



# Jordan River TMDL DO Linkage Symposium

**Welcome!**

**Please find your name tag and  
take a seat.**

**We'll begin at 9:00 a.m.**





# Jordan River TMDL DO Linkage Symposium




April 20, 2009

*and...YOU!*

*Understand the Problem  
to Discover the Solution*

# Purpose of Symposium

- *To achieve a consensus among key individuals in scientific and regulatory roles on the factors resulting in low DO in the lower Jordan River, their interrelationships, and their relative importance.*
- *To identify where consensus is not currently possible and where additional data might help achieve that consensus.*



**“Linkage is the relationship between a water quality impairment – low dissolved oxygen (DO) for example – and those physical and biological factors which influence it.”**



# Roles

- Consultants
- Policy makers (also scientists)
- Scientists in key fields
- Individuals knowledgeable about nuances of pollutant sources

## Schedule

9:00	Welcome and introductions
9:10	Cirrus and Stantec Presentation: Overview of DO Linkage
9:30	Discussion Session 1 – Physical processes
10:30	Break and refreshments
10:45	Discussion Session 2 – Organic decomposition in water column
11:45	Short break
12:00	Discussion Session 3 – Organic decomposition in sediments
1:00	Lunch (provided)
2:00	Discussion Session 4 – Algae and other organisms
3:00	Wrap-up, including discussion on intervention and implementation opportunities and barriers
4:00	Close

# Discussion Sessions

- Consultants review TMDL report (10 min)
- Guest Scientists provide critique and updates on science (10 min)
- Discussion (40)
  - Facilitator
  - One person speak at a time – microphone records

*“Understand the Problem to Discover the Solution”*

Questions?

*Let's go!*





# TMDL Process

- Designate segments of Jordan River for “*Beneficial Uses*”
- Determine if WQ meets criteria for DBUs
- If not, determine Total Maximum Daily Loads to meet WQ to support DBUs

# Status of TMDL Process

2006-2008

## Phase I

- Monitoring
- Data Evaluation
- Source Characterization
- Beneficial Use Assessment



