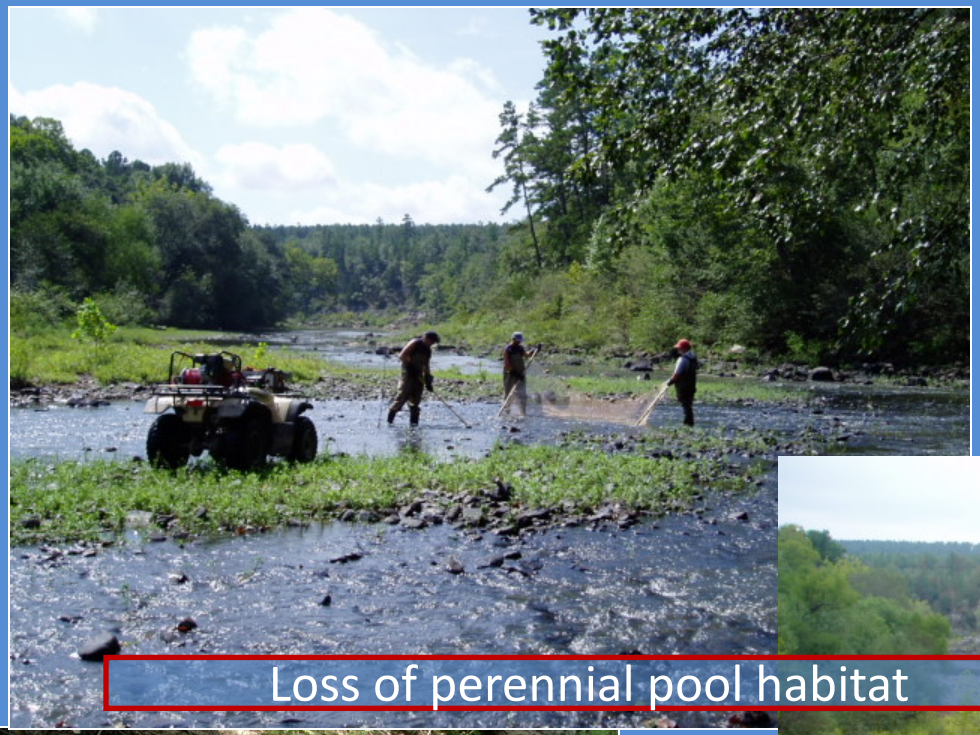
What is Perennial?



