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Savannah Harbor Expansion Project

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Update on Chloride Modeling & Impact Assessment

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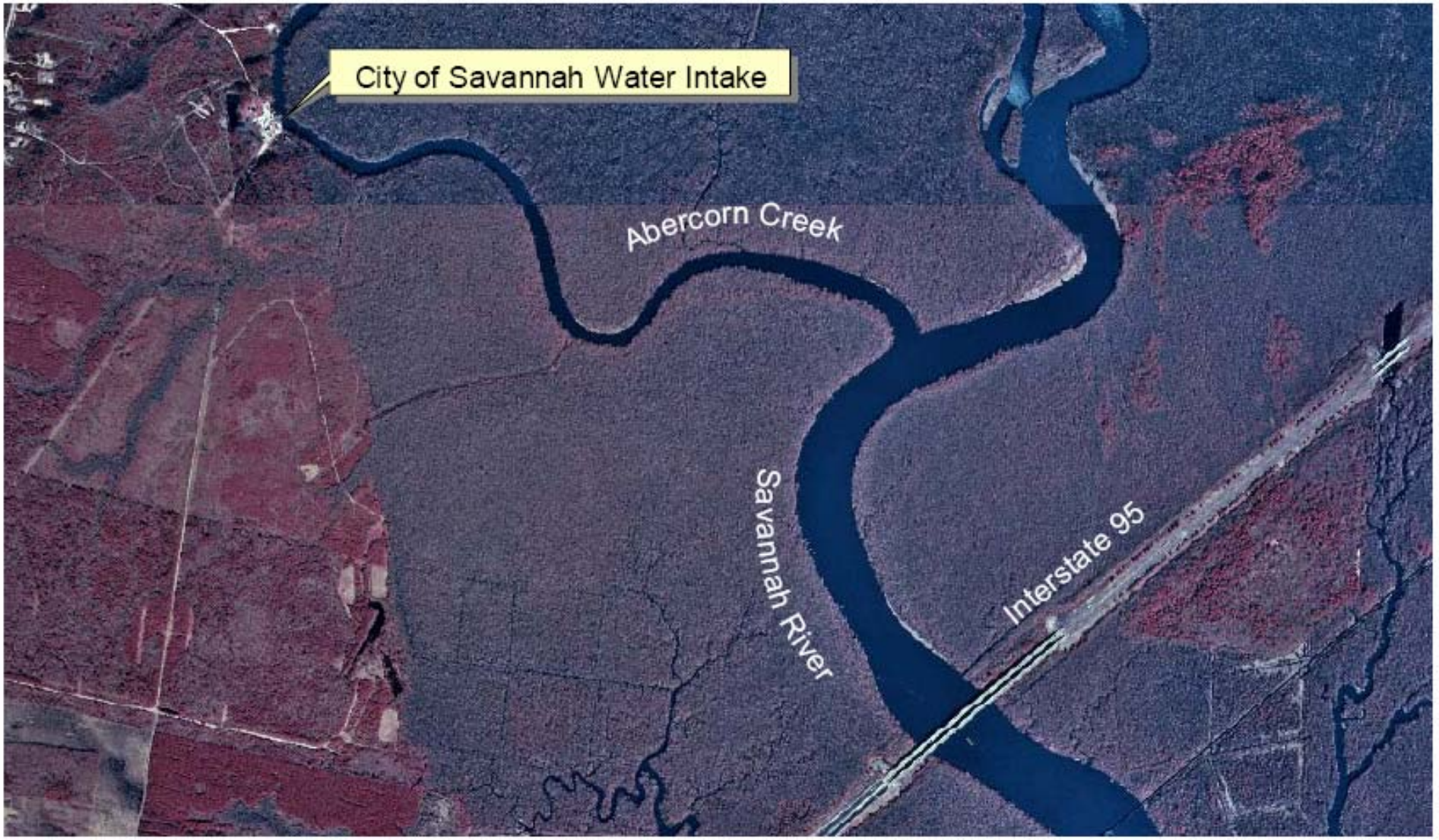
Chloride Evaluation

