Picayune Strand Restoration GSSHA H&H Model

Coupled Surface/Groundwater Model Calibration using ERDC's HPC System

July 22, 2021

sfwmd.gov

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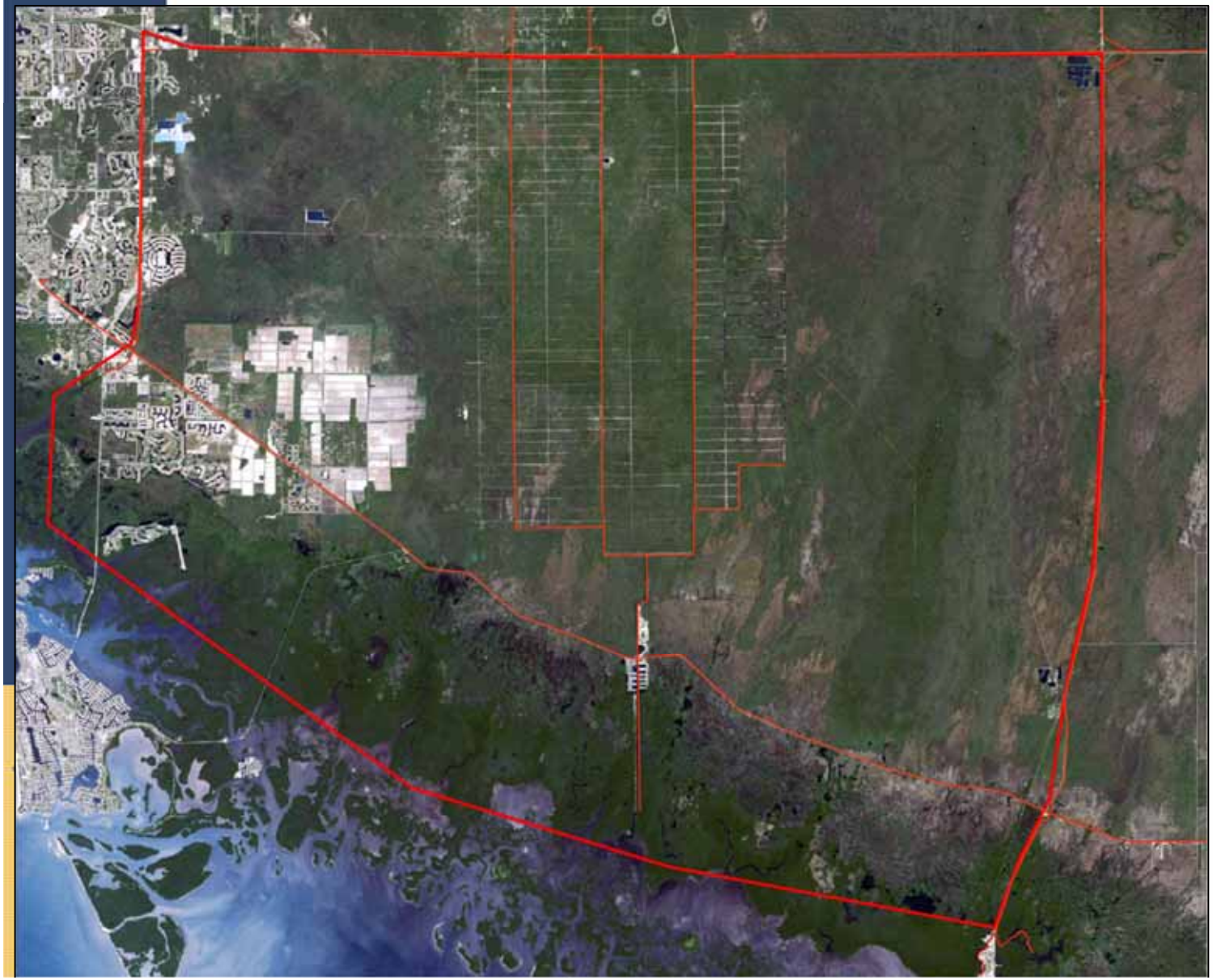
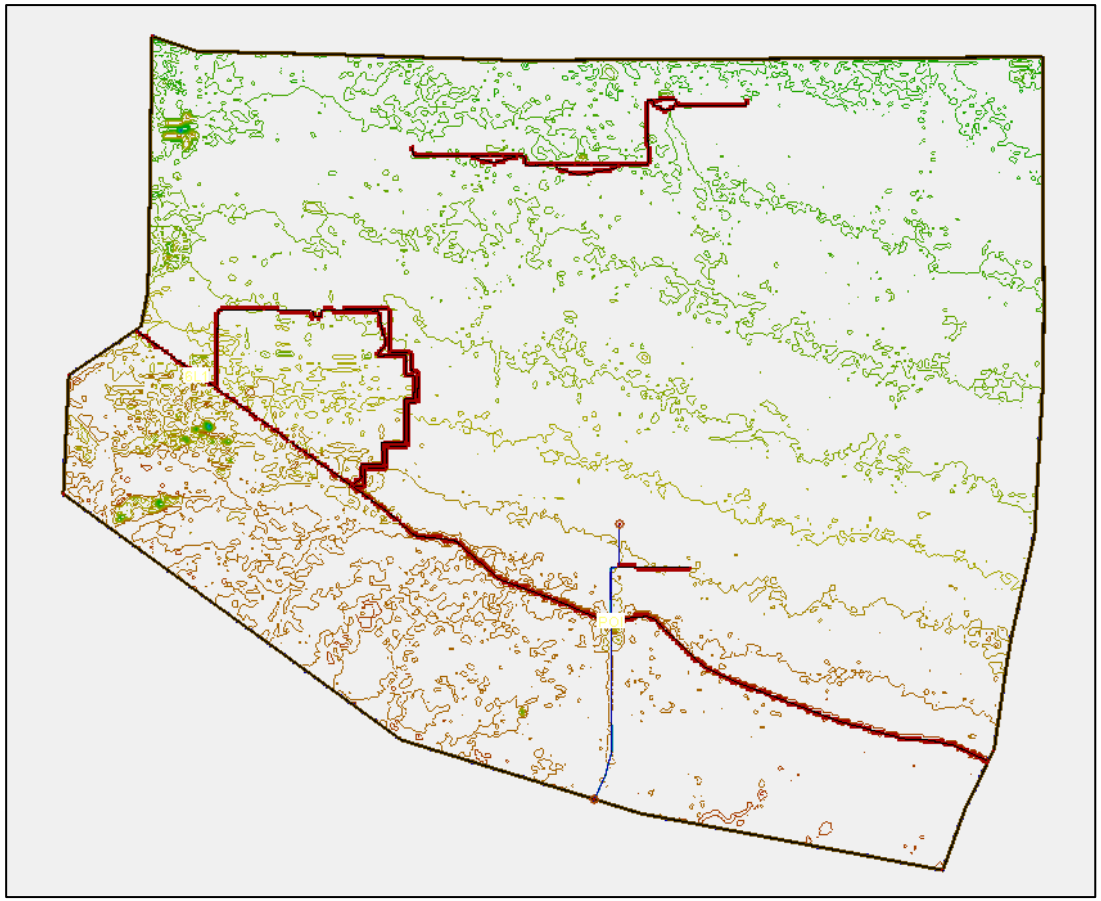
Model Domain and Features



