Indian Creek

Watershed Management Authority

COOPERATION • FLOOD MANAGEMENT • CLEAN WATER

Water Quality Lunch, Learn & Input Session

August 13, 2014

Purpose

- Understand factors influencing water quality of the Indian Creek Watershed
- Overview of water sampling work
- Presentation of draft water quality goals
- Gather input about goals & action steps

ICWMA Members

- Linn County
- City of Marion
- City of Cedar Rapids
- City of Hiawatha
- City of Robins
- Linn SWCD

Draft Goal & Objectives

- Technical Team input
- Draw from other plans
- Goals are not final
- Exercise in small groups designed to further develop goals and set objectives

Framework for goals & objectives

1. Communicate/educate about water quality
2. Develop or update policies to protect water quality
3. Implement practices to improve water quality in urban and rural areas
4. Develop a process to monitor and measure progress toward goals & objectives

Goal 1: Reduce N & P

- Adopt goal consistent with Nutrient Reduction Strategy of an overall 45% reduction in N & P
  - Non-Point sources: 41% N and 29% P
  - Point Sources: 4% N and 16% P
- Implement Nutrient Reduction Strategy practices
- Training opportunities for conservation practices & importance of soil health

Goal 2: Reduce Sediment Loading

- Implement practices to reduce erosion
  - Agriculture: long-term no-till, cover crops, riparian buffers, sediment control structures, and wetlands
  - Urban: measures to reduce construction site runoff
- Training for public & private sectors on erosion control methods & maintenance

Goal 3: Remove Indian & Dry Creeks from the Impaired Waters List

- Reduce E. coli levels to comply with state standard for swimming / wading
- Practices for pet waste; septic system maintenance; fencing livestock out of stream
- Conduct bacteria source tracking program to determine sources of bacteria
- Habitat improvements in the stream corridor, riparian buffers, streambank stabilization

Next Steps

- Goal setting process (July – Sept.)
  - September 10th – social assessment
  - Sept. 24th or Oct. 1st – landcover & urban assessment
- Develop Implementation sections (Aug. – Oct.)
- Public comment on the draft plan (Nov.)
- Final plan to policy makers for adoption (Dec. 2014)

Questions or comments?

Jennifer Fencl

East Central Iowa Council of Governments

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ICWMA Website

www.indiancreekwatershed.weebly.com

Introduction to Water Quality

August 13, 2014

Marty St. Clair

Coe College

Indian Creek Watershed Management Authority

What is “water quality”?

Or…how “good” does the water need to be?

Usually defined by how the water is used

- Drinking
- Recreation
  - Swimming
  - Boating
  - Wading
  - Fishing
- To carry waste away
- Non-human uses
  - Fish
  - Other aquatic life

Iowa water quality

Ch. 61 of the Iowa Code

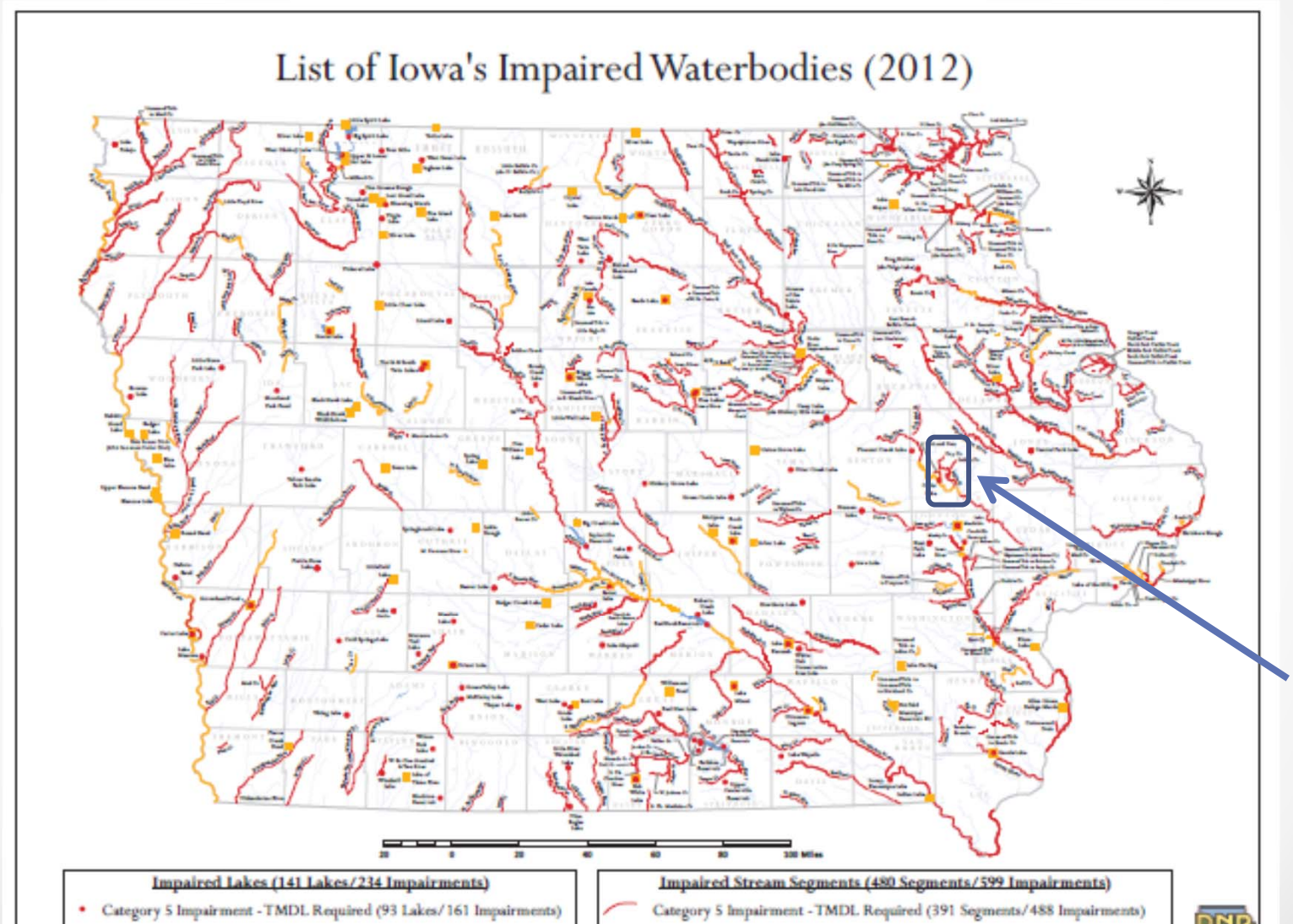
- Every body of water is classified
- Primary contact recreational use (Class "A1").
- Secondary contact recreational use (Class "A2")
- Children's recreational use (Class "A3").
- Aquatic life (Class "B") – different types depending on cold/warm water and types of life supported
- Drinking water supply (Class "C")
- Indian, Dry, and Squaw Creeks are designated class A1 and class B WW2

Iowa water quality

Specific criteria

- Class A – focuses on bacteria (*E. coli* – indicator organism)
  - A1 and A3 – 235 cfu/100 mL (or geometric mean of 126 cfu/100 mL)
- Class B – more specific numerical criteria; pH, dissolved oxygen, ammonia, sulfate, and a multi-page list of metals and pesticides
  - Also relies on biological assessments of aquatic life and of habitat
- Class C – "All substances toxic or detrimental to humans or detrimental to treatment process shall be limited to nontoxic or non-detrimental concentrations in the surface water."
  - EPA standard for drinking water – 10 mg of NO_3^--N/liter
- If a body of water doesn't meet its intended use, it is considered "impaired"

Impaired rivers and streams in Iowa



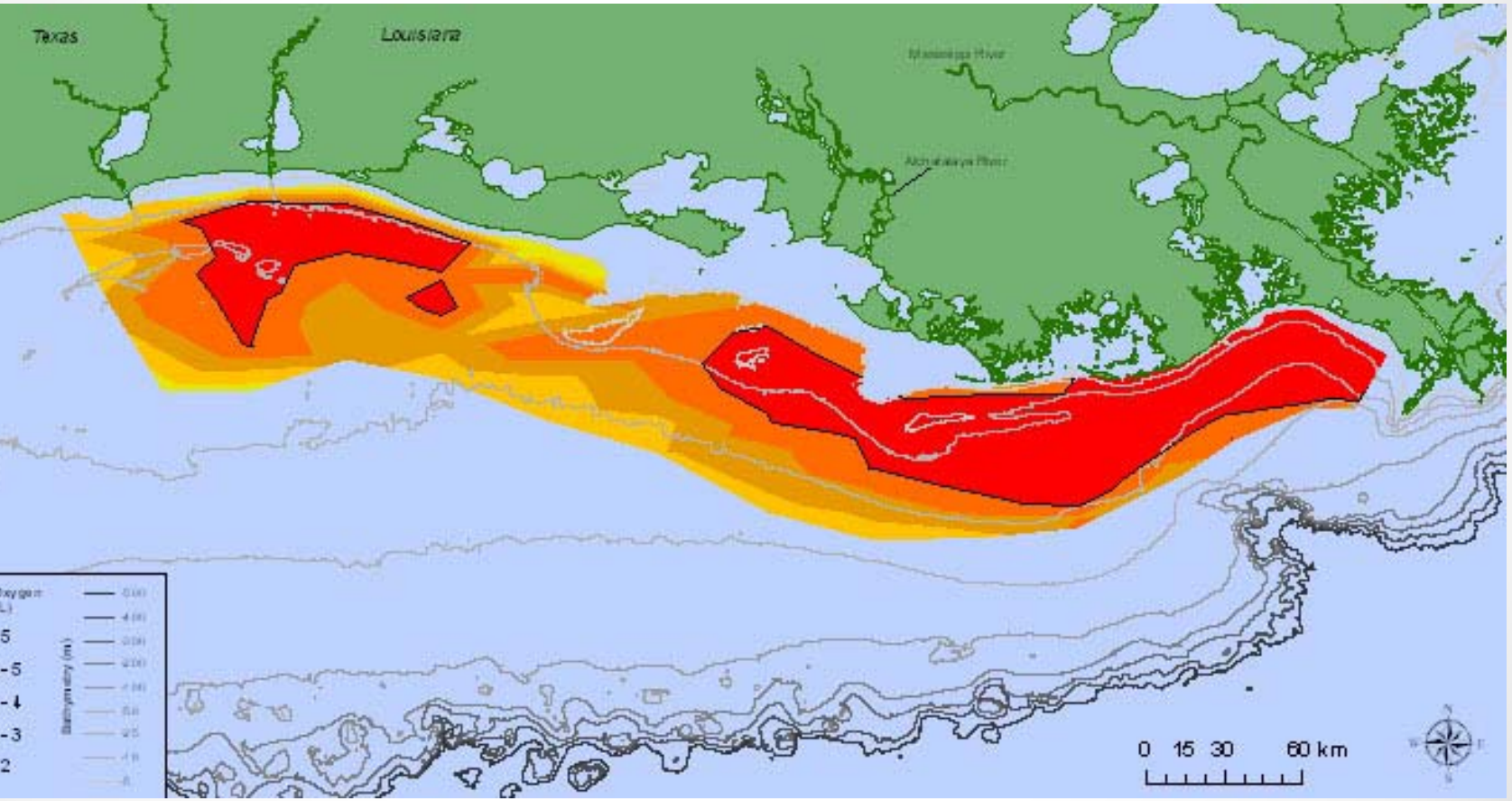
Impaired rivers and streams

Top 10 Causes of Impairment in Rivers/Streams		
Rank	Cause Name	Number of Stream/ River Segments *
1	Bacteria	186
2	Biological	118
3	Fish kill	81
4	Low dissolved oxygen	15
5	Metals	14
6	Mercury (in fish)	12
7	Sewage	4
8	Coal tar	3
9	Ammonia	2
10	Nitrate	2

