Salt in Dutchess Co. Waters

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Vicky Kelly

Where are we now?

Compared to what?

Where are we headed?

Should we be worried?

Cary Institute
of Ecosystem Studies

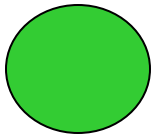
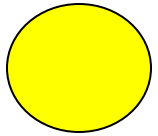
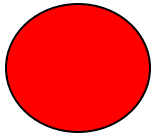
Acknowledgements

- Fishkill Creek Watershed Comm. (R. Oestrike)
- Environmental Management Council (D. Burns, C. Klocker)
- Hudson River NERR (W.C. Nieder, S. Ciparis)
- Town of Clinton CAC (N. Coller)
- Vassar College (K. Menking et al.)
- Syracuse U. (D. Siegel, L. Jin)
- WRI – Cornell; COE - Syracuse

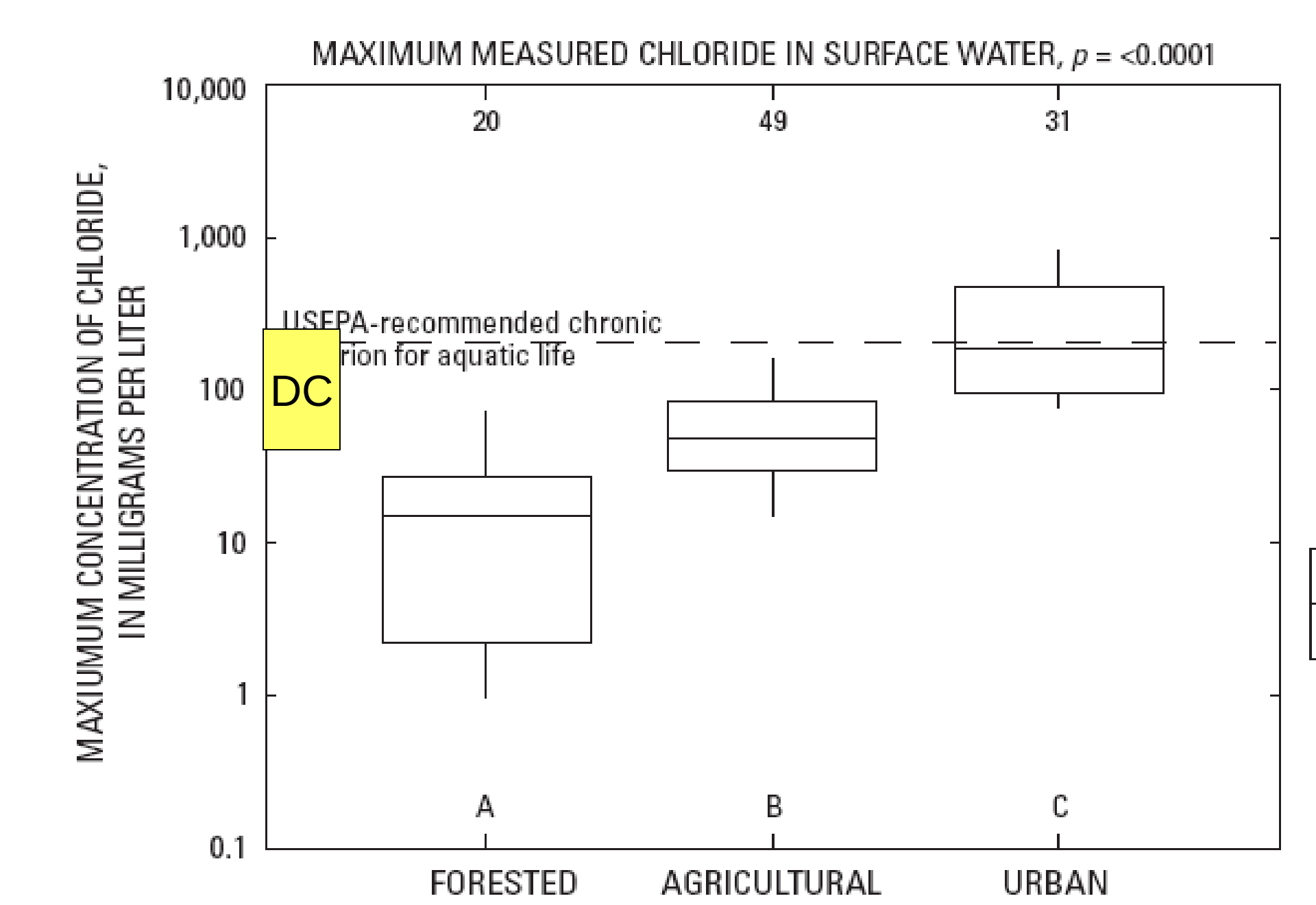
Some Chloride Reference Points

- Background - ~ 10 mg/L or less [Catskill Reservoirs]
- Sublethal – 50-100 mg/L Subtle yet Significant
  - Biotic Indices
  - Microbial processes
  - Associations
- EPA Chronic – 230 mg/L
- Drinking Water Std – 250 mg/L
- EPA Acute – 860 mg/L
- Lethal - 1000 or higher

