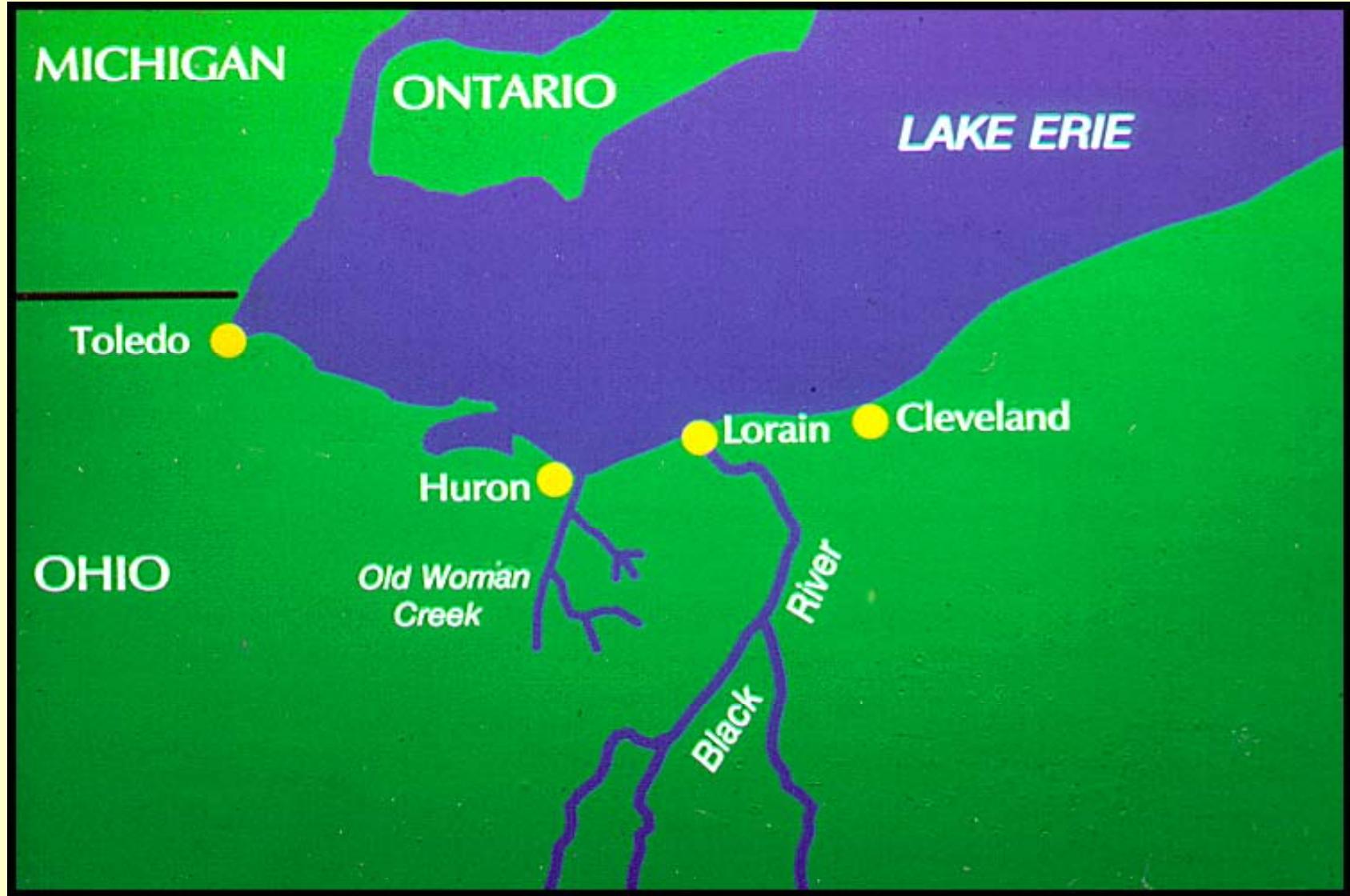


Using Field Data on Fish Pathology to Assess the Effectiveness of Remedial Dredging in the Black River