BACKGROUND

- City of Savannah has M&I water intake on Abercorn Creek
- Industries use water for boilers – are affected by chlorides
  - Threshold around 12 mg/L
    - Commonly equal or exceed that level
      - Average flows – 50 % of time
      - Drought flows – 90 % of time
  - Drinking water standard = 250 mg/L



City of Savannah M&I Water Intake

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BACKGROUND (cont)

- City raised issue of potential impacts to quality of the water at their intake during Tier I feasibility study
- GPA included funds in recommended project to relocate the City's water intake upstream as mitigation
- Collected salinity and chloride information at City's intake during 1999 data collection event

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MODELING

- Adapted EFDC hydrodynamic model to predict chloride levels at City's water intake – modeling report dated Nov 06
- Used City's daily recorded chloride values; USGS gages; data from GPA's 1999 sampling; looked at upstream sources

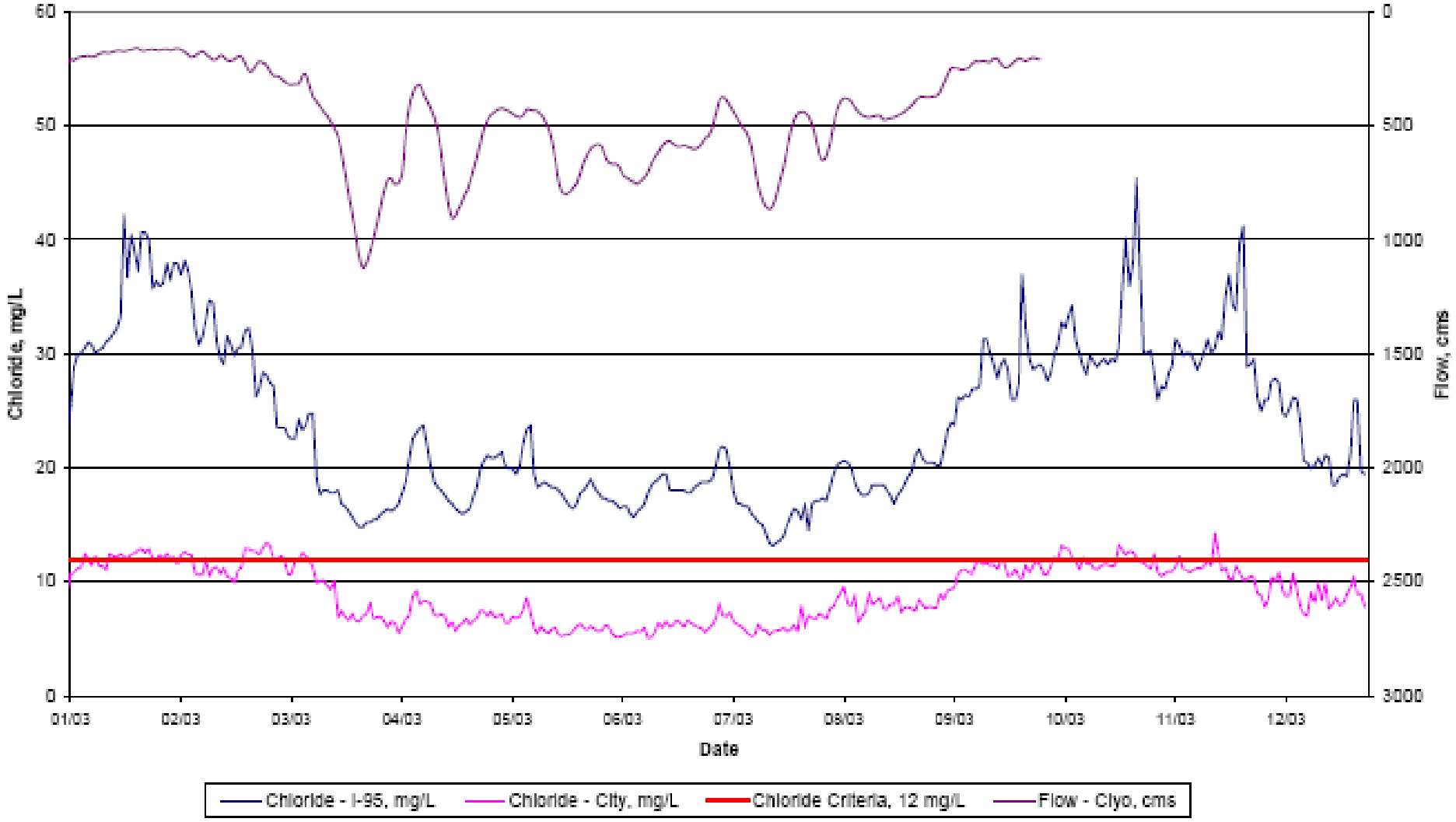

Figure 4-6 Chloride Values and Corresponding Flow Measurements for 2003

River flow vs. Chlorides

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MODELING (cont)

- **Developed an equation based on river flow and salinity at I-95 Bridge**

$$\text{Chloride}_{\text{Intake}} = \text{Chloride}_{\text{Flow}} + \text{Chloride}_{\text{Salinity}}$$

$$\text{Chloride}_{\text{Intake}} = [92.118 * \text{Flow}^{(-0.436)}] + [0.0574 * (\text{Salinity}_{\text{EFDC}} \rightarrow \text{Cond}_{\text{USGS}}) + 4.1603]$$

