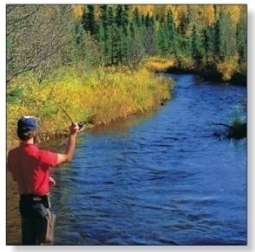
Transient stage data for the Big Wood River

Presented by Allan Wylie, IDWR

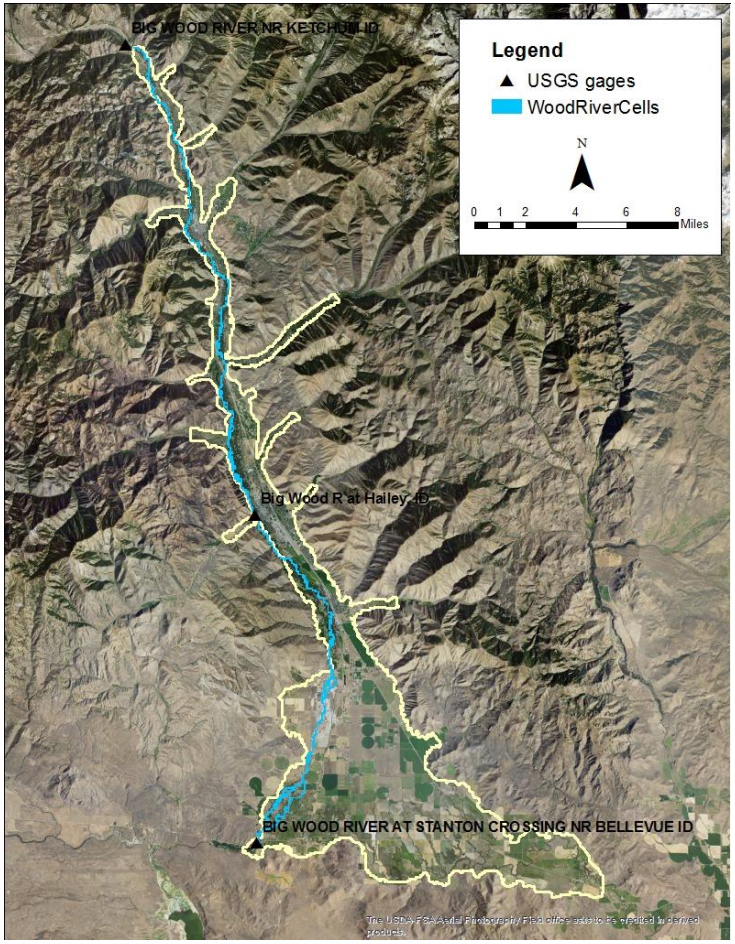
Date May 24, 2017

Outline

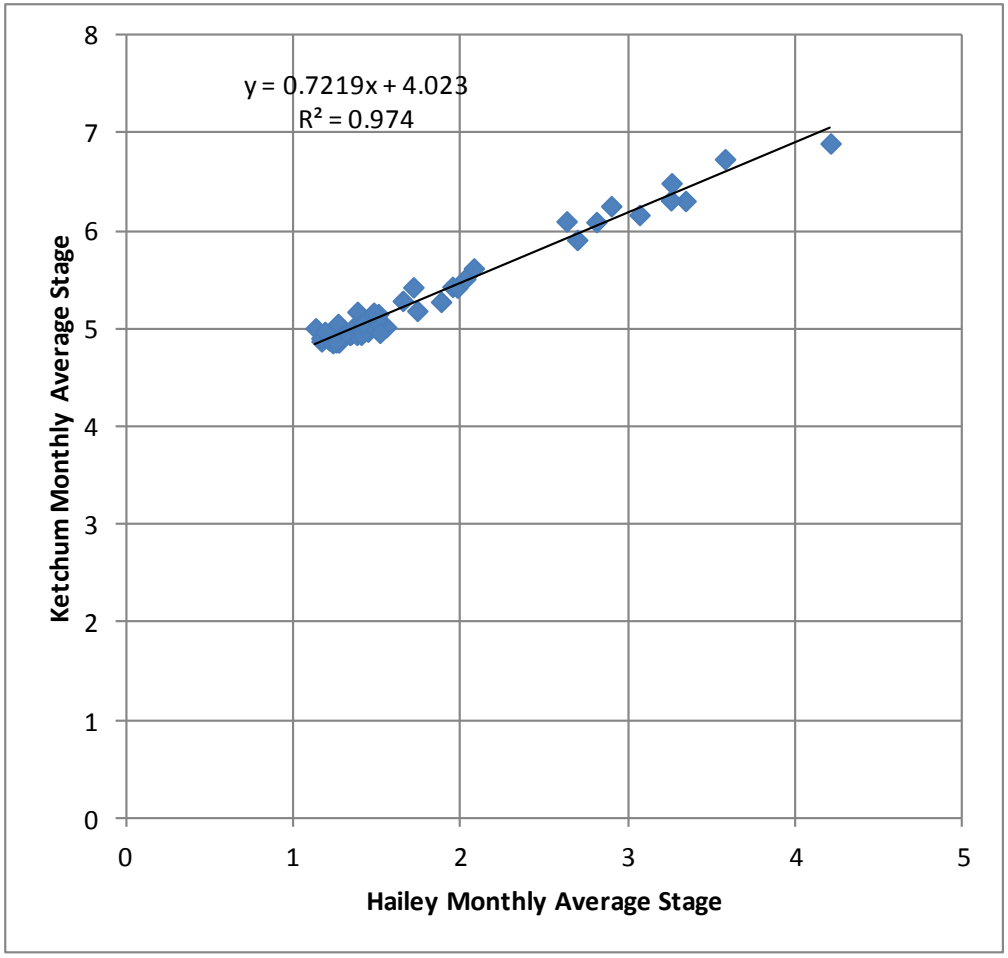
- Data from USGS
  - 15 minute
- Convert to average daily
