Chemical Assessment

- Most complicated, but easiest to do.
- Extreme natural variations
- What is normal?

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Chemical Assessment

- Check expiration dates
- Face upstream at transect
- Monitor from area of greatest flow, but err on the side of safety!

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pH

- Water's acid/base content
- Measured on scale from 0 to 14
- pH affected by
  - Acids in rain
  - Types of soils/bedrock in area
- Low pH can be harmful to aquatic life
- Low pH can cause ammonia and heavy metals to be more soluble

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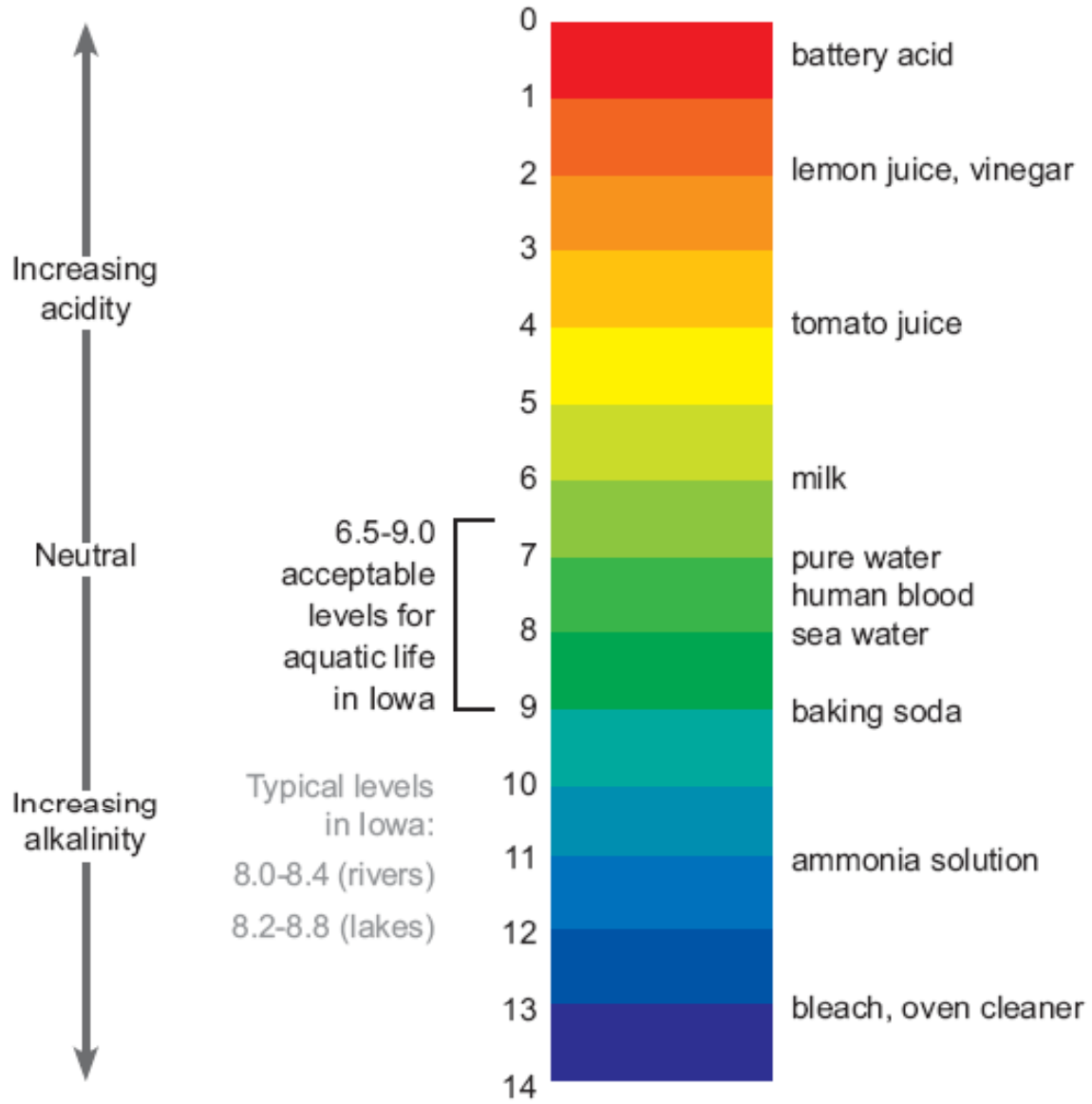
pH scale



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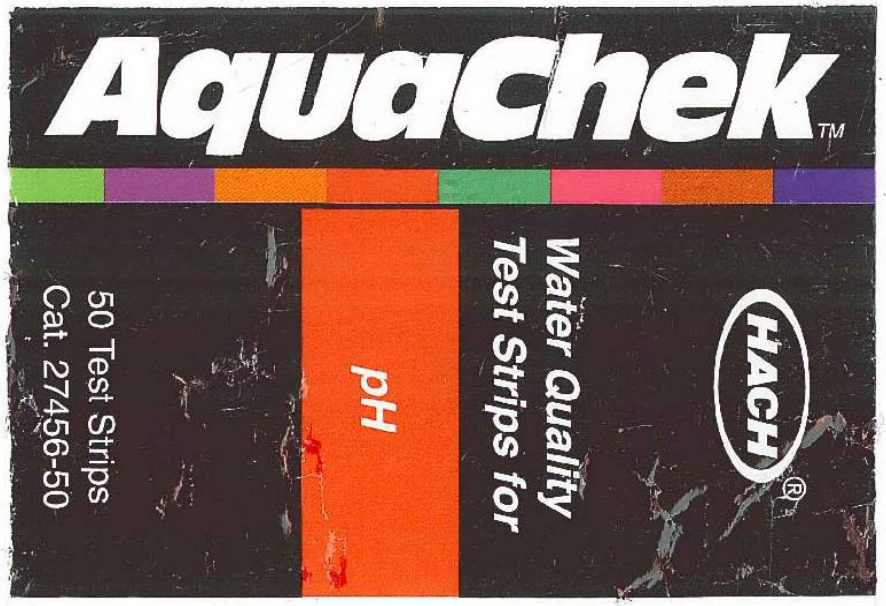

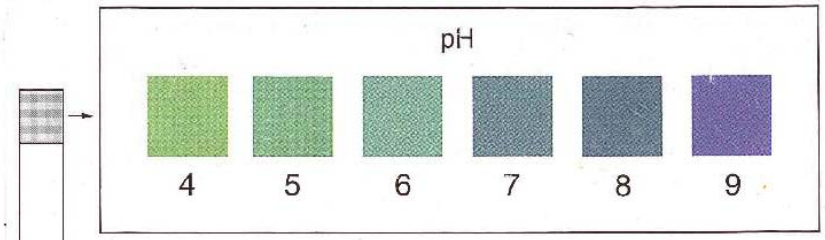

1406LB R11/99

DIRECTIONS:

1. Dip a strip into water and remove immediately.
2. Hold the strip level for **15 seconds.** Do not shake excess water from the test strip.
3. Compare the pH test pad to the color chart above. Estimate results if the color on the test pad falls between two color blocks.

*pH results may be incorrectly low if alkalinity is less than 80 ppm.

IMPORTANT: KEEP CAP ON TIGHT BETWEEN USES. STORE AT ROOM TEMPERATURE.

USE BY DATE ON BOTTOM

HACH®

Hach Company, P.O. Box 389, Loveland, CO 80539 U.S.A.
(800) 227-4224 Outside U.S.A. (970) 669-3050