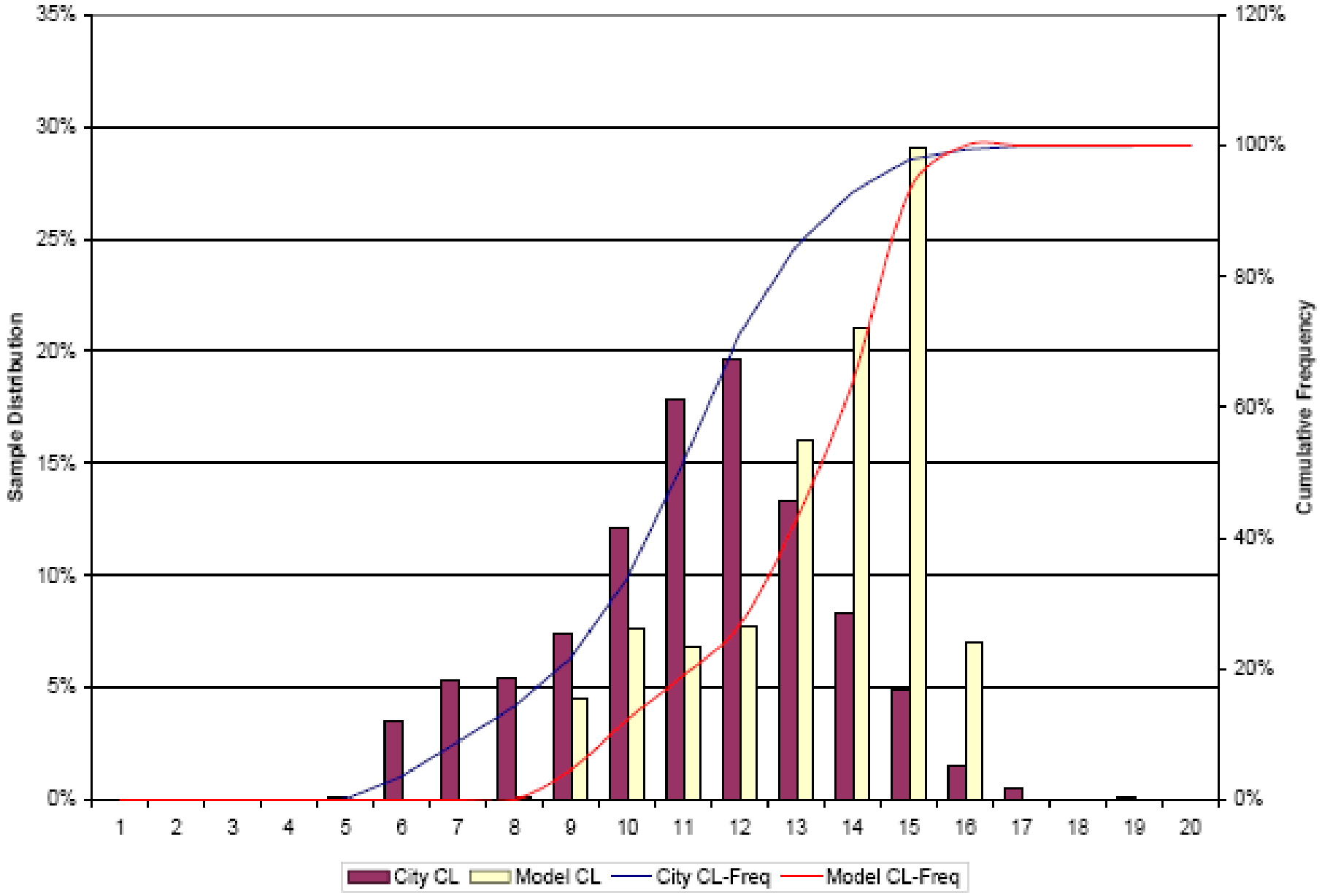

Figure 7-4 Cumulative Chloride Distribution of the City and Model Results

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MODELING (cont)

- Corps had USGS conduct the technical review of the model
- City also reviewed the modeling report
- Reviewers had questions about ability of model to predict changes at these low levels

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MODELING (cont)

- Corps Engineering Division in Wilmington had responsibility for technical adequacy of the model and response to review comments
  - Conclusions
    - Model is as good as it can be with the data that is available
    - Is uncertainty about predictions at these low levels
    - Should monitor after construction to quickly identify any unforeseen impacts

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Chloride Evaluation

IMPACT EVALUATION

- Evaluated impacts under 3 scenarios
  - Basic – low river flows (1999)
  - Sensitivity #1 – average flows (1997)
  - Sensitivity #2 – severe drought (2001)
- Modeling period was 1 May to 1 November
- Looked at existing channel + 4 depths
- Looked at 5 wetland mitigation plans

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IMPACT EVALUATION (cont)

- Basic evaluation – low river flows (1999)
  - No effect on chloride levels at City's intake
- Sensitivity #1 – average flows (1997)
  - Maximum predicted value increases 0.04 mg/L with 6-foot deepening
- Sensitivity #2 – severe drought (2001)
  - Slight increases with all channel depths
