Water Availability Models - where we are today -

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Austin, Texas
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20 TCEQ WAMs for 23 Basins
Origin of State’s Current WAMs

• Senate Bill 1 in 1997 authorized development of Water Availability Models for 22 of 23 river and coastal basins in Texas
  • 6 basins completed by end of 1999
  • 16 basins completed by end of 2001

• House Bill 76 in 1999 authorized development of Rio Grande WAM
  • Texas and Mexico
  • Completed in 2004
What is a Water Availability Model?

A computer-based processor that simulates the available supply of surface water for each water right in a river or coastal basin considering:

• Existing legal and regulatory constraints, e.g. water rights priorities
• Authorizations and conditions specified in individual water rights
• Naturalized hydrologic variations reflective of historical trends and extremes
How are Water Availability Models Used?

• Water rights permitting by TCEQ
  • Determine available supply for new appropriations and amendments
  • Assess impacts on other water rights
  • Satisfy SB3 environmental flow standards
• SB1 regional water supply planning
  • Regional Water Planning Groups
  • TWDB
Key Roles of WAMs in Regional Water Planning

• Determine existing surface water supplies for water user groups and specific projects (under drought of record conditions)
  • Reservoir yields
  • Run-of-river diversions
• Determine potential surface water supplies for recommended projects and strategies (under drought of record conditions)
• Incorporate SB3 environmental flow standards into future project evaluations
What comprises a Water Availability Model?

WAM = Computer Program (WRAP) + Basin-Specific Data Files

- WRAP (Water Rights Analysis Package)
- Basin-Specific Data Files include:
  - Computational node connectivity
  - Water rights priorities and descriptions
  - Naturalized historical hydrology
  - Historical reservoir net evaporation rates
  - Program operation commands
Key Features of Water Availability Models

• Existing WAM data sets typically reflect 1940 to late 1990s historical hydrologic conditions

• Monthly time steps currently used in all WAMs by TCEQ and TWDB – daily time step in progress

• Prior appropriation doctrine – first in time, first in right – applied for allocating flows among all water rights in a basin, except for Rio Grande

• Special conditions can be represented, such as SB3 environmental flow standards, reservoir system operations, water rights subordination, and wastewater reuse
Typical Output from WAMs

- Monthly Diversions for All Water Rights
- Reliabilities of Water Rights Diversions
  - % of Time Full Diversion Satisfied
  - % of Full Diversion Satisfied on Average
- End-of-Month Reservoir Storage Values
- Monthly Evaporation Losses from Reservoirs
- Monthly Return Flows from Diversions
- Monthly Regulated Streamflows
- Monthly Unappropriated Streamflows
- Monthly Flows to Bays and Estuaries
Simulated Annual Diversions
Why Existing WAMs Need to be Updated

• Hydrologic data bases for all but one existing WAM end in late 1990s – Rio Grande in 2000
• Drought of record for many basins has changed from 1950s to recent years not included in data
• Basing available water supplies on droughts less severe than the drought of record results in over-estimation of firm supplies
• Communities and other water users are at risk of water shortages when available supplies are over estimated
Factors Affecting Priorities for Updating Individual WAMs

- Occurrence of new drought of record since end of WAM data base
- Need to revise firm water supplies for existing water rights and projects
- Proposed major projects in a basin that may be limited by available unappropriated water
- Regulatory requirements for updating some existing WAMs – Colorado and Brazos
- Funding needs for updating individual WAMS
### Possible Priorities for WAM Extensions

<table>
<thead>
<tr>
<th>PRIORITY FOR EXTENSION</th>
<th>BASIN</th>
<th>NO. OF WATER RIGHTS</th>
<th>PRIMARY CONTROL POINTS</th>
<th>HYDROLOGIC PERIOD OF RECORD</th>
<th>YEARS TO EXTEND THRU 2016</th>
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Questions