  - Plot to check for problems
- Convert to average monthly
- Strategy for including in model
- Modifications going forward

Continuous Stream Gages Along Big Wood River



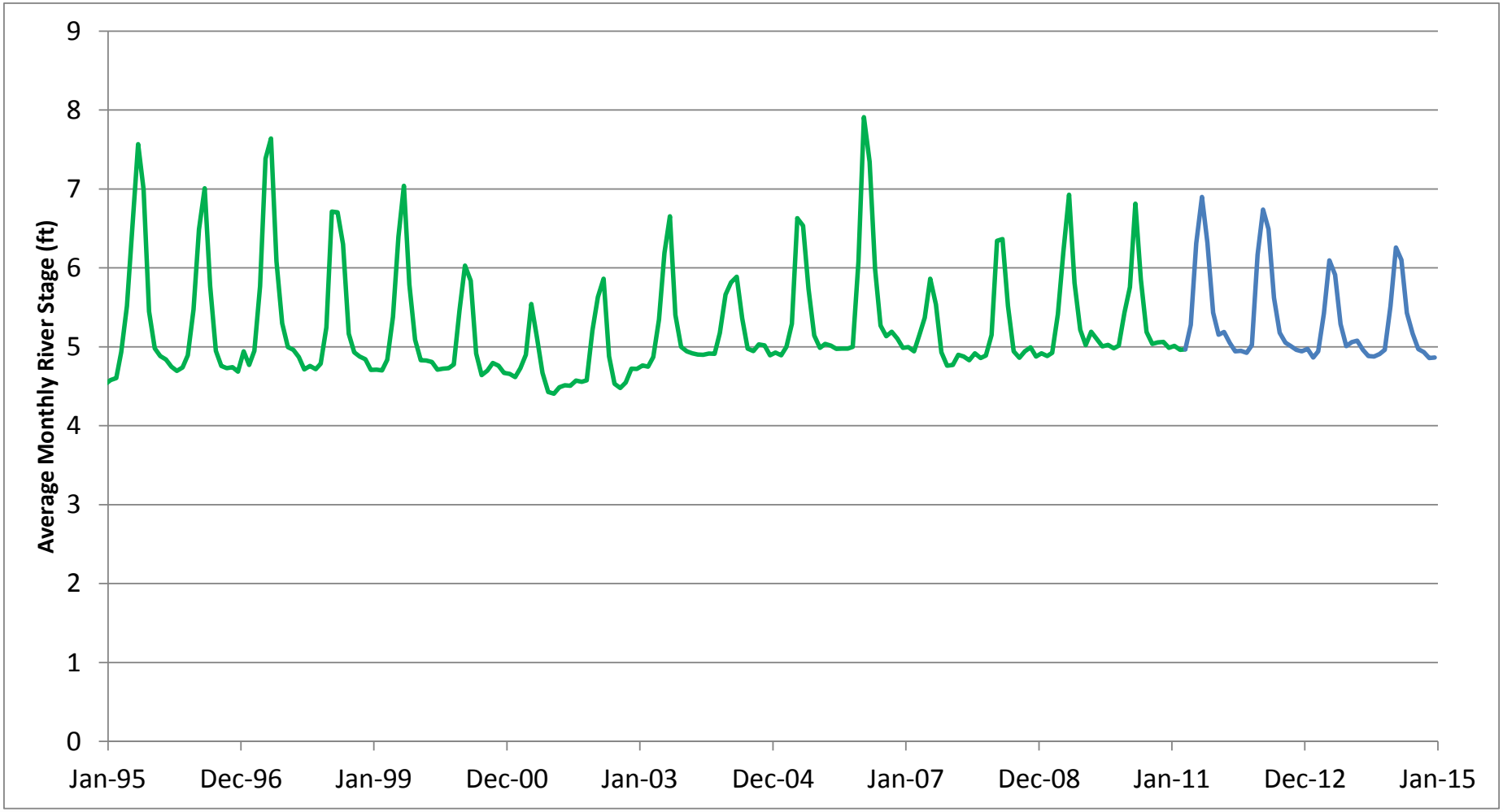
- Nr Ketchum
- At Hailey
- At Stanton Crossing

