

WATER QUALITY ANALYSIS

LAKE WENTWORTH & CRESCENT LAKE

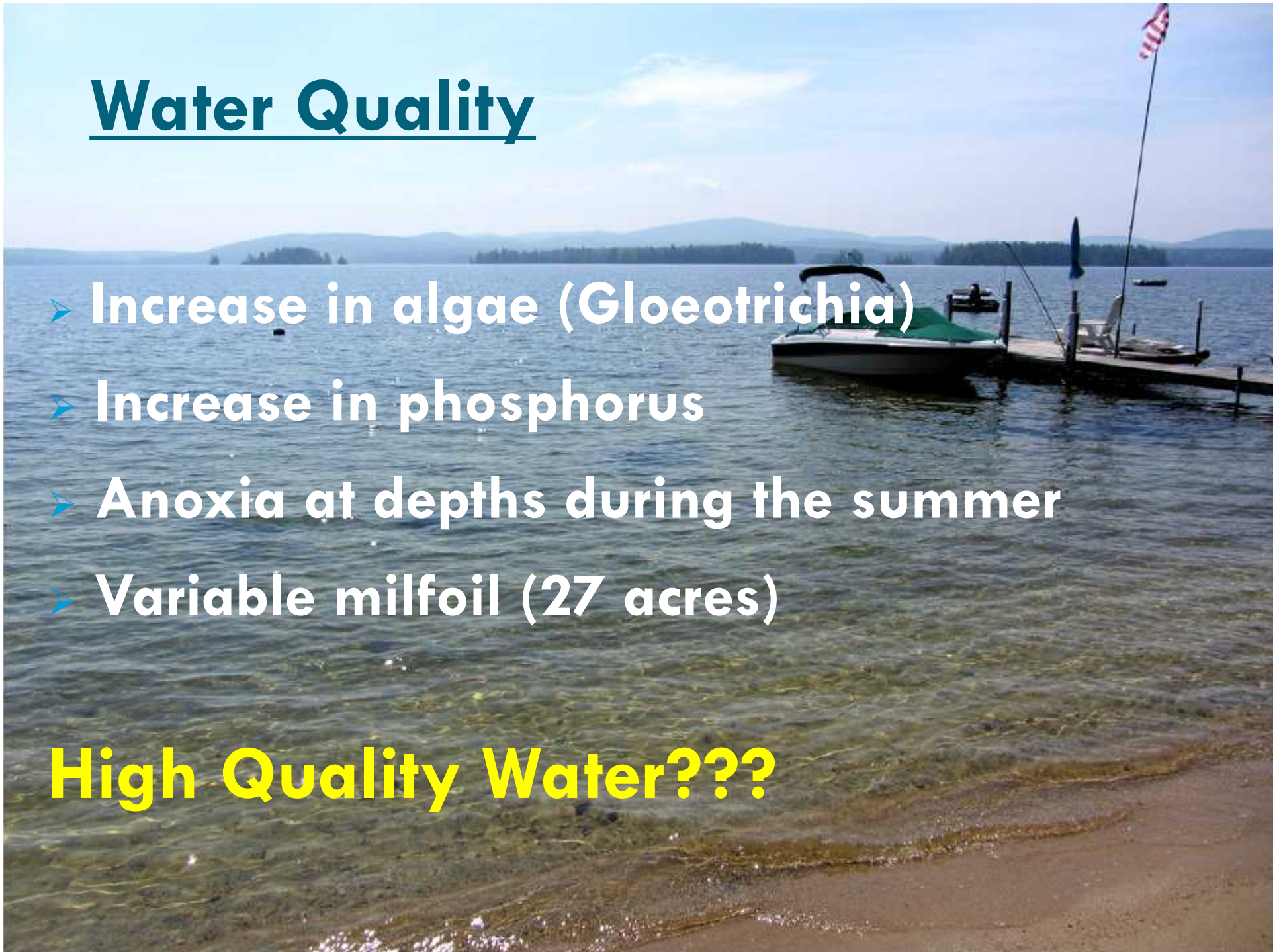


Jennifer Jespersen, FB Environmental

Water Quality

- Increase in algae (*Gloeotrichia*)
- Increase in phosphorus
- Anoxia at depths during the summer
- Variable milfoil (27 acres)

High Quality Water???



WQ Analysis & Setting WQ Goals



WQ DATA SOURCES



Multiple Sources:

- NH DES Trophic Reports
 - NH Volunteer Lake Assessment Program (VLAP)
 - UNH Center for Freshwater Biology (CFB)
 - UNH Lakes Lay Monitoring Program (LLMP)
- ❖ *Not all sources had data available for all years*

DATA OUTPUT

Focus on 5 Parameters:

- 1) Secchi Disk Transparency
- 2) Total Phosphorus
- 3) Chlorophyll-a
- 4) Color
- 5) Dissolved Oxygen

- ❖ *Annual (Seasonal) Averages (May- Sept.)*
- ❖ *Deepest Sampling Location*

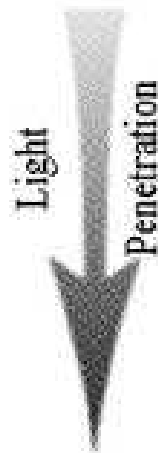


Water Clarity

- ❑ Measured with a Secchi disk
- ❑ Characterize existing water quality
- ❑ Track long-term trends



Clear lake having a small algal population results in a deep SDT reading, high clarity



Turbid lake having large algal population results in shallow SDT reading, low clarity



Photo:
Maine VLMP

Total Phosphorus & Chlorophyll-a

- ❑ **Total Phosphorus**: Major nutrient needed for plant growth. Present in small amount in lakes. Excess phosphorus can lead to algal blooms.
- ❑ **Chl-a**: Measure of the amount of algae growing in the lake.



