

Green Bulkhead Project: Preliminary Findings and Future Sampling Recommendations

CCPC, NEORSD, USACE, CSU

Current State of Artificial Habitat



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Artificial Habitat Failures

* **General**

- * Cables/shackle failure
- * “Frozen” Pear Rings
- * Debris Damaged Plants

* **Bee-Mats**

- * Overturning
- * Zip ties
- * Planting Cups
- * Tearing of Mat

* **Floating Islands**

- * Overturning
- * Bowing of foam
- * Sedimentation

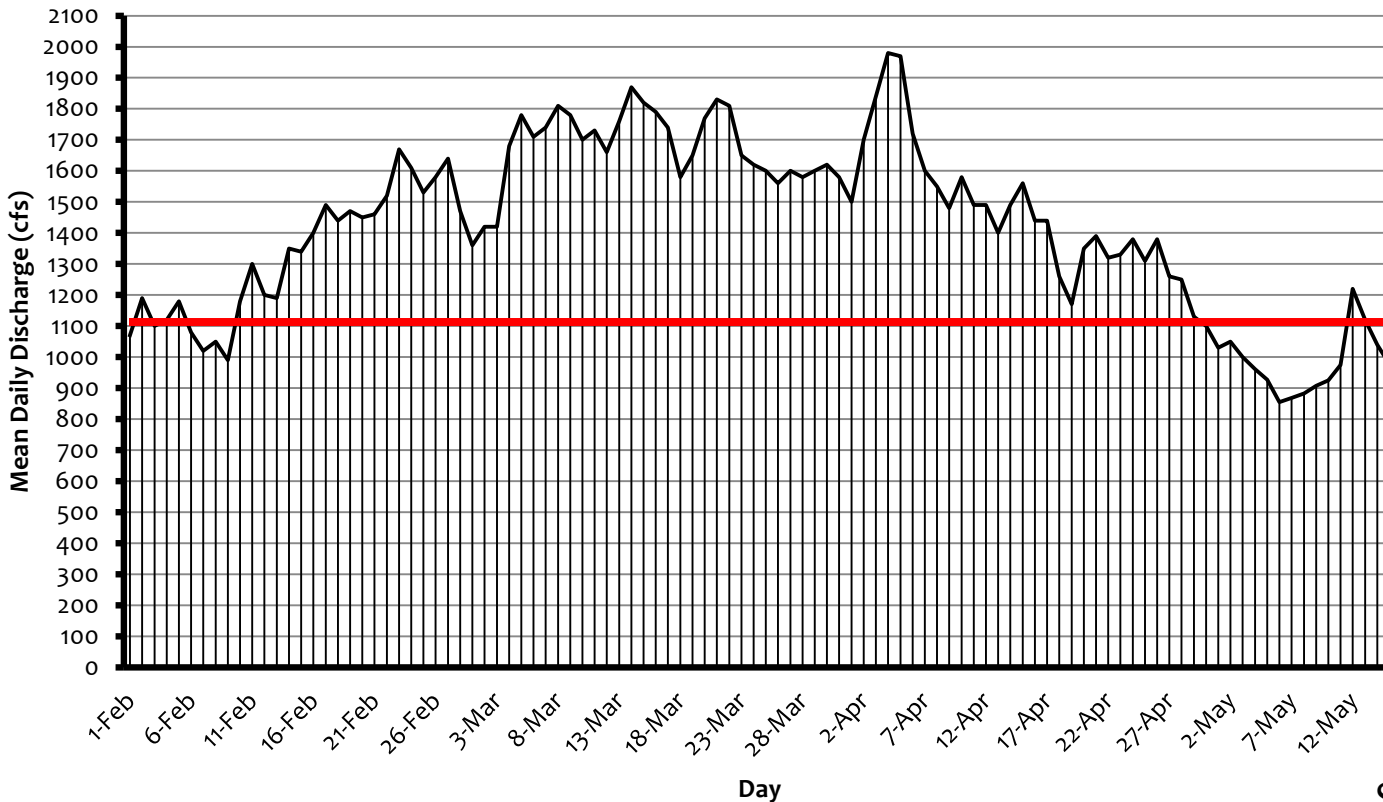
Sampling Issues

- * High Flows and Rain events prevent sampling.
- * 2011 one of the wettest springs on record (record for April 6.89”)

