

# Data and analysis opportunities for conservation of delta smelt

BJ Miller, PhD, PE

Consulting Environmental Engineer

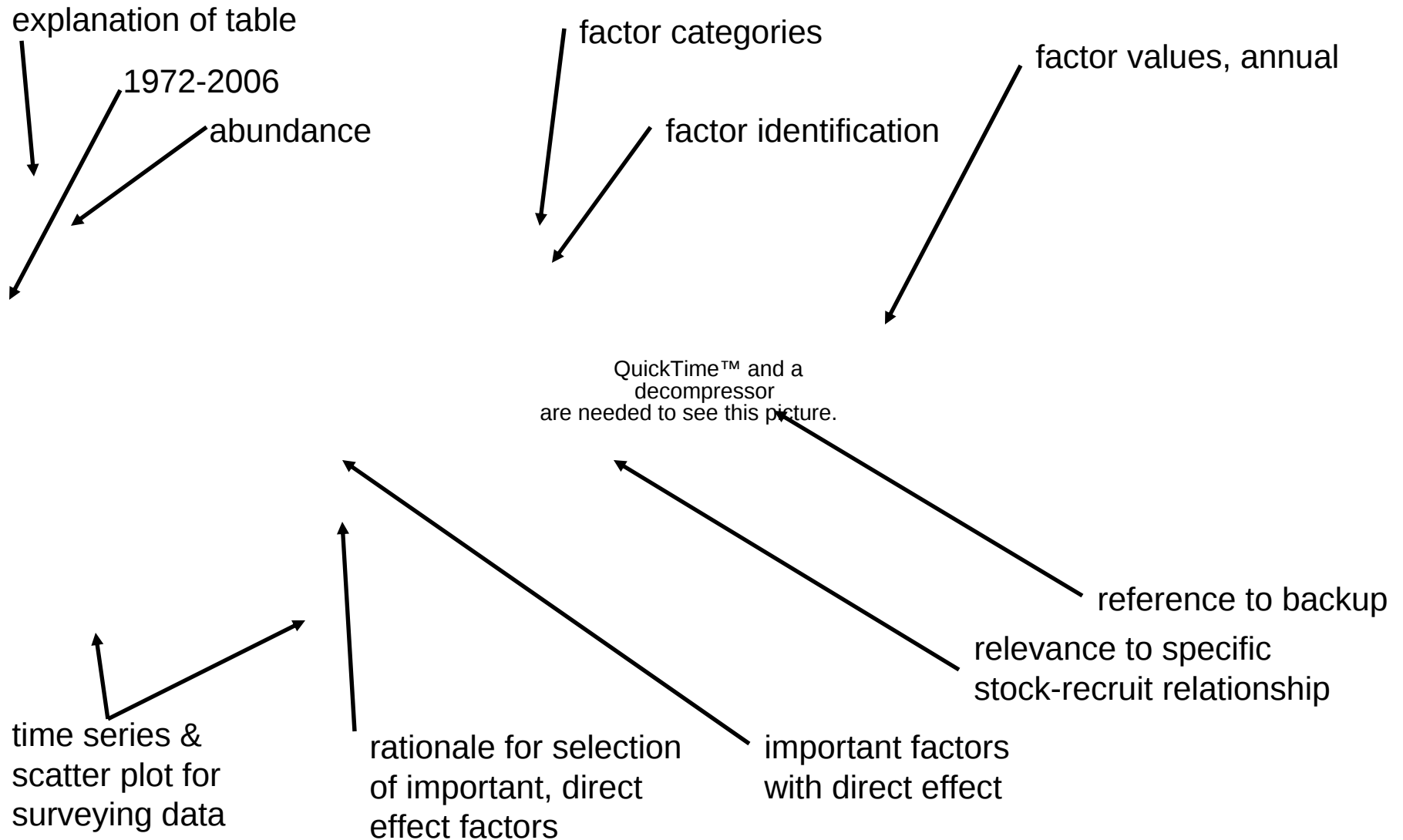
# Summary

1. Comprehensive data sets are available--other data can be developed quickly in a matter of days
2. Multiple methods are available for overview analysis
3. Effects of diverse environmental stressors (first phase Task 3) can be evaluated and would provide important context for RPA tasks

# Data considerations

- Several data sets are available
- The one presented here was developed by team of scientists, engineers, & analysts
- Not the only or the final data set
- Derived from agency raw data
- Developed with considerable attention to mechanism of effect
- Additional data available on request (in days)

# factor value file



# factor description file

explanation of table →

factor identification,  
keyed to value table

rationale for selection  
of factor

references in brief

method of  
calculation

references in detail

QuickTime™ and a  
decompressor  
are needed to see this picture.

