Hourly Operations Model of the Lower Colorado River

Yuma Area Office – U.S. Bureau of Reclamation

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Background

- Client: U.S. Bureau of Reclamation, Yuma Area Office
- Build an hourly-timestep model to assist water operations staff in daily river scheduling
- Lower Colorado River from Parker Dam to Imperial Dam
  - Includes Senator Wash and Brock Reservoirs

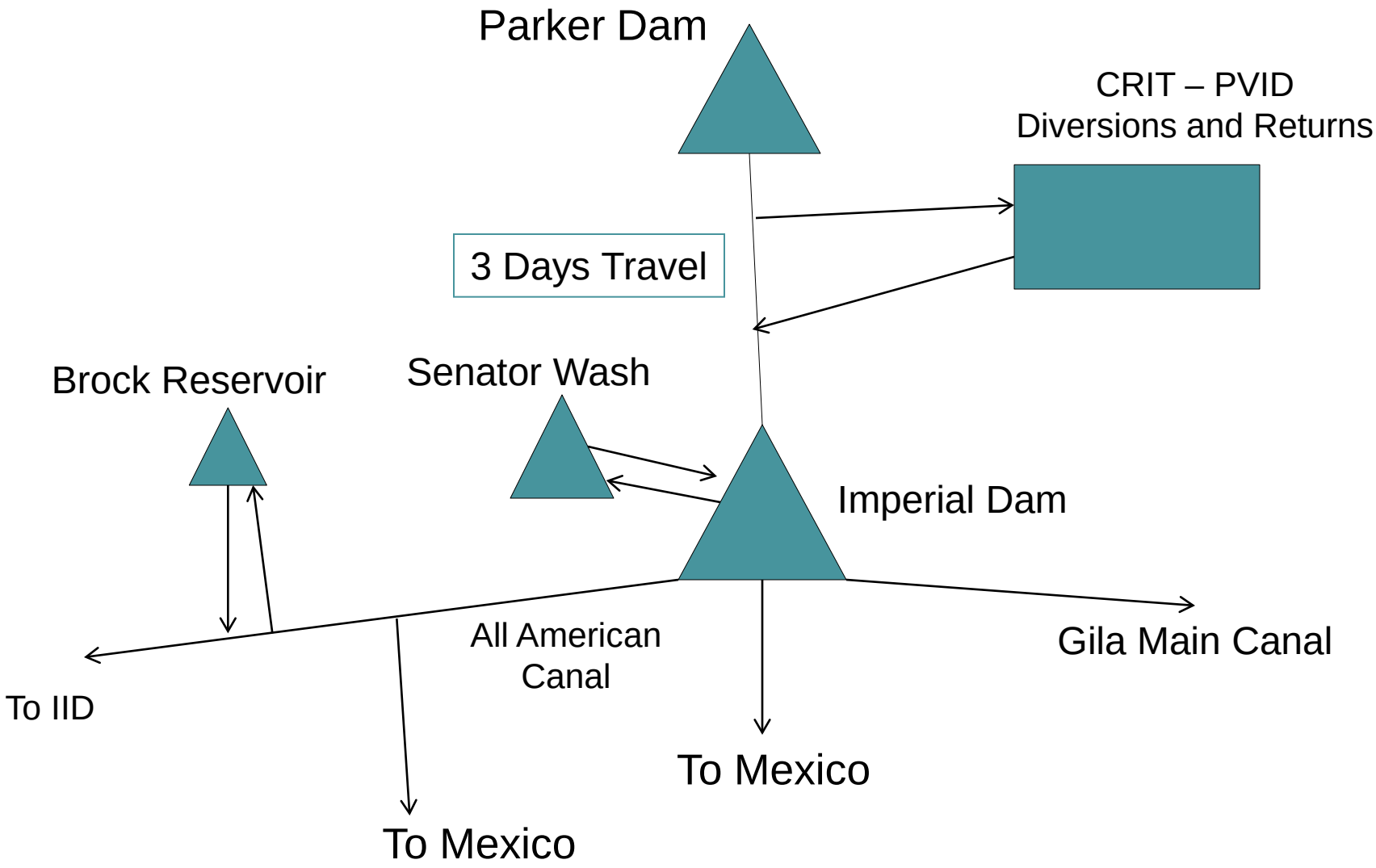

LAS VEGAS
NEVADA
BOULDER CITY
HOOVER DAM
MOHAVE CO.
COCONINO CO.
DAVIS DAM
LAUGHLIN
BULLHEAD CITY
SAN BERNARDINO CO.
NEEDLES
YAVAPAI CO.
CALIFORNIA
LAKE HAVASU CITY
PARKER DAM
PARKER
PALM SPRINGS
ARIZONA
HEADGATE ROCK DAM
RIVERSIDE CO.
LA PAZ CO.
PHOENIX
PALO VERDE DAM
QUARTZSITE
BLYTHE
MARICOPA CO.
IMPERIAL CO.
SENATOR WASH DAM
BRAWLEY
IMPERIAL DAM
LAGUNA DAM
EL CENTRO
PINAL CO.
MEXICALI
MORELOS DAM
YUMA
SAN LUIS
PIMA CO.
BAJA MEXICO
SONORA MEXICO