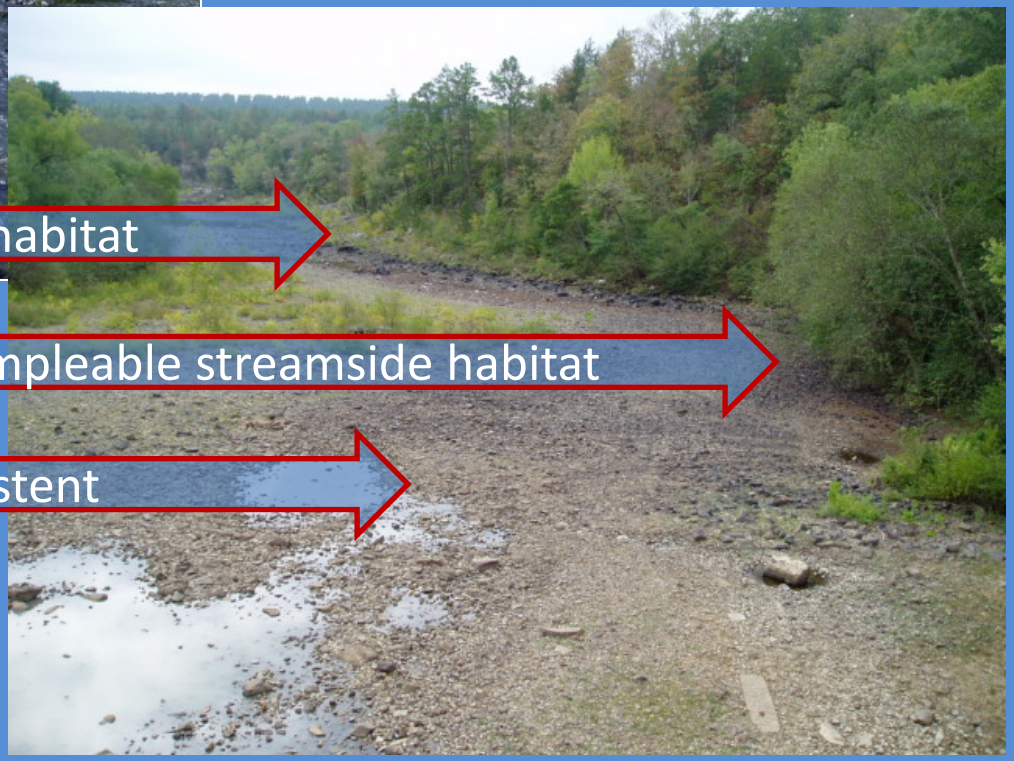


Loss or Degradation of Reference

Loss of Habitat



- Reference Site (Upper Little River)
- Typically Wetted
- High Gradient



Loss of perennial pool habitat

Loss of sampleable streamside habitat