USX Facility



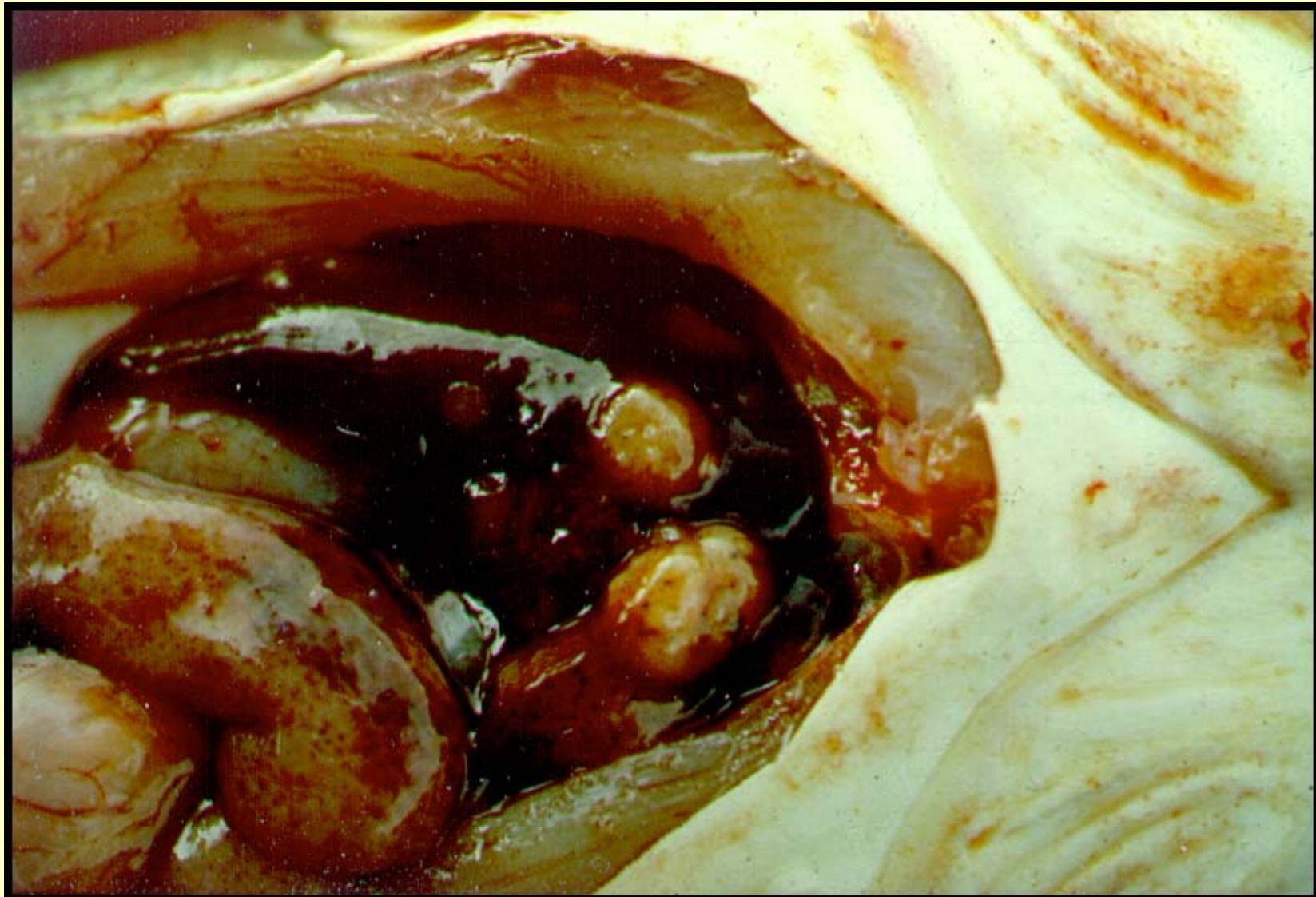
Coke Plant Outfall

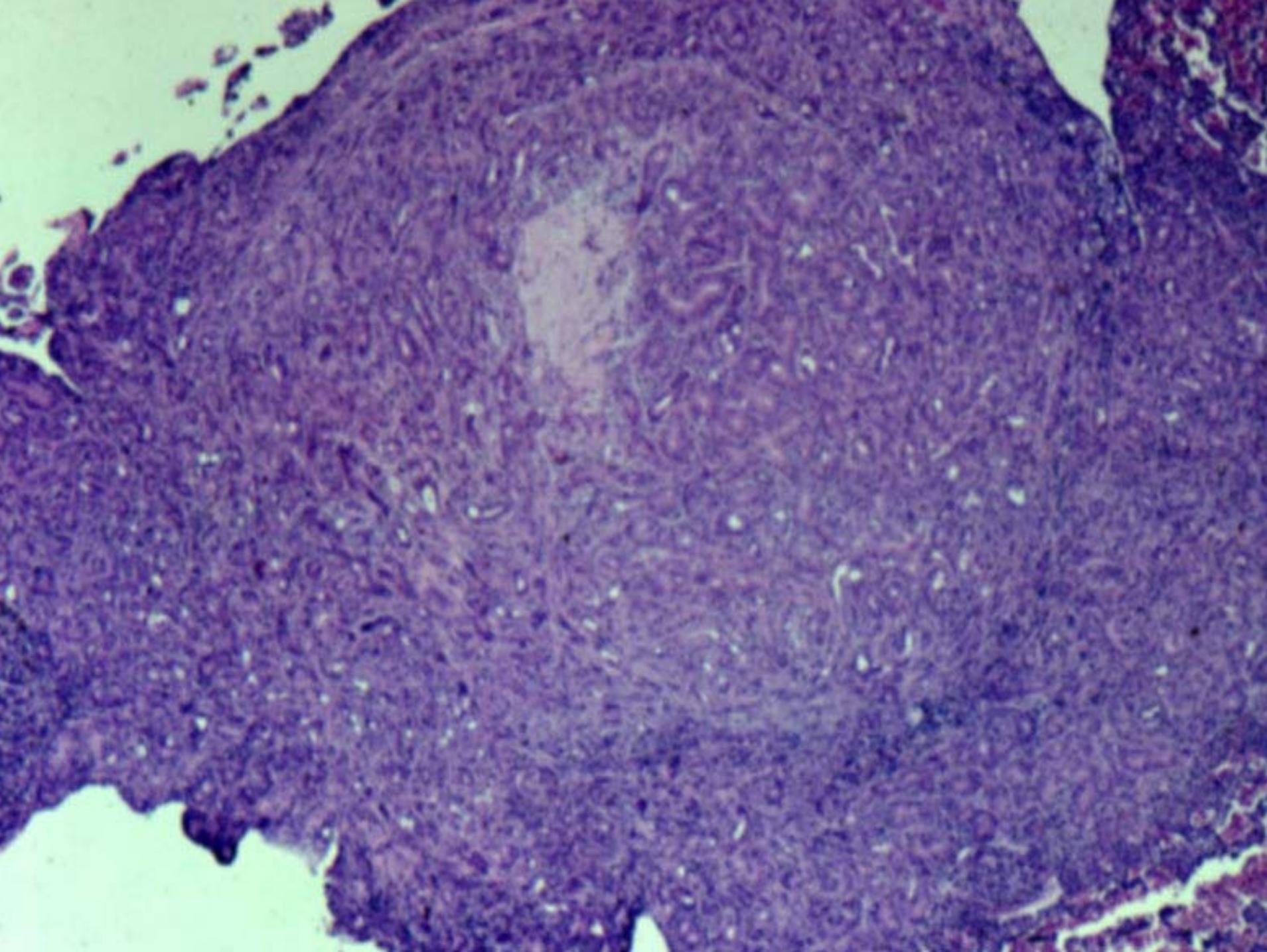


