CAMPUS LAKE

“Inflow and Infiltration Investigation”
Physical Plant’s as well as Universities Financial Commitment to Campus Lake

- Aerators
- Lake shoreline rock installation for erosion control
- Handicap accessible dock
- Pathways around the lake, joint project with Laborers Union
- Former Campus Beach Restoration Project
- Construction of Boardwalk
- Campus Lake Wetlands plantings
- New Bridge across Lake
- Over $1,000,000 spent with these improvements alone!
Physical Plant’s Commitment
to Campus Lake
“...we drilled 3 wells perpendicular to the lake after determining that there was a liquid layer sandwiched between two dry soils.” Pg. 84

“Water samples from all 3 wells reeked of raw sewage. After filtration, we sent the middle groundwater sample for analysis to the laboratory at the City of Carbondale Water Treatment Plant.” Pg. 84

“Fecal coliform counts 5-fold higher in groundwater at Station 4 than in surface waters of Campus Lake (Table 9).” Pg. 84

Dr. Brooks focus was looking for high phosphate levels in the ground water.
Initial Visual Inspection Started in Fall 2012

- Plumbers checked around the lake periodically for infiltration, including the winter for any melted ice or water infiltration.
The purpose of these dye tests was to determine whether the sanitary sewer piping cross connects with the storm sewer piping at Thompson Point.

Dye testing was performed 3 times.

The results of the Dye Test indicate that there are no apparent cross connections between underground sanitary sewer and storm sewer piping. All sewer water drained as expected and no traces of dye were found in storm basins or lake.

If there is a Mainline Defect it would seep into other defective pipes and surrounding ground.
Sanitary Sewer Section - Lentz

- The sanitary sewer located between the lake and Lentz Hall.
- The existing sanitary sewer is located below the level of the lake.
- This indicates that if there is a breach, lake water would seep into the pipe not the sewer seeping into the lake.
The purpose of these smoke tests were to find potential points of inflow and infiltration with the storm sewer piping at Thompson Point.

Tests the condition of sanitary sewer piping.

Typically in sewers that have common attributes (age, material, etc.) as SIU’s, many mainline defects are expected. SIU’s sewer lines that were tested had very few.
Sanitary Sewer Manhole Locations
Video Scope

Sanitary Sewer November 2015 – M.H. C6-C6A
Soil Borings

Soil Boring Locations November 25, 2015
Soil Borings

Holcomb Engineering’s (Central Mine Equipment) Drilling Rig
“Soil Borings

Soil Borings Report by Holcomb Engineering

- “The soils were sampled with CME (Central Mine Equipment) continuous samplers in order to gauge the entire soil profile from the surface depths ranging in 20 to 28 feet.
- The attached boring logs represent the soils encountered and more importantly, no raw sewage was detected.
- “There were no visual or malodorous signs of organic matter or sewage in any of the split spoon samples or cuttings brought to the surface during drilling.”
“Widespread algal blooms also cause the shallow bays to become anoxic (personal observations by authors) which can contribute to a ‘sewer’ like smell emanating from the lake when the wind blows towards campus.” Pg. 25

“As previously discussed, the impervious clay soil forming the lake bottom was assumed to provide minimal groundwater flow to or from the lake, and thus nutrient inputs or outputs from groundwater are assumed negligible in the overall nutrient balance.” 10.6.d Pg. 83
Lonergan said there was no evidence of groundwater when the lake was drained for two years. “The lake bottom remained dry and hard enough for the earth movers that dredged the lake.” he recalled. “There were no springs at all. Underground sources are very rare in sandstone country.”

“The people who developed the lake depended almost entirely on watershed (water entering from runoff streams.)” Caskey said. “The University storm sewers are the only known ground source.”

“Levels of fecal coliform on Campus Beach were found to be above the accepted Illinois Department of Public Health tolerance limits for periods of one to two days following a heavy rainfall of two inches or more during the school year.”