April Rainfall 2011		
Rank	Year	Rainfall (in.)
1	2011	6.89
2	1961	6.61
3	1998	6.07
4	1950	5.9
5	1957	5.78
6	2005	5.57
7	1873	5.38
8	1954	5.36
9	1929	5.26
10	1920	5.01

Historical Cuyahoga R. Data

Mean Daily Discharge (at Independence, OH): February – Mid May 1922 to 2009



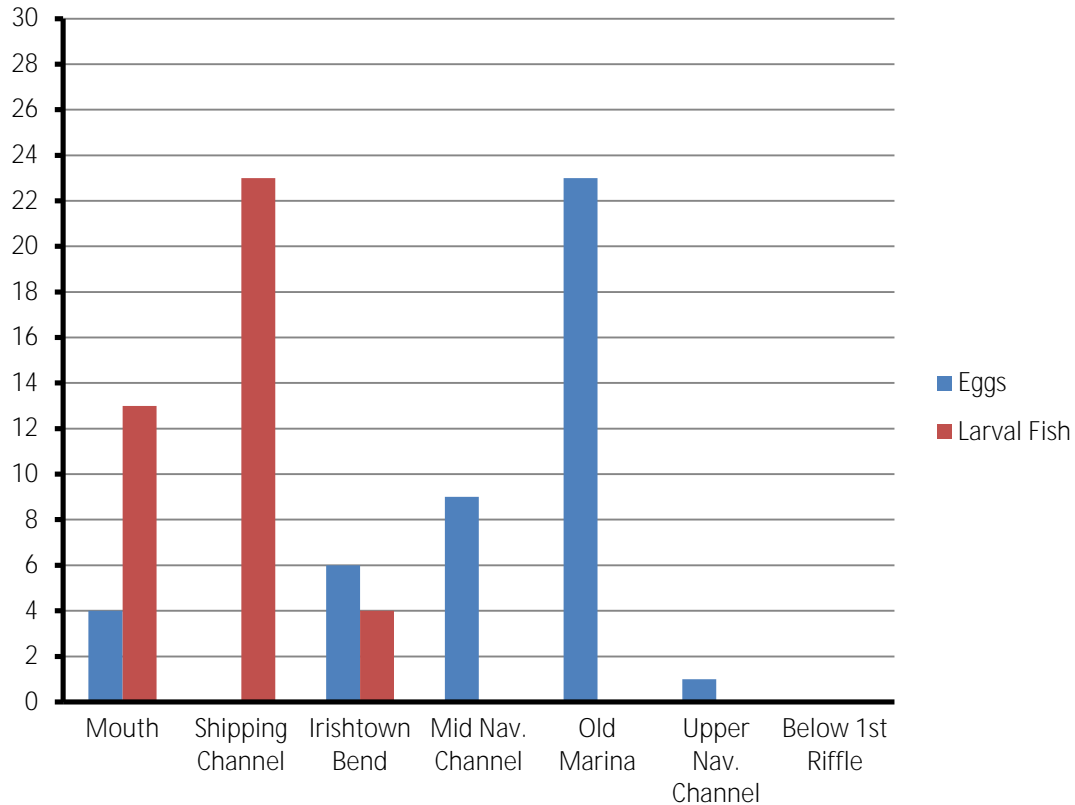
Source: USGS

High Flow and Suspended Sediments

- * Flows over 1100 cfs prevent effective sampling.
 - * Suspended sediments.
 - * High amounts of surface and subsurface debris.
 - * Net fouling.
 - * Underpowered boat above head of navigation.
 - * Extreme damage of specimens due to abrasion.