PSRP Coupled GSSHA Model



- 925 sq. Km
- 266x300 grid
- 120m cell size
- Simul Processes
  - Overland RO
  - GW flow
    - Sat/Unsat
  - Infiltration
  - Interception
  - Evapotrans
  - Time-varying BC (i.e. Tide)

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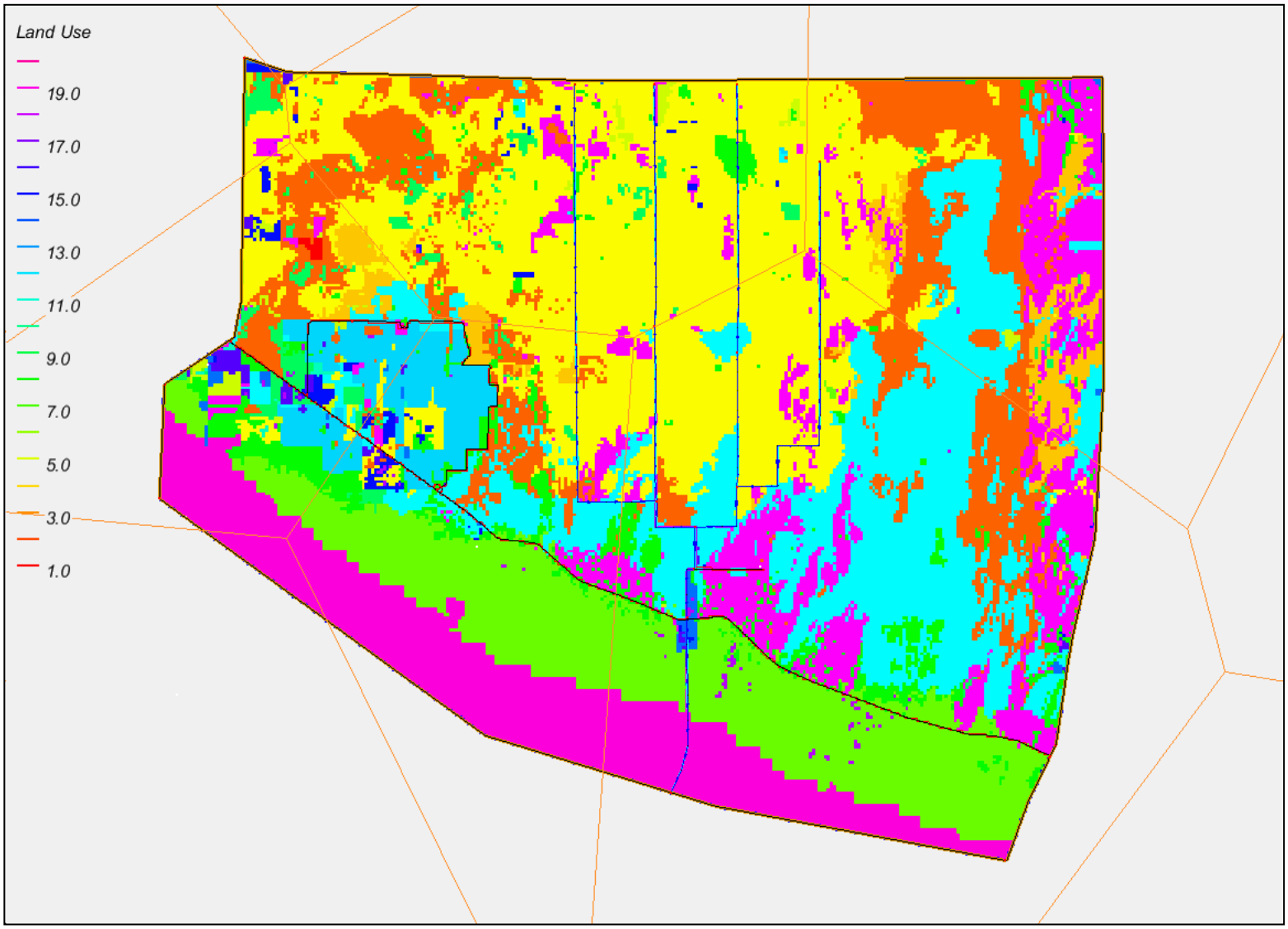
Land use based: Manning's n; ET; Interception