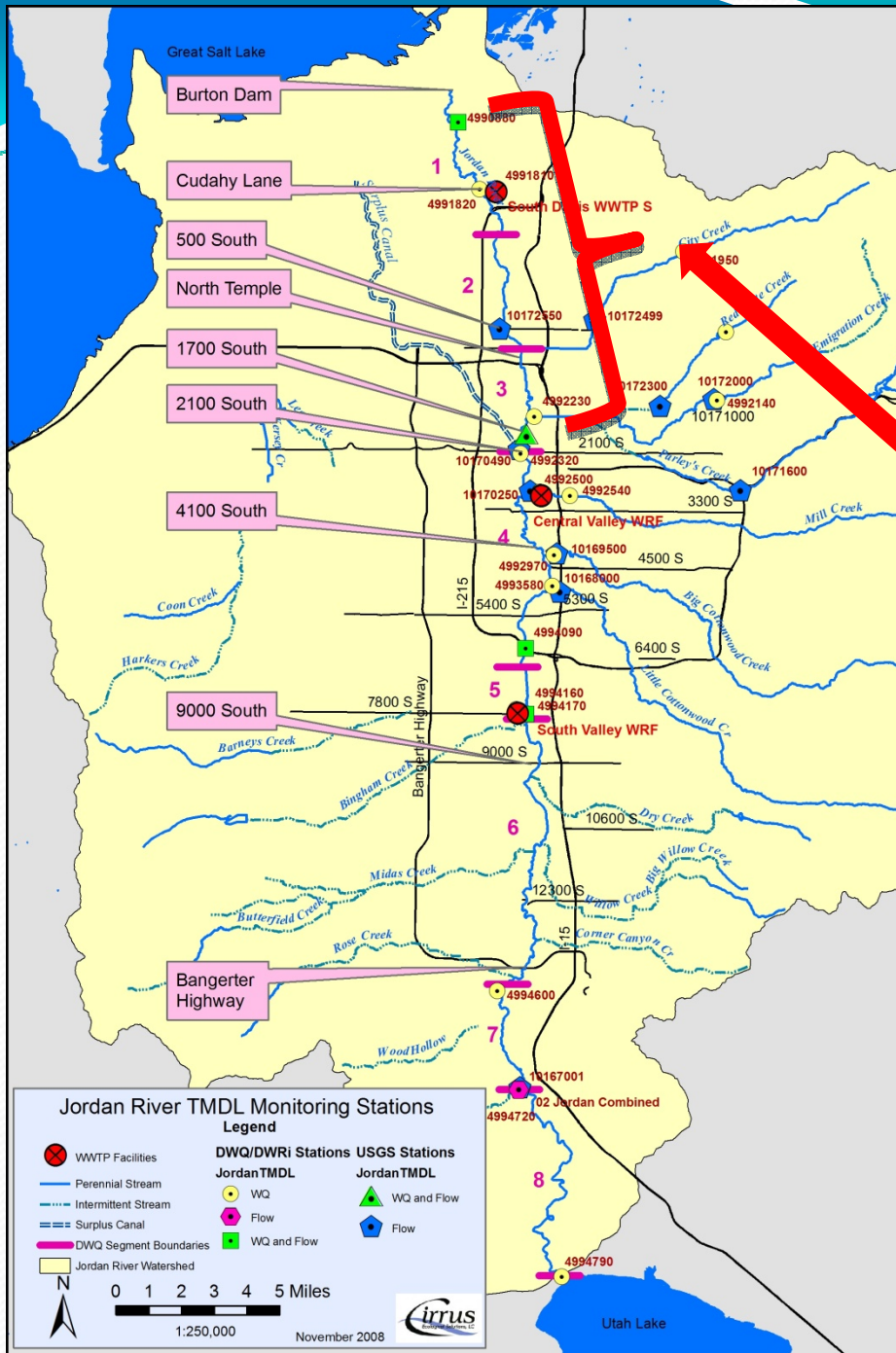
## Source Characterization

- Water Budget
- Pollutant Loads
- **Linkage between physical and biological factors that affect DO**