# Specifying factor values

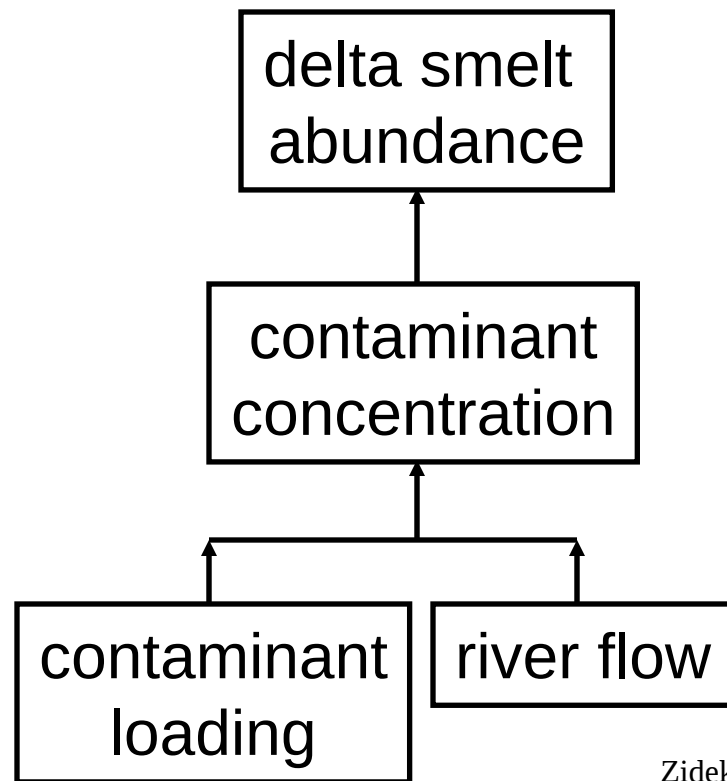
- Annual values
- Specified by season
- Data for many different stressors
- Reflect delta smelt distribution
- Consider prey selectivity

# Data analysis considerations

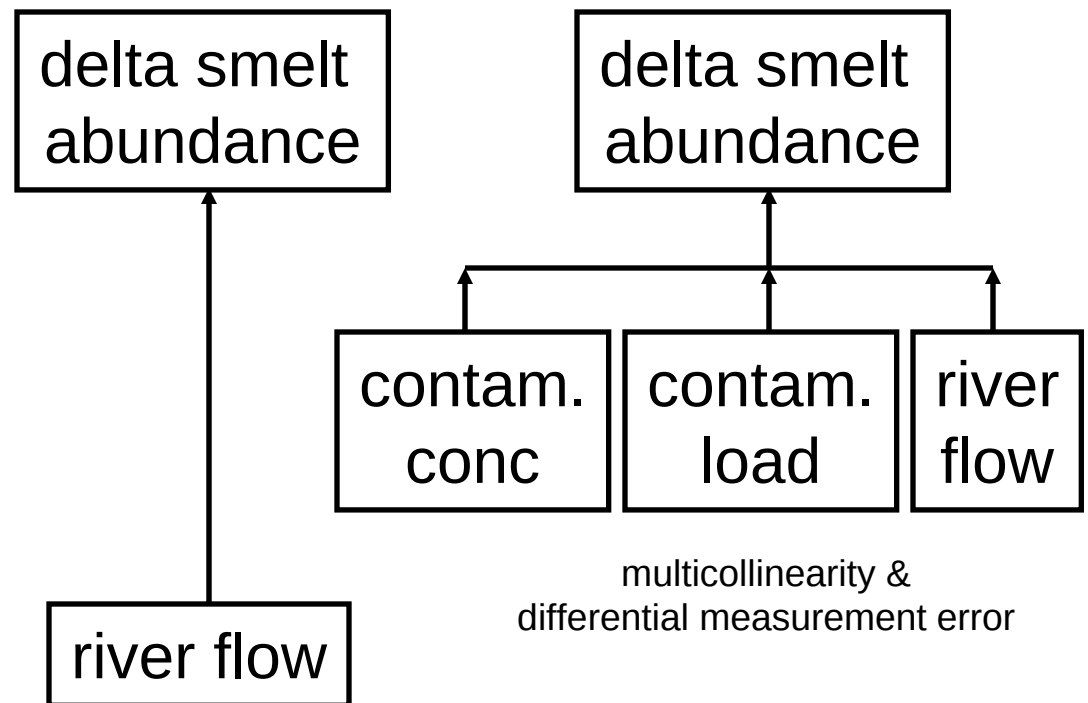
- A simple, hypothetical example
- Application to the actual data

