NASECA 18th Annual Conference
Advancements in Stormwater and Erosion Control
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WinSLAMM v 10.5 Update

Using WinSLAMM v10.5 to Meet Urban Stormwater Management Goals

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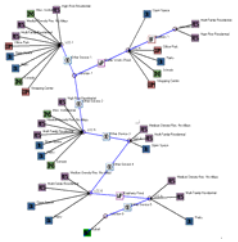
We will cover . . .

1. WinSLAMM Purpose and History
2. Detention Pond Modifications
3. Storing Control Practice Data
4. Street Parameter Changes
5. Model Linking
6. Biofilter Media
7. Tree Runoff Interception
8. Orifice Discharge Calculations
9. Modeling Issues
10. ArcSLAMM Plus



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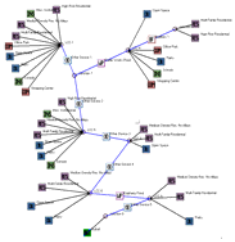

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1. WinSLAMM Purpose and History

WinSLAMM History

- **Development Began in mid-1970's**
  - Early EPA street cleaning projects in California
  - Incorporated data from other NURP projects
- **Mid-1980's - Model used in Agency Programs:**
  - Ottawa, Canada
  - Toronto Area
  - Wisconsin DNR
- **Intensive data collection started in WI in early 1990s.**
- **First Windows version developed in 1995.**
- **Current graphical interface released in 2012.**
- **Continuously being updated based on user needs and new research results.**

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1. WinSLAMM Purpose and History

WinSLAMM Can Answer These Types of Policy Questions . . .

- What are the base level pollutant loadings for different land uses?
- What flow and pollutant levels result from different development scenarios?
- What are the critical sources of flows and pollutants?
- How effective and cost effective are treatment practices in controlling pollutants and reducing flows?
- What combinations of stormwater controls will best meet regulatory requirements?

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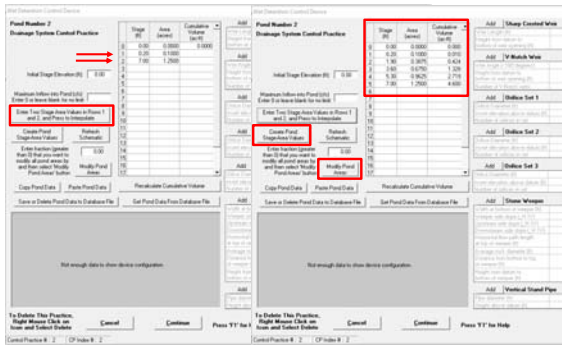
2. Detention Pond Modifications

Interpolate Stage – Area Data



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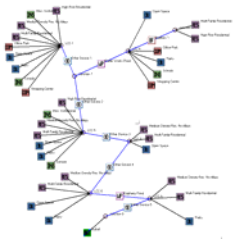

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3. Storing Control Practice Data

Saving Control Practice Data to a Database

Allows users to store control practice configurations in a database and insert them into other WinSLAMM models

- Access database through buttons on each control practice form –
  - Save or Delete Data to Database File
  - Get Data from Database File
- Control Practice data saved "as is" except for –
  - Adjusting the new Average Grass Swale Length by the new area
  - Adjusting Hydrodynamic Device, Catchbasin number and Porous Pavement area by the device density

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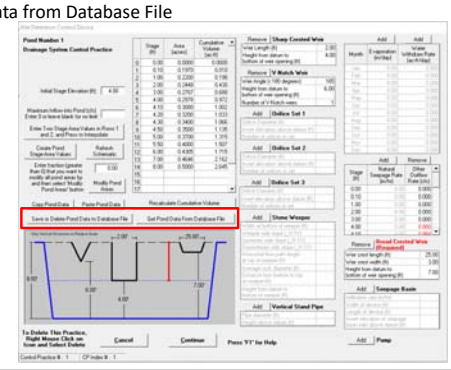
3. Storing Control Practice Data

To access the database, select either -

- Save or Delete Pond Data to Database File, or
- Get Pond Data from Database File

By . . .