Color & Dissolved Oxygen (DO)

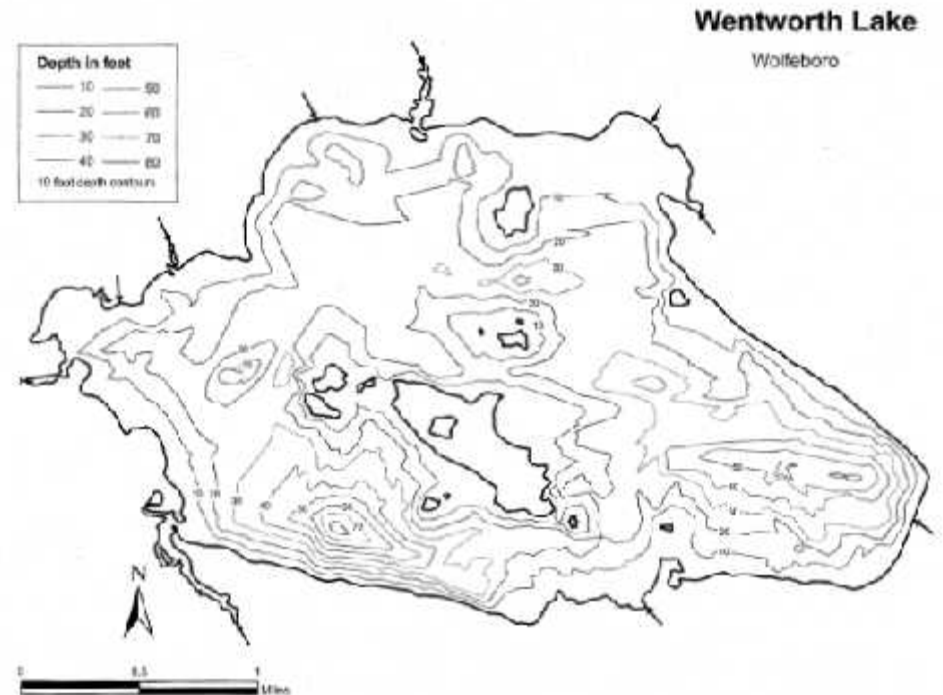
- ❑ **Dissolved Oxygen:** Measure of the amount of oxygen in the water column.
- ❑ **Color:** Natural color measures the concentration of humic acids in lake water.



LAKE WENTWORTH

Lake Characteristics

- 3,018 acres (1,221 ha)
- Mean Depth= 21 ft (6.4 m)
- Max Depth = 83 ft (25.3 m)
- Flushing Rate= 0.7
- Flows to Crescent Lake via Smith River