# Hierarchical nature of effects

hypothetical  
actual effect hierarchy



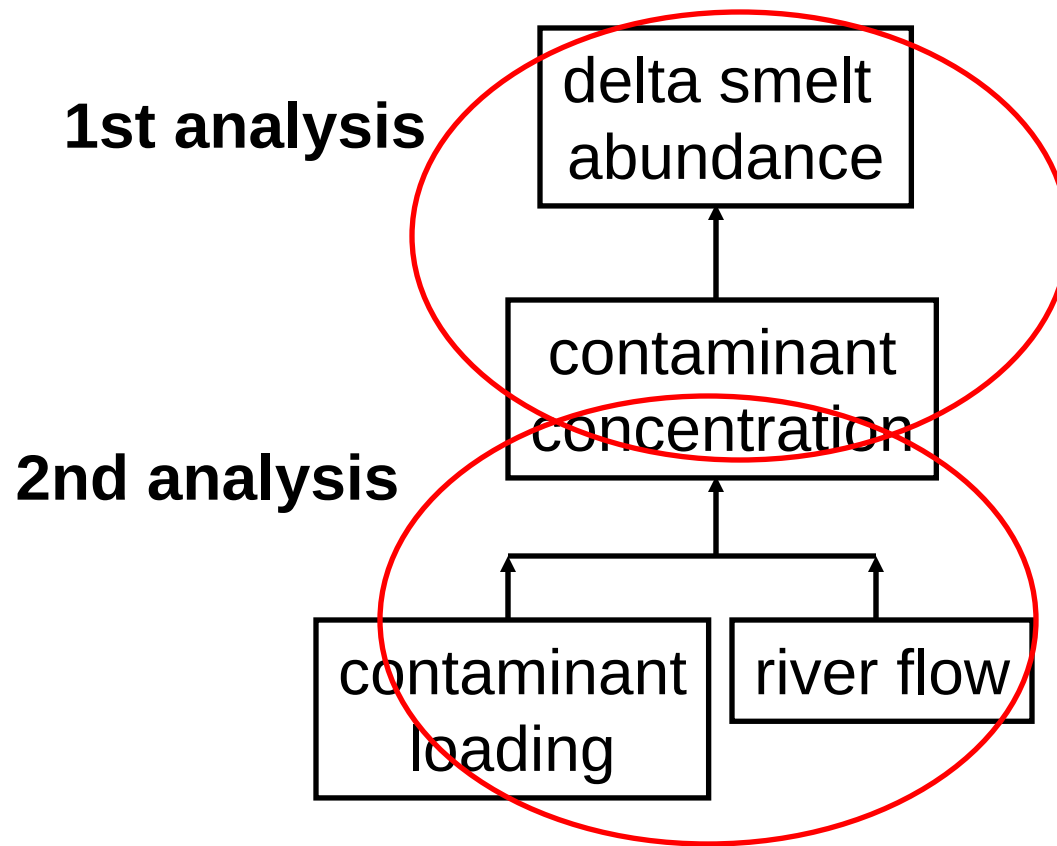
implicit effect hierarchy



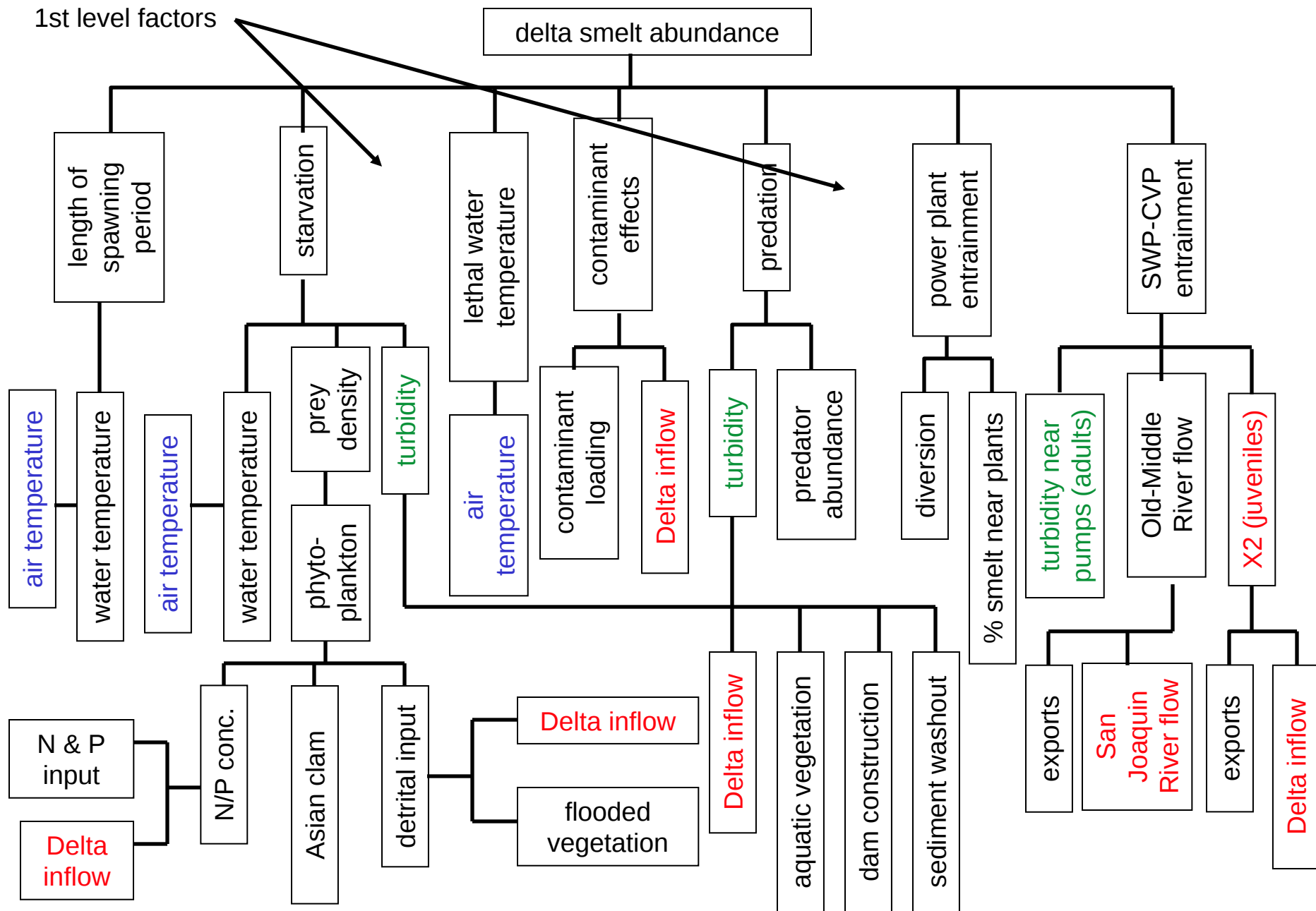
multicollinearity &  
differential measurement error