Indian, Dry, and Squaw Creeks

Raccoon and Cedar

Hypoxia in the Gulf of Mexico



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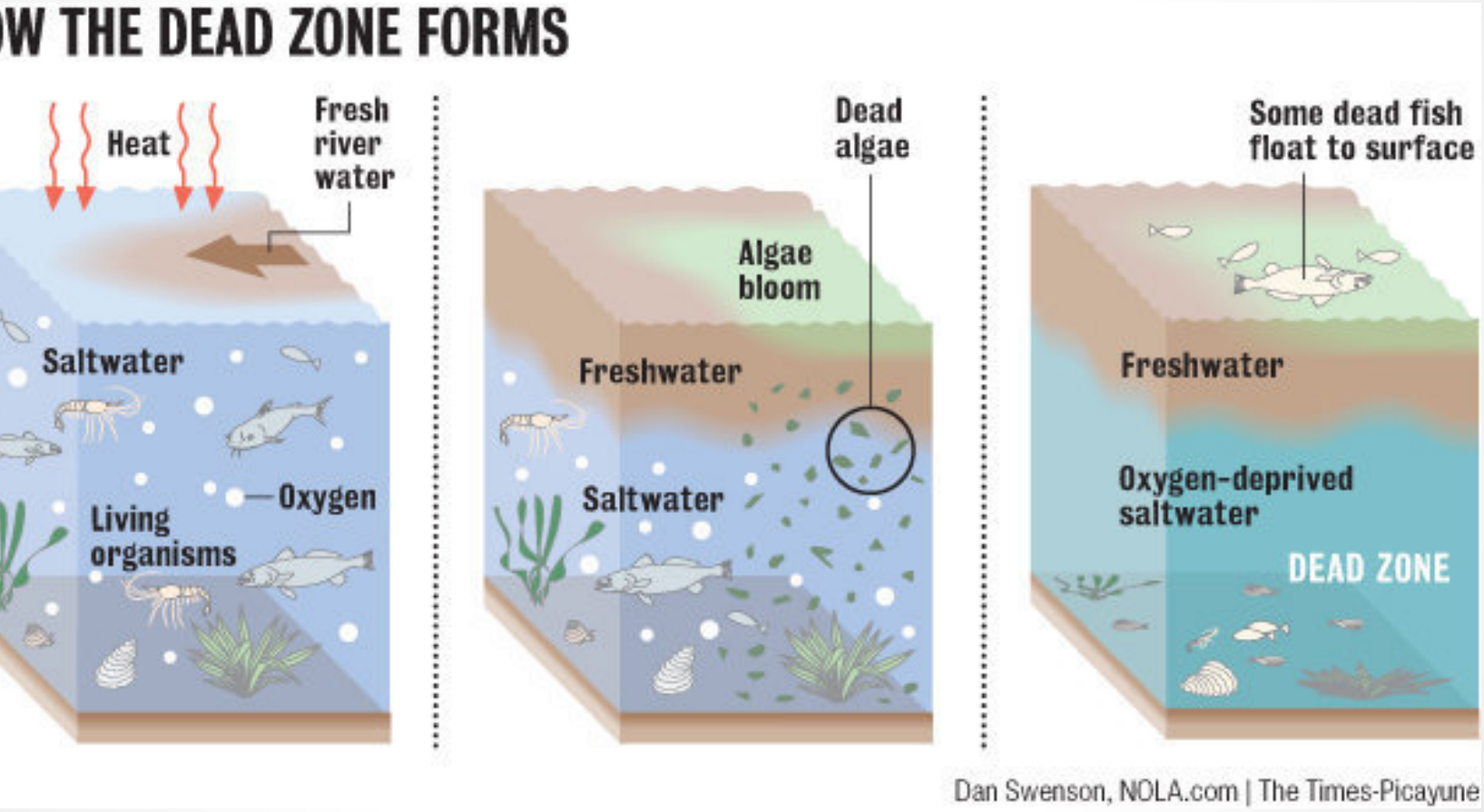
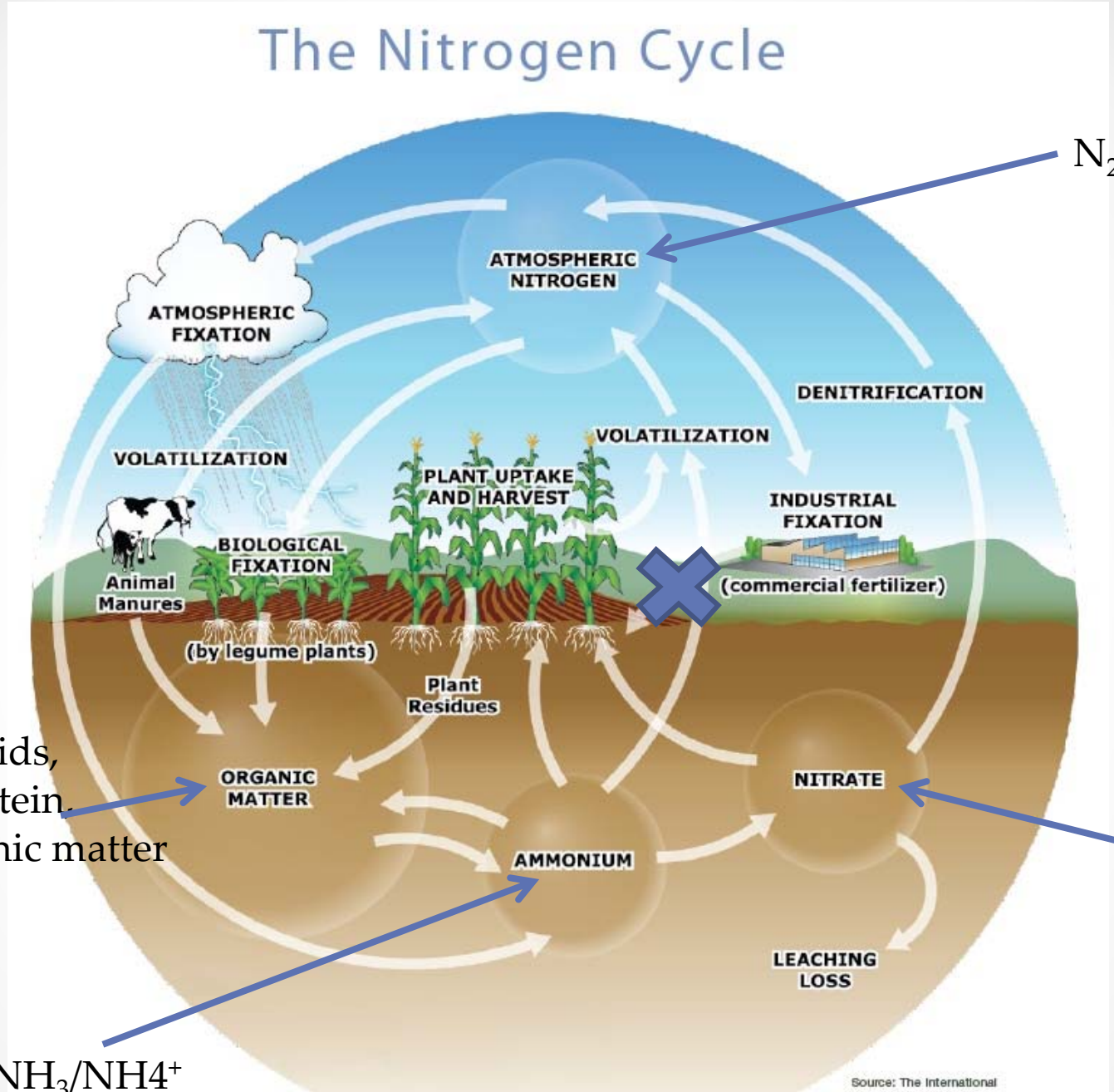


ecommendation of MR GoM Watershed Nutrient Task Force – 45%



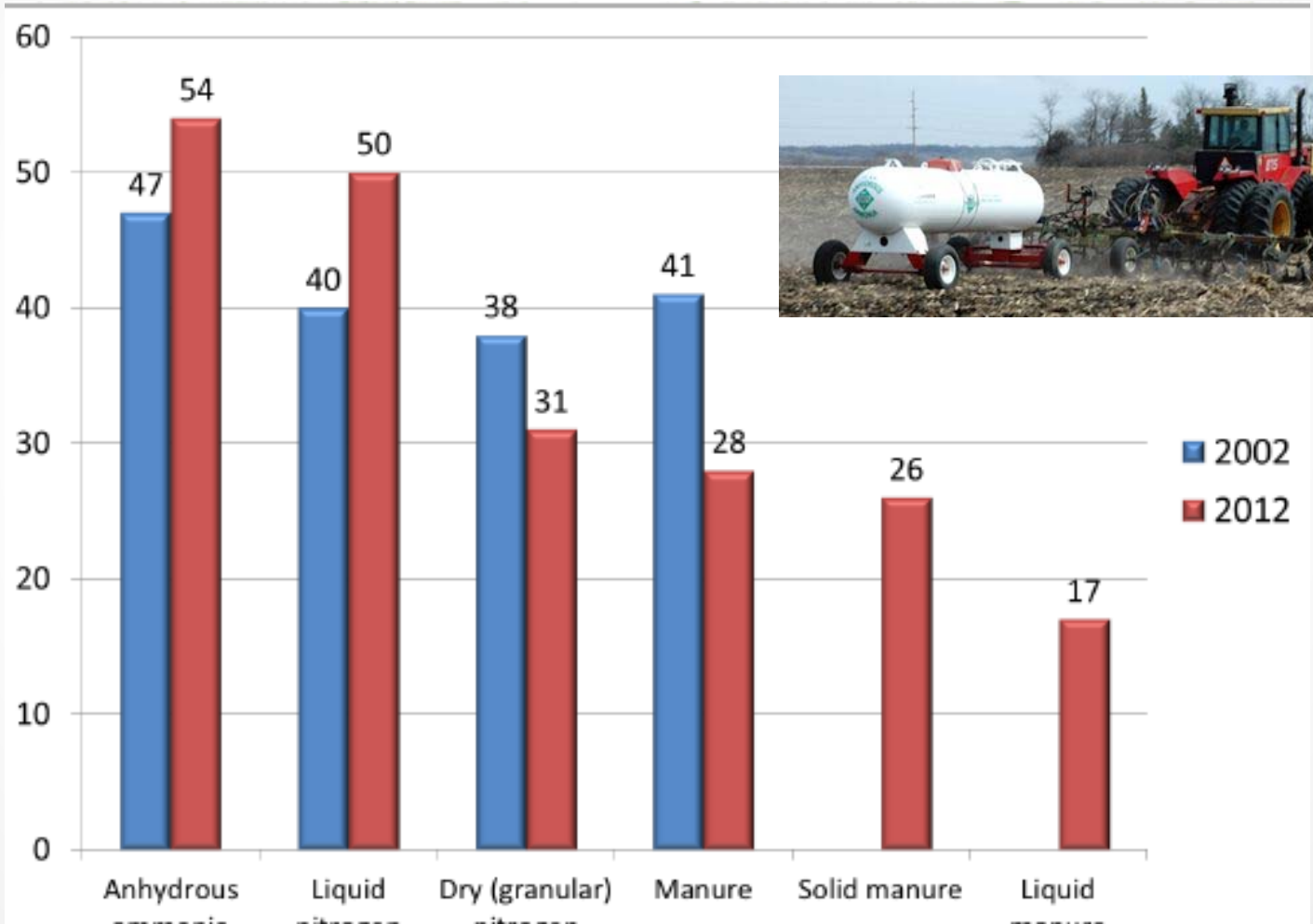
N_2

ino acids,
ea, protein
l organic matter

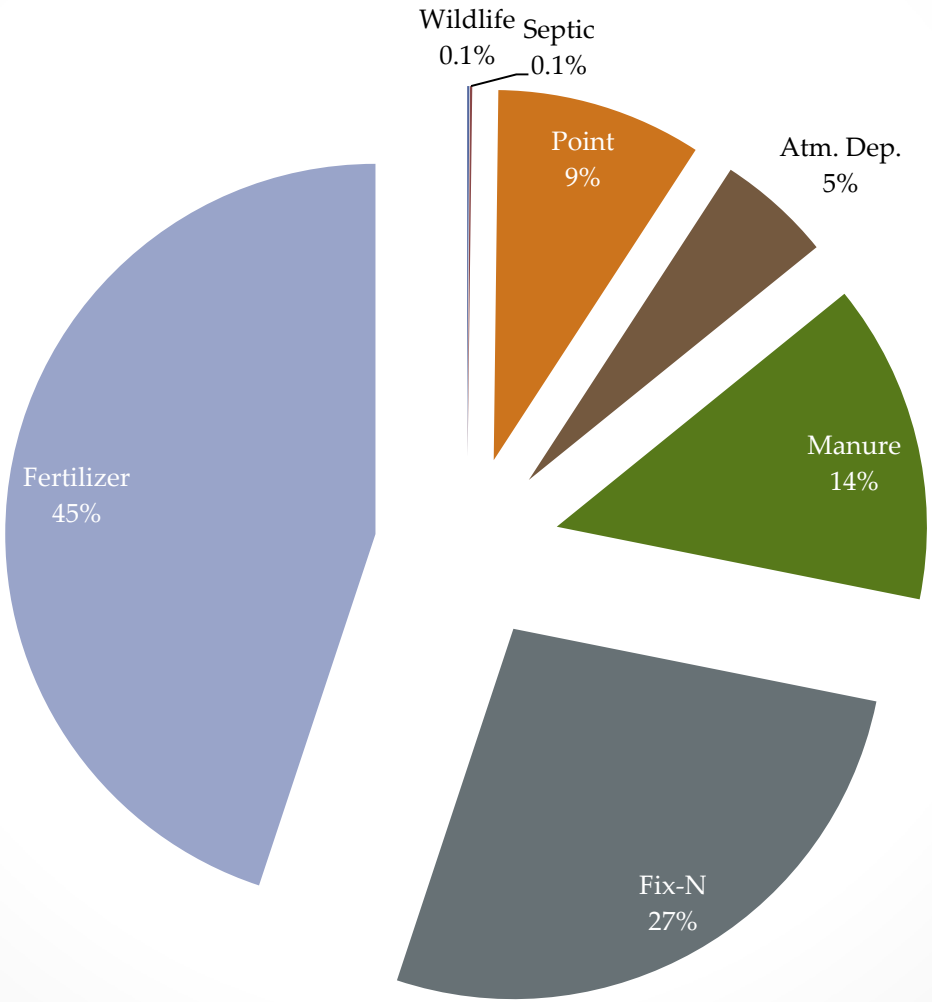
NO_3^-

$NH_3/NH4^+$

What form(s) of nitrogen do we use in Iowa?



Nitrogen allocation in Cedar River watershed



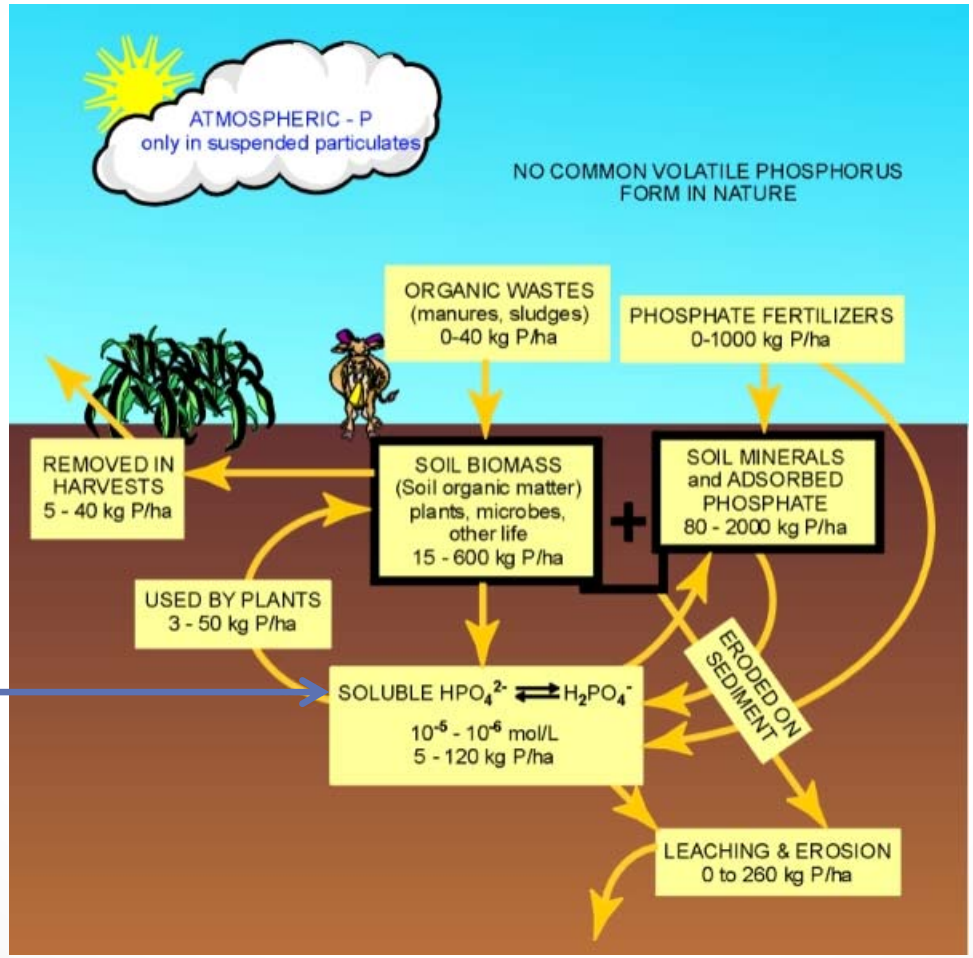
Standards?

