CH2MHILL

Riley Purgatory Bluff Creek Watershed District

# Mitchell Lake Association

*September 17, 2009*

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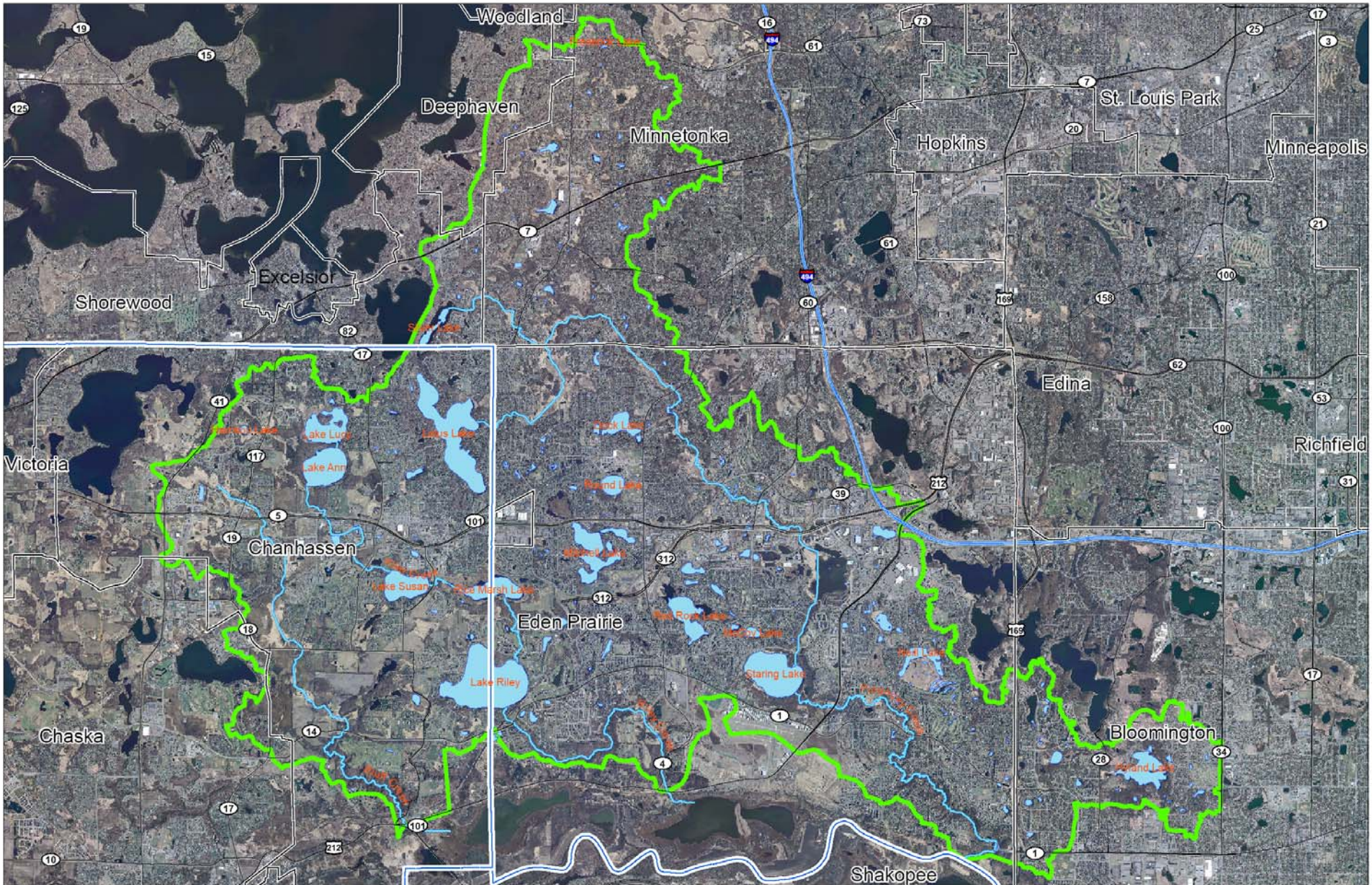
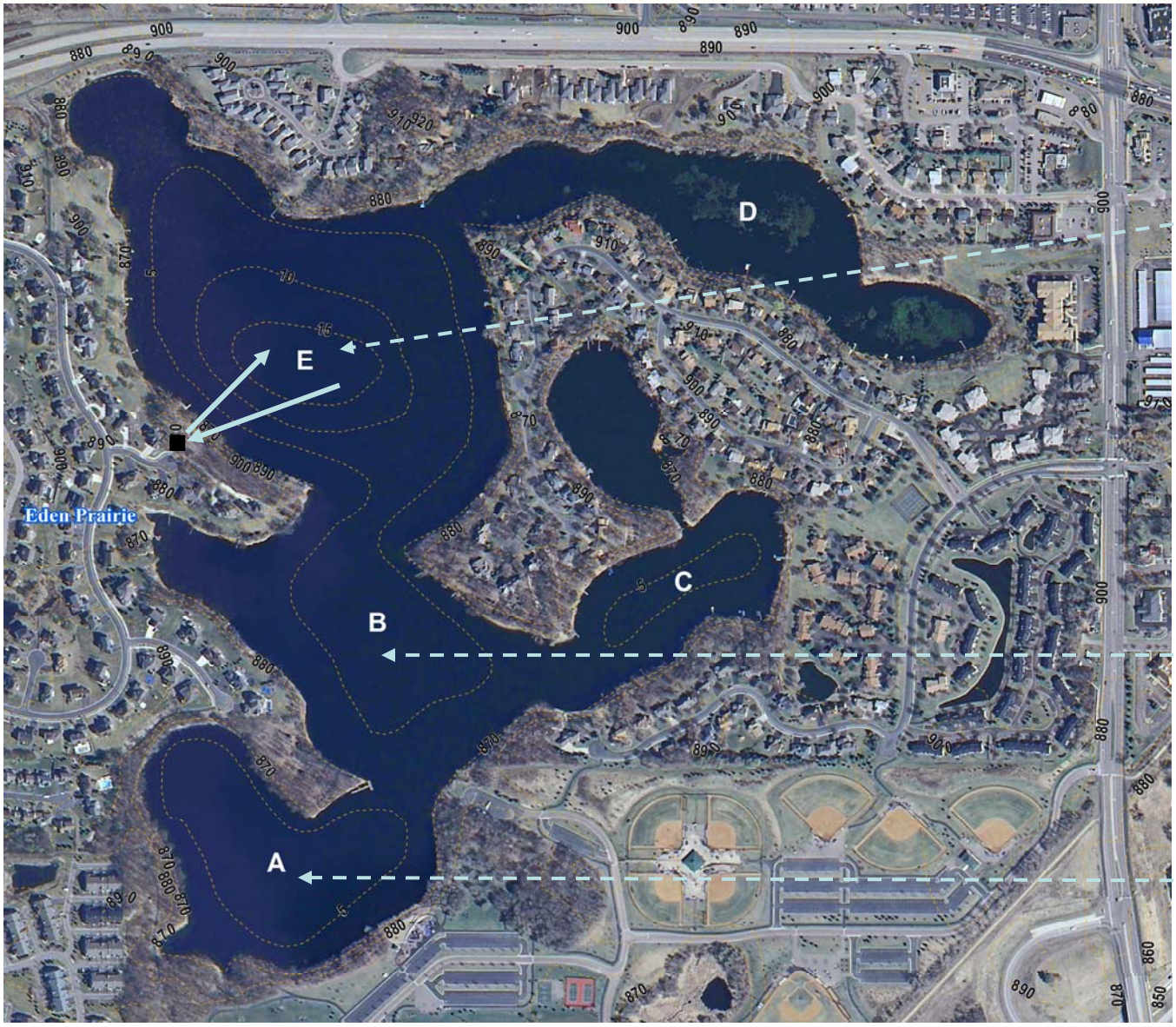
*CH2M HILL – District Engineer*