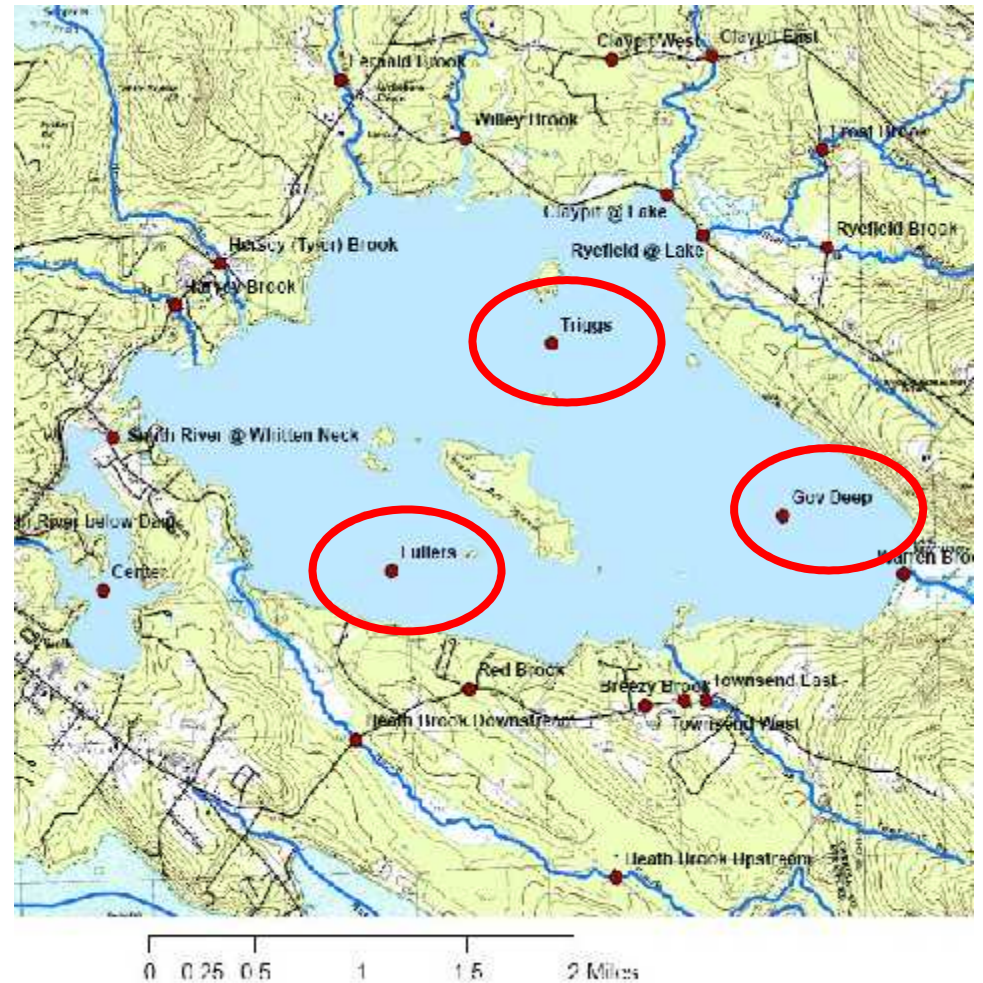


LAKE WENTWORTH

Data from 1975-2011

- 29 yrs SDT
- 26 yrs TP (19 EC)
- 29 yrs Chl-a

- ❖ *Trophic Class = Oligotrophic*
- ❖ *Impaired for pH & exotic plants*



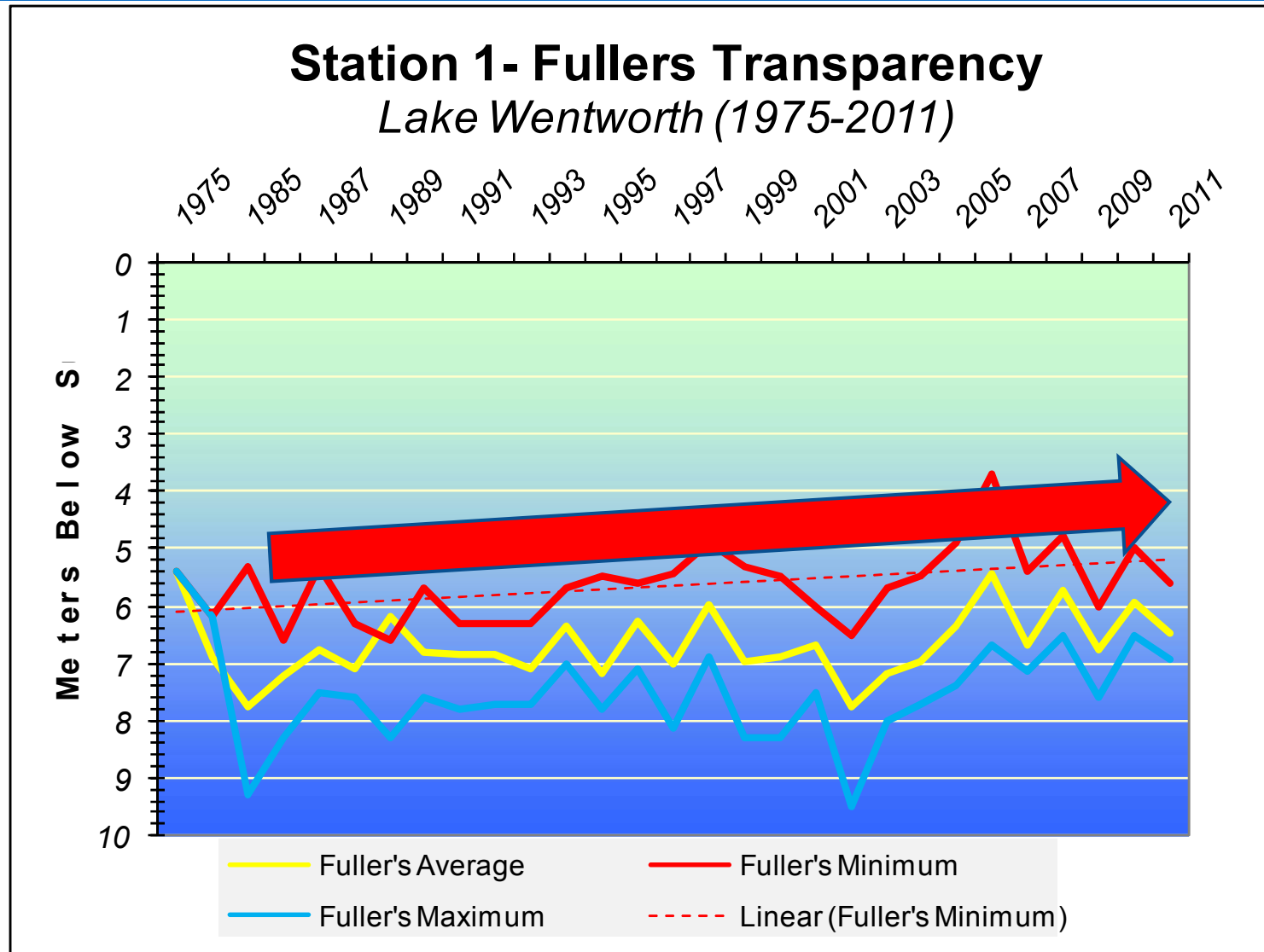
Water Clarity- LAKE WENTWORTH

Water Clarity

Secchi
range
from
3.7 to