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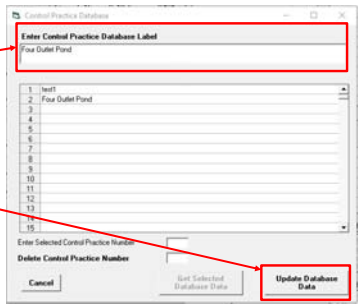
3. Storing Control Practice Data

Selecting the 'Save or Delete Pond Data to Database File' button gets you this form

To Save a practice, enter the Control Practice Database Label name

And press the Update Database Data button



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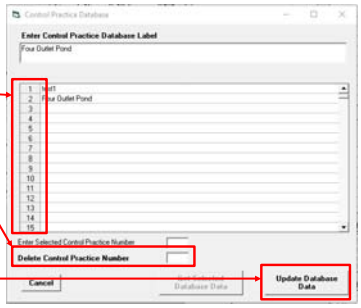
3. Storing Control Practice Data

Selecting the 'Save or Delete Pond Data to Database File' button gets you this form

To Delete a practice, pick the row number of the practice you want to delete

Enter the number in the 'Delete Control Practice Number ' box

And press the 'Update Database Data' button



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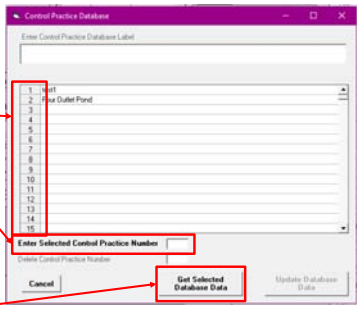
3. Storing Control Practice Data

Selecting the 'Get Pond Data from Database File' button gets you the same form

To Get a practice, pick the row number of the practice you want to get

Enter the number in the 'Enter Selected Control Practice Number ' box

And press the 'Get Selected Database Data' button



The data is then placed in the form. Adjust.

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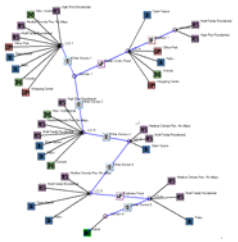

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4. Street Source Area Parameter Changes

New Data Requirements for Streets

- Reconfigured this form due to confusion about street length and curb miles.
- The updated form requires an explicit selection of the number of street edges
- The form has units of edge-miles rather than curb-miles
- The default number of edges for a street is 2 - the same used in previously in WinSLAMM
- Enter either the total street length or the paved street width
- The form includes a graphic representation of the selected street edge option, dimensioned

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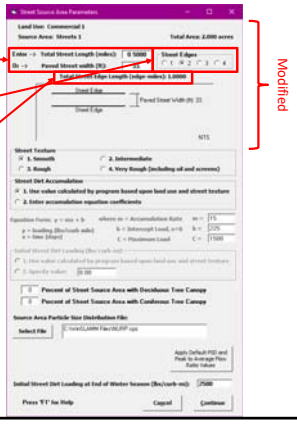
4. Street Source Area Parameter Changes

Enter either the Total Street Length (miles) or the Paved Street Width (ft)

Select the Number of Street Edges

WinSLAMM calculates the Total Street Edge Length (edge-mi)

The graphic illustrates the selected condition



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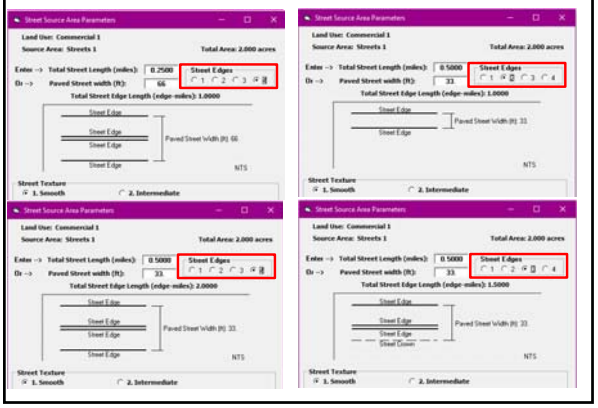
4. Street Source Area Parameter Changes

Examples



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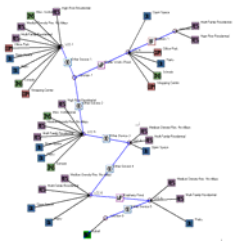

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5. Model Linking

Using Output from One WinSLAMM Model as Input to Another

Allows users to link the Output from any WinSLAMM Model as Input to another Model

Two Step Process –

1. Create the Link Files
2. Insert the Link Files into the Model File

- There are five Link Files with the data needed for the transfer
- Each Link File includes the name of the parent Link File

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5. Model Linking

1. Create the Link Files

Check this box to create the Link File

(In the File/Output Options menu)

Then Run WinSLAMM for the Output

2. Insert the Link Files into the Model File

In Land Use Source Area 83 (or 34 for Freeways), **Select** the file name of the Link File model

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5. Model Linking

Link File Tests

1. Matching rain files.
2. Matching rain file start and ending dates
3. Identical pollutants selected
4. Identical winter start and winter end dates
5. Identical seeds
6. Matching time steps
7. Link File and Model File names must be different

Incompatibilities must be resolved before the Link File can be accepted.

