

Biomass Makes a Difference



Thursday, Aug 25, 2005. 3 PM

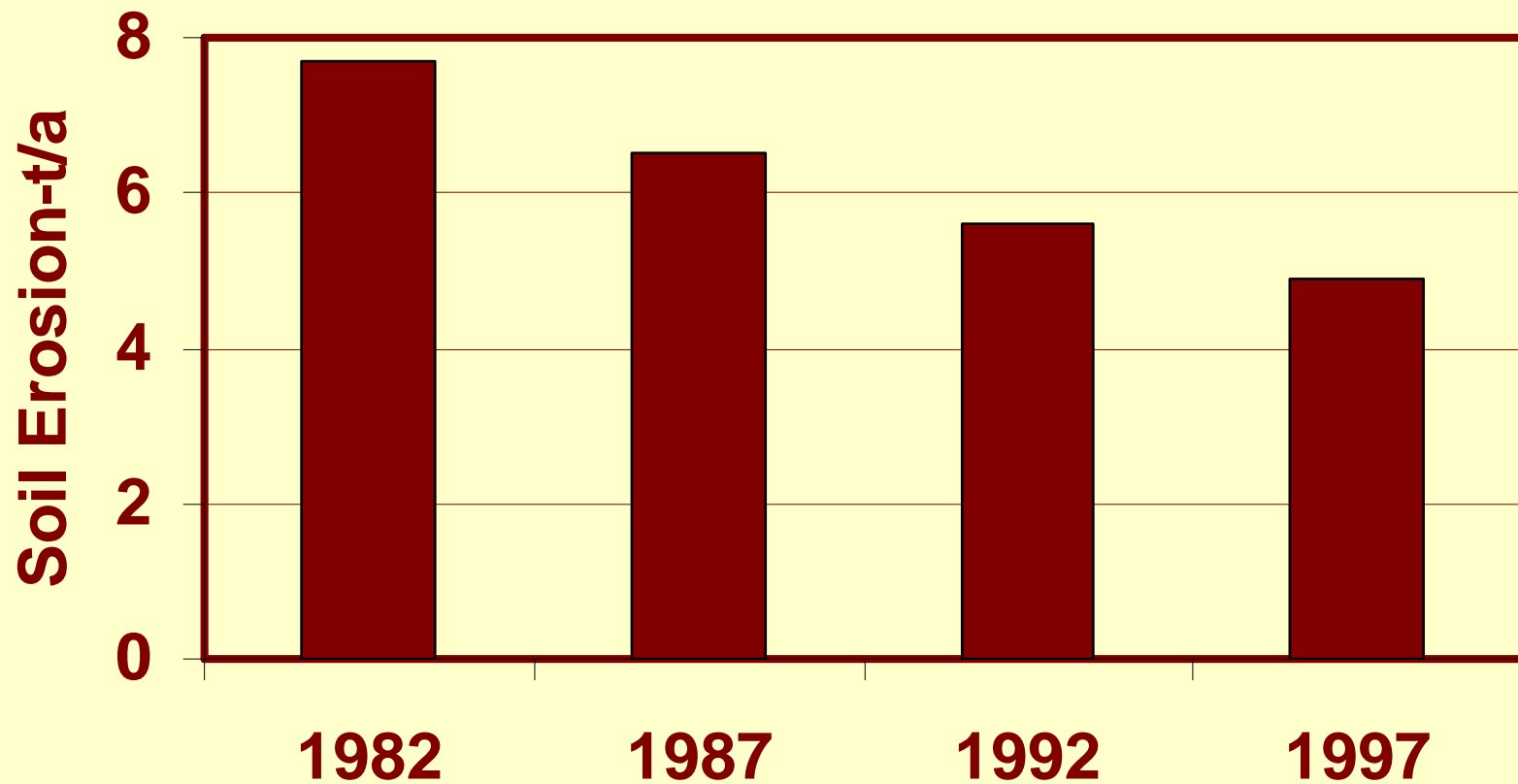


Sunday, May 17, 1998. 3 PM