Zidek JV, Wong H, Le ND, Burnett R. 1996.  
Causality, Measurement Error and Multicollinearity in  
Epidemiology. *Envirometrics* 7:441-451.

# Quantifying the hierarchy



factors with direct effect  
1st level factors



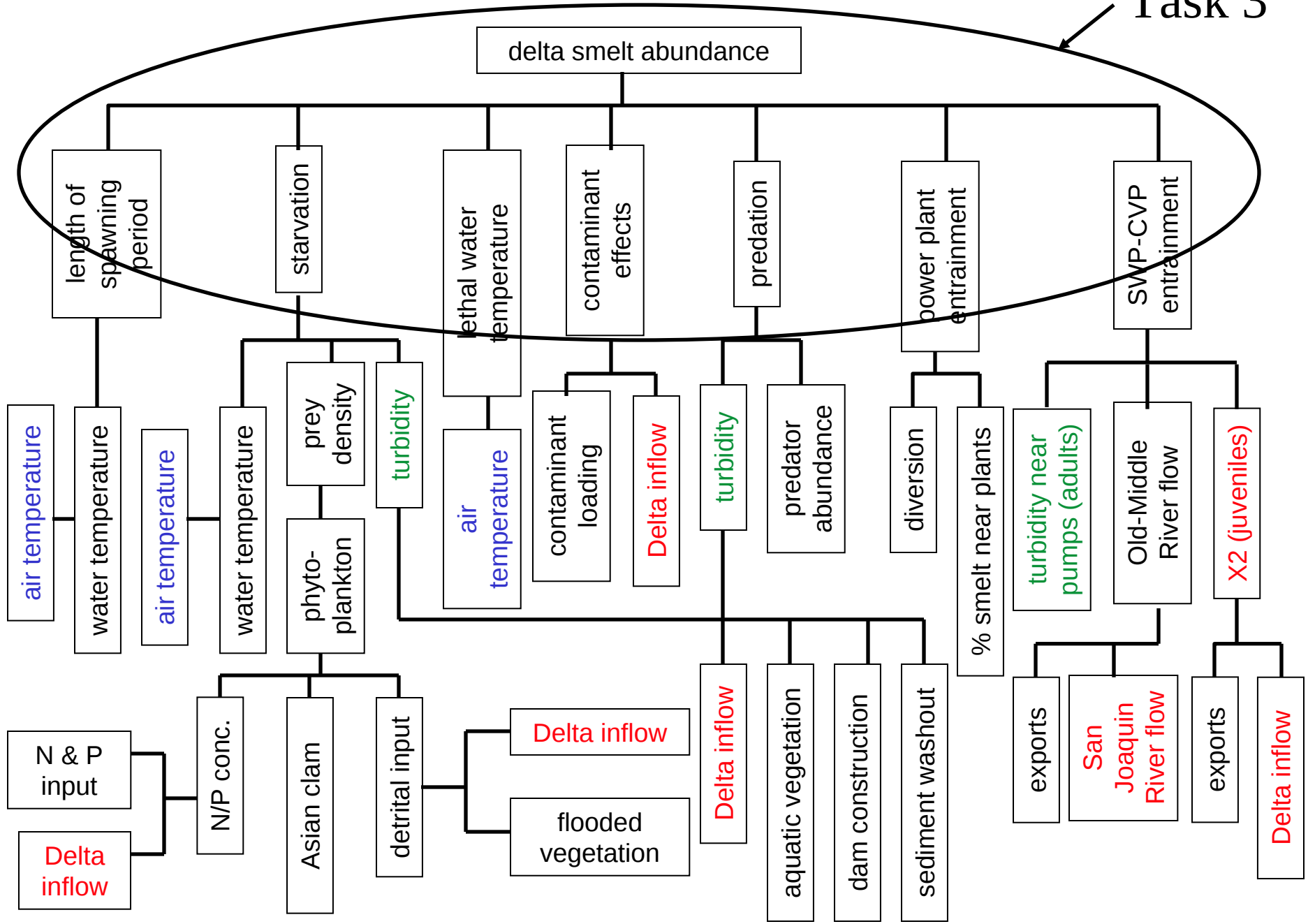
# Suggested purpose

- Not: to identify statistically most important among all factors
- Instead: Quantify and validate the mechanisms (& tolerate the lower  $R^2$ s)