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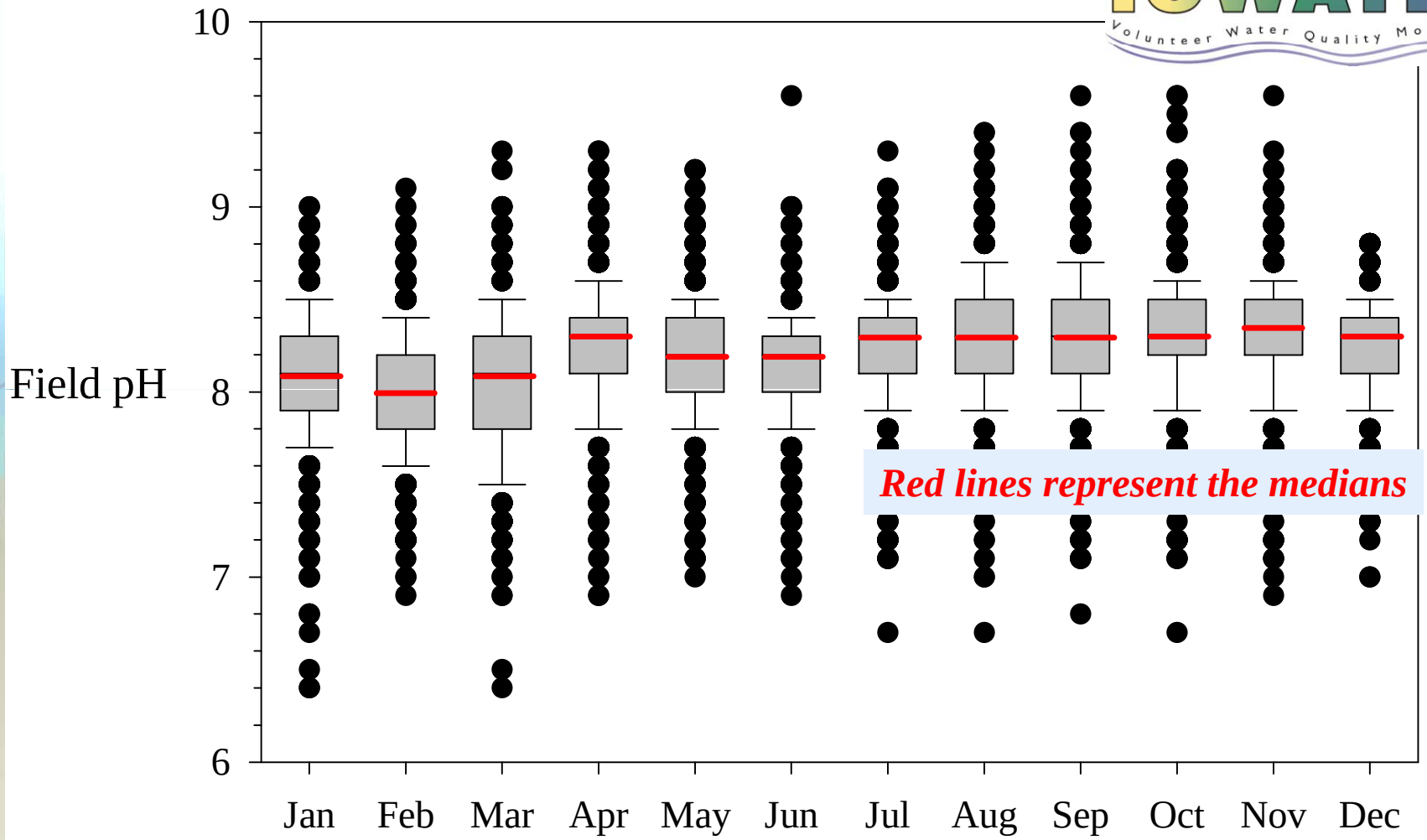
Ambient Water Monitoring Program - All Stream Sites
Field pH



Typical range for pH = 8.0 to 8.4 (rivers); 8.2 to 8.8 (lakes)
Iowa average = 8.2 (rivers); 8.5 (lakes)
Iowa's water quality standard - pH shall not be less than 6.5 nor greater than 9.0

Dissolved Oxygen

- Necessary for aquatic life
- Affected by:
  - Water temperature
  - Season
  - Time of day
  - Stream flow
  - Aquatic plants
  - Dissolved or suspended solids
  - Human impacts

Photo by NRCS

Photo by IOWATER volunteer

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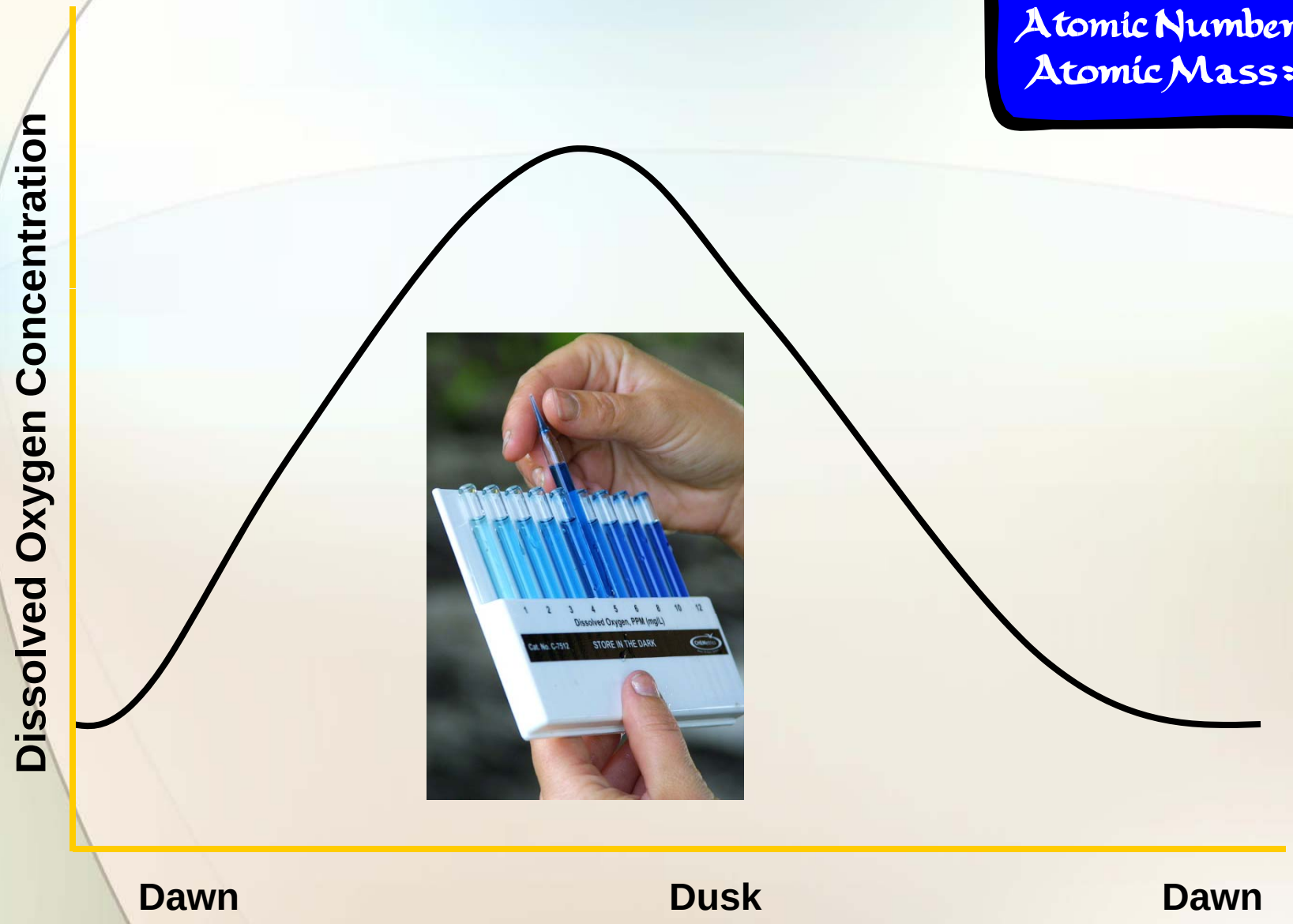
Dissolved Oxygen

Oxygen

Atomic Number: 8
Atomic Mass: 16



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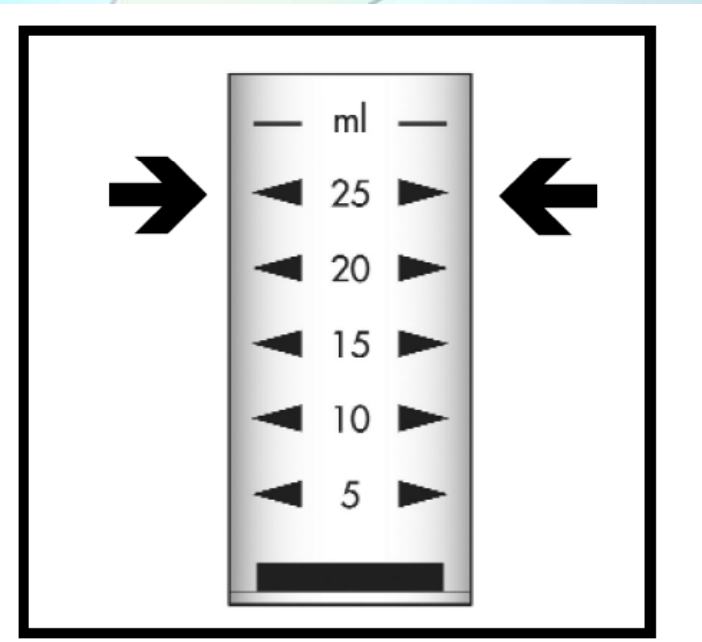