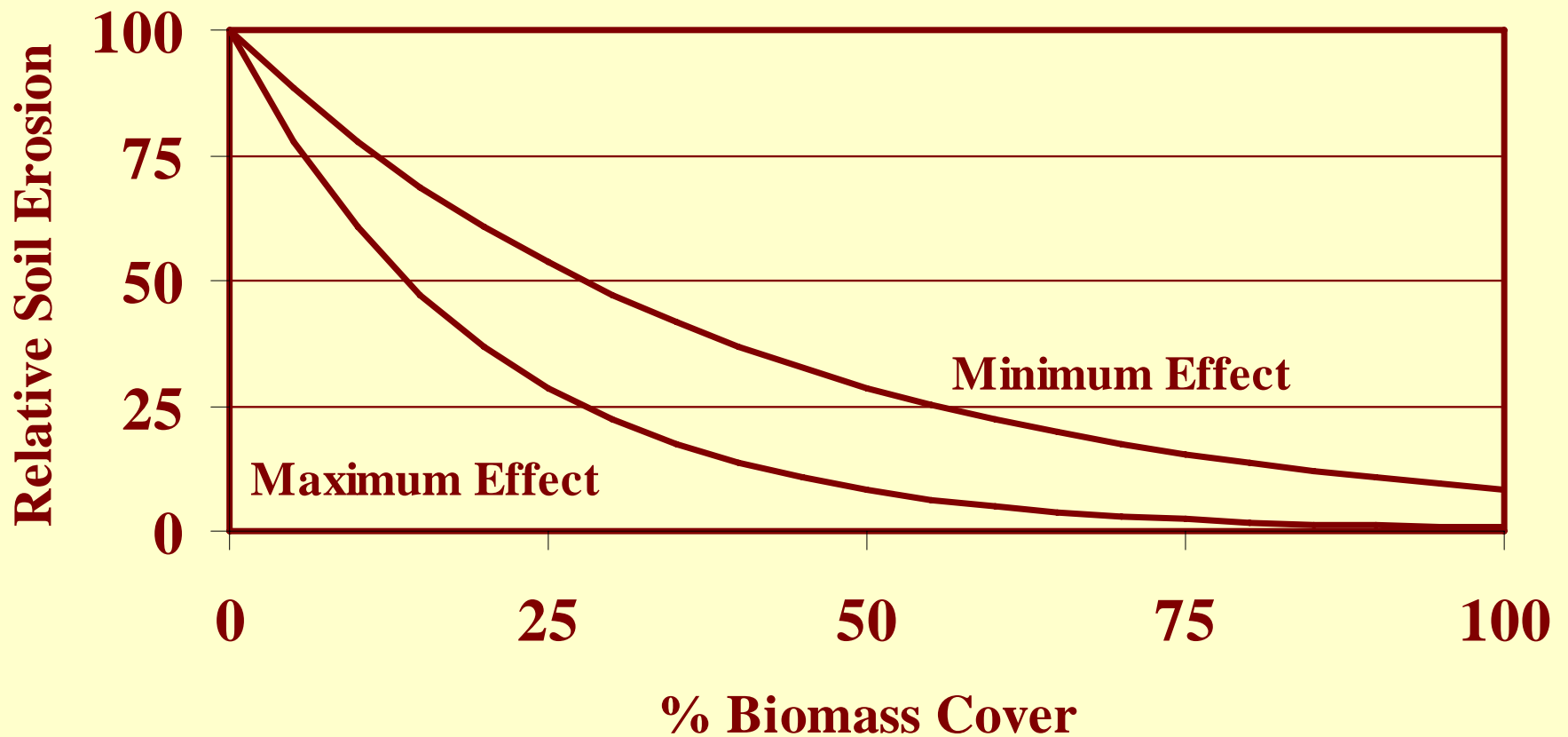
Laflen Home, Highway 9, 3 Miles E of Buffalo Center IA

Biomass Makes a Difference!