2009-2010

## Phase II

- Endpoints
- Permissible Load
- Load Allocations
- Monitoring



- 51.4 miles from Utah Lake to Burton Dam

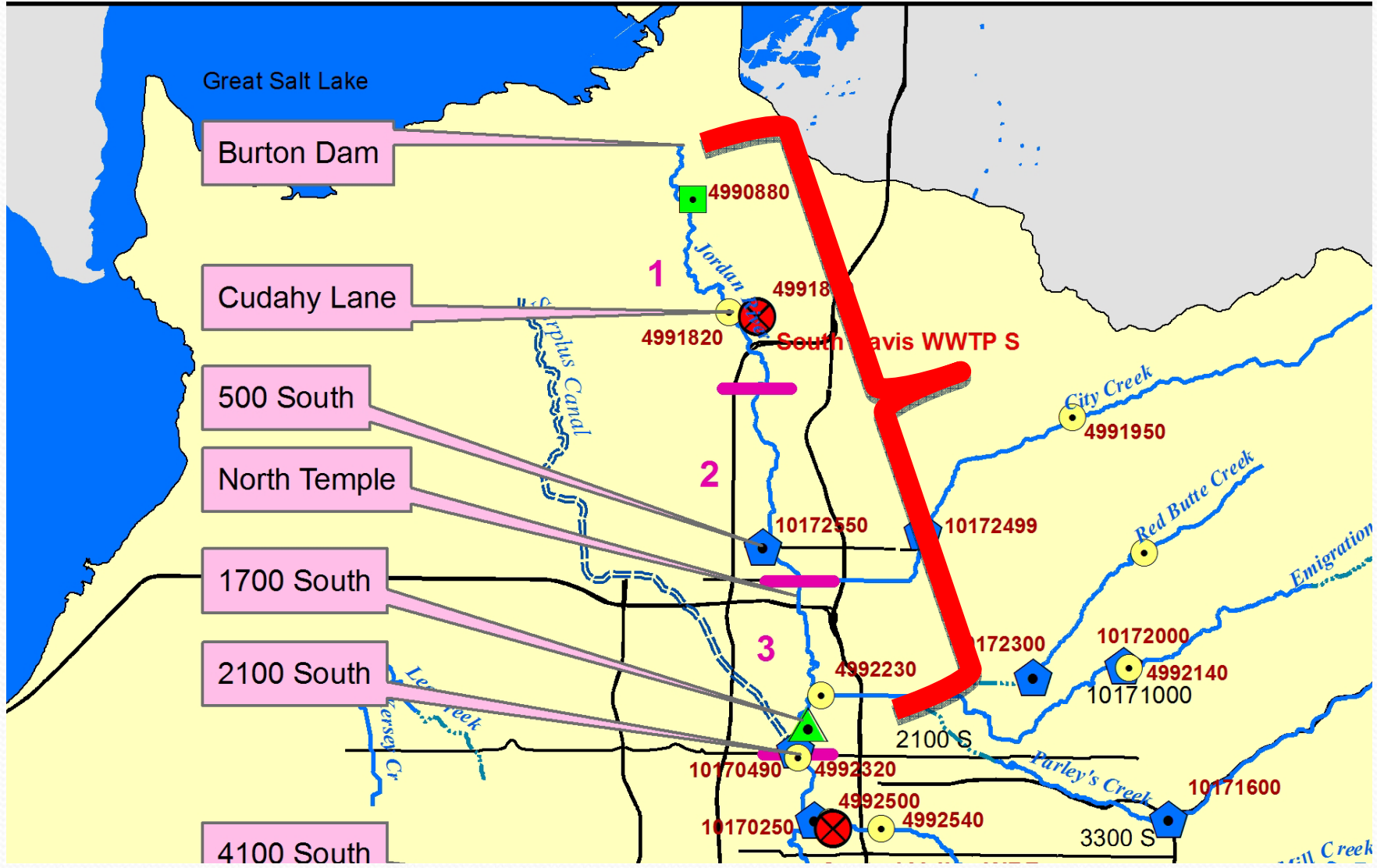
- 8 Segments

- Lower Jordan River (below 2100 South) impaired by low DO

- 3 segments

- 16.1 miles

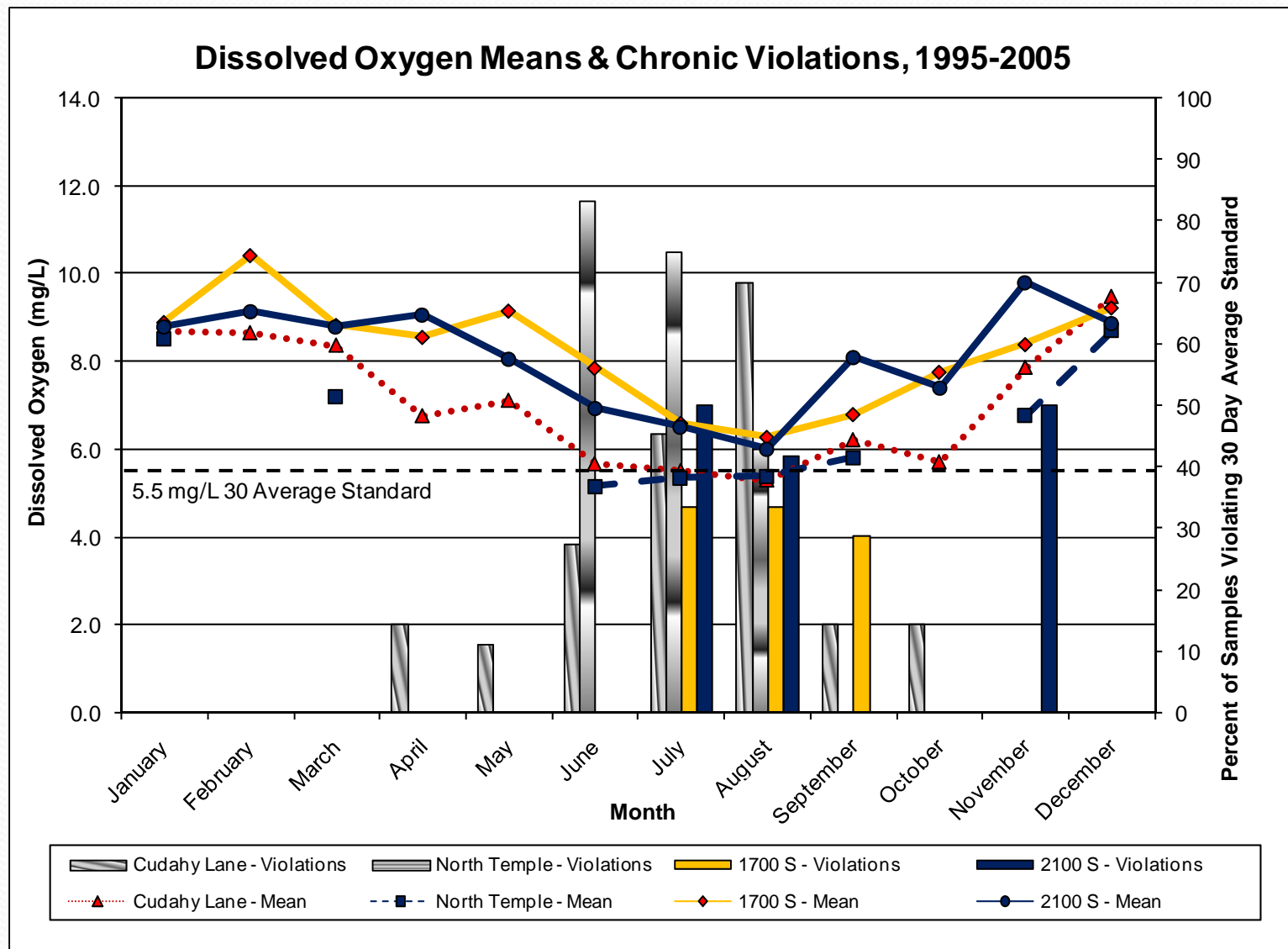
# Lower Jordan River – Low DO



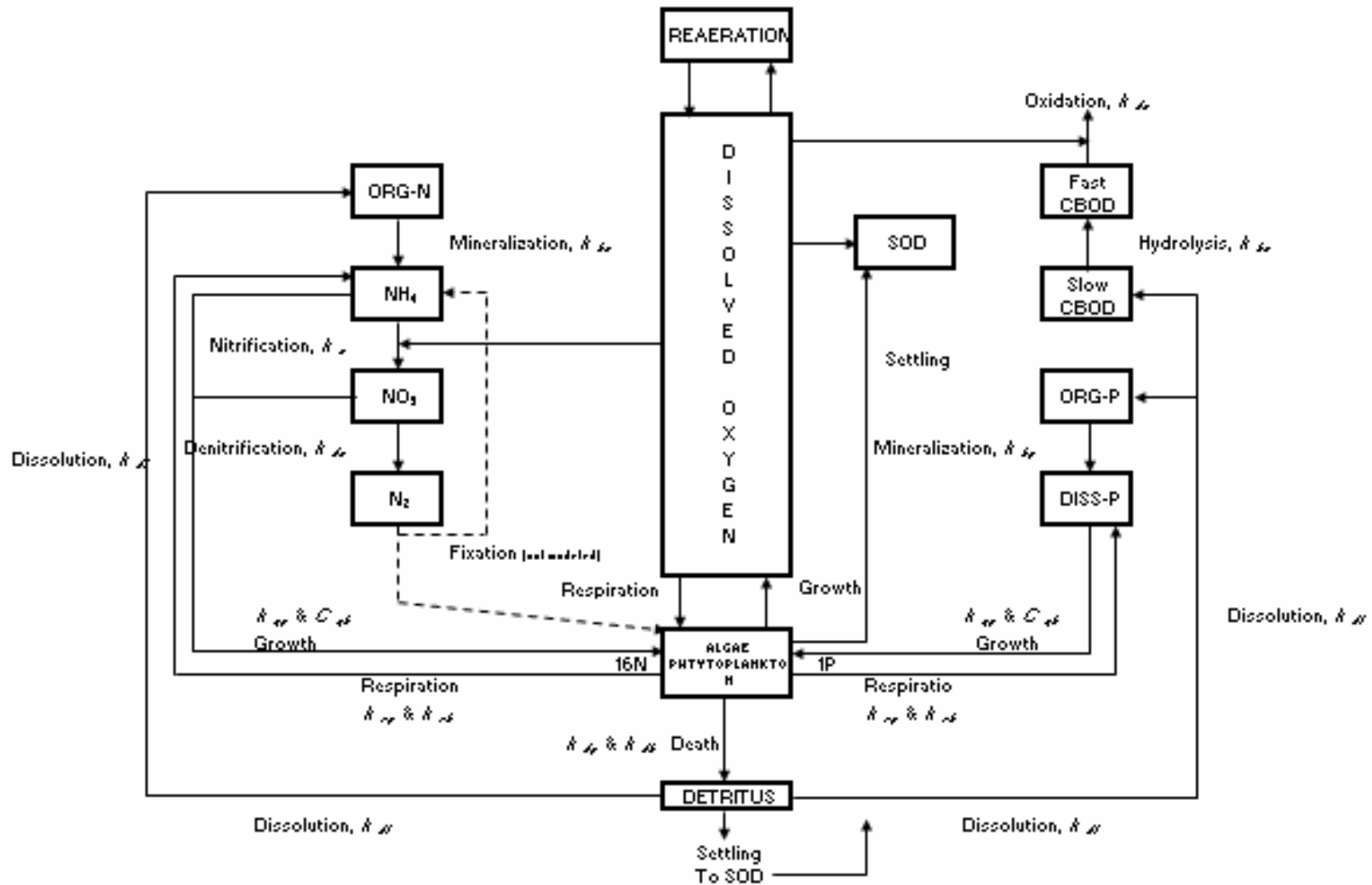
# Jordan River DO Criteria

- Site specific criteria associated with Jordan River from Burton Dam to confluence with Little Cottonwood Creek:
  - 30-Day average (Chronic):
    - 5.5 mg/L year-round
    - Typically used for inclusion on 303(d) list
  - May – July:
    - 7-Day average for juvenile aquatic species = 5.5 mg/L
    - Instantaneous (Acute) = 4.5 mg/L
  - August – April:
    - Instantaneous (Acute) = 4.0 mg/L