# The Watershed



# Mitchell Lake Restoration – Pilot studies




Deep area:
pure $O_2$ injection

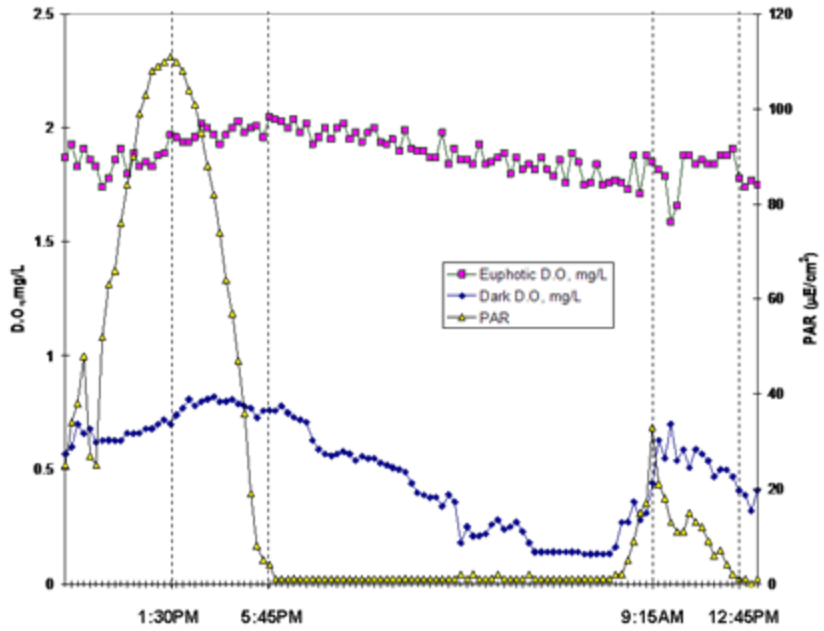
Shallow area:
calcium peroxide

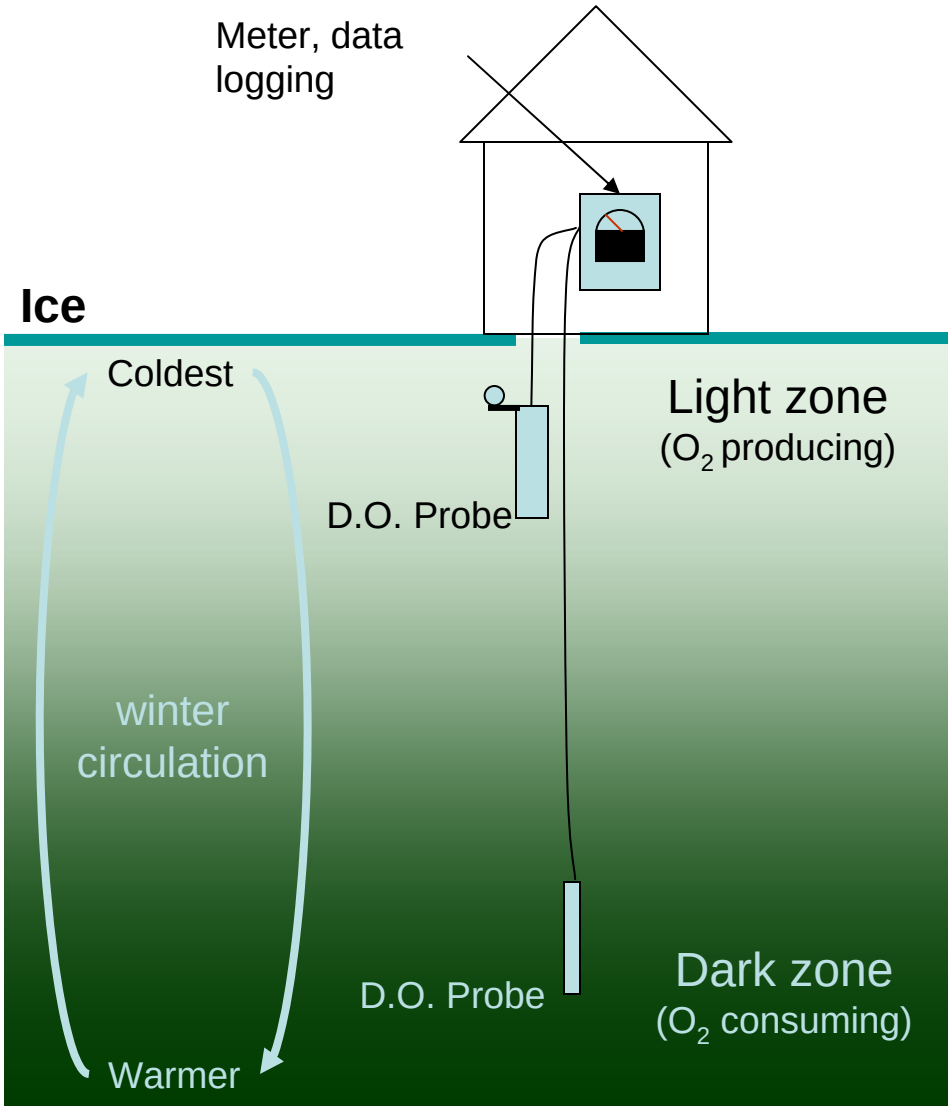
SolarBee