Larval Fish Data June 2011:

Average per site



Species Breakdown June 2011

* Families Represented

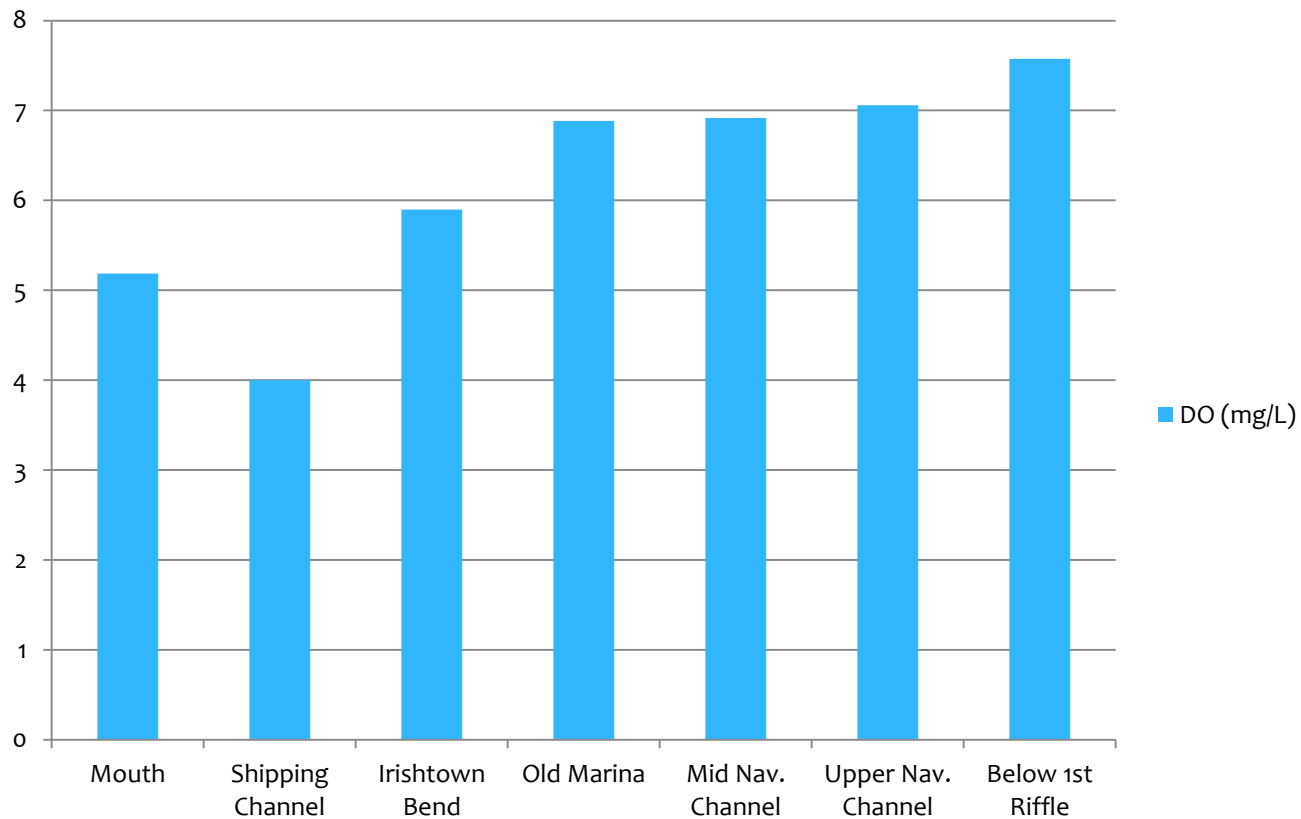
- * **Clupeidae** (Shads and Herrings)
- * **Sciaenidae** (Drums)
- * **Cyprinidae** (Carps and True Minnows)
- * **Atherinopsidae** (New World Silversides)

