

Assessing Transit Losses on the Arkansas River (Step Ins & Outs)

John Van Oort

Division 2

River Operations Coordinator

Leadville to Pueblo Reservoir



• Leadville to Pueblo Reservoir

• BOR Operating Guidelines

- Twin Lakes Reservoir
 - 100cfs per hour
 - Erosion Control
 - 15% of ARKWELCO in one day

• Transit Losses

- 0.07% per mile
- Sunnyside study

• **NO** Incremental steps on deliveries

- Typically there's no account water deliveries to ditches between upper reservoirs and the Pueblo Reservoir.

Pueblo Reservoir to John Martin Reservoir

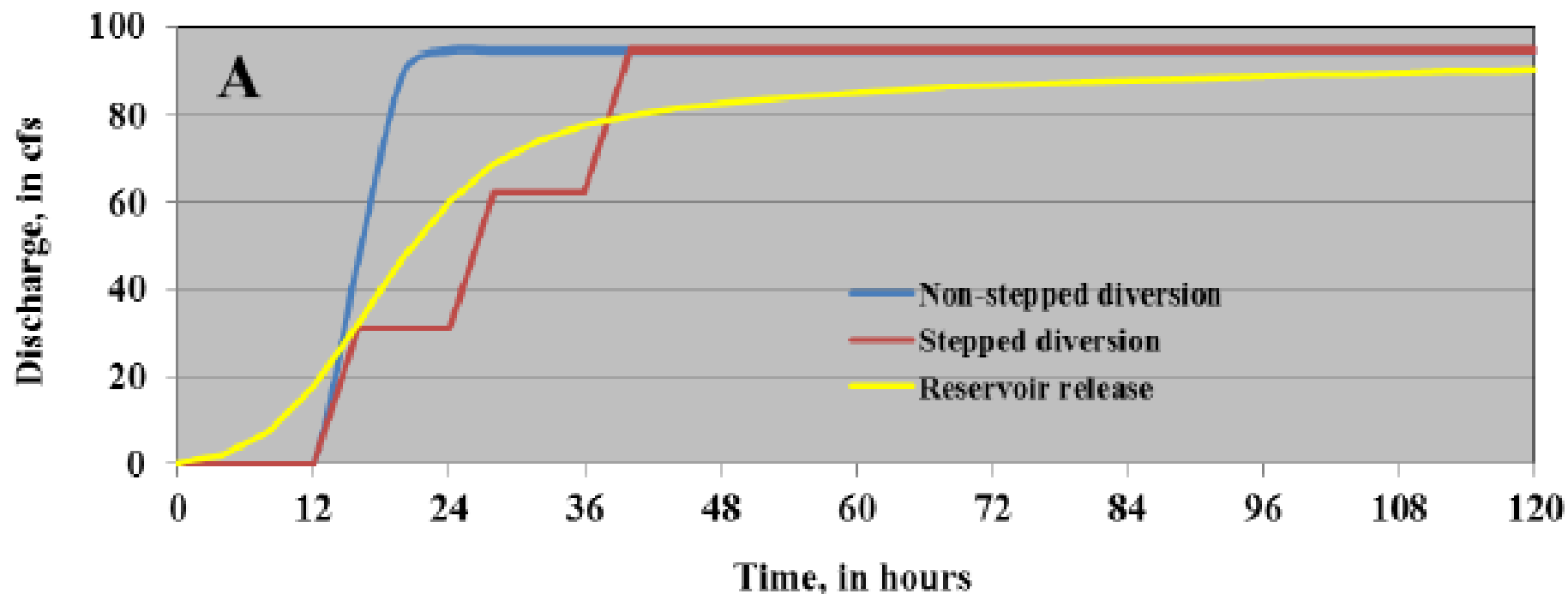


**Transit Losses and Travel Times of Reservoir Releases along the
Arkansas River from Pueblo Reservoir to John Martin Reservoir**

