

# Columbia/Snake Basin: Pulp and Paper Mill Dioxin Reductions



DEQ Toxics Reduction Workshop  
Northwest Pulp and Paper Association

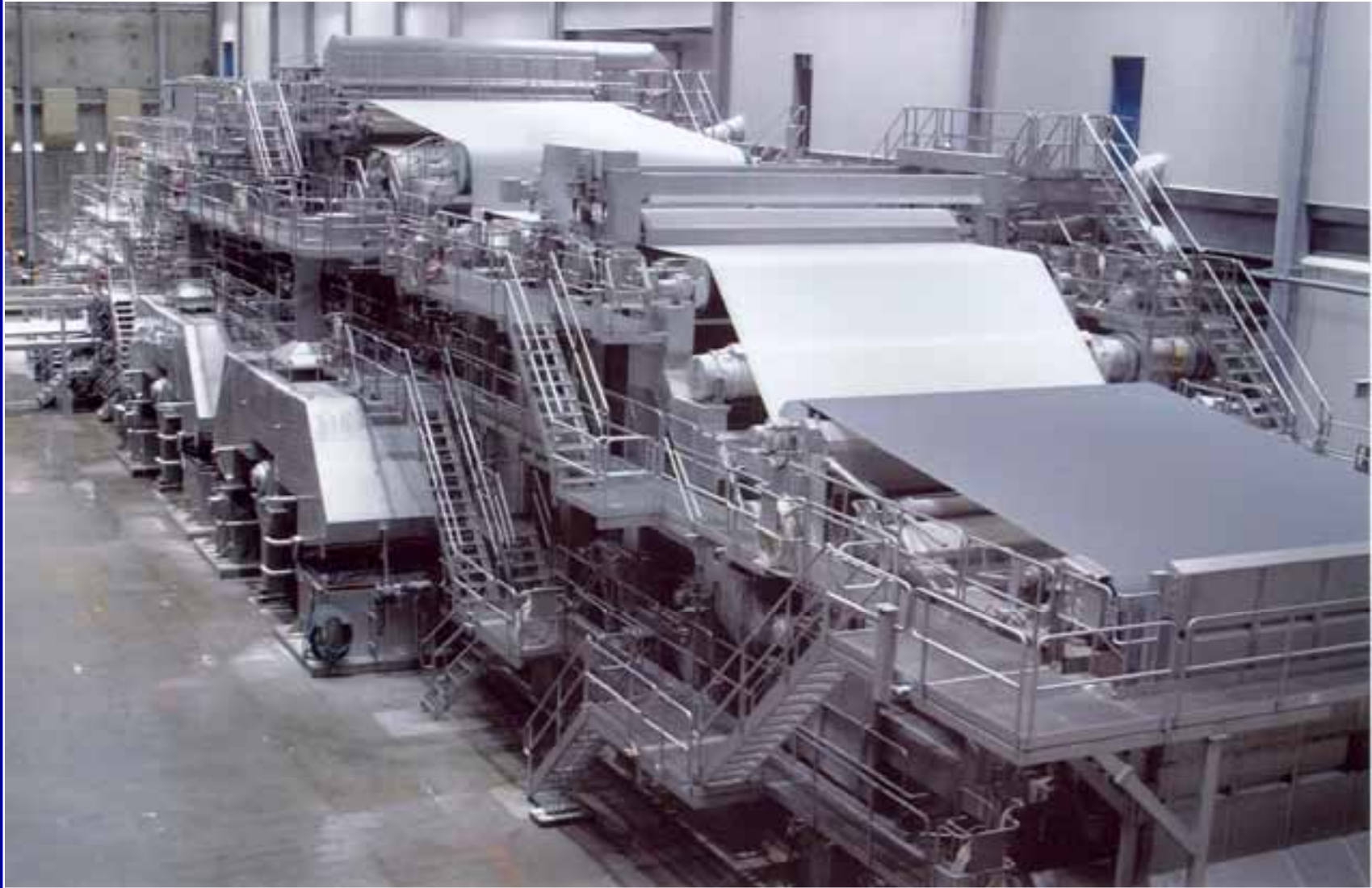
June 4, 2008

# NWPPA Presentation

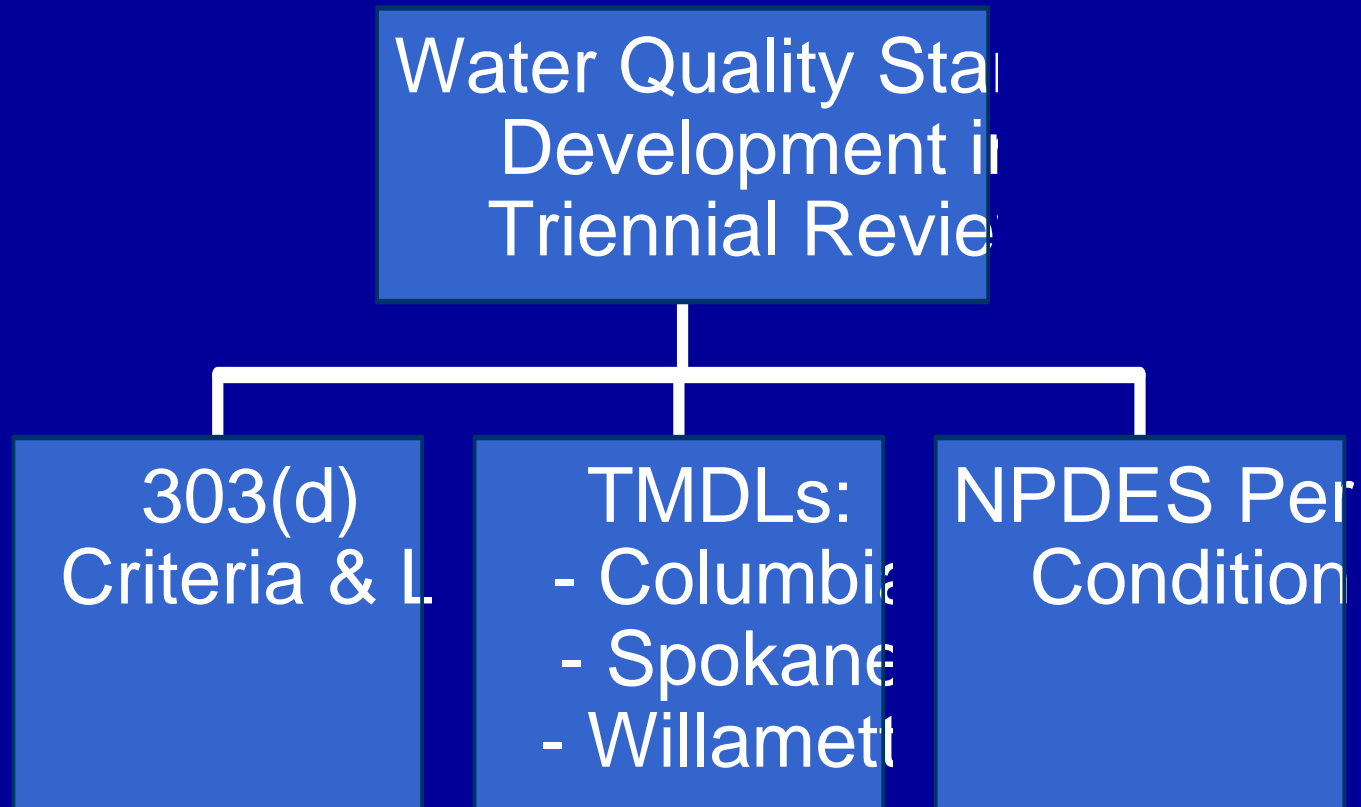
1. Who is NWPPA?
2. TMDL Background
3. Implementation
4. Improvement in Fish Tissue
5. Lessons Learned



# The NW Pulp & Paper Assn.?



# NWPPA Works On WQS Issues Coordinated Policy Development



# Total Maximum Daily Load

- A TMDL is a calculated pollutant amount that a waterbody can receive and still meet water quality standards.

$$\text{TMDL} = LA_{BG} + LA_{NPS} + WLA_{PS} + MOS + RC$$

$LA_{BG}$  = Load Allocation for Background

$LA_{NPS}$  = Load Allocation for NonPoint Source

$WLA_{PS}$  = Waste Load for Industrial and Muni Sources

$MOS$  = Margin of Safety

$RC$  = Reserve Capacity

# TMDL Development Process



- Define loading capacity
- Identify sources
- Allocate loads: point, nonpoint sources & background
- Implement through NPDES & Water Quality Mgmt. Plans

# CR Dioxin TMDL Background

- 1987 EPA Bioaccumulation Study on 2,3,7,8 - TCDD Dioxin.
  - Columbia Basin fish tissue(15 samples) had detectable levels of dioxin -- a bio-accumulating toxic compound.
  - Findings made possible by new low detection methodology
- 1987-1988 Industry studies established link to pulp and paper mill bleach processes; inadvertent by-product:
  - **Organic matter + chlorine + heat, combustion or time**
  - Industry was using elemental chlorine to break down lignin

# CR Dioxin TMDL Background

## Federal Actions

- 1988 *EDF v. Thomas* consent decree set schedule for EPA action on dioxin.
- 1990 EPA announced intent to undertake rulemaking based on risks associated with pulp and paper discharges.
- Early to mid 1990s - technologies assessed and evaluated
- 1998 new effluent guidelines promulgated.

## State Action

- OR and WA preceded federal action.
- Asked for early best management practices that resulted in approximately 80% reduction.

