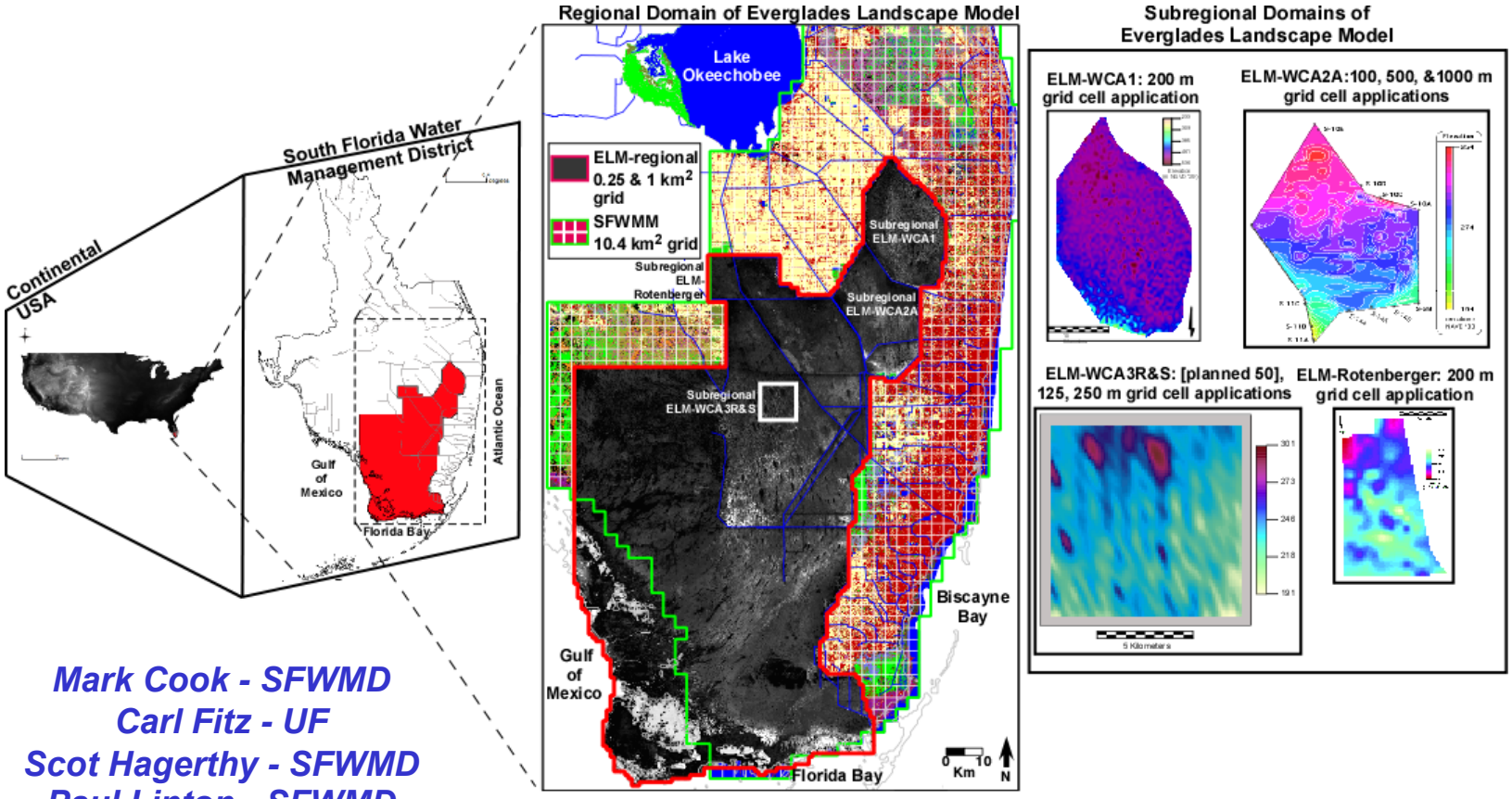
Ecological Landscape Modeling
in support of Everglades WCA-1 restoration



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ELMwca1 application

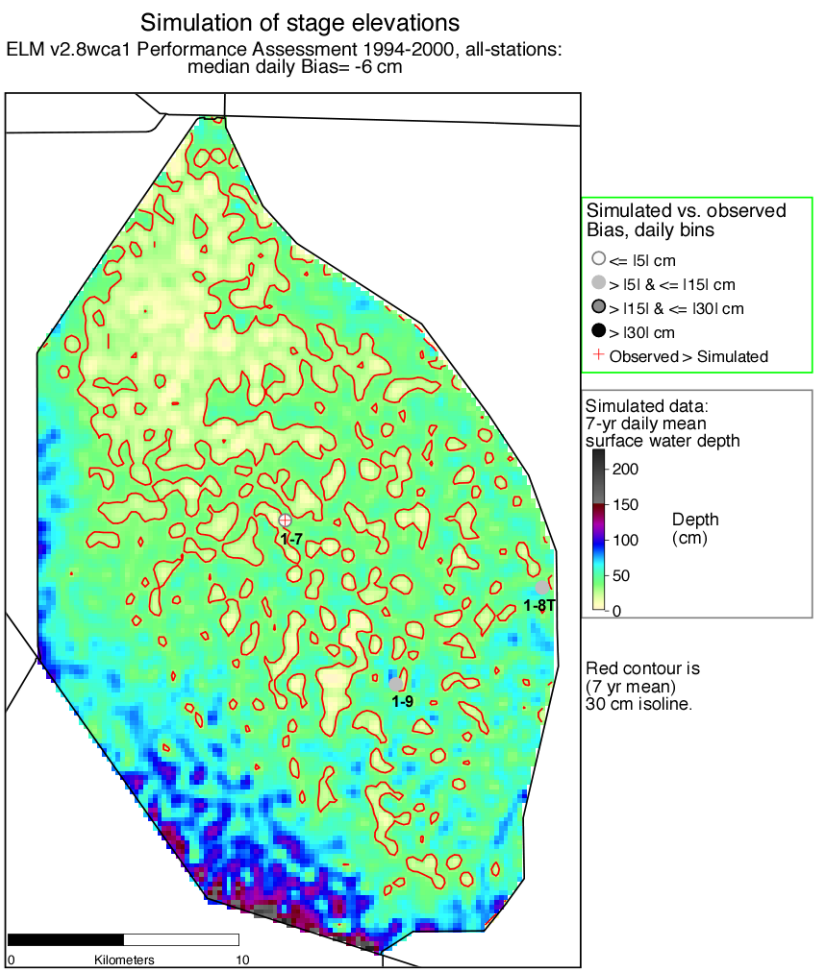
1. Model overview
2. Round 1 scenarios
3. Round 2 scenarios
4. Recommendations

