RECLAMATION

Managing Water in the West

Yellowtail Dam & Bighorn Lake

Operating Criteria

Billings, Montana
November 5, 2015

RECLAMATION

Outline

- **Status of Operating Criteria Evaluation**
  - **Final Recommendations**
  - **On-Going Evaluations**

- **Recommend Changes to the Criteria**

Criteria Background

- **Nov 2014 - Jan 2015: Criteria opened up for comment**
  - **46 people/groups submitted comments**
  - **Reviewed these in detail at the April Spring Operations Meeting**

- **Criteria Documents:**
  - **"*Final Draft Yellowtail Unit Operating Criteria Evaluation Study & Report*"**
  - **"*Draft Bighorn Lake Operating Criteria (Changes for the 2012 Water Year)"***

  - **http://www.usbr.gov/gp/mtao/yellowtail/bighorn_longterm.html**

Final Recommendations

- Minimum Lake Elevation by Memorial Day
- End of November Lake Elevation
- Maximum Lake Elevation Target
- Reallocate Exclusive Flood Control Space to Joint Use Space
- Bighorn Lake Sediment Management

Minimum Lake Elevation by Memorial Day

- **Lake Elevation of 3620 to 3630 by Memorial Day Weekend (3640 is full pool)**

- **Current Criteria**
  - **Rule curve used as a guide for lake levels for flood control**
    - **May 27 Range: 3594.0 to 3626.8**
  - **Runoff forecasts less than 727,000 acre-feet are guided by balancing resource needs (not expecting to fill)**

- **Final Recommendation**
  - **Keep the current rule curves**
    - **Can often provide 3620 by Memorial Day in lower runoff years**
    - **Reservoir drawdown for flood control is critical**

End of November Elevation

- Provide end of November Target of 3635 to 3640

- Current Criteria
  - Currently there is no end of November target
  - End of October 3635 to 3640 then set winter release rate

- Final Recommendation
  - Keep the current end of October target and winter release rate procedure
    - May meet this anyway
    - Would require new procedure for determining winter release
    - Potential for greater swings in river releases

Maximum Lake Elevation Target

- **Target lower fill levels during April through July runoff between 3630 and 3638 (provide “cushion”)**

- **Current Criteria**
  - **Fill the reservoir in early July based on rule curve associated with forecasted runoff**

- **Final Recommendation**
  - **Keep the current fill target of 3640**
    - **Continue to work closely with stakeholders when operating near and in the exclusive flood control pool**
    - **Avoid making many small release changes if possible (2014)**

Reallocate Exclusive Flood Control Space

- Reallocate the first five feet of exclusive flood control space as joint use space (3640 to 3645)

- Current Criteria
  - Normal full pool is 3640 feet, top of joint use pool

- Final Recommendation
  - Maintain current allocations (no change)
    - Maintains current Flood Control Pool volume (no reduction)
    - Continue to closely work with stakeholders when operating in the exclusive flood control pool

Bighorn Lake Sediment Management

- **Sediment issue at the south end of the lake needs to be addressed**

- **Next Steps**
  - **Continue to support sediment management subcommittee**

On-Going Evaluations

- End of October Lake Elevation
- End of March Lake Elevation
- Bighorn Lake Sediment Management
- Manage for River Stage

End of October Elevation

- **Provide End of October Target of 3630 to 3640**
  - **Higher July thru October river flows for rearing habitat**
- **Current Criteria**
  - **End of October 3635 to 3640**
- **Potential Impacts: Lower winter flows**
- **Next Steps**
  - **Model proposed change**

End of March Elevation

- **Change the End of March Target to 3614**
  - **Use more storage for higher winter river releases**
  - **Lower risks for evacuating storage in spring**
- **Current Criteria**
  - **End of March target of 3615 to 3619 depending on winter release rate**
- **Potential Impacts:**
  - **Reduced spring river releases**
  - **Potential increase in risk of filing reservoir**
- **Next Steps**
  - **Review model runs made that established 3614 as end of March target**

Manage for River Stage

- **Manage river levels based on stage instead of flow during the summer months**
  - **Still maintains rearing habitat**
  - **Stores water for higher winter releases**
- **Current Criteria**
  - **River releases are based on release rate (cfs) versus stage**
- **Potential Impacts:**
  - **Lower stage and flow for river below Bighorn Access**
  - **Less predictable scheduling of power generation**
- **Next Step**
  - **Model and study impacts all authorized purposes**

Recommended Changes

- **November through March Gains Forecast**
- **November through March Operations**

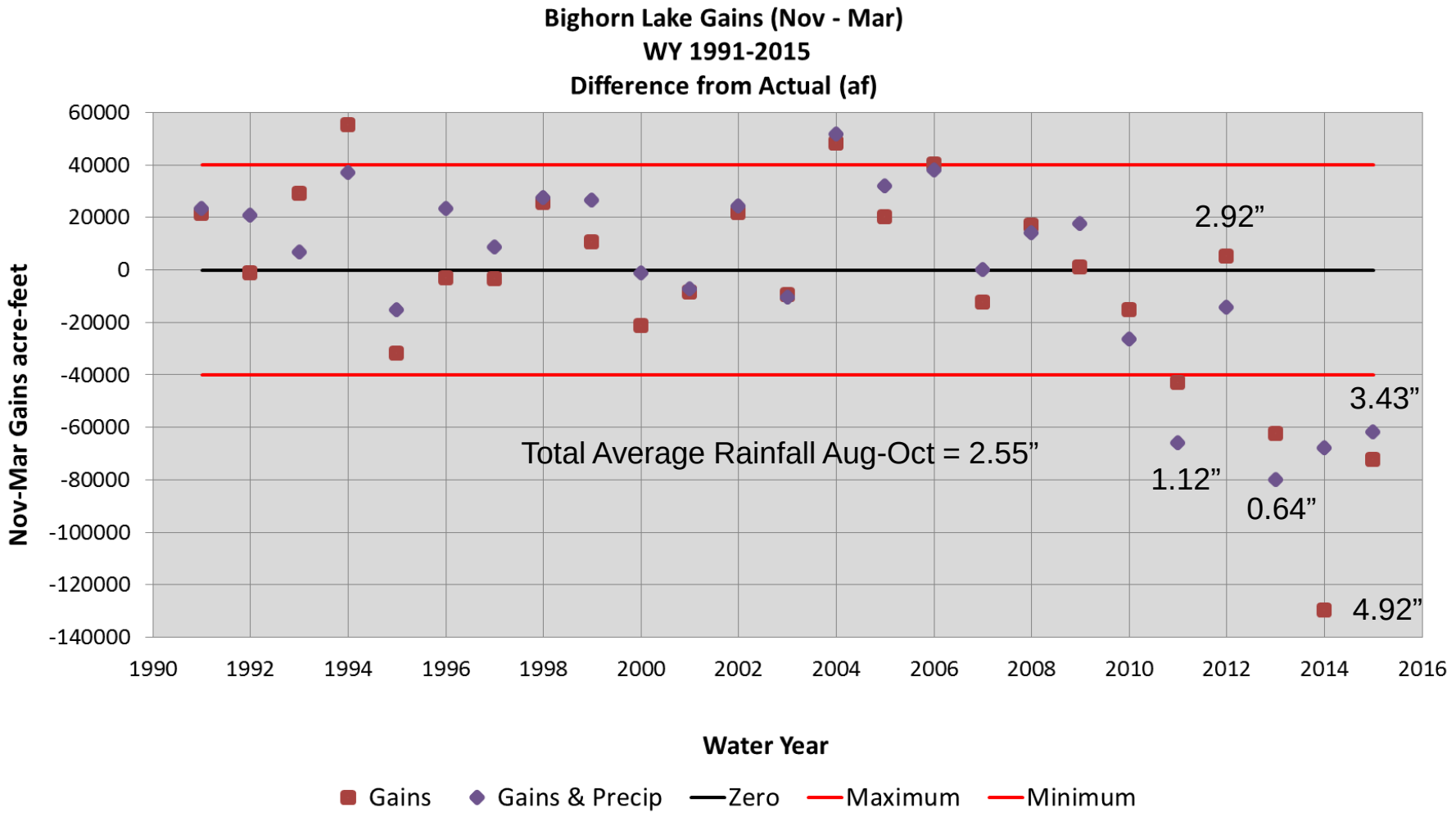
November through March Gains Forecast

- Revise procedures for forecasting the November through March gains
- Why
  - Consistently under forecasting gains
- Current Criteria
  - November through March gains are based the previous April through October gains
- Potential Impacts
  - Improved forecasts

Bighorn Lake
Nov to Mar Gains Inflow Forecast

- Update Gains and Precipitation Forecast Equations with Water Year 2015 Data
- Analyze Equation Results
- Recommended Forecast for Water Year 2016

Updated Forecast Results



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Nov through Mar Gains Forecast

- Utilize Updated Gains Forecast
- Continue Yearly Analysis of Forecast
  - Precipitation
  - Temperatures
  - Other Variables
- Implement as Appropriate

November through March Operations

- More flexibility should be allowed in dealing with established winter release
- Why
  - Higher release during the winter
  - Results in Reservoir levels closer to the end of March target
- Current Criteria
  - Establish winter release rate in November
  - "*Once the February 1 spring runoff forecasts become available, the March 31 lake level target may be allowed to vary somewhat dependent upon the forecast amount*"
  - "*In years with a forecast for a very low spring runoff, it may be beneficial to reduce the February and March river release rate to prevent the need for larger release reductions in the spring*"

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November through March Operations

- **Current Criteria**
  - ***"In years with a well above normal spring runoff forecast, it may be beneficial to increase the February and March release rate to draft the lake sufficiently to meet desired lake levels for flood control…"***
- **Potential Impacts**
  - **Frequent changes during winter months**

Recommended Change to November through March Operations

- Continue to set winter release rate based on
  - End of October storage
  - Target end of March storage
  - Boysen and Buffalo Bill planned winter releases
  - Forecasted gains

- Adjust release rate during November through February to be at 3617 feet by end of March

- Adjust release rate during March and April to meet end of April storage target based on rule curves