Drinking water standard: 10 mg NO_3^--N/liter

Standard for aquatic life?

- What levels result in negative impacts on aquatic community?
  - Usually looking at excessive algal growth
- EPA (2000): For ecoregion 47 (Western Corn Belt Plains), TN is given at 2.615 mg/L, with NO_2 + NO_3 at 1.965 mg/L
- Minnesota (draft 2014 nitrate): < 4.9 mg/L "good"; >4.9 mg/L "poor"

Phosphorus cycle



DRP vs. Total P

Standards?

No drinking water standard for phosphorus

Standard for aquatic life?

- What levels result in negative impacts on aquatic community?
  - Usually looking at excessive algal growth
- EPA (2000): ecoregion 47 (Western Corn Belt Plains), TP is given at 118.3 μg/L (0.118 mg P/L) – 363.2 mg/L as PO_4^{3-}(0.363 mg PO4/L)
- Minnesota (proposed): 0.150 mg/L TP
- Wisconsin (final): 0.075 mg/L TP

What do we do about nutrients?

Iowa Nutrient Reduction Strategy

- Extensive review of research
- Applied to Iowa with specifics
- List of possible strategies
  - Precision farming
    - Location
    - Timing
  - Buffers
  - Biofilters
  - Cover crops
  - Many more…
- Voluntary implementation
- Some support for cost sharing
- Also includes point source reductions

Sediment

Total suspended sediment is a measurement of undissolved solids carried in the water

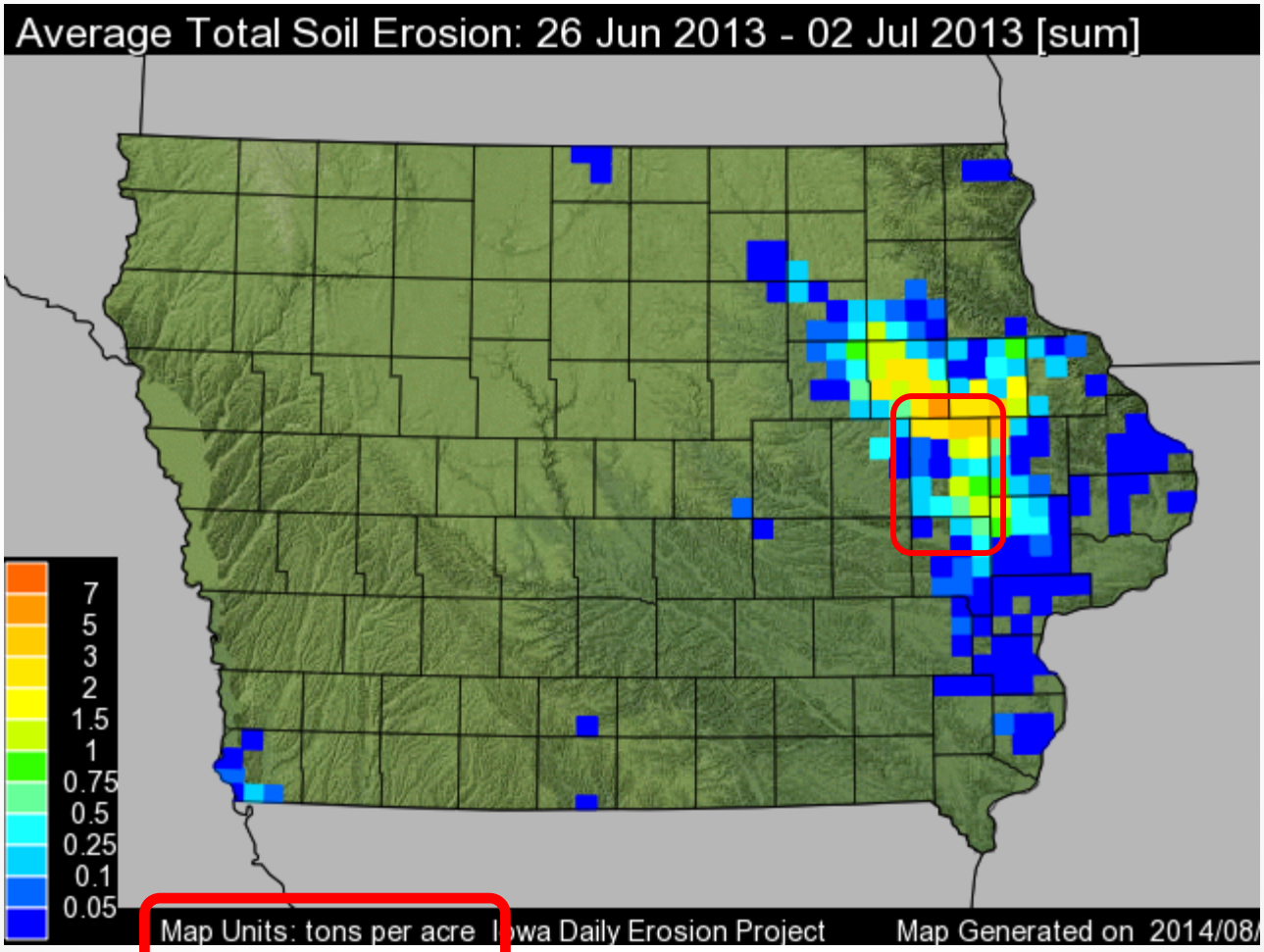
- Related to turbidity – cloudiness in the water

Problems

- Fills in spaces between rocks, which
  - Reduces habitat
  - Reduces availability of oxygen
- Carries phosphorus

Sediment sources

owa Daily Erosion Project



Stream restoration

E. coli

Escherichia coli - indicator organism

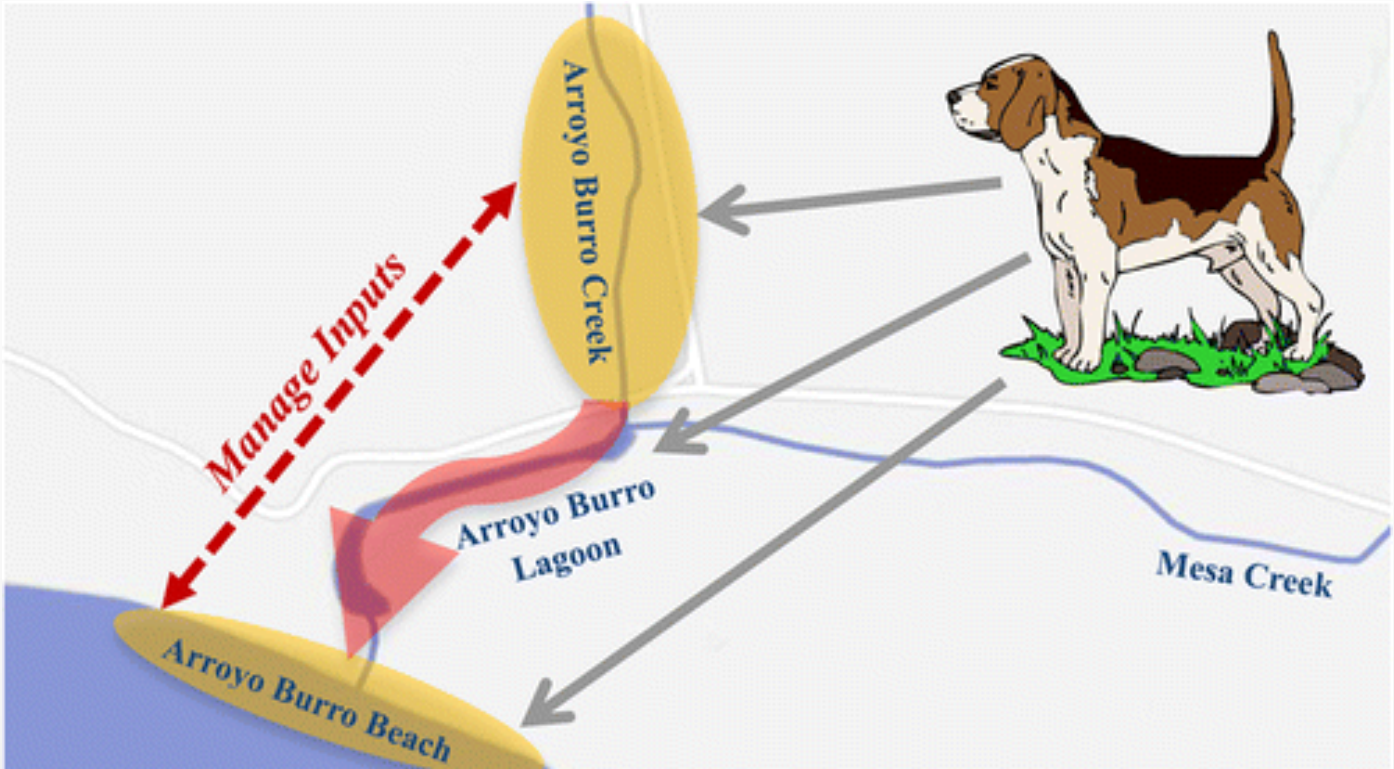
- Found in intestinal tract of mammals
- May not be pathogenic, but indicates the possible presence of organisms which are disease-causing

Possible sources

- Wildlife
  - Geese
- Pet waste
  - Dogs
- Livestock waste
- Human waste
  - Septic systems

"Microbial Source Tracking in a Coastal California Watershed Reveals Canines as Controllable Sources of Fecal Contamination"

Environ. Sci. Technol., Article ASAP; Publication Date (Web): July 23, 2014



How do these things get to the water?

Nitrate

- Very soluble in water – dissolves in water flowing through the soil, and thus is often found in tile drainage

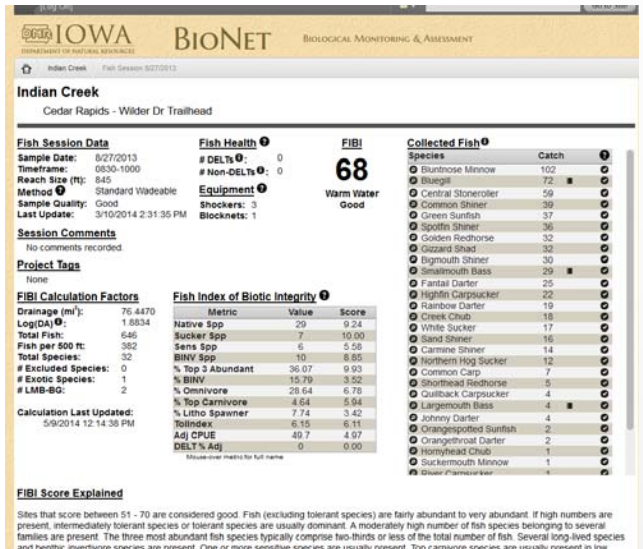
Phosphate, bacteria, sediment

- All tend to move in runoff across the surface. Phosphate is often attached to soil particles (though some dissolves in water as well).

What about everything else?

Biological assessment

- Assess how many and what types of organisms are in a given reach of stream
  - Fish
  - Insects
- Are the organisms typical of a stream with good water quality or a stream with poor water quality?
- Algorithm to generate a quantitative score



IOWA BioNET Biological Monitoring & Assessment

Indian Creek

Cedar Rapids - Wilder Dr Trailhead

Fish Session Data

Sample Date:	8/27/2013
Timeframe:	0830-1000
Reach Size (ft):	845
Method:	Standard Wadeable
Sample Quality:	Good
Last Update:	3/10/2014 2:31:35 PM

Fish Health

DELTs: 0
Non-DELTs: 0

Equipment

Shockers: 3
Blocknets: 1

FIBI

68

Warm Water
Good

Session Comments

No comments recorded.

Project Tags

None

FIBI Calculation Factors

Drainage (mi²):	76.4470
Log(DA):	1.8834
Total Fish:	646
Fish per 500 ft:	382
Total Species:	32
# Excluded Species:	0
# Exotic Species:	1
# LMB-BG:	2

Calculation Last Updated: 5/9/2014 12:14:38 PM

Fish Index of Biotic Integrity

Metric	Value	Score
Native Spp	29	9.24
Sucker Spp	7	10.00
Sens Spp	6	5.58
BINV Spp	10	8.85
% Top 3 Abundant	36.07	9.93
% BINV	15.79	3.52
% Omnivore	28.64	6.78
% Top Carnivore	4.64	5.94
% Litho Spawner	7.74	3.42
Tolindex	6.15	6.11
Adj CPUE	49.7	4.97
DELT % Adj	0	0.00

Mouse-over metric for full name

Collected Fish

Species	Catch
Bluntnose Minnow	102
Bluegill	72
Central Stoneroller	59
Common Shiner	39
Green Sunfish	37
Spottin Shiner	36
Golden Redhorse	32
Gizzard Shad	32
Bigmouth Shiner	30
Smallmouth Bass	29
Fantail Darter	25
Highfin Carpsucker	22
Rainbow Darter	19
Creek Chub	18
White Sucker	17
Sand Shiner	16
Carmine Shiner	14
Northern Hog Sucker	12
Common Carp	7
Shorthead Redhorse	5
Quillback Carpsucker	4
Largemouth Bass	4
Johnny Darter	4
Orangespotted Sunfish	2
Orangethroat Darter	2
Hornyhead Chub	1
Suckermouth Minnow	1

FIBI Score Explained

Sites that score between 51 - 70 are considered good. Fish (excluding tolerant species) are fairly abundant to very abundant. If high numbers are present, intermediately tolerant species or tolerant species are usually dominant. A moderately high number of fish species belonging to several families are present. The three most abundant fish species typically comprise two-thirds or less of the total number of fish. Several long-lived species