* Species Represented

- * Gizzard shad
- * Freshwater drum
- * Brook silverside
- * Common Carp
- * Portion of Specimens Unidentified due to damaged state

Dissolved Oxygen June 2011

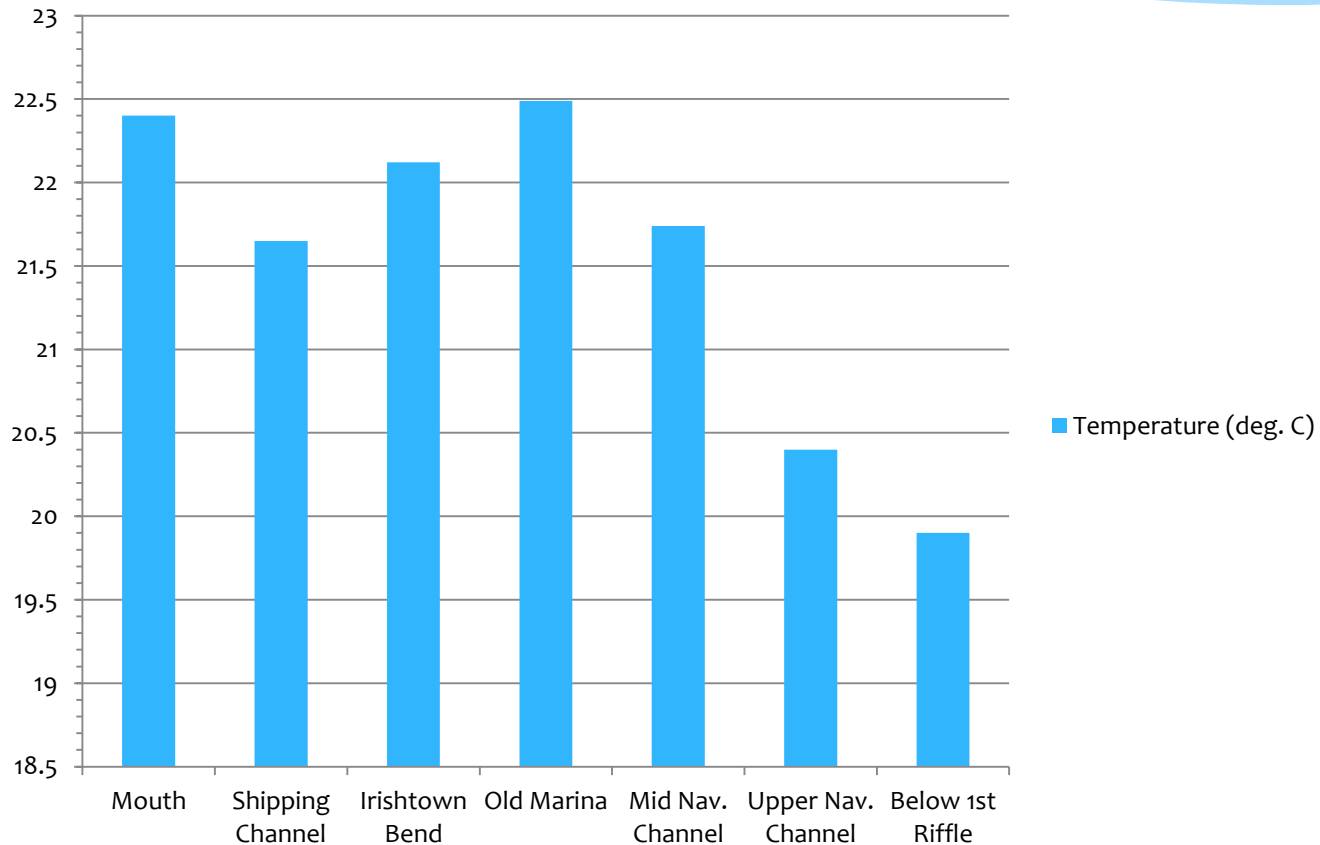
(Mean per site)