# Analyzing the hierarchy

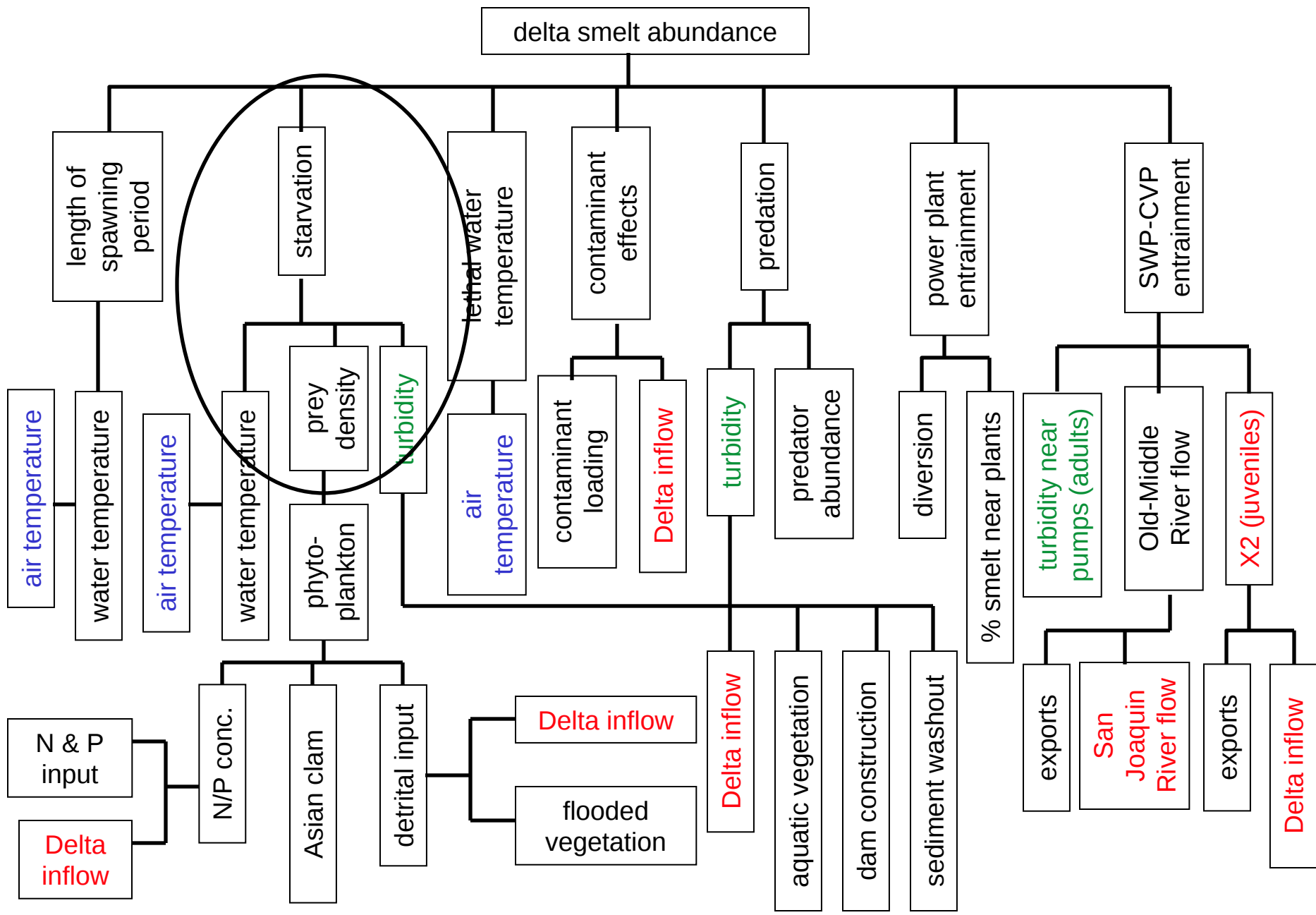
- Identify important 1st level factors

# Task 3



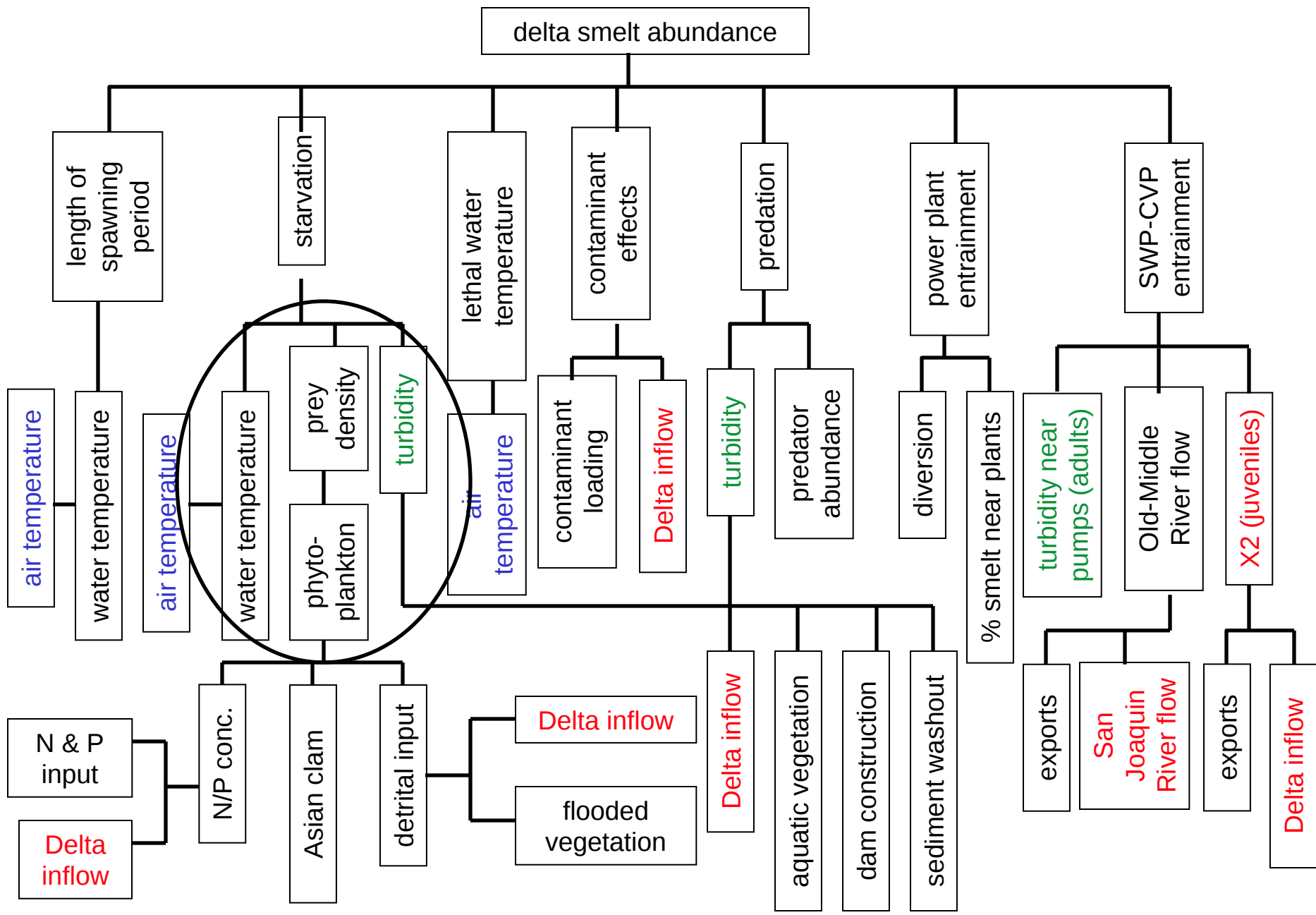
# Analyzing the hierarchy

- Identify important 1st level factors
- Identify important factors for each important 1st level factor



# Analyzing the hierarchy

- Identify important 1st level factors
- Identify important factors for each important 1st level factor
- Proceed down the hierarchy