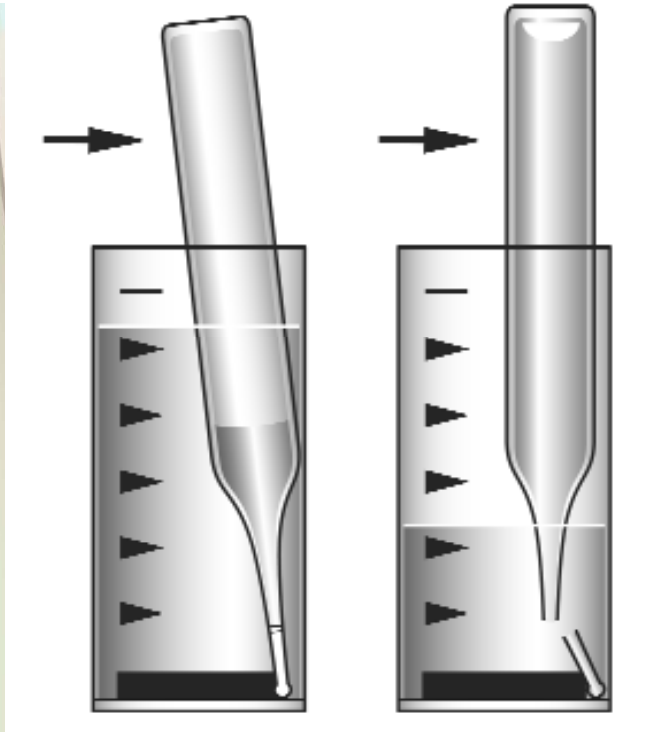

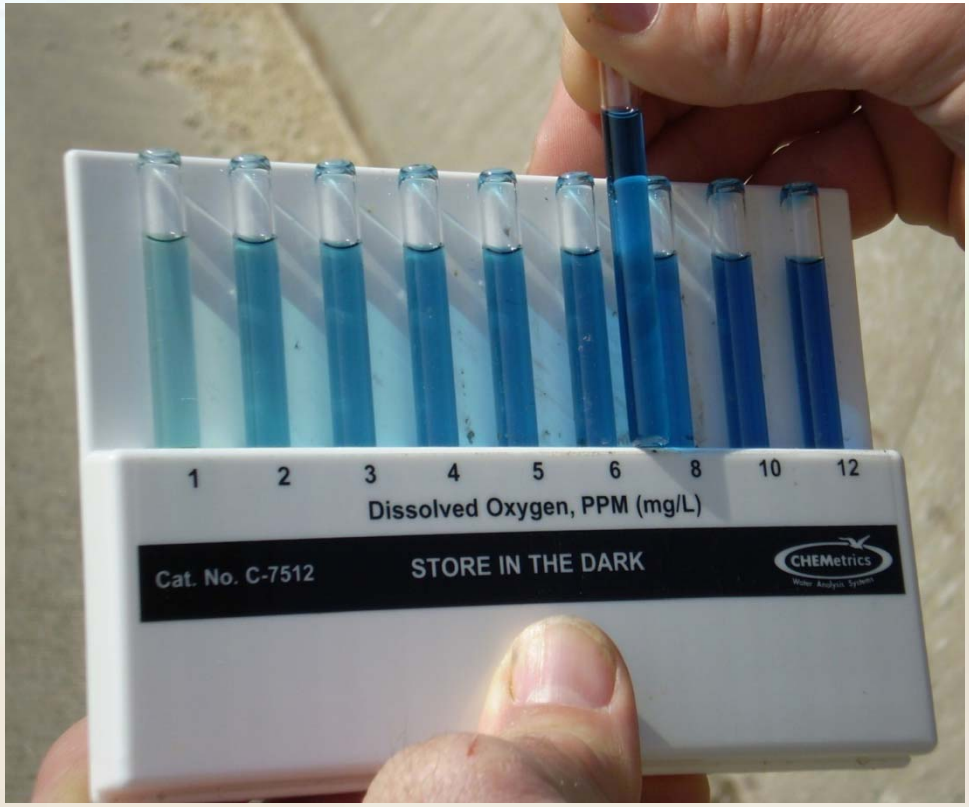

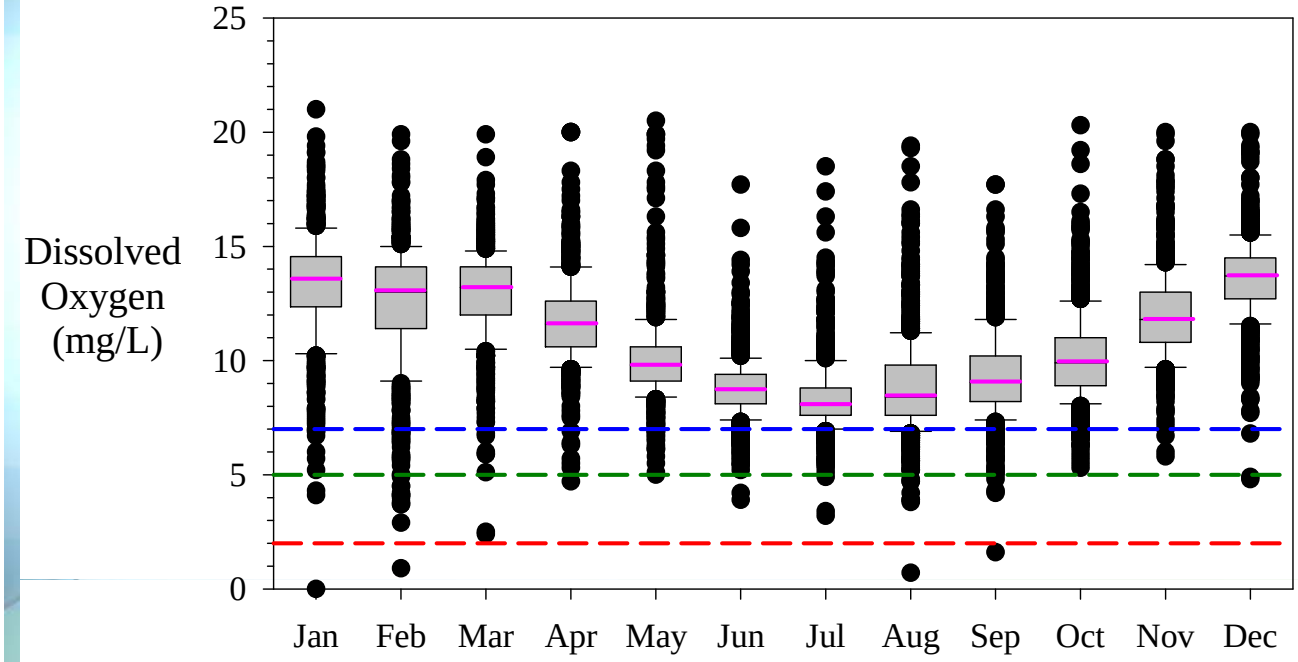

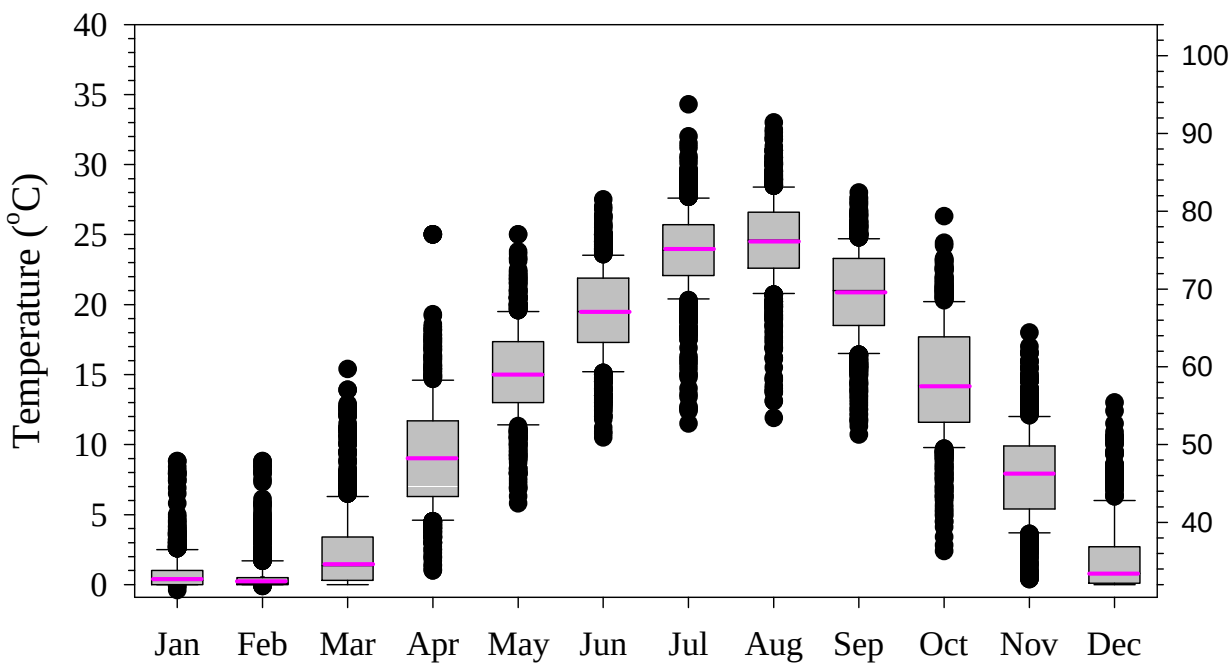

Blue line = Coldwater aquatic life criteria (7 mg/L)

Green line = Warm water aquatic life criteria (5 mg/L)

Red line= hypoxic condition (2 mg/L & lower)