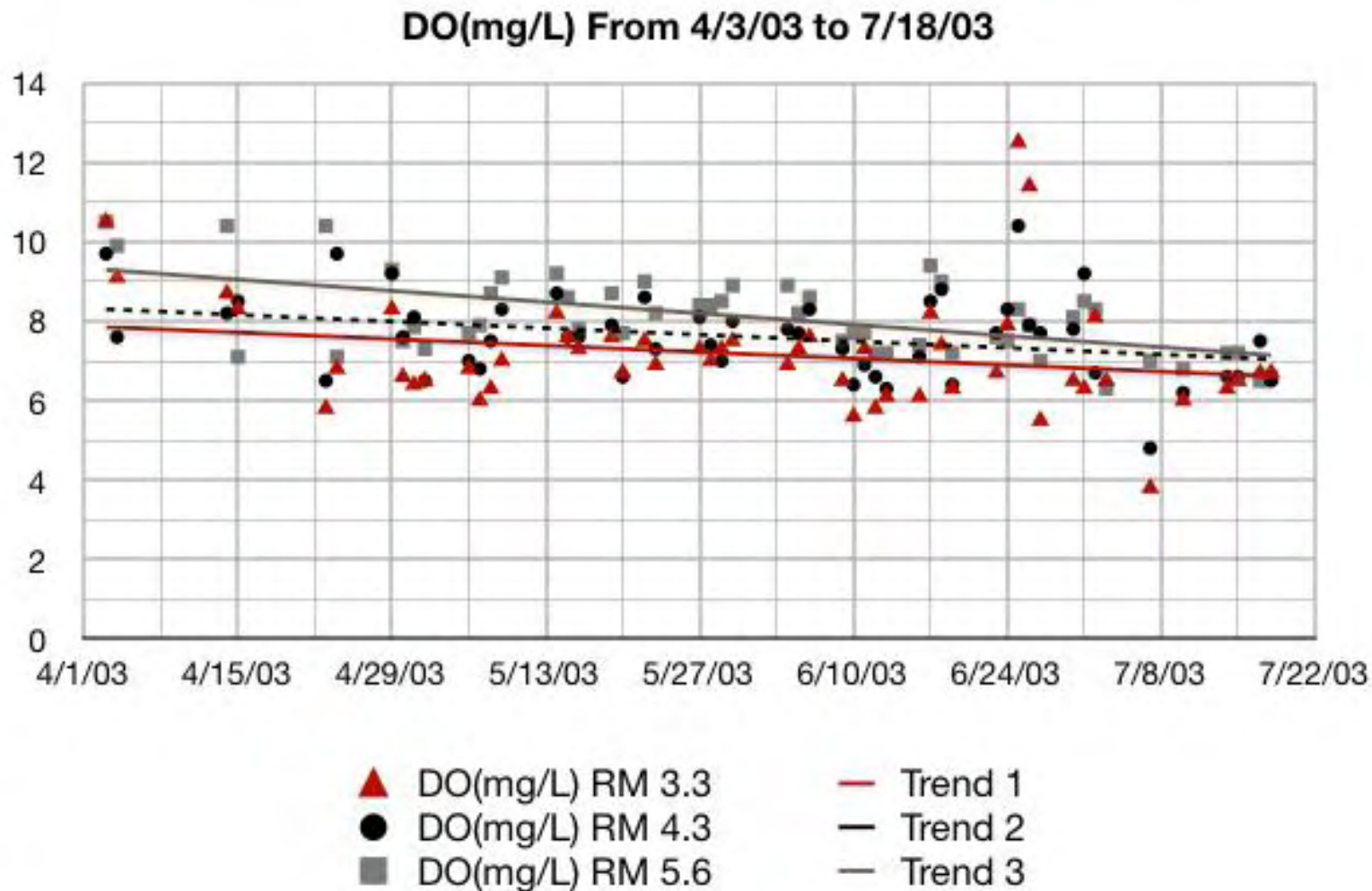
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Temperature June 2011