Other issues

Microcystins

- DNR monitors beaches in the summer

Neonicotinoids

- Recently found at low levels in many Iowa rivers

PCPPs

- Pharmaceutical and personal care products

Indian Creek Watershed Assessment – Water Quality

Marty St. Clair
Coe College
August 13, 2014

Coe College

Indian Creek
Watershed Management Authority

2013

2014

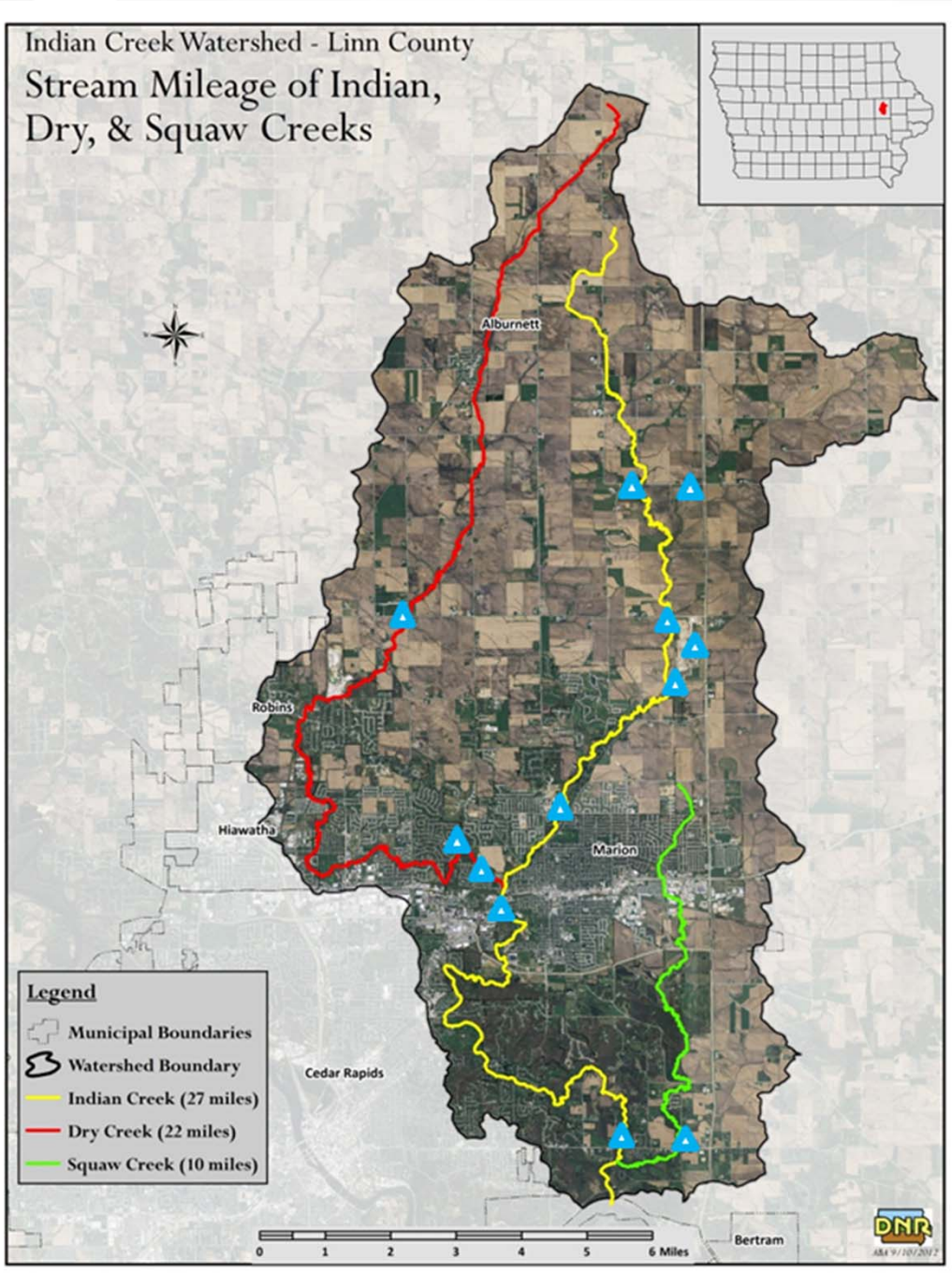
Support provided by:
- Indian Creek Watershed Management Authority
- City of Cedar Rapids Utilities
- Iowa Department of Natural Resources Ambient Stream Monitoring Program
- Coe College – student housing and Mehaffy endowment

Indian Creek water quality

- March to November 2013
- Weekly/twice weekly sampling
- 12 sites
  - Total of ~7000 data points
- Measurement of dissolved oxygen, pH, conductivity, temperature, and turbidity on site
- Chloride, sulfate, nitrate, dissolved reactive phosphorus, total suspended solids, and *E. coli* in the laboratory

Dry County Home

Dry Boyson
Dry Donnelly



Austin W and E

IC County Home
Hwy. 13
Artesian

ICLM

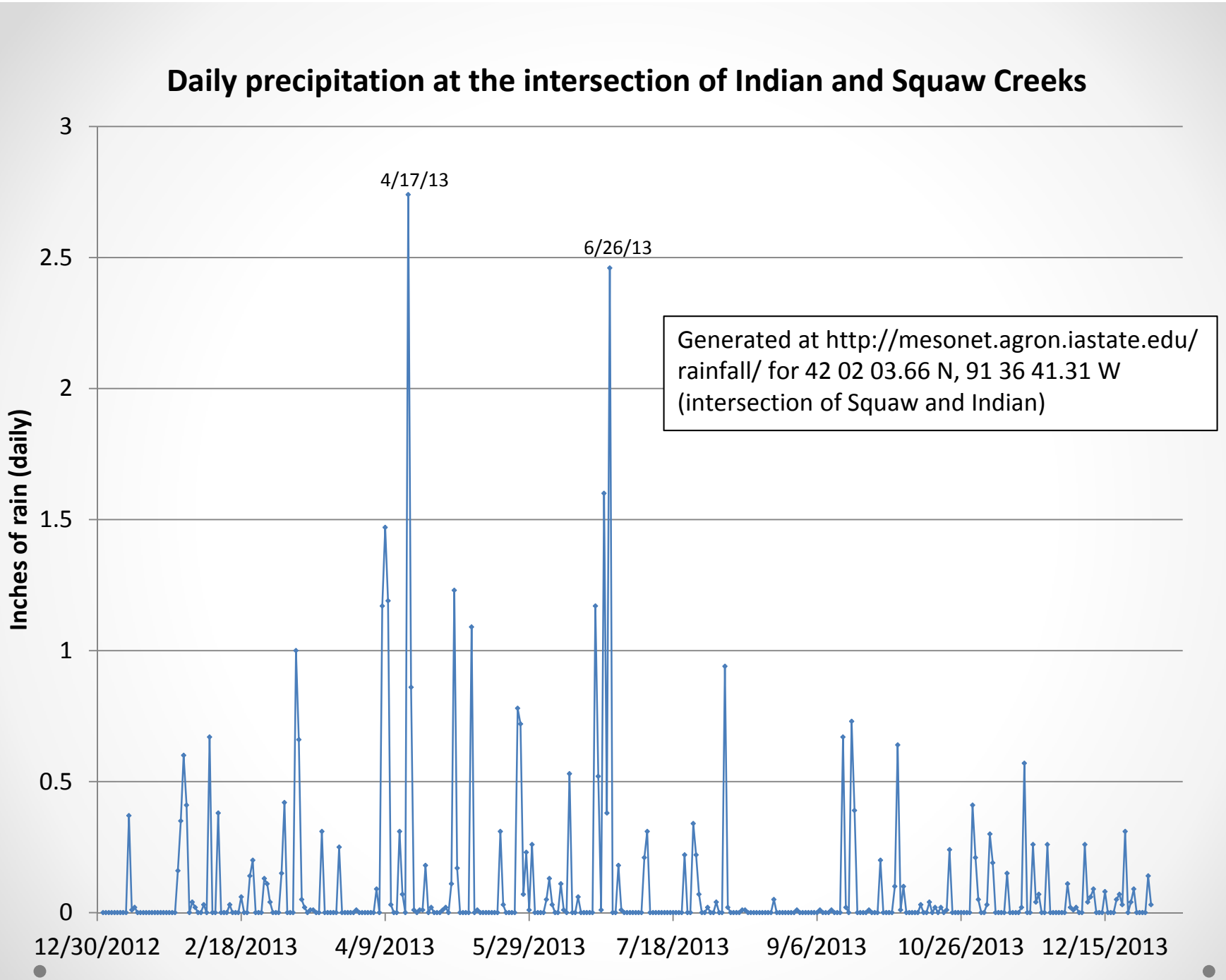
IC Thomas (USGS)

Squaw
ICS

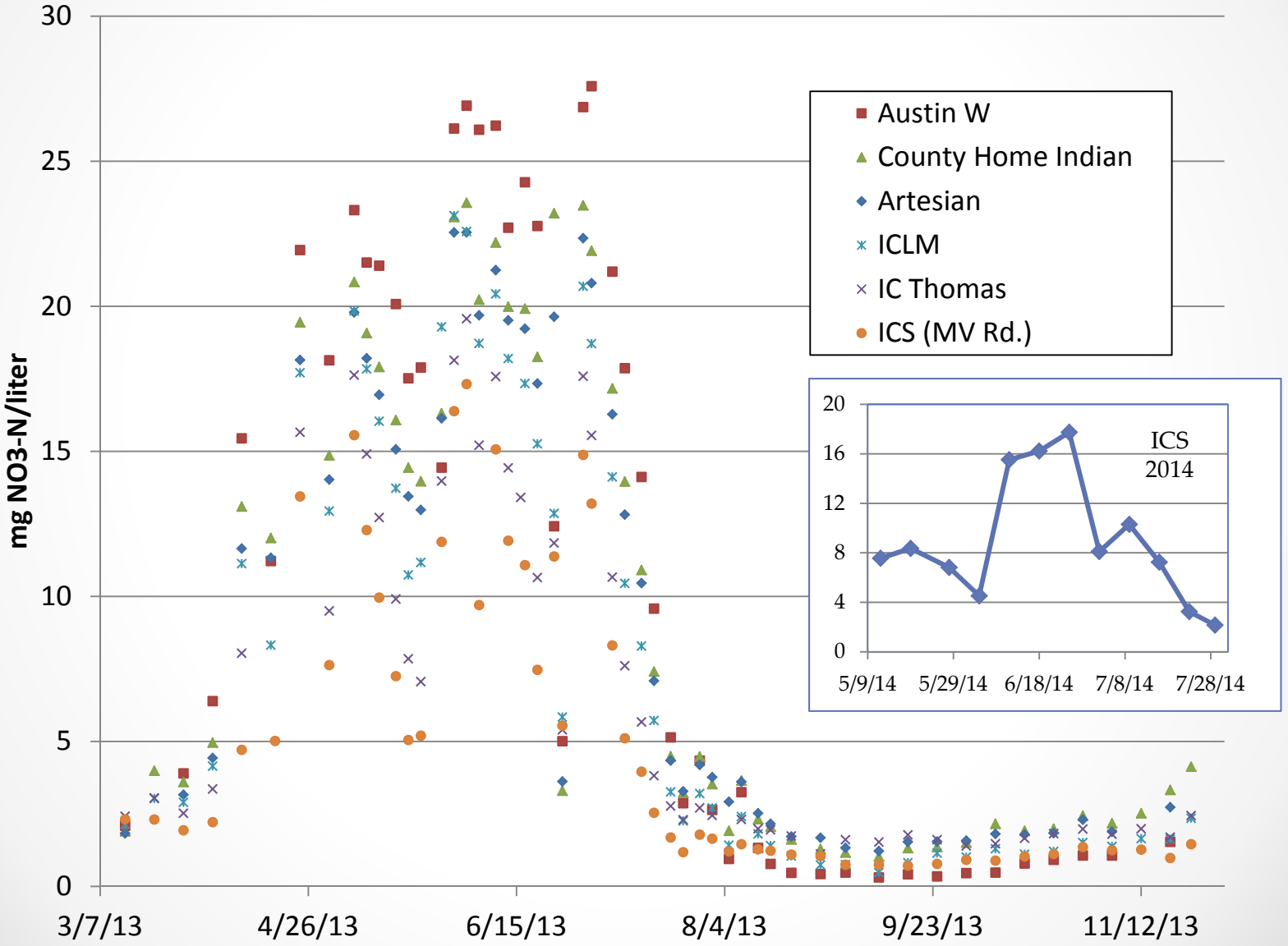
Historical precipitation

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
2004	0.76	1.72	3.75	1.21	10.09	3.87	1.52	4.97	0.58	3.05	2.42	1.13	35.07
2005	1.96	1.33	0.98	2.29	4.23	3.25	2.13	2.81	3.73	0.67	2.68	1.48	27.54
2006	2.20	0.40	3.04	4.26	2.48	3.98	3.62	5.55	2.52	2.54	2.11	2.23	34.93
2007	0.94	1.61	3.36	4.08	3.66	5.11	4.69	6.04	2.96	4.81	0.17	3.43	40.86
2008	1.09	2.81	2.01	7.22	6.42	9.50	7.45	3.00	4.93	1.39	1.78	2.43	50.03
2009	0.96	0.85	3.19	3.19	2.71	4.08	6.34	13.03	1.18	7.30	1.52	3.08	47.43
2010	1.69	0.74	1.40	4.37	3.34	9.18	7.38	5.45	5.29	1.15	1.27	1.88	43.14
2011	0.61	1.68	2.22	3.78	3.40	5.98	4.66	3.45	2.11	1.57	3.10	2.80	35.36
2012	1.26	1.10	2.63	3.61	1.36	2.85	1.34	2.97	2.10	3.45	1.76	1.15	25.58
2013	**0.72**	**1.39**	***2.89***	***8.19***	***5.02***	***7.25***	***1.39***	***1.08***	***2.04***	***1.83***	***1.94***	***1.45***	***35.19***
2014	*1.03*	*2.13*	*1.04*	*6.15*	*3.76*	*11.01*	*1.56*						*26.68*

