

Background Information

- Storm water retention ponds
 - Used as “Best Management Practices” (BMPs) in residential & commercial developments
 - Control flooding
 - Settle out contaminants
 - Aesthetic and recreational uses



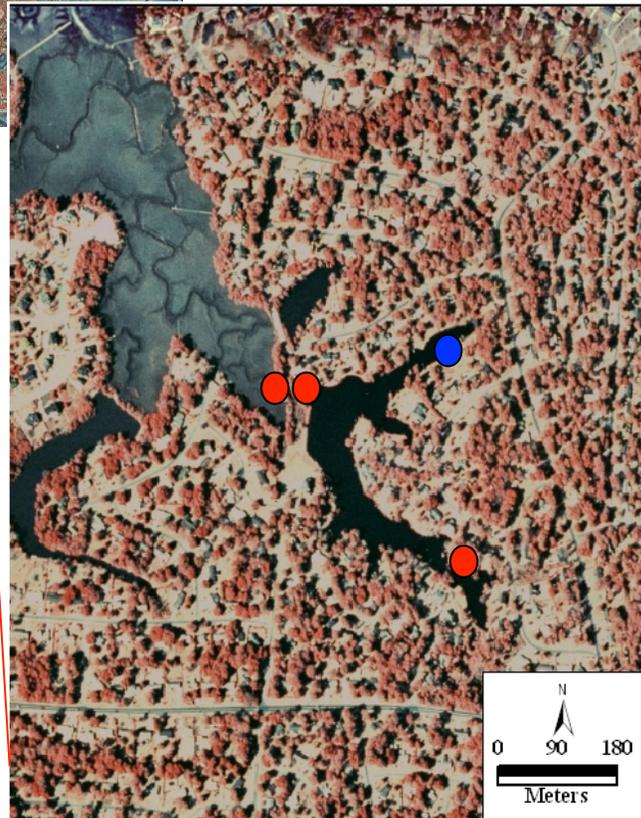
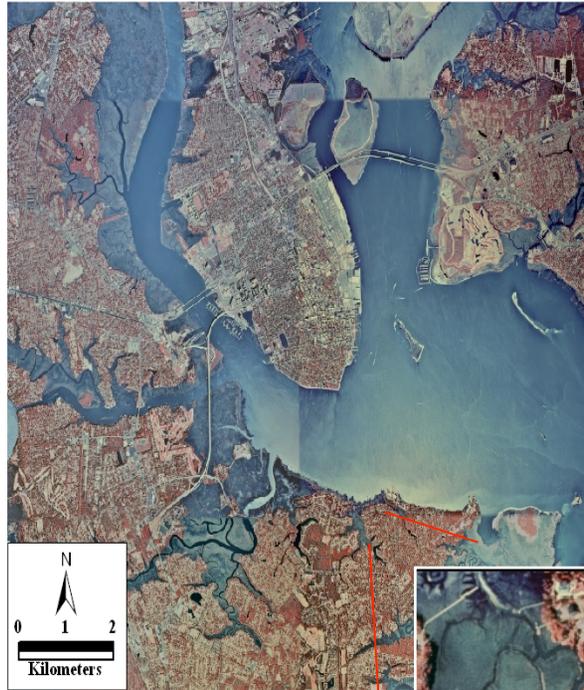
Why care about retention ponds?

- Water quality problems in storm water ponds
 - Water eutrophication
 - algal blooms, algal toxins, water discoloration, bad odor
 - High contaminant concentrations
 - High fecal coliform bacteria levels



Lake Edmonds

- 11 acre fresh water lake
- drainage area = 107 acres (300 homes)



- Lake's importance:
 - overflow into Kushiwah Creek
 - aesthetic value
 - wildlife habitat
 - recreational boating
 - fishing
- model for retention pond management