9.5 m

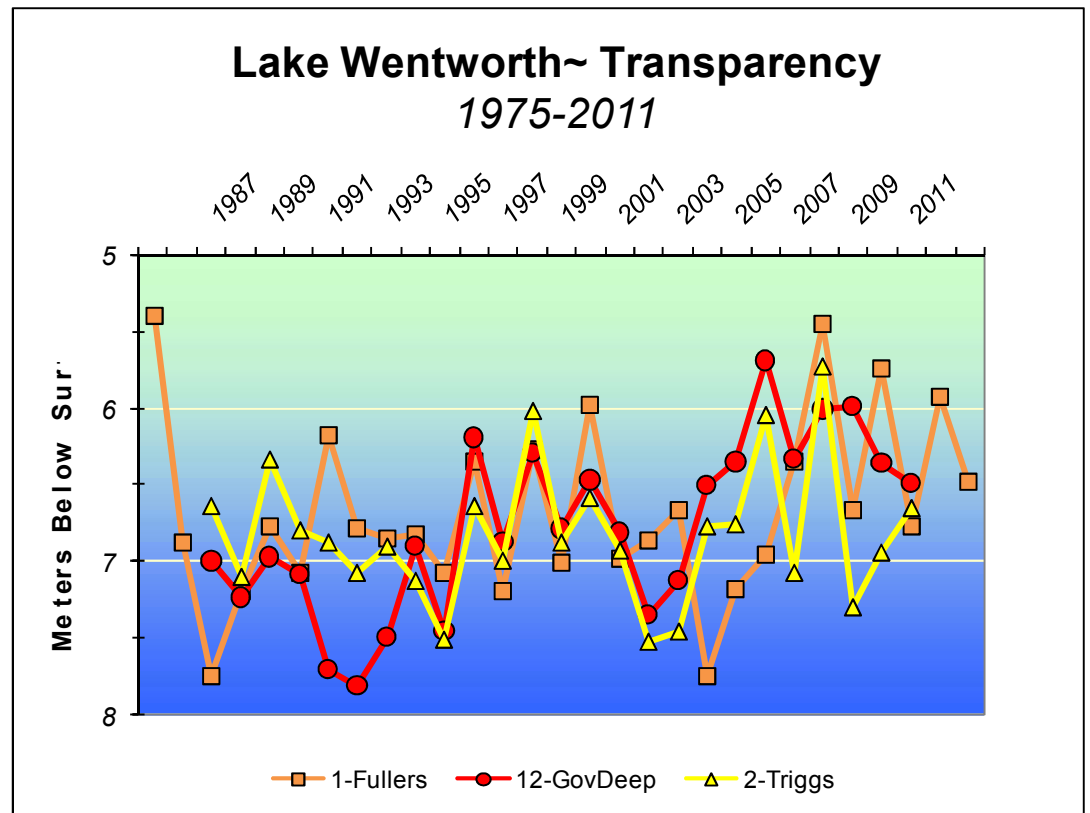
Average =
6.7 m
(22 ft)

Trend =
slight
decline



LAKE WENTWORTH

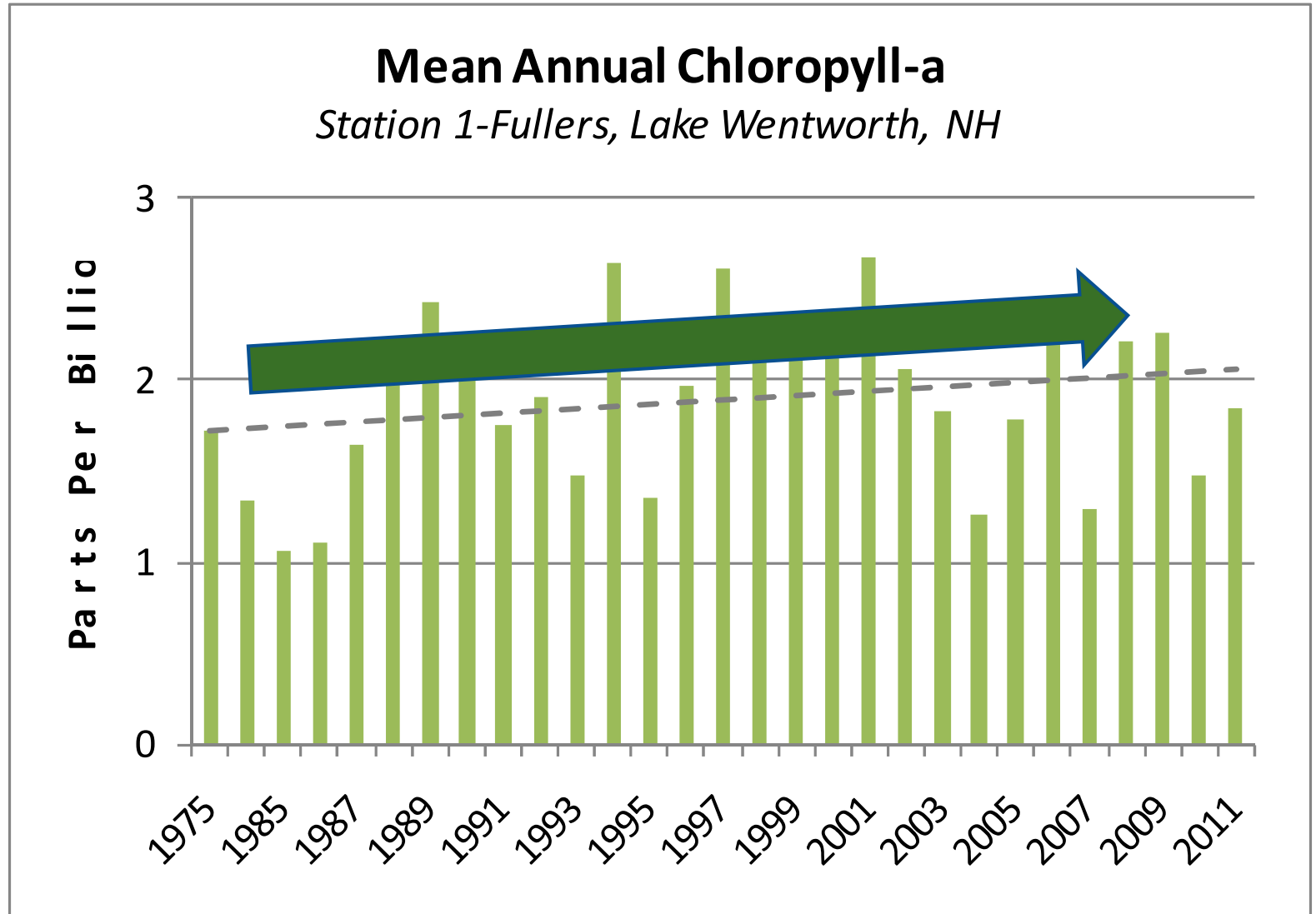
- Similarities between stations over long-term
- Some variability between stations on same year
- Triggs only station with neutral trend, other 2 stations declining