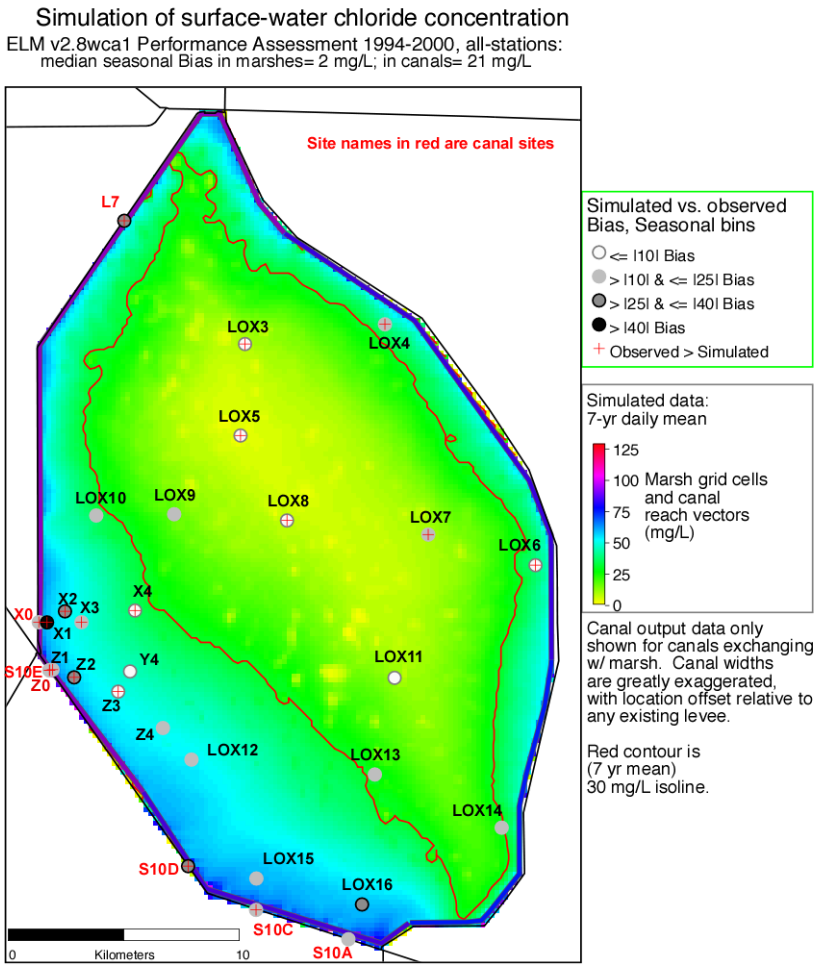
Goals in ELMwca1 application in support of WCA-1 restoration

Develop a modeling tool for integrated ecological assessment of water management scenarios for Everglades restoration

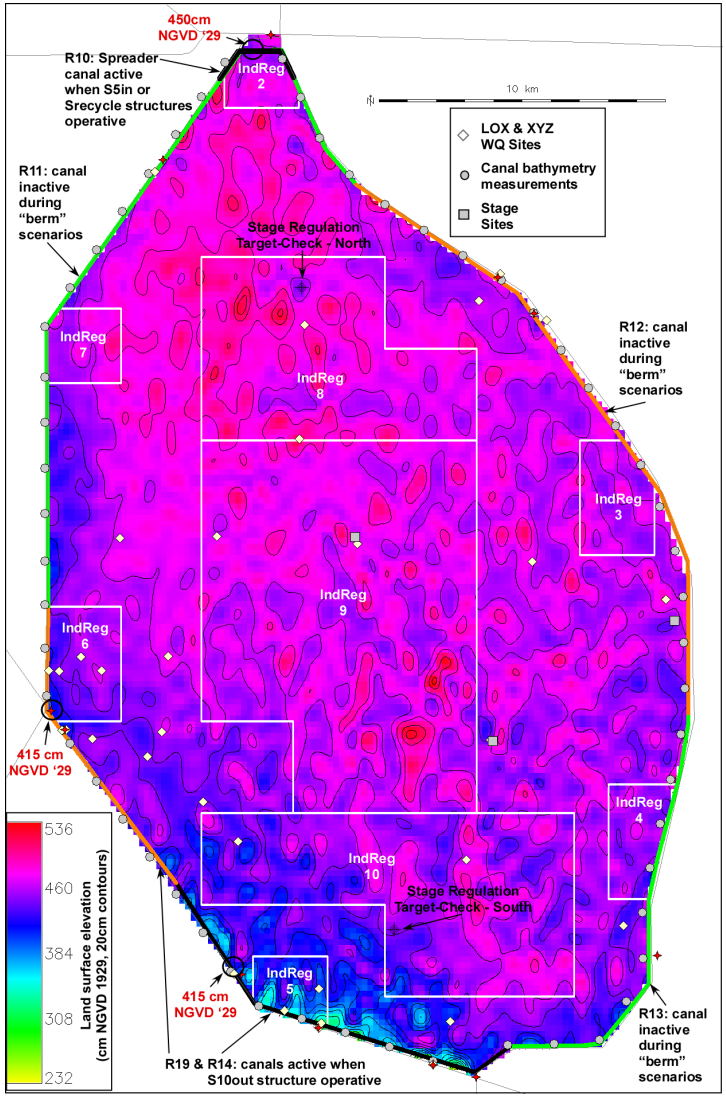
- **Develop restoration scenarios for Water Conservation Area 1**
- **Integrate hydrologic and water quality Performance Measures**
- **Evaluate water and nutrient management scenarios, to:**
  - **Achieve NSM-like depths**
  - **Minimize gradient of dry in north, deep water in south, establish flowing system**
  - **Minimize (towards background levels) chloride and phosphorus in system**

