USDA-ARS multi-location project 464: Impacts of climate change on US agro-ecosystems
The Mahantango Creek Experimental watersheds

Mahantango Creek (1968 – present)

WE-38 watershed (3.5 mi²)

Three climate stations assessed for long-term trends in precipitation and temperature.
WE-38 trends in precipitation

- Historical trend (1968-2010) in precipitation was not significant
- All three emission scenarios suggest significant long-term precipitation increases through 2100

Garbrecht et al. (2013)
• Temperatures significantly increased over the period from 1981 through 2010
• All three emission scenarios suggest significant long-term temperature increases through 2100
Multi-state comparison & upgrades of P Indices: using field, watershed, and model data

- 6 land grant universities
- 10 state agencies
- Conservation districts

Chesapeake Component

2011 Revised NRCS Nutrient Mgmt. Standard
- USDA national initiative to inform local efforts
- Regional projects will result in changes in P Index and state nutrient management planning

- 6 land grant universities
- 10 state agencies
- Conservation districts
Mean surface runoff: *P conc. & flow*

- **big P loads from small places**
- **runoff timing is not uniform**

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**== > can we improve model simulations? BOTH spatial & temporal**
Incorporating latest model improvements

Modified

Standard
Database for long-term WE-38 watershed data: *STEWARDS, data papers, management surveys*

**Climate**
- Precipitation
- Maximum temperature ($^\circ$C)
- Minimum temperature ($^\circ$C)
- Solar radiation (MJ/m²)
- Relative humidity (%)
- Wind speed (m s⁻¹)

**Elevation**
- 5 m and 30 m DEMs from recent LiDAR

**Soils**
- SSURGO, STATSGO or any better soils data

**Land Use**
- Crop management
- Crop yield
- Tillage
- Fertilizer
- Pesticide

**Hydrology**
- Runoff at outlet
- Upstream runoff

**Water Quality**
- Sediment
- Dissolved reactive phosphorus
- Orthophosphate
- Total phosphorus
- Total nitrogen
- Organic nitrogen
Organizing management surveys into a searchable database
Smallest Field Unit
1. Spatial information (.shp file)
2. Unique Field Unit Identification*
3. Farm ID
4. Operator ID

*Each spatial unit is a single row

Crop Data
1. Unique field unit ID
2. Farm ID
3. Crop type
4. Planting date (Start/end date)

Multiple crop planting possible: the same field with different plantings will be contained in different rows, the date differentiates the rows

Harvest Options Data
A. Harvest only, B. Harvest/kill or C. Kill only*
1. Unique field unit ID
2. Farm ID
3. Harvest date
4. Yield information

*Three tables will be necessary to store the different harvest options. Each table would include similar information

Fertilizer Application Data
1. Unique field unit ID
2. Farm ID
3. Fertilizer Name
4. Fertilizer application method
5. Fertilizer application rate
6. Start/End
7. Remarks

Multiple fertilizer applications in a single field recorded in different rows. Date differentiates rows for single field.

Tillage Data
1. Unique field unit ID
2. Farm ID
3. Tillage Method
4. Spacing
5. Max Plow Depth
6. Start/End
7. Remarks

Multiple tillage operations in a single field recorded in different rows. Date differentiates rows for single field.
Pasture Systems and Watershed Management Research Unit

University Park, Pennsylvania

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