Nr Ketchum average monthly

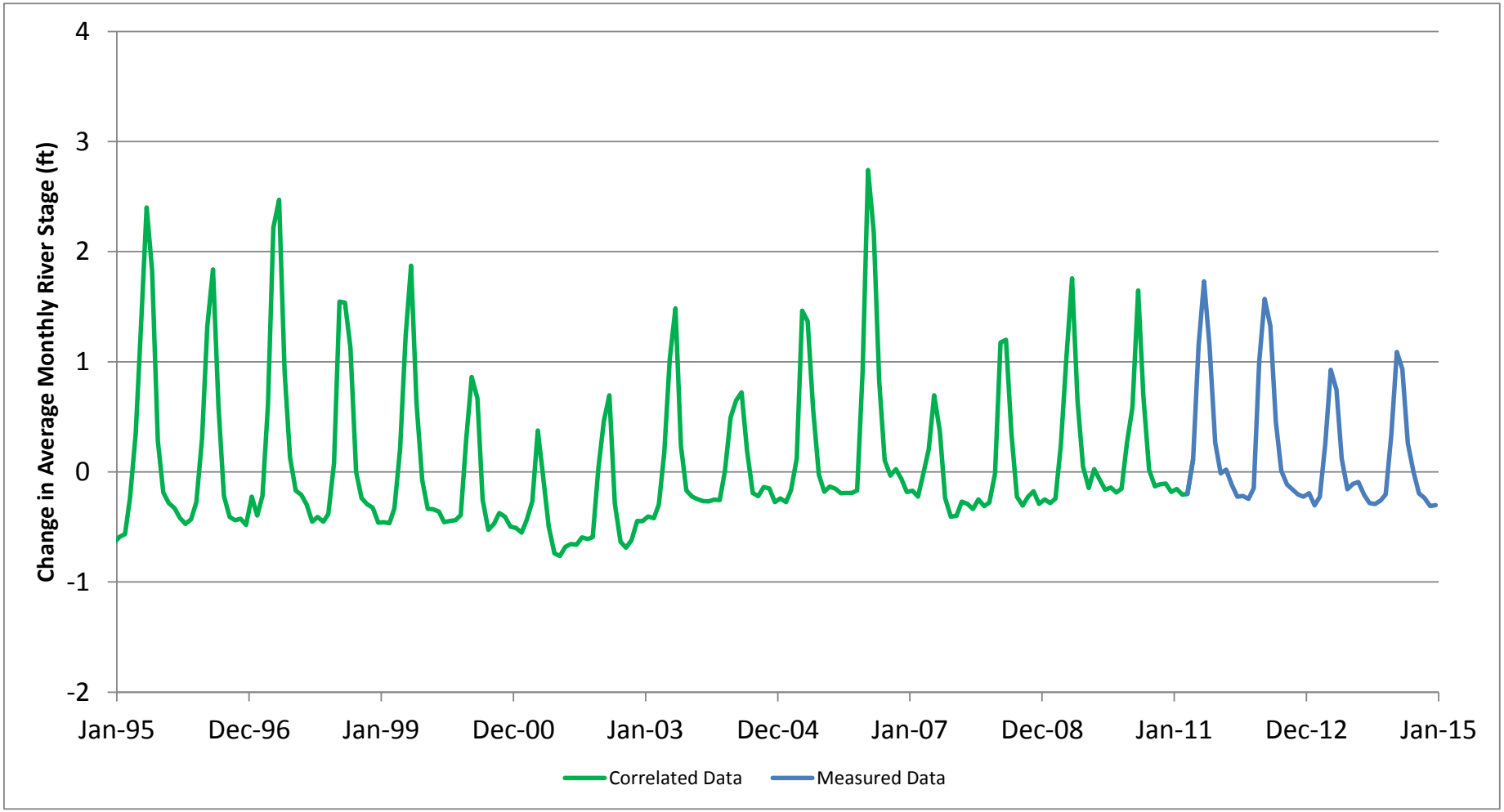


- Nr Ketchum gage in operation 1948-1971 and 2011-present
- Correlate Nr Ketchum monthly average with At Hailey monthly average