Water Year 2015

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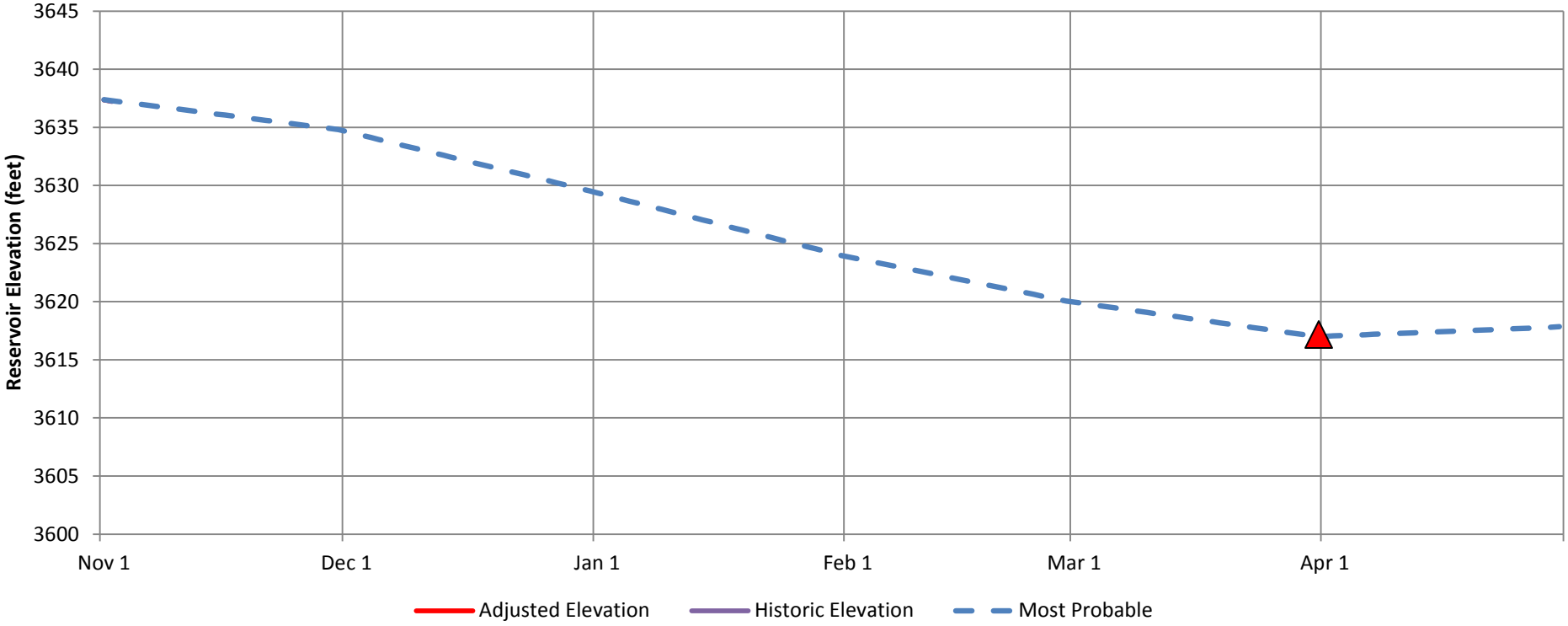
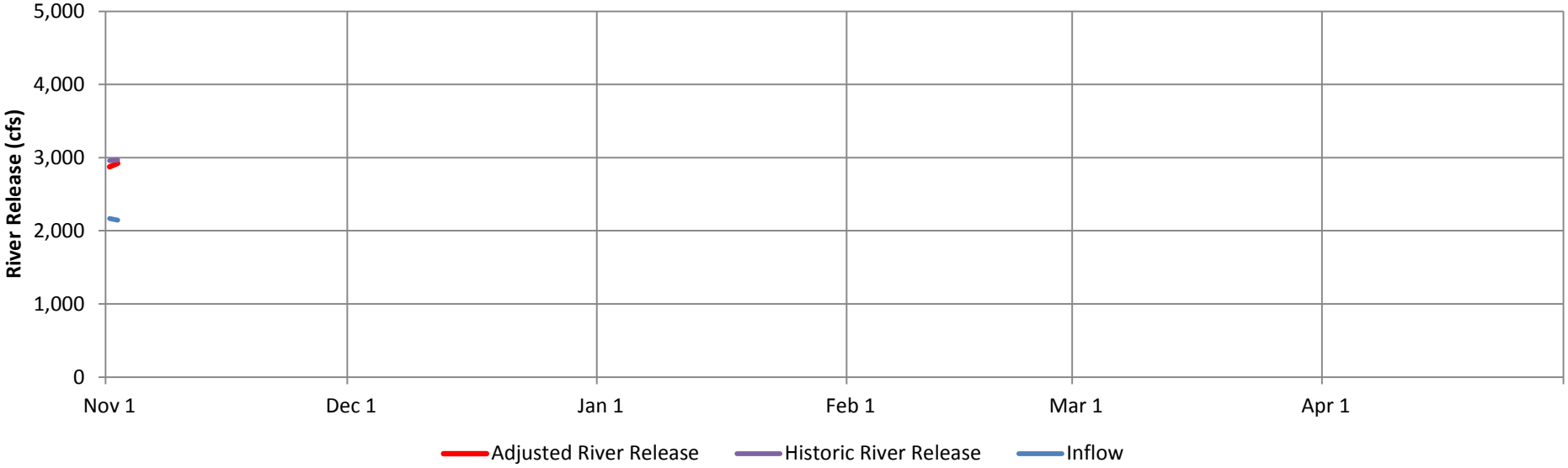
2015 November through April Operations





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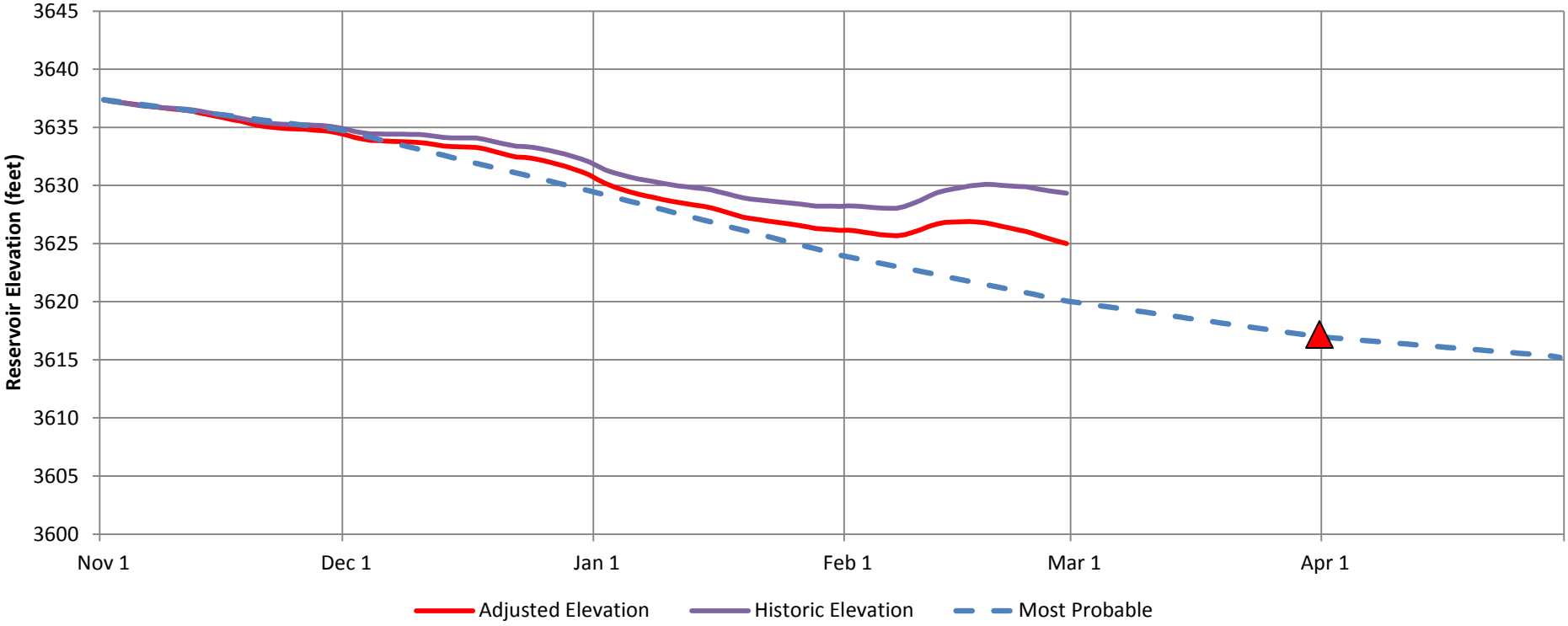

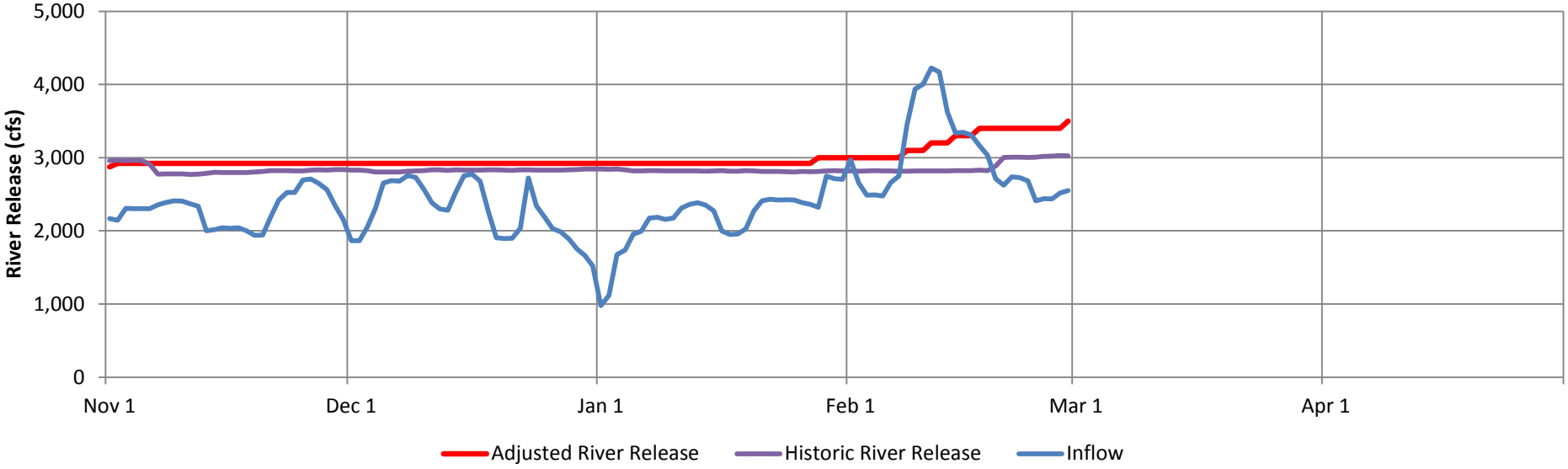

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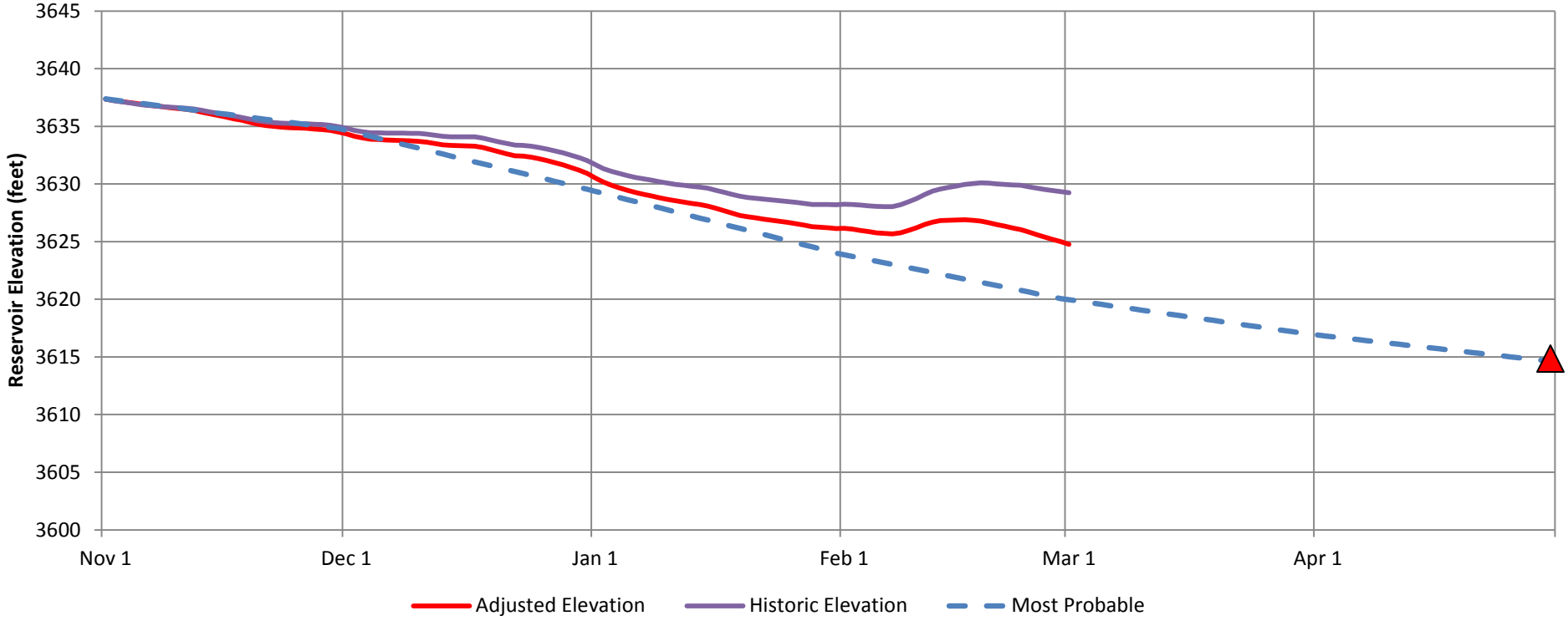