# CR Dioxin TMDL Background

## EPA Region 10

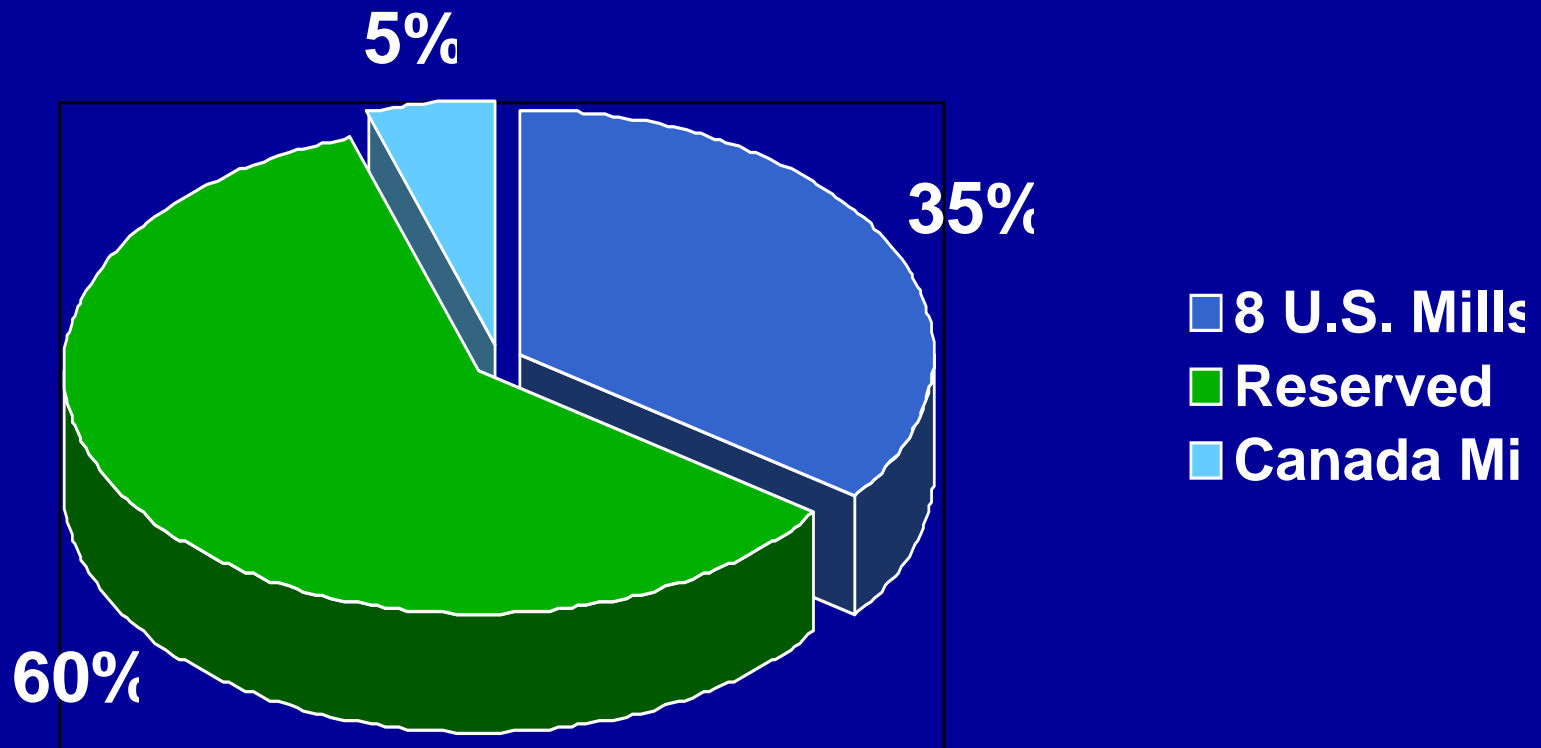
- EPA's 1984 2,3,7,8 -TCDD water quality criteria was .013 ppq (parts per quadrillion).
  - Not measurable in water
  - 0.7 ppt (parts per *trillion*) in fish tissue equated to exceedance of criteria.
- Confirmed by 1989 NWPPA study:
  - Salmon maximum 0.36 ppt
  - Sturgeon, sucker and carp higher
- 1990 EPA assumed responsibility for preparation of the Columbia River Dioxin TMDL partly due to:
  - Disparity in state water quality standards
  - International component

# Dioxin Source Allocations

Allocation Type	Source
Waste Load Allocation	Chlorine bleaching pulp & paper mills in OR, WA & Idaho
Reserved	Non-chlorine bleaching P&P mills, Woodtreaters, POTWs (Municipalities), Ports, Urban areas, Other point & nonpoint sources, Background and Canadian sources.

# TMDL Allocations

## Columbia Basin Loading Capabilities Divisions



# P&P Compliance Costs



Mills have changed the way we make pulp through process improvements and switching chemicals.