History-matching performance of ELMwca1 v2.8, 200m app





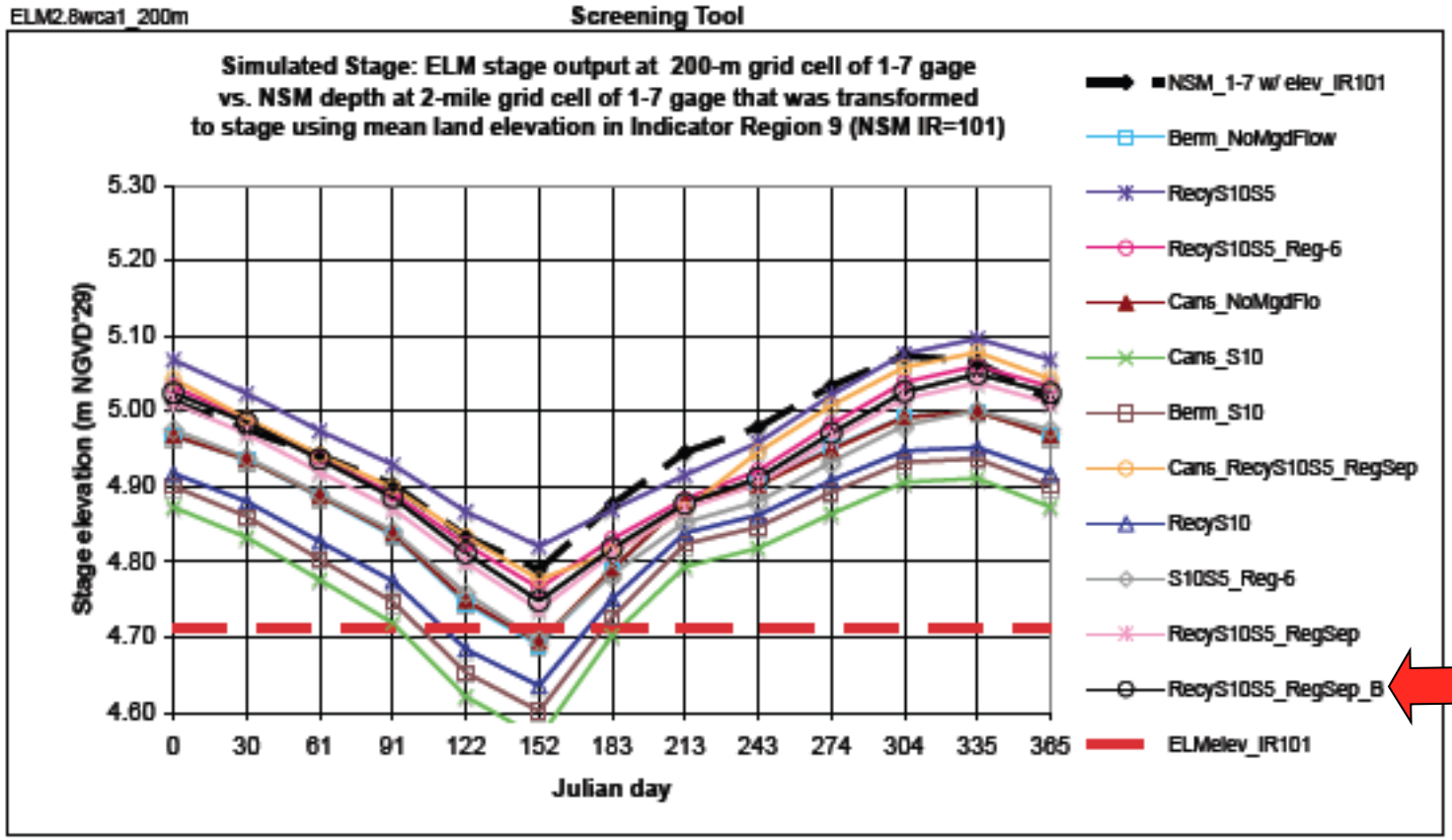
Alternative scenarios: landscape configuration