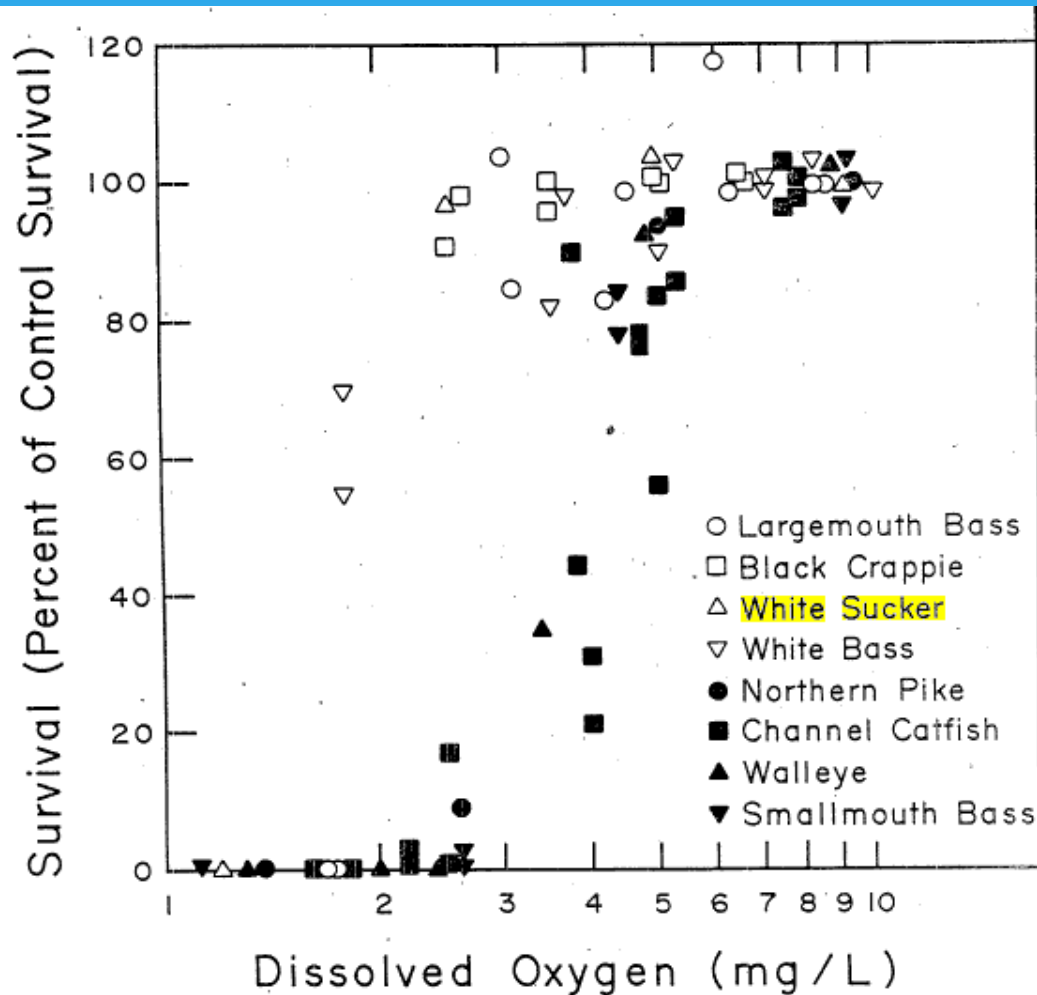
(Mean per site)