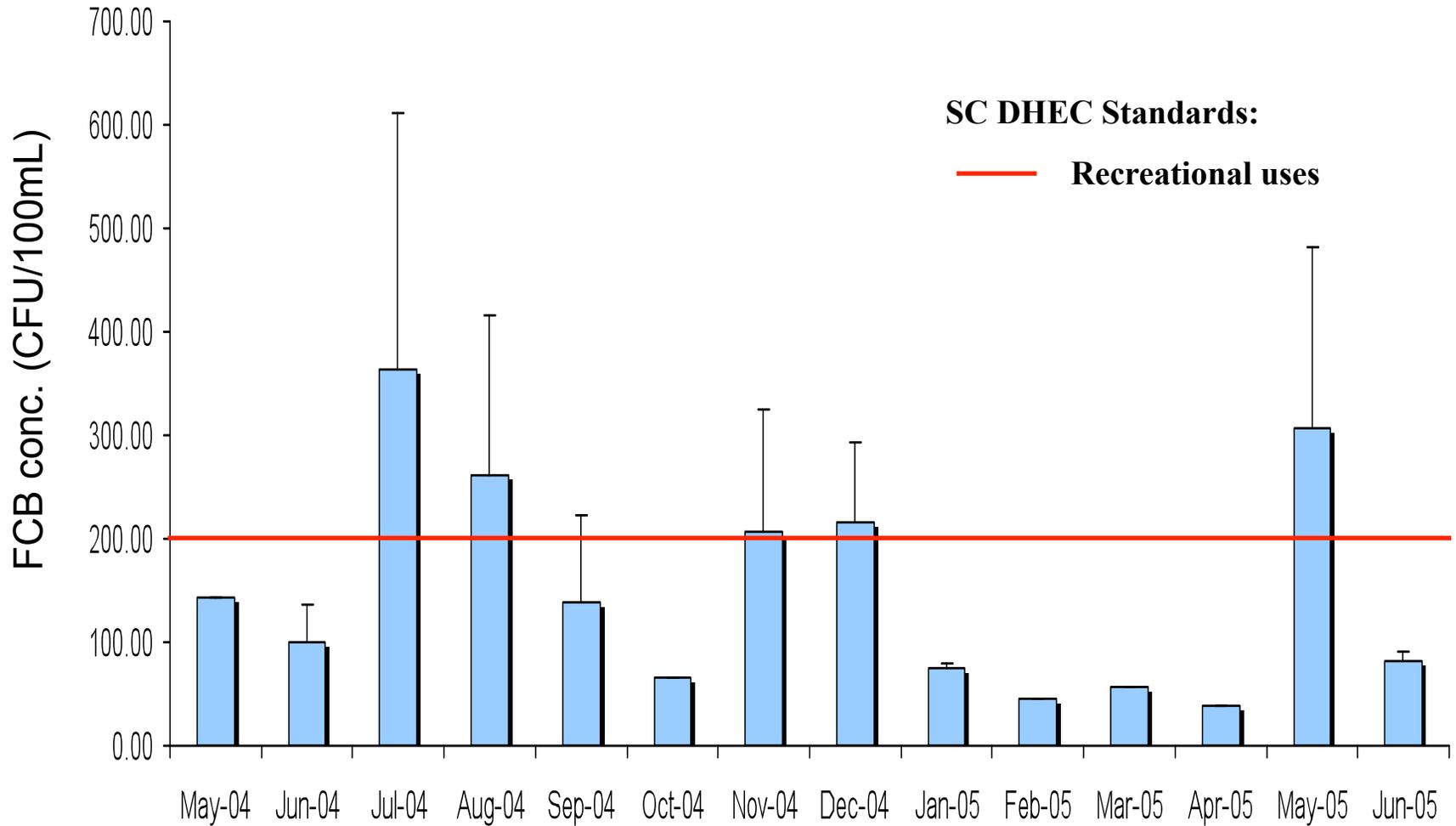
Methodology

- **Parameters Measured**

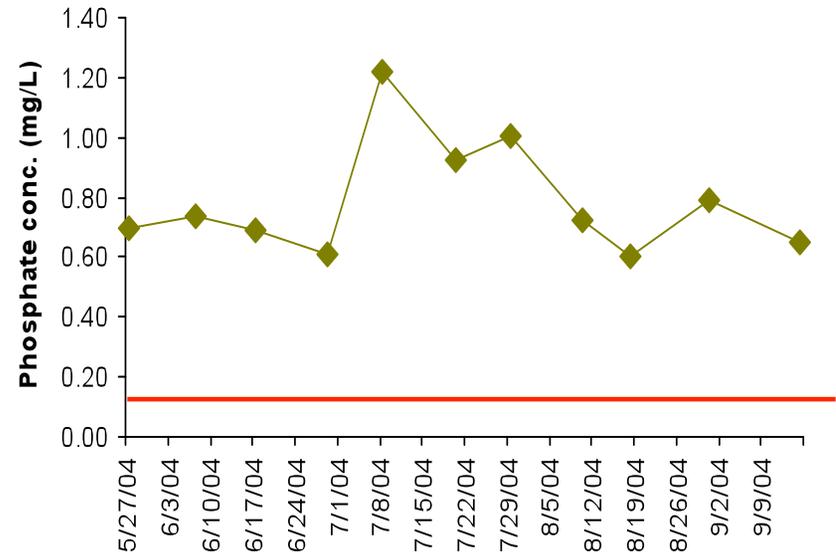
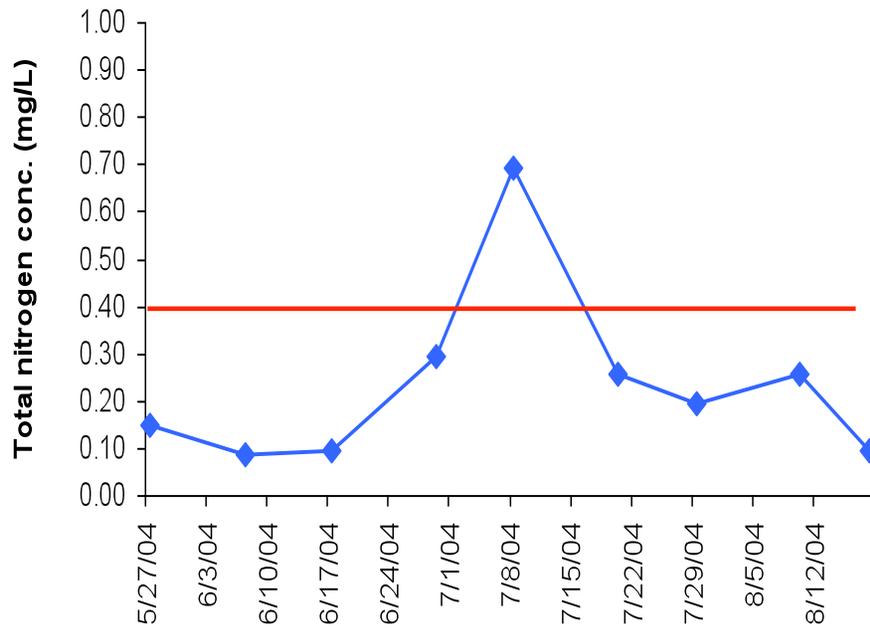
- **Water quality** (DO, temp., pH, turbidity, salinity, conductivity)
- **Nutrients** (NH_4^+ , NO_2^- , NO_3^- , PO_4^{3-}) (mg/L)
- **Chlorophyll *a*** ($\mu\text{g/L}$)
- **HABs** (cells counts)
- **Algal toxins** (microcystin [$\mu\text{g/L}$])
- **Fecal coliform bacteria** (CFU/100mL) & antibiotic resistance (*E. coli*)
- **Pesticides** [$\mu\text{g/L}$]
 - Atrazine & 2,4-D (Herbicides)
 - Chlorothalonil (Fungicide)
 - Chlorpyrifos (Insecticide)