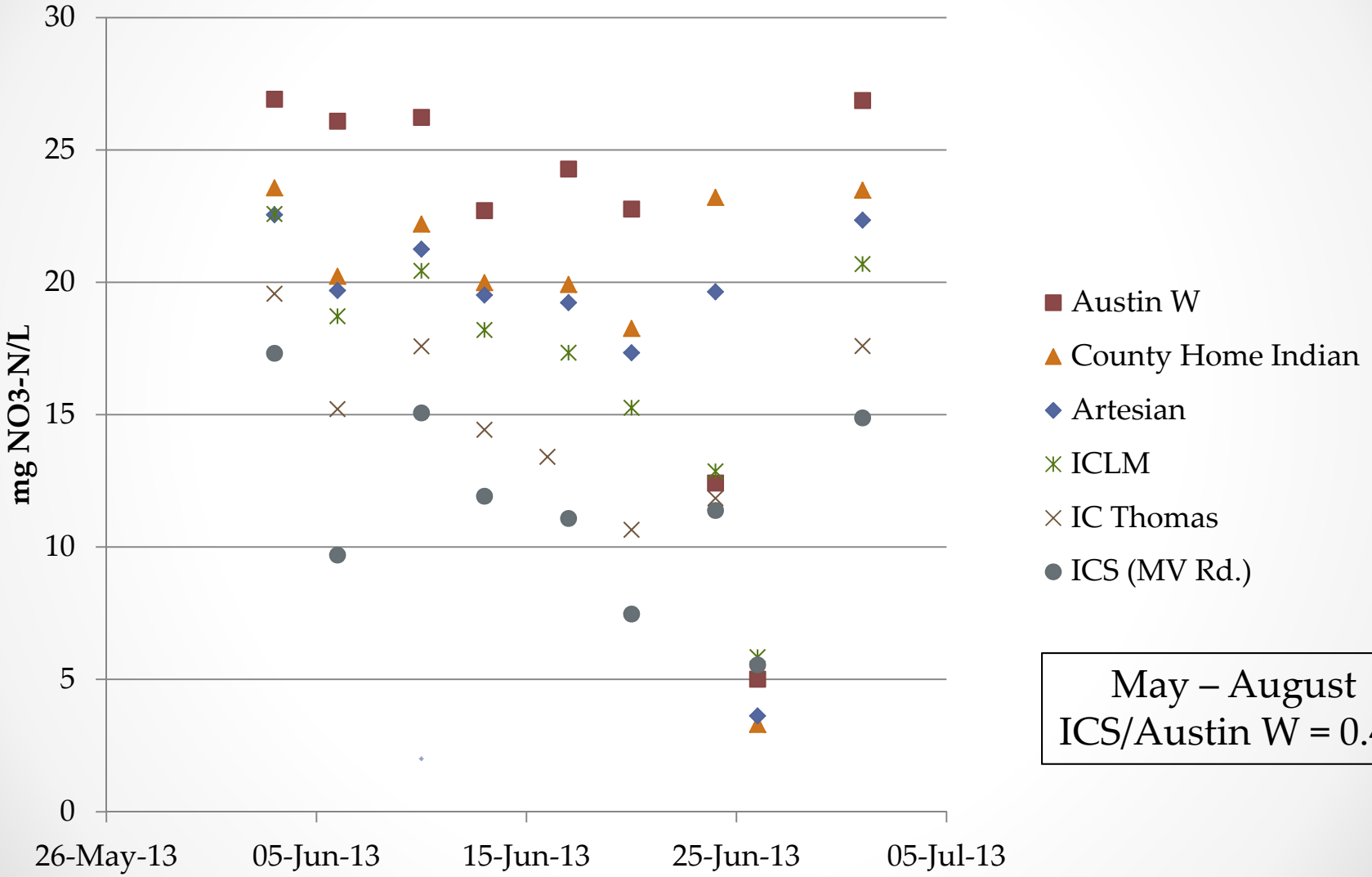
Data in inches; 2004-2012 High Plains Regional Climate Center; 2013-14, Iowa Environmental Mesonet


Daily precipitation at the intersection of Indian and Squaw Creeks
Inches of rain (daily)
3
2.5
2
1.5
1
0.5
0
4/17/13
6/26/13
Generated at http://mesonet.agron.iastate.edu/rainfall/ for 42 02 03.66 N, 91 36 41.31 W (intersection of Squaw and Indian)
12/30/2012
2/18/2013
4/9/2013
5/29/2013
7/18/2013
9/6/2013
10/26/2013
12/15/2013

Nitrate – main stem of Indian Creek

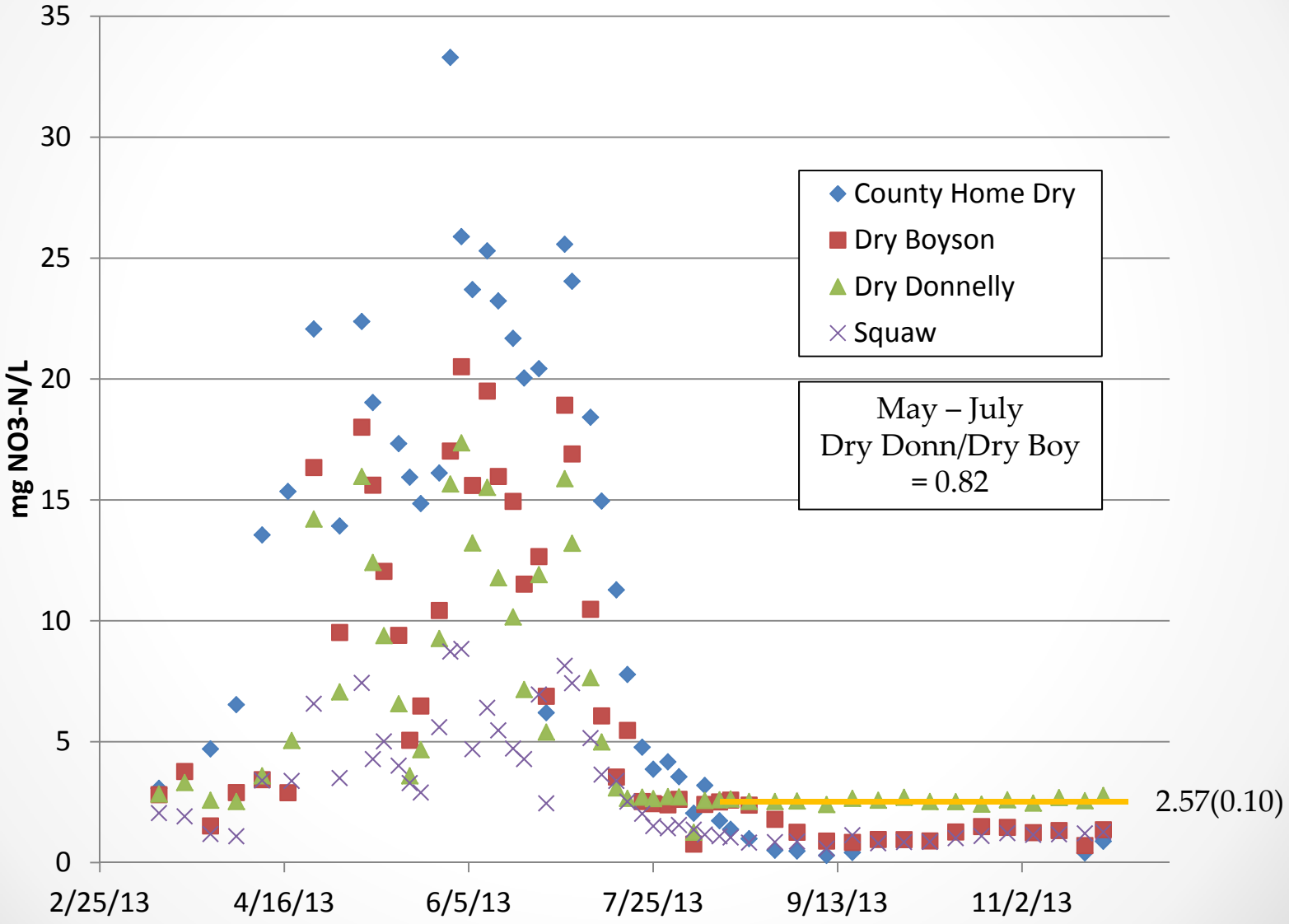


Nitrate – main stem June 2013



May – August
ICS/Austin W = 0.45

Nitrate – Dry Creek and Squaw Creek



N loading

- Need flow (i.e. liters/second) x concentration (mg/liter)
- Better measure of impact of a watershed than concentration
  - Low flow x high concentration may equal relatively little N
- USGS gauge at Thomas Park is best source of flow in Indian Creek watershed
  - Flow every 15 minutes
- Use flow measurements combined with grab samples to get loading from March to November
- Calculated N loading (March-November) was 23.6 pounds per acre (1,400,000 lbs. total)
  - 2004 nutrient budget reported a range of 3 to 34 lbs./acre
  - Using total area of watershed

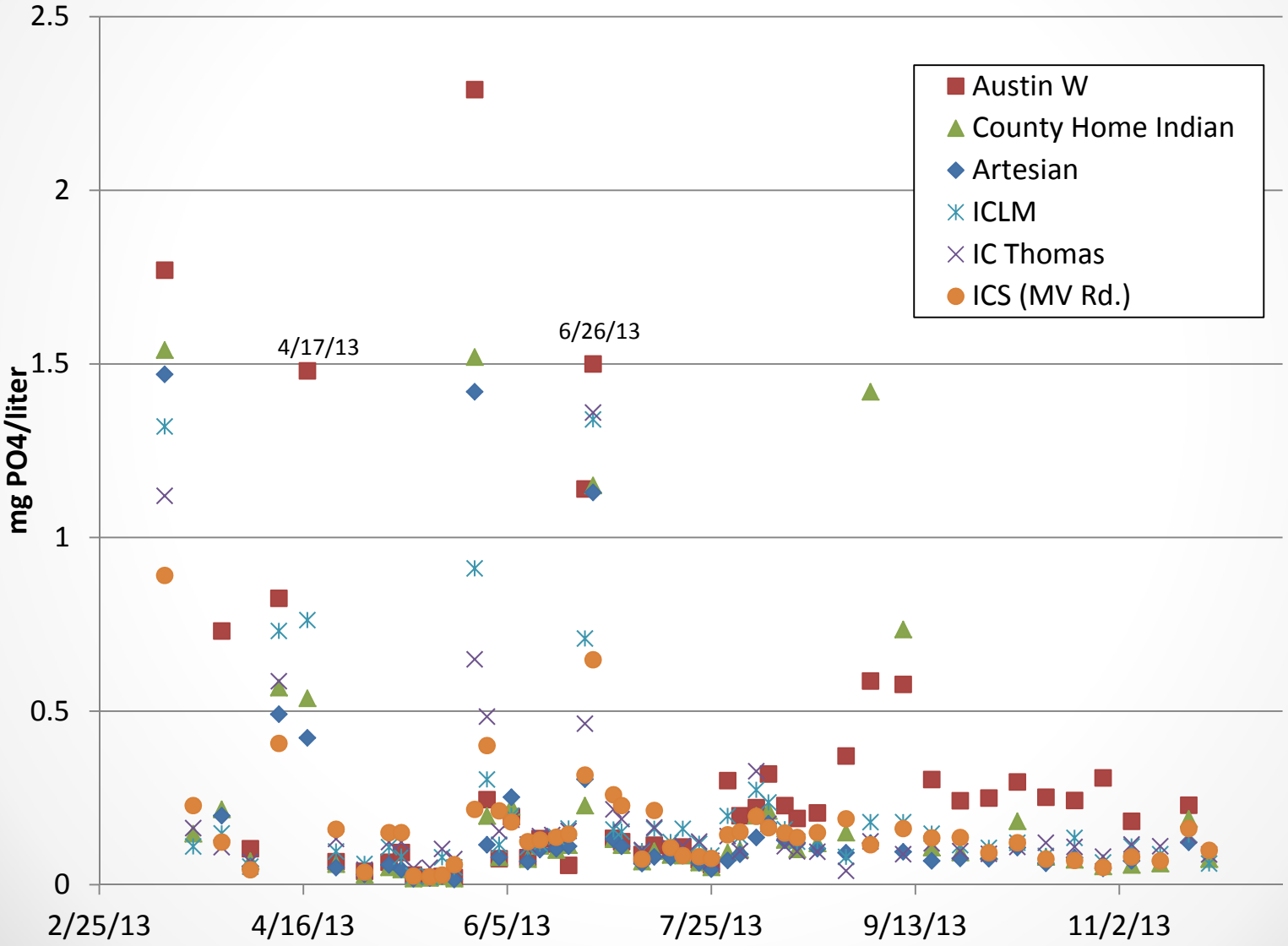
Indian Creek nitrate over time

	2004	2005	2006	2007	2008	2009
ICLM	8.58	4.57	12.01	10.50	12.00	7.44
IC Thomas	6.74	3.96	9.70	8.17	8.35	5.94
Dry Donn	2.64	3.18	5.43	5.32	6.46	NA
ICS	5.83	2.49	7.58	6.17	7.74	4.90

	2010	2011	2012	2013	2014
ICLM	8.95	9.25	3.89	12.01	12.93
IC Thomas	7.28	7.00	3.52	9.62	10.28
Dry Donn	5.83	5.89	2.85	7.89	7.59
ICS	6.02	5.89	2.72	7.75	8.40

May – August averages of NO_3-N (mg/L)