Goal of Daily Scheduling (Excluding Salinity)

- Meet demands for water districts and Mexico

- Minimize excess flows to Mexico

System Schematic



Operators Need to Know:

- What is the hourly forecasted flow arriving at Imperial Dam today and next 2 days?
- How to operate off-channel storage reservoirs (Brock and Senator Wash) to mitigate excess or shortages?
- How much to order from Parker Dam today and next two days?
  - Based on Master Schedule orders 3-6 days into the future

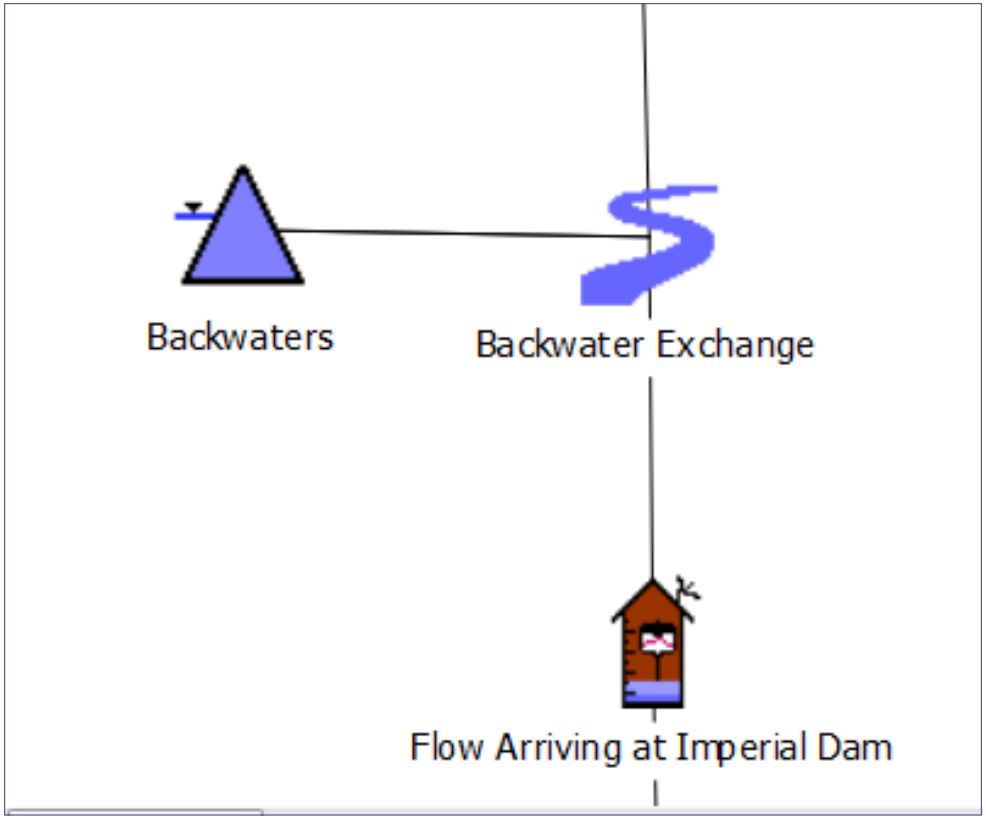
Why Hourly?

- Very little storage space at Imperial Dam ~1,000 AF

Routing Methods

- Model uses RiverWare's Kinematic Routing Method

- Backwaters



Building an Operations Model for a Client:

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- Unique Challenge:
  - Needs to be easy to use for someone who was not the person who built model
  - Operator may not be RiverWare expert

- Model Development has two parts:
  - The usual model building, calibration, ruleset development
  - “Interface” for operator (develop a “user experience”); SCTs, output tools, etc.

Flexibility and User Experience

- Operator needs model to make recommendations (RiverWare rules) and needs ability to overwrite these (user input)
  - Model needs to work if slots are set by rules or user input
- Run “what if” scenarios without getting into rules or data
- Needs to be easy to use and fast – operators only have a few minutes each day for the modeling portion of scheduling
- RiverWare can do anything, but can it do it fast and in an uncomplicated way?

Time Horizon

- Current day or “now” is in the middle of the run
- Several days of initialization and historical data (around 7)
  - RW can’t always dispatch before start date
- Six days of forecasting

Demo

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