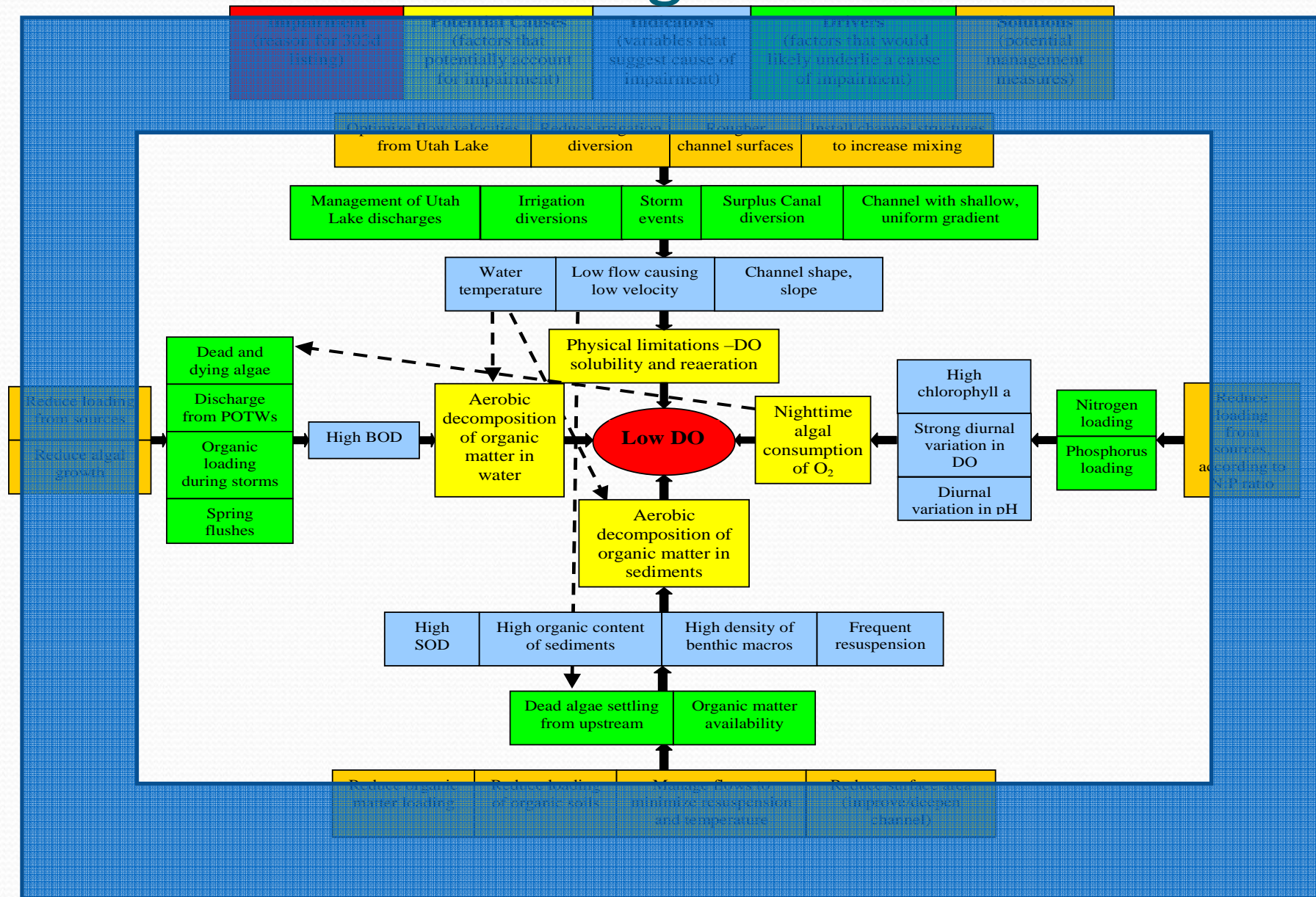
# Season Pattern in DO Violations



# DO Interactions in QUAL2K

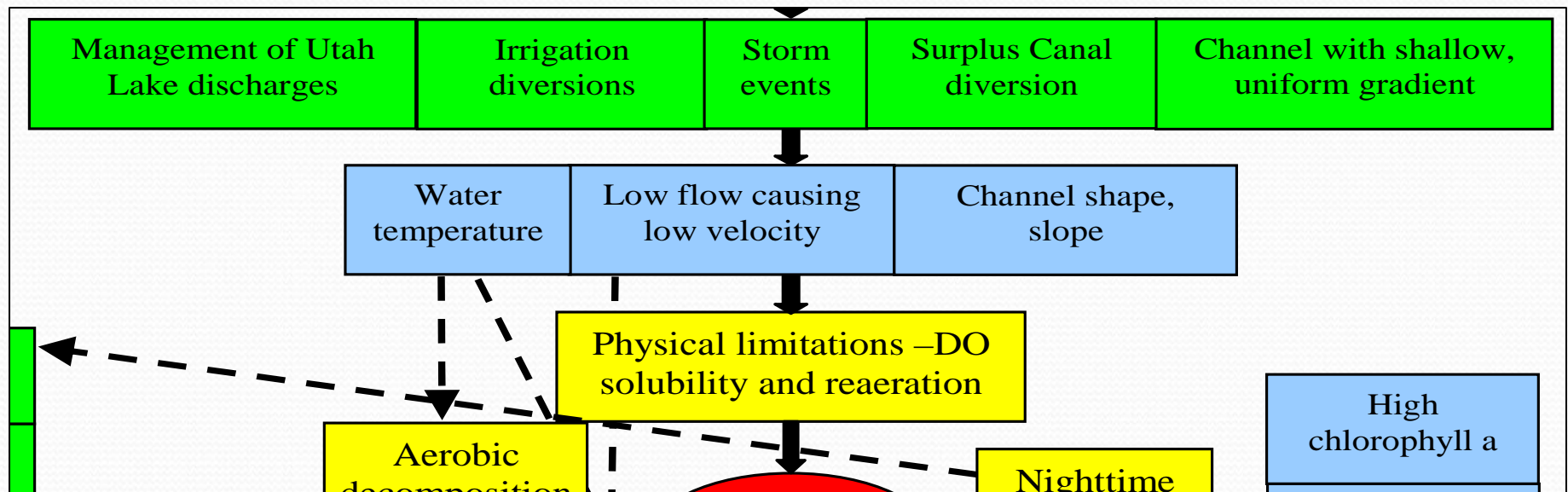