SIMPLER

- REFERENCE <10 mg/L 
- ENVIRONMENTAL EFFECTS ~ 100 mg/L 
- LETHAL > 1000 mg/L 

DUTCHESS COUNTY WATERS
80 mg/L (+/- 79 SD)



Mullaney et al., USGS

Chloride (mg/L)

Crum Elbow
15-50

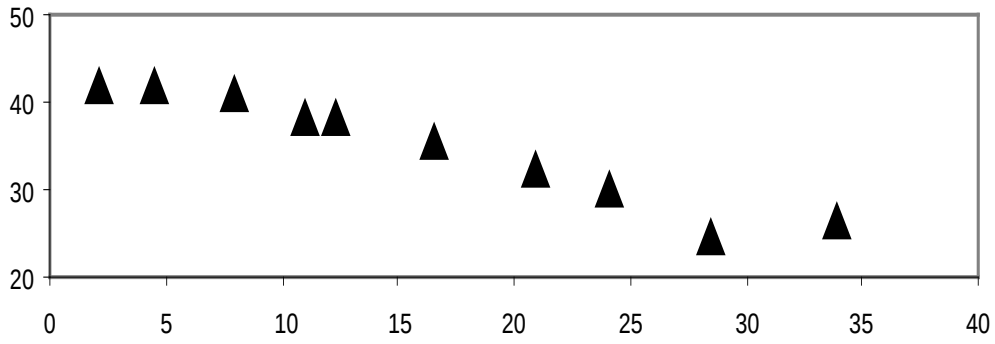
Ten Mile
10-40

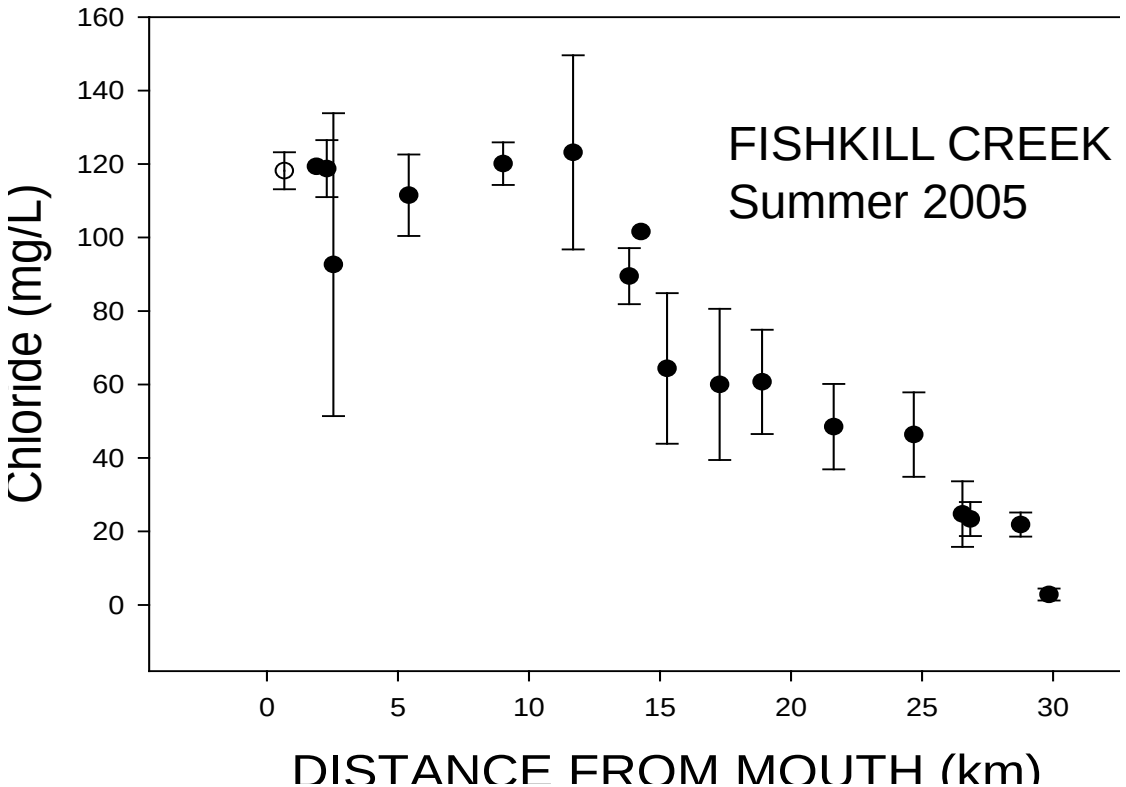
Casperkill
100-300

Wappinger
10-45

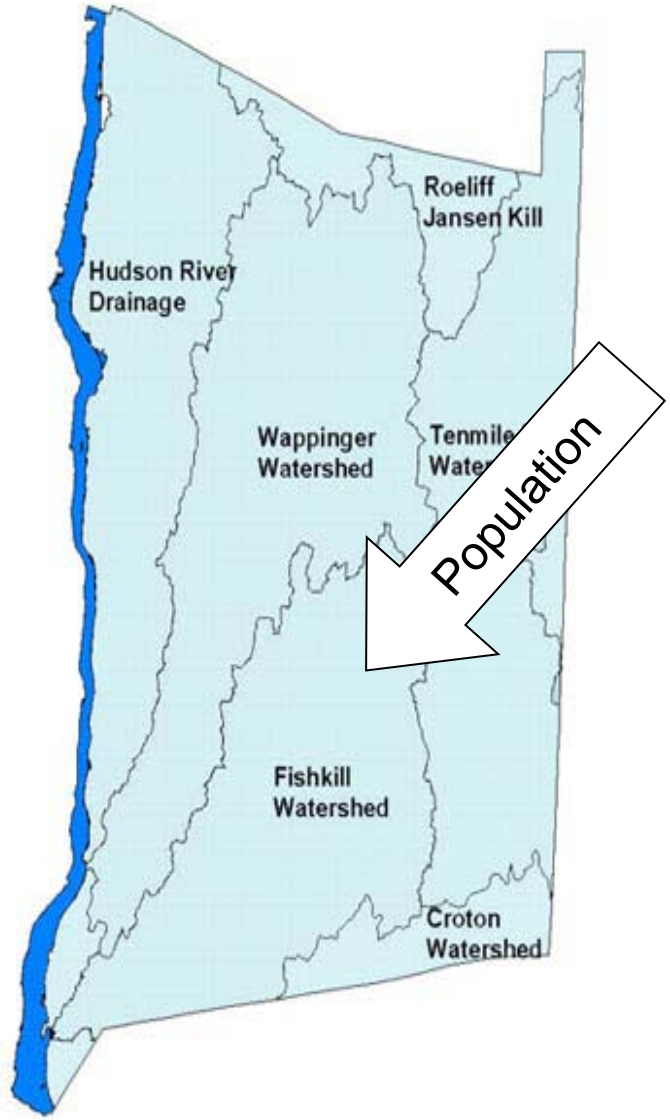
Fishkill