Dissolved reactive phosphorus



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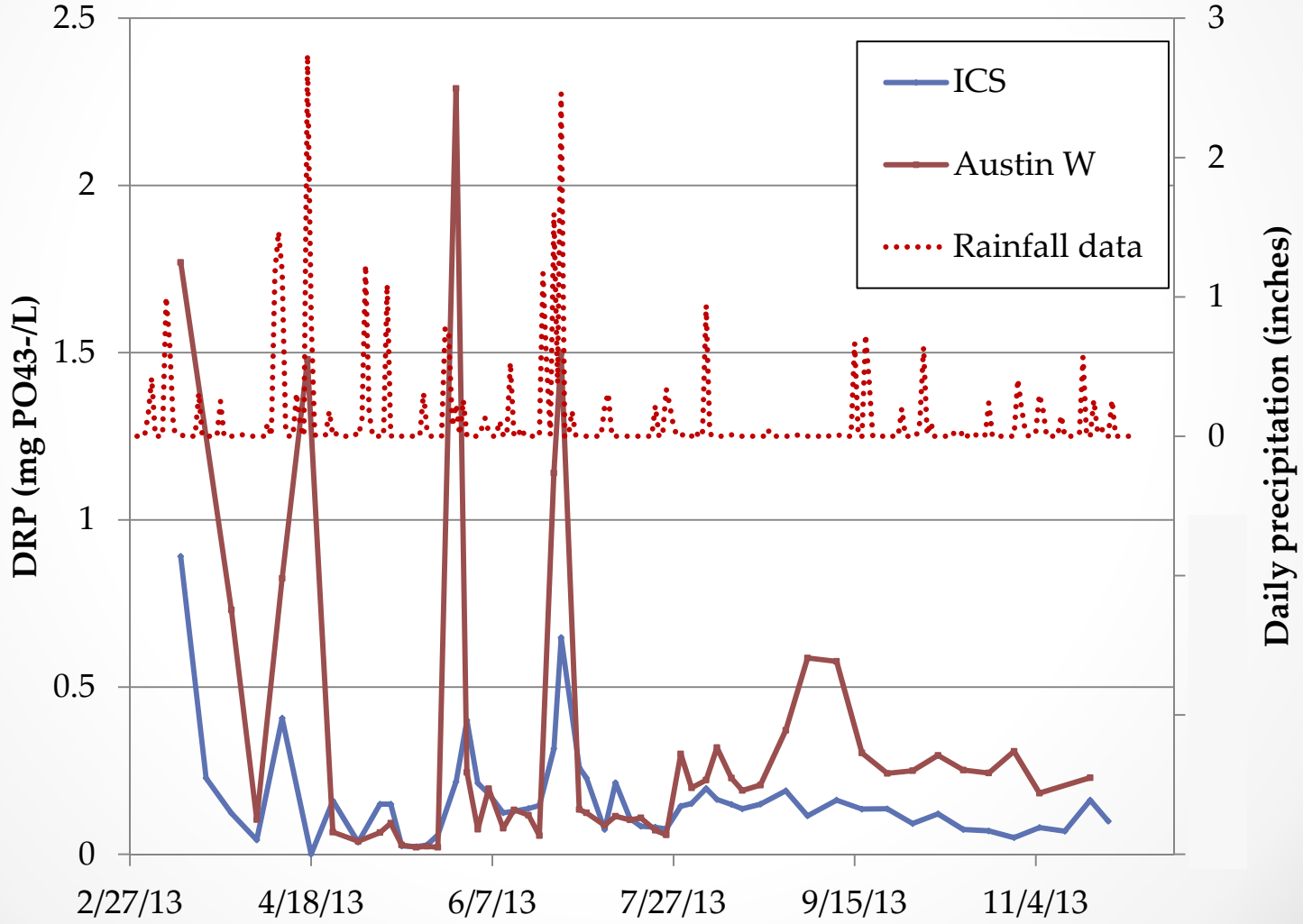
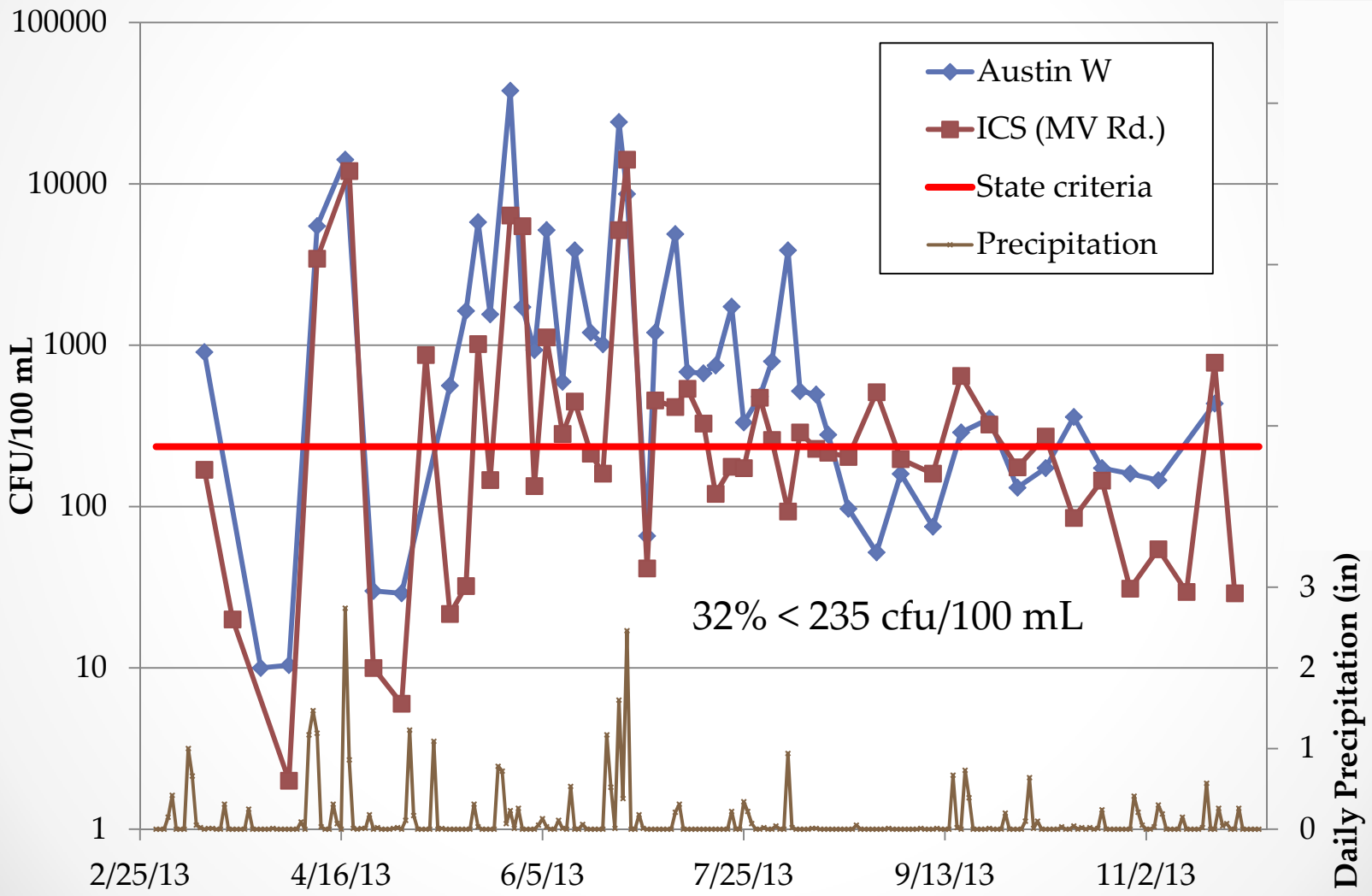


P loading

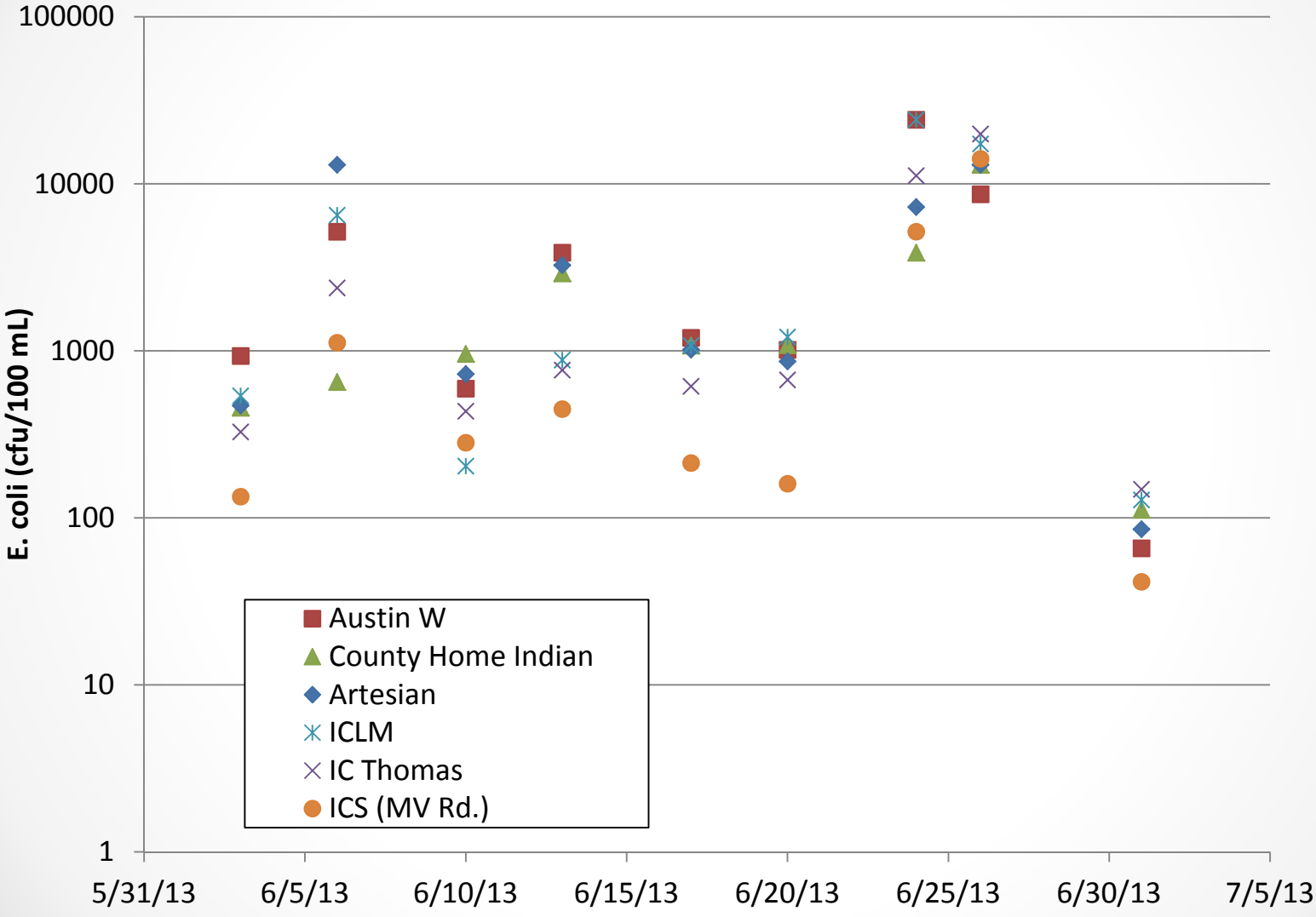
- Again, using USGS gauge information at Thomas Park for flow data
- DRP reported as PO_4^{3-} → convert to P
- 0.271 lb of P (in the form of DRP)/acre
  - Using total area of watershed
- For comparison purposes, range of total P/acre in the 2004 IDNR Nutrient Budget was 0.3 to 3.2 pounds/acre
- In a different study, we are measuring both DRP and total P; total P is, on average, 1.92 times higher than DRP
- Applying this factor gives an *estimated* total P loading of 0.52 pounds total P/acre from March to November (31,000 pounds total)