Chlorophyll-a- LAKE WENTWORTH

Chlorophyll-a

- Chl-a range from 0.4 to 12.6
- Average = 1.9 ppb
- Trend = increasing



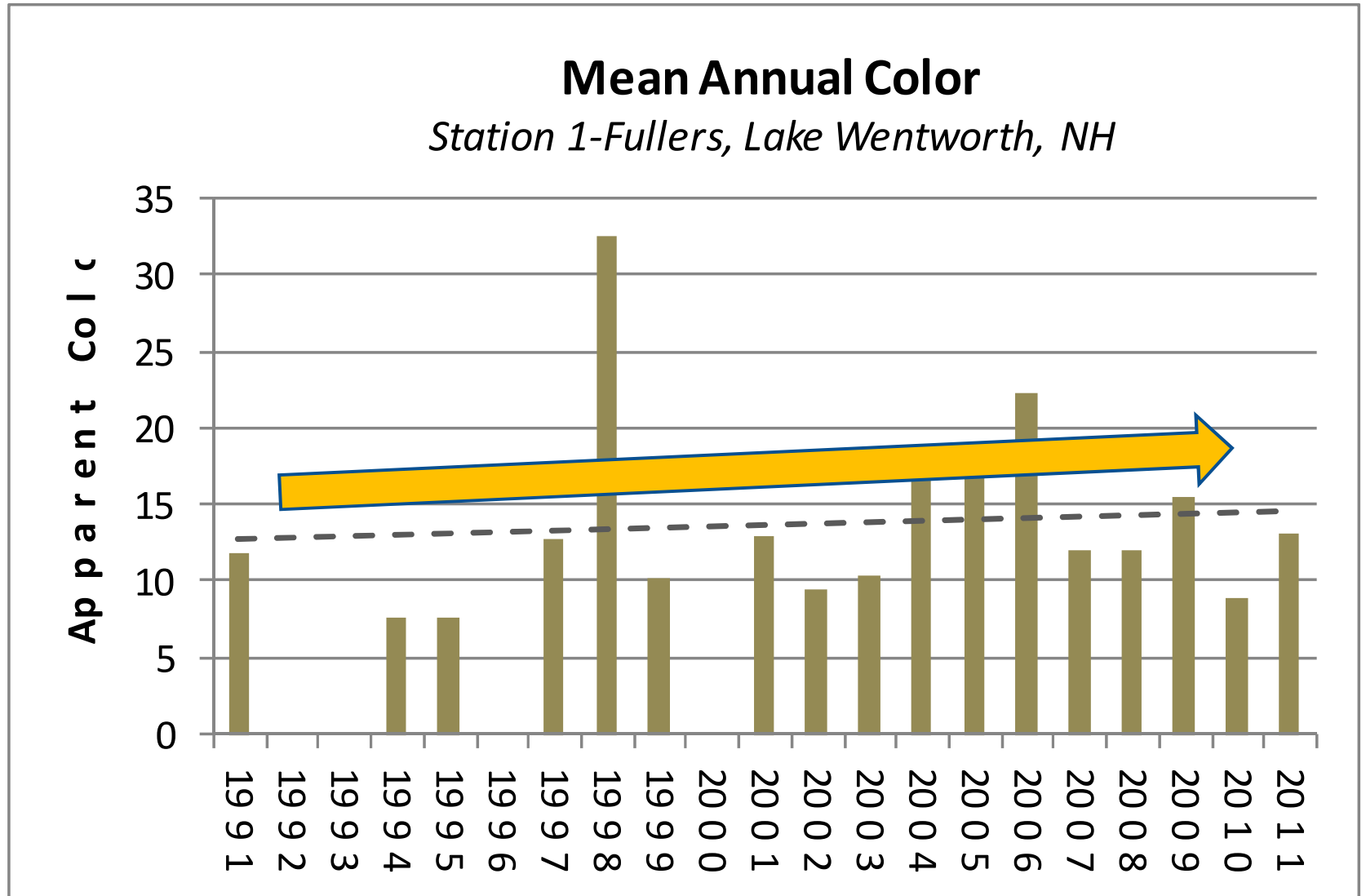
LAKE WENTWORTH

Color

Color range
from 7.7 to
32.6 CPU

Average = 13.9
CPU

Trend =
increasing



Dissolved Oxygen- LAKE WENTWORTH

Dissolved Oxygen

- ✓ DO depletion below 10m
- ✓ Potential for P release high
- ✓ Stress coldwater fish



Citation: BetterCartoon.com

Lake Nutrient Criteria

NH Criteria for Oligotrophic Lakes:

- Nutrient Indicator: Phosphorus < 8 ppb
- Response Indicator: Chlorophyll-a < 3.3 ppb