Source NRI-Iowa Cultivated Cropland



Biomass and Soil Erosion



Winnebago County Crew Cleaning Ditches and Culverts

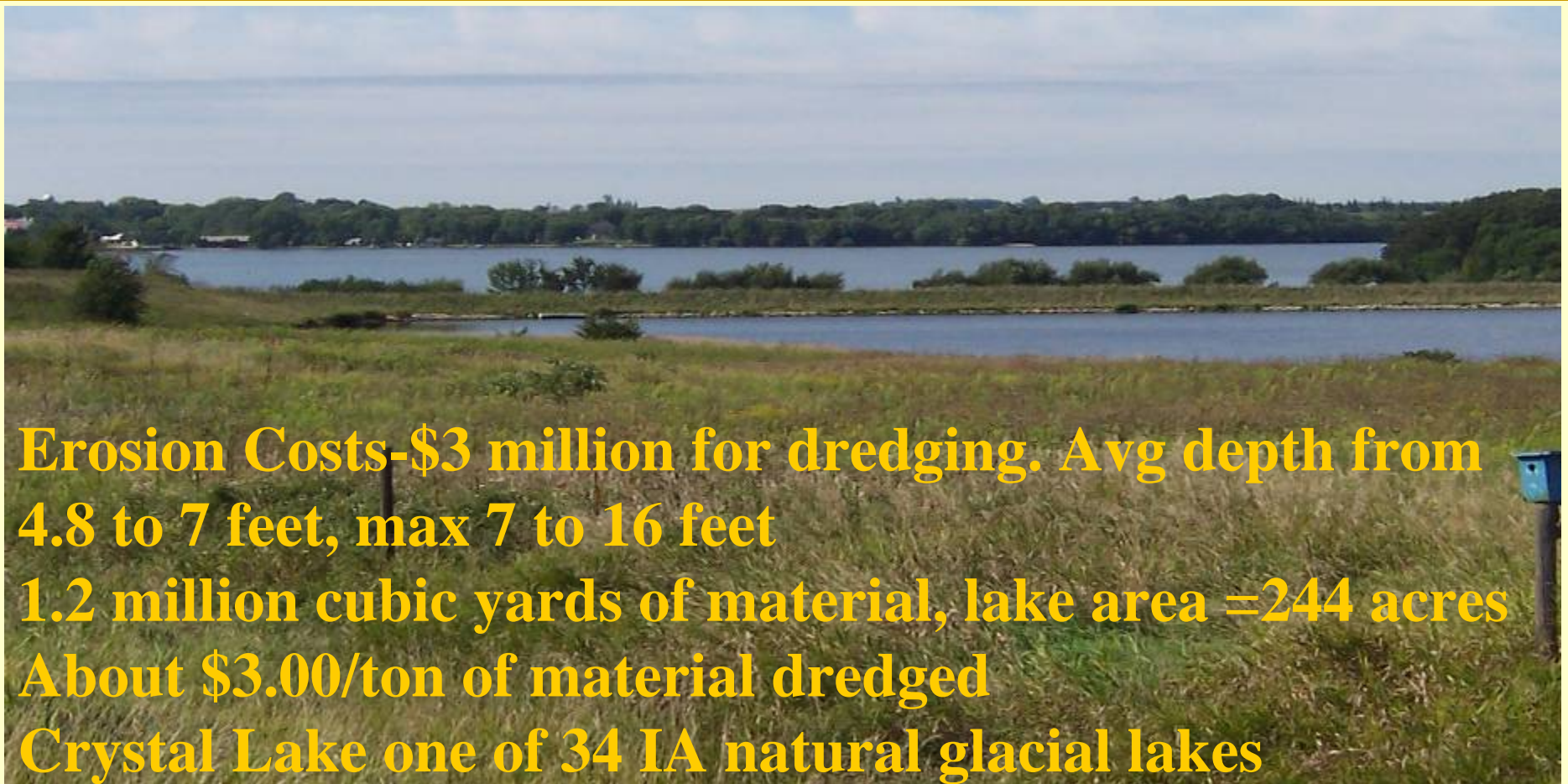


Erosion Costs-\$4/ton?