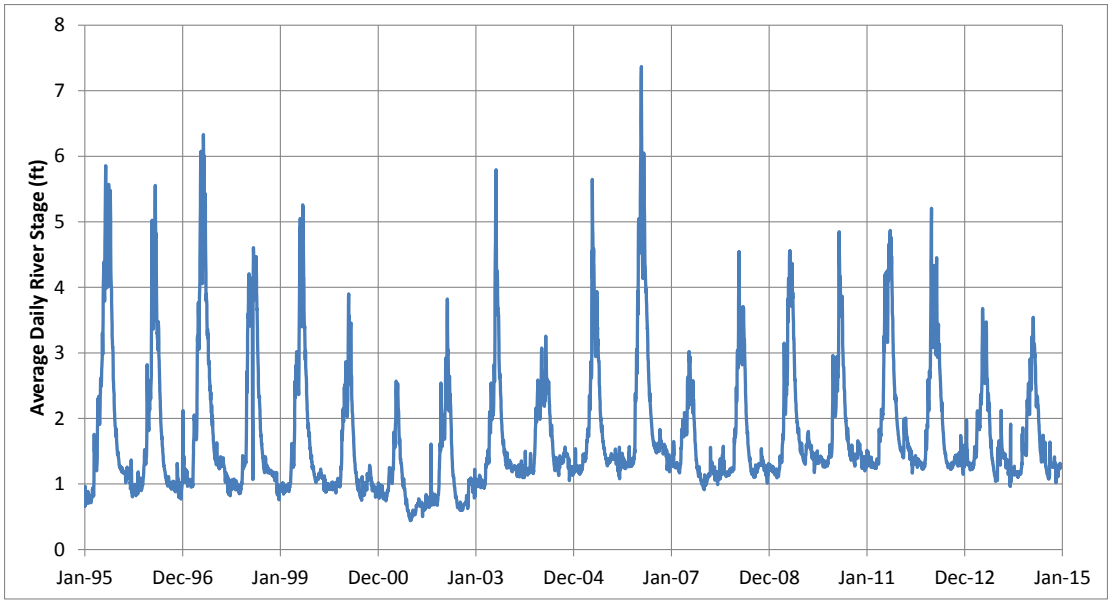
Nr Ketchum monthly stage



Nr Ketchum monthly change