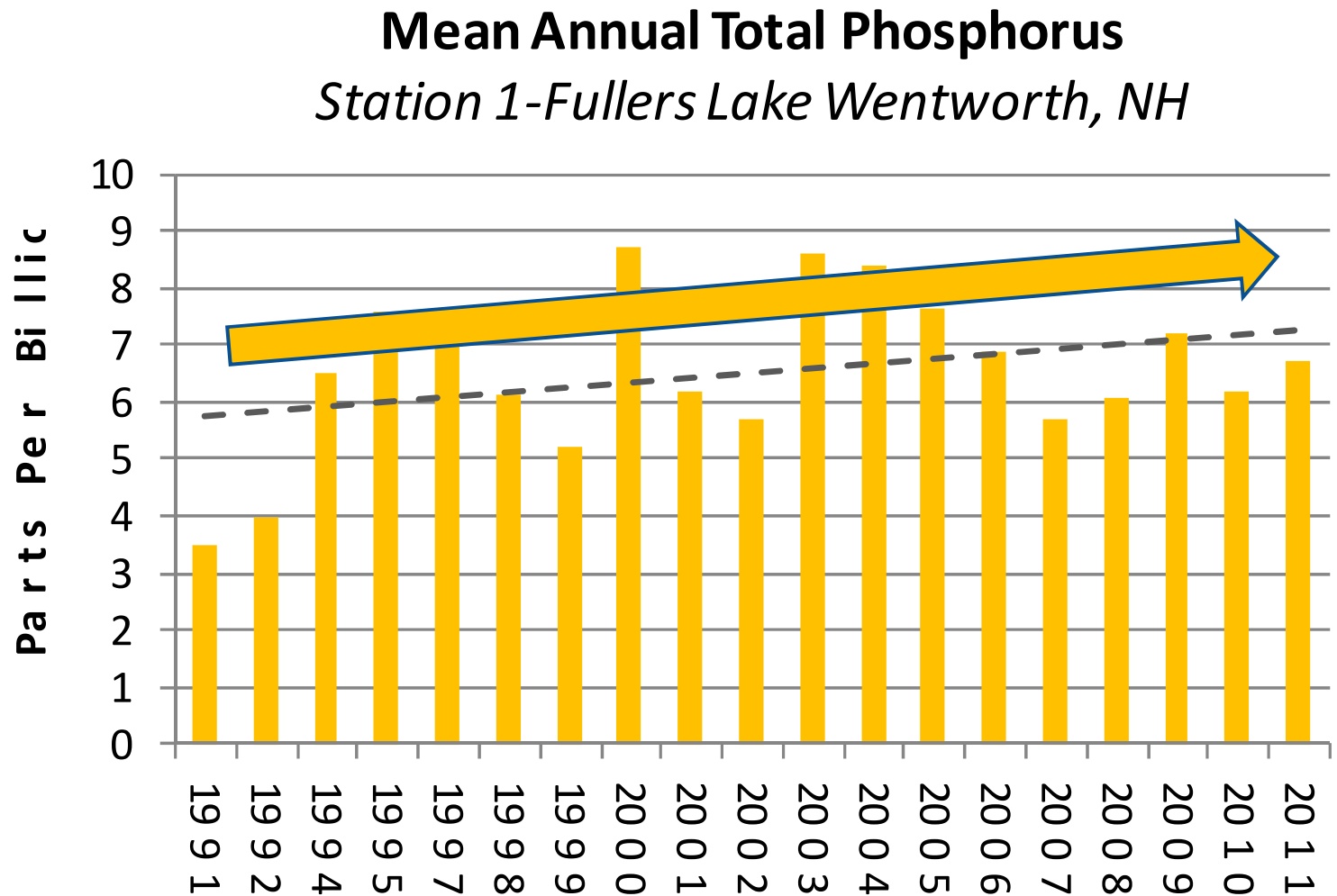
Total Phosphorus- LAKE WENTWORTH

Total Phosphorus

TP EC range from
3.2 to 11.5 ppb

Average (median)=
6.7 ppb

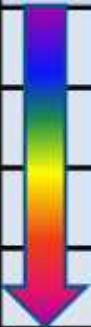
Trend = increasing



LAKE WENTWORTH

Water Quality Summary- Lake Wentworth

WQ Parameter	Fullers- 1
<i>Mean Secchi (m)</i>	*6.7
<i>Mean Color (PCU)</i>	*13.9
<i>Mean Chl_a (ppb)</i>	*1.9
<i>Median TP</i>	*6.7
<i>DO Trends</i>	Late Summer Anoxia