ELMwca1 application

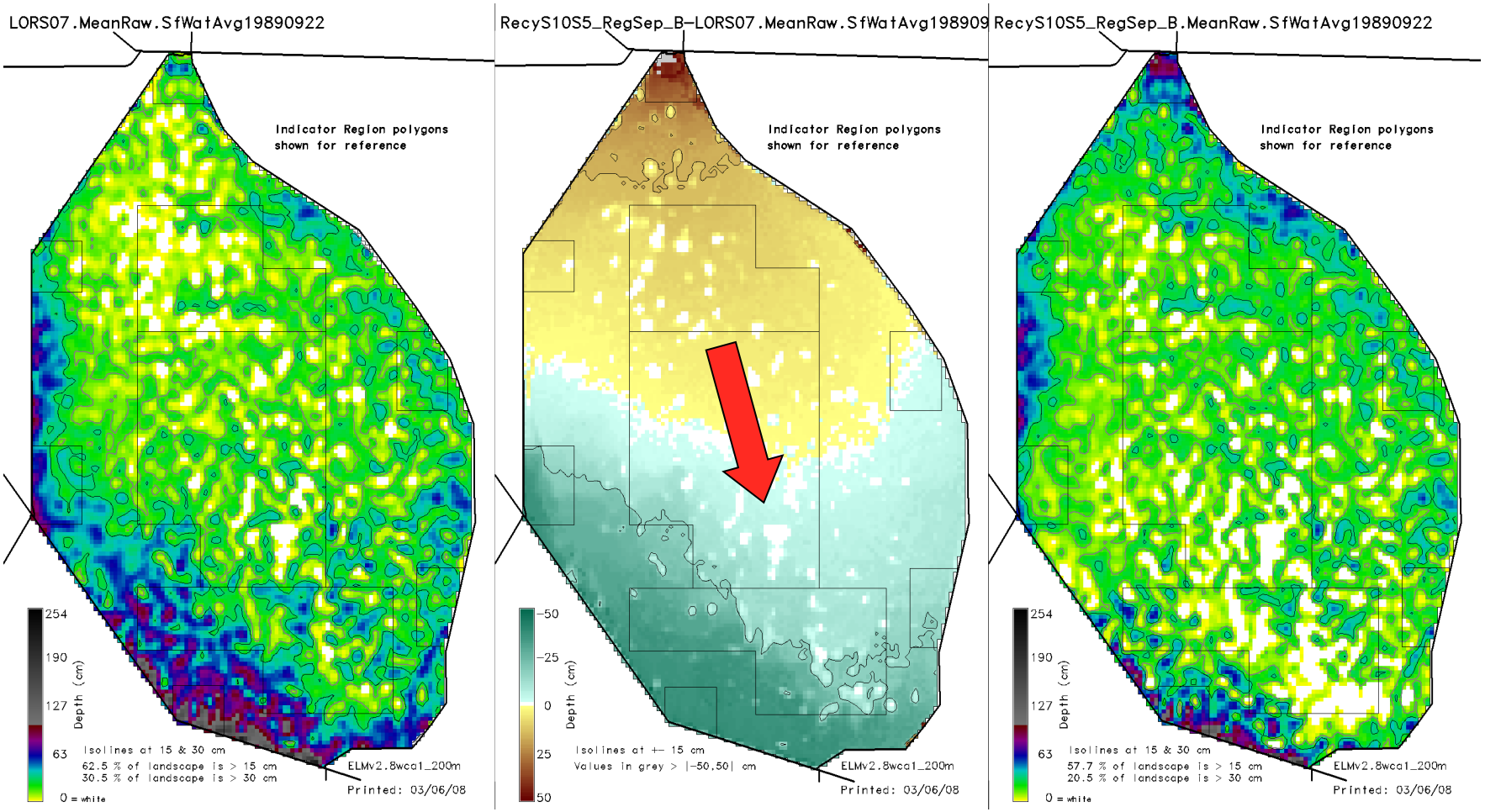
1. Model overview
2. Round 1 scenarios
   - ❑ 26 Performance Measures
   - ❑ 12 Alternative scenarios
     - No LEC water supply in Alts (but in LORS07 Base run)
     - Considered range of novel options, including rainfall-only system, removal of canals, "recycling" water
   - ❑ "Best" Alternative:
     - met hydrologic restoration target(s)
     - improved water quality, but did not meet all targets
3. Round 2 scenarios
4. Recommendations

Alternative scenario results:
"Best" Alt: stage similar to NSM



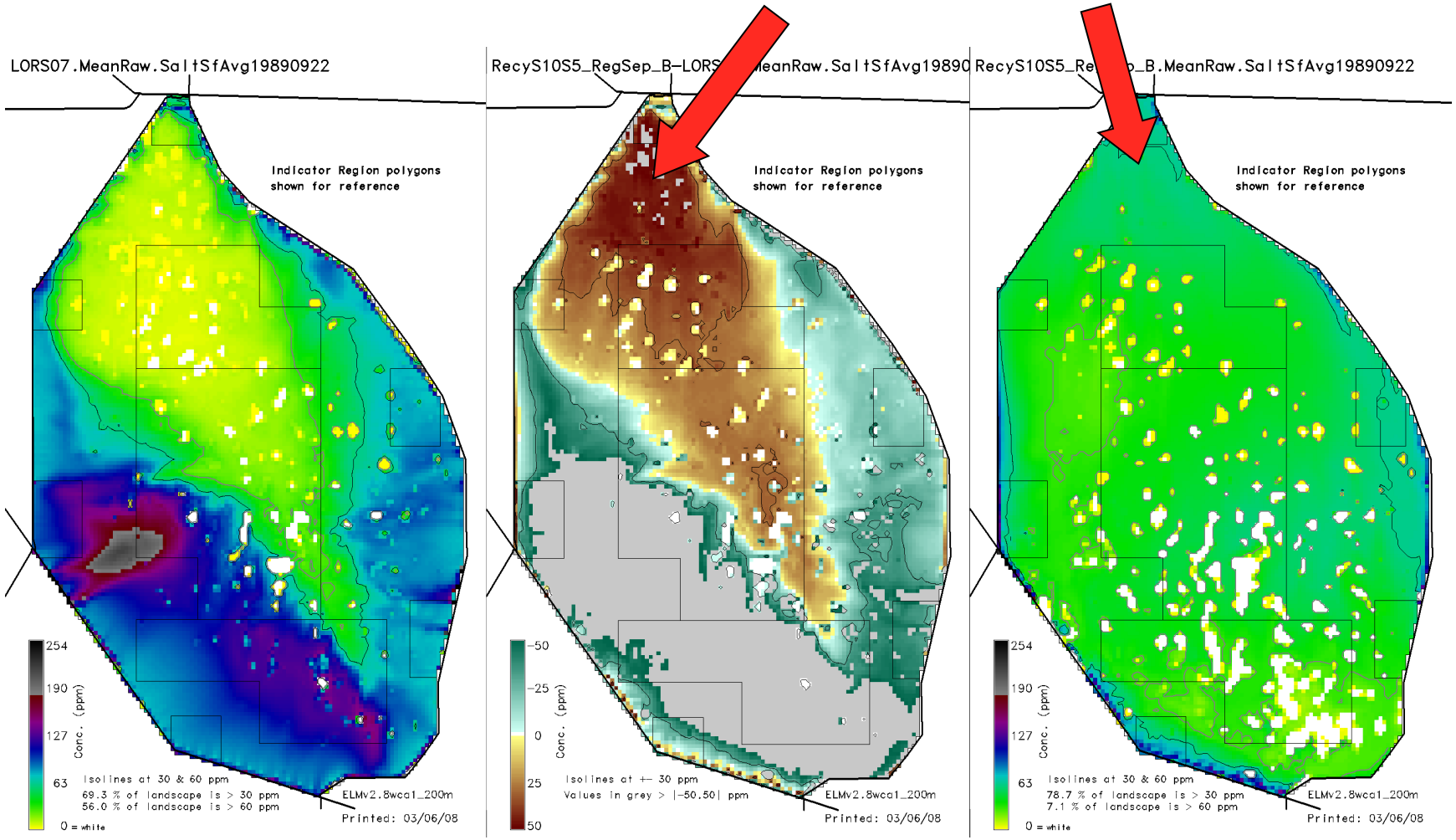
"Best" scenario

Alternative scenario results: "Best" Alt: "leveled" out depths (N-S), with a flowing system