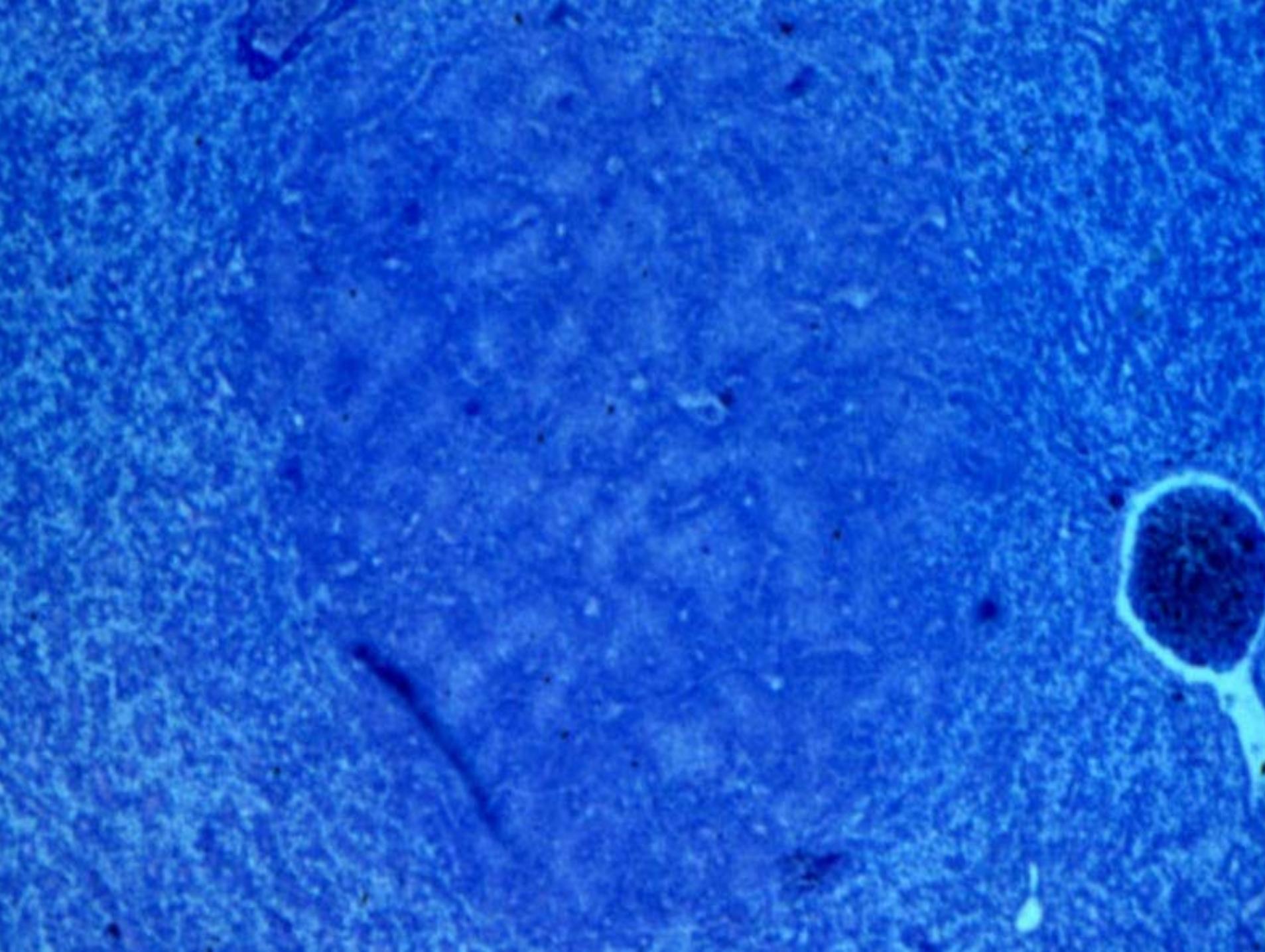
External Abnormalities and Tumors