# DO Linkage Processes





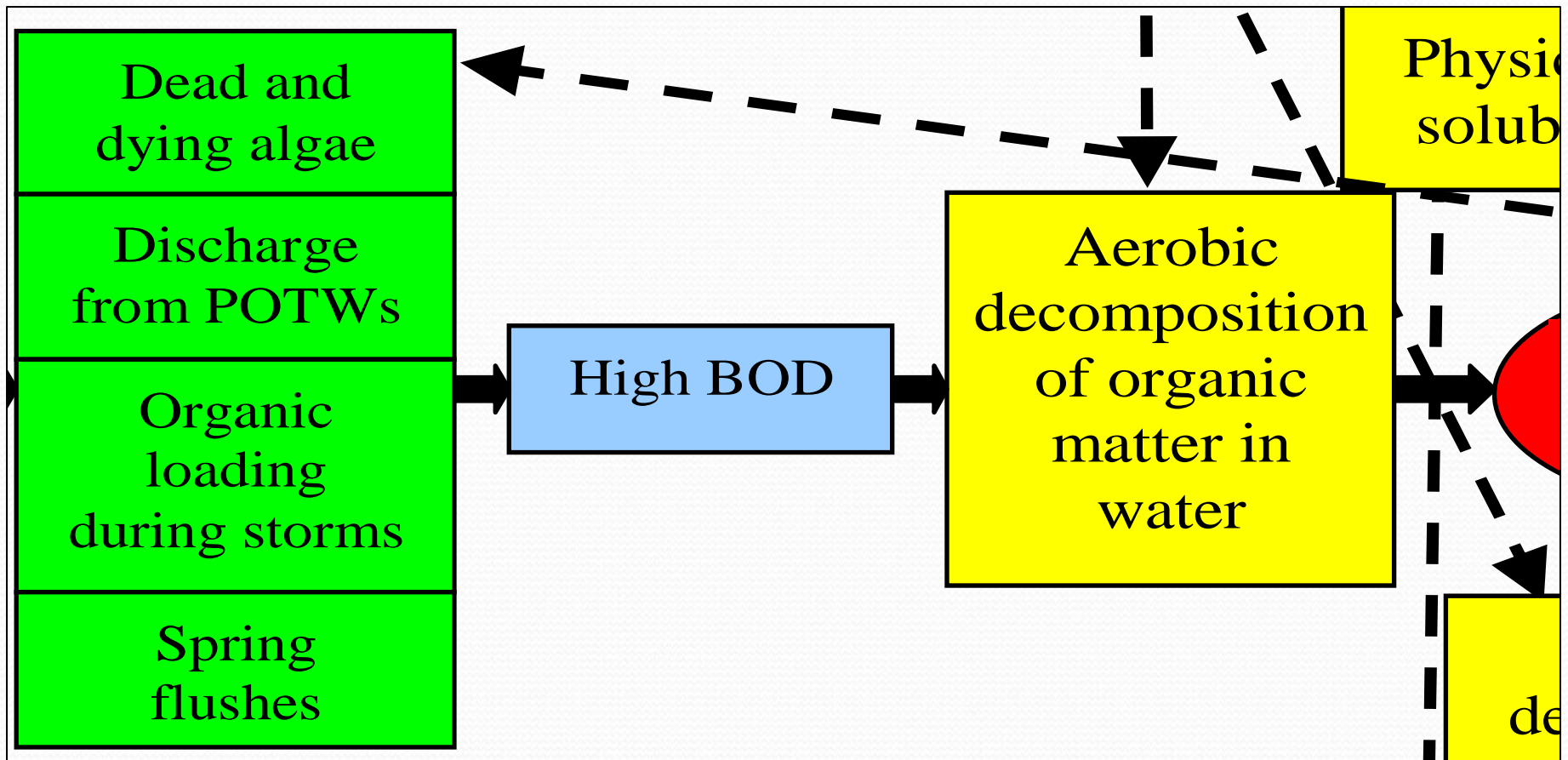
# Physical Processes



Physical reaeration function of:

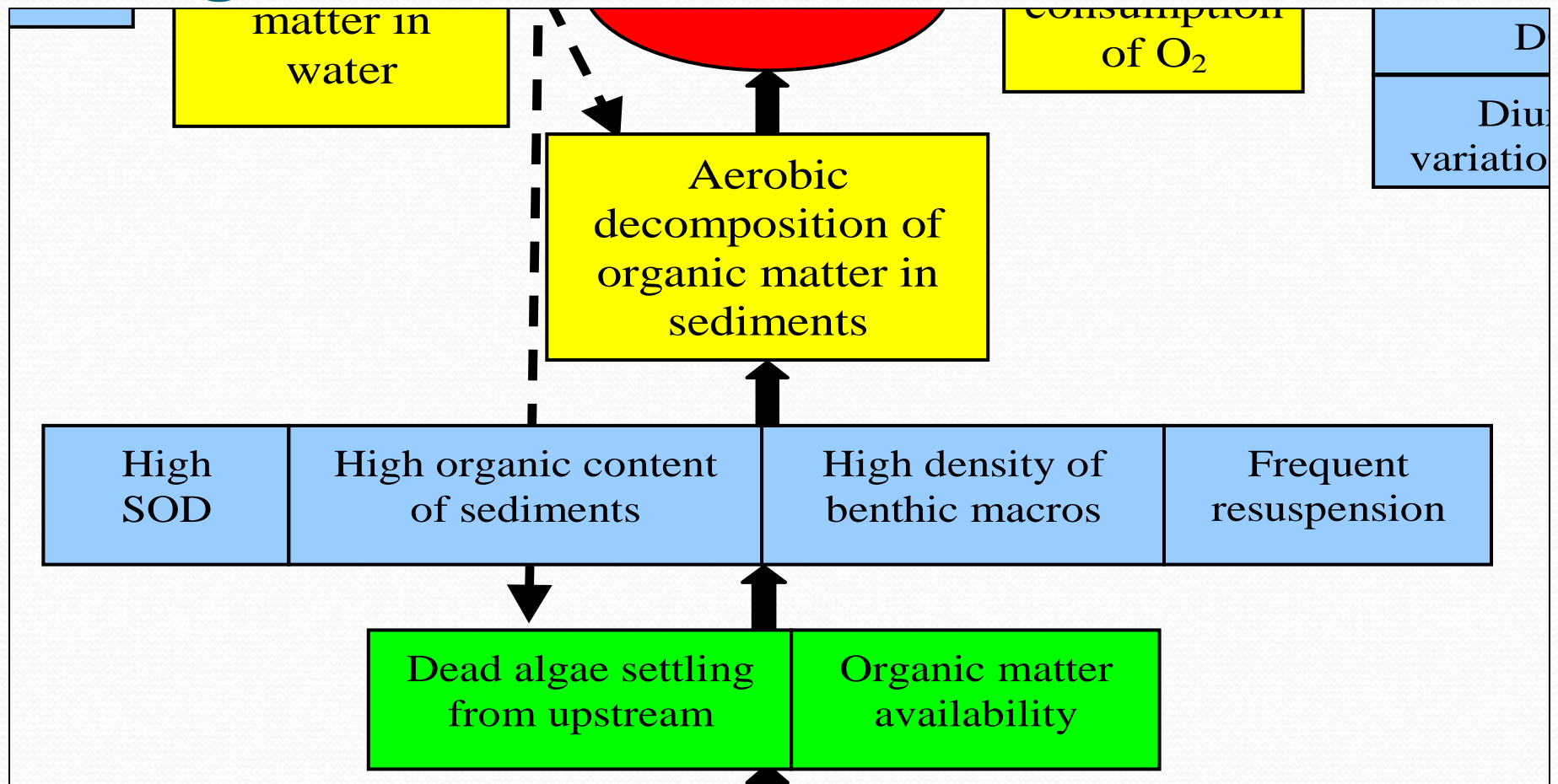
- DO deficit (temperature, pressure, salinity)
- Turbulence – channel morphology and flow