08/23/2005

Crystal Lake-Sediment Basin

2006-Dredging of Crystal Lake



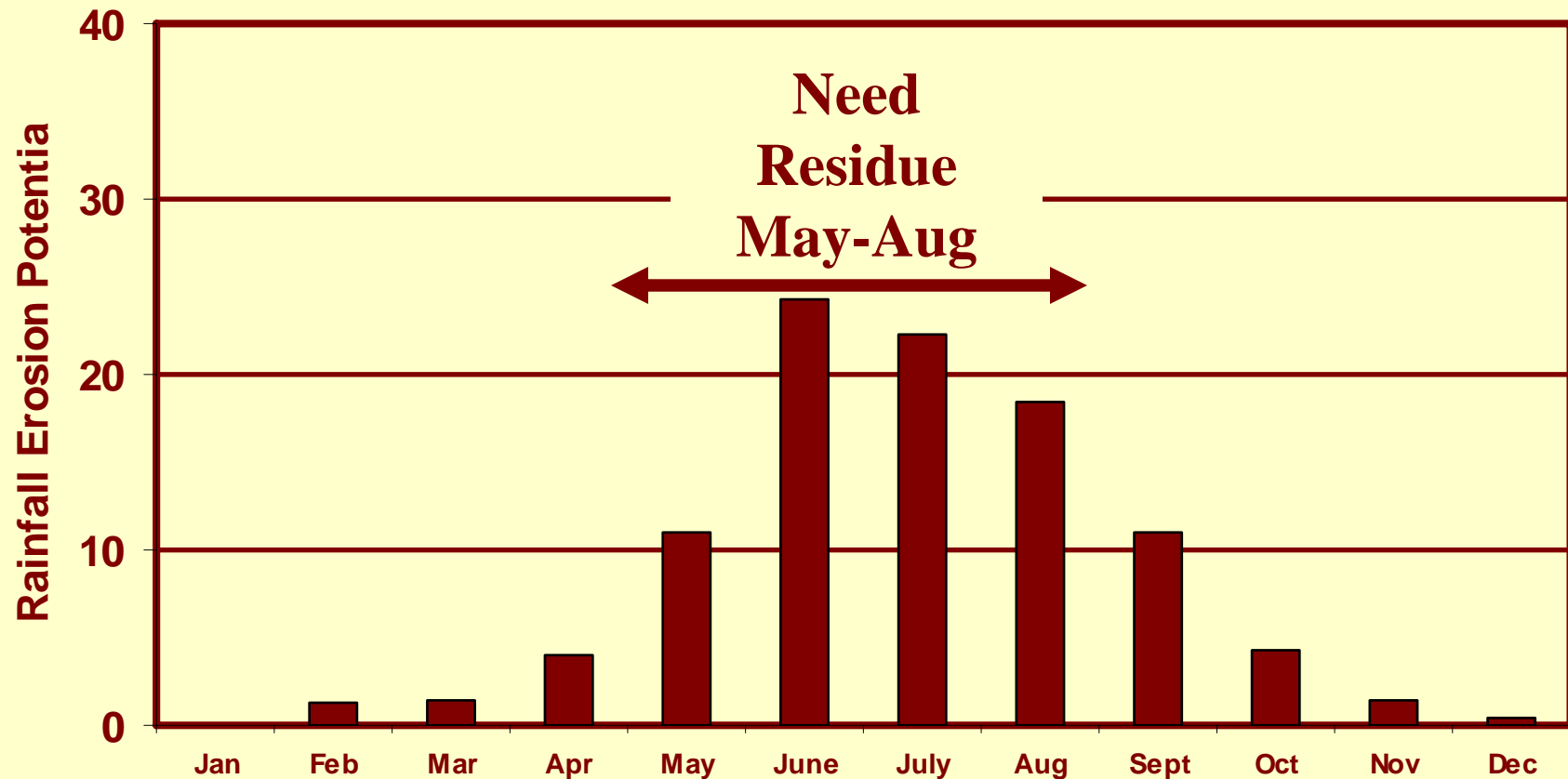
Erosion Costs-\$3 million for dredging. Avg depth from 4.8 to 7 feet, max 7 to 16 feet
1.2 million cubic yards of material, lake area =244 acres
About \$3.00/ton of material dredged
Crystal Lake one of 34 IA natural glacial lakes

