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LCRA RiverWare Modeling Activities

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CADSWES RiverWare™ Users Group Meeting
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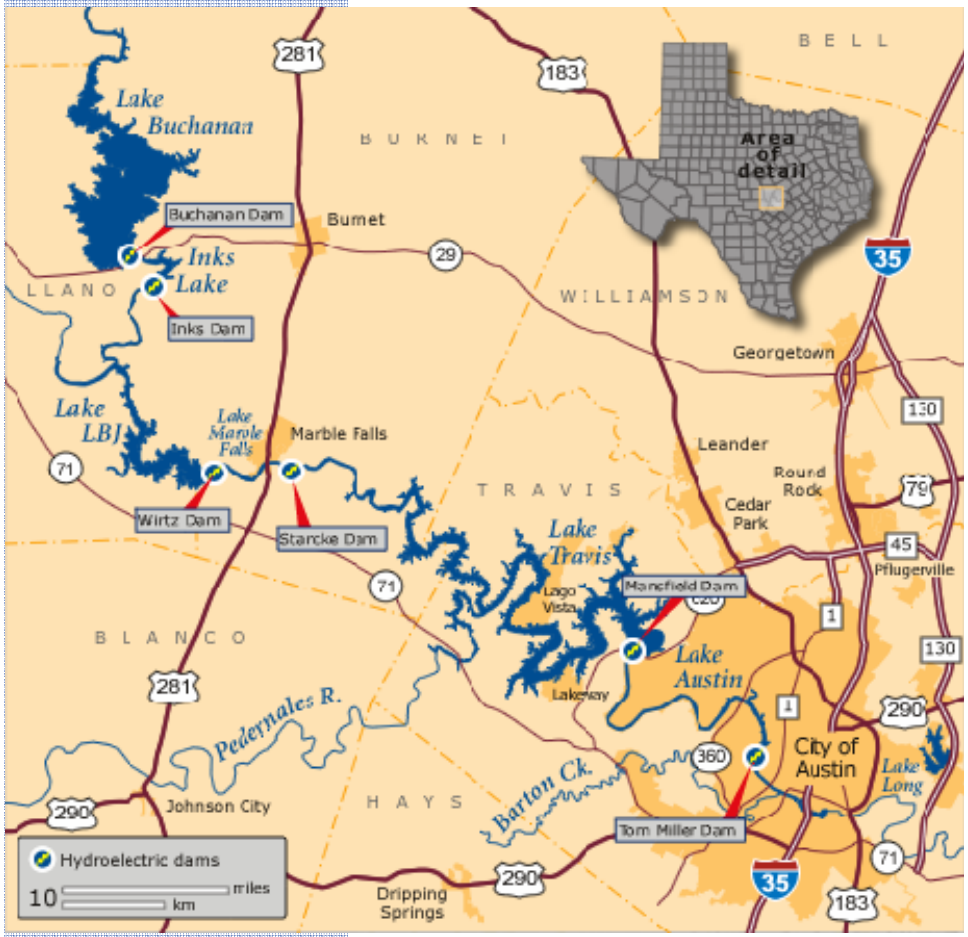
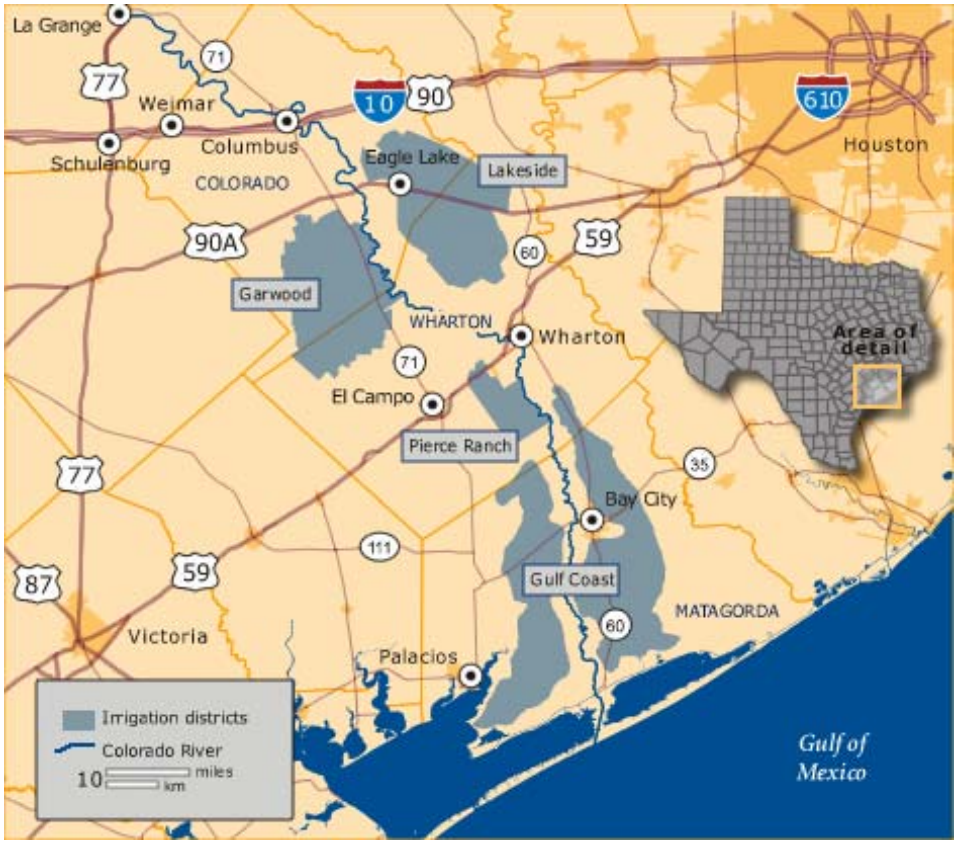
Lower Colorado River of Texas