Base: LORS07 | **Difference: "Best"-LORS07** | **Round 1 "Best"**

Alternative scenario results:
"Best" Alt still had a bit of a chloride issue

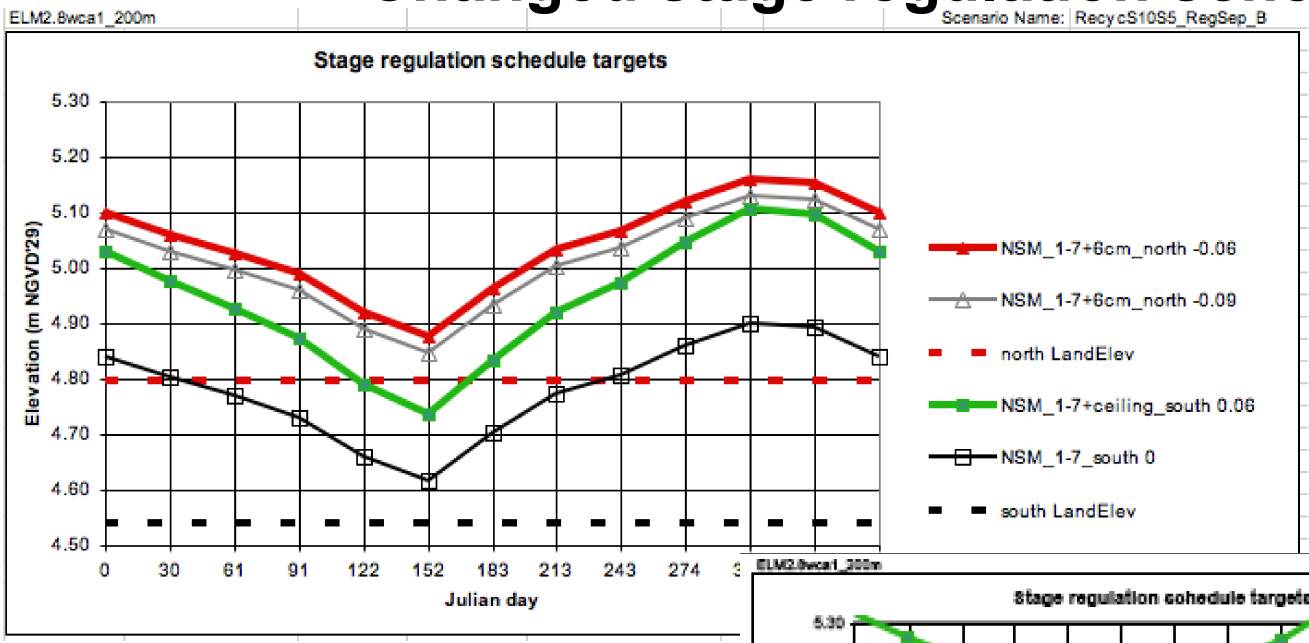


Base: LORS07 **Difference: "Best"-LORS07** **Round 1 "Best"**

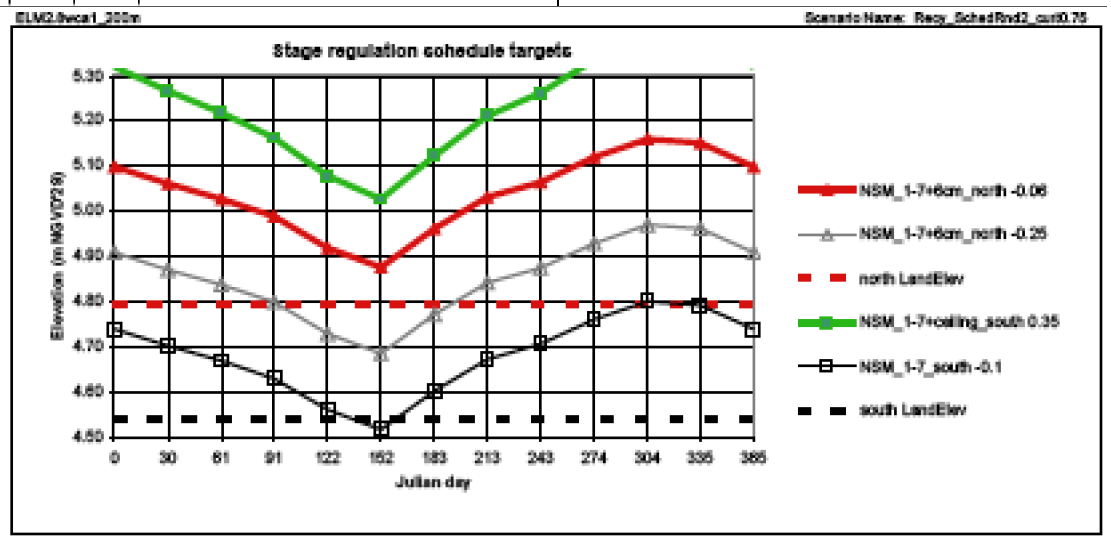
ELMwca1 application

1. Model overview
2. Round 1 scenarios
3. **Round 2 scenarios**
   - ❑ **7 additional Alternative scenarios**
     - **Tweaked Regulation Schedules**
     - **Reduced groundwater losses**
   - ❑ **"Best2" Alternative:**
     - **met hydrologic restoration target(s)**
     - **met water quality targets**
4. Recommendations