Hint - ID the Land Use to easily find the Link File later

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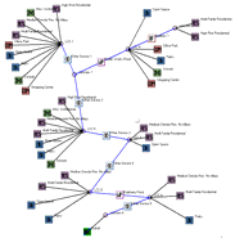

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6. Biofilter Media

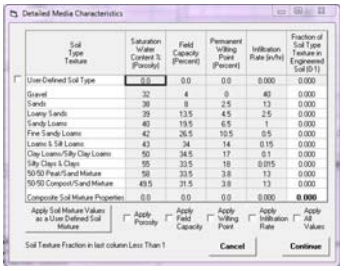
Upgraded the Media Table

Current v 10.4 Media Characteristics Table

8 Soil Types

2 Media Mixtures

Limited Treatment Options



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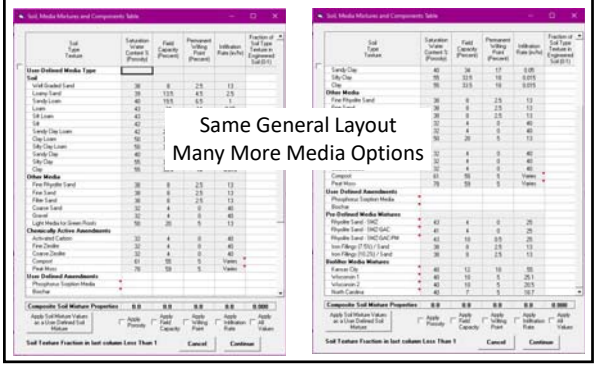
6. Biofilter Media

V 10.5 Media Table



Same General Layout
Many More Media Options

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6. Biofilter Media

V 10.5 Media Table

- Filterable and Particulate Pollutant Retention
- Influent and Effluent Pollutant Concentration Regression Equations for Particle Size Ranges
- Data from Full Depth Column Tests and Field Tests

Compost and Peat Moss infiltration rates vary

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6. Biofilter Media

V 10.5 Media Table

User Defined Amendments currently not available

Pre-Defined Media Mixture and Biofilter Media Mixture components available by hovering over the red squares

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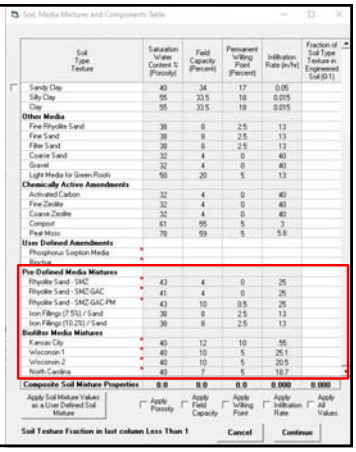
6. Biofilter Media

The Mixtures require that you enter a 1.0 as the fraction

Wisconsin users should comply with DNR Infiltration Standard requirements



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6. Biofilter Media

Media Parameters

Media Component

Stand-Alone Media Mixture

Media Component	Median (microns)	Median Class	Uniformity Coefficient (Cv)	Max. Sediment Accumulation Before Clogging (lbs/sf)
sand	140	fine	6.94	2.33
loamy sand	120	fine	21.11	2.33
sandy loam	40	fine	820	2.33
loam	12	fine	50	2.33
silt loam	4	fine	13.33	2.33
silt	4.3	fine	5.45	1.16
sandy clay loam	54	fine	500	1.16
clay loam	5.5	fine	140	1.16
silty clay loam	2.3	fine	40	1.16
sandy clay	35	fine	78	1.16
silty clay	1.2	fine	24.44	1.16
clay	0.1	fine	80	1.16
fine Rhyolite sand	390	fine	1.87	8.15
fine sand	290	fine	2.86	2.33
filter sand	710	medium	3.71	4.65
coarse sand	2,000	medium	1.69	8.15
gravel	8,350	coarse	1.76	
light media for green roofs	4,175	coarse	1.76	
activated carbon	2,150	medium	2.49	8.84
fine zeolite	740	medium	2.49	6.52
coarse zeolite	3,150	medium	2.04	3.56
compost	750	medium	8	4.65
peat moss	670	medium	10.49	4.65
PSM **				
biochar				
R-SMZ	560	fine	2.07	8.84
R-SMZ-GAC	850	medium	2.09	12.33
R-SMZ-GAC-PM	850	medium	2.2	12.86
Iron fillings 7.5%/Sand	650	fine		
Iron fillings 10.2%/Sand	650	fine		
Kansas City	2,000	medium	40	3.45
Wisconsin 1	400	fine	6	8.15
Wisconsin 2	600	fine	5	8.15
North Carolina	700	medium	6	8.15

