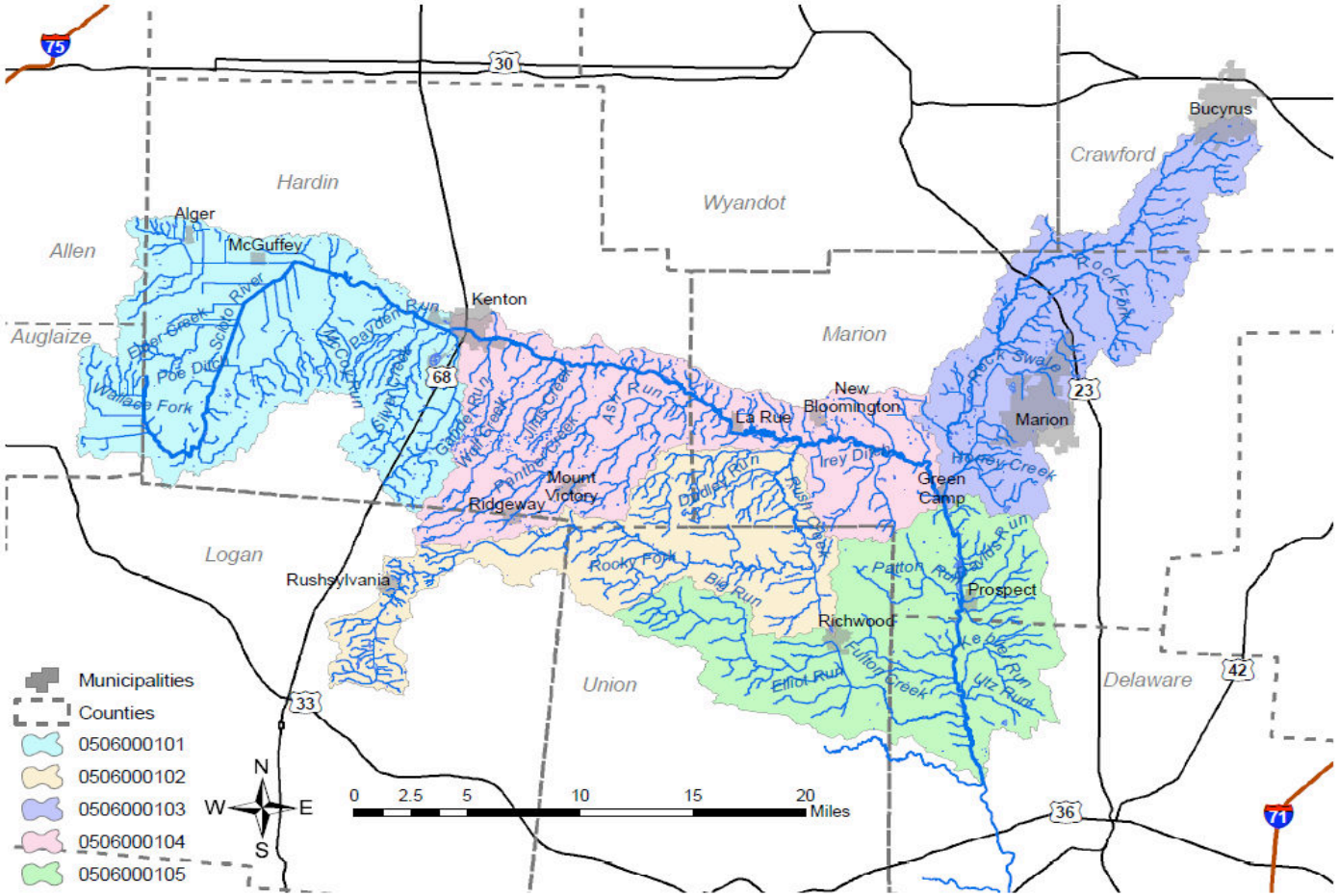
What is Happening at the Upper Scioto Watershed?

