Integrated Nowcast/Forecast Operation System for Yahara Waters
About INFOS

Information → Integration ← Models

USGS Gauges
Wireless Buoys
AOSS
INFOS Gauges
Web Cam

www.infosyahara.org

Surface Water

Groundwater
Yahara Water Levels

June 2008 Cumulative Rainfall

Rainfall (in)

0 2 4 6 8 10

6/1/08 6/8/08 6/15/08 6/22/08 6/29/08

Rainfall data from U.S. gage 05427716, Yahara River at Windsor, WI
Yahara Digital Map

100 Year Flood
Integrated Nowcast/Forecast Operation System
for Yahara Waters

CASE STUDY: Lake Monona Outlet

OBJECTIVE: Reduce Lake Monona Water Level to achieve 0.2 foot difference from Lake Waubesa

<table>
<thead>
<tr>
<th></th>
<th>Summer Min</th>
<th>Summer Max</th>
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</thead>
<tbody>
<tr>
<td>Lake Monona</td>
<td>844.7</td>
<td>845.2</td>
</tr>
<tr>
<td>Lake Waubesa</td>
<td>844.5</td>
<td>845</td>
</tr>
</tbody>
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Water Level Difference 0.2 0.2
Lake Monona – Water Budget

Temporary Water Level Sensor

Starkweather Hydrograph

Storm Sewer Hydrograph

Yahara River Inflow

Storm Sewer Inflows

Wingra Creek Hydrograph

Wingra Creek Inflow

Yahara River Outflow

Starkweather Creek Inflow

Storm Sewer Inflows

Storm Sewer Inflows
Water Level Measurements (2010)
Model Validation

SITE 1

SITE 2

SITE 3

SITE 4

SITE 5

Water Elevation

Observed
Simulated
Monona Outlet Observed Water Elevations

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Date</th>
<th>Value</th>
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<tbody>
<tr>
<td>Sensor 1</td>
<td>07/01/10</td>
<td>846.5</td>
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<tr>
<td>Sensor 2</td>
<td>07/11/10</td>
<td>847.0</td>
</tr>
<tr>
<td>Sensor 3</td>
<td>07/21/10</td>
<td>845.5</td>
</tr>
<tr>
<td>Sensor 4</td>
<td>08/10/10</td>
<td>845.0</td>
</tr>
</tbody>
</table>

- **Monona Bay**: 846.5
- **Waubesa**: 845.0

Rainfall:
- 3.8 inches on 07/01/10
- 1.9 inches on 07/21/10
- 1.4 inches on 08/10/10

Monona and Waubesa Water Level Difference:
- **Summer Max**: 0.4
- **Summer Min**: 0.2

DNR Snapshot

- **Lake Monona**: 845.2
- **Lake Waubesa**: 845.0

Rainfall (in.)

Monona and Waubesa Water Level Difference (ft)
INFOS MODEL INTEGRATION

July 2010 Lake Monona Observed & Simulated

HYDROLOGICAL MODEL

HYDRAULIC MODEL

Lake Monona Water Budget

Discharge (cfs)

<table>
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<tbody>
<tr>
<td>Tenney Inflow</td>
<td>Starkweather</td>
<td>Storm Sewer</td>
<td>Wingra</td>
<td>Groundwater</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2600</td>
<td>2200</td>
<td>2200</td>
<td>1800</td>
<td>1400</td>
<td>1000</td>
<td>600</td>
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Management Scenarios

1. Current Conditions (Existing)
2. Rail Widening
3. Outlet Dredging
4. Rail Widening & Dredging
5. Reduce Monona Inflow (0.5x)
Rising Period

Hydrograph

Water Profile
Recession Period

Hydrograph

1. Current Conditions (Existing)
2. Rail Widening
3. Outlet Dredging
4. Rail Widening & Dredging
5. Reduce Monona Inflow (0.5x)
2010 Lake Monona/Waubesa Water Levels

Water Elevation (ft)

Rising Period

Recession Period

Lake Monona Summer Max.

Lake Waubesa Summer Max.

07/21 07/26 07/31 08/05 08/10 08/15

07/21 07/26 07/31 08/05 08/10 08/15

Dredging Options

Dredge All

1 foot

2 feet

4 feet

Dredge Local

Dredge

Local
Water level sensitivity

2010 Lake Monona/Waubesa Water Levels

Water Level Difference from Waubesa to Monona

Achieve 0.2 Foot Difference In Non-Storm Period
Strategy

**Rising Period**

- Time Series of Water Level Scenarios
  - Monona (Existing)
  - Monona (Rail Widening)
  - Monona (Outlet Dredging)
  - Monona (Rail & Dredging)
  - Waubesa
  - Waubesa+0.2

**Management Scenarios**

- Reducing **Monona Inflow** has the Largest Impact on Reducing Monona Water Level

- Dredging Channel Achieves 0.2 Foot Difference from Monona to Waubesa in Recession Period

**Recession Period**

- Time Series of Water Level Scenarios
  - Monona (Existing)
  - Monona (Rail Widening)
  - Monona (Outlet Dredging)
  - Monona (Rail & Dredging)
  - Monona (Inflow)
  - Waubesa+0.2
  - Waubesa

- Dredging Sensitivity

- Reducing Monona Inflow has Largest Impact on Reducing Monona Water Level

- Dredging Channel Achieves 0.2 Foot Difference from Monona to Waubesa in Recession Period
Ongoing Project: Lake Waubesa Channel Restrictions

Objective: Assess Natural and Man Made Impediments to the Conveyance System.

- GEOMETRY
- BRIDGES
- ROCKS
- FISH WEIR
- VEGETATION
Ongoing Project: Yahara River and Cherokee Marsh Monitoring

Objective: Map bathymetry and Assess sediment dynamics due to hydrological/hydraulic & Carp disturbance

Bathymetry (Nov 2009-Nov 2008)

Dynamic Sediment Behavior
SUMMARY

YAHARA DIGITAL MAP

NOWCAST/FORECAST MODELS

CASE STUDY: Lake Monona Outlet

Friends Groups

Community Support

Scenarios

Water Level Difference from Waubesa to Monona

Sensitivity

Strategy