Internal Pathology



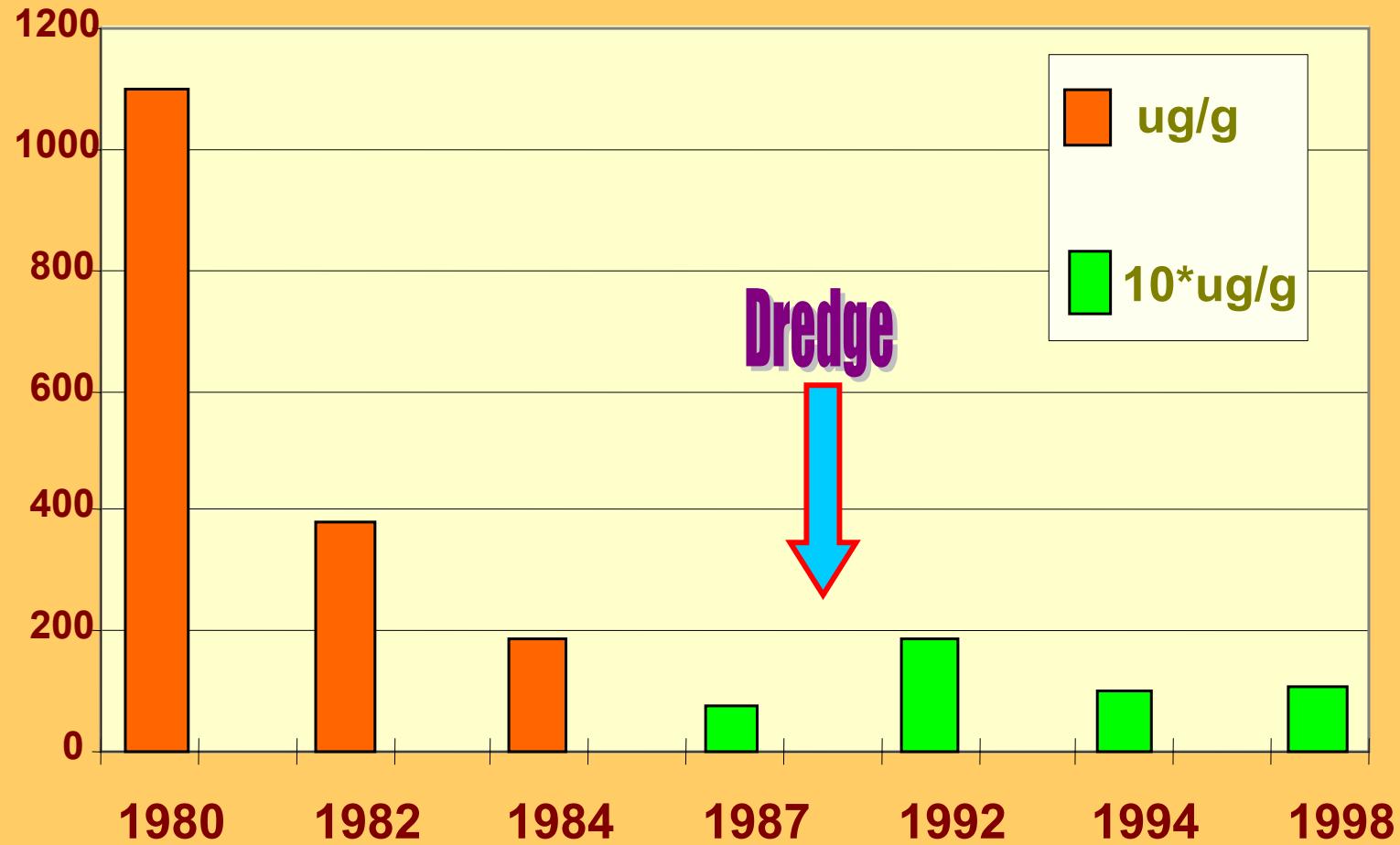




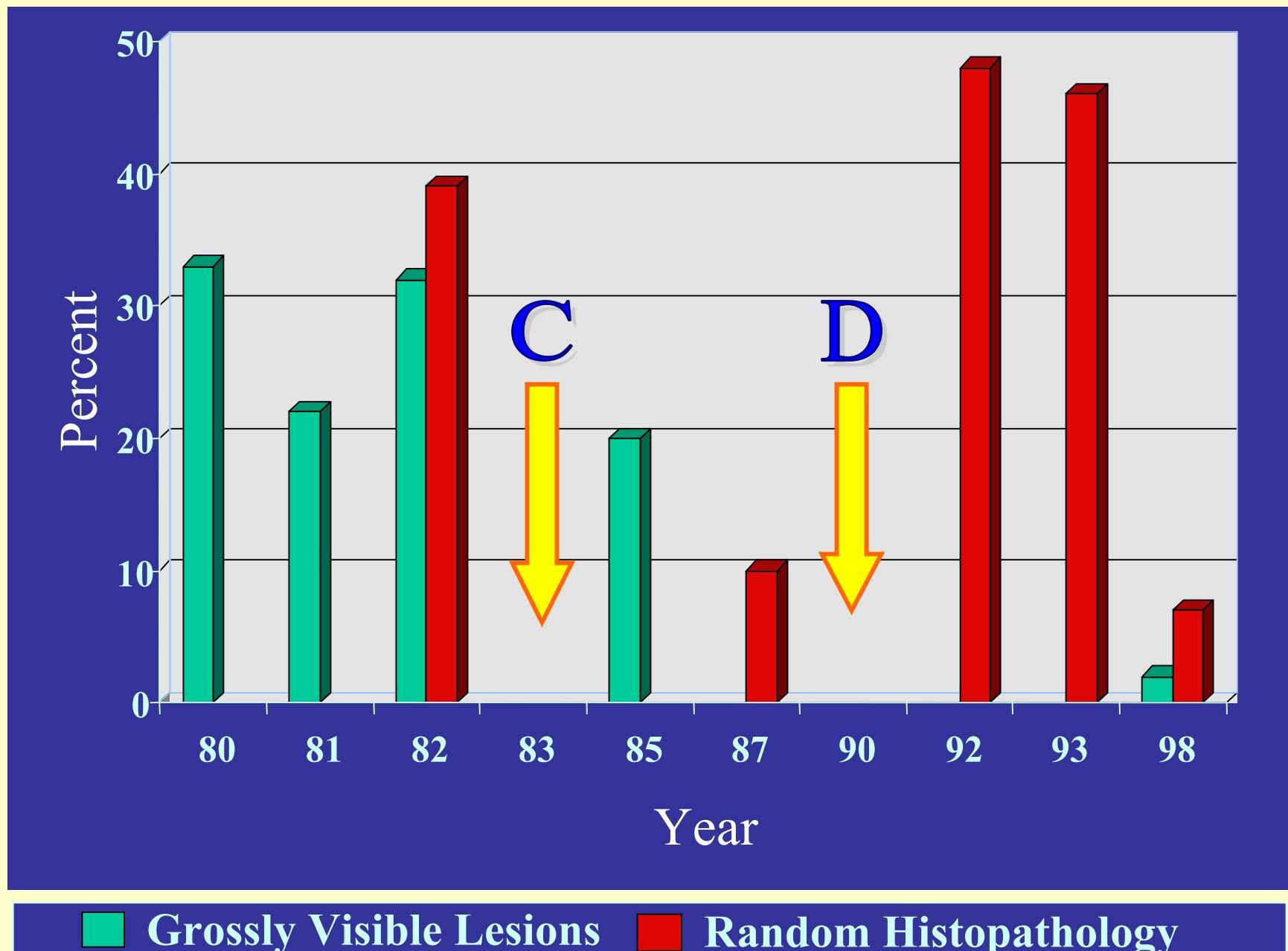
Black River Timeline

- 1980 Select
- 1981 Select
- 1982 Complete
- 1983 Coking Stops
- 1985 Select
- 1987 Complete
- 1990 Dredging
- 1992 Complete
- 1993 Complete
- 1994 Complete
- 1998 Complete