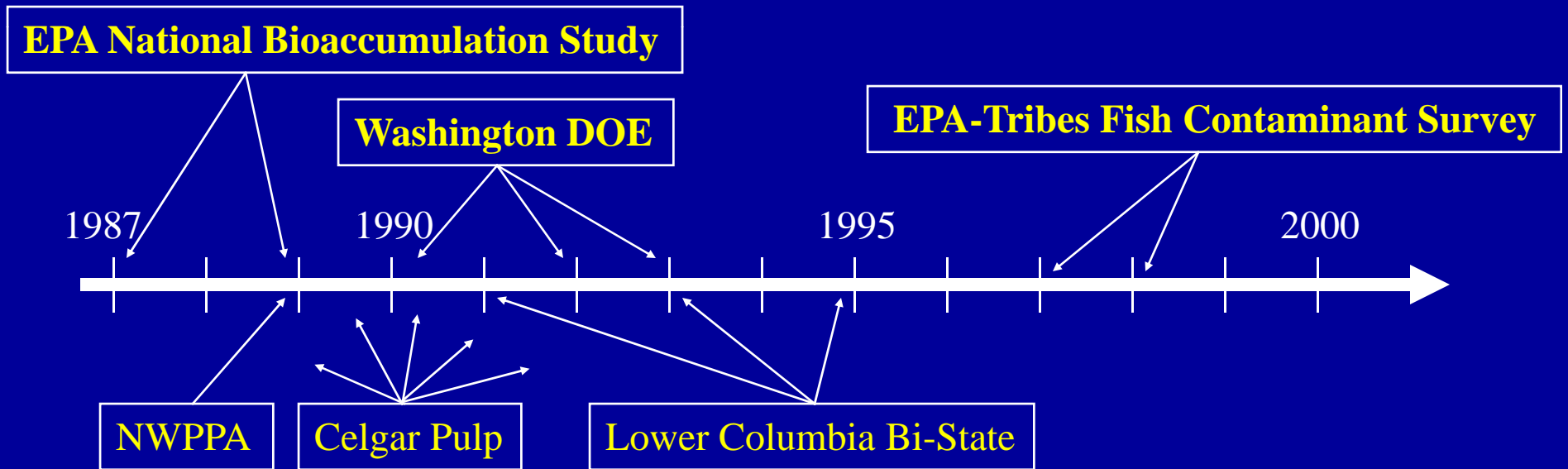
- 1990's costs for PNW mills was \$200-300 million.
- Appears to be working better than anticipated.

# Litigation

## What motivated the regional litigation?

- Technology was either not yet in existence, or deemed economically feasible.
- CWA is a strict liability statute.
- Sense that state and regional action preceding federal effluent guidelines would create a competitive disadvantage for regional mills.