Riffle habitat non-existent

Sample Locations Inaccessible

No access to lacustrine zone

Waterbody Inaccessible

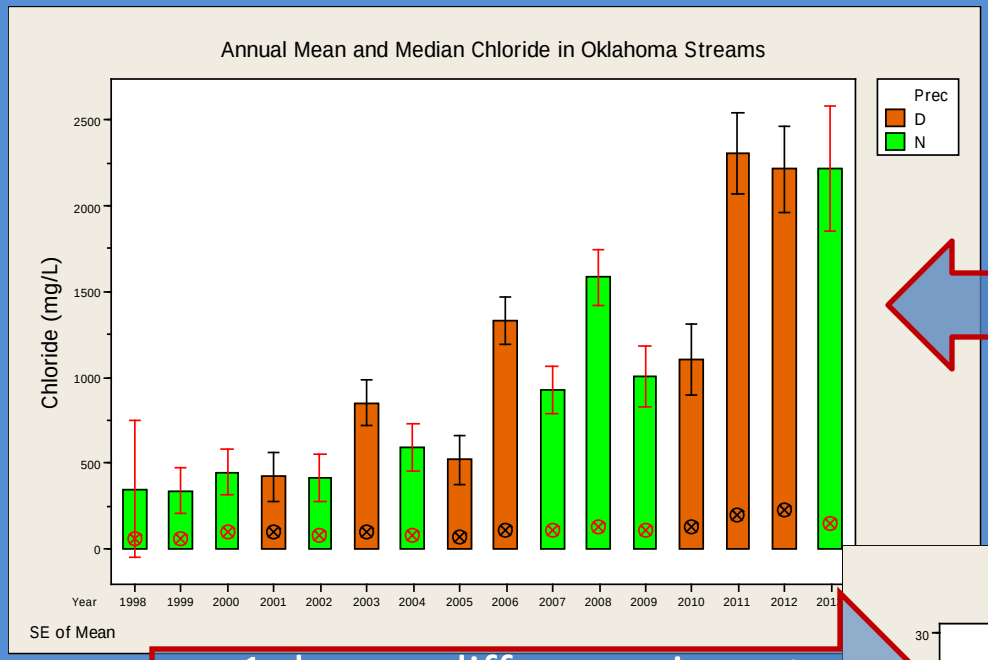
Watershed Disconnected

Deployed Instruments

- Loss of fidelity