** indicates declining trend over time*

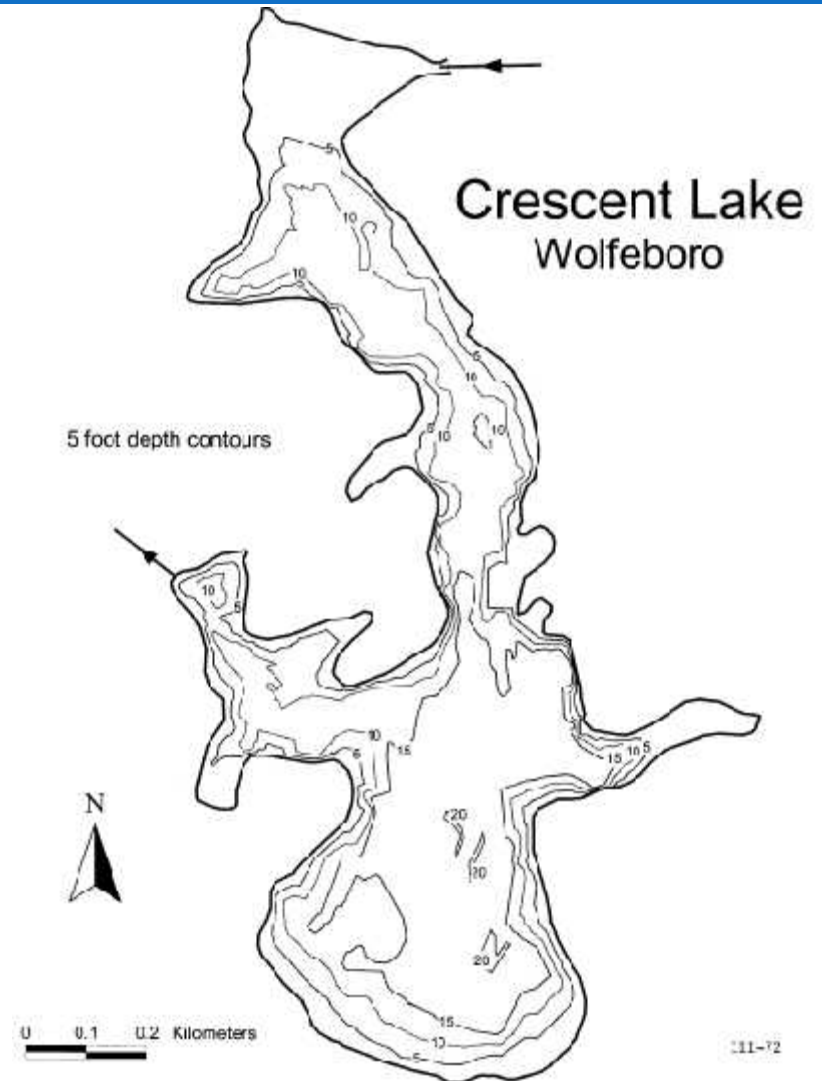
Summary

- Declining water quality trend for all parameters
- Low Dissolved Oxygen

CRESCENT LAKE

Lake Characteristics

- 148 acres (60 ha)
- Mean Depth= 9.8 ft (3m)
- Max Depth = 21 ft (6.4 m)
- Flushing Rate= 31
- Flows to Winnepesaukee



CRESCENT LAKE

Data from 1984-2011

- 27 yrs SDT
 - 22 yrs TP
 - 27 yrs Chl-a
 - 25 yrs Color
 - 7 yrs DO
-
- ❖ *Trophic Class = Oligotrophic*
 - ❖ *Weakly stratified*
 - ❖ *Invasive Aquatic Plants*

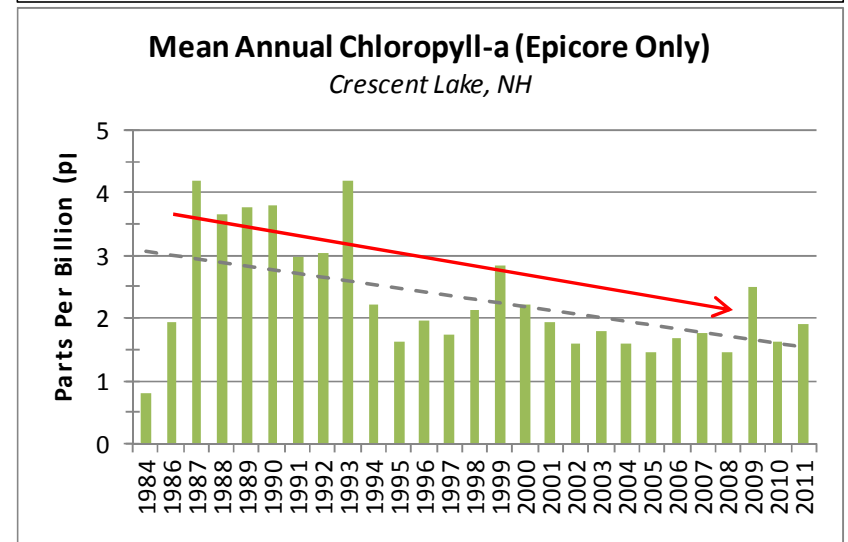
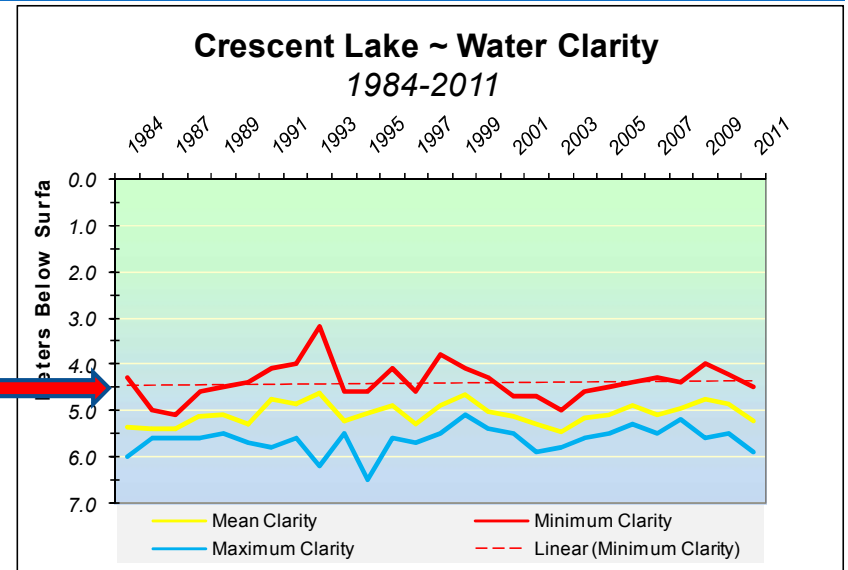