10-100

WAPPINGER CREEK JULY 2006



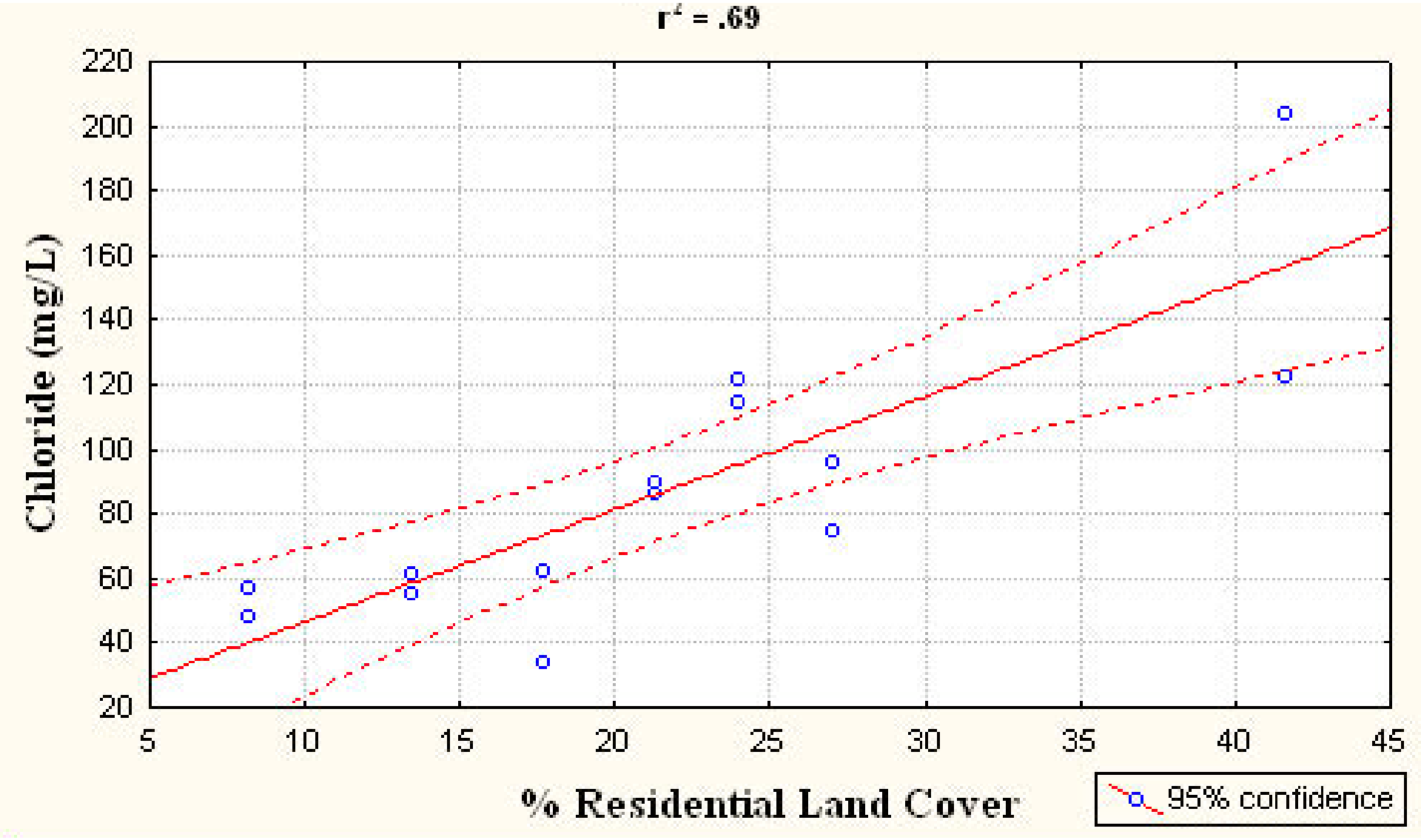


Downstream Increases

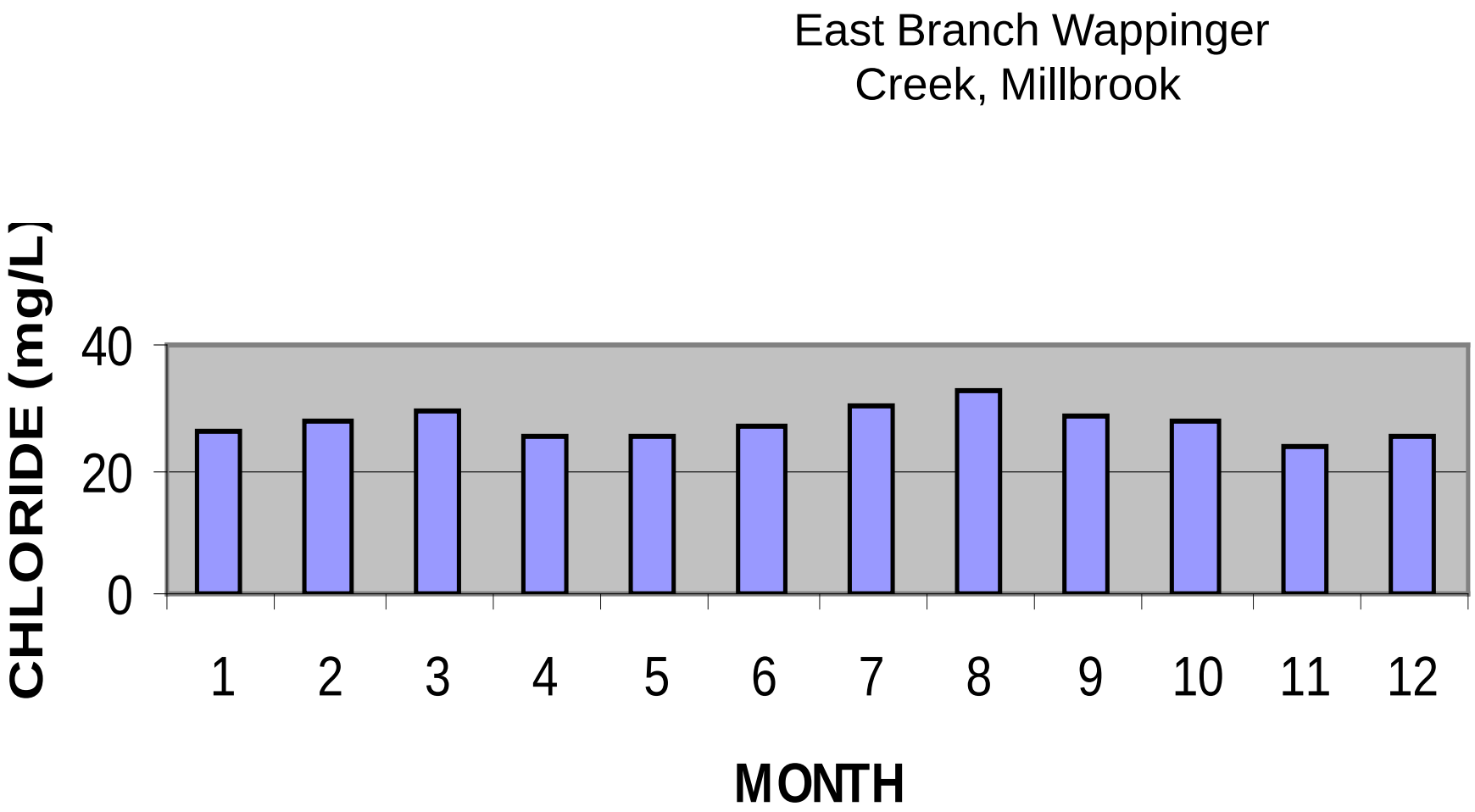


Residential Land Cover and Chloride (M. Essery)