# Advantages of this approach

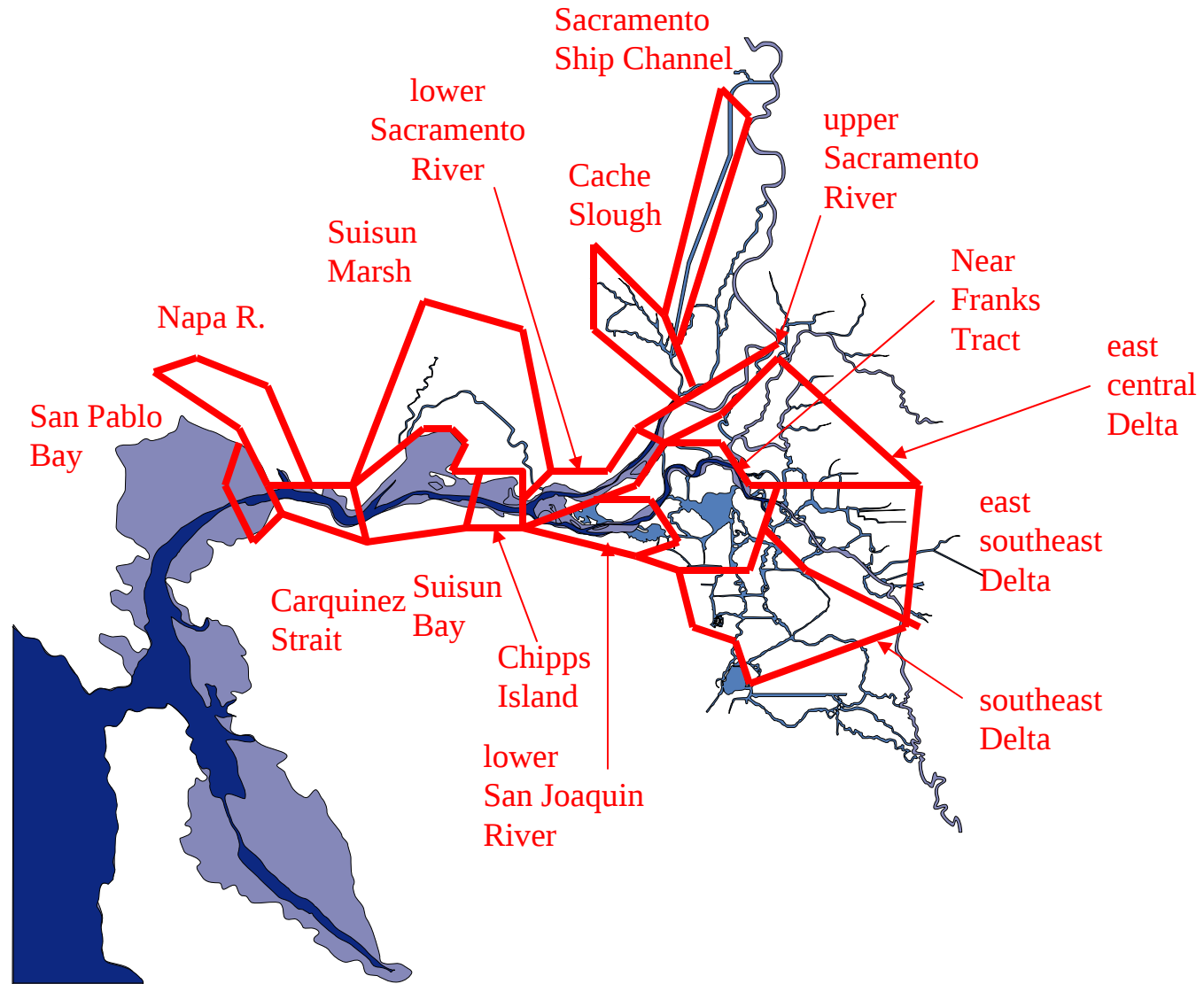
1. Makes the analysis accessible and allows for intervention with biological or other considerations
2. Reduces number of covariates, thereby reducing problems of MDM
3. Allows for informative overview analysis to be done quickly

# Summary

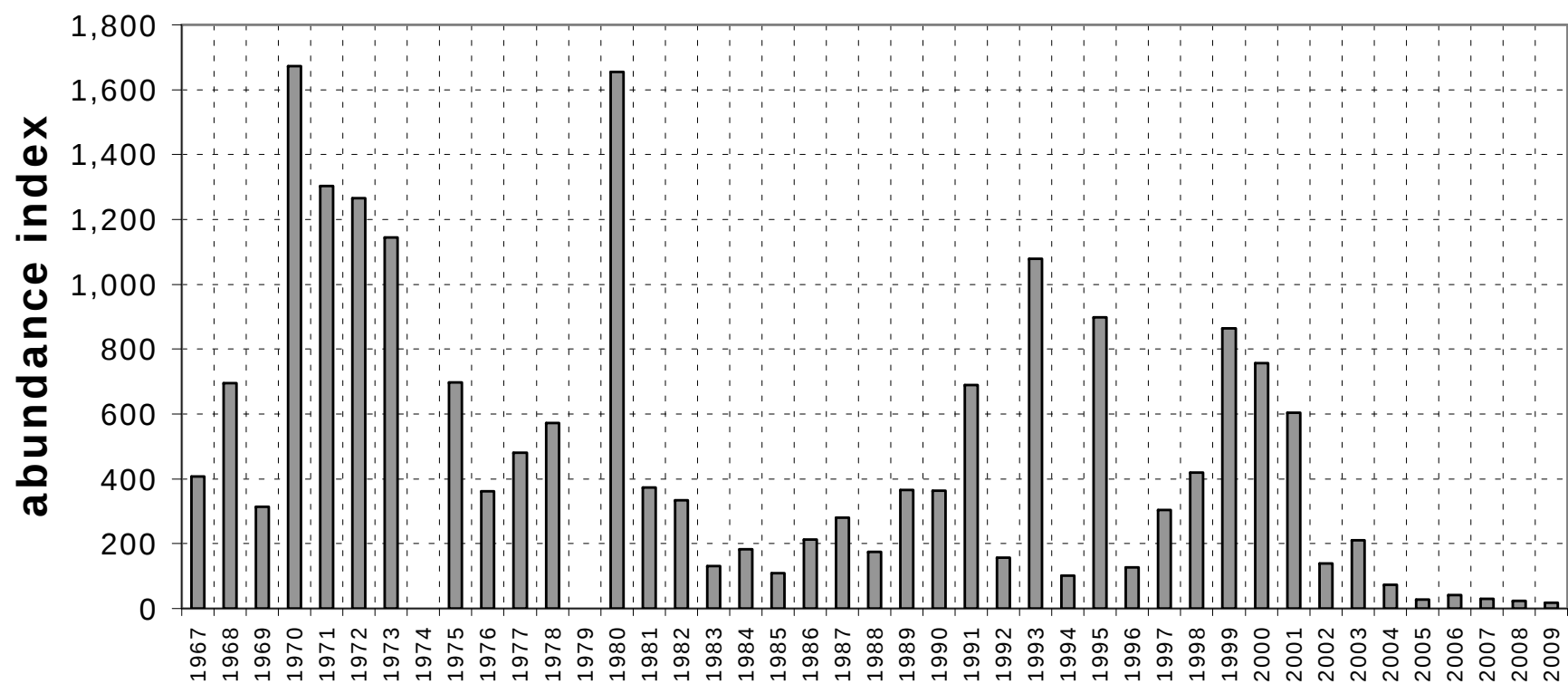
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Questions?