# SOD 2008 Study Pictures (Round, Lotus, Mitchell)

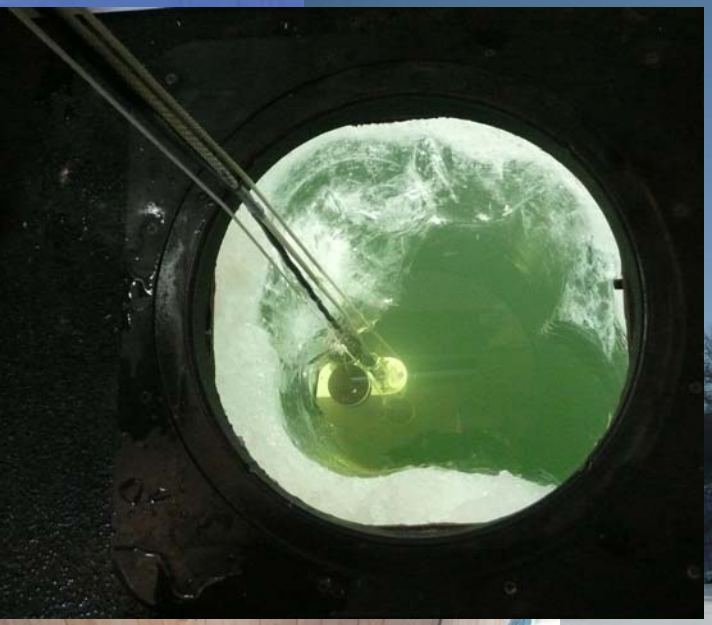

# Suspended community oxygen demand (SCOD)

- Bacteria & algae in water sediment consume oxygen
- Measure consumption rate to get CSOD (g $O_2/m^2/day$)
- Results important for engineering efforts