Poor Fishing and Boating on a Western Iowa Lake

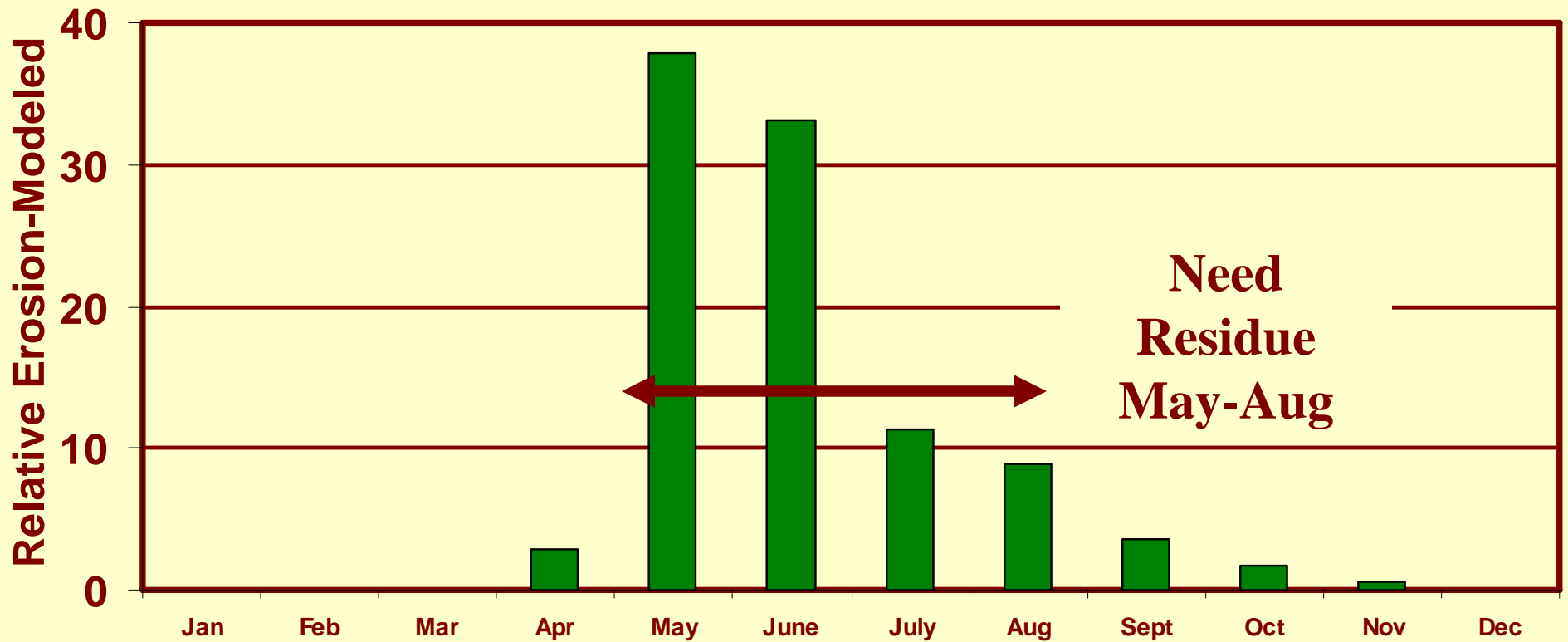


**Erosion Costs-Built in 1950's with a planned
life of 50 years. picture taken in 1967**