Pink line = medians

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Dissolved Oxygen

- Dissolved Oxygen levels of 5 mg/L or less are a concern

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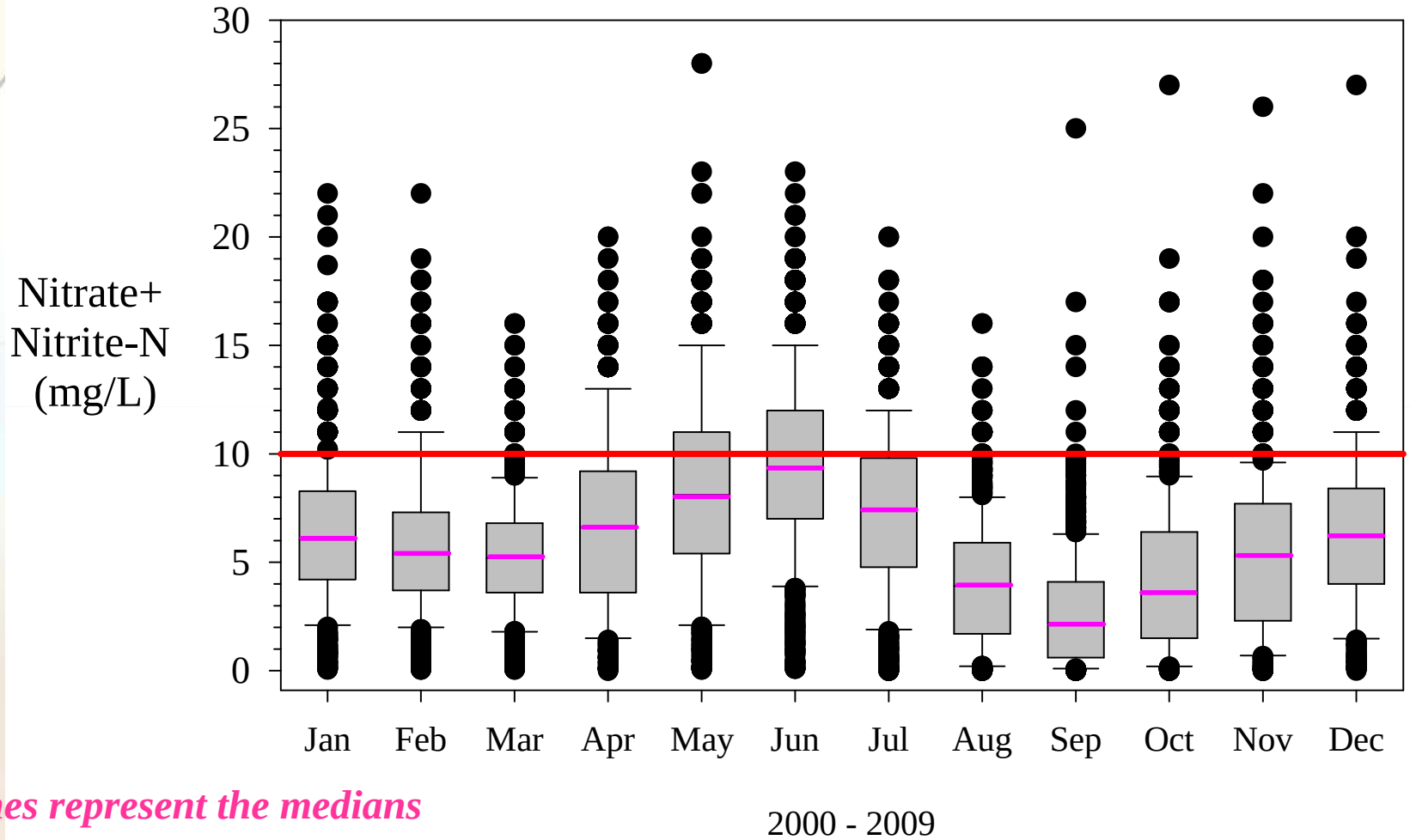
Nitrate-N and Nitrite-N

- Nitrogen is an essential plant nutrient.
- Excess levels can cause nutrient enrichment.
- Nitrate and nitrite are two forms of nitrogen. Nitrate is very water soluble and is more common. Nitrite is less stable and quickly converts.
- Sources include:
  - Soil organic matter
  - Animal wastes
  - Decomposing plants
  - Sewage
  - Fertilizers
- Levels higher in late spring/early summer.

Ambient Water Monitoring Program - All Stream Sites
Nitrate + Nitrite as N (mg/L)



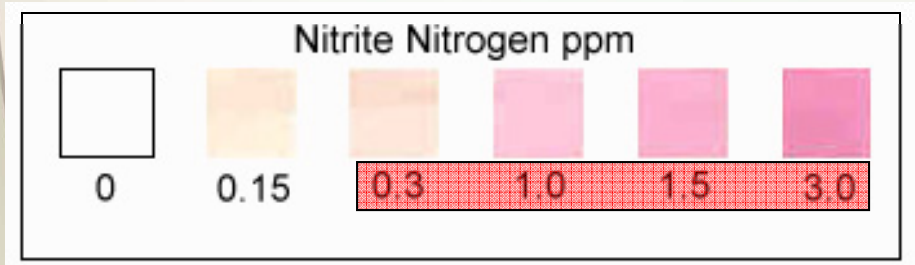
Pink lines represent the medians

Typical range for Nitrate + Nitrite-N = 3 to 8.5 mg/L (rivers); 0.05 to 0.94 mg/L (lakes)
Iowa average = 5.8 mg/L (rivers); 0.07 mg/L (lakes)

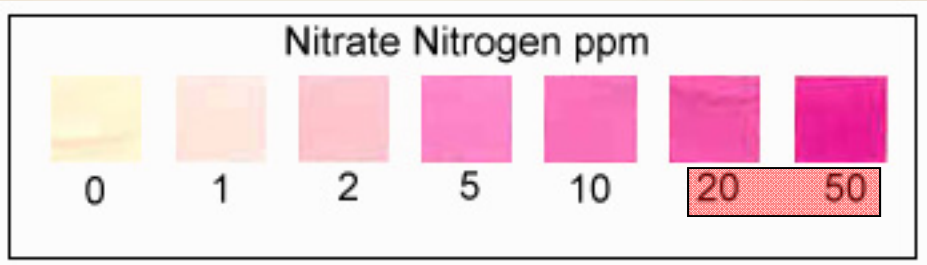
Iowa's drinking water quality standard – 10 mg/L

Nitrite/Nitrate Nitrogen

- Pads must be read at specified times
- Colors should be estimated to nearest color standard.



Levels of concern
- Nitrite – 0.3 and greater
- Nitrate – 20 & 50 mg/L



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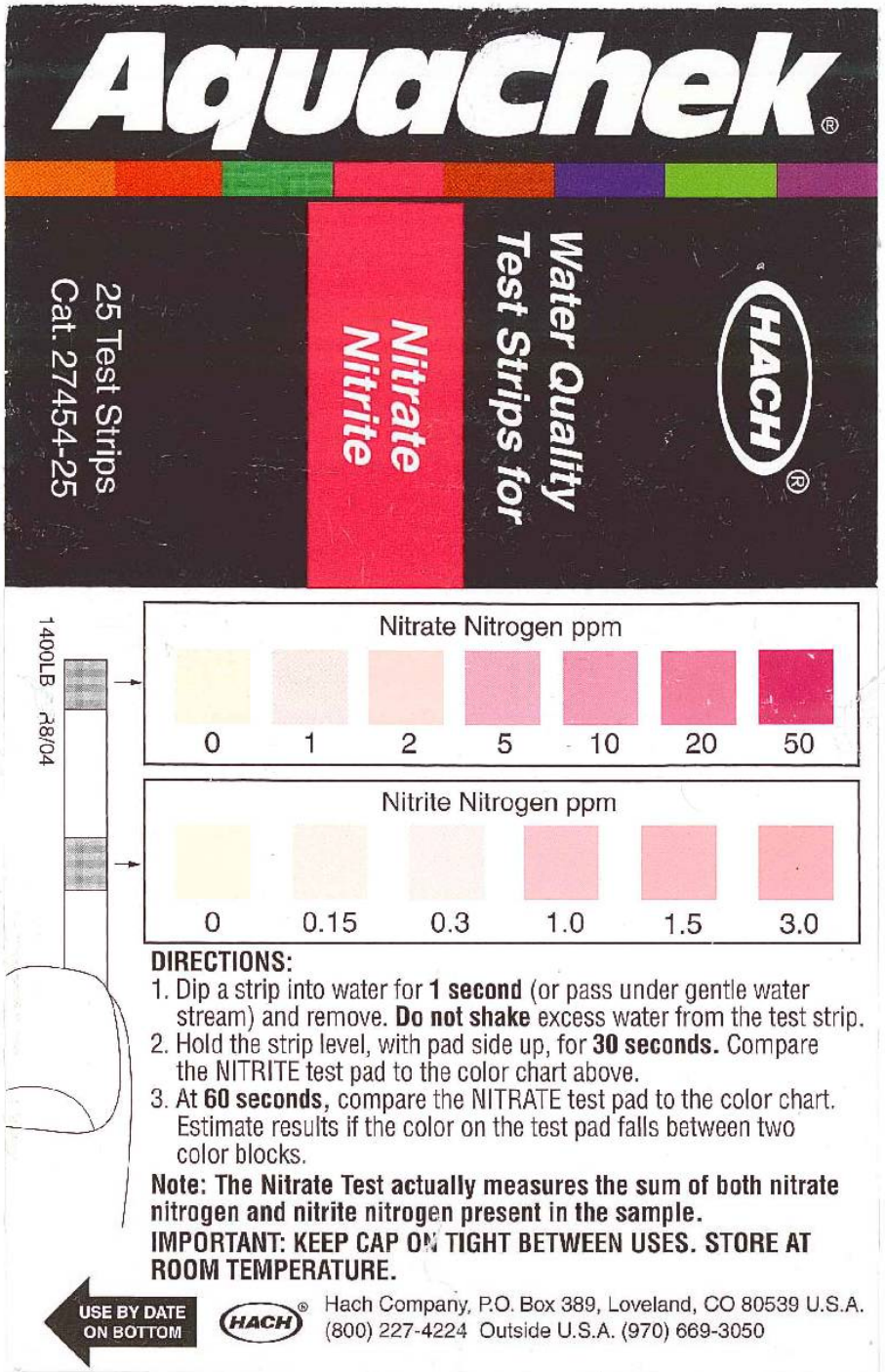