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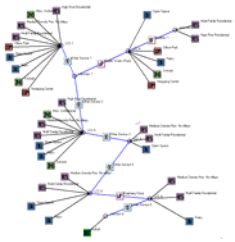

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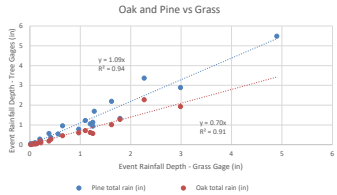
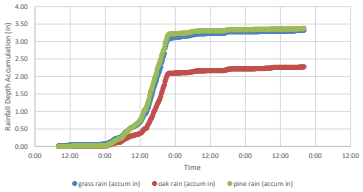
7. Tree Canopy Rainfall Interception

Incorporating Tree Runoff Interception into WinSLAMM





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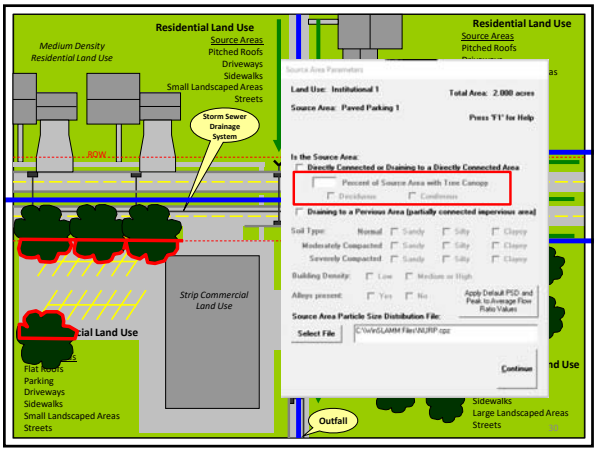

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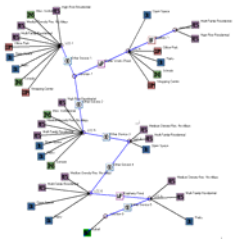

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8. Orifice Discharge Calculations

Low Flow Orifice Discharges

- Orifice outlet intended for drain tile or vertical standpipe discharge, assuming small diameter holes
- Detention pond outlets modelled as large culvert pipes distort device performance because current equations for orifice discharge are higher than they should be for very low water surface elevations

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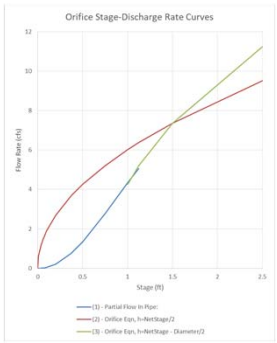
8. Orifice Discharge Calculations



Example Stage-Discharge Curves for a 1.5-ft. Diameter Pipe

Current curve – Red Line

Possible proposed curve – blue/green/red (minimum value)

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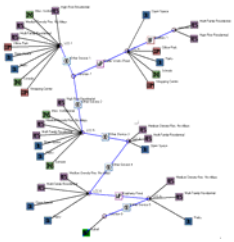

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8. Modeling Issues

Modeling Issues

Municipal Issues

1. Large networks may exceed WinSLAMM processing capabilities – use the new Link File option
2. Credit from private treatment practices allowable if municipalities have authority to require maintenance
3. DNR allows Dry Ponds in WinSLAMM, with reduced performance as determined by the model, so long as:
   1. Inlet energy dissipated
   2. Outlet protected by sediment barrier
   3. No low flow pilot channel
   4. Basin well vegetated
   5. Maximum water surface rise less than 5 ft for 1-yr, 24-hr storm
   6. Basin draws down within 24-hrs for 1-yr, 24-hr storm

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8. Modeling Issues

Site Level Issues

1. Connected vs Disconnectedness. See Post-Construction Modeling Guidance, Items 39 - 43: http://dnr.wi.gov/topic/stormwater/documents/Modeling_Post-Construction_Guidance.pdf
2. Permanent pool of wet detention ponds and effective infiltration areas must be included as a Water Body Area.
3. Source area soil types: A: Sandy, B: Silty, C/D: Clayey.
4. Hard copy submittals should include
   a. Input (use File/Print Input Data menu option)
   b. Output Summary (use Print Output Summary button on Outfall Output Summary tab)
   c. Drainage system diagram

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8. Modeling Issues

Site Level Issues

5. Use Infiltration Rates from SOC Standard 1002, not default values in WinSLAMM.
6. Filter strips are for sheet flow, not concentrated flow.
7. Enter Dynamic, not Static, Infiltration rates for swales and filter strips.
8. Typically enter the wet pond initial elevation equal to the lowest outlet invert elevation.
9. A corollary – the datum is zero and all subsequent elevations use the zero datum.