Distribution of Rainfall Erosion Potential in Iowa

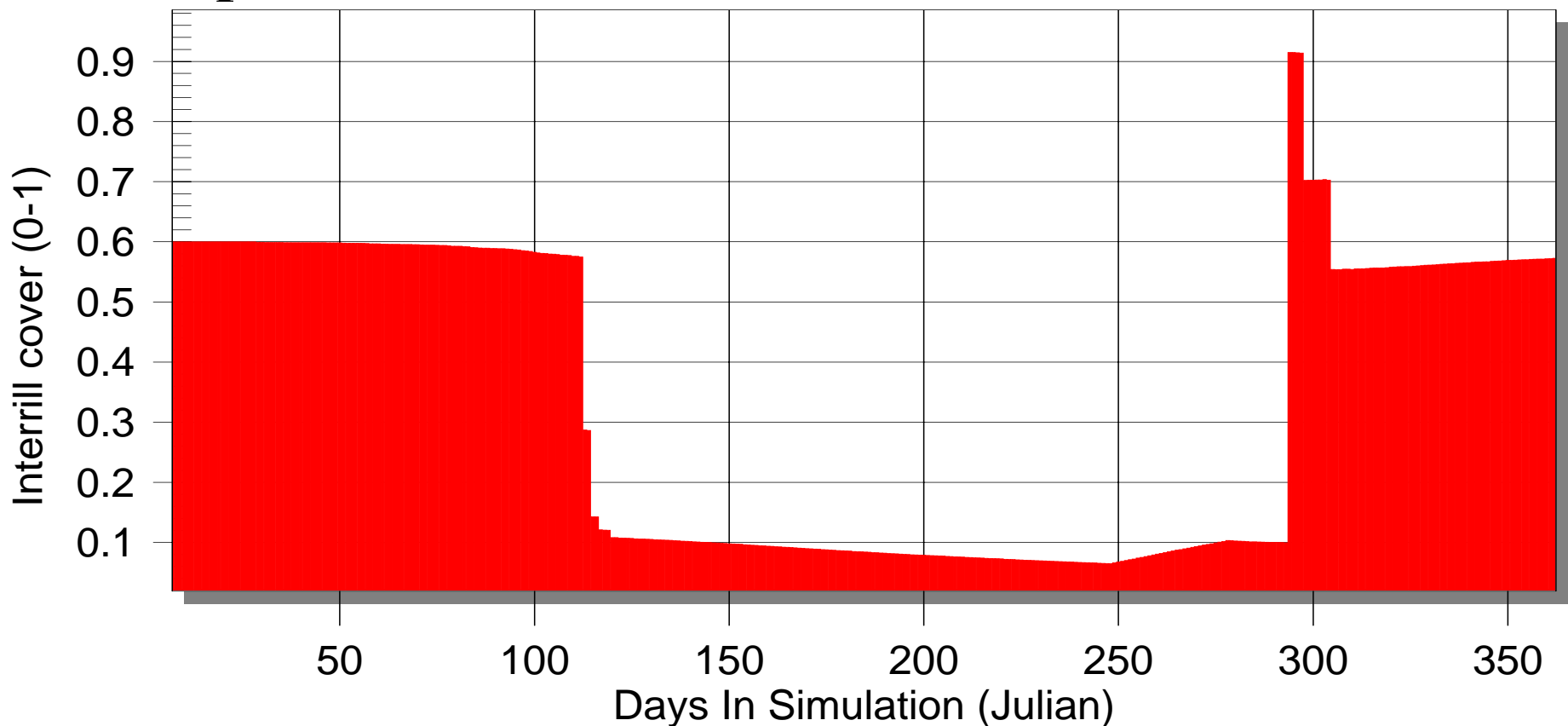


Distribution of Erosion when Corn is Produced

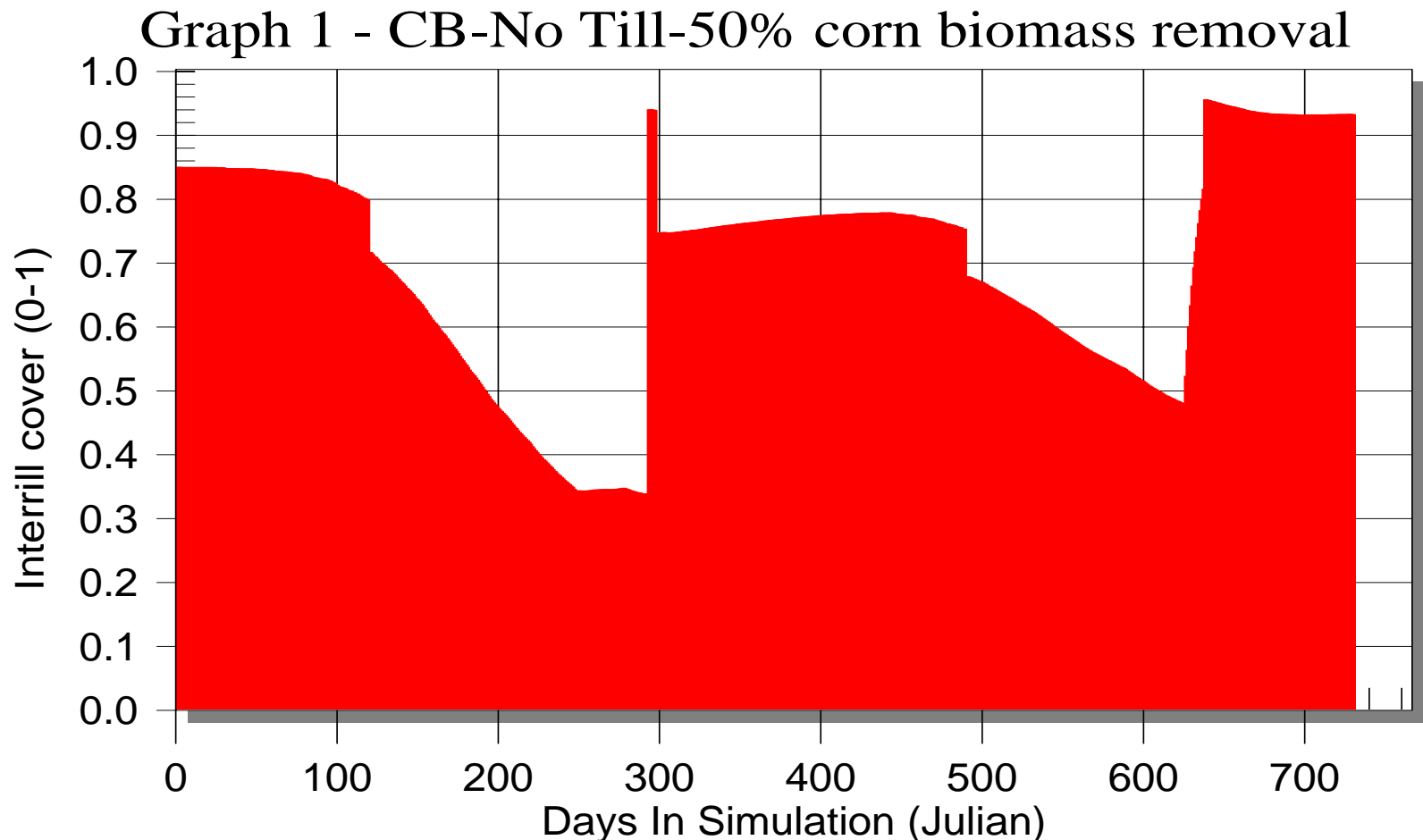