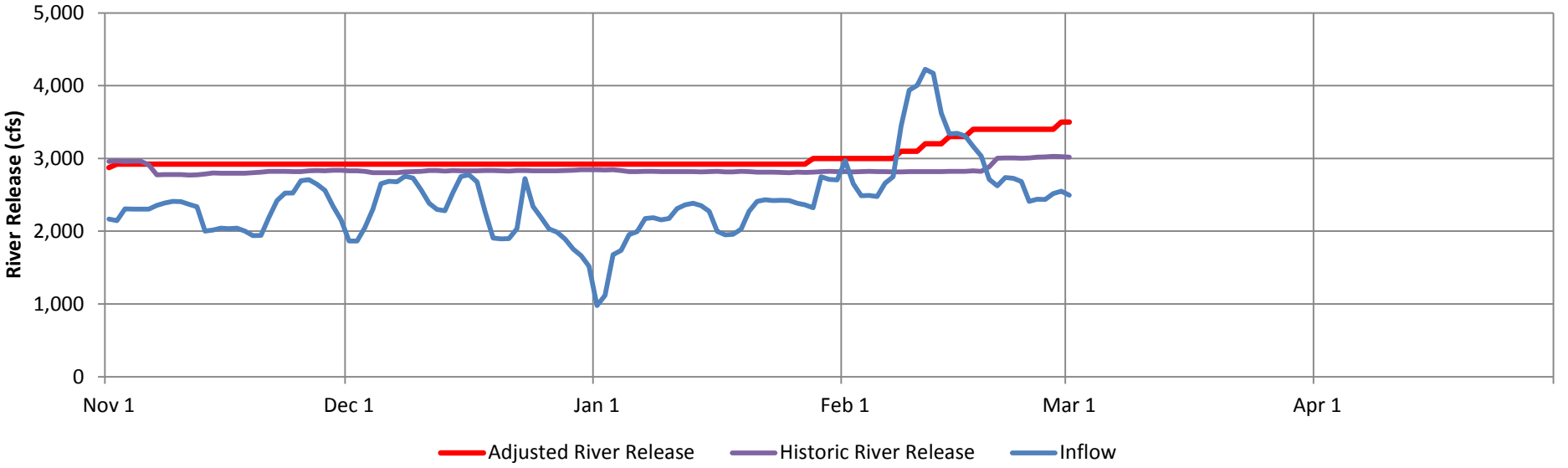

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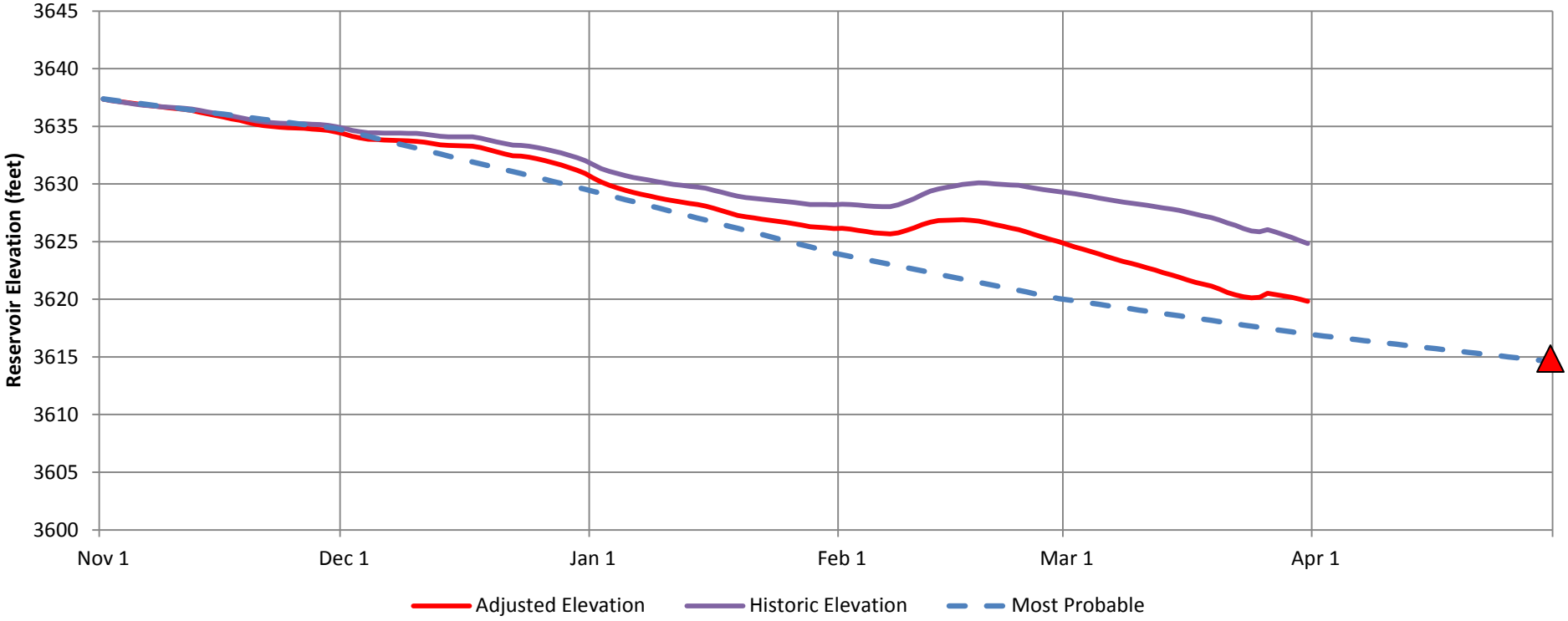

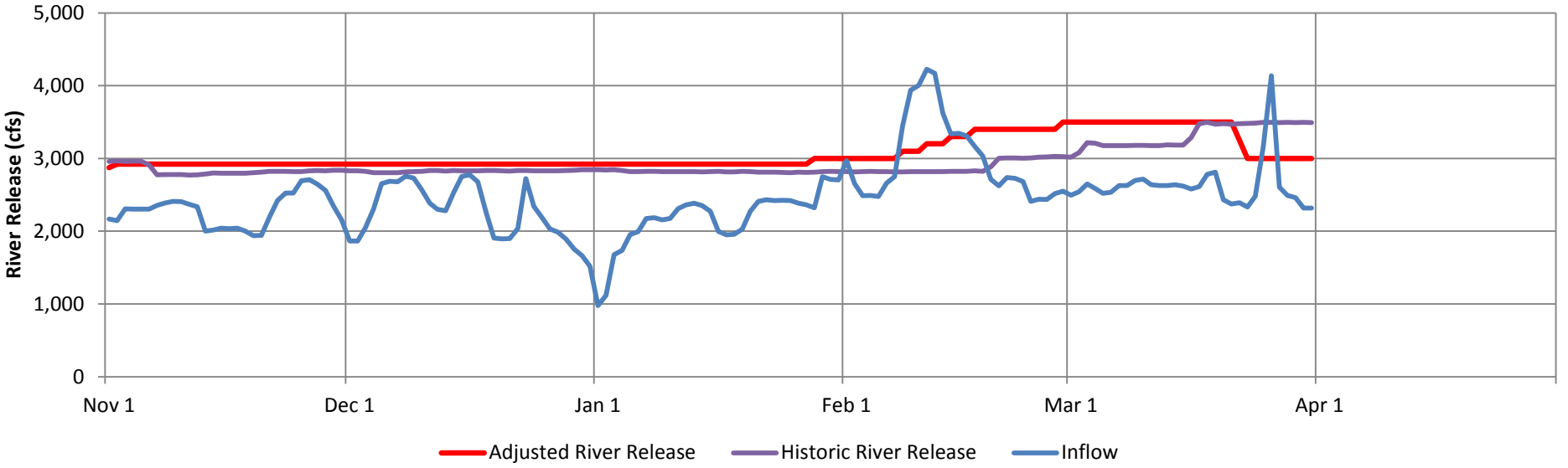

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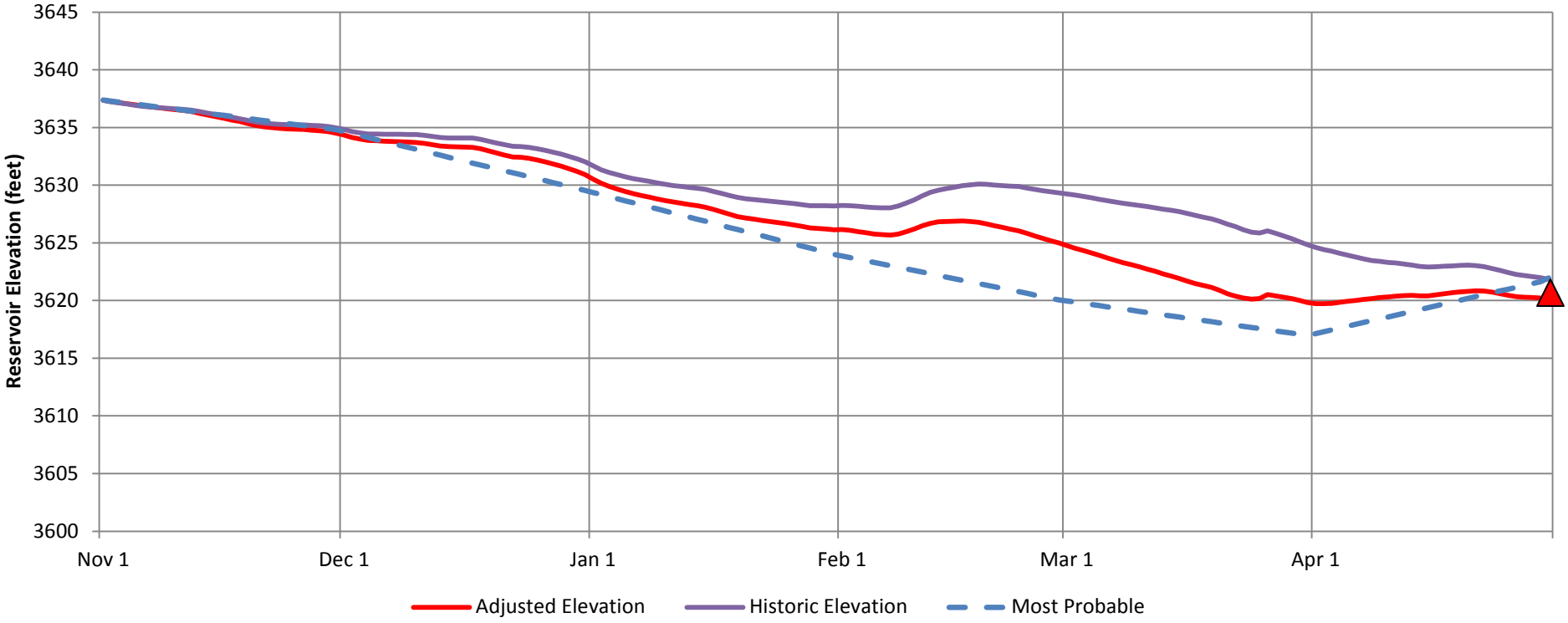