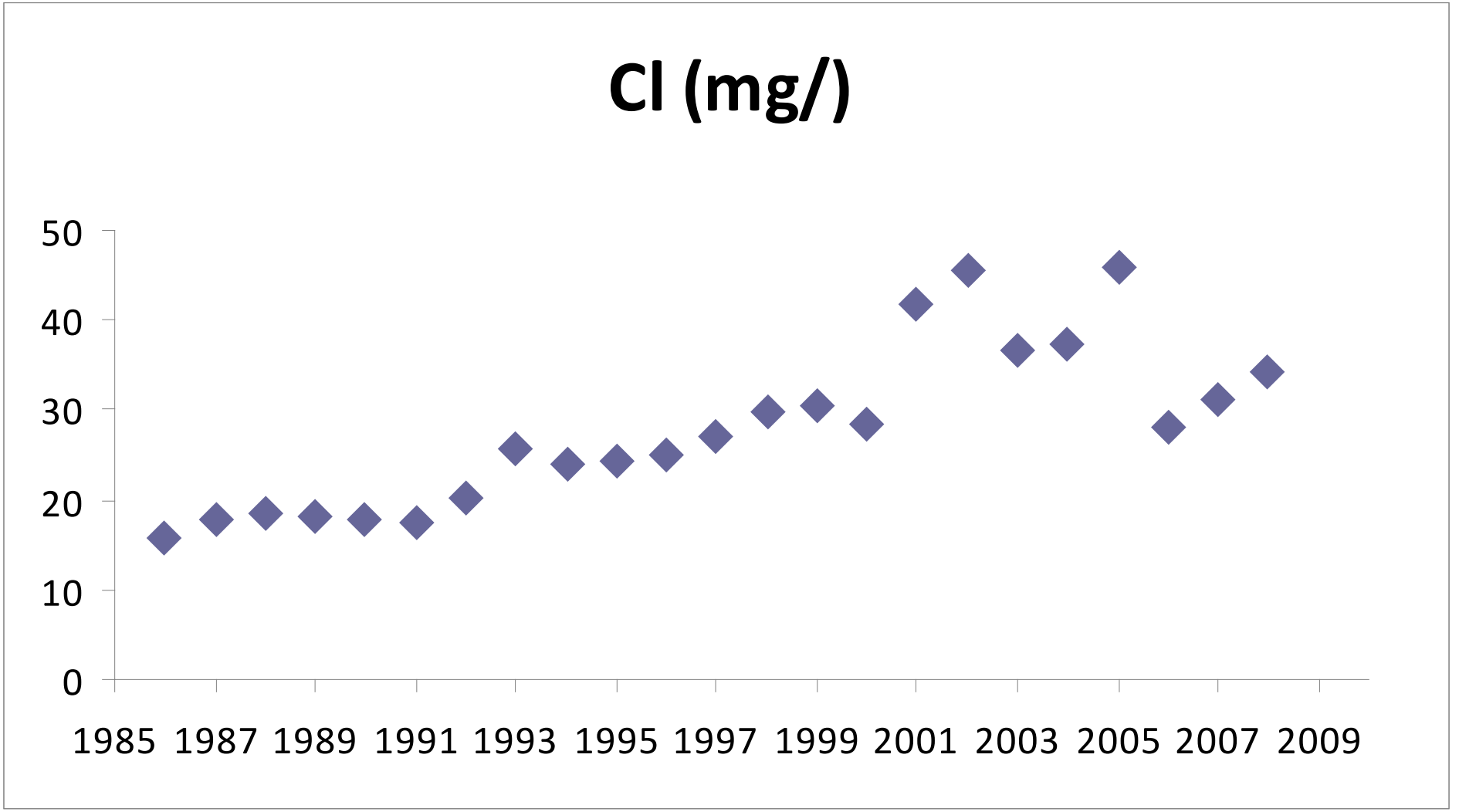
Subwatersheds in the Fishklill Basin



No decline in summer concentrations

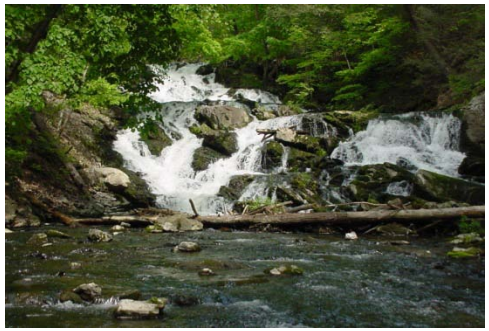


Long-term increases in concentration
East Branch of the Wappinger Creek