Biomass Cover for a Fall Chisel, Continuous Corn with 50% biomass removal-Erosion = 7.6 t/a

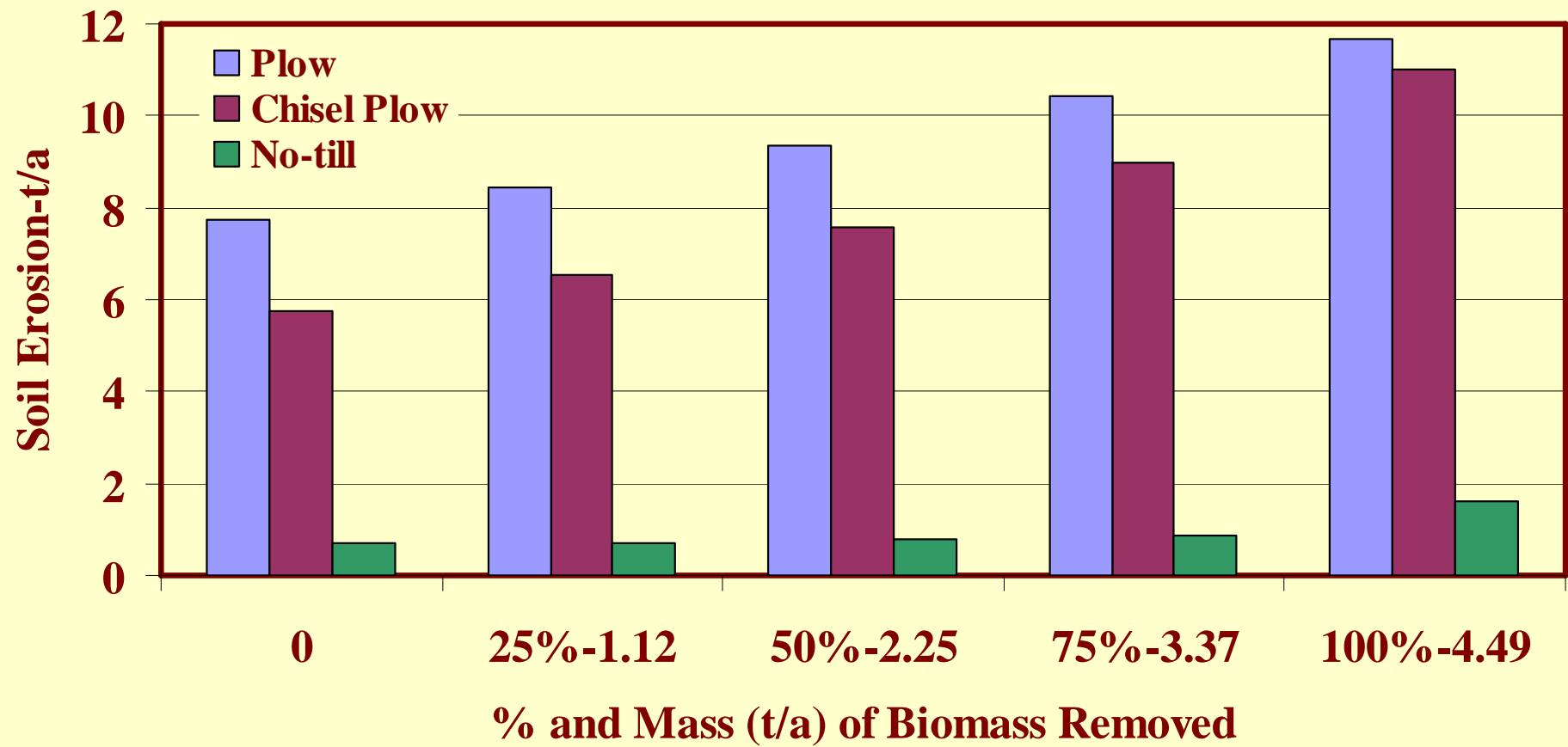
Graph 1 - CC-FALL Chisel-50% biomass removal