  - Max increase is 0.85 with 6-foot deepening

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IMPACT EVALUATION (cont)

- Wetland mitigation plans
  - Plan 1 – no different than basic deepening
  - Plan 2
    - Increase under Sensitivity #2 (max change increased from 0.85 to 0.96 mg/L)
  - Plan 3
    - Slight increases with Basic Evaluation and Sensitivity #1 (max increased 0.4)
    - Increase under Sensitivity #2 (max changed from 0.85 to 0.93 mg/L)

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IMPACT EVALUATION (cont)

- Wetland mitigation plans
  - Plan 4
    - Slight increases with Basic Evaluation and Sensitivity #1 (max increased 0.4)
    - Increase under Sensitivity #2 (max change increased from 0.85 to 1.34 mg/L)

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IMPACT EVALUATION (cont)

- Wetland mitigation plans
  - Plan 5
    - Slight increases with Basic Evaluation and Sensitivity #1 (max increased 0.7 mg/L)
    - Increase under Sensitivity #2 (max change increased from 0.85 to 1.55 mg/L)

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CONCLUSIONS

- Developed an acceptable tool to predict impacts to chloride levels at the City's M&I water intake on Abercorn Creek
- Minimal impacts predicted under average and low flows (<1 mg/L)
- Minor impacts predicted for severe drought flows (max concentrations increased by 10%)
- Should monitor chloride levels at the City's M&I water intake if harbor deepening occurs

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QUESTIONS ?