Lower Santa Cruz River Basin Study

Recap of Key Decisions, Progress Review and Next Steps

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Reclamation Phoenix Area Office
Project Team and Sub-Teams Meeting
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LSCR Basin Study Objectives

1) Identify Where Physical Water Resources are Needed to Mitigate Supply-Demand Imbalances

2) Develop Strategies to Improve Water Reliability for Municipal, Industrial, Agricultural and Environmental Sectors
LSCR Basin Study Overview

Four Required Elements:

1. Project future supply & demand imbalances (without adaptation measures)
2. Evaluate risks to infrastructure and other systems
3. Develop and investigate adaptation strategies (structural and non-structural)
4. Perform trade-off analysis of strategies
Recap of Key Climate Decisions - 1

- **Include Dynamically Downscaled (DD) Climate Projections in Analysis**
  - Physics based model of medium-scale atmospheric processes, especially monsoon
  - Not constrained by historical data
  - Limited in spatial resolution
  - High emissions scenario (RCP 8.5) only ("Worse Case")

- **Contrast with Lower Emission (RCP 4.5) “Best Case” Scenario**
  - Only Statistically Downscaled projections available
  - Constrained by historical data
  - Higher spatial resolution available

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**Emissions Scenarios**

- RCP 8.5
- RCP 4.5

**RCP** = Representative Concentration Pathways
From CMIP5 climate model intercomparison
Recap of Key Climate Decisions - 2

• Develop Climate Metrics to Evaluate Appropriate DD Climate Model

• Model(s) should simulate seasonal precipitation patterns, esp. monsoon

• Project Team and other sub-teams identified key metrics:
  – Change in intensity of extreme events (precipitation and temperature)
  – Change in monsoon timing
  – Change in dry period timing

• MPI and HadGEM models selected

• Hadley model eliminated due to inconsistency in seasonal changes

• MPI climate model selected
Recap of Key Climate Decisions - 3

- Variability is a defining characteristic of area precipitation patterns

- Climate model projections do not reproduce this variability

- “Weather Generator” - a technique to generate large numbers of plausible time series while preserving statistical properties of a distribution

- Use of Weather Generator recommended to produce probability distribution of future streamflow discharges
Other Progress – Modeling Future Demands

Simplified Modeling Overview

- Climate Driving Forces
  (Precipitation, Temperature)
  - GLOBAL CLIMATE MODELS
  - SURFACE HYDROLOGY MODEL

Tucson AMA Groundwater Model

Socio-Economic Driving Forces
(Demographics, Economics, Technological, Regulatory)

CAP SERVICE AREA MODEL
<table>
<thead>
<tr>
<th>Scenario Description</th>
<th>Official/Baseline Values</th>
<th>Slow Compact Growth</th>
<th>Slow Outward Growth</th>
<th>Rapid Outward Growth</th>
<th>Rapid Outward Growth Plus Mining without Replenishment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population Growth Rate</td>
<td>Medium</td>
<td>Low Series</td>
<td>Medium Series</td>
<td>High Series</td>
<td>High Series</td>
</tr>
<tr>
<td>Growth Pattern - Infill vs. Outward Growth</td>
<td>Baseline</td>
<td>In-Fill/Redevelopment</td>
<td>Slow Outward</td>
<td>Rapid Outward</td>
<td>Rapid Outward</td>
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</tbody>
</table>
## Supply-Demand Scenarios

### A. Official Projections
- Medium, mixed-density growth and Current climate

### B. Slow, compact growth and Best Case climate

### C. Rapid, outward growth and Best Case climate

### D. Slow, compact growth and Worse Case climate

### E. Official Projections and Worse Case climate

### F. Rapid, outward growth and Worse Case climate

<table>
<thead>
<tr>
<th>Climate Emissions</th>
<th>Growth</th>
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<tbody>
<tr>
<td></td>
<td>Slow, Compact</td>
</tr>
<tr>
<td>Worst Case</td>
<td>D</td>
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<tr>
<td>Best Case</td>
<td>B</td>
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<tr>
<td>Current Climate</td>
<td>A</td>
</tr>
</tbody>
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2018-05-08

RECLAMATION
CAP-SAM Status

• Model Runs Complete for six Climate-Growth scenarios
Translating Provider Demands to Modflow Input

Individual Provider Demand by Water Type

Individual Provider Pumping by Well
What’s Next?

• Project Supply/Demand Imbalances

• Run Groundwater Model under Six Scenarios

• Identify Where Imbalances Occur
Changes in timing and funding

• Budget increase ($325,000) and due date extension (February 2019 to September 2020) requested in March 2018
• Reclamation Policy Office granted request in June 2018
• Amendment to Memorandum of Agreement and Revised Plan of Study
• All required partner signatures have been collected
• Documents being prepared for Regional Director signature