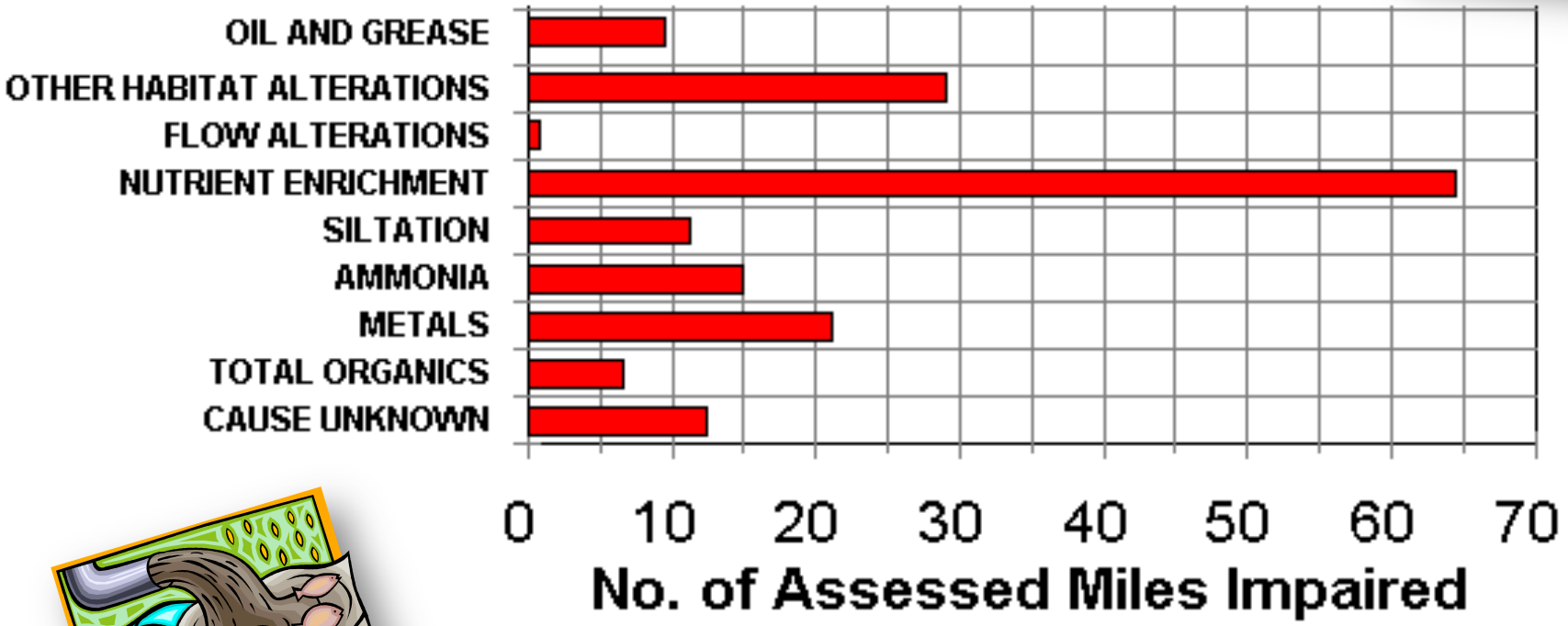


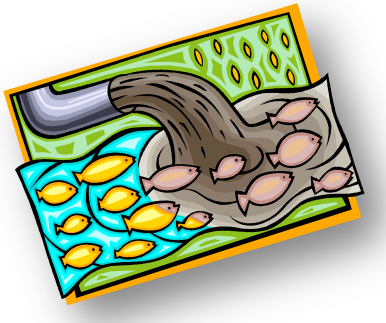
Anitra Karthic, Madeline Smith, and Krista Gresham

Upper Scioto Watershed Fun Facts!

- Counties: Union, Hardin, and Marion in Northwestern Ohio
- City: Marion
- The Scioto River flows into the Ohio river near Portsmouth
- 80% agricultural land, 8% developed land, 6% forest, 4% pastures and hay