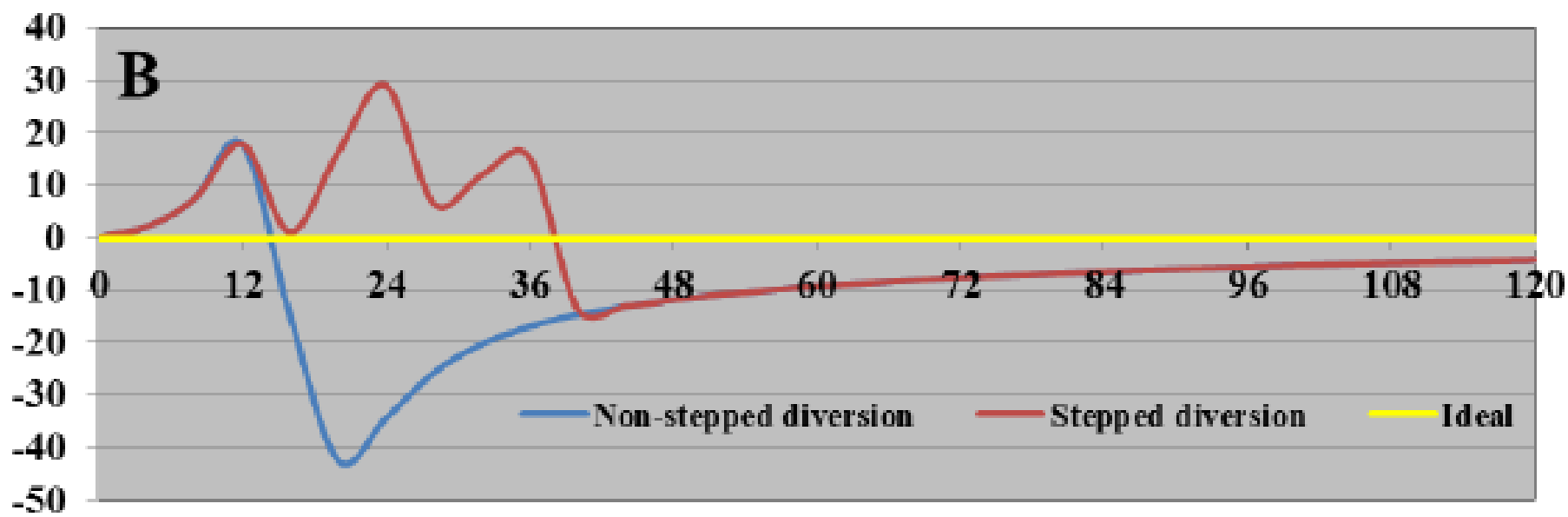
- **Pueblo Reservoir to John Martin Reservoir**
- **BOR Operating Guidelines**
 - Pueblo Reservoir (500 per hour)
- **Transit Losses**
 - 2011 Livingston Transit loss Model
- **Incremental steps at ditch headgates**



Figure 18. Simulated hydrographs at River Mile 64 for a 100 cfs release from Pueblo Reservoir.