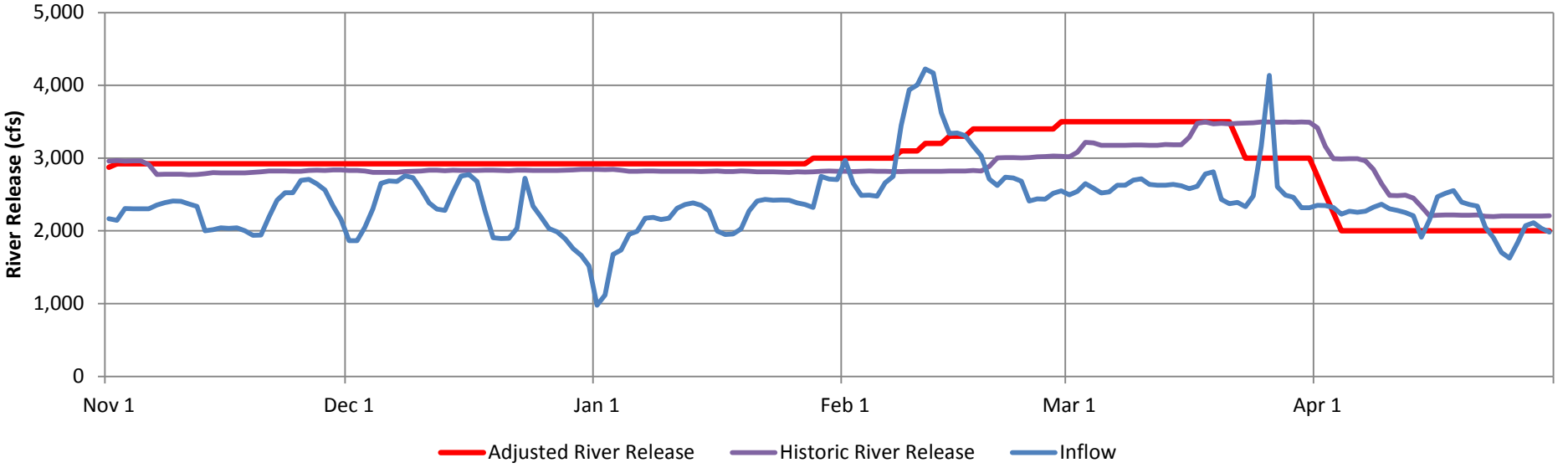

Water Year 2014

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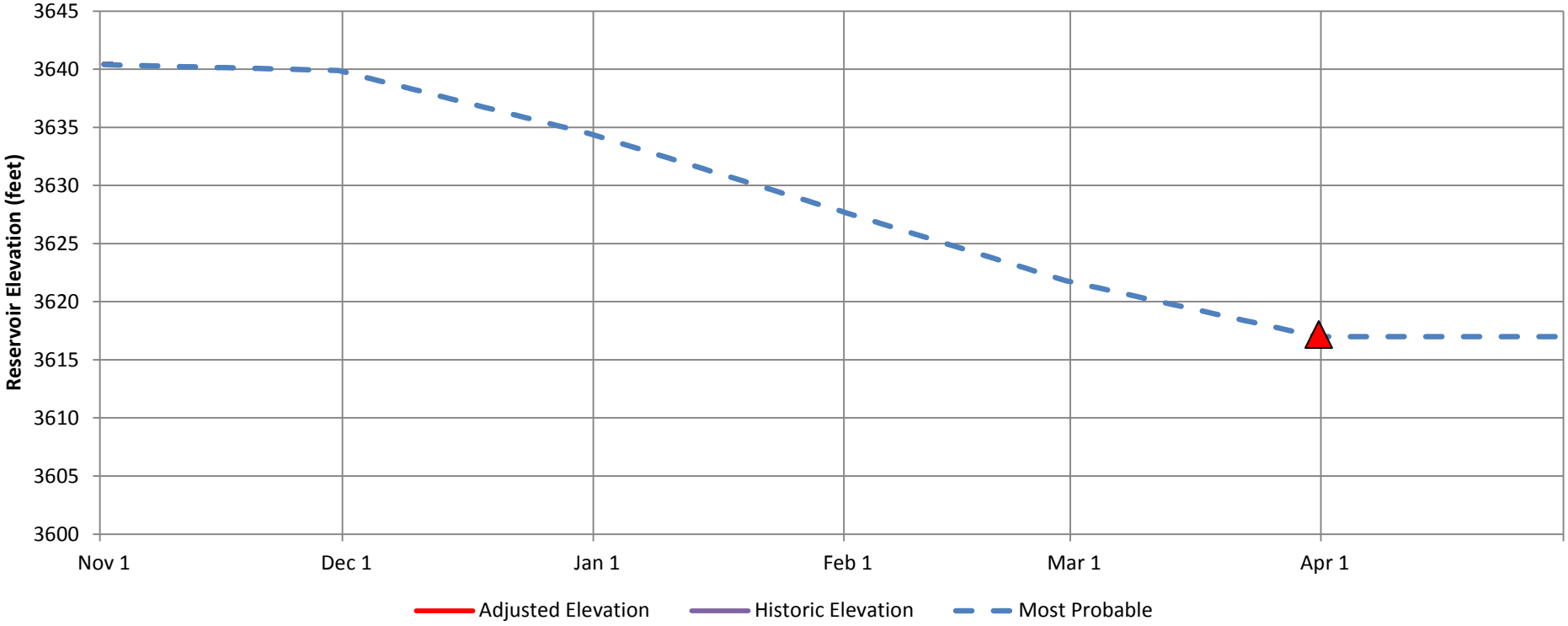
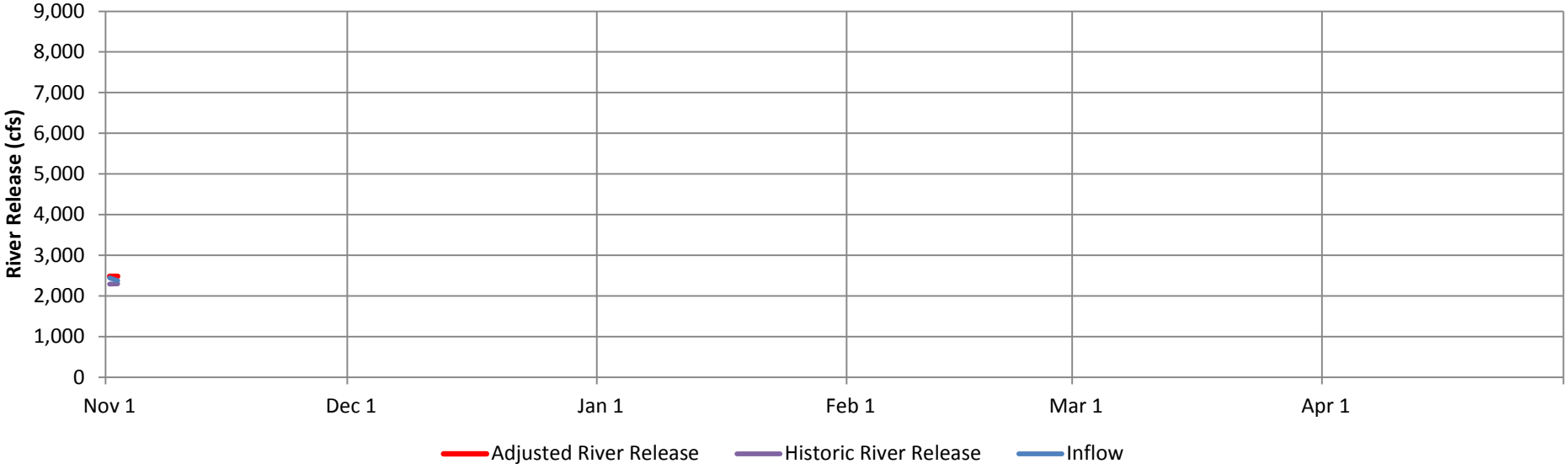
2014 November through April Operations





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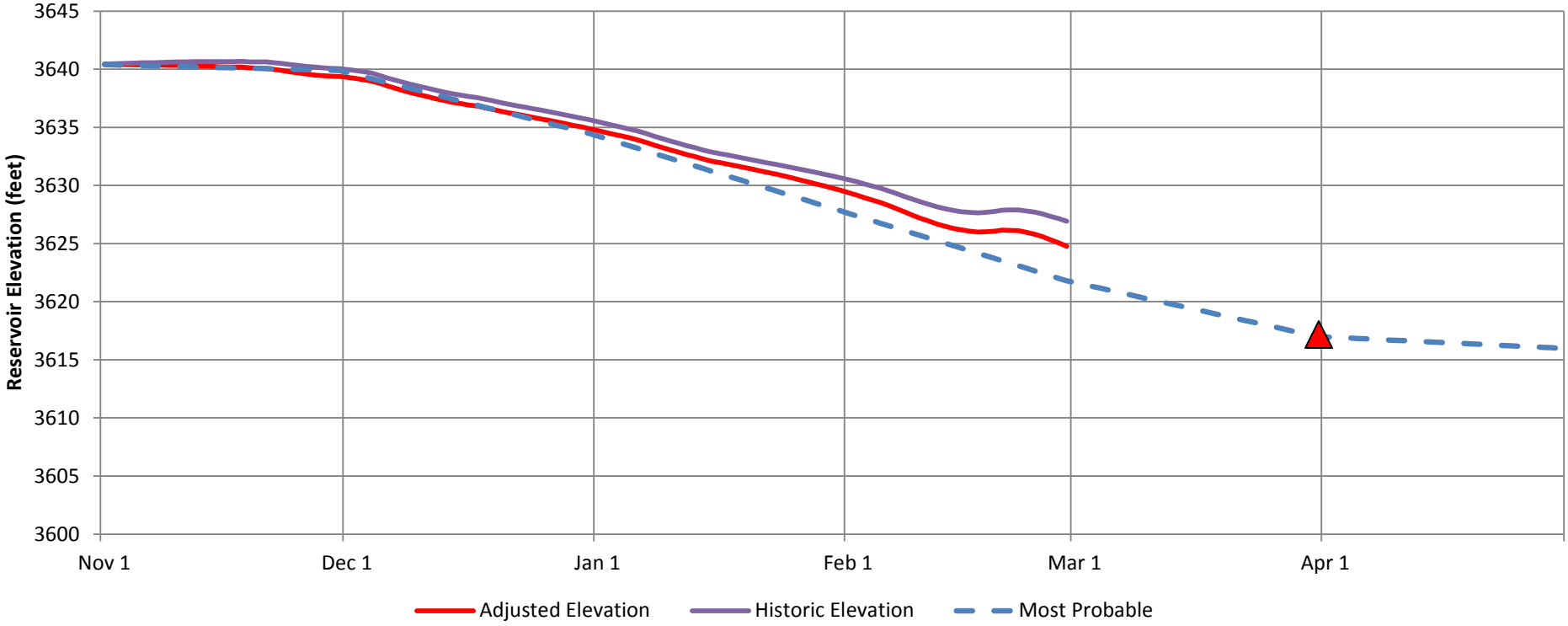