E. coli in Indian Creek



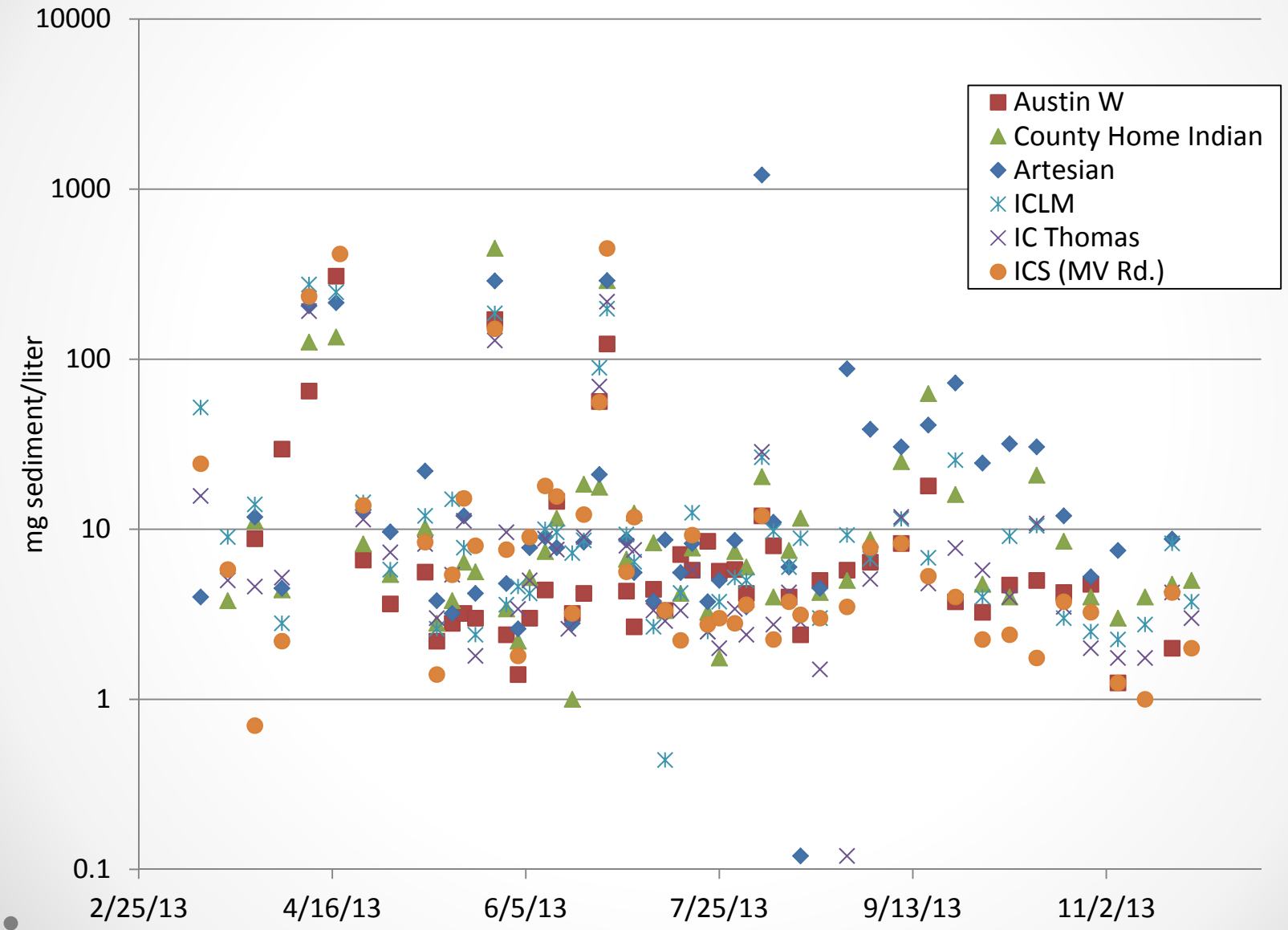
Note – log 10 scale

E. coli in Indian Creek



Note – log 10 scale

TSS



Note – log 10 scale

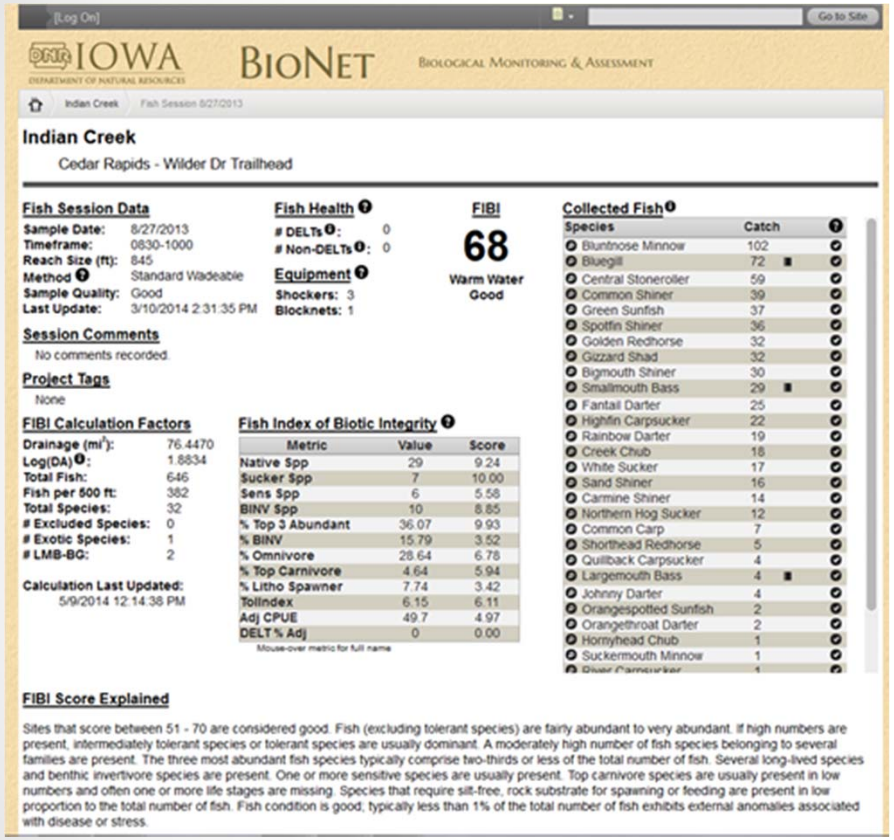
Sediment loading

- Again, using USGS gauge information at Thomas Park for flow data
- Works out to 64.9 lbs./acre March to November
- Averaged over watershed (including impermeable surfaces)

Biological assessement

- Carried out by staff from the State Hygienic lab
- Data available at IDNR's Bionet web site
  - https://programs.iowadnr.gov/bionet/
- Assessment of
  - Fish population
  - Invertebrate population
  - Habitat
- Converted to a quantitative score

Biological assessment



IOWA DNR — BioNET — Biological Monitoring & Assessment

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TolIndex	6.15	6.11
Adj CPUE	49.7	4.97
DELT % Adj	0	0.00

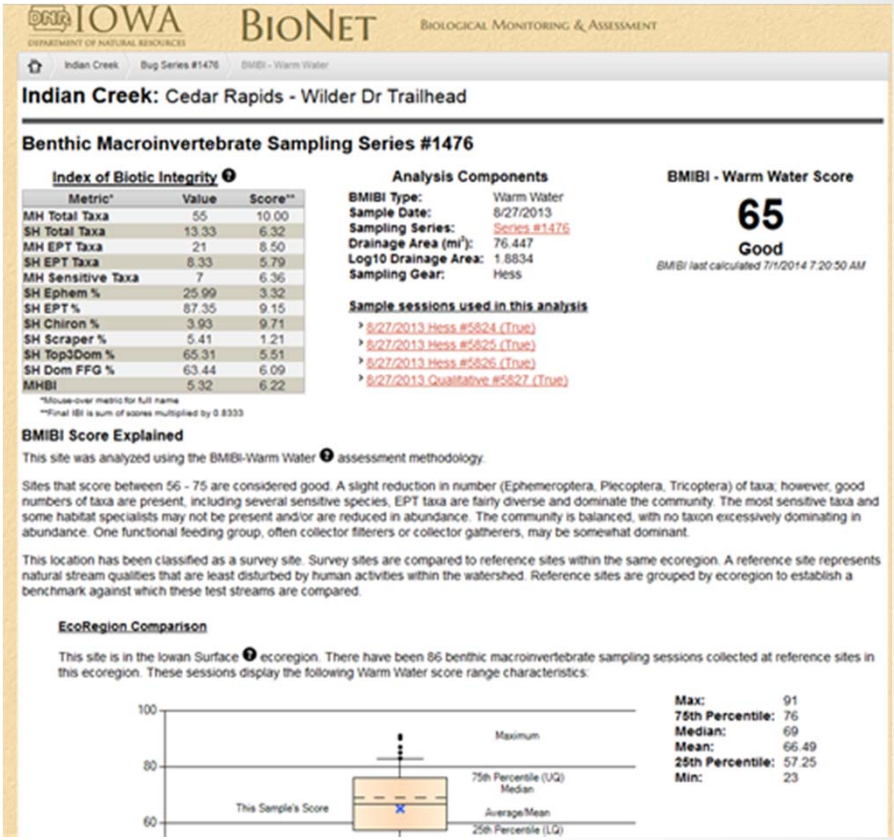
Mouse-over metric for full name

Collected Fish

Species	Catch
Bluntnose Minnow	102
Bluegill	72
Central Stoneroller	59
Common Shiner	39
Green Sunfish	37
Spottin Shiner	36
Golden Redhorse	32
Gizzard Shad	32
Bigmouth Shiner	30
Smallmouth Bass	29
Fantail Darter	25
Highfin Carpsucker	22
Rainbow Darter	19
Creek Chub	18
White Sucker	17
Sand Shiner	16
Carmine Shiner	14
Northern Hog Sucker	12
Common Carp	7
Shorthead Redhorse	5
Quillback Carpsucker	4
Largemouth Bass	4
Johnny Darter	4
Orangespotted Sunfish	2
Orangethroat Darter	2
Hornyhead Chub	1
Suckermouth Minnow	1
River Carpsucker	1

FIBI Score Explained

Sites that score between 51 - 70 are considered good. Fish (excluding tolerant species) are fairly abundant to very abundant. If high numbers are present, intermediately tolerant species or tolerant species are usually dominant. A moderately high number of fish species belonging to several families are present. The three most abundant fish species typically comprise two-thirds or less of the total number of fish. Several long-lived species and benthic invertivore species are present. One or more sensitive species are usually present. Top carnivore species are usually present in low numbers and often one or more life stages are missing. Species that require silt-free, rock substrate for spawning or feeding are present in low proportion to the total number of fish. Fish condition is good; typically less than 1% of the total number of fish exhibits external anomalies associated with disease or stress.



IOWA DNR — BioNET — Biological Monitoring & Assessment

Indian Creek: Cedar Rapids - Wilder Dr Trailhead

Benthic Macroinvertebrate Sampling Series #1476

Index of Biotic Integrity

Metric*	Value	Score**
MH Total Taxa	55	10.00
SH Total Taxa	13.33	6.32
MH EPT Taxa	21	8.50
SH EPT Taxa	8.33	5.79
MH Sensitive Taxa	7	6.36
SH Ephem %	25.99	3.32
SH EPT %	87.35	9.15
SH Chiron %	3.93	9.71
SH Scraper %	5.41	1.21
SH Top3Dom %	65.31	5.51
SH Dom FFG %	63.44	6.09
MHBI	5.32	6.22

*Mouse-over metric for full name
**Final IBI is sum of scores multiplied by 0.8333

Analysis Components

BMIBI Type:	Warm Water
Sample Date:	8/27/2013
Sampling Series:	Series #1476
Drainage Area (mi²):	76.447
Log10 Drainage Area:	1.8834
Sampling Gear:	Hess

Sample sessions used in this analysis

- 8/27/2013 Hess #5824 (True)
- 8/27/2013 Hess #5825 (True)
- 8/27/2013 Hess #5826 (True)
- 8/27/2013 Qualitative #5827 (True)

BMIBI - Warm Water Score

65

Good

BMIBI last calculated 7/1/2014 7:20:50 AM

BMIBI Score Explained

This site was analyzed using the BMIBI-Warm Water assessment methodology.

Sites that score between 56 - 75 are considered good. A slight reduction in number (Ephemeroptera, Plecoptera, Tricoptera) of taxa; however, good numbers of taxa are present, including several sensitive species. EPT taxa are fairly diverse and dominate the community. The most sensitive taxa and some habitat specialists may not be present and/or are reduced in abundance. The community is balanced, with no taxon excessively dominating in abundance. One functional feeding group, often collector filterers or collector gatherers, may be somewhat dominant.

This location has been classified as a survey site. Survey sites are compared to reference sites within the same ecoregion. A reference site represents natural stream qualities that are least disturbed by human activities within the watershed. Reference sites are grouped by ecoregion to establish a benchmark against which these test streams are compared.

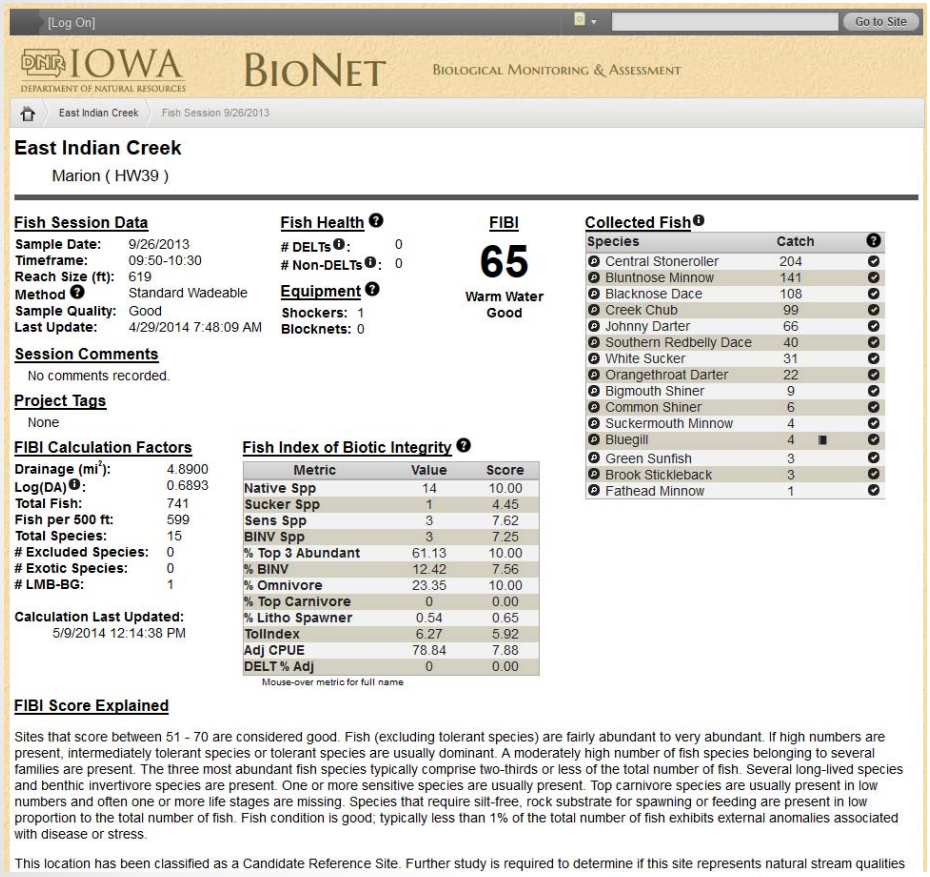
EcoRegion Comparison

This site is in the Iowan Surface ecoregion. There have been 86 benthic macroinvertebrate sampling sessions collected at reference sites in this ecoregion. These sessions display the following Warm Water score range characteristics:

Max:	91
75th Percentile:	76
Median:	69
Mean:	66.49
25th Percentile:	57.25
Min:	23

West of Cottage Grove Parkway, south of Hwy. 100

Biological assessment



[Log On] Go to Site

DNR IOWA DEPARTMENT OF NATURAL RESOURCES BIONET BIOLOGICAL MONITORING & ASSESSMENT

East Indian Creek | Fish Session 9/26/2013

East Indian Creek

Marion (HW39)

Fish Session Data

Sample Date:	9/26/2013
Timeframe:	09:50-10:30
Reach Size (ft):	619
Method	Standard Wadeable
Sample Quality:	Good
Last Update:	4/29/2014 7:48:09 AM

Fish Health

# DELTs:	0
# Non-DELTs:	0

Equipment

Shockers: 1
Blocknets: 0

FIBI

65

Warm Water
Good

Collected Fish

Species	Catch
Central Stoneroller	204
Bluntnose Minnow	141
Blacknose Dace	108
Creek Chub	99
Johnny Darter	66
Southern Redbelly Dace	40
White Sucker	31
Orangethroat Darter	22
Bigmouth Shiner	9
Common Shiner	6
Suckermouth Minnow	4
Bluegill	4
Green Sunfish	3
Brook Stickleback	3
Fathead Minnow	1

Session Comments

No comments recorded.