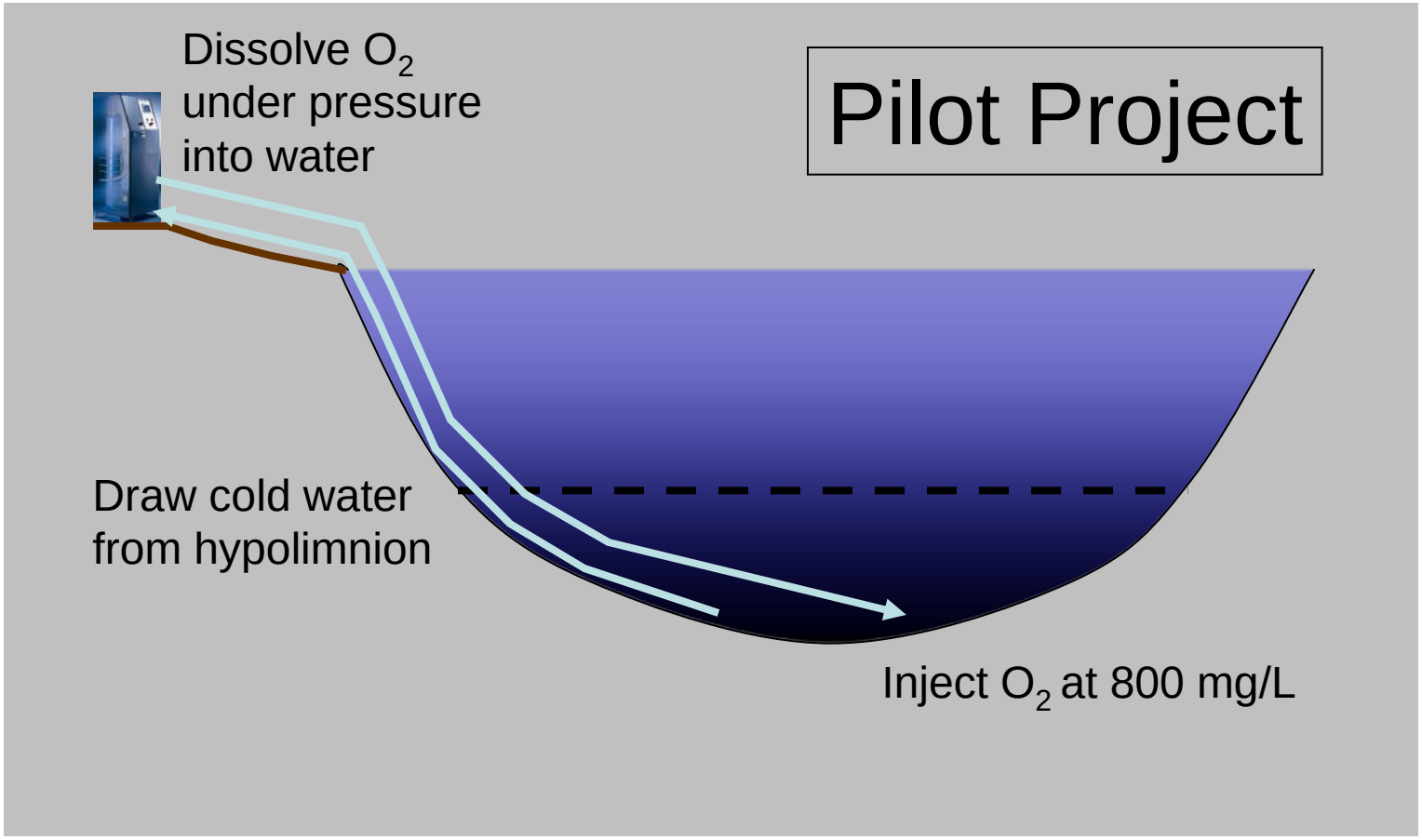


# CSOD 2009 Study Pictures (Round, Lotus, Mitchell)



# Deep Lakes: Hypolimnion oxygen management




Sediment oxygen demand (2008) & community oxygen demand (2009) data used to calculate size of oxygen unit

# Deep Lakes: Hypolimnion oxygen management

- Supply pilot with liquid oxygen
- Temporary installation
- Units in place July-Sept 2009
- Demobilizing next week

# Shallow lake SOD management

- The issue:
  - Organic sediments warm up in summer
  - ***Warm*** organic sediments = big SOD from bacteria
  - High SOD consumes most of oxygen near sediments
  - Anaerobic bacteria release P from warm sediments
- The potential solution:  Alter sediments
  - Oxidize organic material to cut down SOD
    - Calcium peroxide
    - Calcium nitrate
  - Lock up P in insoluble (calcium) complexes

# Shallow Lake Pilot: Calcium Peroxide Amendment

- $CaO_2$ in slow-release granules
- Food-grade material
- Benign

- Raises oxidation state of sediment surface
- Calcium binds Phosphorus
- Barge application
- New product; collect dosing data

# Plant management

- Removed about 2.1 million pounds curly leaf pondweed from Mitchell in 2008 & 2009
  - 272 tons (2008), 775 tons (2009)
- Dying plants create SOD
- Plant and oxygen management may be linked in shallow lakes

# 2010 Projects – Mitchell Lake

Mitchell Lake Water Quality Improvement

- Plant Management (weed harvesting)
- Biomanipulation (Milfoil control & water quality improvement)