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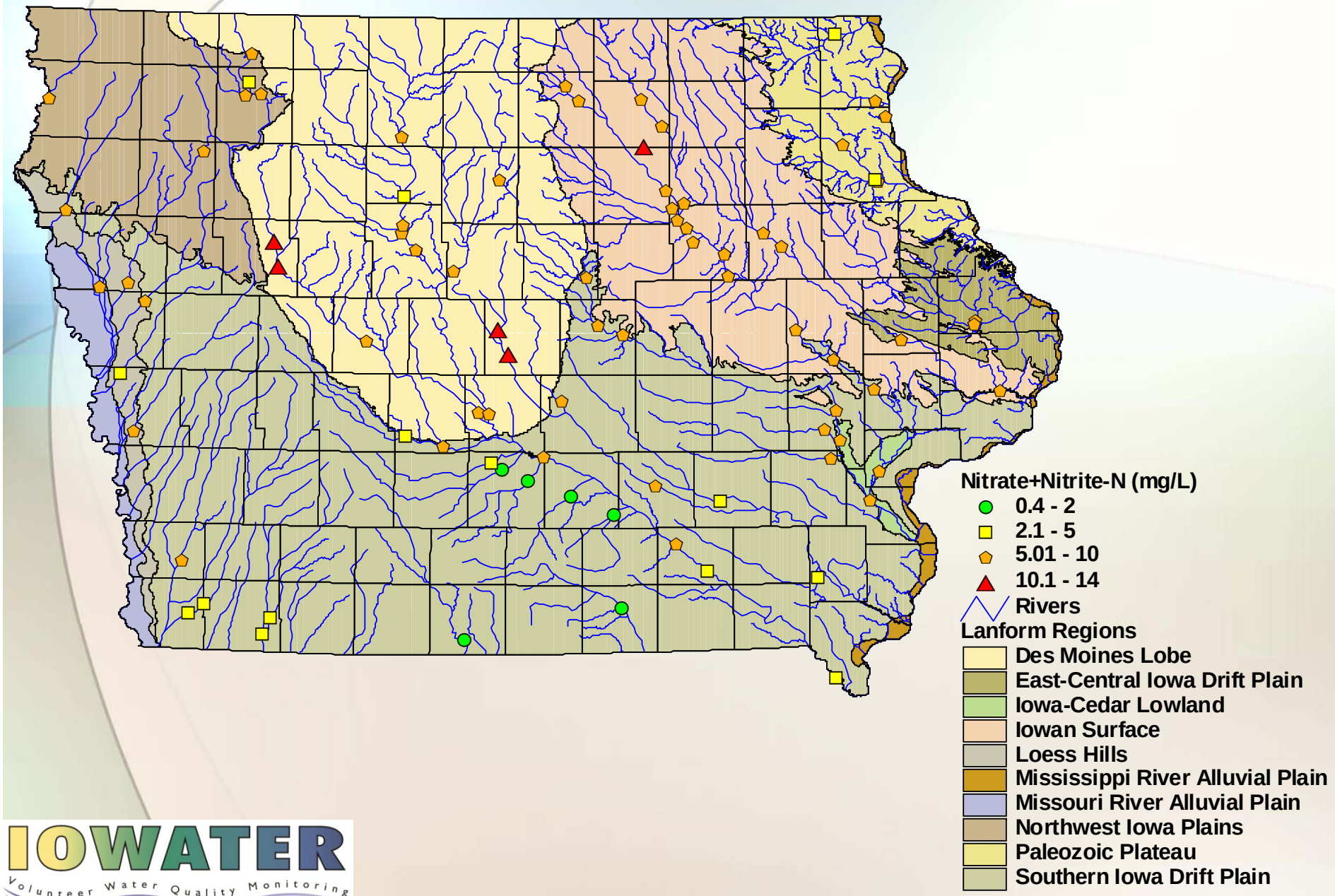
Ambient Monthly Stream Monitoring Sites 2000 - 2009 (Median)



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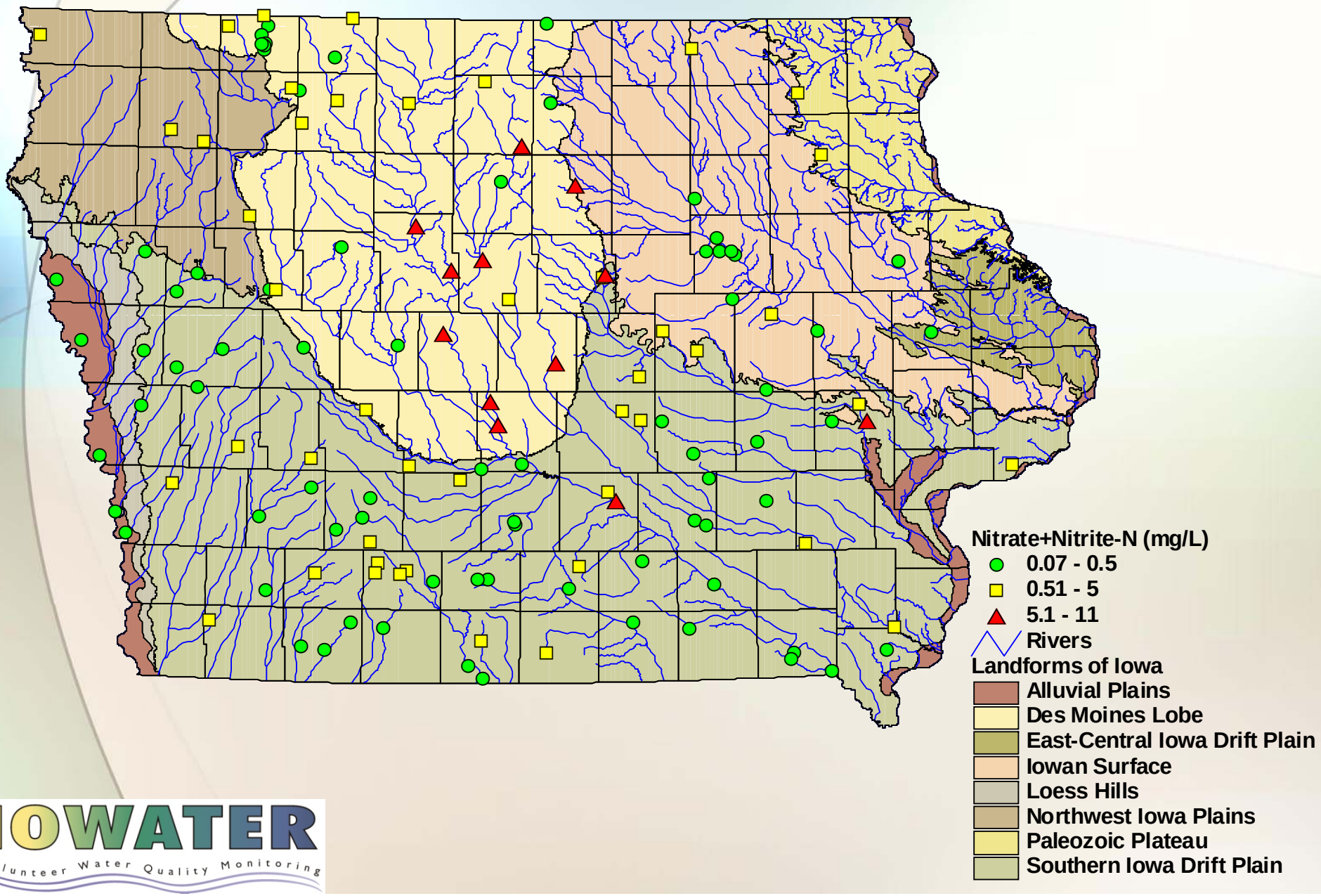
Ambient Monthly Lake Monitoring Sites 2000 - 2008 (Average)



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Phosphorus

- An essential nutrient for plants and animals.
- Sources include:
  - Human, animal, or industrial wastes
  - Certain soils and rocks
- Excess phosphorus in water can cause excess plant growth which can cause algal blooms which may result in lower dissolved oxygen levels.