RiverWare User's Group

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Mansfield Dam

Forms: Lake Travis

Completed: 1941

Height: 266.41 feet

Capacity: 1,132,172 acre-feet

Generation Capacity: 106.5 MW

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Buchanan Dam

Forms: Lake Buchanan

Completed: 1937

Height: 145.5 feet

Capacity: 885,507 acre-feet

Generation Capacity: 51.3 MW

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Inks Dam

Forms: Inks Lake

Completed: 1938

Height: 96.5 feet

Capacity: 15,063 acre-feet

Generation Capacity: 14 MW

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Wirtz Dam

Forms: Lake LBJ

Completed: 1950

Height: 118.3 feet

Capacity: 134,353 acre-feet

Generation Capacity: 56 MW

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Starcke Dam

Forms: Lake Marble Falls

Completed: 1951

Height: 98.8 feet

Capacity: 6,420 acre-feet

Generation Capacity: 36.4 MW

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Tom Miller Dam

Forms: Lake Austin

Completed: 1940

Height: 100.5 feet

Capacity: 21,725 acre-feet

Generation Capacity: 17.3 MW

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Development Team

- LCRA Staff
- WAVE Engineering
- AMEC Earth & Environmental (formerly Hydrosphere)
- CADSWES

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Some Motivations

- Replace Legacy Fortran Model for in-house planning (RESPONSE):
  - 1970s (mainframe) technology
  - Hybrid of models: monthly reservoir optimization, daily river administration, lower basin post processing
  - Difficult to modify, shrinking base of FORTRAN programmers, completely in-house developed
  - Efficient code was difficult to understand and verify
  - Needed updates to hydrology, agreements, and facilities

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Motivations - continued

- Incorporate hydroelectric simulation
- Platform for advanced and future analysis
  - Monte Carlo analyses
  - Robust daily operations and hydrology
    - Environmental flows
    - Water quality issues
    - High flow pumped diversion operations
  - Stream gains and losses
  - Groundwater interactions
- Open platform
  - Accessible to stakeholders
  - Existing base of consultants
- Utility for both planning and operations
- Robust presentation graphics

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Top Candidates

- CADSWES RiverWare™
- TAMU Daily WRAP WAM– Water Rights Analysis Package Water Availability Model
- UT GAM – General Algebraic Modeling System
- DHI Mike Basin package
- Hydrologics OASIS
- Inhouse upgrades of RESPONSE

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Selection Considerations

- Object orientation
- Pricing
- Breadth of use
- Technical support and training
- Availability of outside resources
- Documentation
- Flexibility and readability of rules
- Scenario management
- Diagnostics
- Transparency

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Selected Lessons Learned

- Texas specific water law experience
  - same words, different meaning
- Run time requirements
  - Aggregation of smaller diverters
  - Cut-off assumption for upstream operators
  - Pre-process hydrology using WRAP-WAM
- Appropriateness of OR methods to the water rights solution
  - Development of the WR solver method
- Complexity of environmental flows
- Four year development process