HSPF Model Review
Watershed Models for Fox River

• Hydrological Simulation Program - Fortran (HSPF)

• Simulates the loadings into the mainstem Fox River
  • Agricultural areas
  • MS4s
  • WWTPs discharging to tributaries

Distribution of Annual Average Total Phosphorus Load for HSPF and QUAL2K Models (FRIP 2015)
Model Structure

- 33 sub-watershed models
- Continuous simulation from January 1990 to September 2011
  - Time series of flows and loads
- Includes WWTP’s on the Fox River tributaries
Point Sources in HSPF Model

- Barrington WWTP (3.68*)
- Crystal Lake WWTP#2 (5.8)
- Village of Elburn STP (1.3)
- Village of Gilberts WWTP (1.0)
- Lake in the Hills SD STP (4.5)
- City of Plano STP (2.4)
- City of Sandwich STP (1.5)
- Terra Cotta STP (1.0)

* Design Flow in MGD
Estimated Annual Average Loading

Figure 18. Simulated total phosphorus loading rate per watershed, lbs/acre/year

Figure 19. Simulated total nitrogen loading rate per watershed, lbs/acre/year
FRIP QUAL2k Model-HSPF Linkage

• Tributary loads (from HSPF) were used as annual averages loading for the steady state Qual2k model for low flow conditions

• Does not utilize the time series generated from HSPF

• Includes a sediment flux of total phosphorus for wet weather loading from non point sources (NPS)
  – Approach not suitable for apportioning load for scenarios (Bartosova, ISWS)
  – Does not account for dynamic nature of NPS loading
Proposed Approach

Use time series of simulated loads from HSPF as input to QUAL2kw model

– Standard approach for linked watershed-instream models
– Allows direct assessment of the impact of NPS load reductions
– Allows assessment of the impact of tributary WWTP load reductions
Linkage with Updated QUAL2kw

• Estimated tributary loads for inputs
  – Calibration Period – August to September 2016
  – Validation Period – June to July 2012

• Current HSPF models not setup for above periods

• Additional effort to extend these model not currently budgeted