- Sensors out of water
- Sedimentation
- Record Interruption

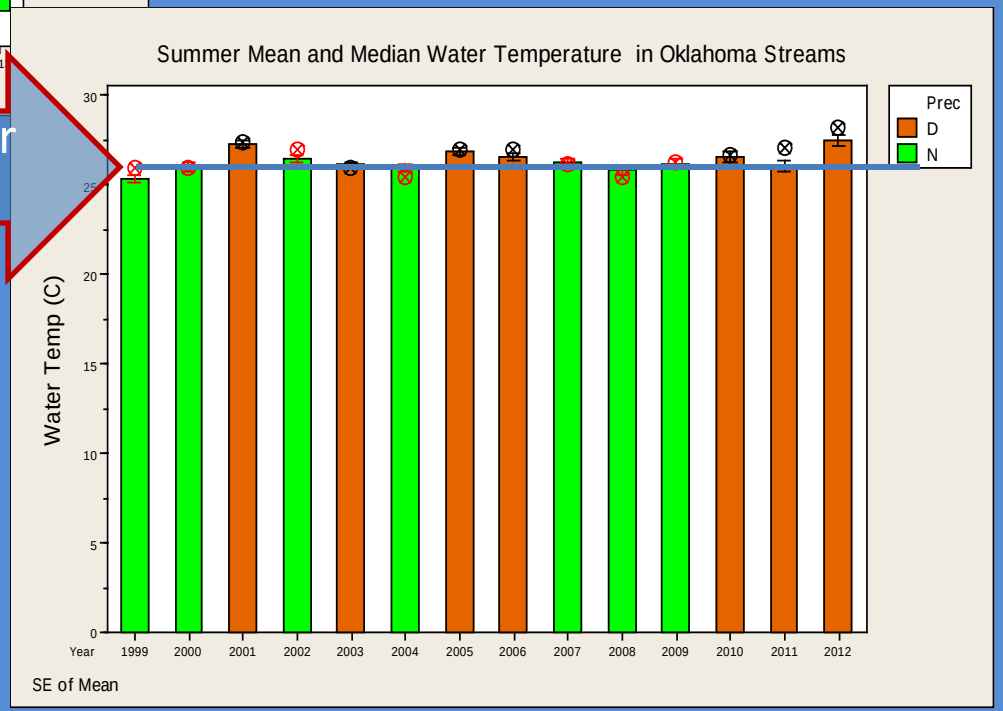
Data Trends

Data Trends

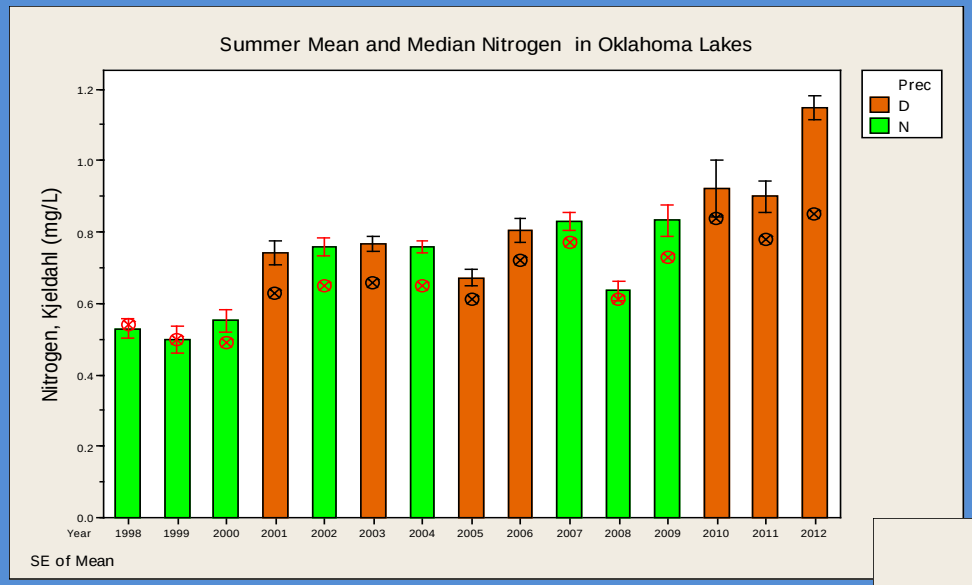


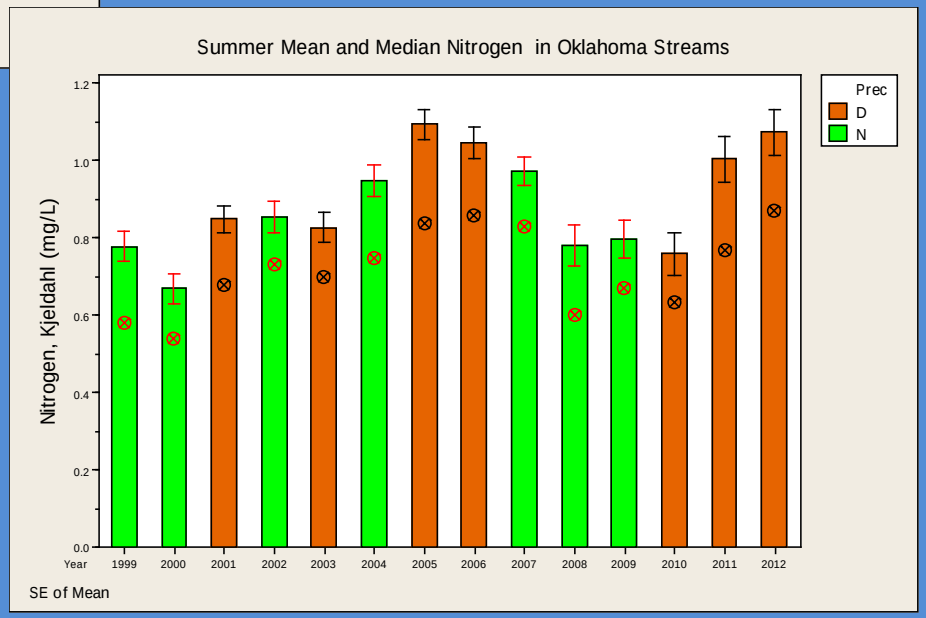
Steady upward trend—drought??