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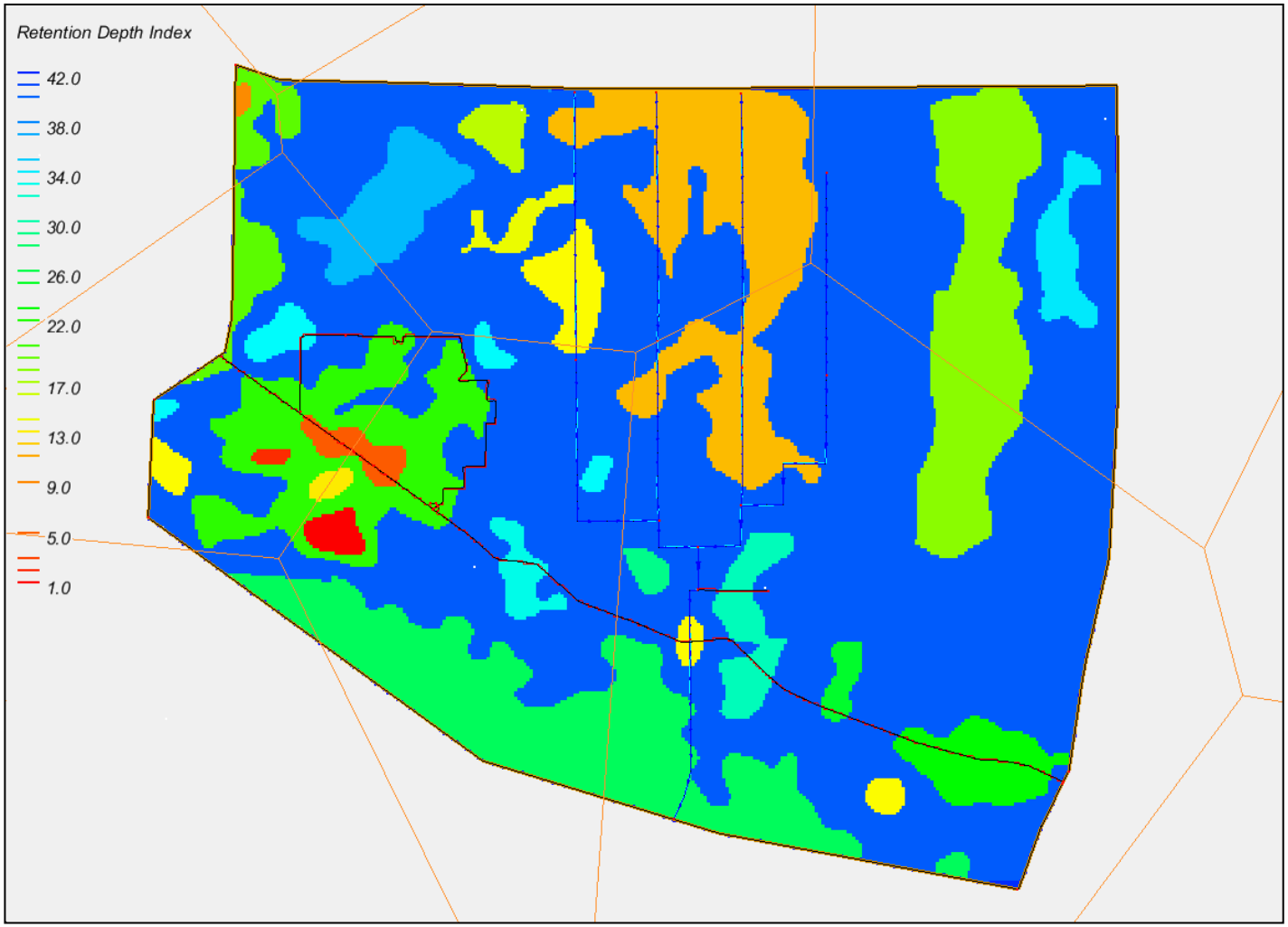
Retention polygons