Fecal Coliform Bacteria

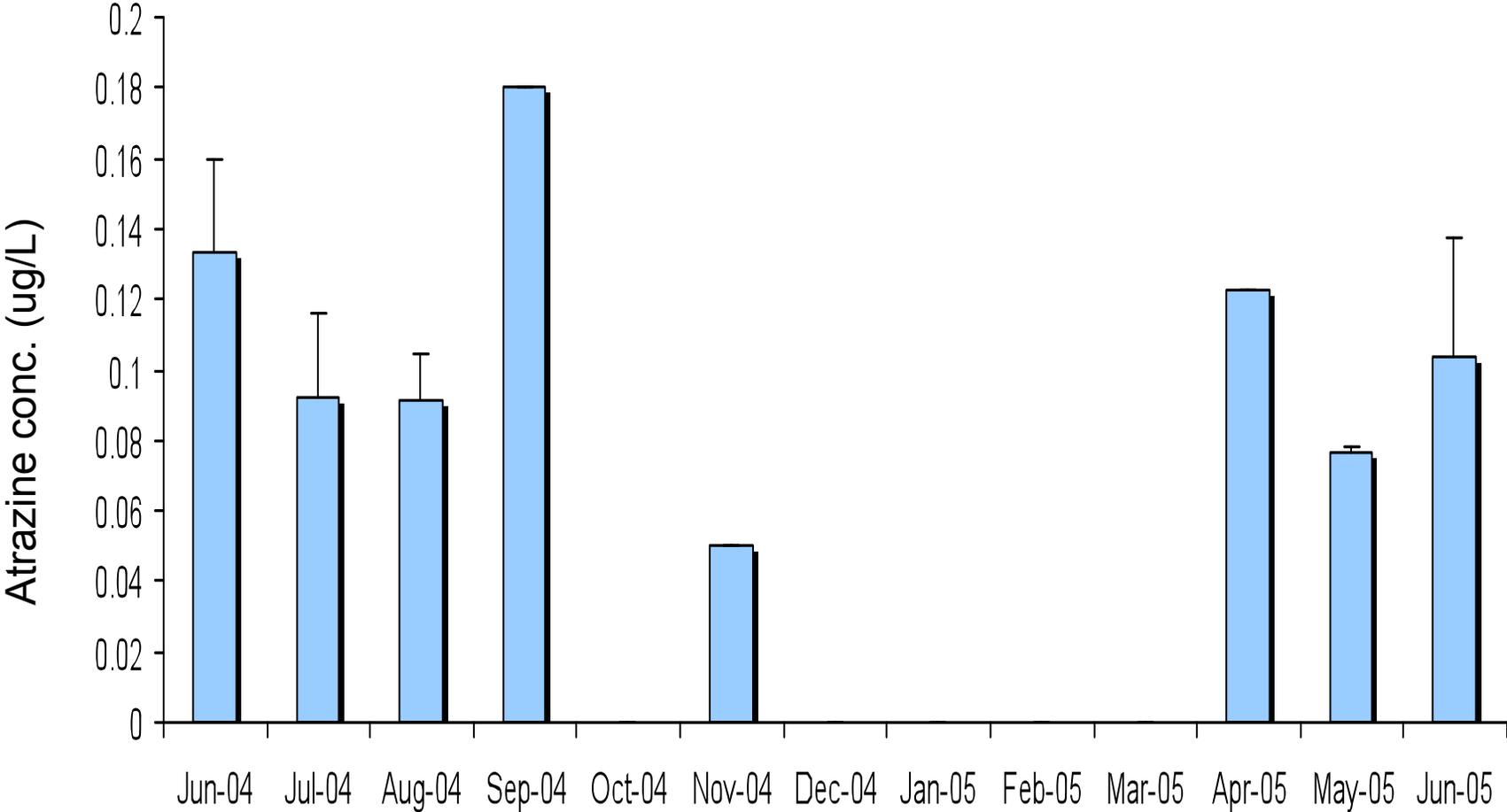


Nutrient Levels

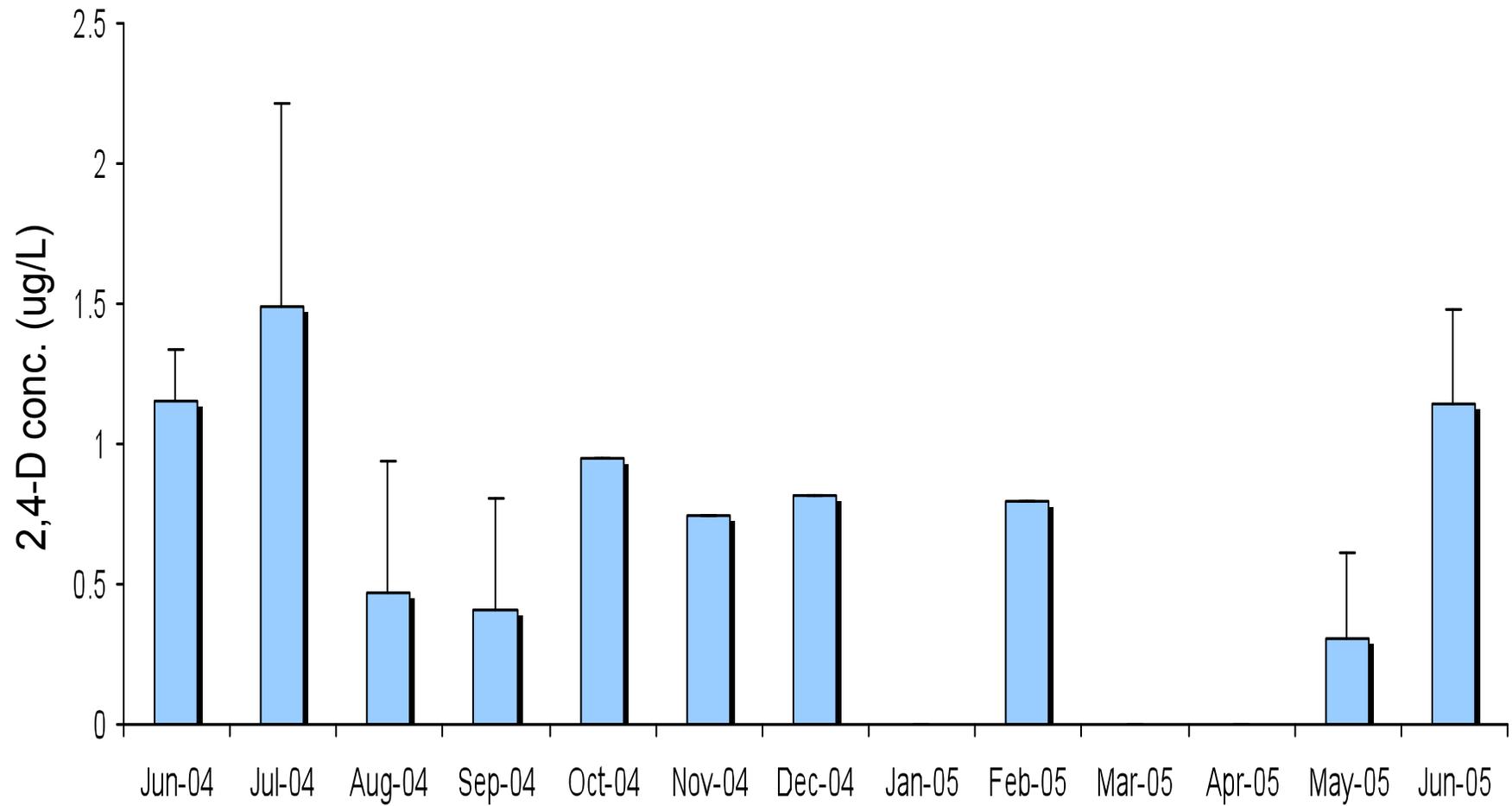


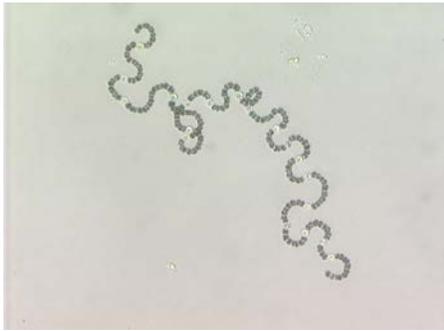
— EPA water quality standards for lakes

Atrazine Levels

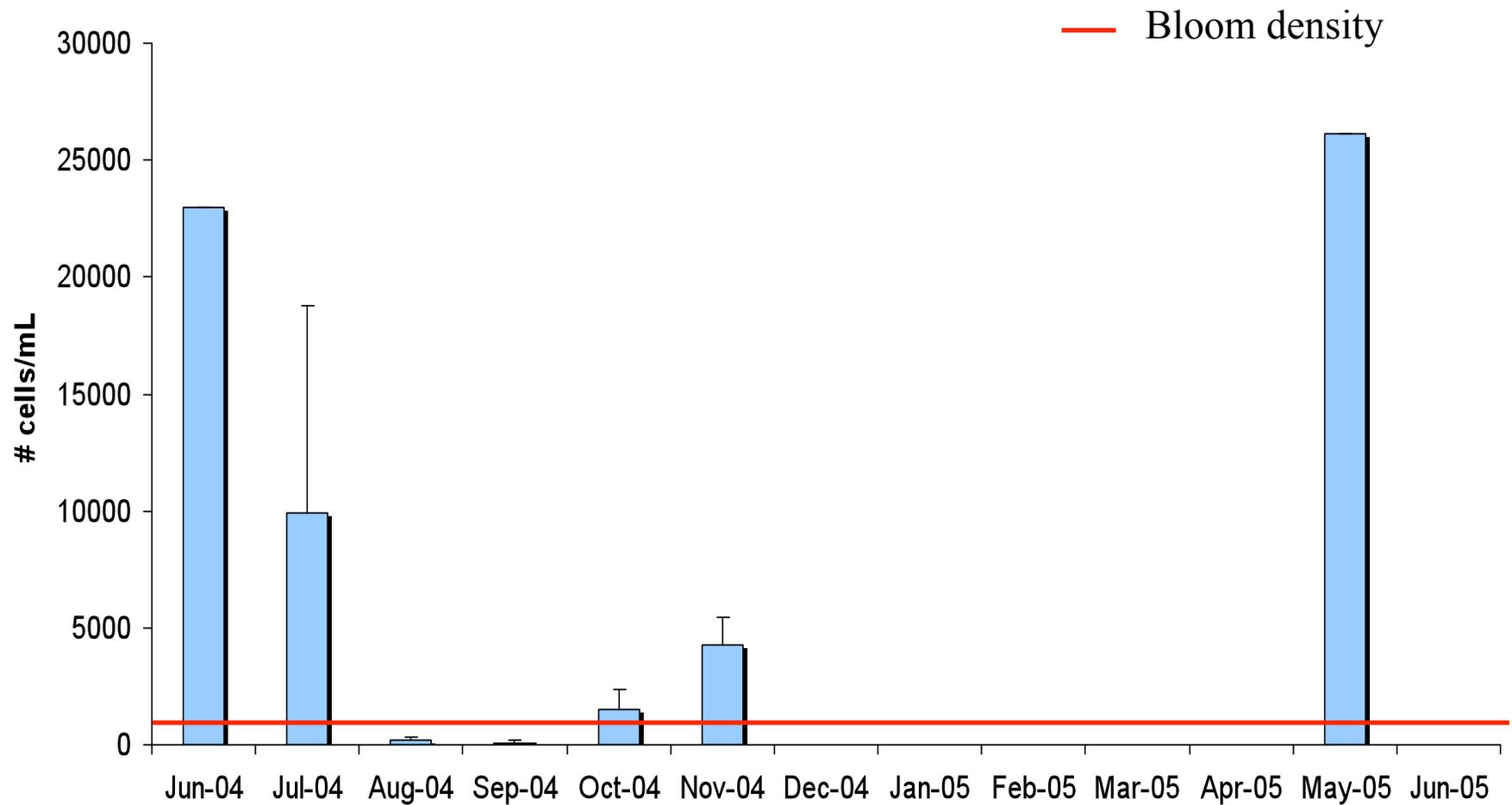


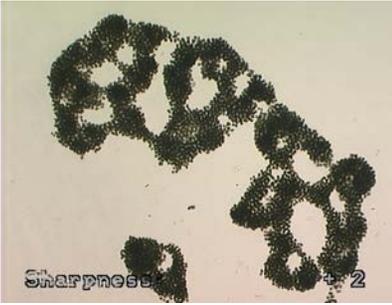
2,4-D Levels



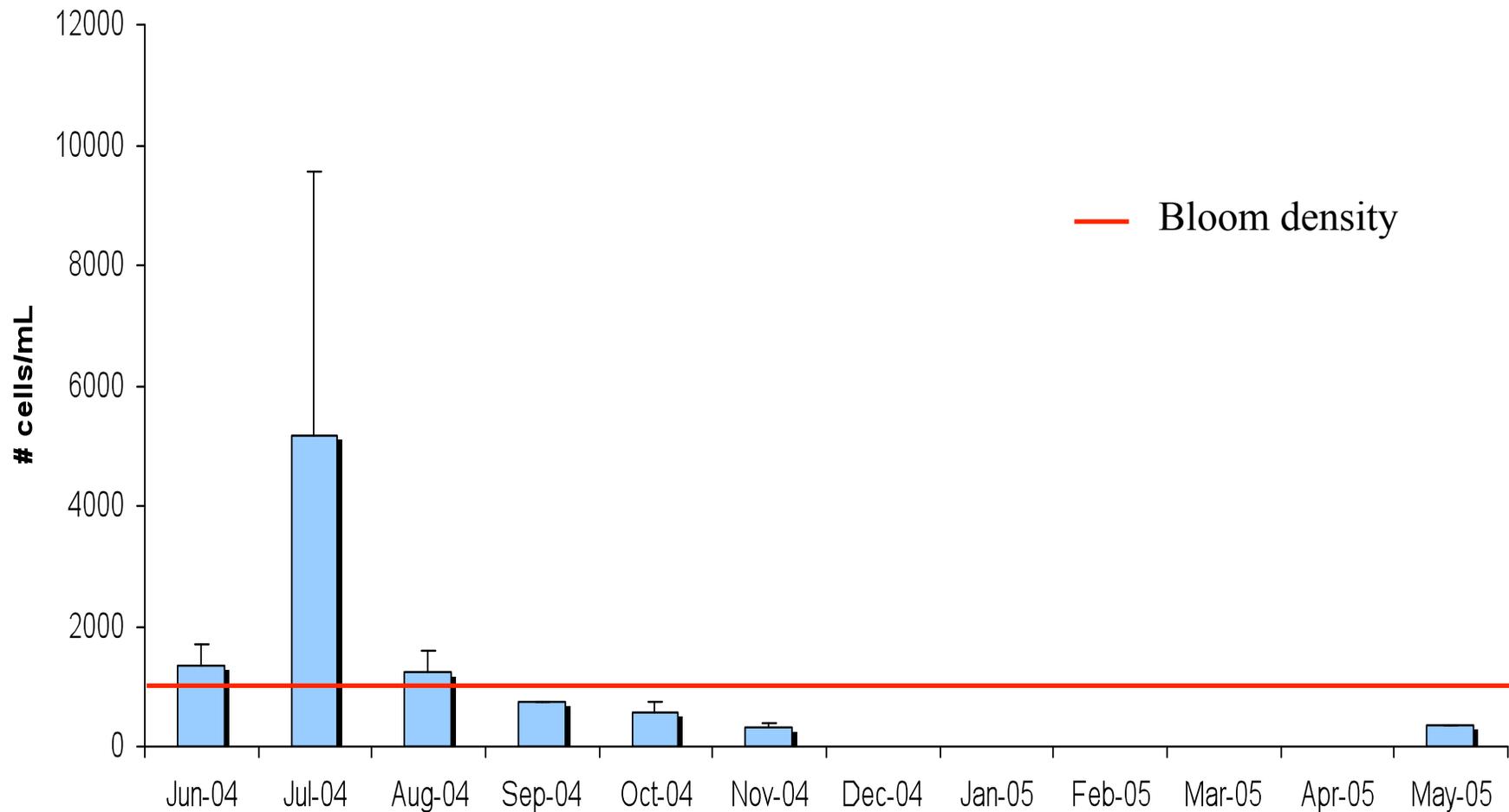


Anabaena sp. Density





Microcystis sp. Density



Residents Survey

- A total of 45 residences in the Lake Edmonds Homeowners Association were surveyed regarding land use practices that may influence water quality
