DRAFT
CRSS: Key Modeling Assumptions
January 2022 Model

- Initial reservoir conditions were based on one simulation of the December 31st, 2022 conditions, for all modeled reservoirs, using the January Colorado River Mid-term Modeling System (CRMMS) in ensemble mode initialized with the beginning of January hydrology forecast (January 2, 2022 forecast). The initial conditions at Powell and Mead are:
    - Powell: 3,488.69 – 3,613.90 feet
    - Mead: 1,048.34 – 1,079.20 feet
- Powell's WY 2022 release is 7,480 kaf with October – December 2022 releases ranging from 1,580 kaf – 2000 kaf.

Other Assumptions:
- Future water demands referred to collectively as the "2016 Demands":
    - Future water demands for the Upper Division States per the 2016 Upper Colorado River Commission schedule.
      Reclamation incorporated the 2016 UCRC Demand Schedule for the Upper Colorado River Division States ("2016 Schedule") for the first time in the January 2021 CRSS official model run. The Upper Division States and UCRC assisted with the representation of this new schedule in CRSS. During this process, the need for additional refinements to the representation of Upper Colorado River Basin water use in CRSS was identified. Reclamation is currently working with the Upper Division States and UCRC on such refinements.

    - Future water demands for the Lower Division States (during Normal Conditions) are according to the schedules provided for the 2007 FEIS for the Colorado River Interim Guidelines modeling with updates to Nevada's demands in May 2019.
- Run duration 2022 – 2060
    - Interim Guidelines and Lower Basin Drought Contingency Plan (IG_DCPnoUBDRO) are assumed to extend through 2060
    - Rules that revert to the 2007 Final Environmental Impact Statement "no-action alternative" (NAnoUBDRO) starting in 2027 are included in the model package
- Increases and reductions to Mexico's delivery are per Minute 323 for 2022-2026
    - When the Interim Guidelines are assumed to extend through 2060, Minute 323 is also assumed to continue through the end of 2060.
    - This includes Mexico's Binational Water Scarcity Contingency Plan (also assumed to extend through 2060).
- The August 2021 official runs use the "Stress Test" hydrology.
  Hydrologic inflow files in the package include:
    - Full hydrology, i.e., Direct Natural Flow (DNF) – Index Sequential Method (ISM) used on observed historical period of record (1906-2019)
    - Stress Test hydrology – ISM used on the observed historical period of 1988-2018 (ISM1988_2019)
    - "Pluvial Removed" hydrology – ISM used on the observed historical record

of 1931-2019. See dmi/ISM1931_present.

- o CMIP3 hydrology – previously referred to as "VIC" in the model package. The CMIP3 hydrology are now included in dmi/CMIP3 with the corresponding scaled evaporation coefficients included in dmi/CMIP3Evap. This hydrology is derived from projections from the World Climate Research Program's Coupled Model Intercomparison Project Phase 3 (CMIP3). Additional details are available in the [2012 Basin Study Technical Report B](#).

Salinity Model Assumptions

- Salinity is disabled in the January 2022 CRS

January 2022 CRSS Updates

This document includes all of the changes made to CRSS between the "August 2021" and the "January 2022" packages. Files for the model and ruleset for these two packages are:

	January 2022	August 2021-fixed
RiverWare	RW v8.3.4	RW v8.2.2
Model	CRSS.V5.3.0.2023.Jan2022.mdl	CRSS.V5.2.1.2022.Aug2021.mdl
Ruleset	CRSS.Baseline.2027[IGDCP/NA]noUBDRO.v5.CRSS.Baseline.2027[IGDCP/NA]noDRO.v5.1.1.rls

Changes That Affect Results

- Updated to RW8.3.1 which includes a bug fix to the `NetSubbasinDiversionRequirement()` function. Impacts shortages determined by rule Protect Elevation 5990 per Water Sharing Agreement.
- Updated monthly distribution coefficient for water user `EnergyUsesShoshonePowerPlant.Energy` to reflect an even distribution of water across all months.

- Flaming Gorge Spring and Baseflow April-July Volume Update function was changed so that March flows were not based on a scaled average during wet years.
- Updated `ReleasableVolumeRate()`, `MaximumRelToAvoidMinimumPE()`, Update values for `Crystal.MaxOutflow[]`, and `BlueMesa.Maximum Controlled Release[]` to improve reservoir operations during low storage.
- Updated Navajo Elevation Volume table `Navajo.Elevation Volume Table[]`
- Added new resource categories and logic for Nevada including Nevada's Interstate Bank, BICs, and YDP system conservation ICS.
- Removed statement multiplying input DCP ICS by system tax in `DetermineArizonaAnnualDCPPut()` as it was getting double counted in later rules.
- Added aggregate diversions `AgUsesGrowthLittleSnakeR` and `ExportUsesYampaRiver` to the UsersAboveDeerlodge subbasin to fix issues with depletion volume calculations at Deerlodge.

Changes That Do Not Affect Results

Model and Global Functions

- Updated `DetermineICSToDCPConversion()` to allow function to look to Arizona's initial bank balance in at the start timestep to allow model to solve for input DCP ICS in the first timestep for Arizona.
- Updated DMI groups, control files, and MRM configurations associated with running CRSS in Verification Mode.
- Rebuilt Upper Basin Salt Mass Balances.
- Created new Salt input DMIs and supporting Excel files.
- Added new scripts to assist with setting up salinity modeling.
- Changed some agricultural water user salt pickup methods.
- Added Virgin_FWAAC to `Annual Salinity` Data object.

Ruleset

- Reordered rules so rules that set surplus and shortage flags are lower priority.

Other Files

- Updated control files to output the `InterstateBanking` data object.
- Updated DIT to incorporate January Most Probable 24-MS water use assumptions for 2023.