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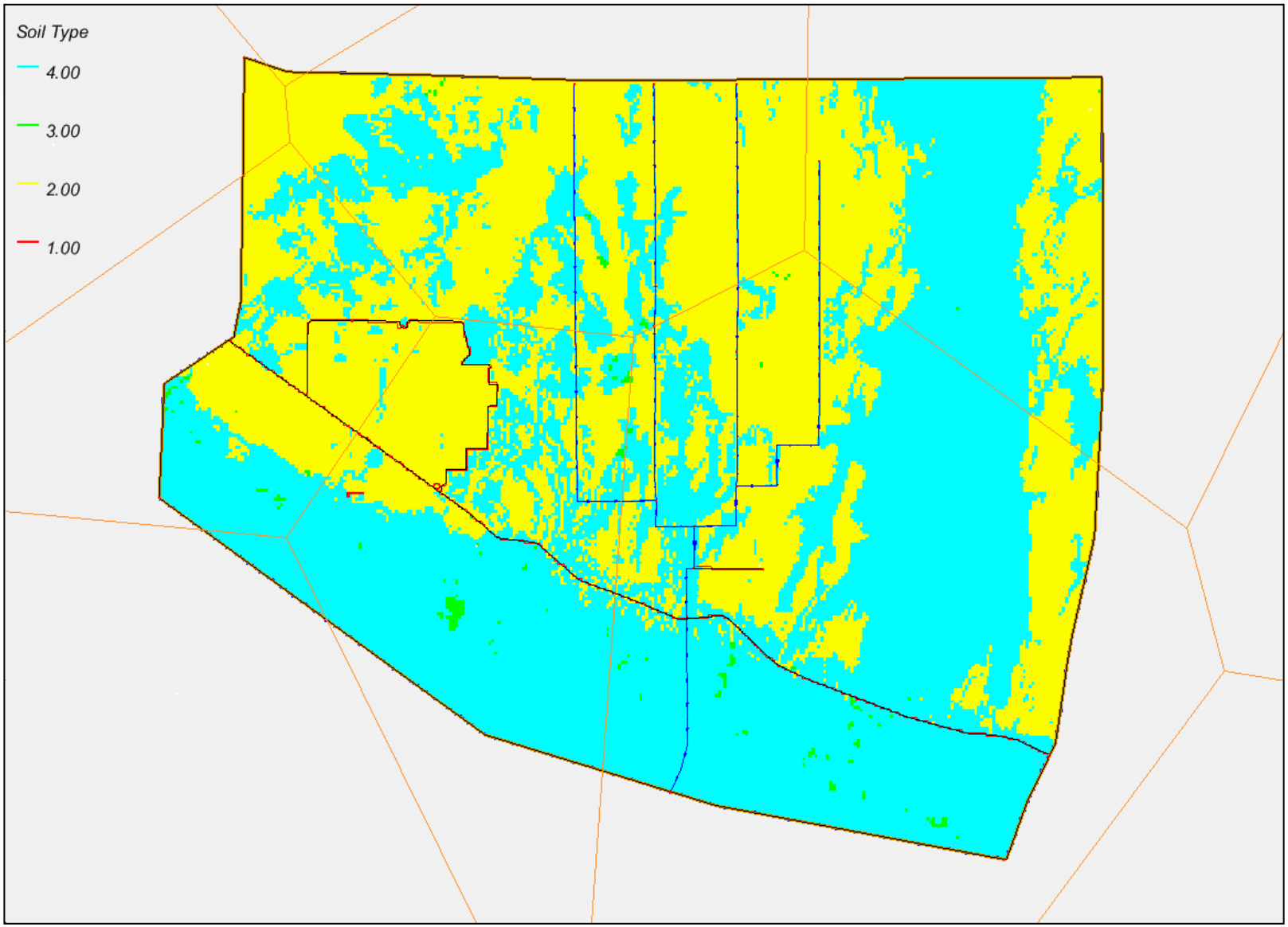
Soil type coverage (infiltration model)