Round 2 Alternative scenarios: Changed stage regulation schedules

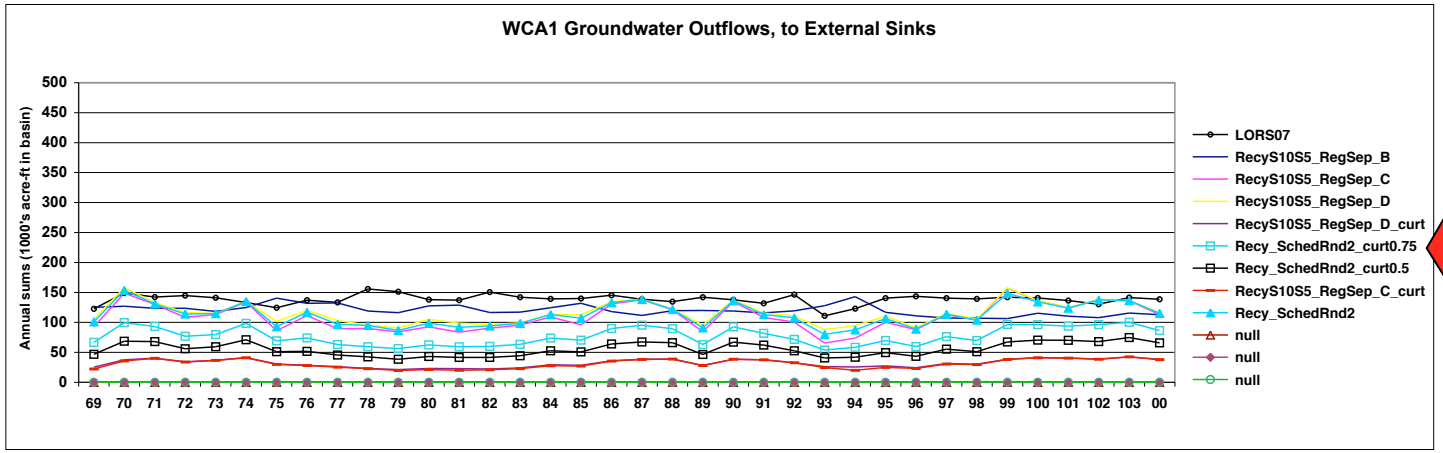


Round 1 "Best" Alt



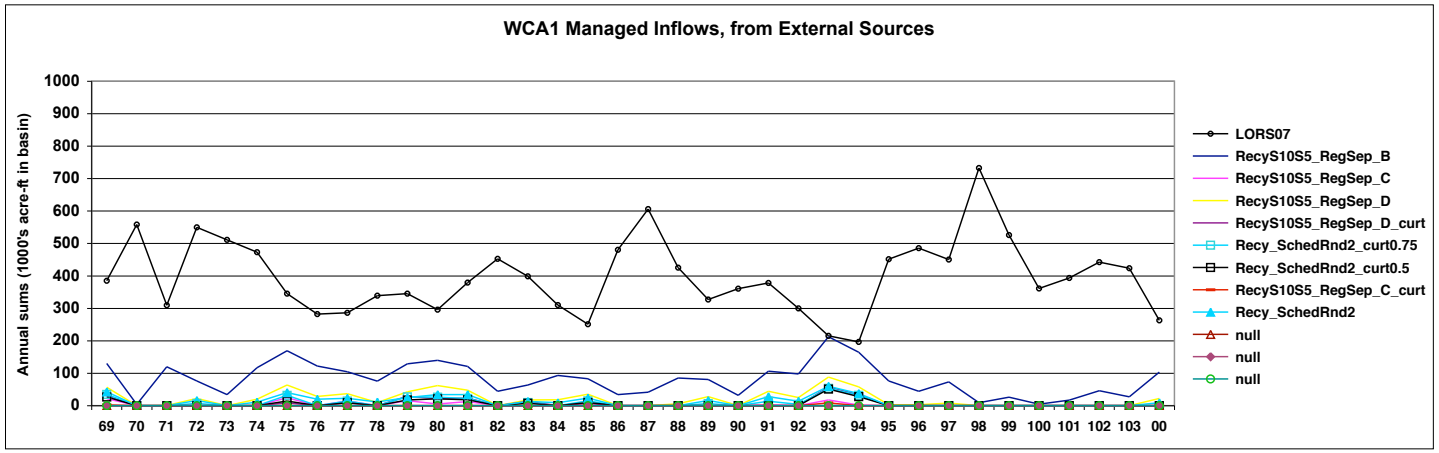
Round 2 "Best2" Alt

Round 2 Alternative scenario results: Reduction in groundwater losses



"Best2" Alt

Managed inflows shown for relative comparison to groundwater losses



Round 2 Alternative scenario results: Managed flow summaries (into, out-of, recycle)

Table: Managed flow summary. *ELMwca1_200m*

Scenario	Mean annual sums, thousands acre-ft Basin_IN	Basin_OUT	Recycle
LORS07	397	329	N/A
Cans_NoMgdFlo	0	0	N/A
Cans_S10	0	65	N/A
Berm_NoMgdFlo	0	0	N/A
Berm_S10	0	47	N/A
RecyS10	0	33	78
RecyS10S5	170	105	92
RecyS10S5_Reg-6	125	82	58
RecyS10S5_RegSep	89	60	70
Cans_RecyS10S5_RegSep	960	904	379
S10S5_Reg-6	165	115	N/A
RecyS10S5_RegSep_B	81	43	72