- Including: pet waste management, pesticide applications, pond uses, and homeowner interest in the pond's water quality.

66.7% back !!!



Survey Results

- **Pet Waste Management**

- 75% of dogs & cats were reported as being kept either outdoor or indoor/outdoor
- Only 9% of homeowners pick up pet waste daily

- **Fertilizer Application**

- 29% of homeowners apply fertilizer to their lawns
- 68% apply fertilizer 2 or more times per year

- **Pesticide Application**

- 73% of homeowners apply herbicides to their lawns
- 83% apply insecticides to their lawns
- 33% apply fungicides to their lawns
- Majority of respondents make 2 or more applications of each pesticide class per year

Survey Results (cont'd)

- **Lake uses**
 - boating activities 73.68%
 - fishing activities 63.16%
- **Observed algal blooms** 76.67%
- **Established vegetative buffer in lawns** 10.71%
- **Willing to install buffer** 68.96%
- **Willing to change practices** 94.74%

Conclusions

- **Water quality problems were detected in the model retention pond, Lake Edmonds:**
 - **high fecal coliform bacteria levels**
 - **high phosphate concentration**
 - **harmful algal bloom development**
 - **persistent herbicide concentration**
- **Residential lawn care practices such as the use of fertilizers and pesticides are affecting the water quality of this retention pond.**
- **Pet waste left on lawns may increase fecal coliform bacteria levels in the lake (runoff with rainfall).**

Recommendations

- **Some examples of the practices we recommend are:**
 - **Lawn care product recommendations**
 - **lower chemical and nutrient content products**
 - **organic and biodegradable products**
 - **use of the product as directed**
 - **Collection of pet waste from yard and deposit in trash**
 - **Grow plants on the edges between the yards and the retention pond (vegetative buffer installation)**
 - **Proper disposal of lawn clippings (avoid deposition into the pond)**



<http://edisto.cofc.edu/~lserrano/>