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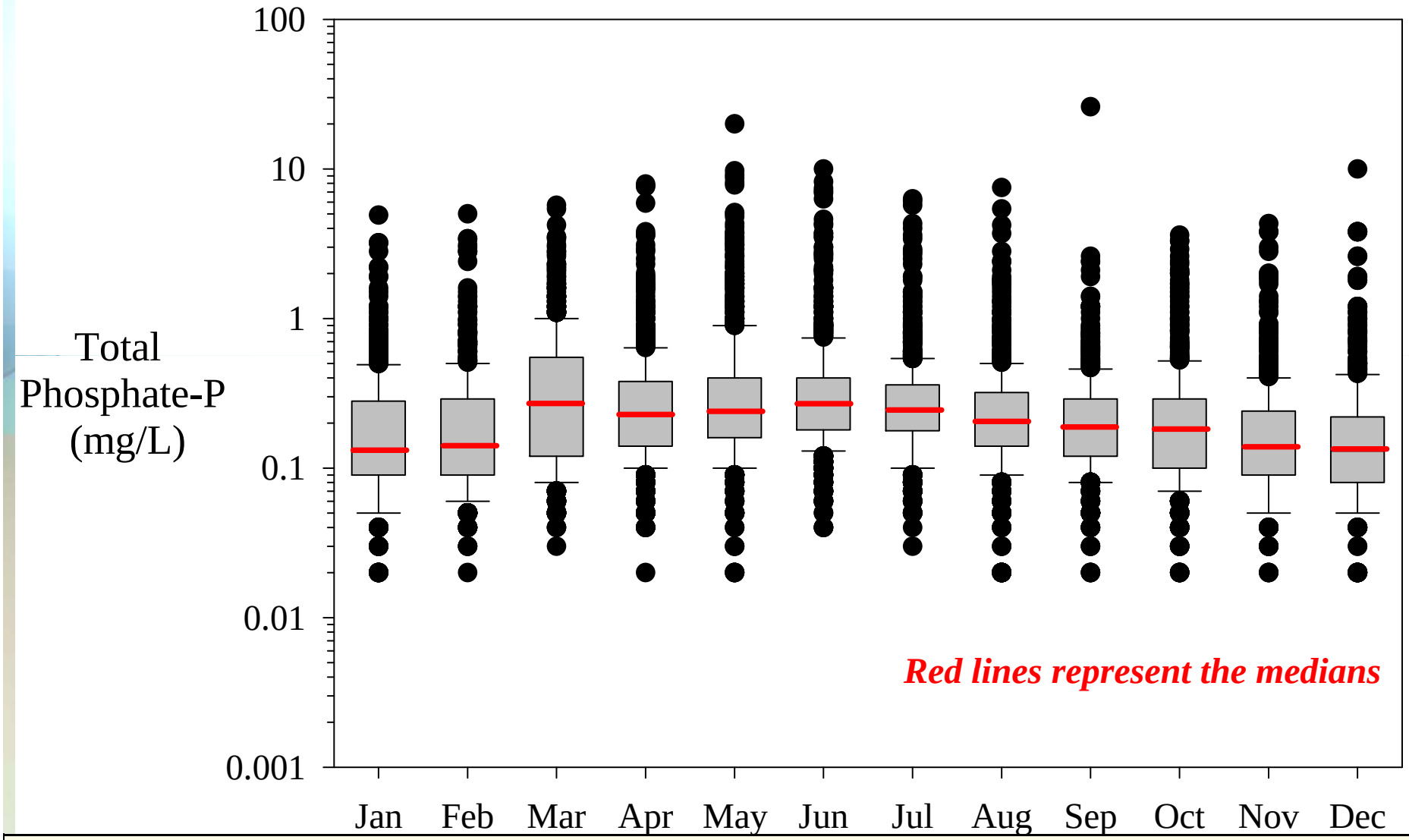
Ambient Water Monitoring Program - All Stream Sites
Total Phosphate as P (mg/L)

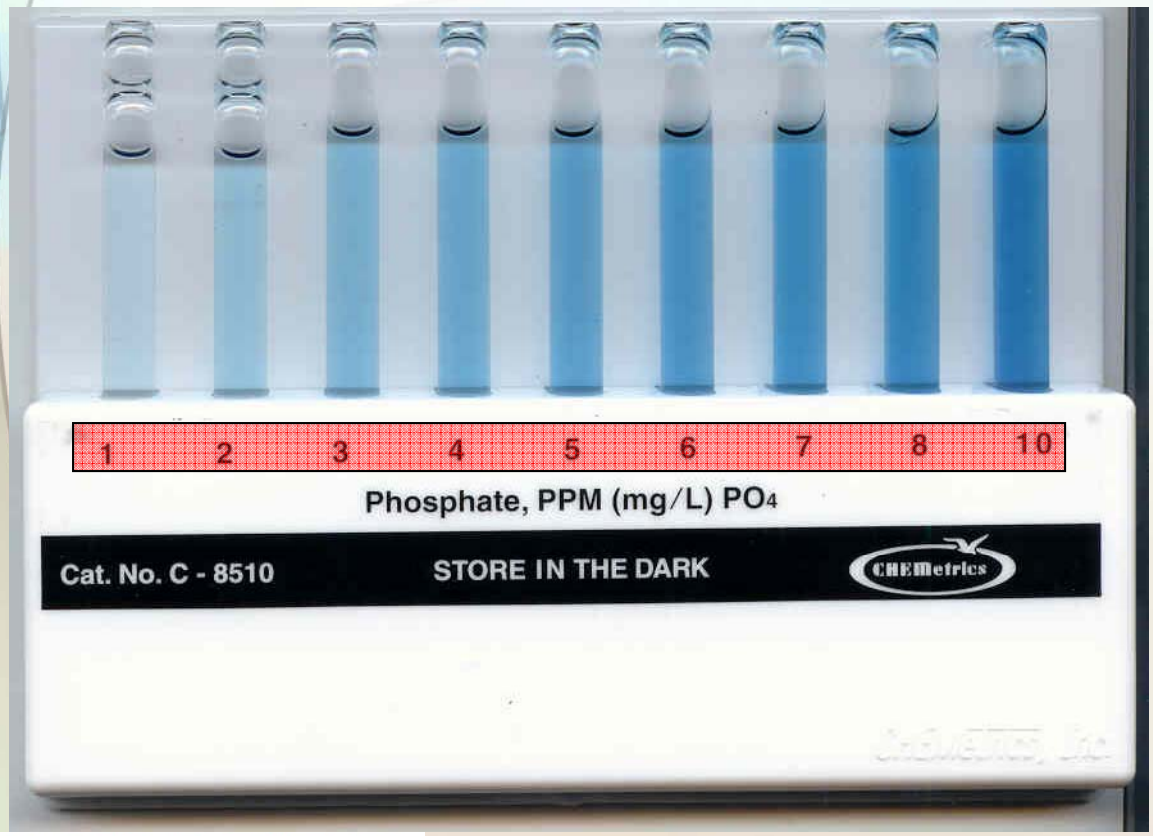


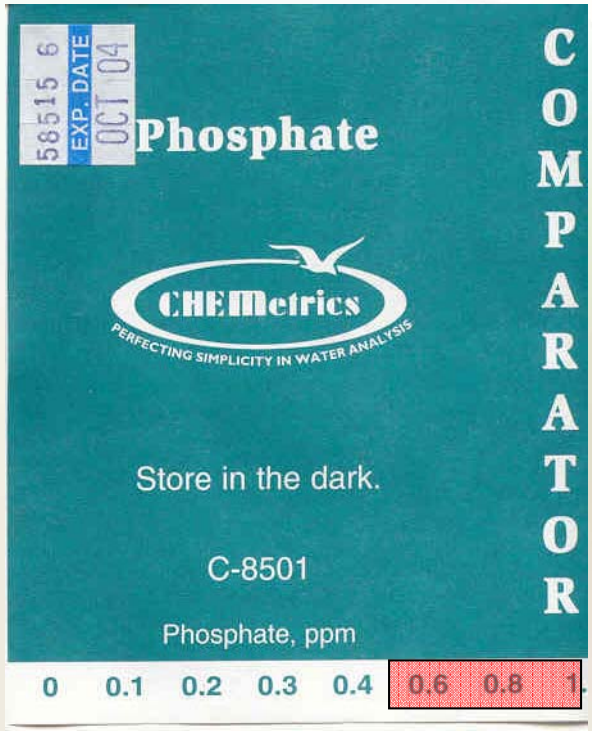
Typical range for total phosphorus = 0.11 to 0.34 mg/L (rivers); 0.05 to 0.13 mg/L (lakes)

Iowa average = 0.2 mg/L (streams); 0.08 mg/L (lakes)