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K field

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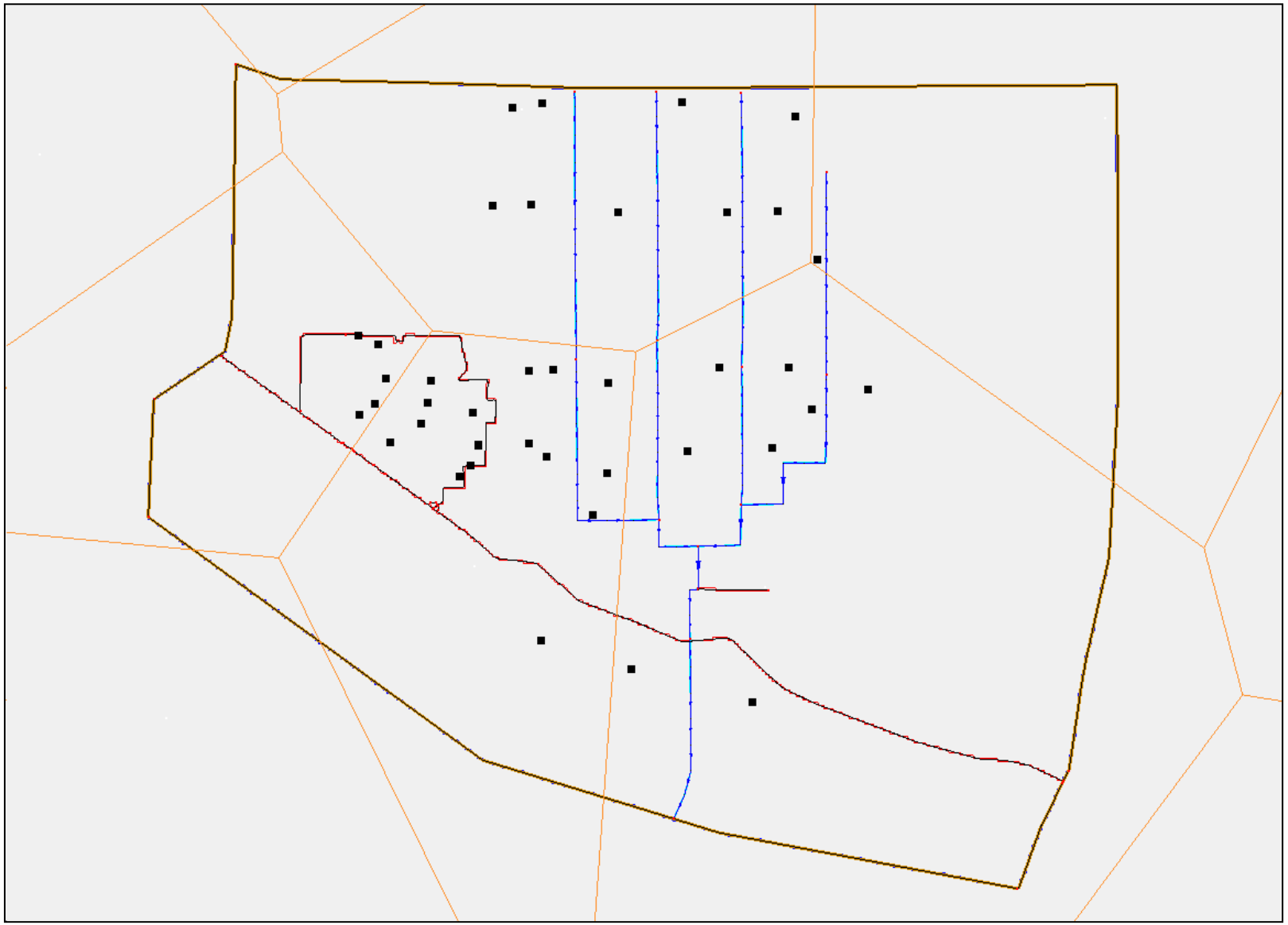
Other parameters

- Channel System/Groundwater interaction
  - K sediments
  - Sediment Thickness
- Soil column depth
- Initial moisture content