Impairments of the Upper Scioto Watershed





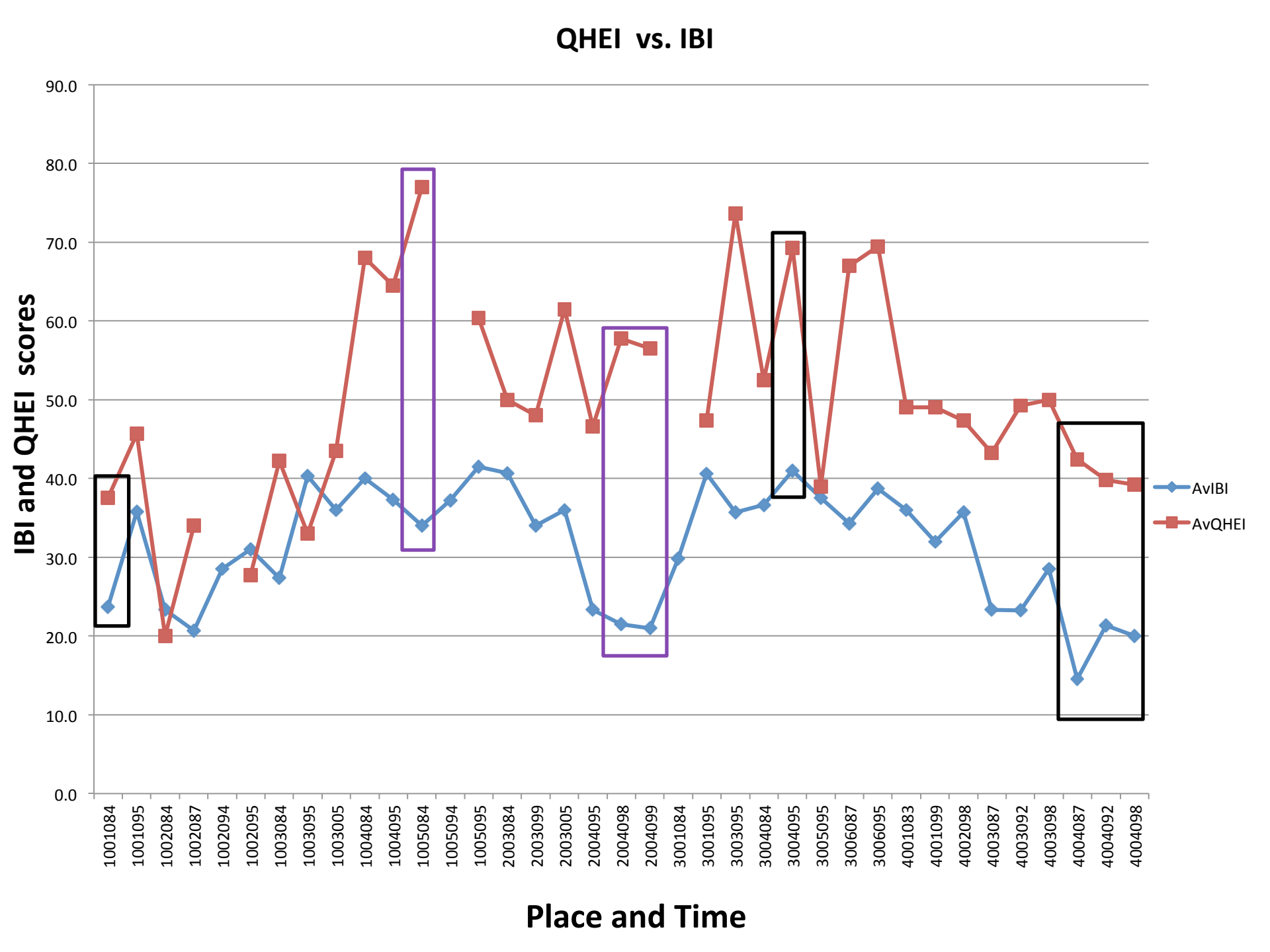
Hypothesis:
As the QHEI increases, the IBI increases.

IBI- diversity of fish in a habitat

Range score: 12 to 60

High quality score: 44 to 60

- QHEI- measures quality of habitat
- Why?
  - QHEI is measured using substrate, cover, channelization, pool and riffle quality, riparian zone, and the map gradient.
  - Max. score: 100
  - Exceptional score: 60 or above
  - Good score: 50 or above
  - Good quality water leads to healthy fish