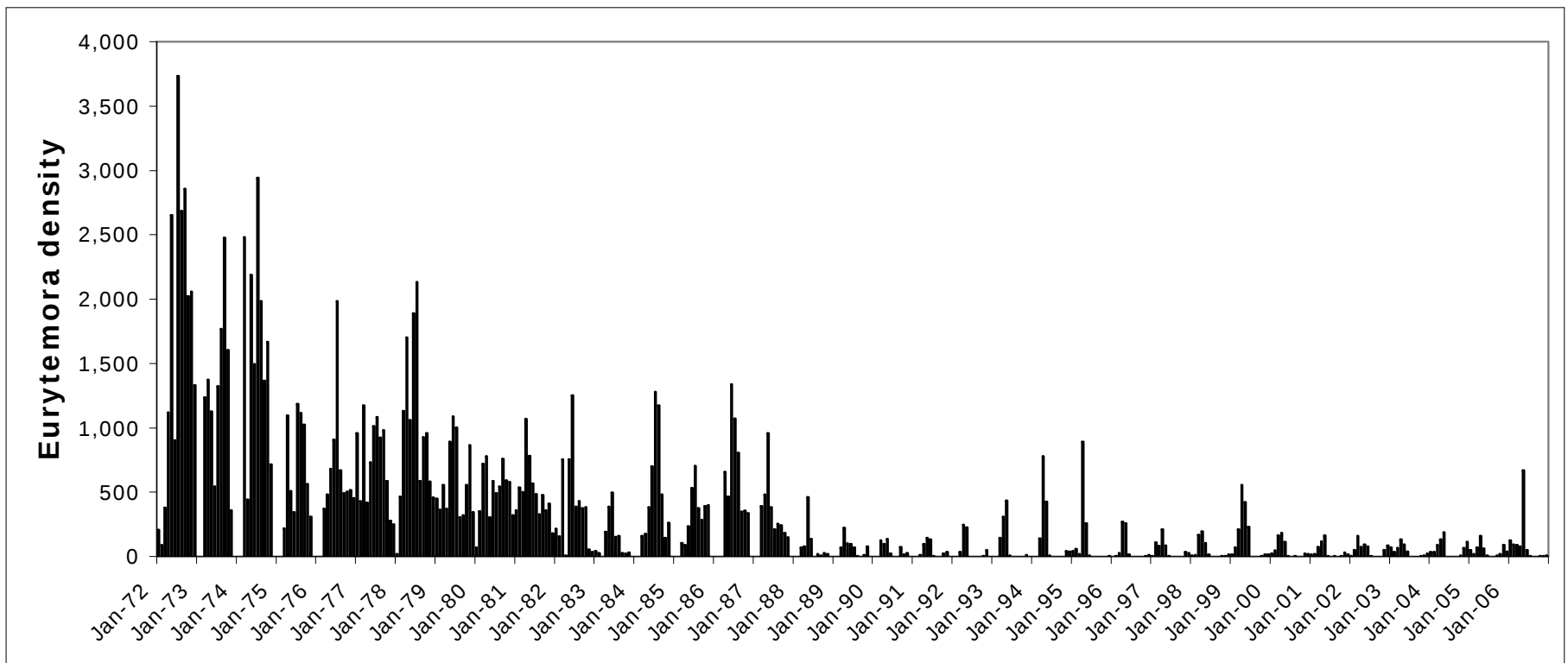
Areas occupied by delta smelt  
during at least some part of their life cycle



## delta smelt FMWT index of sub-adult abundance



# monthly Eurytemora density



# Trends: Eury, Pseu & Limnoi densities

QuickTime™ and a  
decompressor  
are needed to see this picture.