2003 NEORSD Larval Fish study



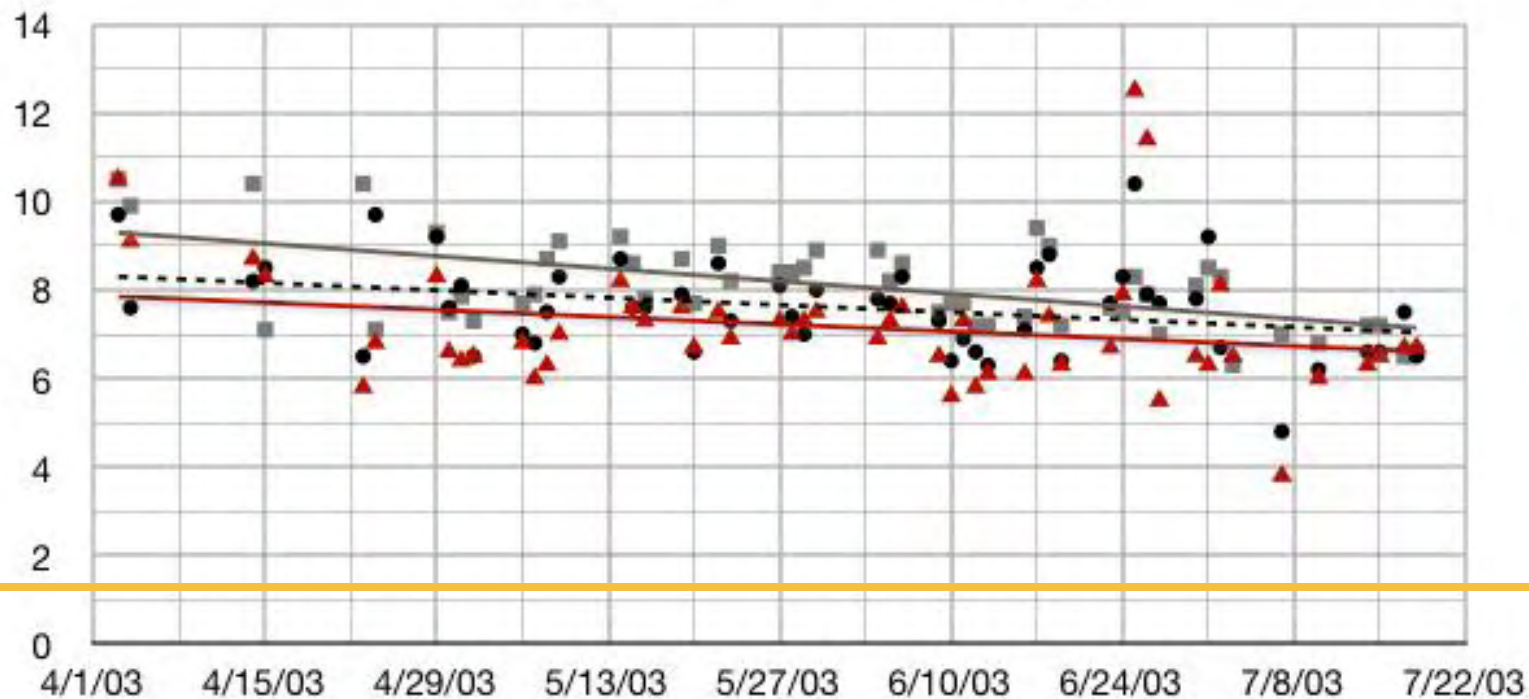
Dissolved Oxygen



Larval White Sucker show adverse effects to survival at 1.2mg/L (Sieffert and Spoor 1974)

Controlled Laboratory DO Experiments

DO(mg/L) From 4/3/03 to 7/18/03



- ▲ DO(mg/L) RM 3.3
- DO(mg/L) RM 4.3
- DO(mg/L) RM 5.6
- Trend 1
- Trend 2
- Trend 3

Possible Sampling Modifications

- * New study plan centered upon light trap and permanent data sonde equipment use.
- * Towing for larval fish, zooplankton, and phytoplankton still conducted when possible.
- * Provides more thorough sampling, especially during high flow periods.
- * Increased water chemistry data, illustrating fluctuations throughout the diel cycle.