QHEI vs. IBI
IBI and QHEI scores
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
AvIBI
AvQHEI
1001084
1001095
1002084
1002087
1002094
1002095
1003084
1003095
1003005
1004084
1004095
1005084
1005094
1005095
2003084
2003099
2003005
2004095
2004098
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3001084
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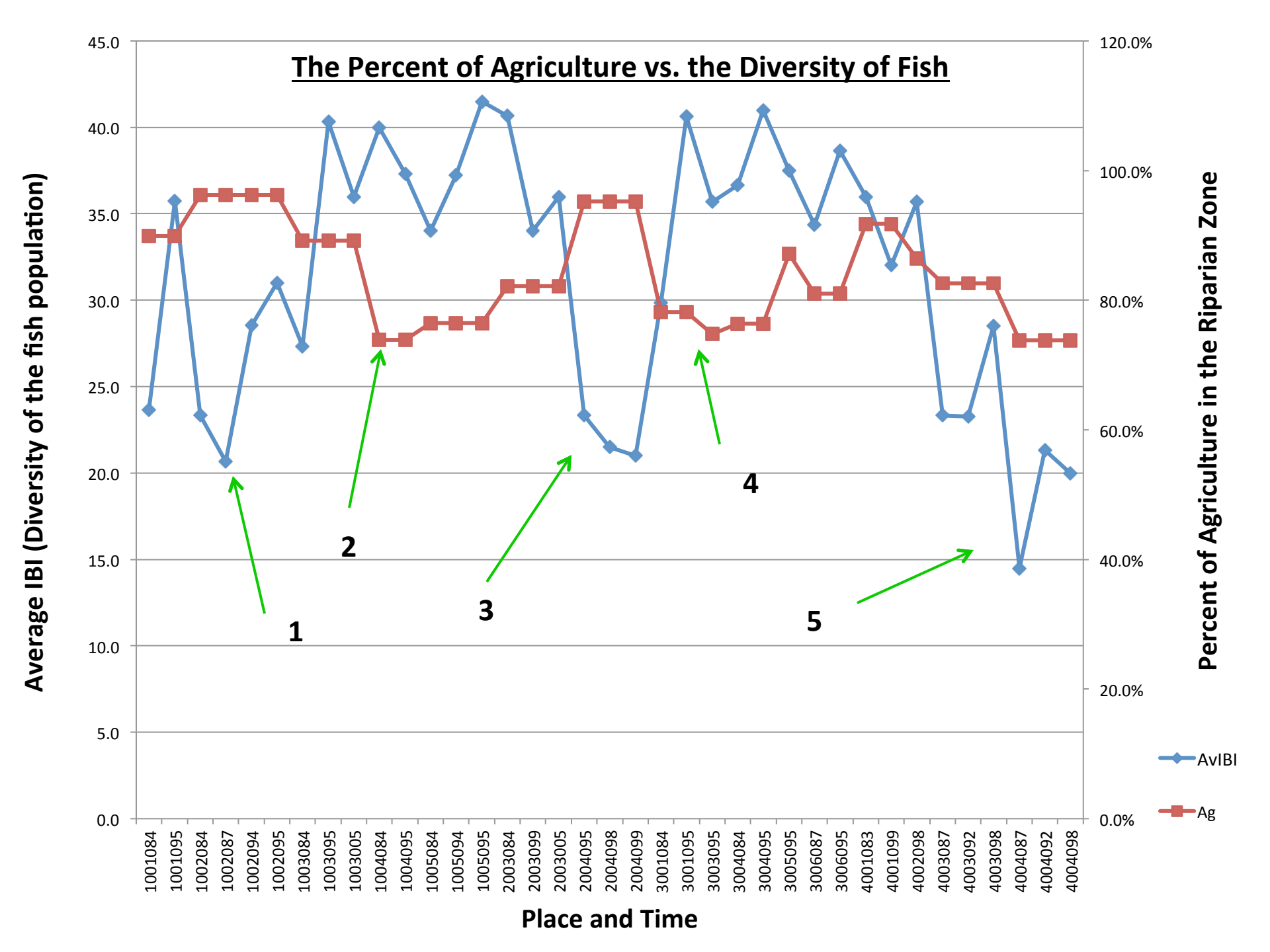
3004095
3005095
3006087
3006095
4001083
4001099
4002098
4003087
4003092
4003098
4004087
4004092
4004098
Place and Time

Hypothesis:

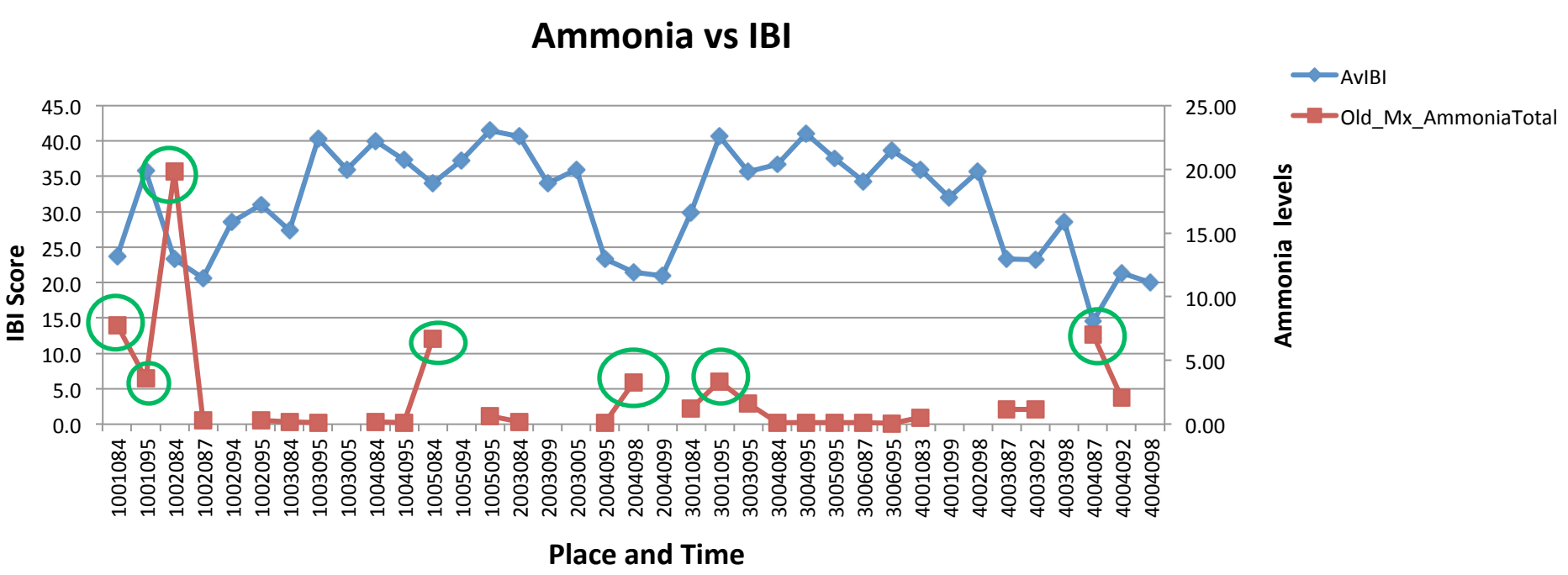
As the percent of agriculture increases, the IBI decrease

- When many farms surround a stream, fertilizer and loose dirt run into the water
- Fertilizer causes algae blooms that use up dissolved oxygen
- Loose dirt makes the water very turbid


The Percent of Agriculture vs. the Diversity of Fish
Average IBI (Diversity of the fish population)
Percent of Agriculture in the Riparian Zone
Place and Time
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
120.0%
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
1001084
1001095
1002084
1002087
1002094
1002095
1003084
1003095
1003005
1004084
1004095
1005084
1005094
1005095
2003084
2003099
2003005
2004095
2004098
2004099
3001084
3001095
3003095
3004084
3004095
3005095
3006087
3006095
4001083
4001099
4002098
4003087
4003092
4003098
4004087
4004092
4004098
1
2
3
4
5
AvIBI
Ag

Hypothesis:
When chemicals used in agriculture increase, the IBI will decrease

- Farms use fertilizer that have nitrates and phosphates
- Ammonia and nitrates are poison to fish and macroinvertebrates
- Ammonia should be at 1ppm or less
- Nitrates should be at 4ppm or less