# History of Fish Tissue Studies



# Columbia River Segmentation

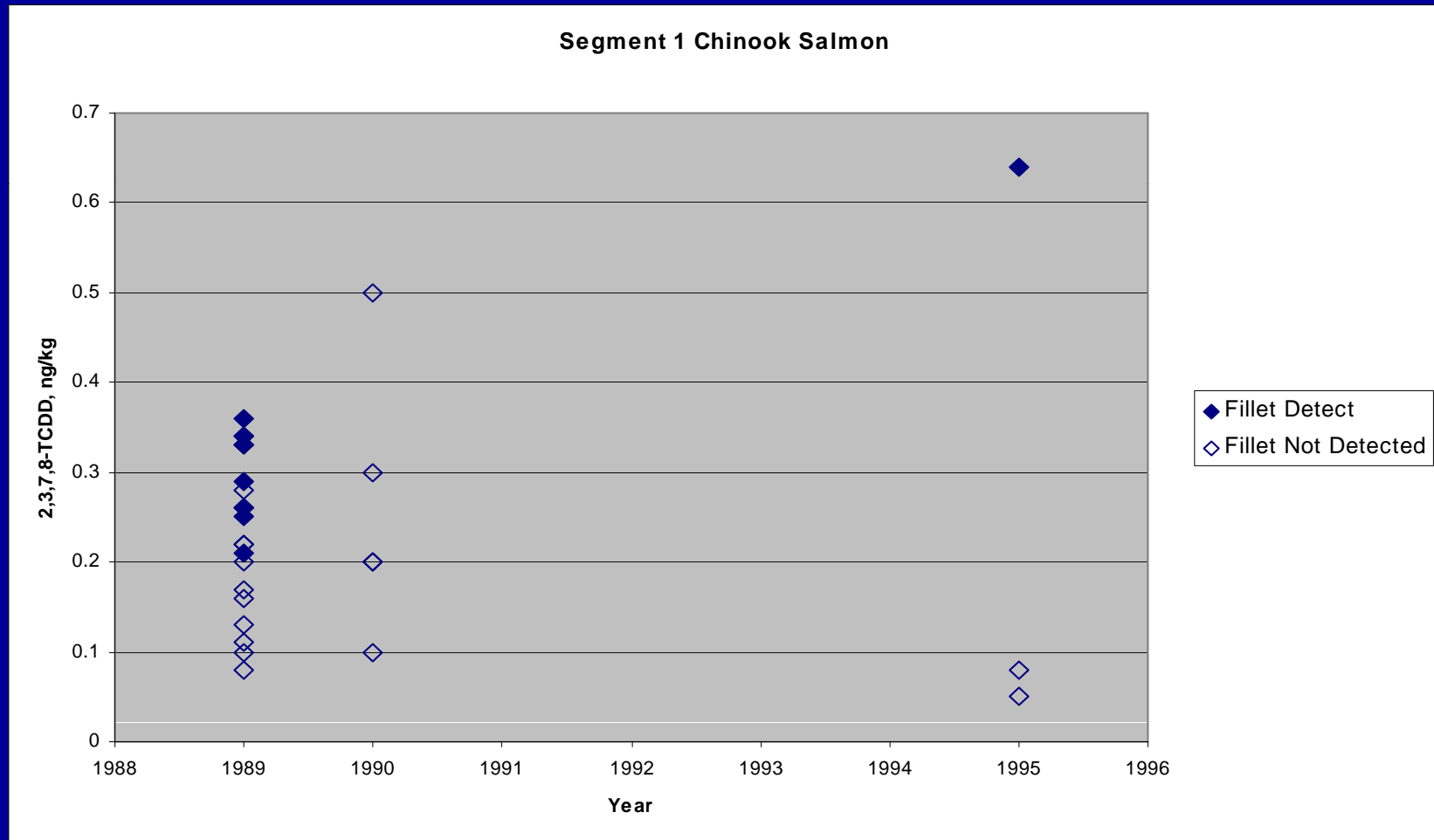


# Is A Trend Analysis Possible?

- Differing study designs, methods, locations, fish species and congeners
- Amount of data was invaluable:
  - 15 fish species and 2 crustacean
  - Approximately 400 samples representing 3000 fish
    - 200 2,3,7,8 -TCDD
    - 200 full congener analyses
  - Samples from mouth to Canadian border
- NCASI focused on like species within segments; mostly 2,3,7,8 -TCDD and -TCDF