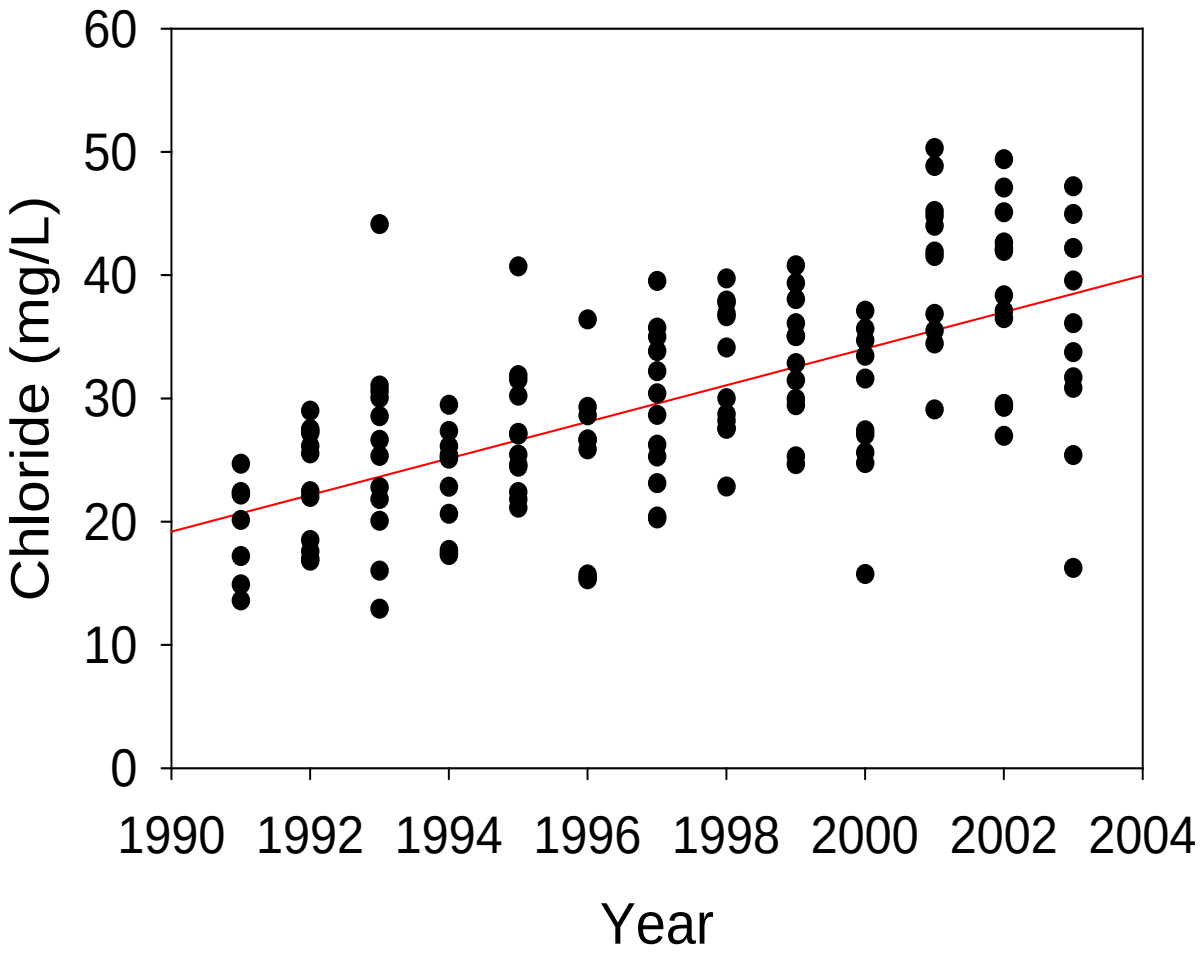


Kelly et al. ES&T 2008

Saw Kill Creek



- **Low-density residential**
- **Yearly mean Cl^- concentrations have doubled since 1991 (20 to 40 mg/L)**
- **Similar Cl^- concentrations throughout year**



