

TDG Supersaturation Criterion v Field Investigations

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BASIC ISSUES

- Does available literature support the need for 110% to adequately protect fish?
- Have gas bubble disease (GBD) mortalities or injuries produced population effects?
- 115% v 120%

Supersaturation different than other water quality issues?

- Supersaturation is a *relative* measure rather than a measure of *concentration*.
- Always measured relative to surface pressure.

% SATURATION AT SURFACE PRESSURE

100%

110%

120%

130%

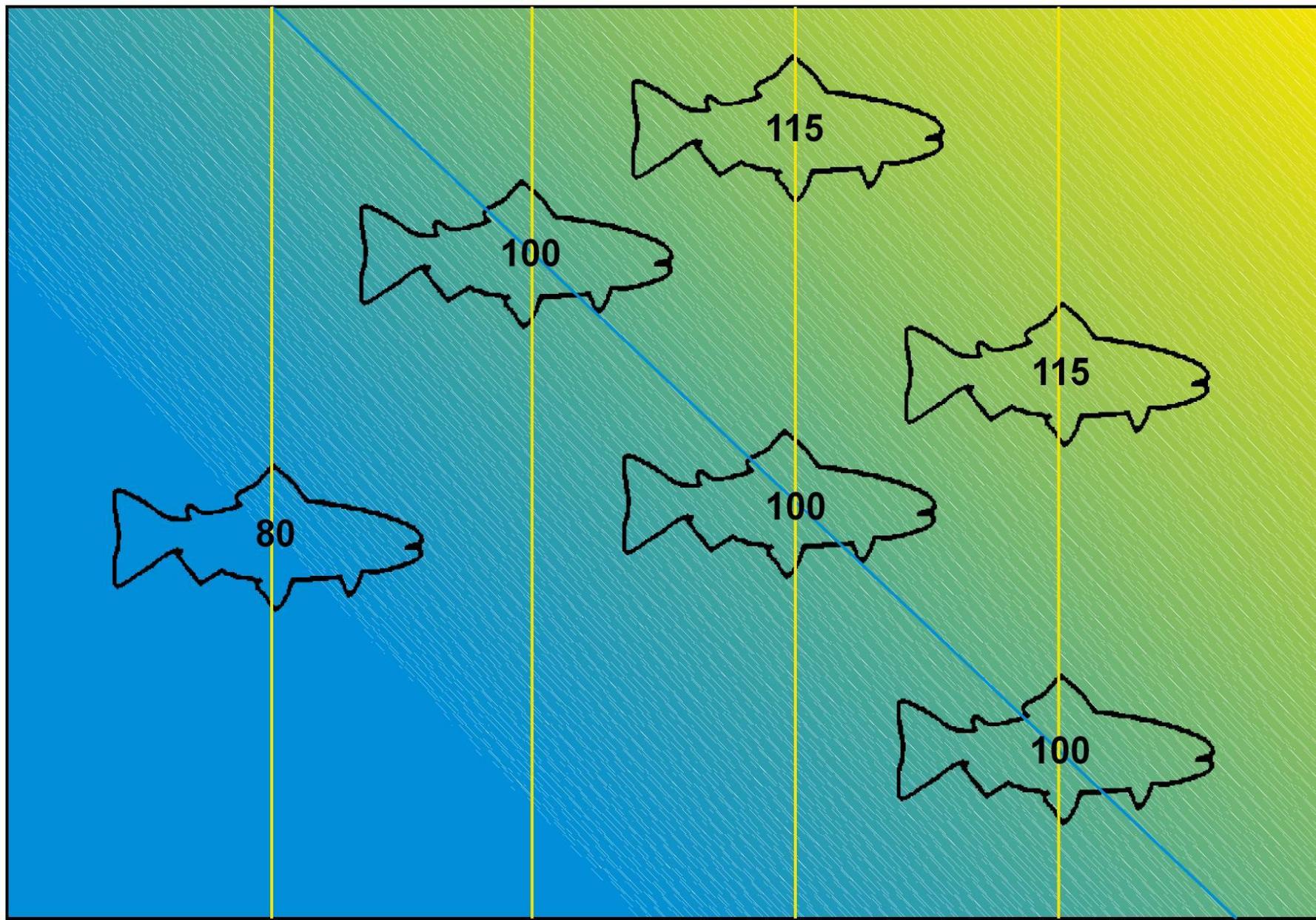
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1