Project Tags

None

FIBI Calculation Factors

Drainage (mi²):	4.8900
Log(DA):	0.6893
Total Fish:	741
Fish per 500 ft:	599
Total Species:	15
# Excluded Species:	0
# Exotic Species:	0
# LMB-BG:	1

Calculation Last Updated:
5/9/2014 12:14:38 PM

Fish Index of Biotic Integrity

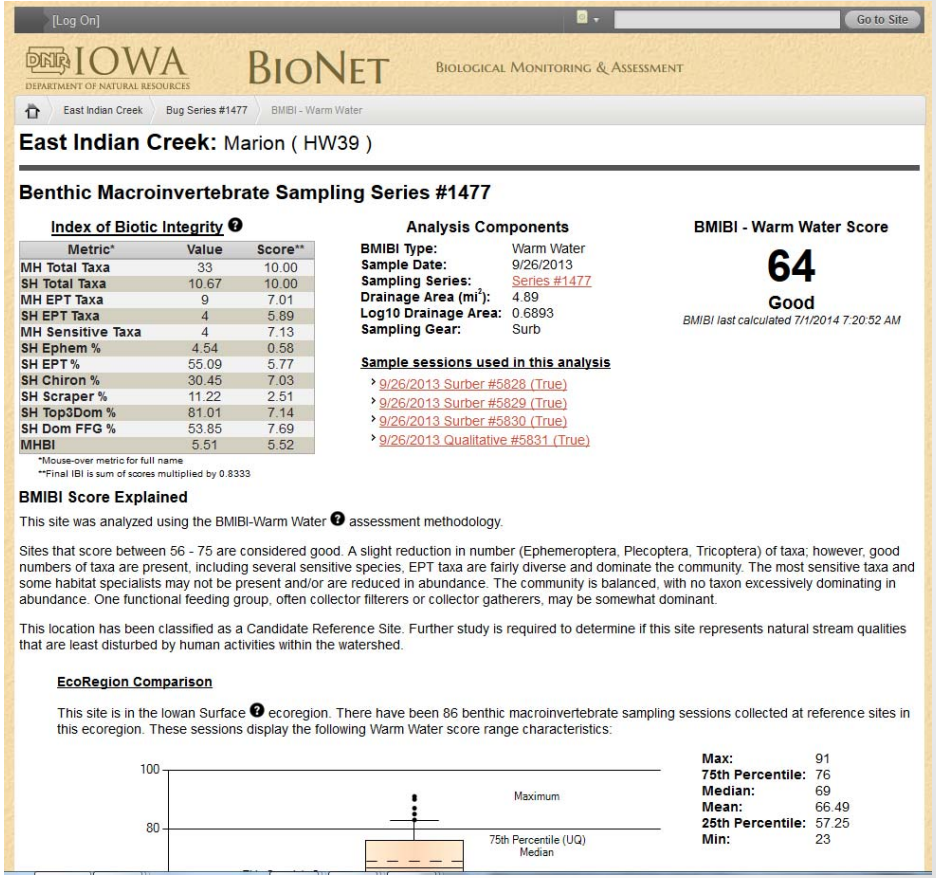
Metric	Value	Score
Native Spp	14	10.00
Sucker Spp	1	4.45
Sens Spp	3	7.62
BINV Spp	3	7.25
% Top 3 Abundant	61.13	10.00
% BINV	12.42	7.56
% Omnivore	23.35	10.00
% Top Carnivore	0	0.00
% Litho Spawner	0.54	0.65
TolIndex	6.27	5.92
Adj CPUE	78.84	7.88
DELT % Adj	0	0.00

Mouse-over metric for full name

FIBI Score Explained

Sites that score between 51 - 70 are considered good. Fish (excluding tolerant species) are fairly abundant to very abundant. If high numbers are present, intermediately tolerant species or tolerant species are usually dominant. A moderately high number of fish species belonging to several families are present. The three most abundant fish species typically comprise two-thirds or less of the total number of fish. Several long-lived species and benthic invertivore species are present. One or more sensitive species are usually present. Top carnivore species are usually present in low numbers and often one or more life stages are missing. Species that require silt-free, rock substrate for spawning or feeding are present in low proportion to the total number of fish. Fish condition is good; typically less than 1% of the total number of fish exhibits external anomalies associated with disease or stress.

This location has been classified as a Candidate Reference Site. Further study is required to determine if this site represents natural stream qualities



[Log On] Go to Site

DNR IOWA DEPARTMENT OF NATURAL RESOURCES BIONET BIOLOGICAL MONITORING & ASSESSMENT

East Indian Creek | Bug Series #1477 | BMIBI - Warm Water

East Indian Creek: Marion (HW39)

Benthic Macroinvertebrate Sampling Series #1477

Index of Biotic Integrity

Metric*	Value	Score**
MH Total Taxa	33	10.00
SH Total Taxa	10.67	10.00
MH EPT Taxa	9	7.01
SH EPT Taxa	4	5.89
MH Sensitive Taxa	4	7.13
SH Ephem %	4.54	0.58
SH EPT %	55.09	5.77
SH Chiron %	30.45	7.03
SH Scraper %	11.22	2.51
SH Top3Dom %	81.01	7.14
SH Dom FFG %	53.85	7.69
MHBI	5.51	5.52

*Mouse-over metric for full name
**Final IBI is sum of scores multiplied by 0.8333

Analysis Components

BMIBI Type:	Warm Water
Sample Date:	9/26/2013
Sampling Series:	Series #1477
Drainage Area (mi²):	4.89
Log10 Drainage Area:	0.6893
Sampling Gear:	Surb

Sample sessions used in this analysis

- 9/26/2013 Surber #5828 (True)
- 9/26/2013 Surber #5829 (True)
- 9/26/2013 Surber #5830 (True)
- 9/26/2013 Qualitative #5831 (True)

BMIBI - Warm Water Score

64

Good

BMIBI last calculated 7/1/2014 7:20:52 AM

BMIBI Score Explained

This site was analyzed using the BMIBI-Warm Water assessment methodology.

Sites that score between 56 - 75 are considered good. A slight reduction in number (Ephemeroptera, Plecoptera, Tricoptera) of taxa; however, good numbers of taxa are present, including several sensitive species, EPT taxa are fairly diverse and dominate the community. The most sensitive taxa and some habitat specialists may not be present and/or are reduced in abundance. The community is balanced, with no taxon excessively dominating in abundance. One functional feeding group, often collector filterers or collector gatherers, may be somewhat dominant.

This location has been classified as a Candidate Reference Site. Further study is required to determine if this site represents natural stream qualities that are least disturbed by human activities within the watershed.

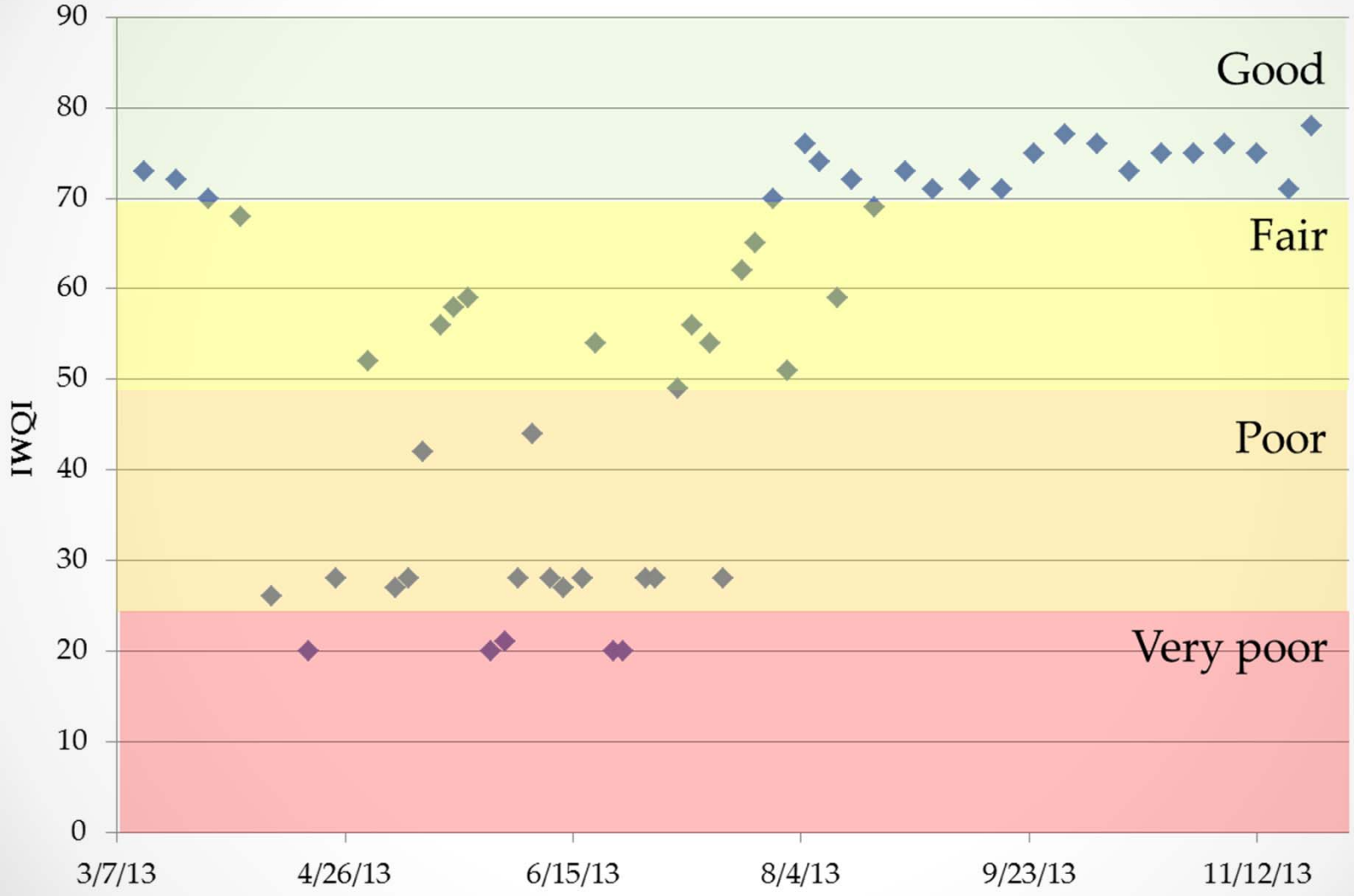
EcoRegion Comparison

This site is in the Iowan Surface ecoregion. There have been 86 benthic macroinvertebrate sampling sessions collected at reference sites in this ecoregion. These sessions display the following Warm Water score range characteristics:

Max:	91
75th Percentile:	76
Median:	69
Mean:	66.49
25th Percentile:	57.25
Min:	23

East of Hwy. 13 near Indian Bridge Road

Iowa Water Quality Index – ICS (MV Rd.)



Indian Creek
Watershed Management Authority

Water Quality Goals: Input Form

If you were unable to attend the "Indian Creek Watershed Plan - Water Quality Goals: Lunch, Learn & Input Session" on Wednesday, August 13th or would like to provide additional information, please fill out this form, save it and e-mail it to jennifer.fencl@ecicog.org.

Water Quality Chapter of the Indian Creek Watershed Management Plan

Goal 1: In line with the Iowa Nutrient Reduction Strategy non-point source reduction goals, encourage and implement practices to reduce concentrations of nitrogen by 41% and phosphorus by 29% in the Indian Creek Watershed over the next 20 years.

Please provide your reaction, thoughts, ideas, and suggested action steps for this goal below. Consider adding ideas using the following framework:
- Education / Communication
- Policy
- Practices
- Measure / Monitor

Water Quality Chapter of the
Indian Creek Watershed Management Plan

Goal 2: Reduce sediment loading by 35% in the Indian Creek Watershed over the next 20 years.

Please provide your reaction, thoughts, ideas, and suggested action steps for this goal below. Consider adding ideas using the following framework:
- Education / Communication
- Policy
- Practices
- Measure / Monitor

Water Quality Chapter of the
Indian Creek Watershed Management Plan

Goal 3: Remove Indian Creek and Dry Creeks from the Impaired Waters List.
- Reduce E. coli levels to comply with state standard for swimming /wading

Please provide your reaction, thoughts, ideas, and suggested action steps for this goal below.
Consider adding ideas using the following framework:
- *Education / Communication*
- *Policy*
- *Practices*
- *Measure / Monitor*

Water Quality Chapter of the
Indian Creek Watershed Management Plan

Please provide your general input to the draft goals or the water quality section of the plan.

If you would like to provide additional information or receive future e-mails from the Indian Creek Watershed Management Authority, please fill out the information below.

First Name (optional)

Last Name (optional)

E-mail (optional)

Water Quality Focus Group
August 13, 2014

Summary of Responses & Input

Target Audiences: A full list of attendees is included in this report. In general, the focus group participants represented city & county public works and planning staff; state level staff; agriculture interests; property owners; local college students; conservation interests; civic organizations; and development interests.

Focus group participants were asked to work in small groups and brainstorm strategies for one of the three draft goals presented. The small groups were encouraged to use the framework listed below as a way to group strategies. The small groups reported their ideas to the larger group and consensus formed around the strategies and ideas listed below.

Framework for goals and objectives:

- Education / Communication
- Policy
- Practices
- Measure / Monitor

One small group worked on providing direction for the goals overall utilizing the framework:

1. Education and communication should be targeted to specific audiences
2. Policies should favor incentives over regulation whenever possible
3. Practices should be targeted to the best areas to achieve improvements
4. Establish benchmarks for monitoring & measuring improvements – two examples:
    a. Tracking landuse changes
    b. Tracking agriculture chemicals and lawn care chemicals

Draft Goal 1: In line with the Iowa Nutrient Reduction Strategy non-point source reduction goals, encourage and implement practices to reduce concentrations of nitrogen by 41% and phosphorus by 29% in the Indian Creek Watershed over the next 20 years.

- Agreed with a 20 year plan timeline, but felt strongly that specific goals or implementation strategies be divided into 5 year increments and progress be measured regularly
- At the State level, request $6 million each year for cost share to implement conservation practices
- Tailor BMP / solutions to site specific land contours and soil types
- Encourage precision application of phosphorus
- Utilize bacteria inhibitor for fall application of nitrogen
- Promote view of soil as a whole system / encourage overall soil health & practices to improve
- Balanced approach

Draft Goal 2: Implement practices in both agriculture and urban areas to reduce sediment loading by 35% in the Indian Creek Watershed over the next 20 years.

- Agreed to set the baseline to current creek levels and to set goals to cut peak creek levels by some amount for a 2" and 5" rain event
- Encourage stream bank restoration projects
- Review rules for construction site erosion control practices and increase enforcement
- Encourage BMPs for construction sites
- Develop a regional stormwater detention catchment or basin; employ a treatment train approach
- More beavers
- Encourage installation of more buffer strips
- Promote the expertise of NRCS and SWCD staff for implementing BMPs
- Involve schools
- Support more monitoring work by Coe College and its students
- City outreach
- Implement BMPs related to the use of sand and salt on city streets
- Promote topsoil preservation in new development, even if the 4" rule is not continued by the state

Draft Goal 3: Remove Indian Creek and Dry Creeks from the Impaired Waters List by reducing *E.coli* levels to comply with state standard for swimming / wading and improving habitat over the next 20 years.

- Encourage proper maintenance of septic systems through both education and incentives / vouchers – highlight why maintenance is important
- Encourage proper management of pet / dog poop through:
    - Awareness & education campaign – what is the proper method & why
    - Posting signs and providing bags in public spaces
    - Increase fines for not picking up pet / dog poop
- Reduce geese droppings by deterring geese and discourage feeding
- Educate residents about the proper method(s) for draining private pools