Phosphate

- Phosphate values of 0.6 mg/L & greater are of concern





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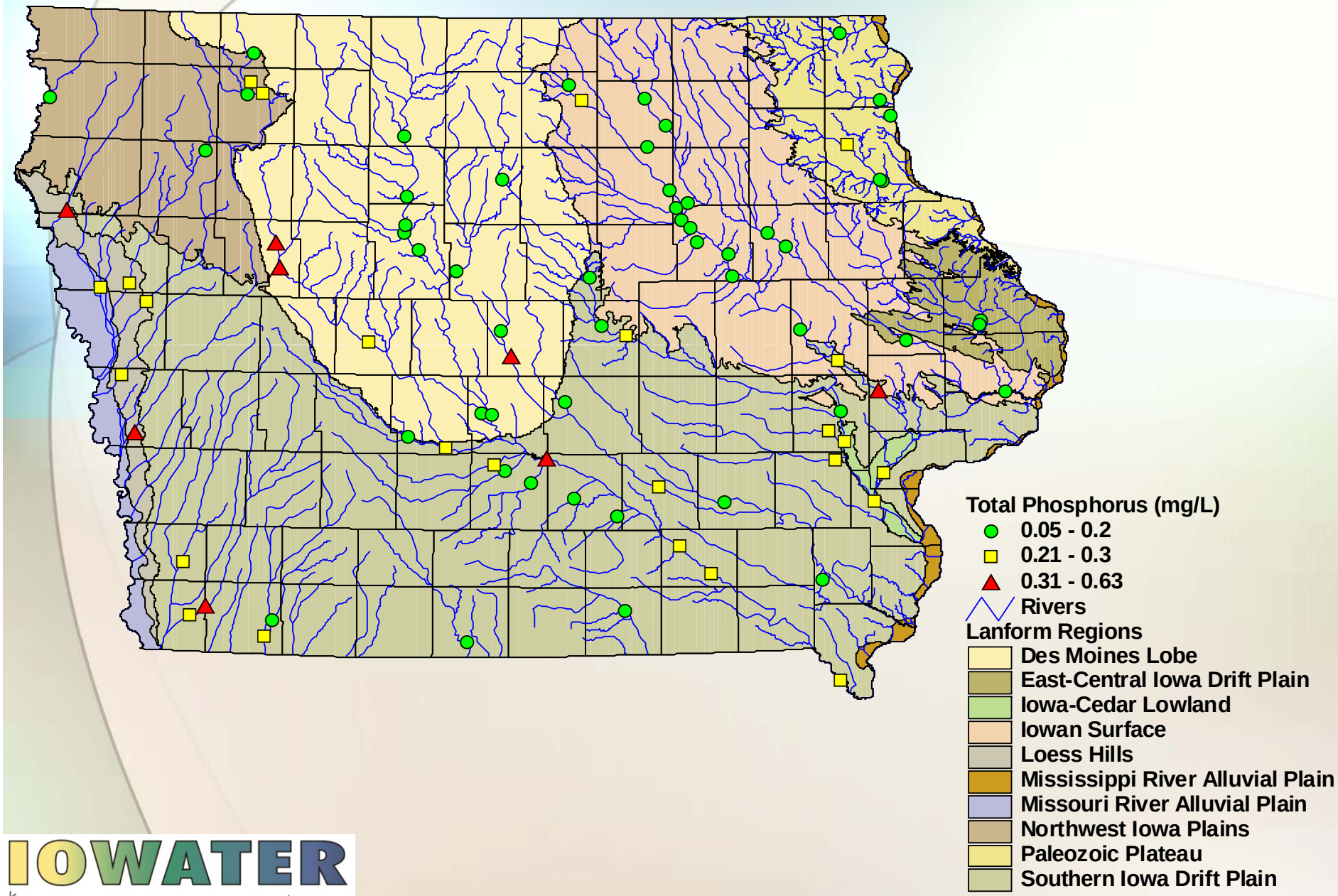
Ambient Monthly Stream Monitoring Sites 2000 - 2009 (Median)



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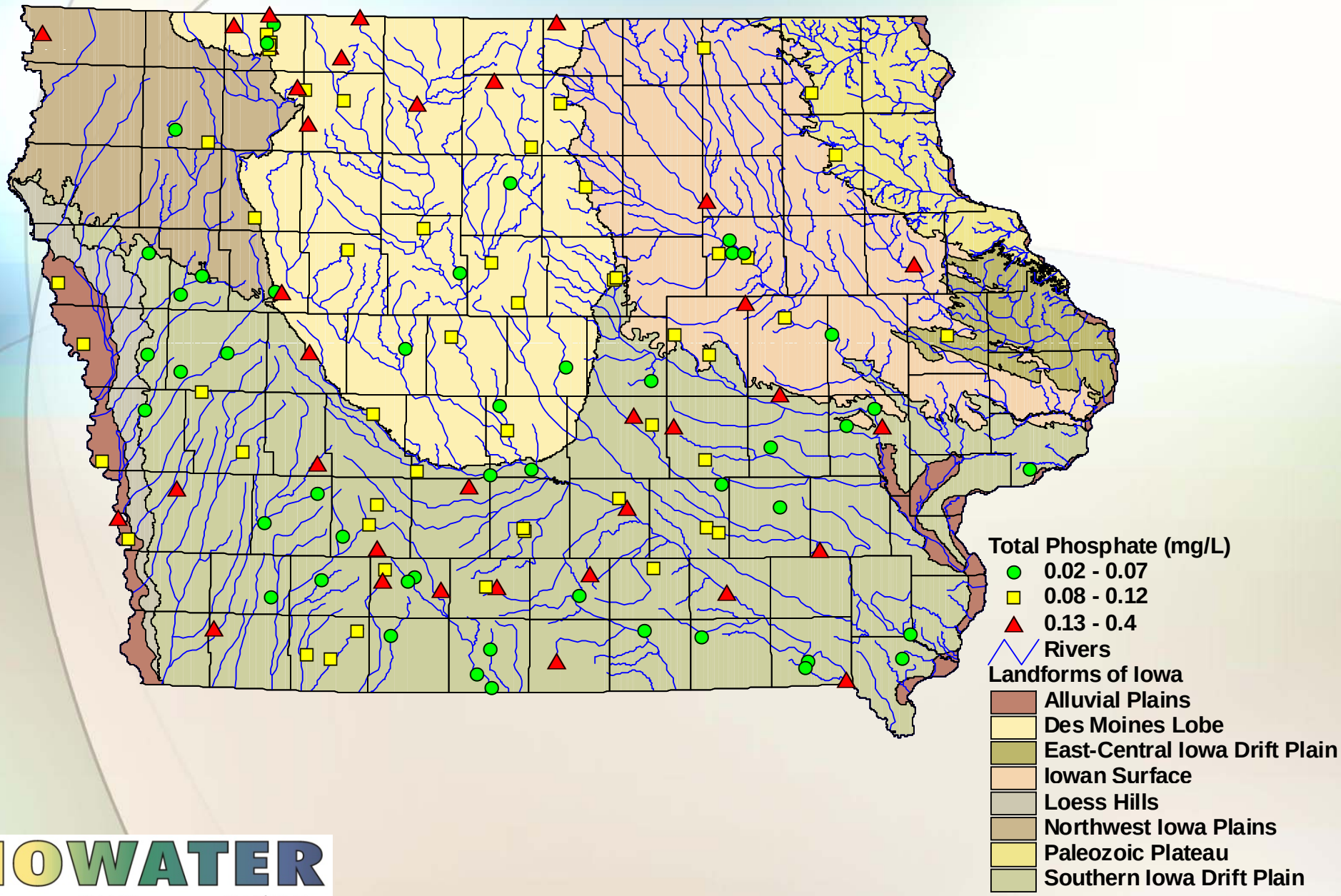
Ambient Monthly Lake Monitoring Sites 2000 - 2008 (Average)



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Phosphorus

- If results are too brown or too green to read accurately, please contact IOWATER for a filtering apparatus

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Chloride

- Found in salts.
- Easily dissolves in water.
- Sources include:
  - Human or animal wastes
  - Inputs from fertilizers
  - Road salt runoff
- Conservative tracer.