# Organic Matter in the Water Column – Measured as BOD



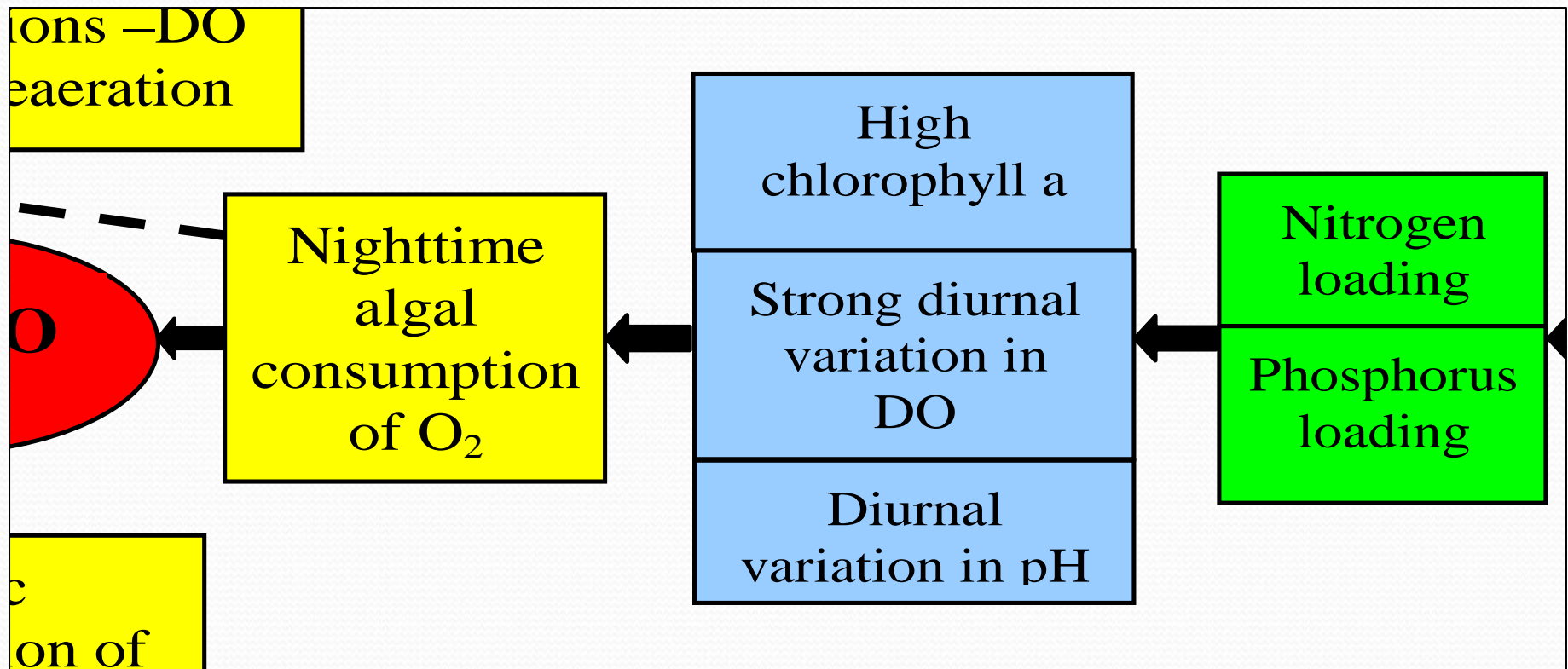
- BOD<sub>5</sub> versus cBOD
- Nitrification ( $\text{NH}_4$  to  $\text{NO}_2$  and  $\text{NO}_3$ ) is typically suppressed

# Organic Matter in Sediments - SOD



- Organic decomposition (similar to BOD<sub>5</sub>)
- Nitrification (NH<sub>4</sub> to NO<sub>2</sub> and NO<sub>3</sub>)

# Nighttime Algal Net Consumption of DO



- Suspended and benthic algae and macrophytes always respiring
- Net production of DO during photosynthesis
- Net consumption of DO for respiration at night
- Eventual senescence of algae contributes to BOD<sub>5</sub> and SOD

# Conclusions

- DO problematic in summer
- Processes complex and interacting
- More data needed for complete understanding...but...TMDL must be completed in a timely manner to begin moving toward a solution
- What makes sense now?