Notes from August 18th, 2021 to August 25th, 2021

Notes from Sankar Meeting

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Slack Quote from Sankar:

> Basically, we want the joint pdf percentiles from 0 to 1 for the three variables, what would be the corresponding normalized release for the current time step. That should be the rule. Basically, it looks like this. If release_pre <0.1 percentile, storage_pre between 0.4 to 0.5 percentile and the inflow is 0.5 to 0.6 percentile, what is the normalized release for the current time step?"

Issues with trying to do this:

- Tree only splits on release
  - So when release is in a certain percentile, storage and inflow can be anything and we get the same parameterization
- So intead we would say

> When normalized release is between 0.2 and 0.4 percentile, equation 2 provides the normalized release for the next time step. Where equation 2 is:
>
> $$r_t = 1.996(s_{t-1} - \bar{s}_7) + 0.108(s_{t-1} \times i_t) + 0.622r_{t-1} + 0.403\bar{r}_7 - 0.086i_t - 0.148\bar{i}_7 + MI(t)$$

- And even this only works when we drop rolling release from the X matrix for the tree (then it splits only on release)

Current Model State

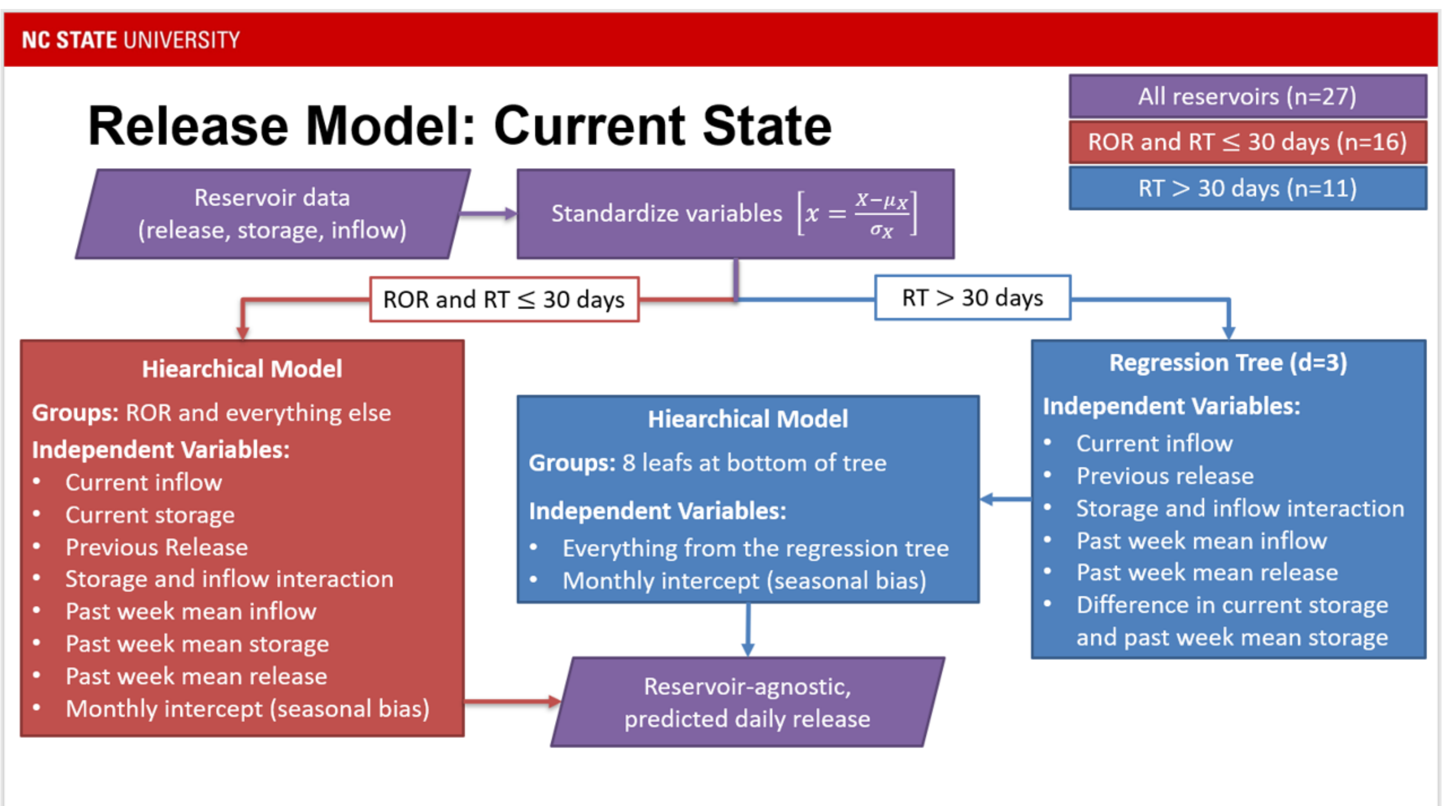

Figure 1: Current Model State Flow Chart

- High RT Release Rules:

Leaf/Equation	Min. %ile	Max. %ile
1	0.001	0.221
2	0.221	0.394
3	0.394	0.565
4	0.565	0.713
5	0.713	0.859
6	0.859	0.943
7	0.943	0.982
8	0.982	1.000