> 1 degree difference in water temperature



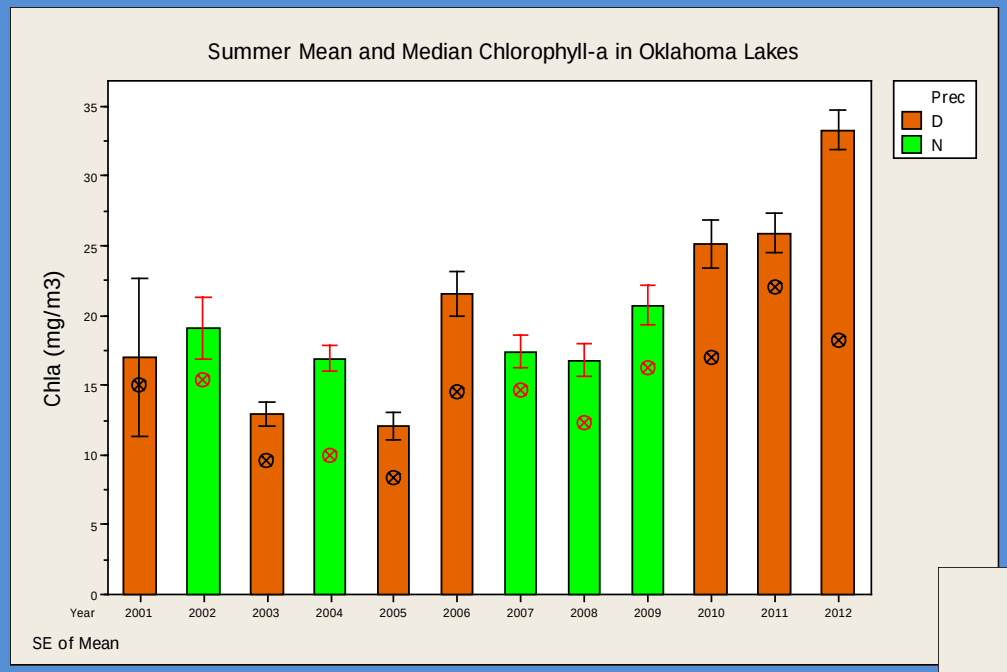
Data Trends

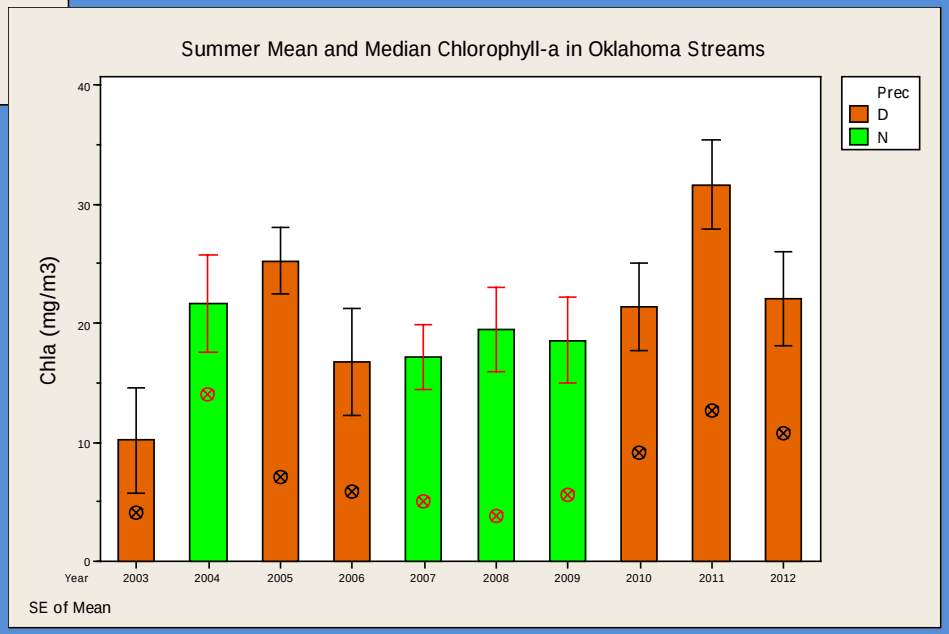




Notable relationship to drought in Summer

Data Trends





- Summer Chlorophyll-a data, in both Oklahoma lakes and streams, show a potentially strong relationship to drought

Stressor Trends Across Study Periods (% of flowing water miles in poor condition)

Indicator/Stressor	Wet 2008-09 %Poor	Dry 2010-11 %Poor	Trend	Large %Poor	Small %Poor	Change
Conductivity_ECO	10.6%	21.4%	↑	38.5%	5.5%	**
Conductivity_NRSA	16.7%	22.7%	↑	55.0%	5.1%	**
TN_ECO	23.4%	37.5%	↑	40.3%	24.1%	**
TN_NRSA	12.2%	22.3%	↑	31.3%	10.1%	**
TP_ECO	40.7%	36.9%	↓	73.8%	26.2%	**
TP_NRSA	31.0%	40.1%	↑	76.4%	18.3%	**
Turbidity_ECO	11.5%	26.6%	↑**	36.9%	9.5%	**
Sediment	15.8%	51.3%	↑**	34.9%	26.2%	NS

Indicator Trends Across Study Periods (% of flowing water miles in poor condition)

Indicator/Stressor	2008-09 %Poor	2010-11 %Poor	Trend	Large %Poor	Small %Poor	Change
Fish	43.9%	21.7%	↓**	50.1%	30.4%	**
Macroinvertebrate	40.6%	25.7%	↓	62.3%	24.7%	**
Benthic Algae	3.7%	21.3%	↑**	21.7%	5.9%	**
Sestonic Algae	18.2%	28.3%	↑	60.6%	6.8%	**

All Uses Are Affected

Supply Canal between Shawnee Twin Lakes (large municipality)

Water Supply

Consumptive vs. Environmental vs. Recreational Use

Hefner Lake (OKC Water Supply)

Consumptive vs. Environmental vs. Recreational Use

Lugert-Altus Reservoir—water rights owned by local irrigation district

Questions?