2

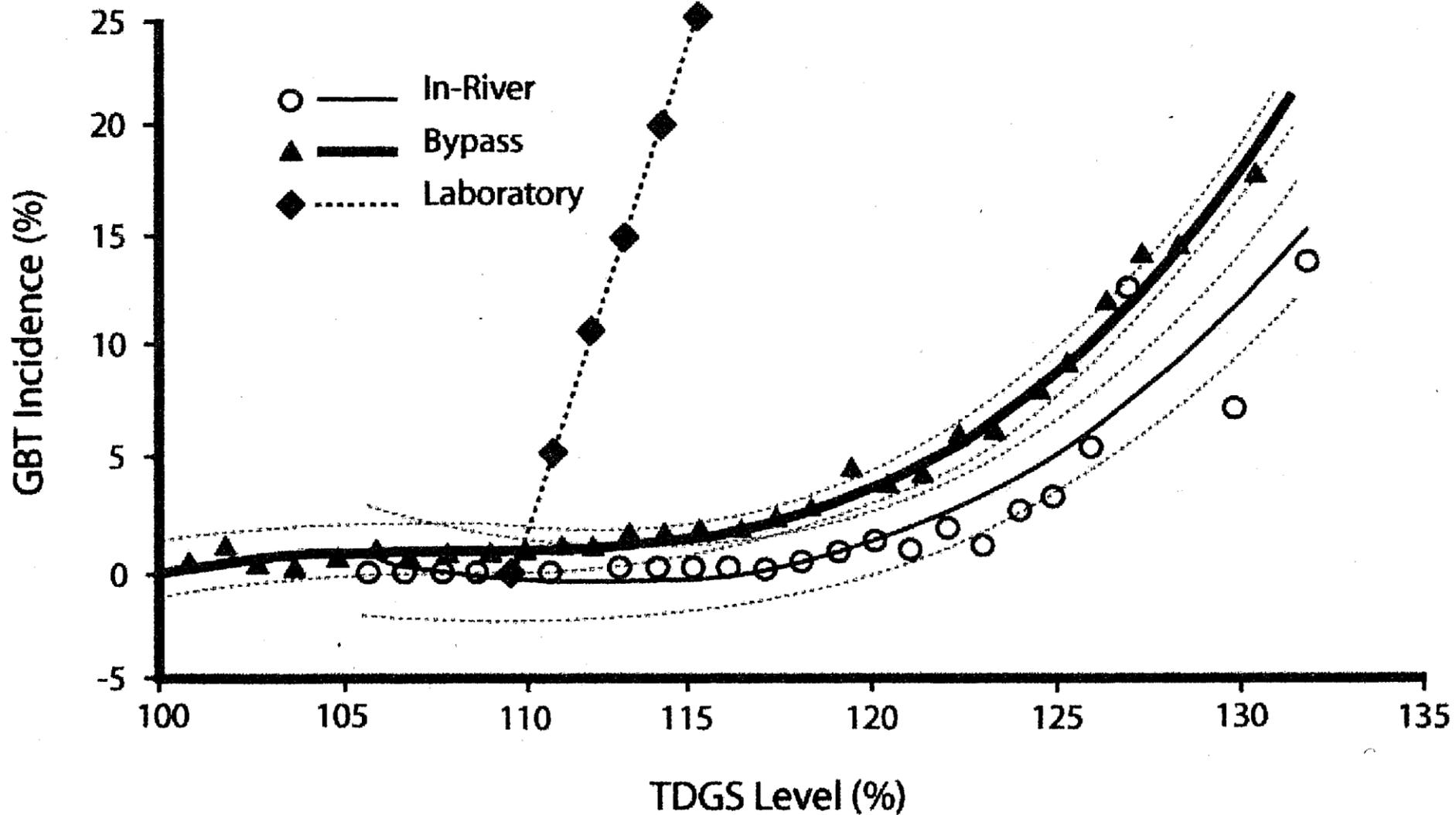
3

DEPTH (m)