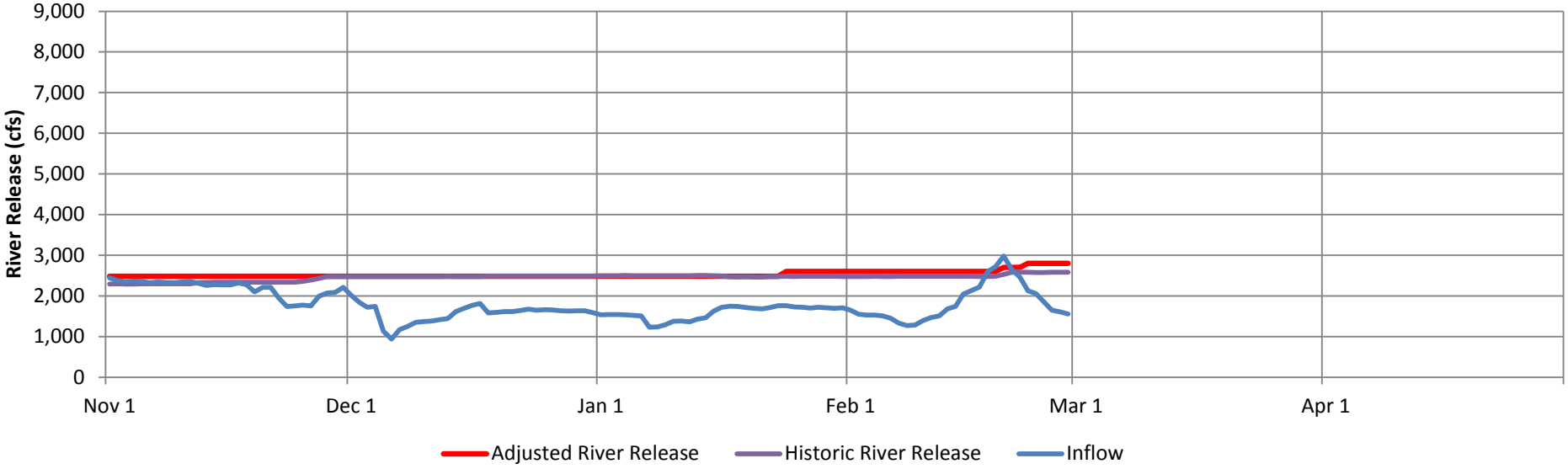

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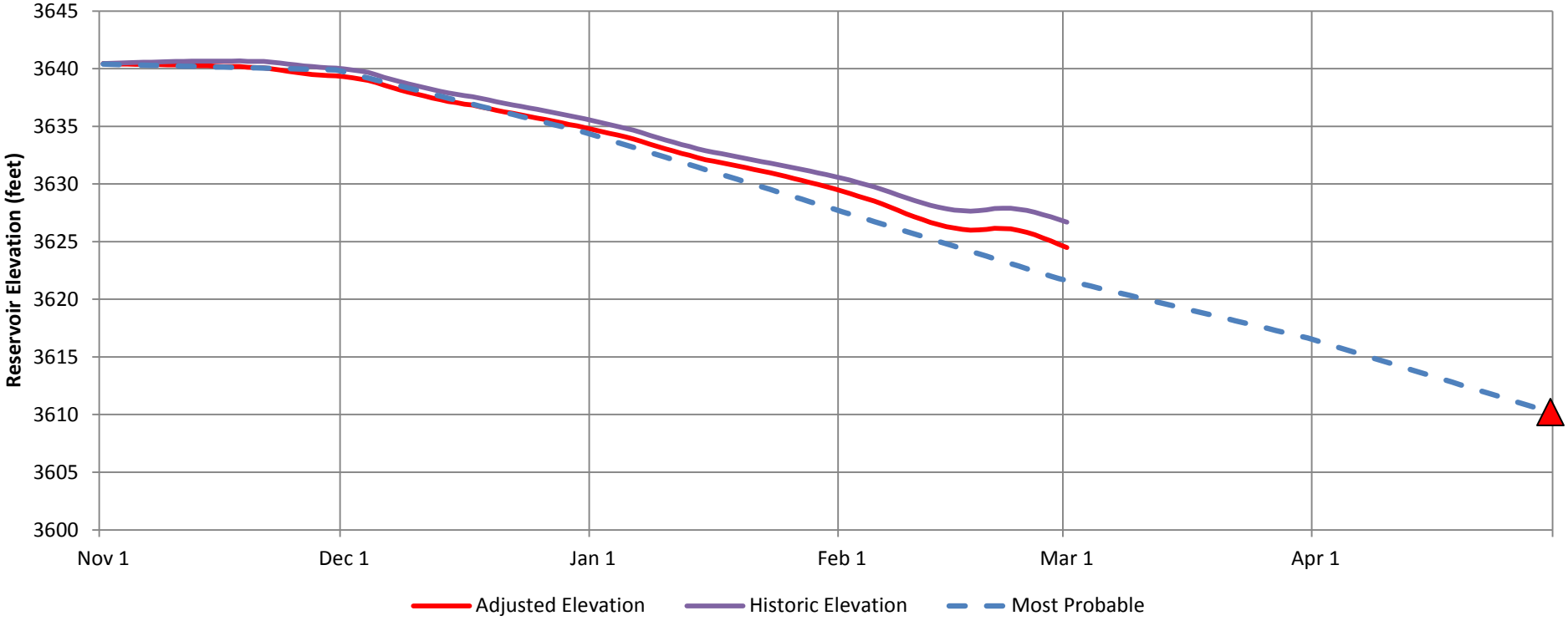

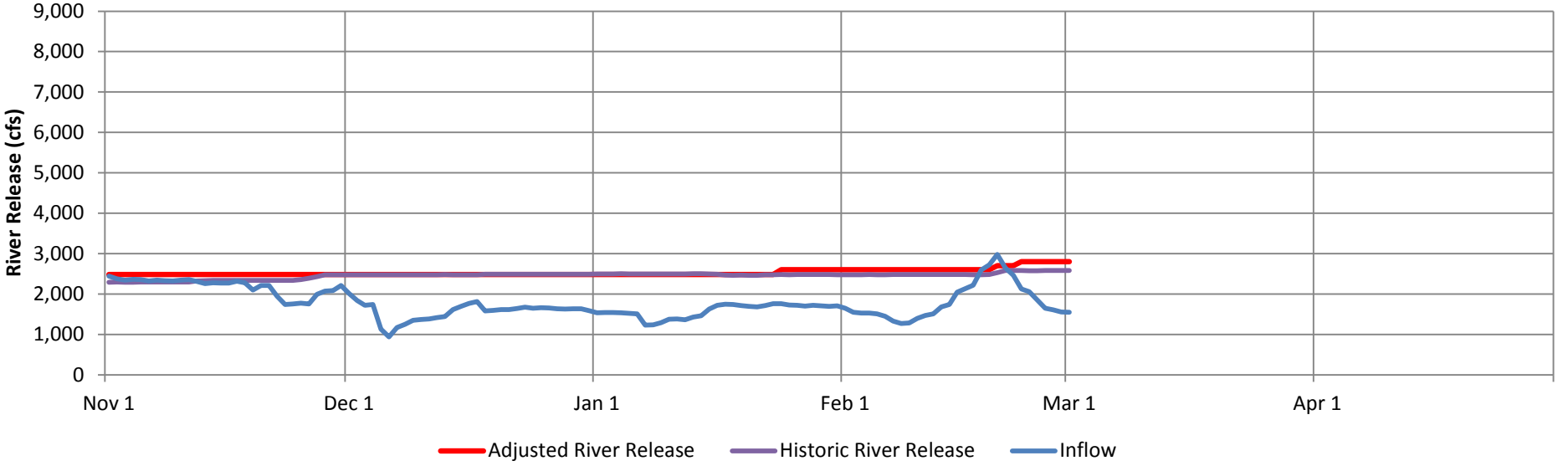

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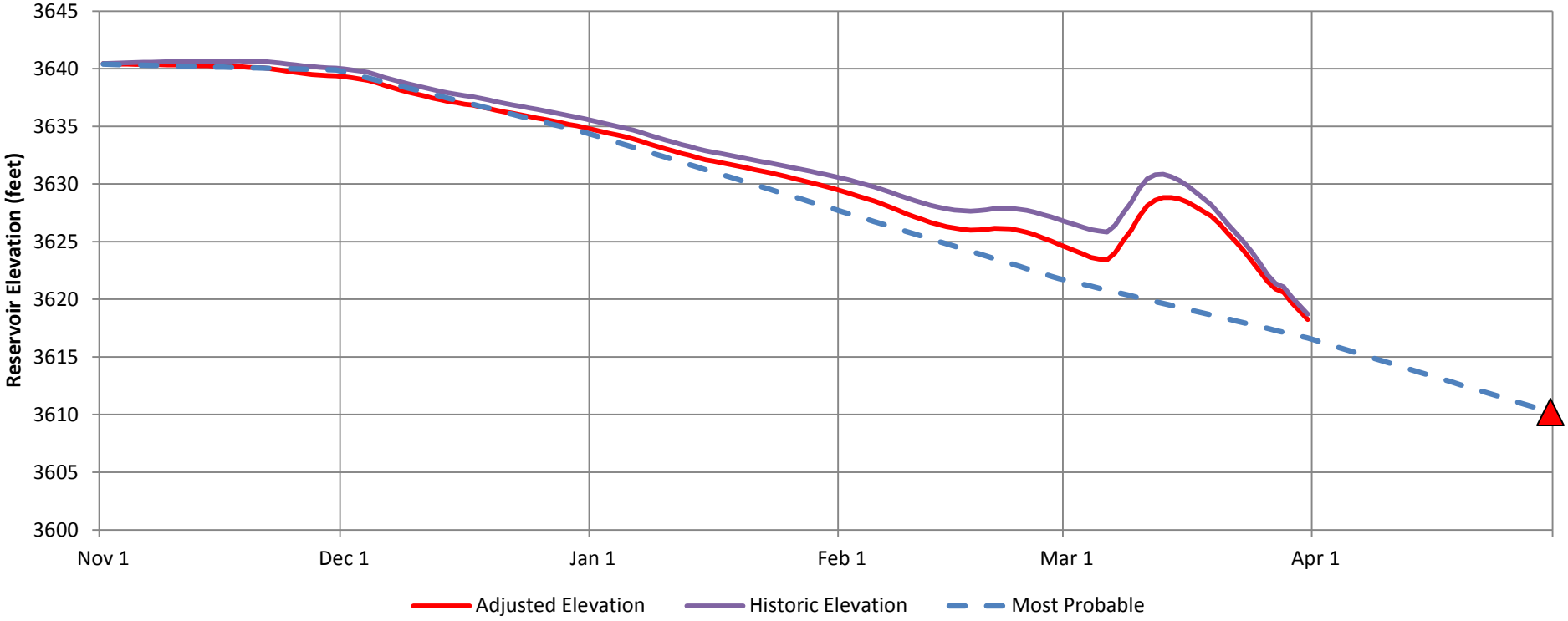