All Patterns Suggest a Reservoir

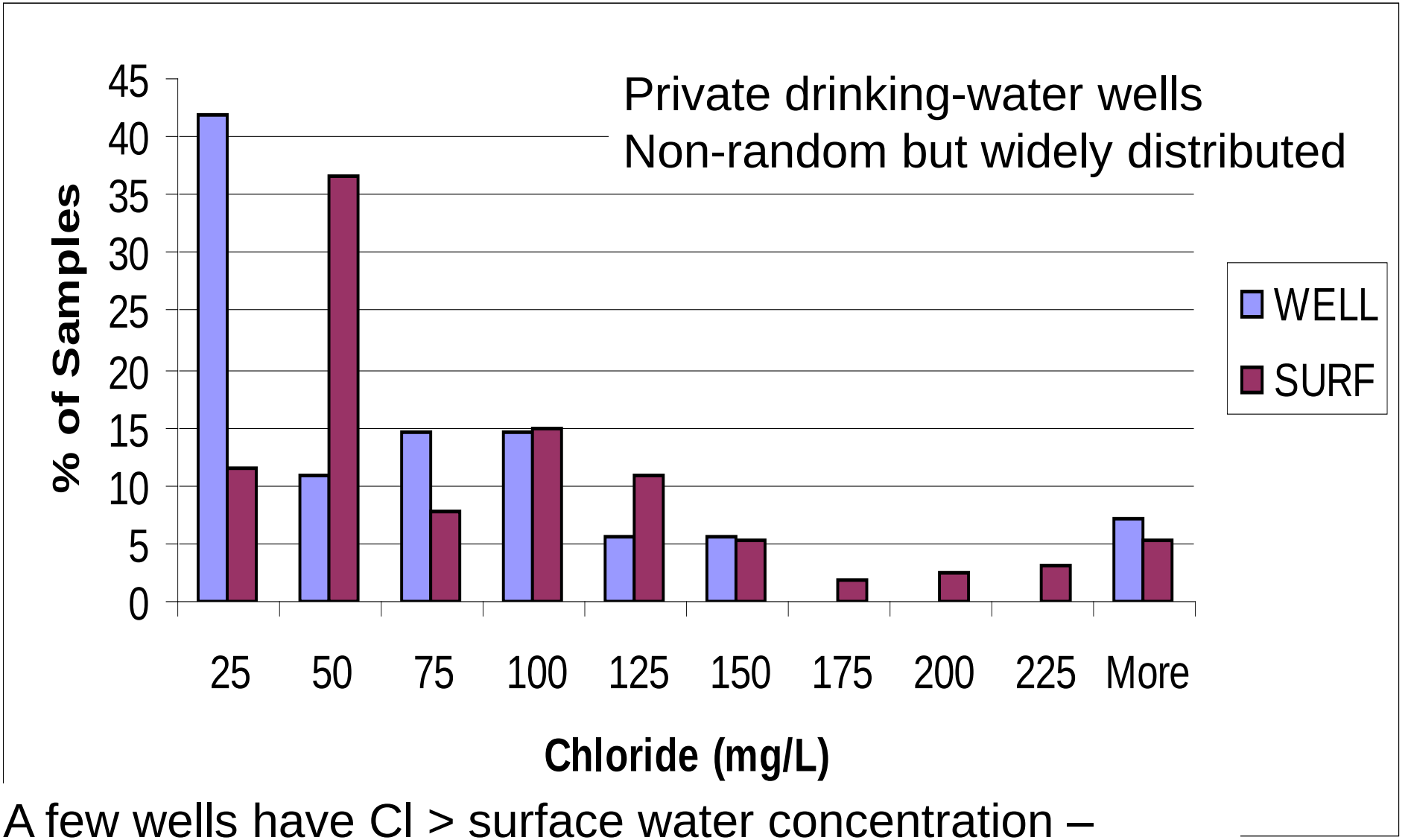
- Road salt biggest source – others?

Soil Sorption or Groundwater?