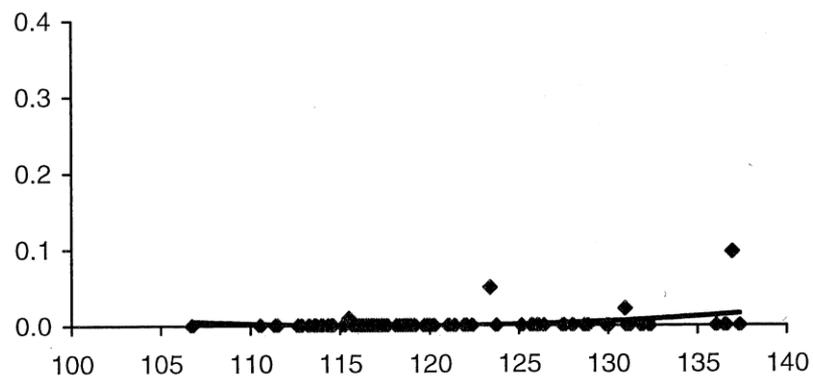
Nature of Field Information?

- Considerable long-term monitoring of juvenile salmon
- Monitoring of adult salmon (GBD & depth)
- Monitoring of resident species and invertebrates

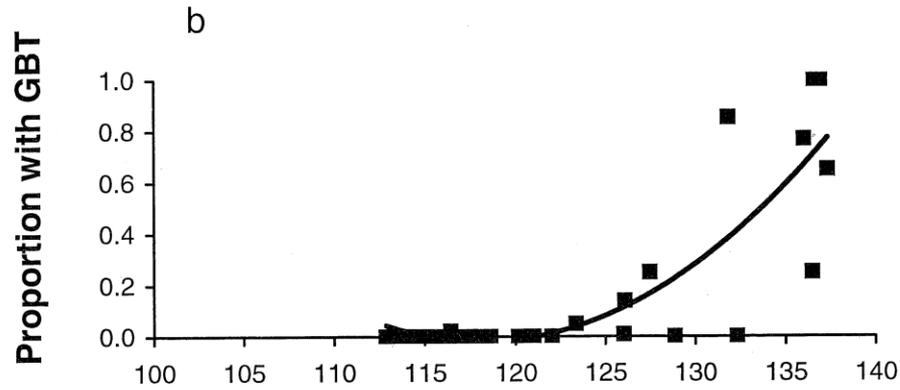


Juvenile salmon GBD incidence
from Backman et al. 2002

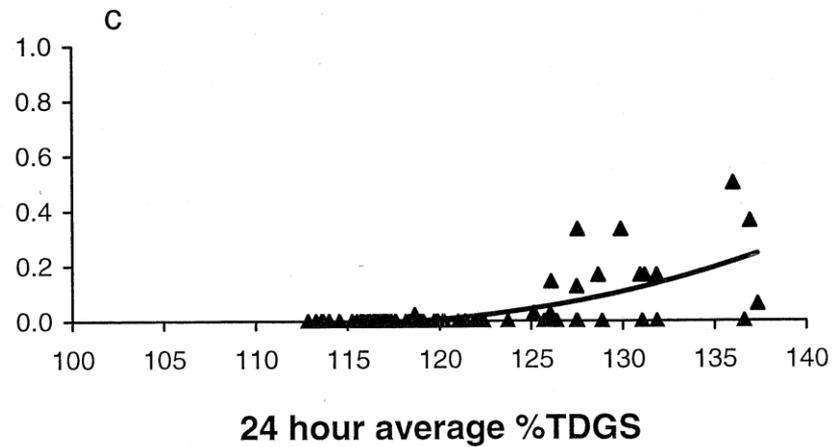
Chinook



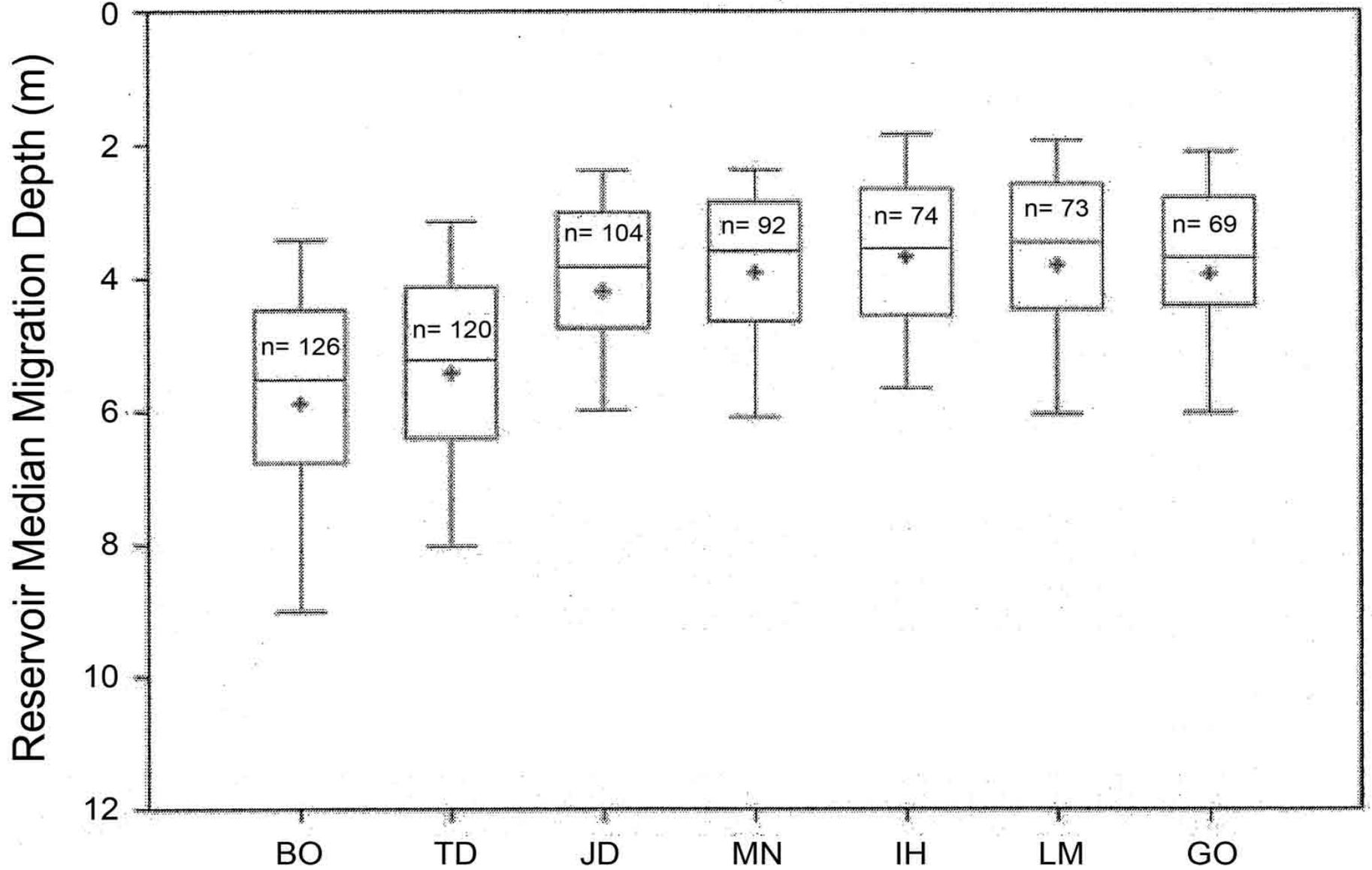
Sockeye



Steelhead



24 hour average %TDGS



Adult Chinook depth distribution
Johnson et al. 2005

Resident Sp. Clark Fork

SPECIES	Average median depth (m)	Max. depth (m)	Average range (km)
rainbow trout	1.8	6.1	6.1
brown trout	2.6	8.7	6.6
cutthroat trout	1.7	10.4	7.1
bull trout	2.2	11.8	7.7
mountain whitefish	1.7	4.3	8.3
northern pikeminnow	3.3	15.4	3.5
largescale sucker	2.3	11.4	6.3

TDG Supersaturation Natural

- Tendency to believe that TDG should naturally not exceed 100%.
- Natural falls and some rapids produce TDG supersaturation exceeding 110%.

Natural TDG Supersaturation



120-130%

Celilo Falls

Circa 1890

CELILLO FALLS TDG ?



GBD Risks

- GBD minor or not present at TDG up to ~120%
- GBD commonly not fatal
- Most fish appear to recover in field conditions
- Population effects have not been documented