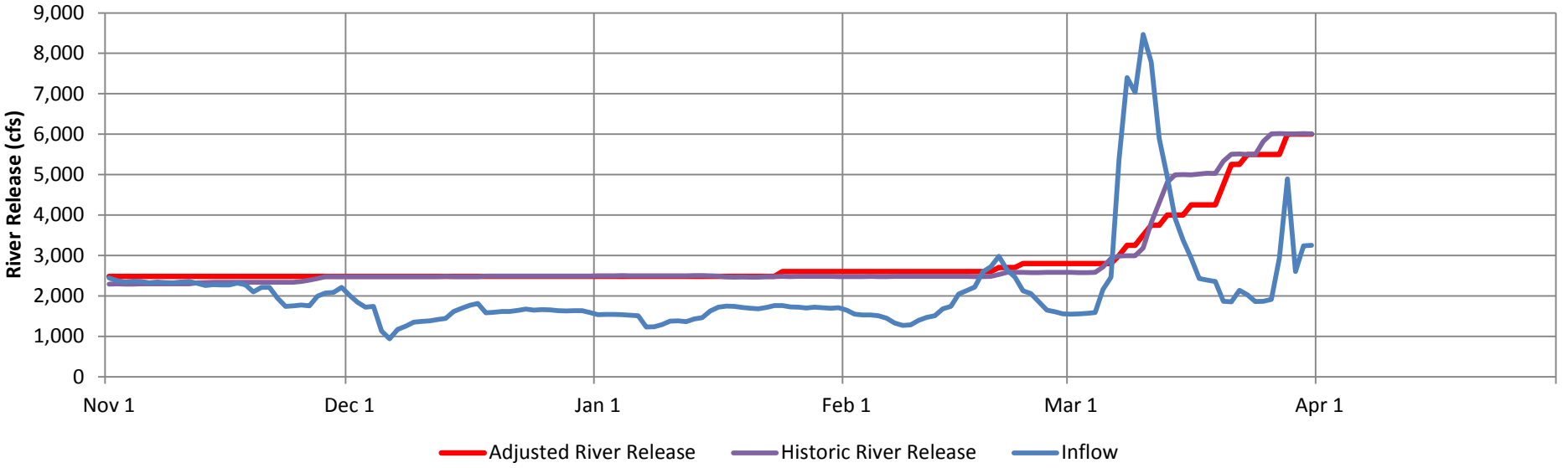

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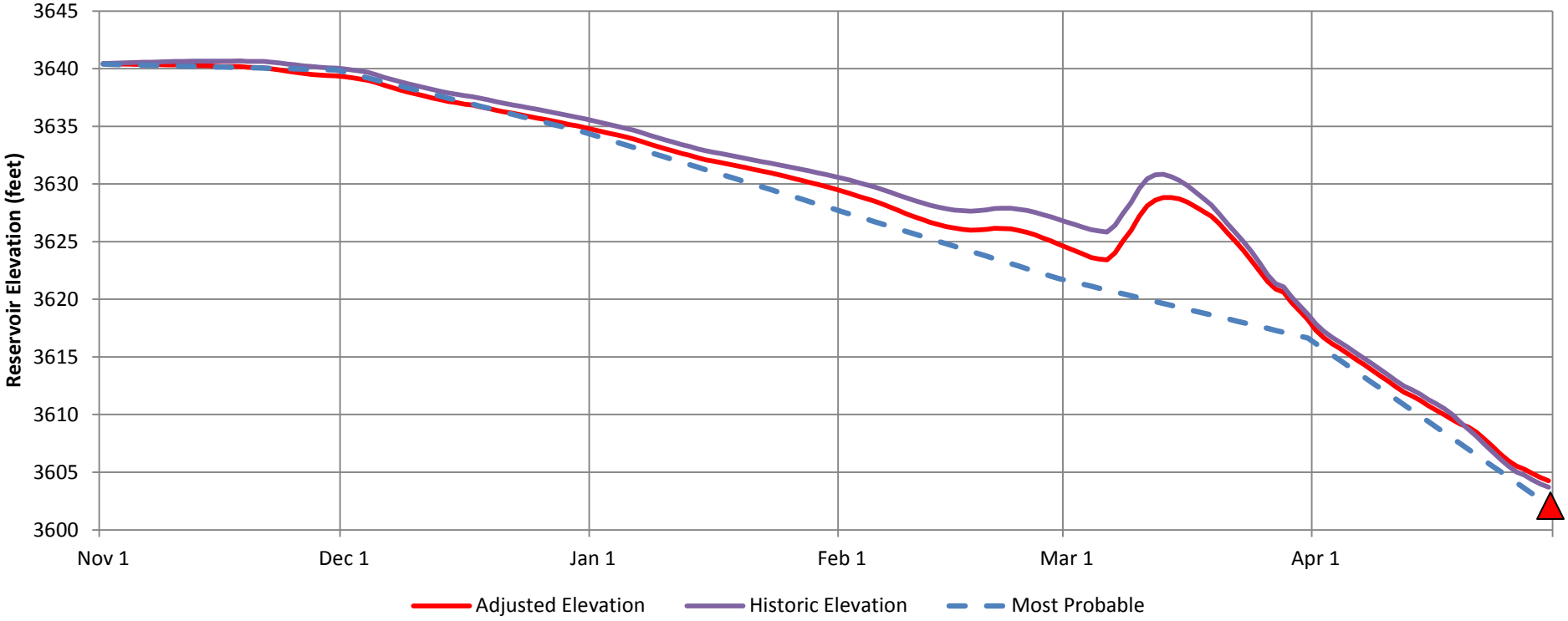

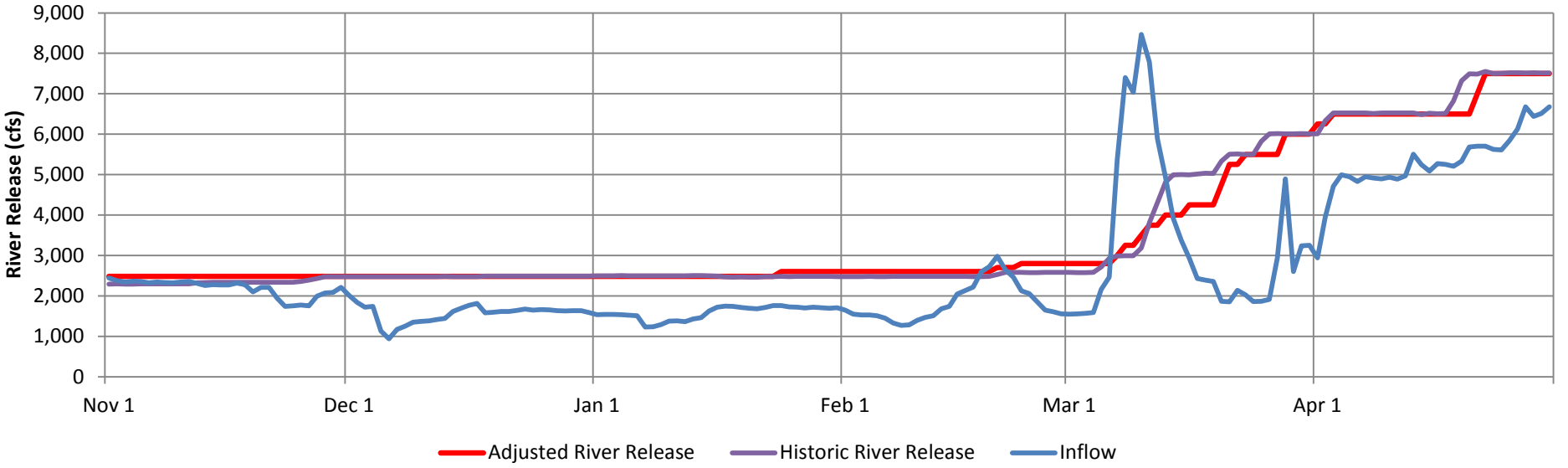

Water Year 2006

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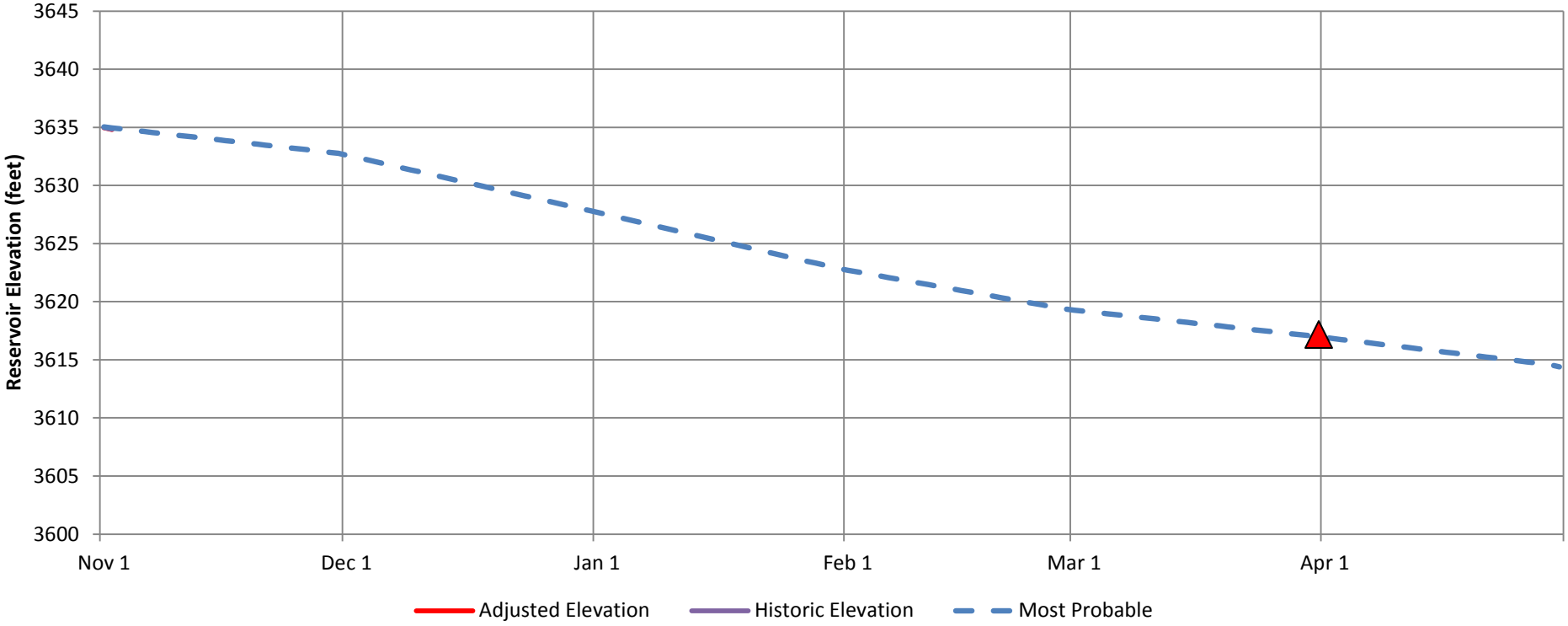
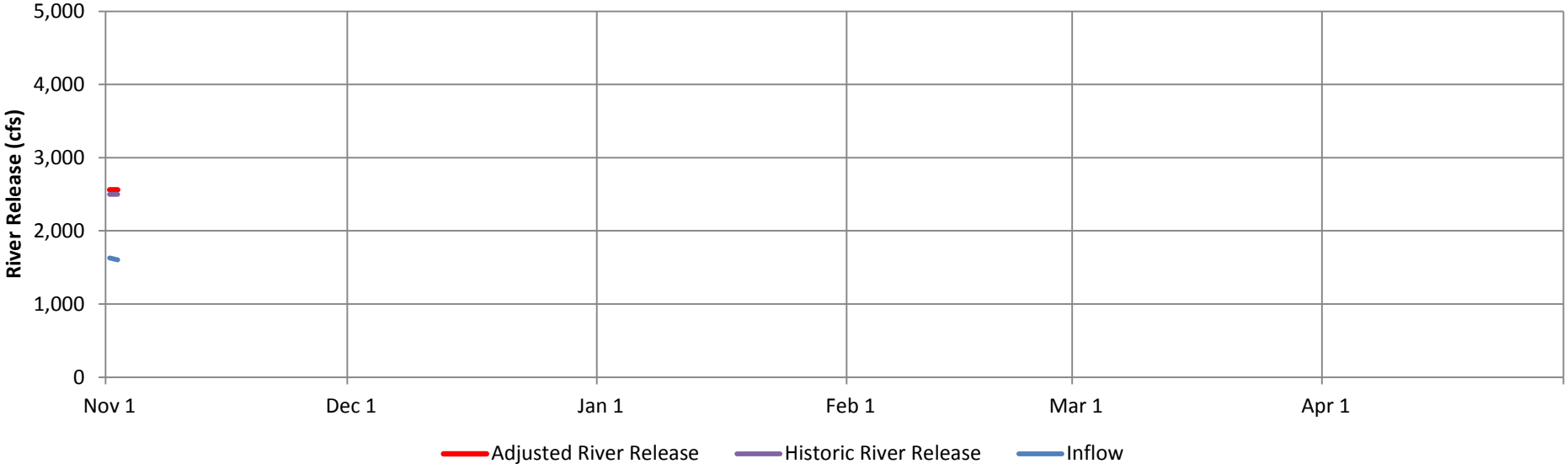
2006 November through April Operations