Round 1 "Best" Alt

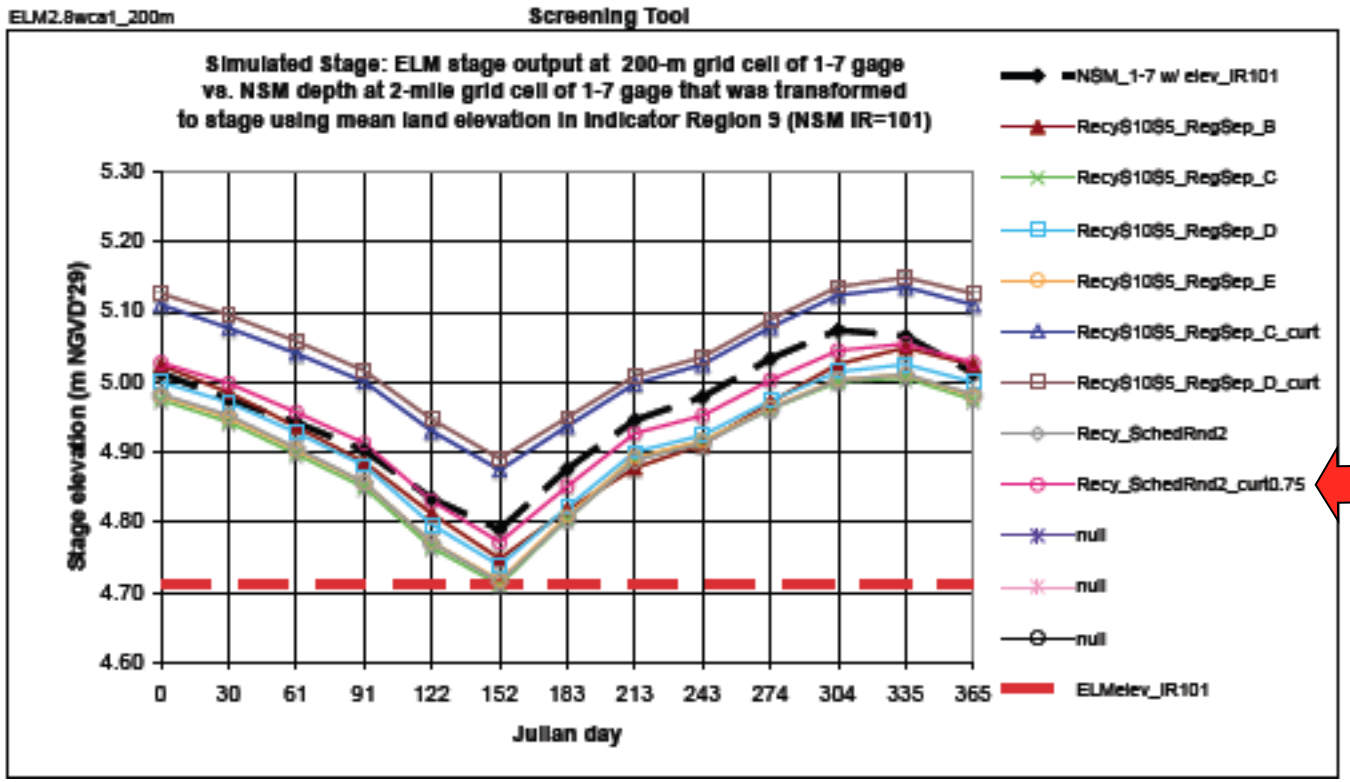
Round 1

Scenario	Mean annual sums, thousands acre-ft Basin_IN	Basin_OUT	Recycle
LORS07	397	329	N/A
RecyS10S5_RegSep_B	81	43	72
RecyS10S5_RegSep_C	3	2	124
RecyS10S5_RegSep_C_curt	0	18	97
RecyS10S5_RegSep_D	21	2	129
RecyS10S5_RegSep_D_curt	6	18	99
Recy_SchedRnd2_curt0.75	8	6	78
Recy_SchedRnd2_curt0.5	6	11	75
Recy_SchedRnd2	13	2	87

