Upper Niobrara-White Modeling

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UPPER NIOBRARA-WHITE GROUNDWATER MODEL
Upper Niobrara-White Groundwater Model

- UNW Model is up and running
- Will assist in the analysis of water supplies and uses in the UNWNRD
- A tool to assist in the integrated management planning (IMP) process
- Used to evaluate hydrologically connected areas and management scenarios
WaterSMART – Niobrara River Basin Study

• UNW model and CENEB model used to assess the impact of different conditions
• Help to define options for meeting future demands
• Under terms of the WaterSMART grant received from the Bureau of Reclamation in 2010, certain conditions must be evaluated:
  ✓ Impact of climate change
  ✓ Impact of alternative management scenarios
WaterSMART Scenario Results

- Integrated model run – groundwater, watershed, and surface water operations model
- Groundwater model preliminary results
- Climate scenario
- Alternative scenarios
- Baseflow and water level draw down
WaterSMART Scenario

Results

• Current calibrated model run and baseline run
WY to Stateline
Stateline to Agate
Agate to Box Butte
Box Butte to Dunlap
Dunlap to Gordon

[Graph and map showing flow data and locations]
Gordon to Edge
WY to Stateline
Stateline to Agate
Agate to Box Butte
Box Butte to Dunlap
Dunlap to Gordon
Gordon to Edge
WaterSMART Scenario Results

• Alternative 1 scenario – Pumping station
WaterSMART Scenario Results

• Alternative 2 scenario – Canal Recharge
Box Butte to Donlap

Box Butte to Dunlap
Baseline No Action vs. Baseline Alternatives 1 and 2
Dunlap to Gordon
Gordon to Edge

Gordon to Edge
Baseline No Action vs. Baseline Alternatives 1 and 2

Values
- Baseline No Action
- Baseline Alt 1
- Baseline Alt 2

Baseline flow (cfs)

Jan 61 Jan 66 Jan 71 Jan 76 Jan 81 Jan 86 Jan 91 Jan 96 Jan 01 Jan 06 Jan 11
Apr 61 Apr 66 Apr 71 Apr 76 Apr 81 Apr 86 Apr 91 Apr 96 Apr 01 Apr 06 Apr 11
WaterSMART Scenario

Dun2Gord

Baseflow (cfs)

Season

Model
Alt1
Alt2
Baseline

Irrigated
Non-Irrigated
WaterSMART Scenario Results
Management Scenarios

Scenario 1a: Wet Climate

Model simulation of wetter weather condition
Management Scenarios

Scenario 1b: Dry Climate

Model simulation of drier weather condition
Management Scenarios

Scenario 2: Change in Allocation

Model simulation of change in allocated groundwater pumping condition
Management Scenarios

Scenario 3: Change in Cropland Condition

Model simulation of changes in irrigated acreage and crop type
Refinement of UNW Model

- Better data is now available
- Recalibration of model
  - Compare modeled data to updated meter data
  - Recalibrate model - modify model to more closely match observed conditions
Potential Scenarios

• Future use of the UNW Model
  – What does the public want to know about potential future conditions?
  – What management actions have occurred and how can their impacts be analyzed?
  – What information would be useful to the UNW water users?

Please give us your input after the presentation!
Thank You

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