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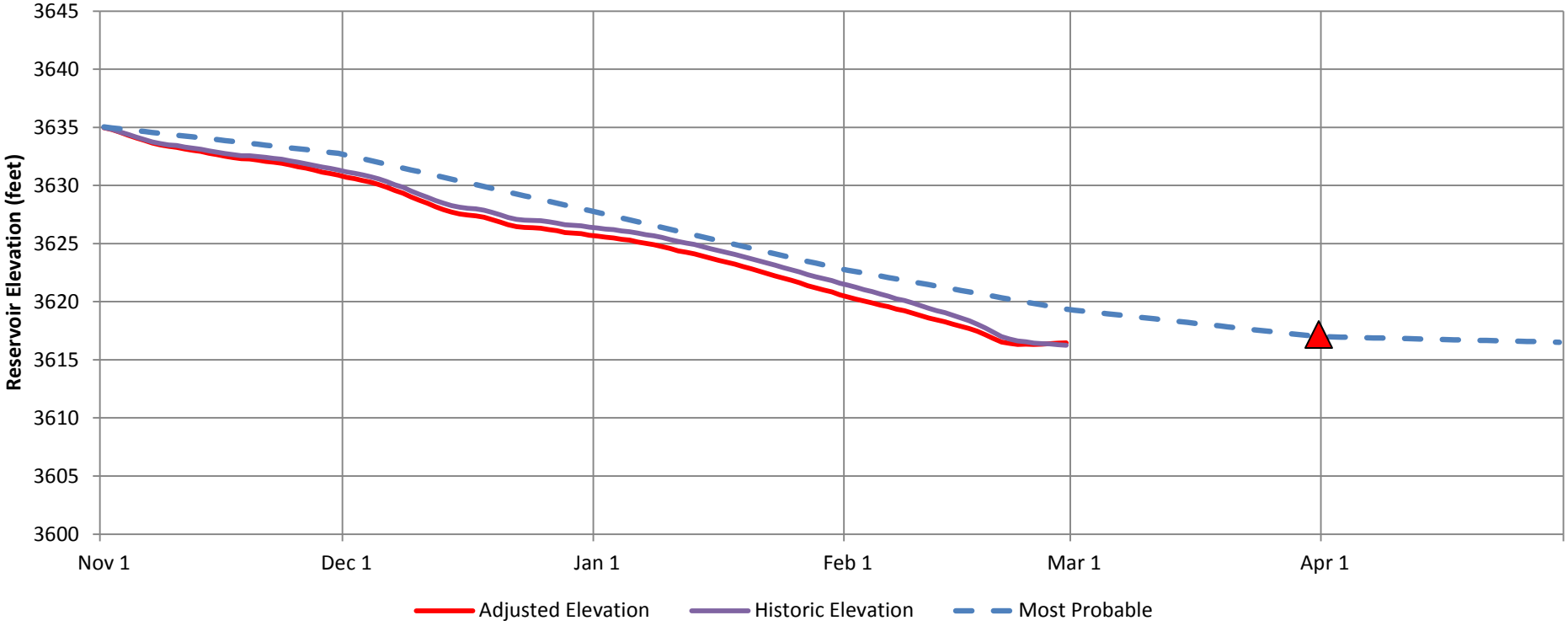

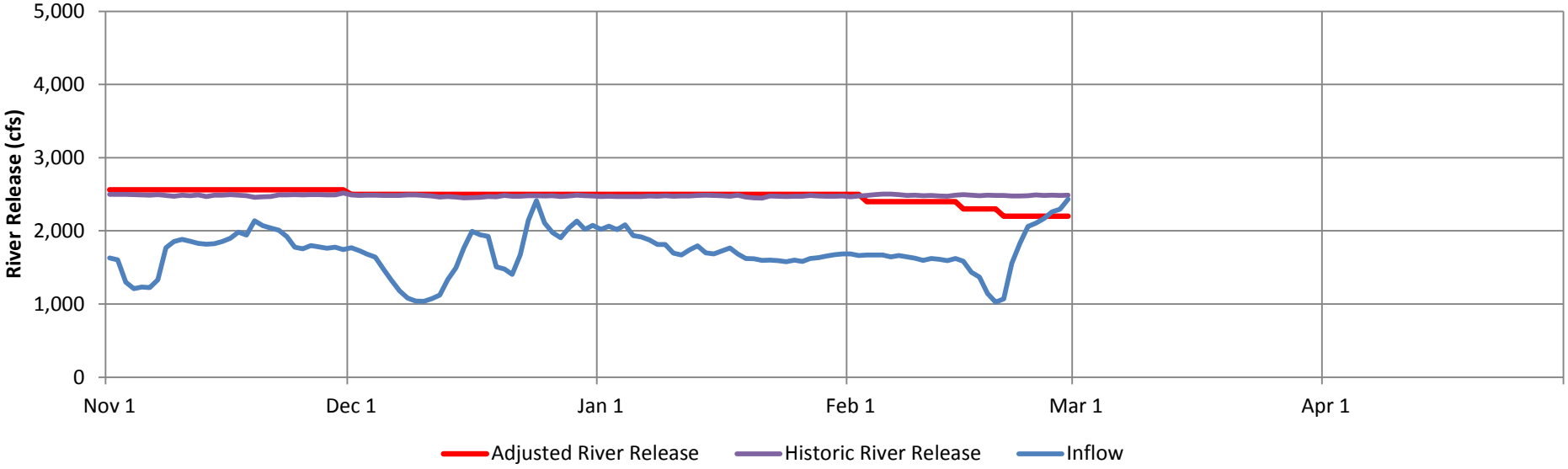

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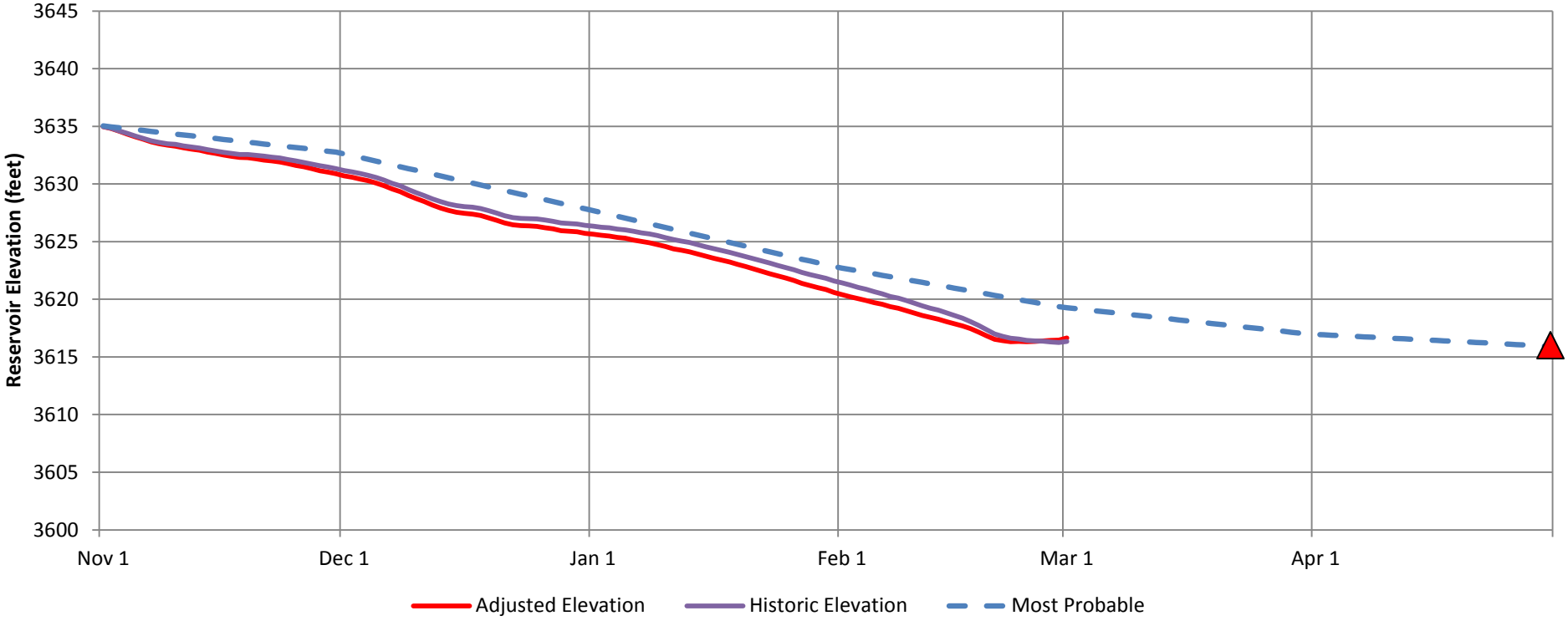