Observation Wells



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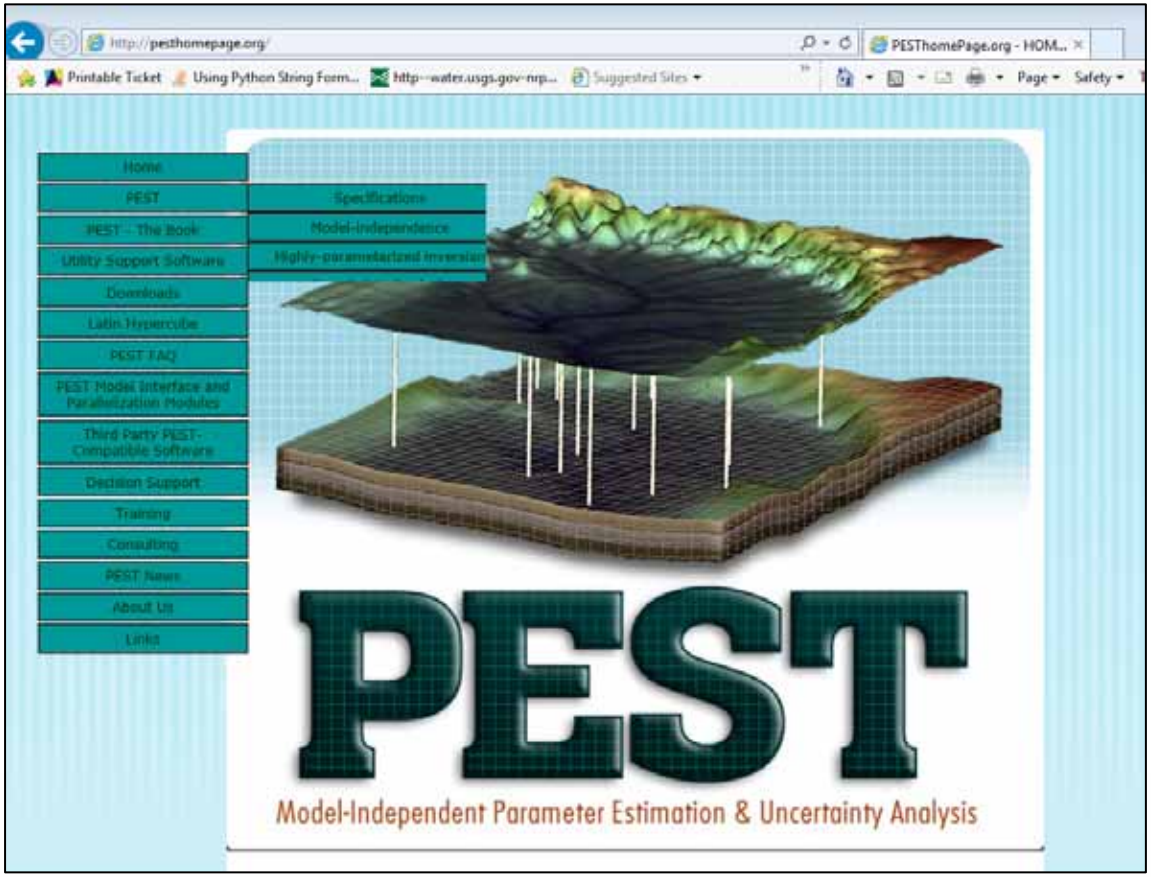
Model Calibration Set-up



- **Beo-PEST**
  - **234 par**
  - **13mo – daily obs**
- **ERDC's HPC ONYX**
- **Model run time ~ 4hrs**

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Model Calibration Using PEST in HPC

- **Get HPC account**
  - **USACE district staff = time consuming and painful!!!!**
    - **ACE-IT security issues**
  - **Compatibility with ACE-IT Software**
  - **KERBEROS kit.**
  - **Dave Dumas = Extremely helpful!!!!!**
- **PEST**
  - **Develop template directory, input files and set-up**
  - **Decide communication protocol between slaves and master**
    - **In HPC MPI/OpenMP preferred over TCPIP**
  - **TESTING**
    - **Do it in qsub interactive mode using the “debug queue”**

PBS - Script

```
#!/bin/bash

#PBS -V
#PBS -N PSRP_Calib_Long
#PBS -q standard
#PBS -A ERDCV00898ENQ
#PBS -l select=84:ncpus=36:mpiprocs=3:ompthreads=11
#PBS -l walltime=144:00:00
#PBS -j oe
#PBS -m be
#PBS -M Jaime.A.Graulau-Santiago@usace.army.mil

export MPICH_ENV_DISPLAY=1

cd $PBS_O_WORKDIR

# turn on debugging output
set -x

#module load ad mpi-sgi/mpt
#export OMP_NUM_THREADS=11
KMP_AFFINITY="disabled"

mpiexec_mpt -np 252 omplace -vv /p/work1/jgraulau/bin/ppest_beo ${PBS_O_WORKDIR}/PSRP_Calib_Long /M /p/work1/jgraulau/test_ /p1
~
```

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Take Home notes

- **RE-Compile EVERYTHING in HPC (e.g. ONYX)**
- **TESTING/De-bugging**
- **Interactive mode “short” runs**
- **PSRP Model Calls: ~7500**
- **Many others!!!**

Hands on Exercise

- **Calibration of a PSRP model for 5 parameters**