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Aug. 15, 2007

RE: Assessment water quality in Lake Bellaire from plan to dredge Craven Pond

Dear Lake Bellaire and Intermediate River residents,

We are writing in regard to a plan by the Village of Bellaire to dredge Craven Pond. Over the years Craven has filled with sediment turning this once great fishing habitat into a 2 to 3 foot pond, too shallow to use for recreational purposes. The Village has proposed to dredge the pond to a depth of about 10 feet that would again support fish and make the pond more useful for recreation.

This past year Three Lakes Association (TLA) has developed a water quality model that can forecast changes in water quality based on changes in the watershed. In this case changes in phosphorus coming into Intermediate River and Lake Bellaire from the dredging of Craven Pond. Phosphorus is an essential and growth-limiting nutrient for plants in the lake, including plankton in surface waters. Any long term increase in phosphorus will increase plankton levels leading to a decrease water quality and clarity.

The sediment in Craven Pond is a reservoir of phosphorus, mostly natural, that has fallen to the bottom of the pond and currently lies there inert. Dredging the Pond will stir this phosphorus up and suspend it in the water for some time. During this suspension the water will run over the dam and find its way through Intermediate River into Lake Bellaire. Eventually, this phosphorus will either be redeposited in the sediments of Lake Bellaire or be flushed out of the lake by the flow of water through it. However, there will be an increase in the phosphorus levels in the lake for some time. Our model shows how long the effect will last and at what level.

Enclosed is a copy of the presentation we gave to the Bellaire Village's Council on July 18, 2007 regarding our recommendations and the effects the project will have on the health of Lake Bellaire and Intermediate River. TLA has worked with the Village over the past year to make this assessment. This discussion is ongoing and Village officials have recommended to us that we communicate our findings to residents who will be affected. In addition to the specific predictions on water quality for a representative dredging operation, TLA has made some recommendations about minimizing the phosphorus load by modifying some details of how the dredging is carried out.

If the dredging is done in the late fall, TLA feels that the likelihood of serious changes to Lake Bellaire will be small and short lived. This is the advice we have given to the Council. It is not our intention to stop this project, only to advise the residents that there is a trade off between the proposed dredging and water quality. When the dredging occurs, TLA will monitor the effects both to verify our model and improve our ability to make accurate predictions in response to this and other changes in the watershed.

Sincerely,

Bob Bagley, TLA President

Norton Bretz, TLA Executive Director

Proposed Dredging of Craven Pond

Three Lakes Association's Evaluation
of Anticipated Phosphorus Loading
on Lake Bellaire Water Quality

Presented to Bellaire Village
Council

July 18, 2007

Dean Branson and Norton Bretz, TLA

Doug Endicott, GLEC

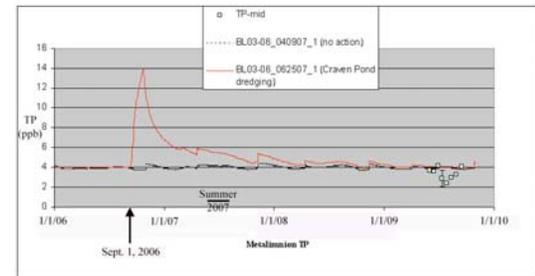
Dredging Scenario Assumptions

- About 80,000 cubic yards sediment to be removed, six-week operation, five days per week
- Five lab tests simulating sediment & phosphorus potentially suspended in pond water during dredging...
 - ⊗ Mix 125 ml sediment + 500 ml pond water
 - ⊗ 212 ug/L phosphorus in surface water after 7 hr settling
- Phosphorus loading rate during dredging...
 - ⊗ 37.8 kg/day based on 100 cfs (Cedar River) x 212 ug/L
 - ⊗ 1,600 kg phosphorus into Lake Bellaire in six week
- Suspended solids from dredging passes over dam, no mitigation

Craven Pond Dredging by the Village of Bellaire

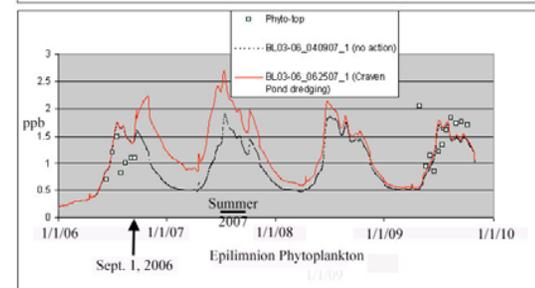


Phosphorus levels go up to 14 ppb, drop to ~ 6 ppb compared to 4 ppb by last summer

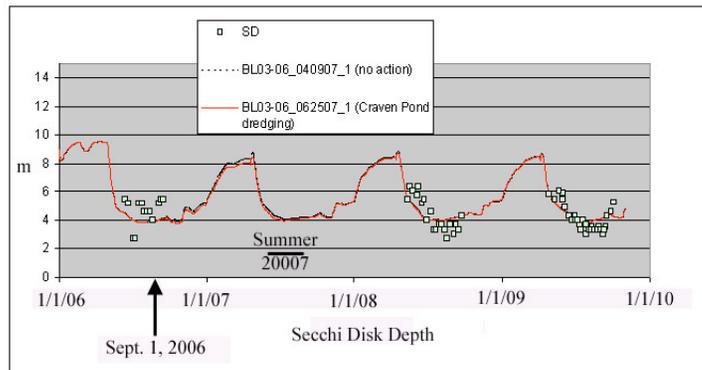


Key: Red- prediction
Black - no dredging

Phytoplankton levels go up and stay elevated through the next summer

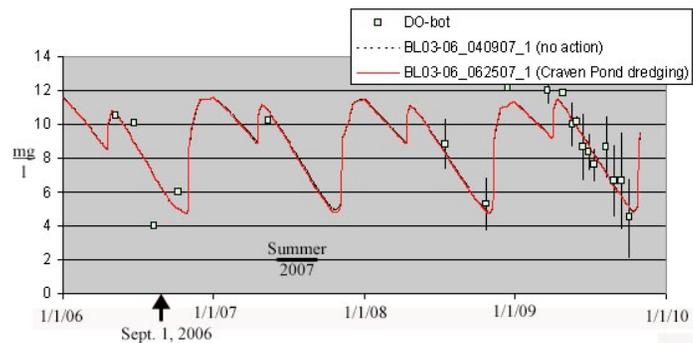


Water Clarity based on Secchi Disk Depth



Conclusion: No Change

Dissolved Oxygen near bottom of Lake Bellaire



Conclusion: No Change

Uncertainties include...

- Duration of the dredging operation, vs 6 weeks
- Actual vs estimated phosphorus release rate, 38 kg/d
- Capability of reducing phosphorus release rate...
 - Ⓢ Increasing settling time by raising & lowering dam spillway
 - Ⓢ Using submerged barriers around dredging operation to contain some suspended solids
 - Ⓢ Other ideas for reducing mixing of sediment & pond water

Conclusions

- Phosphorus concentration in Lake Bellaire is expected to increase from 4 to 14 ppb during the winter months and then decrease to about 6 ppb (4 ppb is normal) by next spring.
- Water clarity is not expected to be significantly less next summer compared to previous summers.
- Parameters of some concern to be monitored after dredging:
 - Ⓢ Blue-green algae in Lake Bellaire next summer
 - Ⓢ Dissolved oxygen near bottom, Lake Bellaire, fall 2008
 - Ⓢ Sediment in Intermediate River
 - Ⓢ Phosphorus in lake midlevel