1 Greg Lonergan – Former University Landscape Architect
2 Robert Caskey – Former Associate Professor in Chemistry and Biochemistry
“Nearly every mammal and bird carries *E. coli*. And, there are many different "flavors" of *E. coli."”

“…these are generic counts of *E. coli* cells in the water. The actual source of these *E. coli* are unknown. In fact, they likely originate from a multitude of possible sources, including human waste, bird droppings, agricultural run-off, or even naturally occurring *E. coli* present in the soil.”

“Because lake water typically contains *E. coli*, the infiltrating lake water will also carry *E. coli* into the sand. Most of the infiltrated lake water will quickly head back into the lake but the sand will act to filter the *E. coli* and retain it in the sand.”

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1 - E. coli in our lakes: What does it really mean? (Health Talk)  

2 - Healthy Lake Huron (E. coli Bacteria and Beaches: What is In Your Sand?)  
Thompson Lake History

- Originally known as Thompson Lake, it was developed after the Civil War as a pond to cut ice for the Thompson families ice houses.

- “The most exclusive resort area of the early 1900’s in Southern Illinois, the lake was once surrounded by summer cottages...” Outdoors Magazine, November 1961, Vol. 3 No. 6

- SIU purchased the lake in 1951 for recreational purposes for freshman students that could not have cars on campus.
Thompson Point Pre-Development

Thompson Lake before development by SIU.
Historical Aerials

1952 Aerial

1965 Aerial
Pre World War One

Thompson Lake Fishing Club, Carbondale, Ills.

Cabins on lake.
Historical Aerial

Thompson Point Dormitories being Constructed.
Historical Aerial

Thompson Point Dormitories being Constructed.
Lentz Hall being Constructed 1958-1959. Lake is low in background, due to dredging.
Building of Boat Dock / Dredging of Lake

Circa 1957
Existing November 2015 Conditions of the Lake
Existing November 2015 Conditions of the Lake
Nutrients in Campus Lake

Dr. Marjorie Brooks – Prepared 11/4/2015

- Campus Lake refreshes the water at minimum every 1.75 years.
- Campus Lake has an income of nutrients from storm drains.
- Campus Lake has a savings account of decaying algae. The decaying algae is wet compost that fertilizes the harmful cyanobacteria.
- If decaying algae is not removed, natural flushing of these nutrients would take 18 years.
Nutrients from decaying algae—"wet compost"

- If we remove one cubic foot of wet compost for each foot of shoreline,
- We remove 20 tons of decaying algal compost from Campus Lake
- This equals eighteen years of excessive nutrients that now feed the cyanobacteria in the lake
- Algal decay contributes the odors of rotten eggs and methane
Moving forward: Plan of action

- Lower lake level and remove several tons of algal compost from Campus Lake. It is critical that we remove this vast storage of nutrients.
- Move forward with the slow and expensive process of capping any compromised aspects of the sanitary system surrounding the lake.
- Work with neighborhoods to cope with storm drain systems that appear to be overtopping into the sanitary system during rainstorms.
What can Faculty Senate do to get involved?

- Organize funding for the dredging of algal compost that contains stored nutrients.
- Volunteer
- Pass a non-binding resolution to allocate resources to restore and maintain Campus Lake

The path forward is clear, but challenging under current fiscal constraints.
Nutrients in Campus Lake
Nutrients in Campus Lake
Nutrients in Campus Lake
Although it does not appear that raw sewage is coming into the lake from Thompson Point, the elevated e-coli in the groundwater near the lake is a concern. Possible sources for this e-coli / sewer smell could also be related to the following:

- Ducks, geese, muskrats and beaver in the lake
- Old Fishing Cabins
- Thompson Point Construction
- President’s pond

The lake is an important and unique asset to the University. It was dredged nearly sixty years ago and since that time it has built up a large amount of phosphates and nitrogen. The significant amount of compost in the lake needs to be removed and presently there is limited university funds available. The low turnover and reliance on storm sewers to feed the lake has created the condition we now have.
Questions or Suggestions?

- Marjorie Brooks is in attendance today.