- Equations

Group	Equation
1	$$r_t = 1.783(s_{t-1} - \bar{s}_7) + 0.081(s_{t-1} \times i_t) + 0.560r_{t-1} + 0.445\bar{r}_7 - 0.071i_t - 0.095\bar{i}_7 + \mathsf{MI}(t)$$
2	$$r_t = 1.996(s_{t-1} - \bar{s}_7) + 0.108(s_{t-1} \times i_t) + 0.582r_{t-1} + 0.417\bar{r}_7 - 0.032i_t - 0.169\bar{i}_7 + \mathsf{MI}(t)$$
3	$$r_t = 2.864(s_{t-1} - \bar{s}_7) + 0.117(s_{t-1} \times i_t) + 0.622r_{t-1} + 0.403\bar{r}_7 - 0.086i_t - 0.148\bar{i}_7 + \mathsf{MI}(t)$$
4	$$r_t = 2.935(s_{t-1} - \bar{s}_7) + 0.088(s_{t-1} \times i_t) + 0.570r_{t-1} + 0.369\bar{r}_7 - 0.056i_t - 0.150\bar{i}_7 + \mathsf{MI}(t)$$
5	$$r_t = 2.964(s_{t-1} - \bar{s}_7) + 0.124(s_{t-1} \times i_t) + 0.627r_{t-1} + 0.313\bar{r}_7 - 0.093i_t - 0.133\bar{i}_7 + \mathsf{MI}(t)$$
6	$$r_t = 2.622(s_{t-1} - \bar{s}_7) + 0.062(s_{t-1} \times i_t) + 0.642r_{t-1} + 0.276\bar{r}_7 - 0.058i_t - 0.059\bar{i}_7 + \mathsf{MI}(t)$$

Group	Equation
7	$r_t = 1.297(s_{t-1} - \bar{s}_7) + 0.020(s_{t-1} \times i_t) + 0.654 r_{t-1} + 0.196 \bar{r}_7 - 0.064 i_t + 0.086 \bar{i}_7 + \text{MI}(t)$
8	$r_t = 1.184(s_{t-1} - \bar{s}_7) + 0.105(s_{t-1} \times i_t) + 0.749 r_{t-1} + 0.137 \bar{r}_7 - 0.099 i_t + 0.051 \bar{i}_7 + \text{MI}(t)$
St. Dam	$r_t = -0.002 + 0.526 i_t + 0.093 s_{t-1} - 0.048 \bar{s}_7 + 0.280 \bar{i}_7 + 0.162(s_{t-1} \times i_t) + \text{MI}(t)$
ROR	$r_t = 0.002 + 0.897 i_t + 0.087 s_{t-1} - 0.040 \bar{s}_7 + 0.039 \bar{i}_7 + 0.052(s_{t-1} \times i_t) + \text{MI}(t)$