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8. Modeling Issues

Site Level Issues

10. Infiltration rate for biofilters with engineered media but no underdrain should use lower, native soil, infiltration rate
11. Don't enter an underdrain invert elevation above datum depth that exceeds the 72 hour drain time tech standard criteria for bioretention and permeable pavement systems.
12. Not entering "80" for the biofilter percent solids reduction due to engineered media.
13. Not entering "65" for the permeable pavement underdrain discharge percent TSS reduction.

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8. Modeling Issues

Site Level Issues

14. Proper use of 'Other Device' including Tools-Program Options-Default Model Options check box.
15. Reality check your model, including a review of the 'Control Practice' summary tab for realistic volume and load reductions.
16. The Isolator Row performance is based upon settling in the entire footprint of the device, not just the area of the isolator row chamber.
17. "ProShowCentered in Global_ProcessProcedures" error usually due to mis-matched monitors.

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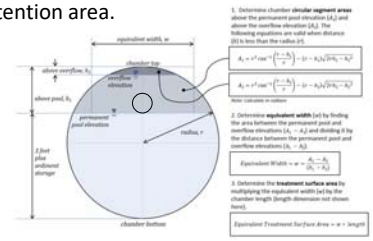
8. Modeling Issues

Site Level Issues

17. Modeling underground storage. Use DNR Guidance (2/2020 EGAD #: 3800-2020-01 WT-19-0023) to convert a circular pipe detention area into a vertical wall detention area.



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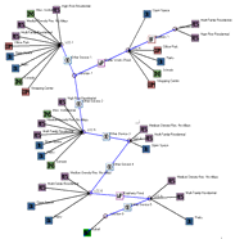

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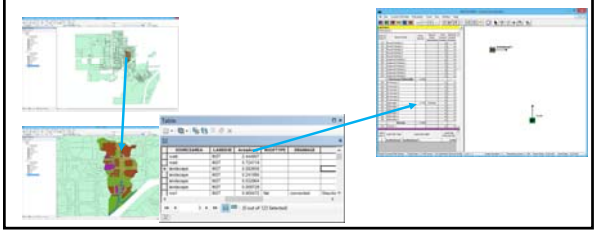
9. ArcSLAMM

ArcGIS and WinSLAMM

A user could use GIS to develop source areas and then manually enter values into the WinSLAMM interface

– This can be extremely time consuming



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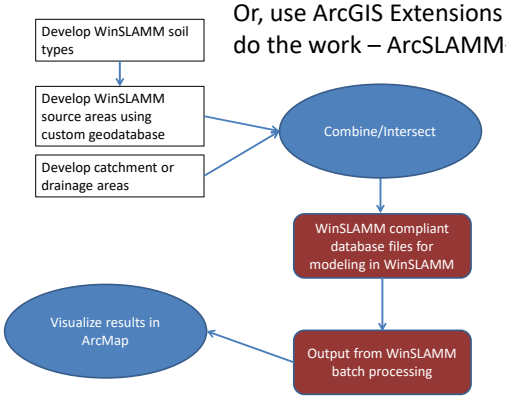
9. ArcSLAMM+

Or, use ArcGIS Extensions to do the work – ArcSLAMM+



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9. ArcSLAMM+

ArcSLAMM+ is Applied Through Standard Land Uses

- Standard Land Uses allows users to utilize more generalized source area spatial data
- Reduces digitization requirements to make it easier to model large areas

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9. ArcSLAMM+

ArcSLAMM+ Status

UNI has developed the databases and tools for the Standard Land Use module in WinSLAMM

- ArcSLAMM for WinSLAMM v 10.3 is available free from the UNI web site, http://www.geotree.uni.edu/extensions/
- A license for ArcSLAMM/ArcSLAMM Plus for WinSLAMM v 10.5 costs $150. It is available from the WinSLAMM web site
- This fee is transferred to UNI to cover the SLU module development costs and to support updates by the UNI GeoTREE Center

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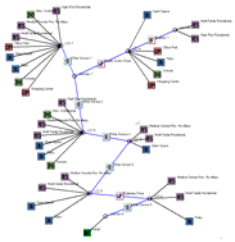

Questions?

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