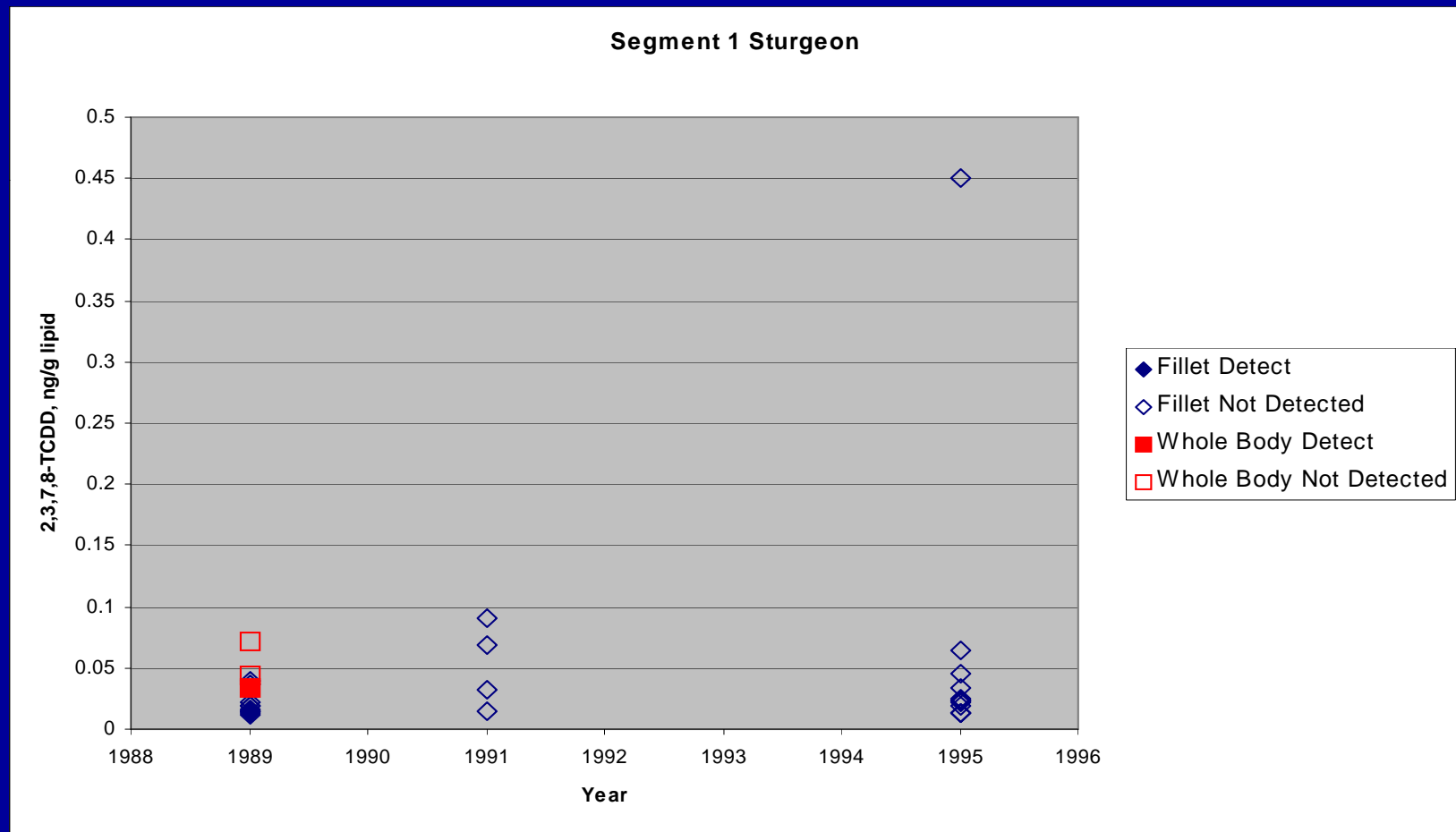
# Trends

## Segment 1 - Chinook 2,3,7,8 -TCDD



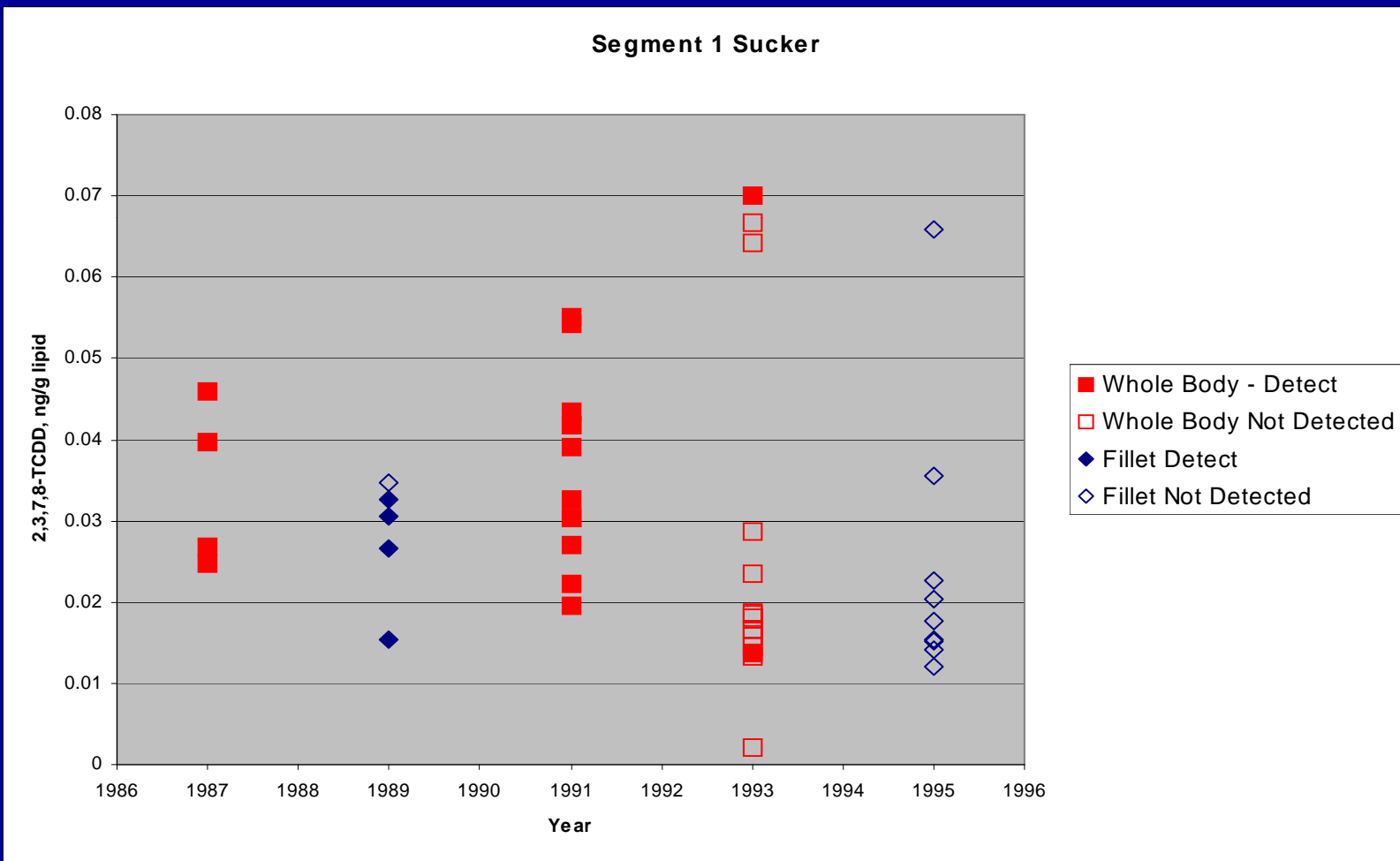
# Trends

## Segment 1 - Sturgeon 2,3,7,8 -TCDD



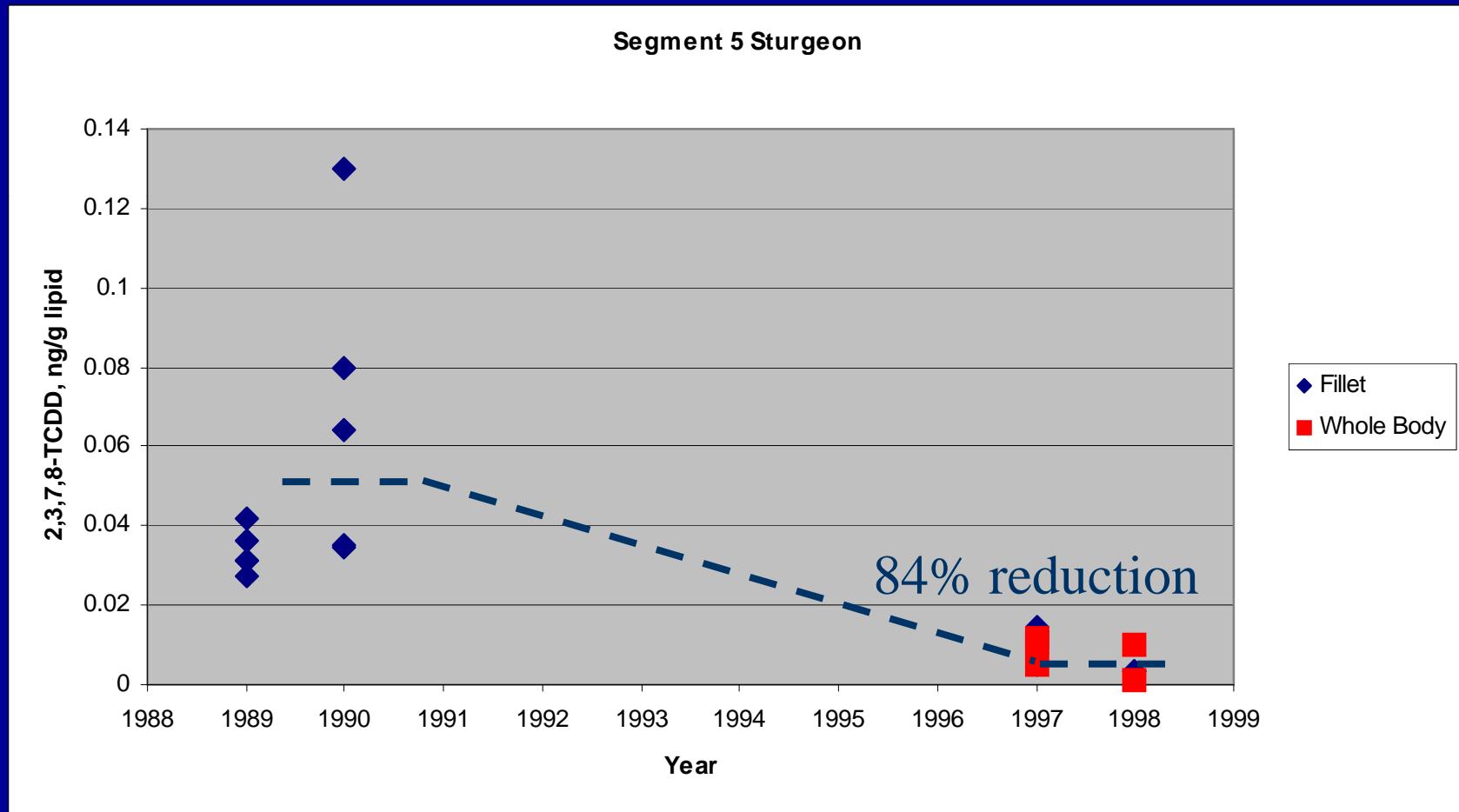
# Trends

## Segment 1 - Sucker 2,3,7,8 -TCDD



# Trends

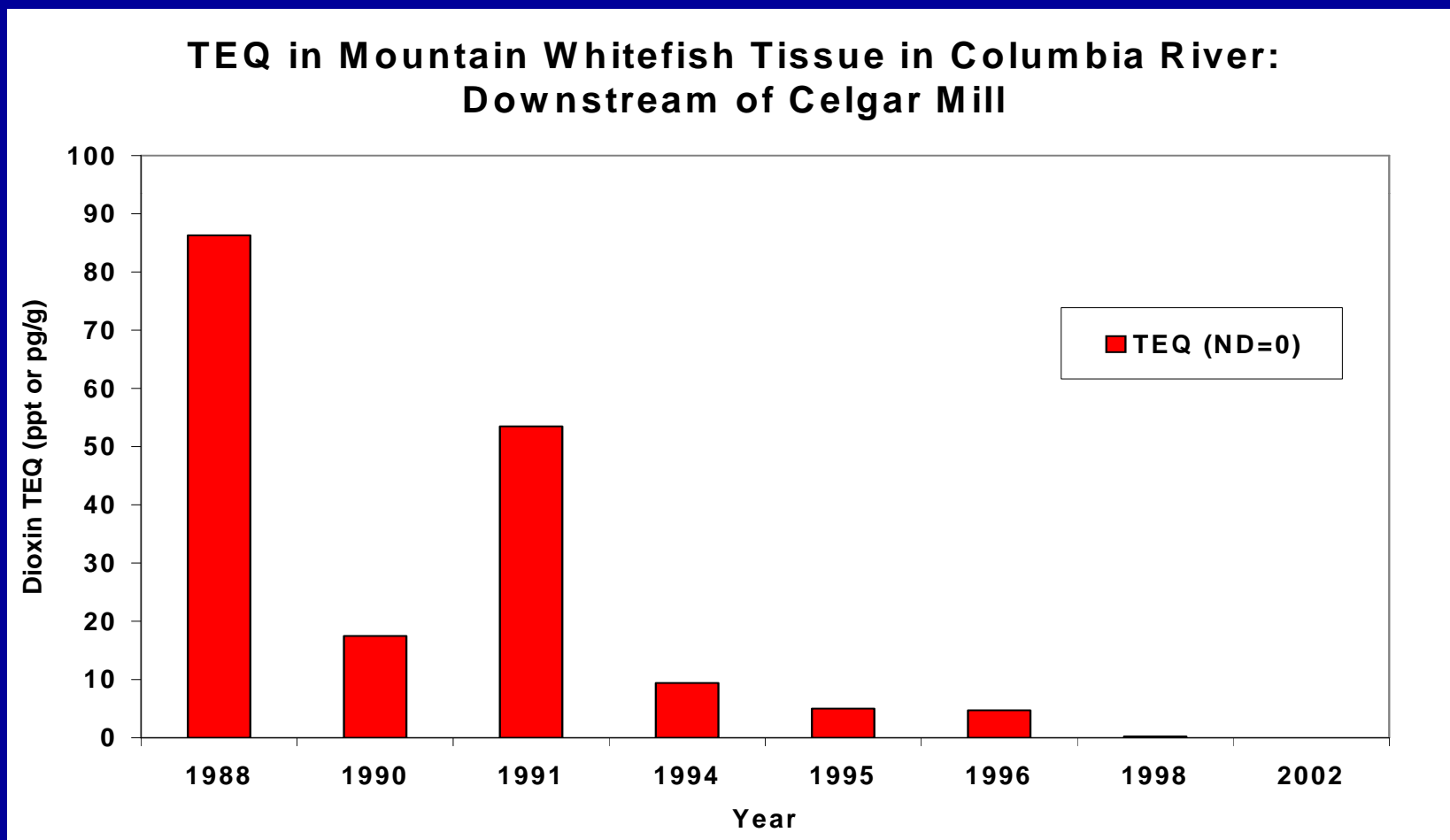
## Segment 5 - Sturgeon 2,3,7,8 -TCDD



# Trends

## Above Segment 9 - Whitefish (TEQ basis)

2,3,7,8 -TCDD and 2,3,7,8 -TCDF only



# Results

- Fish from some reaches above Bonneville Dam showed higher historic levels of dioxins; these reaches have shown the greatest decreases through 1997-1998
- Sturgeon from Segments 2, 4, and 5 showed significant reductions
- Low tissue concentrations in fish from segment 1 hinder trend analysis through 1995