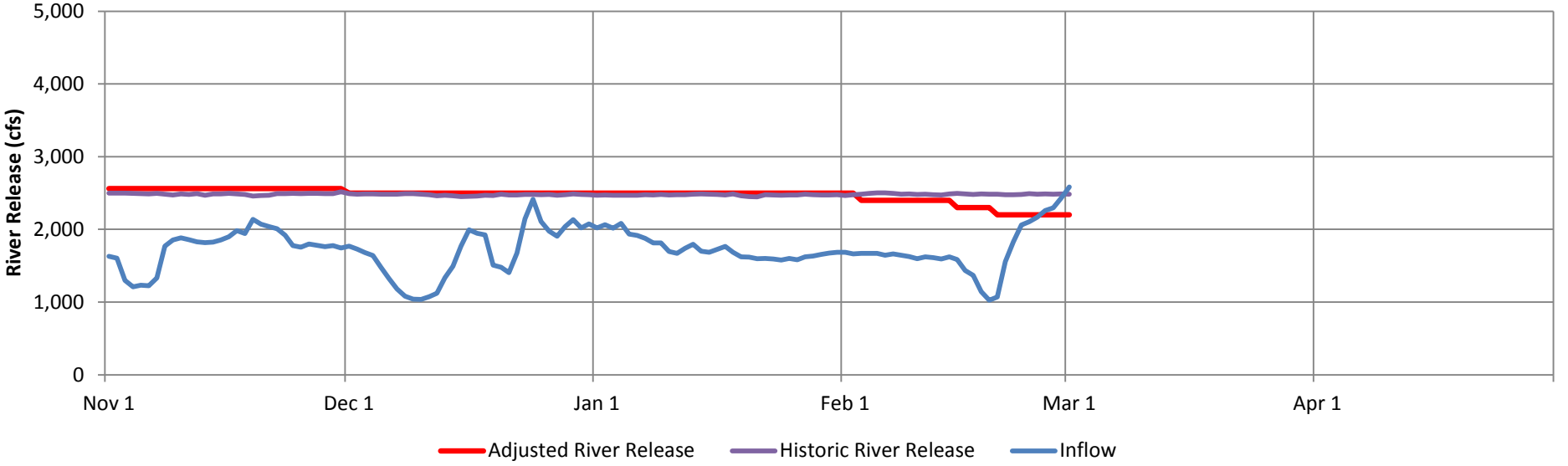

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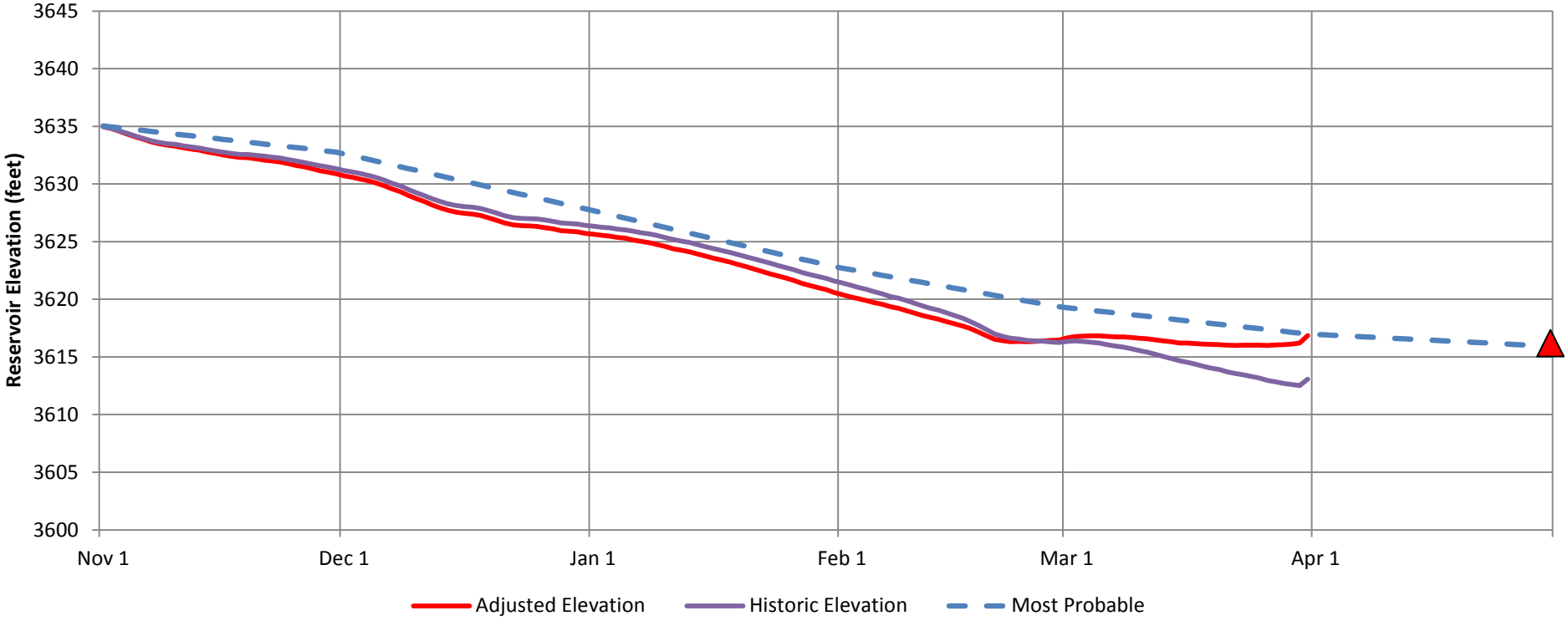

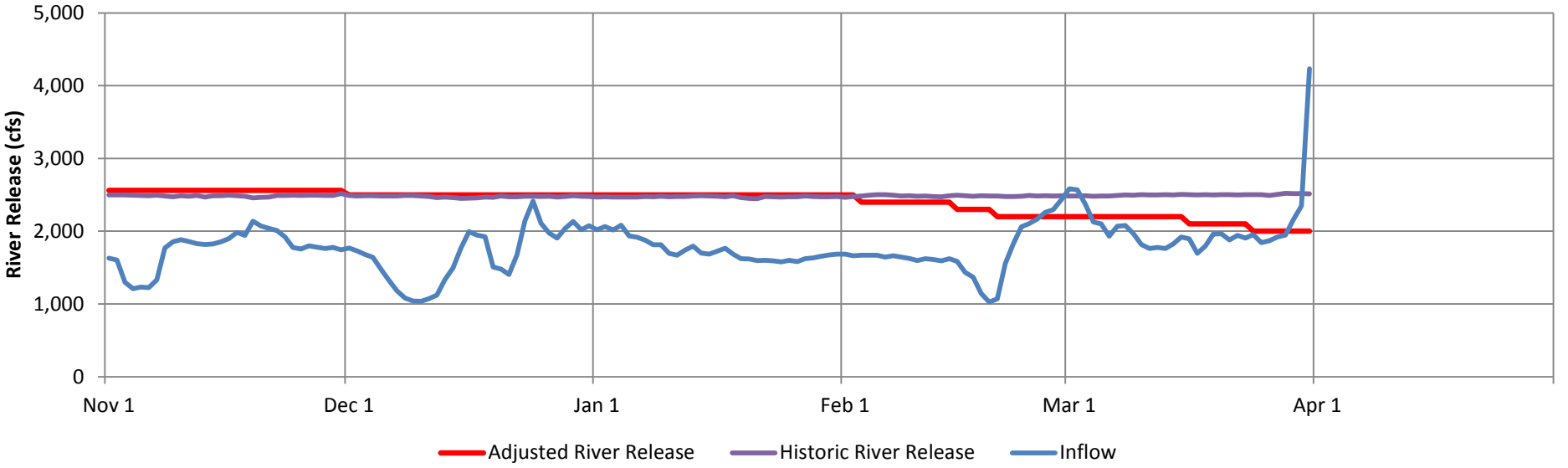

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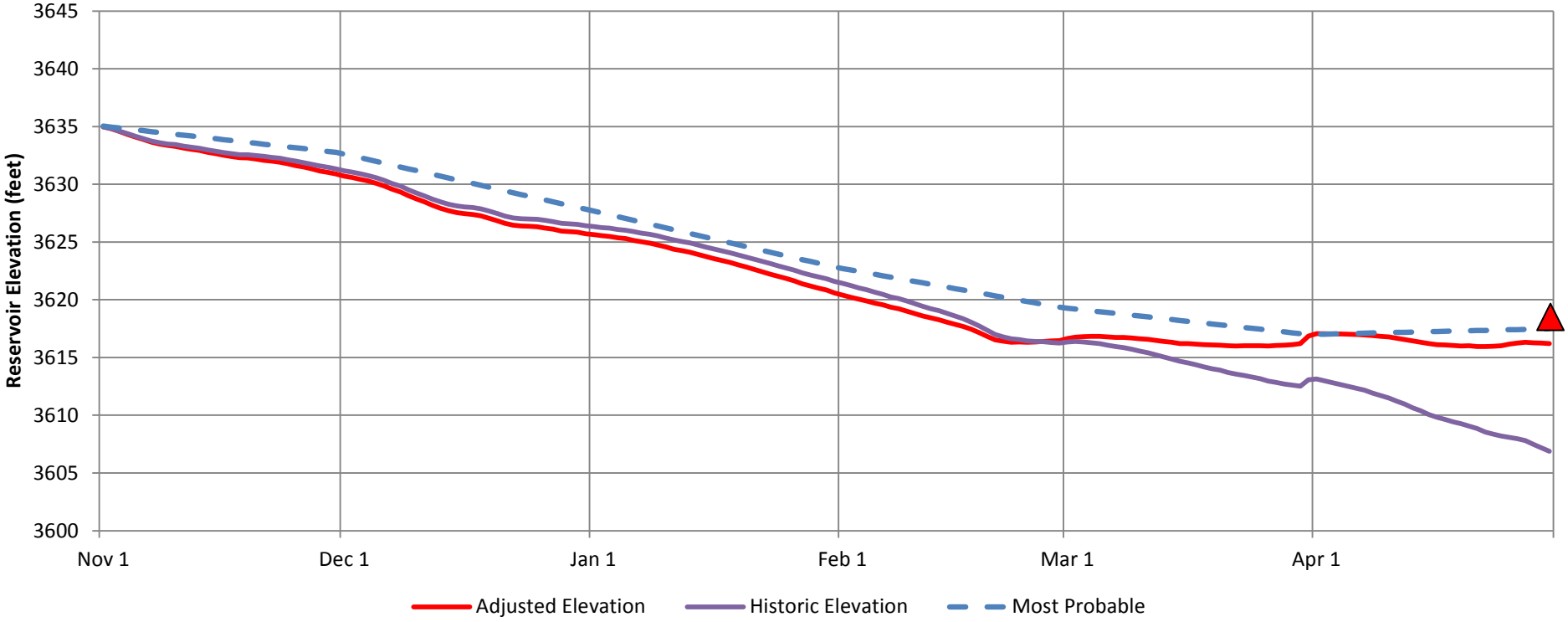

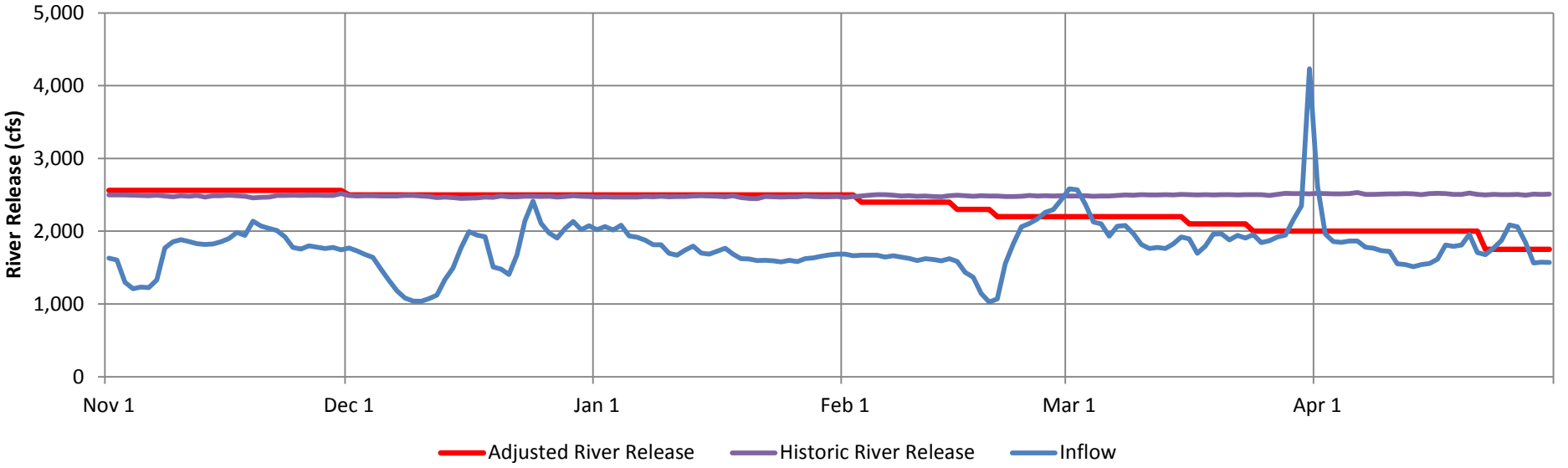

Discussion on Recommended Changes?

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Next Steps

- **Complete On-Going Evaluations**
  - **Provide updates on Spring 2016 Stakeholder Calls**
  - **Present status and Recommendations at April 2016 Spring Meeting**
- **Wrap-up effort with a report responding to all comments**
  - **Anticipate “Interim” posting of actions completed**
- **Create a condensed operating criteria document**
- **http://www.usbr.gov/gp/mtao/yellowtail/bighorn_longterm.html**