Ammonia vs IBI
AvIBI
Old_Mx_AmmoniaTotal
IBI Score
Ammonia levels
Place and Time
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
25.00
20.00
15.00
10.00
5.00
0.00
1001084
1001095
1002084
1002087
1002094
1002095
1003084
1003095
1003005
1004084
1004095
1005084
1005094
1005095
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2003005
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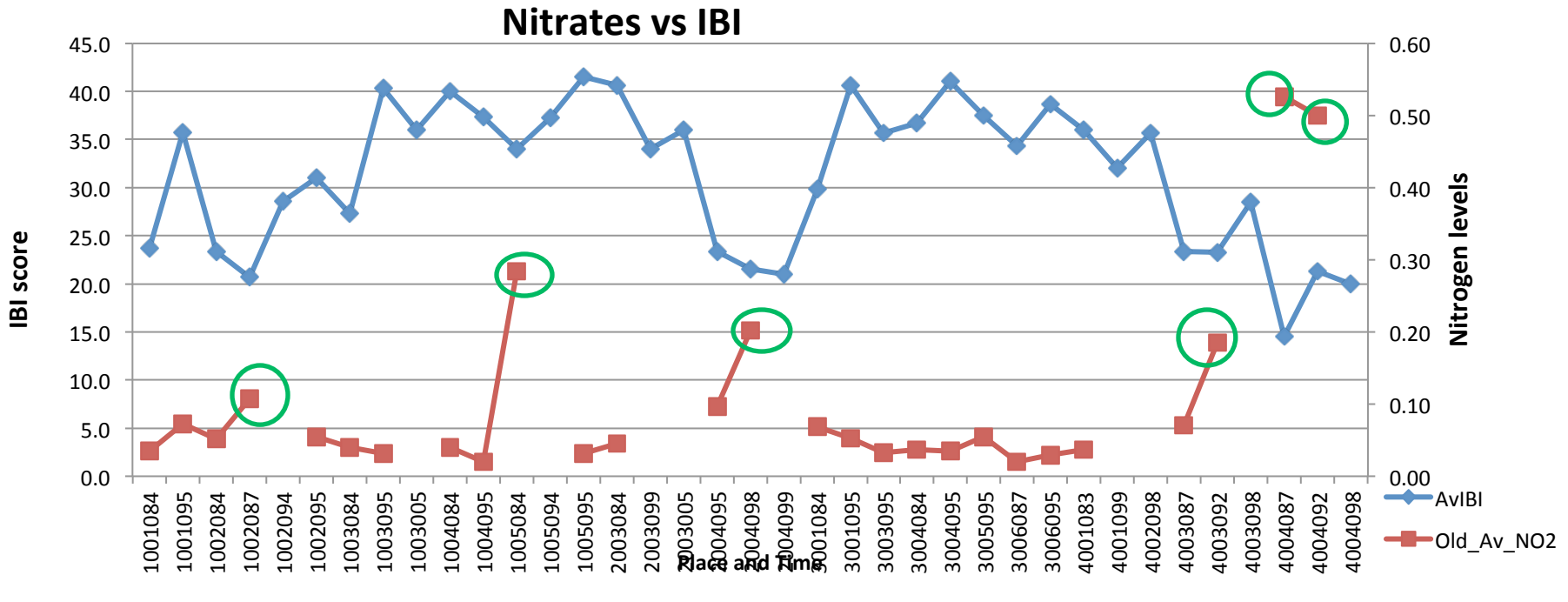
Nitrates vs IBI
IBI score
Nitrogen levels
Place and Time
AvIBI
Old_Av_NO2
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
0.60
0.50
0.40
0.30
0.20
0.10
0.00
1001084
1001095
1002084
1002087
1002094
1002095
1003084
1003095
1003005
1004084
1004095
1005084
1005094
1005095
2003084
2003099
2003005
2004095
2004098
2004099
3001084
3001095
3003095
3004084
3004095
3005095
3006087
3006095
4001083
4001099
4002098
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4003092
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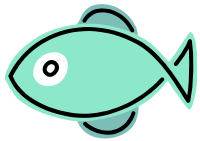
In Conclusion…

- QHEI increases as the IBI increases.
- IBI decreases as the percent of agriculture increases.
- IBI decreases as nitrates increase.

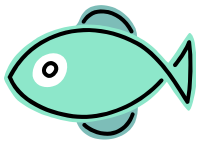


Why should we care?

- **We are drinking this water, using it for recreation and sewage**
- **Agricultural land uses fertilizer that gets into our stream which will lead to overgrowth of algae which will take all of the dissolved oxygen from the fish when the algae dies. Dying causes bacteria growth**
- **Unregulated urbanization (when urban areas expand without planning) can result in poor watershed quality**

How can we help?

- **If growth is controlled and buffer zones created along the stream(this will prevent agricultural runoff), watershed quality can improve**
  - **We can help by taking simple actions like not dumping harmful chemicals into sewage pipes.**
  - **Create a rain garden**
  - **Reducing runoff, constructing wetlands, and improving construction practices to minimize erosion**



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