CRESCENT LAKE

Water Clarity & Chlorophyll-a

- Secchi range from 3.2 to 6.5 m
- Average = 5.1 m (16.7 ft)
- Trend = stable

- Chl-a range from 0.5 to 19.4
- Average = 2.3 ppb
- Trend = decreasing



Total Phosphorus- CRESCENT LAKE

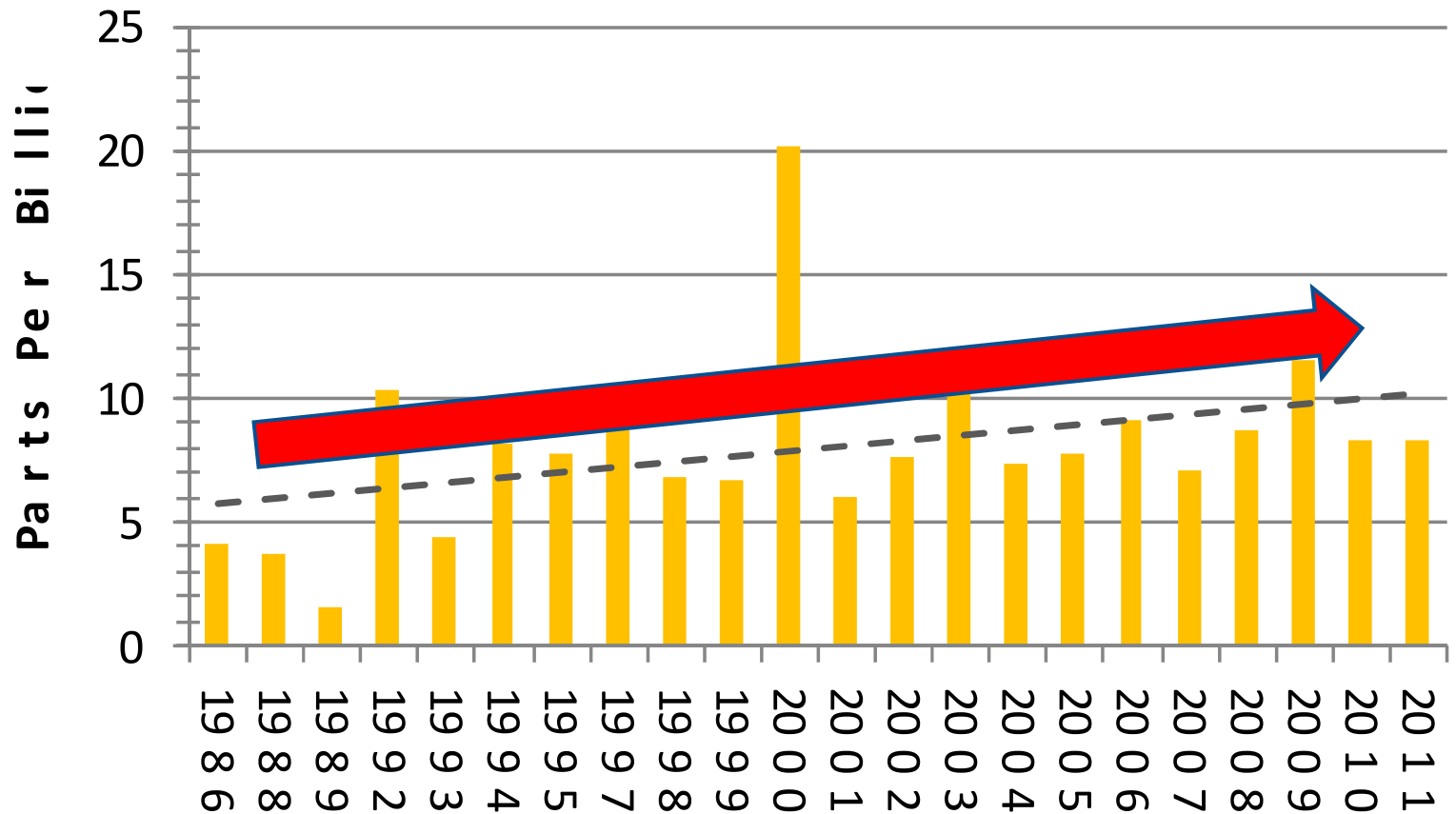
Total Phosphorus

TP EC range from
1.1 to 20.7 ppb

Average (median)=
7.9 ppb

Trend = increasing

Mean Annual Total Phosphorus (1986-2011) *Station 6- Center, Crescent Lake, NH*



CRESCENT LAKE

Water Quality Summary- Crescent Lake

WQ Parameter	Center-6
<i>Mean Secchi (m)</i>	5.1
<i>Mean Color (PCU)</i>	15.8
<i>Mean Chl_a (ppb)</i>	2.3
<i>Median TP (ppb)</i>	*7.9
<i>DO Trends</i>	Little to No Depletion

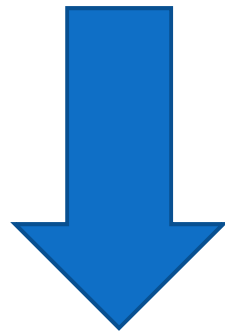
** indicates declining trend over time*

Summary

- Increasing levels of Total Phosphorus over time
- Increase in >1 ppb TP over historical time period

Setting Water Quality Goals

Reduce Total Phosphorus Levels in
Crescent Lake



~ 6%

Reduce Total Phosphorus Levels in
Lake Wentworth

Reduce by 6% - 10%