SOIL CORES HOLD Cl LONGER THAN WATER

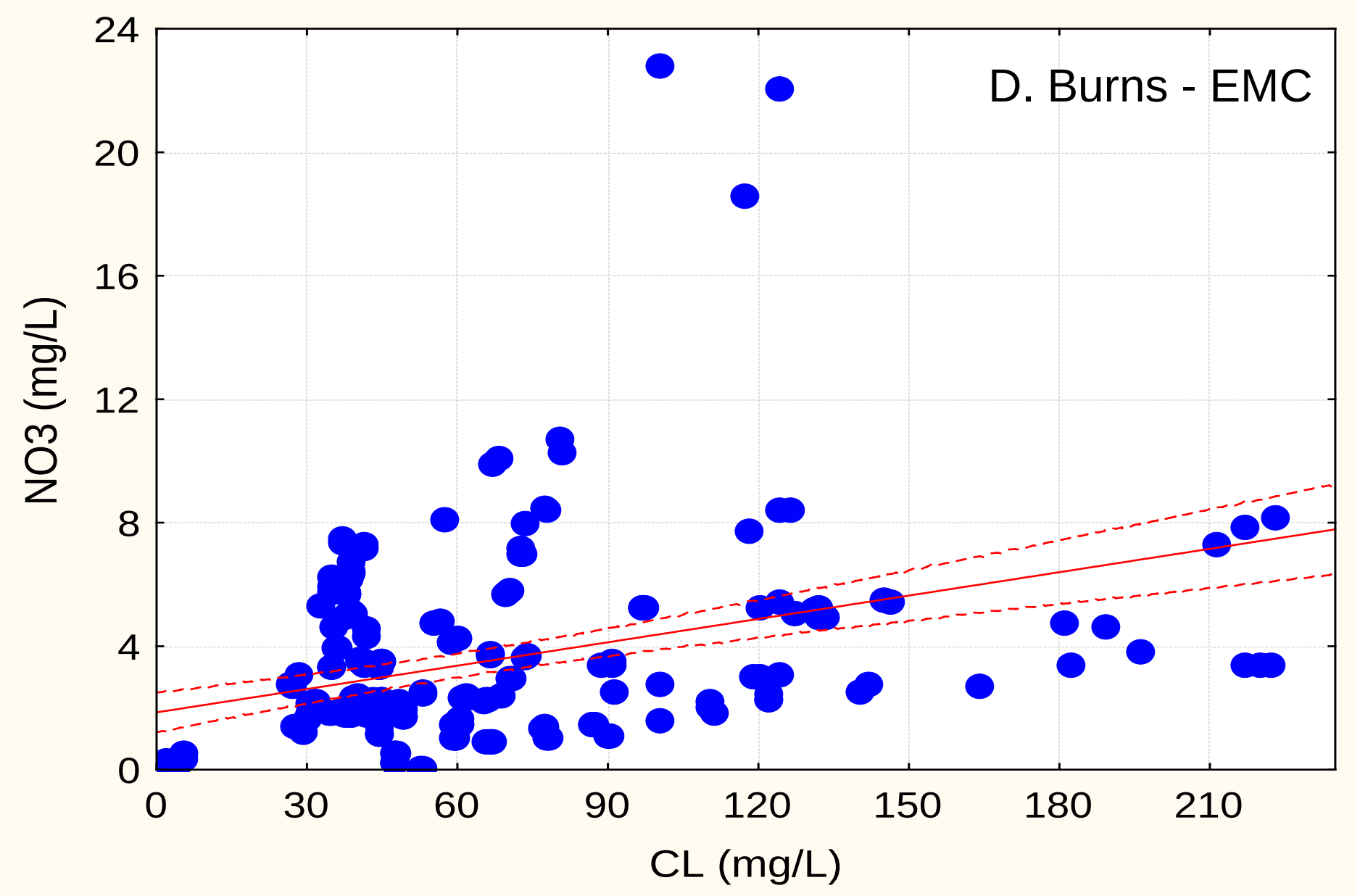
Kincaid and Findlay, 2009

Groundwater ?



A few wells have Cl > surface water concentration –
Could support high baseflow concentrations

CHLORIDE IS NOT ALONE



Should we be Worried?

- At the brink, trends are not encouraging
- Groundwater concentrations must be increasing
- What else is coming along?

Scope for Action

- Reduced Salt is in Everyone’s Interest
- Widespread Problem, Lots of Mental Horsepower
- Solutions may Require Capital

What do we Need to Know?

Today's Program

Environmental Effects – Not Huge Yet but Close?

Human Health Effects

Cost

- Direct (Salt is cheap, labor is not, use is high)
- Indirect (Corrosion, contamination

Solution?