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Iowa Urban FEWS - OVERVIEW

The project is focused on **developing sustainable food production systems** in the Des Moines–West Des Moines, IA Metropolitan Statistical Area (DMMSA). Multiple models are being integrated to evaluate the impact of converting cropland, peri-urban and/or urban landscapes to table food production, in DMMSA transboundary and urban subareas.

SWAT model application

A multi-phase testing approach was created to **establish accurate hydrologic representation** of baseline conditions across three drain parts of north central and central Iowa, U.S.: Des Moines River (DMRB), South Skunk River (SSRB), and North Skunk River (NSRB).

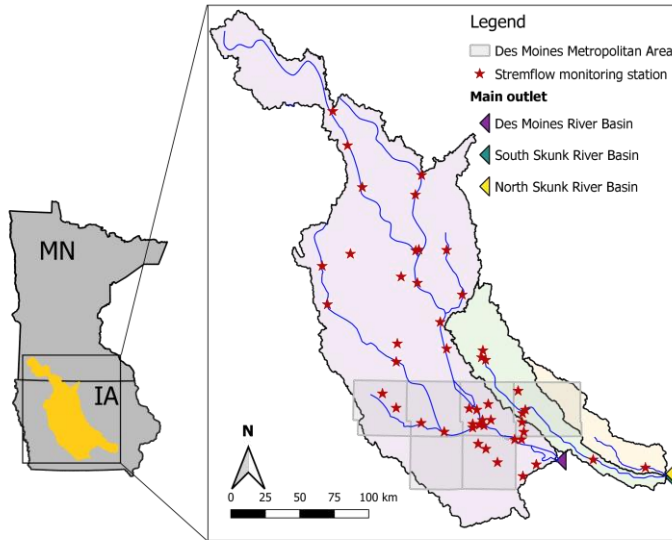


Figure 1 - Study area location and streamflow monitoring gauges distribution.

- Alternative runoff curve number (RCN) method [2,4,6,8,10]
- Management data [5,6,9,10]
- Tile-drain map [3,4,5,6,7,8,9,10]

- HAWQS [1,2,3,4,5,6]
- Land use
- Soil type
- Topography
- Weather data



40 streamflow monitoring stations

Model evaluation

- Outputs
- Streamflow
- Crop Yields

- Importance of **tile drain locations**, density and parameters
- Impacts of different **surface runoff methods** calculation on the water balance
- Effects of **N fertilizer applications** on corn biomass and yields production
- Evaluate the **spatial efficiency** of SWAT model

Time of the Year	Crop Rotation	Ap. Rate (kg/ha)
Fall	Corn-soybean	183
Spring	Corn-soybean	172
Spring	Cont. corn	196

Table 2 - Annual Elemental Nitrate application rates on corn.

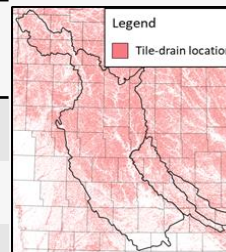
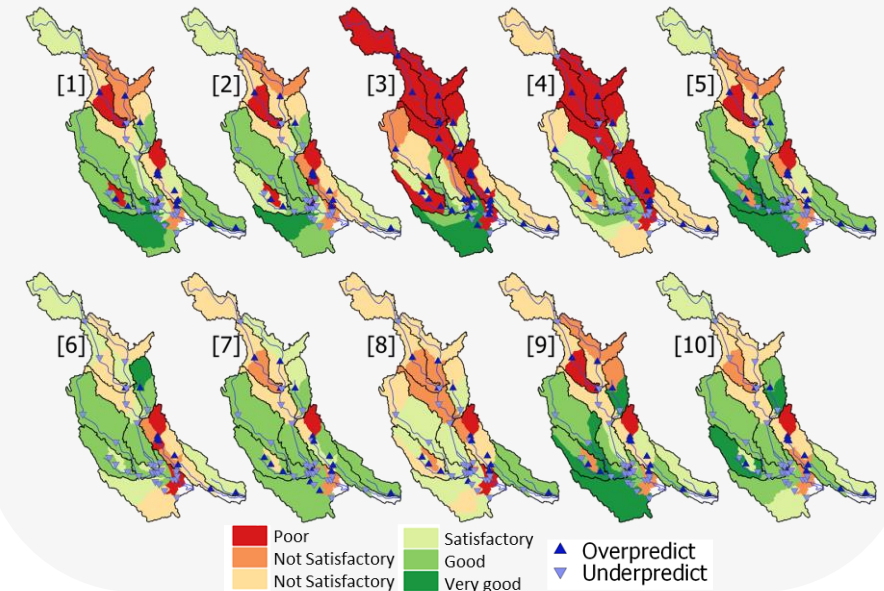


Figure 3 - Tile drainage spatial distribution.

10 baselines analysis

- Water balance check
- Simulated crop yields comparison with USDA Census Survey
- Statistical coefficients to evaluate streamflow (volumes, peaks, averages)
- Separated time-series analysis (snowmelt and growing season)

- Baseline 8 shows more agreeable ratios for baseflow and surface runoff.
- Baselines with fertilizer application update present closer values to the USDA Census Survey for DMRB and SSRB.
- Baseline 9 had better performance for DMRB and baseline 7 for the Skunk System (NS median values).
- The spatial variability increases the model performance confidence.
- The baseline 9 accumulated the most significant amount of good statistical results.
- The model performed better in the high flow segment (95%).
- The 10% of low flows were underestimated for all baselines at DMRB, and overestimated at NSRB.
- Tile drain map increase in general model performance.



- Poor
- Not Satisfactory
- Not Satisfactory
- Satisfactory
- Good
- Very good
- Overpredict
- Underpredict