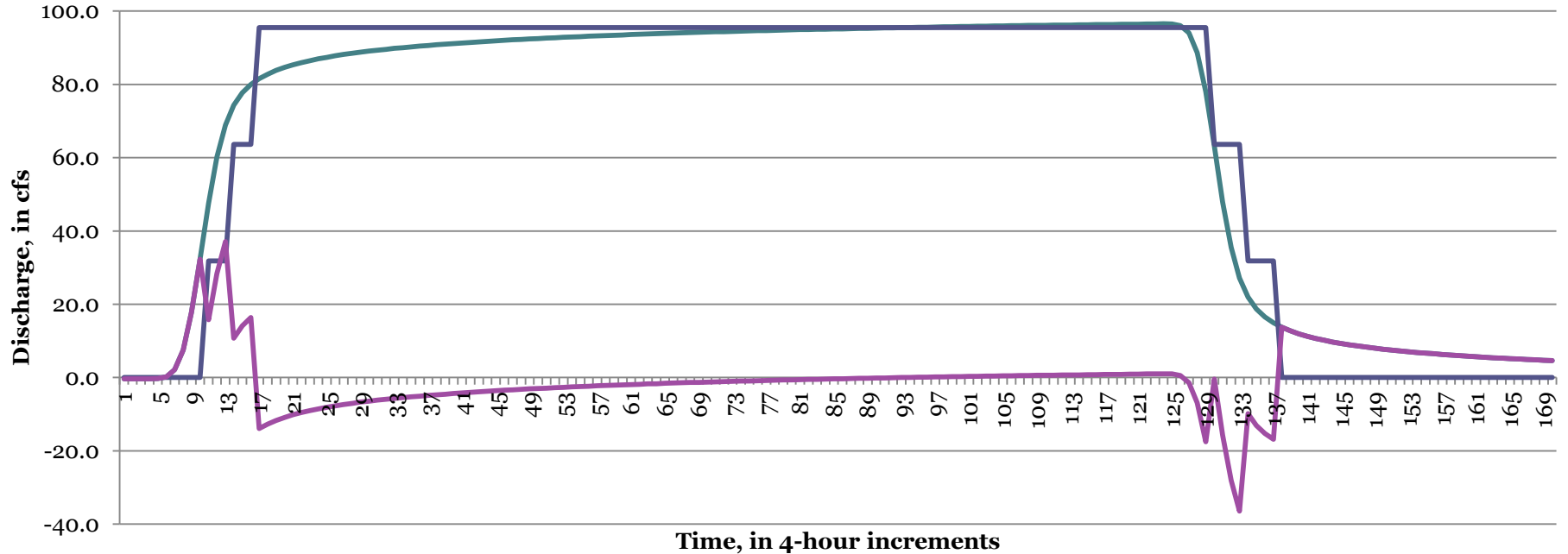
Change in discharge, in cfs



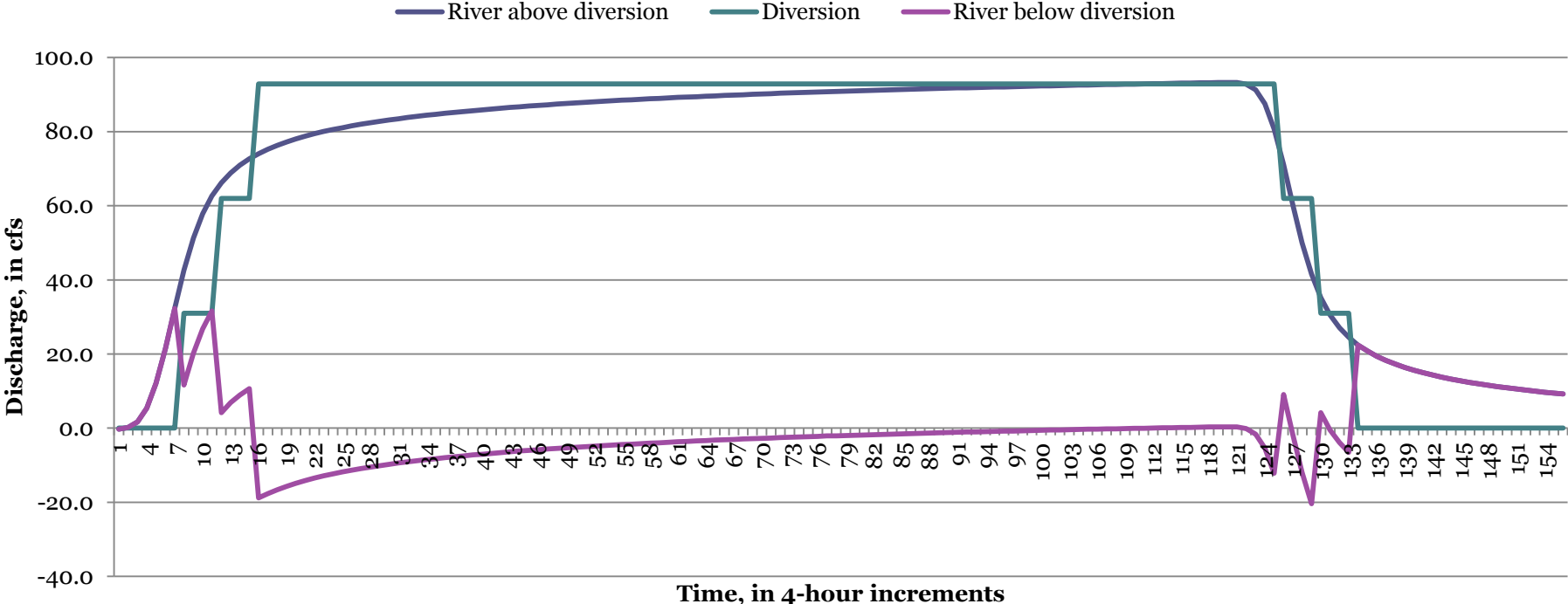
Time, in hours

Release to Catlin Canel during Medium Flow Conditions

— River above diversion — Diversion — River below diversion



Release to Ft Lyon Canal during Medium Flow Conditions



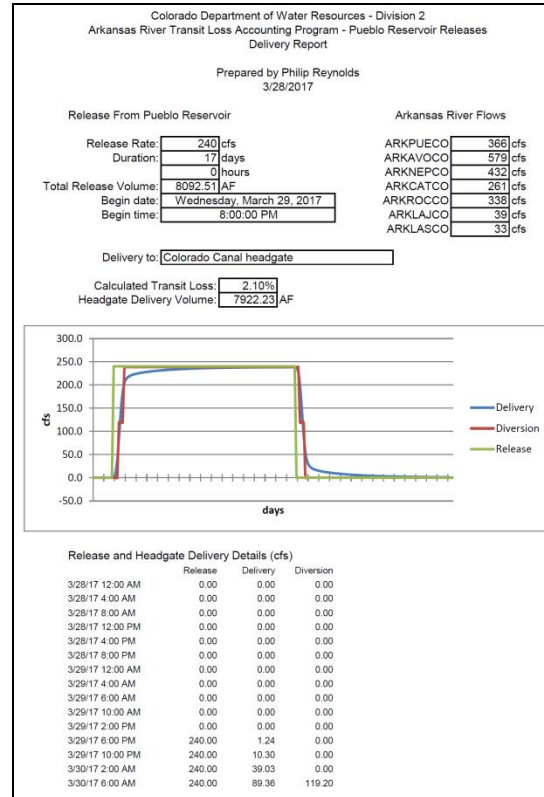
Number of steps

Table 21. Number and duration of diversion steps for several antecedent flow conditions.

| Diversion | River mile | Low flow ¹ | | Average flow ¹ | | High flow ¹ | |
|-------------------------|------------|-----------------------|--------------------|---------------------------|--------------------|------------------------|--------------------|
| | | Number of steps | Duration, in hours | Number of steps | Duration, in hours | Number of steps | Duration, in hours |
| Colorado Canal | 29.5 | 3 | 12 | 2 | 12 | 2 | 16 |
| Highline Canal | 34.6 | 3 | 12 | 2 | 12 | 2 | 16 |
| Oxford Farmers Canal | 41.1 | 3 | 12 | 2 | 12 | 2 | 16 |
| Otero Canal | 53.6 | 4 | 16 | 3 | 12 | 3 | 16 |
| Catlin Canal | 59.4 | 4 | 16 | 3 | 12 | 3 | 20 |
| Holbrook Canal | 67.9 | 4 | 16 | 3 | 12 | 3 | 20 |
| Rocky Ford Ditch | 69.4 | 4 | 16 | 3 | 12 | 3 | 20 |
| Fort Lyon Storage Canal | 70.4 | 4 | 20 | 3 | 12 | 3 | 20 |
| Fort Lyon Canal | 90.7 | 4 | 24 | 4 | 12 | 4 | 20 |
| Consolidated Ditch | 110.2 | 4 | 24 | 4 | 12 | 4 | 20 |

¹Flow conditions as defined in Appendix C, which represent flows at ARKNEPCO of 155, 515, and 1,115 cfs, respectively.

Colorado Canal Delivery (3/29/2017)



Questions??