PHOTO: RIVERKEEPER

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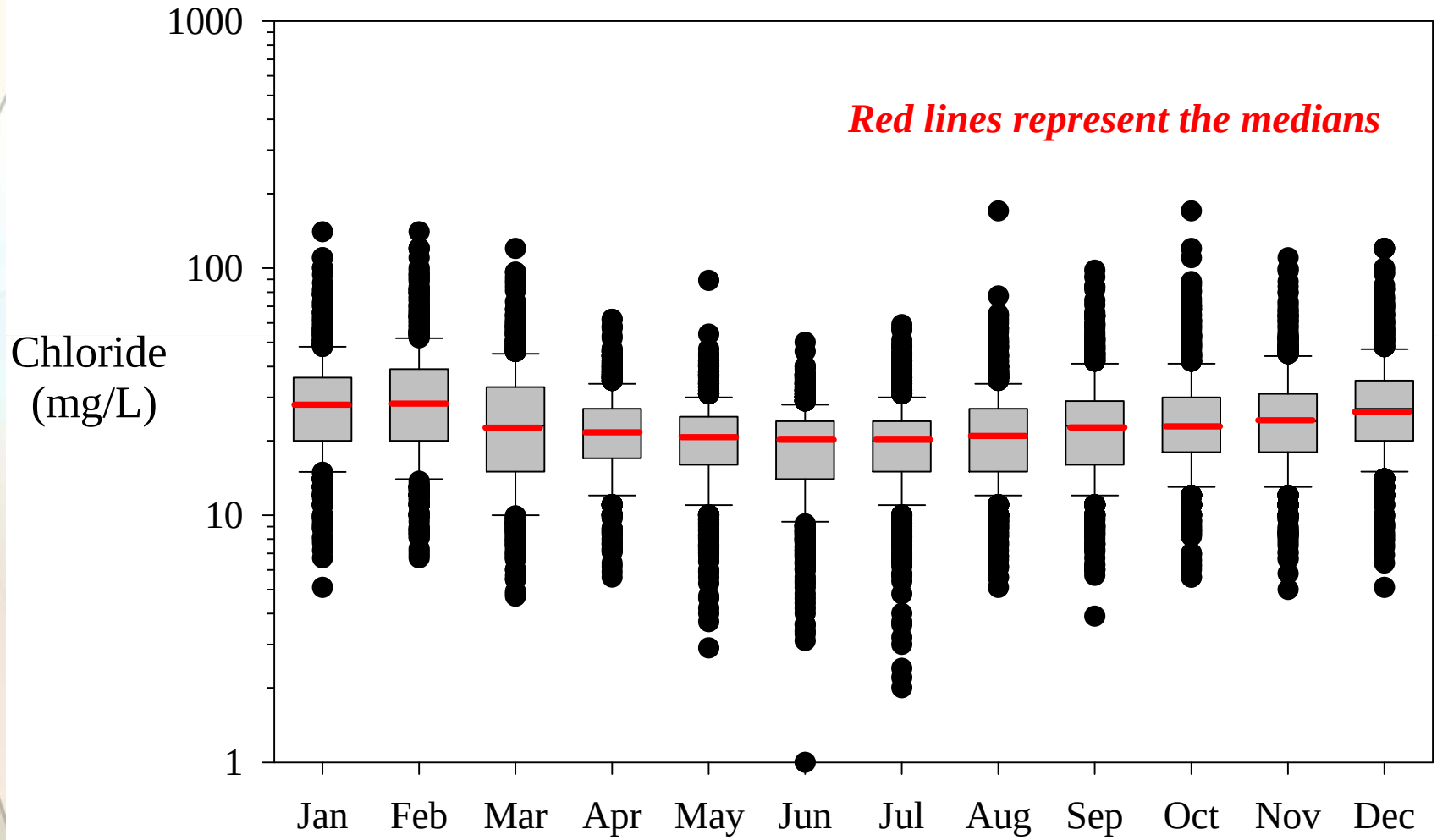
Chloride

Ambient Water Monitoring Program - All Stream Sites



Typical range for chloride = 16 to 29 mg/L (rivers)

Iowa average = 22 mg/L (rivers)

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Quantab®

Titrators for **Chloride**

Low Range
30-600ppm Cl^-
(0.005-0.1% as NACl)

40 Tests
Cat. 27449-40

HACH®

1179LB AR1204A

Lot A9099
USE BY: 01/2011

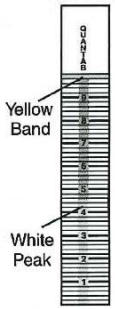
DIRECTIONS:

1. Remove a titrator from bottle and replace cap immediately.
2. Insert lower end of titrator into solution. Do not allow solution to reach yellow completion band at top of titrator.
3. Allow solution to completely saturate wick of titrator. Reaction is complete when yellow band turns dark.
4. Note where the tip of the white chloride peak falls on the numbered Quantab® scale. This represents the Quantab® unit value.
5. Refer to the table below to convert Quantab® units into salt concentration.

NOTE: Filtration of the sample solution may be needed to prevent obstruction of the titrator.

Quantab Units	%NaCl	ppm(mg/L) Cl^-	Quantab Units	%NaCl	ppm(mg/L) Cl^-
1.0	0.005	29	4.4	0.034	209
1.2	0.006	35	4.6	0.037	226
1.4	0.007	42	4.8	0.040	244
1.6	0.008	49	5.0	0.044	264
1.8	0.009	57	5.2	0.047	285
2.0	0.011	65	5.4	0.051	307
2.2	0.012	73	5.6	0.055	331
2.4	0.014	82	5.8	0.059	356
2.6	0.015	92	6.0	0.063	383
2.8	0.017	102	6.2	0.068	412
3.0	0.019	113	6.4	0.073	444
3.2	0.020	124	6.6	0.079	477
3.4	0.022	136	6.8	0.085	513
3.6	0.025	149	7.0	0.091	553
3.8	0.027	163	7.2	0.098	595
4.0	0.029	177	7.4	0.106	641
4.2	0.032	192			

QUANTAB® Test Strip



Important: Keep Cap on Tight Between Uses.
STORE AT TEMPERATURES NOT TO EXCEED 86°F (30°C).

USE BY DATE ON BOTTOM

HACH® Hach Company, P.O. Box 389, Loveland, CO 80539 U.S.A.
(800) 227-4224 Outside U.S.A. (970) 669-3050

*Quantab® is manufactured by Environmental Test Systems, Elkhart, Indiana.

Chloride

- Quantab values that fall below table on bottle should be recorded as <25 mg/L.
- If you find your chloride strips are inadequate (chloride >600 mg/L), contact IOWATER for high range chloride strips.
- Chloride values of 100 mg/L & greater are of concern.

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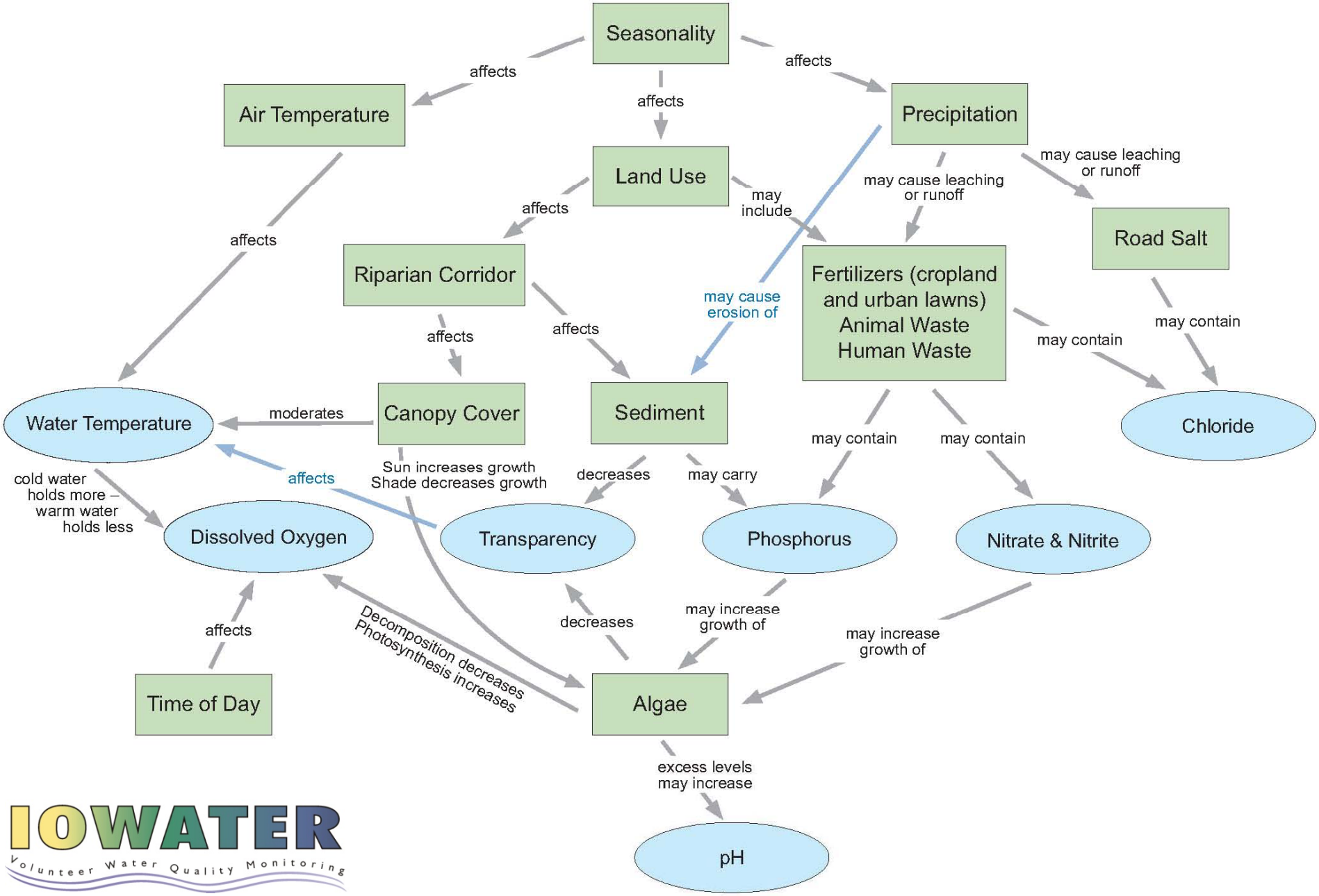
Interrelationship among Chemical and Physical Parameters



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