Round 2 "Best2" Alt

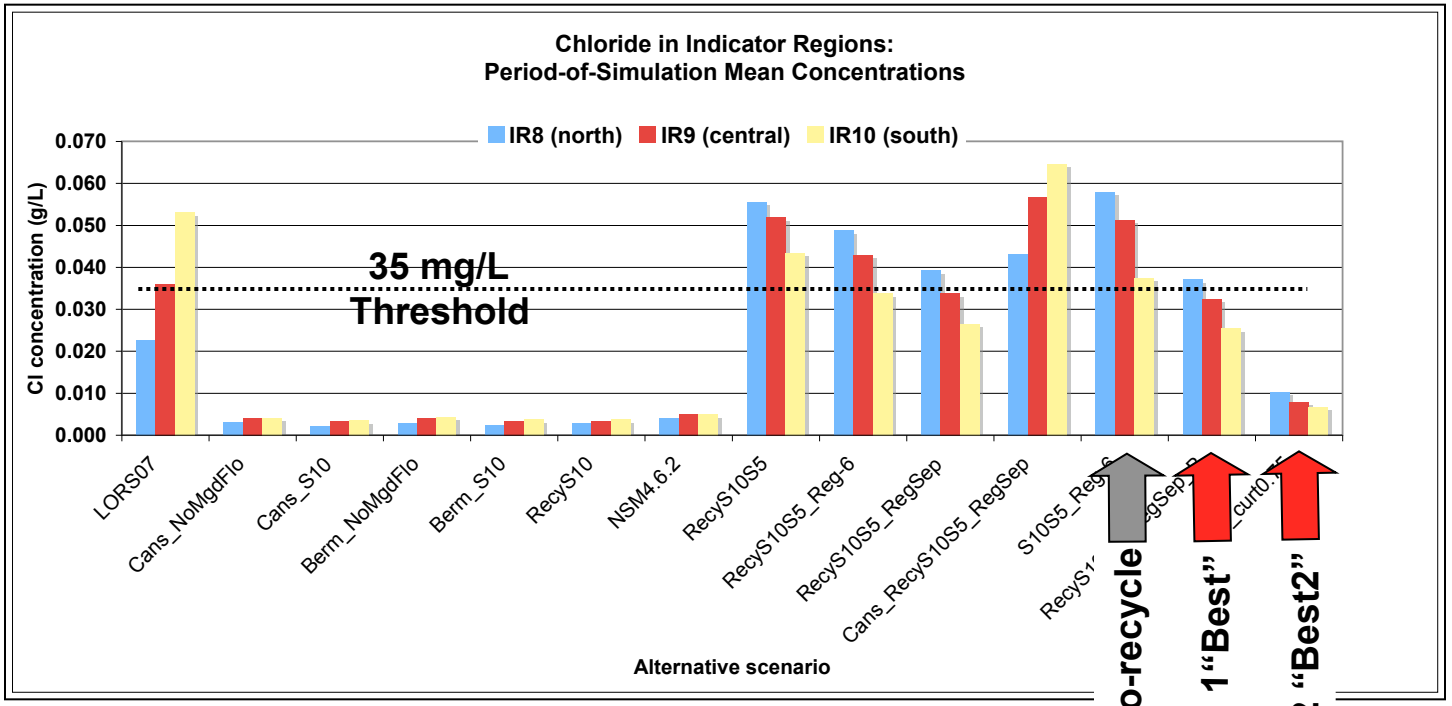
Round 2

Round 2 Alternative scenario results: "Best2" Alt: stage similar to NSM



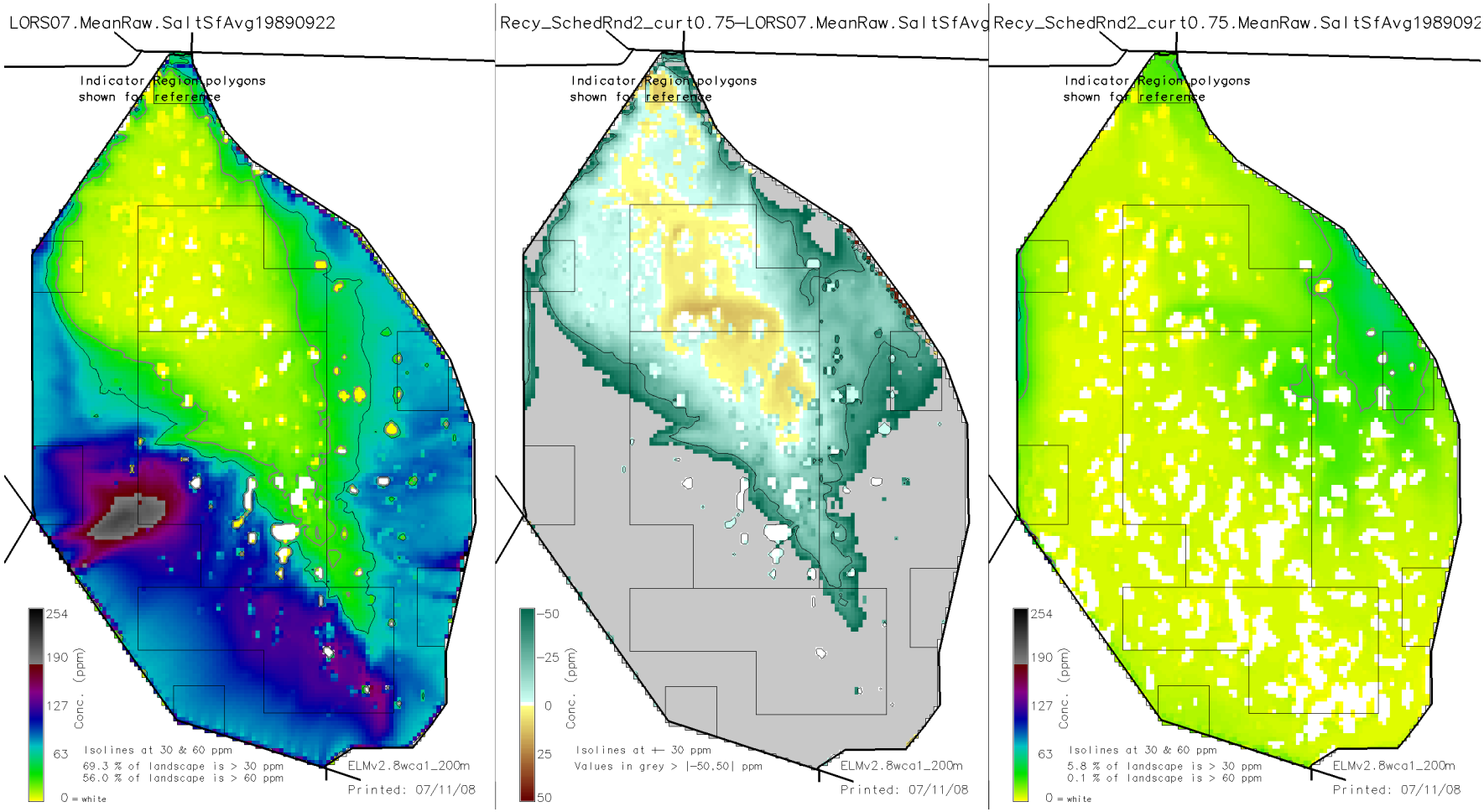
"Best2" Alt

Round 2 Alternative scenario results: "Best2" scenario, chloride issue ~gone; no-recycle Alt had excessive chloride



Threshold: native periphyton lost ~instantaneously above 35 mg/L; thus, mean concentration should be << 35 mg/L

Round 2 Alternative scenario results: “Best2” scenario, chloride issue ~gone



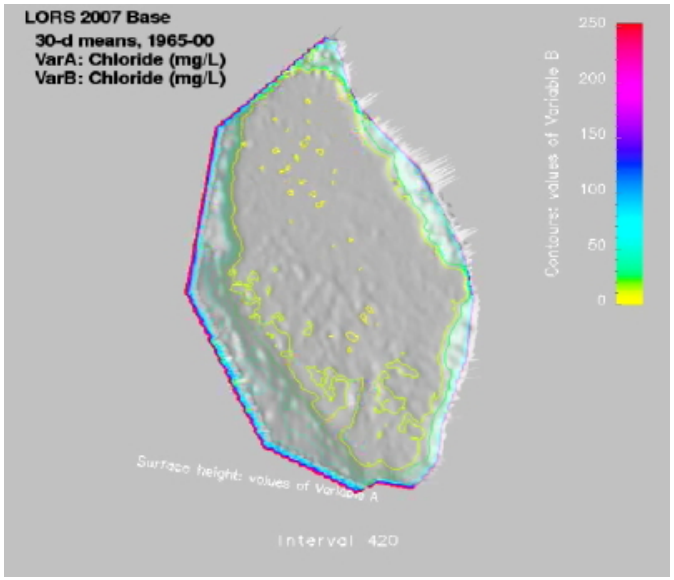
Base: LORS07 **Difference: “Best”-LORS07** **Round 2 “Best2”**

Recommendations from ELMwca1 application in support of WCA-1 restoration

- Backfill most of perimeter canal (or explore plugs)
- Configure south - to - north “recycling” water management infrastructure
- Use new schedule to
  - § Restore natural hydropattern, with a flowing system
  - § Alleviate existing water quality problems
- All models are uncertain, to be used in an adaptive framework

Visualize Spatial-Temporal Dynamics of Integrated Hydrology & Ecology

- **<u>Explore</u> 3D animations of simulations, with visualizations of integrated velocity, chloride, and water depth**



Will provide Quicktime mpg (not avi) movie or two;
These may not run within PowerPoint, so would just
Open them outside of PowerPoint