- Some indication that 2,3,7,8 -TCDD is lower in sucker collected in 1995 as compared to earlier periods
- Whitefish from above Segment 9 show reductions greater than 98%

# What About Risk?

## Calculations of risk declined over same decade

- 1996-8 EPA Columbia Basin Fish Contaminant Survey showed 2,3,7,8 -TCDD and -TCDF accounted for *de minimus* % of cancer risk due to consumption of Chinook (spring and fall) and Coho
- Earlier Bi-State work showed these compounds accounted for much higher percent of cancer risk due to consumption of:
  - Chinook - 30%
  - Coho - 55%
- Other dioxin congeners are still a factor

# Regional Success Story...but

- Mills made process and material changes.
- By mid-1990s Columbia River was de-listed for dioxin after TMDL approved by EPA.
- In late 1990s US Geological Survey testing found no detected dioxin associated with bleached pulp and paper mills.
- Fish tissue concentrations dramatically reduced as shown in prior slides.

# Lessons Learned

- Problematic issues:
  - Regulation below detection limits
  - Requirements exceeding capability of technology
  - Competitive disadvantages
- Best management practices can achieve *significant* if not the *majority* of reductions.
- Early focus on 2,3,7,8 -TCDD and -TCDF might have led to a false sense of security regarding the role of other sources.
- Worthwhile to address remaining toxic organics as fish tissue levels should reduce quickly.

# Wrap Up and Questions

Thank you!

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