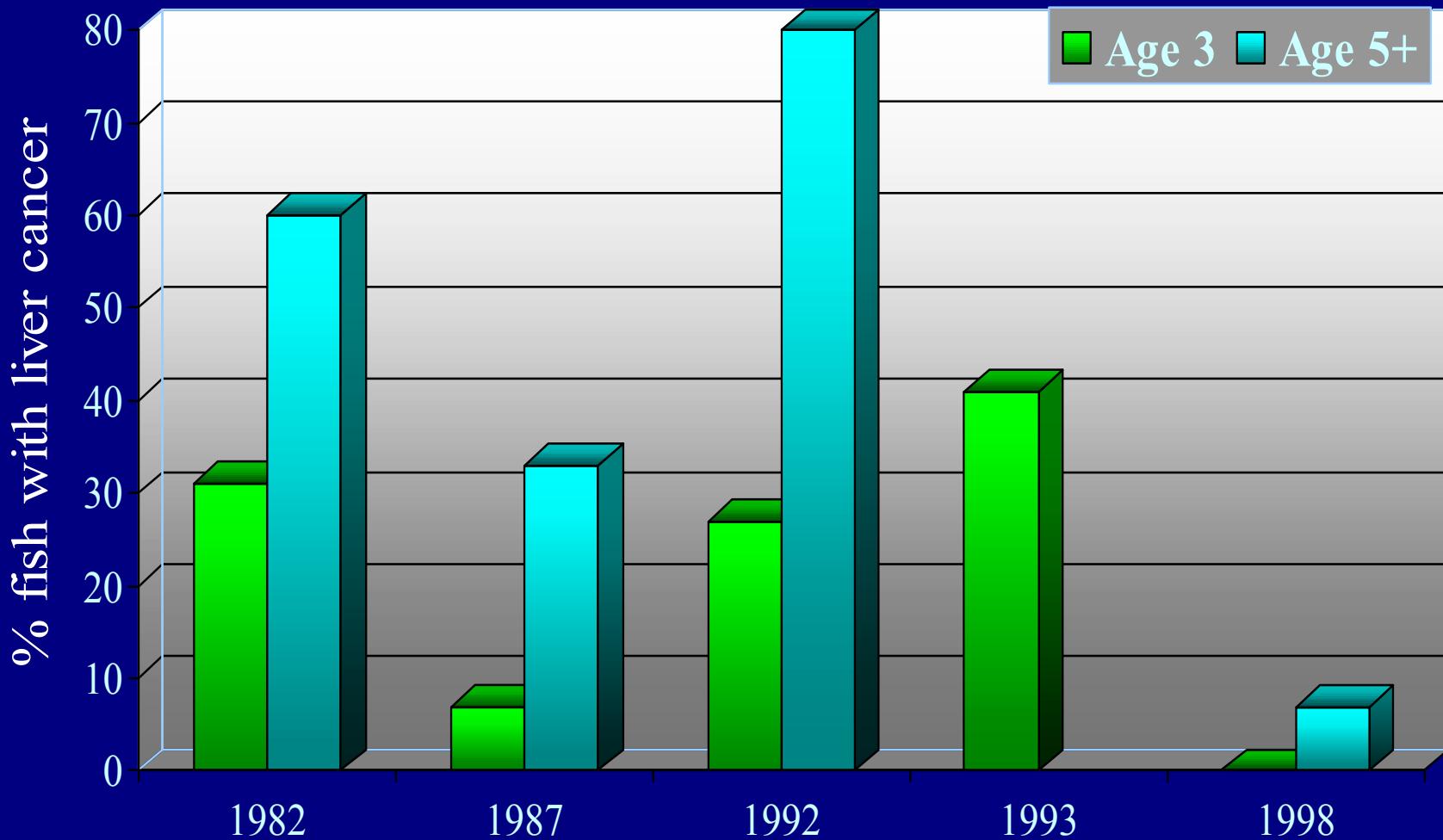
PAH (ug/g) in Black River Sediment



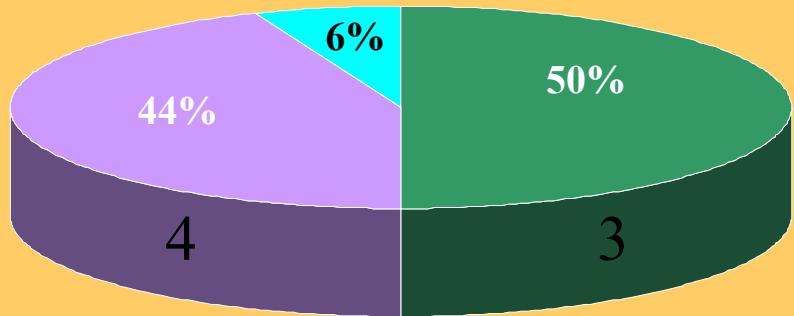
Bullhead Cancer Prevalence



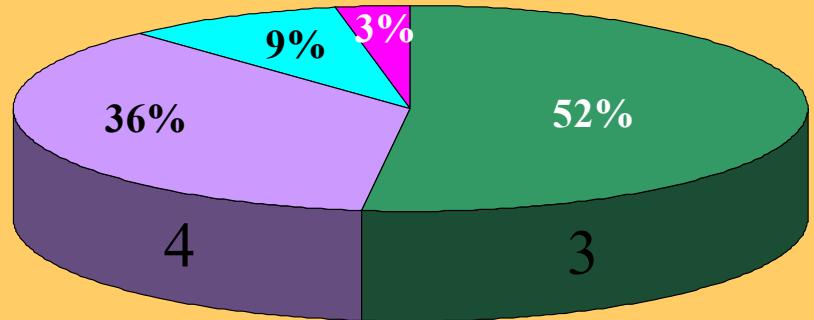
Liver Cancer of Fish Age 3 and 5+



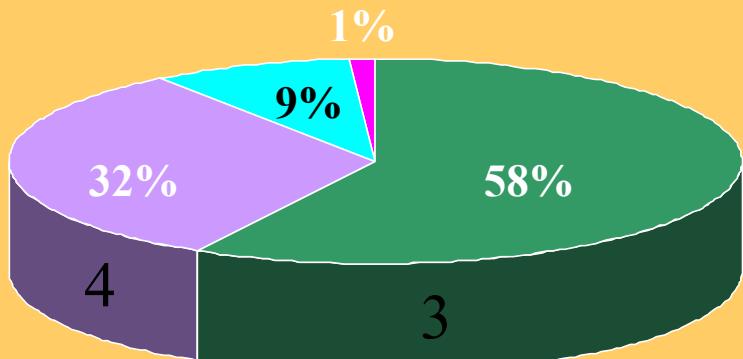
POPULATION EFFECTS



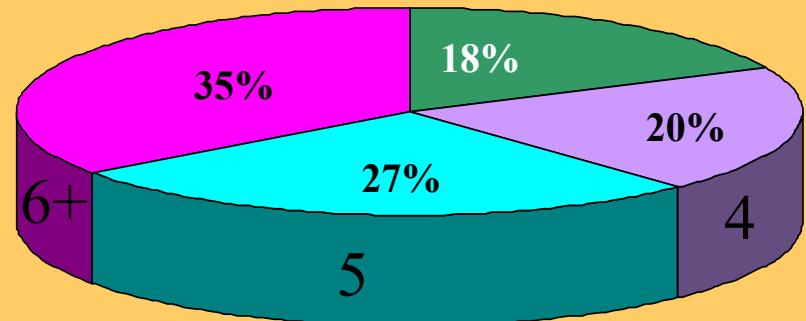
81 & 82



87



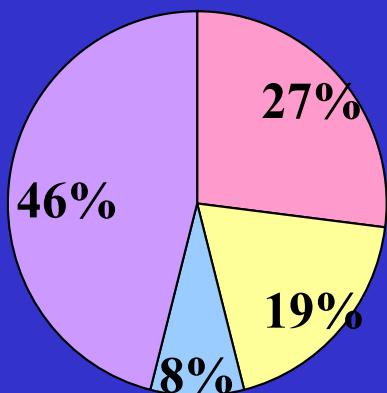
92 & 93



98