Biomass Cover for a NT CB Rotation When 50% of Corn Biomass is Harvested-Erosion = 0.8 t/yr



Effect of Biomass Removal and Tillage System on Soil Erosion



Biomass and Soil Erosion



Relationship between Biomass Cover and Mass

- $\%Cover = 100[1 - e^{(-A \text{ Mass})}]$
- $A = \text{Biomass Area} / \text{Biomass Weight}$
 - Examples:
 - Cylinder of Diameter D , Length L , Density d
$$A = LD / ((3.14 D^2 / 4) L d) = 1 / (3.14 d D / 4)$$
 - Flat Surface of Thickness t , Density d , Area- a
$$A = a / (t a d) = 1 / (t d)$$

Am (sq m/kg) Measured in 1982 study at WIEF and Ames

		Am Values (sq m/kg)			
Crop	Prior Crop	Stalks	Cobs	Fines	Total
B	B	1.84	0.21	4.67	2.07
C	B	1.31	0.18	3.63	1.22
B	C	1.43	0.25	4.07	1.04
C	C	1.51	0.30	3.04	1.25
	Avg	1.53	0.24	3.85	1.40

Computed vs Measured A values

	Diameter or Thickness- mm	Density- gm/cc	Computed A-sq m/kg	Laflen et al. 1982	Gregory, 1982 Beans	Gregory, 1982 Corn
Pine Cylinder	25	0.500	0.1			
Pine Cylinder	10	0.500	0.25			
Cobs	25	0.250	0.20	0.24		
Stalks	10	0.125	1.02	1.53	2	3.2
Leaves, fines	0.7	0.250	5.71	3.85	6.3	

Biomass for the Bioeconomy

- We have the ability to evaluate on a field by field basis the impact of biomass removal on downstream water bodies.
- We have less of a handle on the effect of biomass removal on the soil resource.

Biomass for the Bioeconomy

1. Biomass has greatly reduced soil erosion, but, we still have a large number of impaired water bodies!
2. Need Biomass from May-August to control soil erosion in Iowa
3. A grass harvested for biomass (Hay) has same erosion as no-till corn with no biomass removal

Biomass for the Bioeconomy

- If No-till were required for biomass removal, soil erosion rates could be less than current rates due to farmers switching from systems based on tillage to no-till.

An Observation

The University of Iowa is
the Cultural Center of
Interstate 80

Donald Kaul