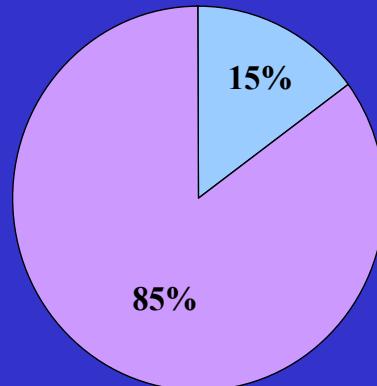
Neoplasms in Age 3 Fish

1992 N = 37

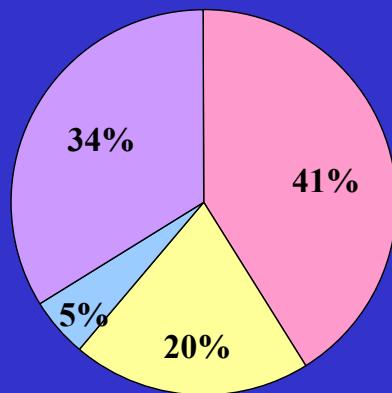


Age 1

1994 N = 27



1993 N = 56



YOY

YOY 1991

Passive vs Active Remediation

- 1983 Coking Stops
- 1984 Fish Hatch
- 1985: Fish Age 1
- 1986: Fish Age 2
- 1987: Age 3-Study
- 1990 Dredging
- 1991 Fish Hatch
- 1992 Fish Age 1
- 1993 Fish Age 2
- 1994 Age 3-Study

Age 3 Bullhead Liver Condition