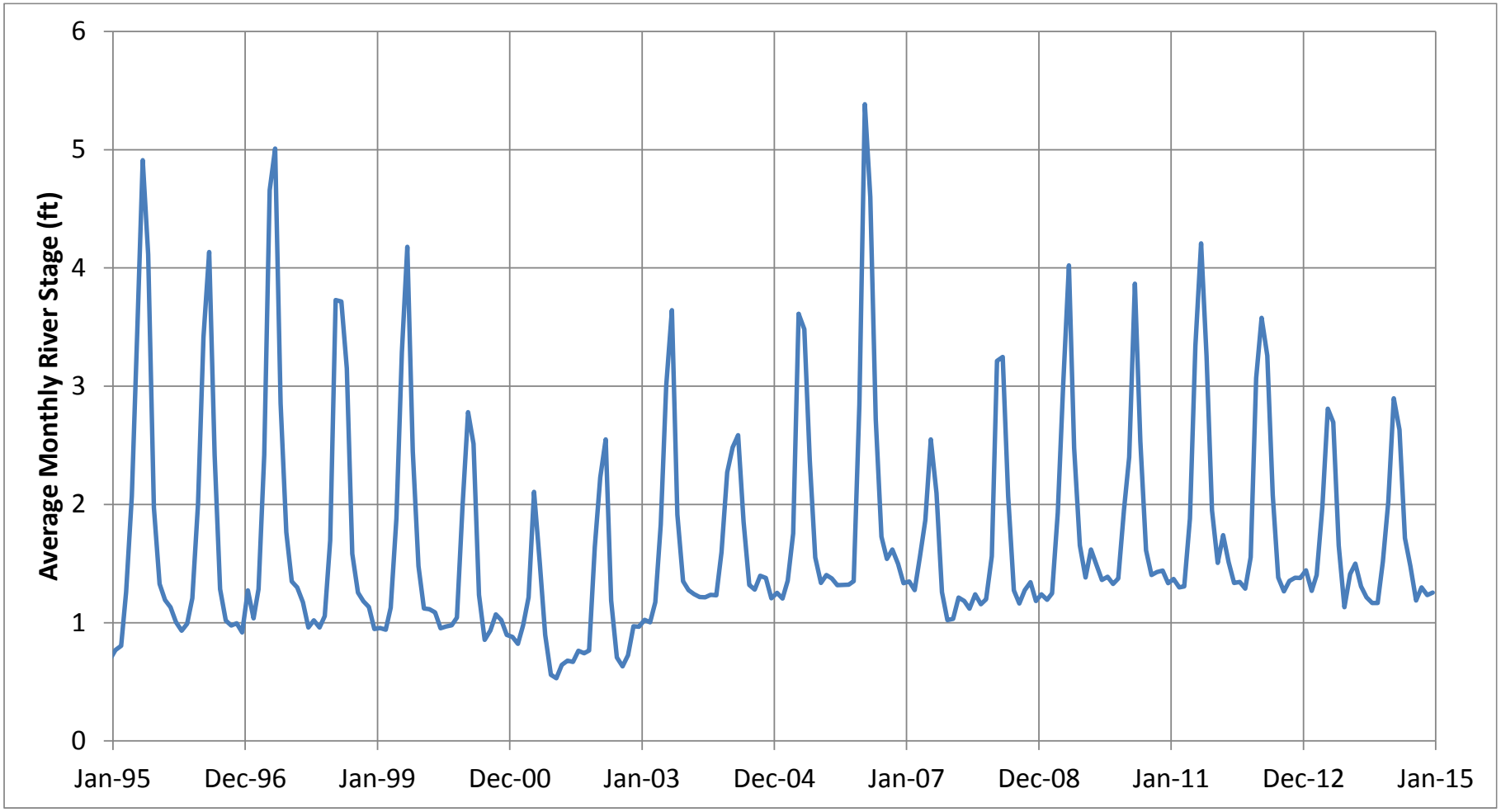
At Hailey average daily



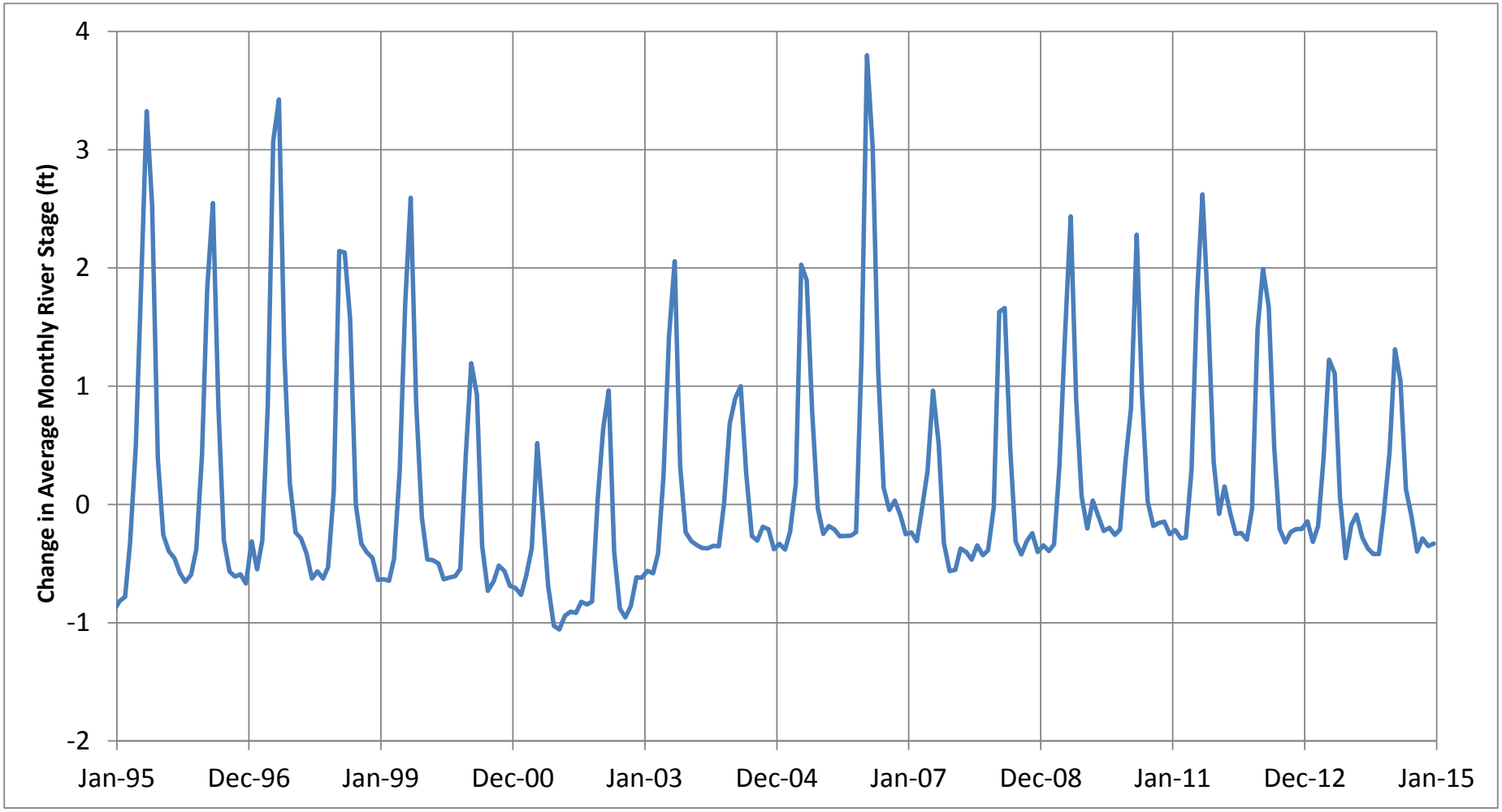
Evidence of Icing

- Assume prior day's stage is best estimate of stage during icing

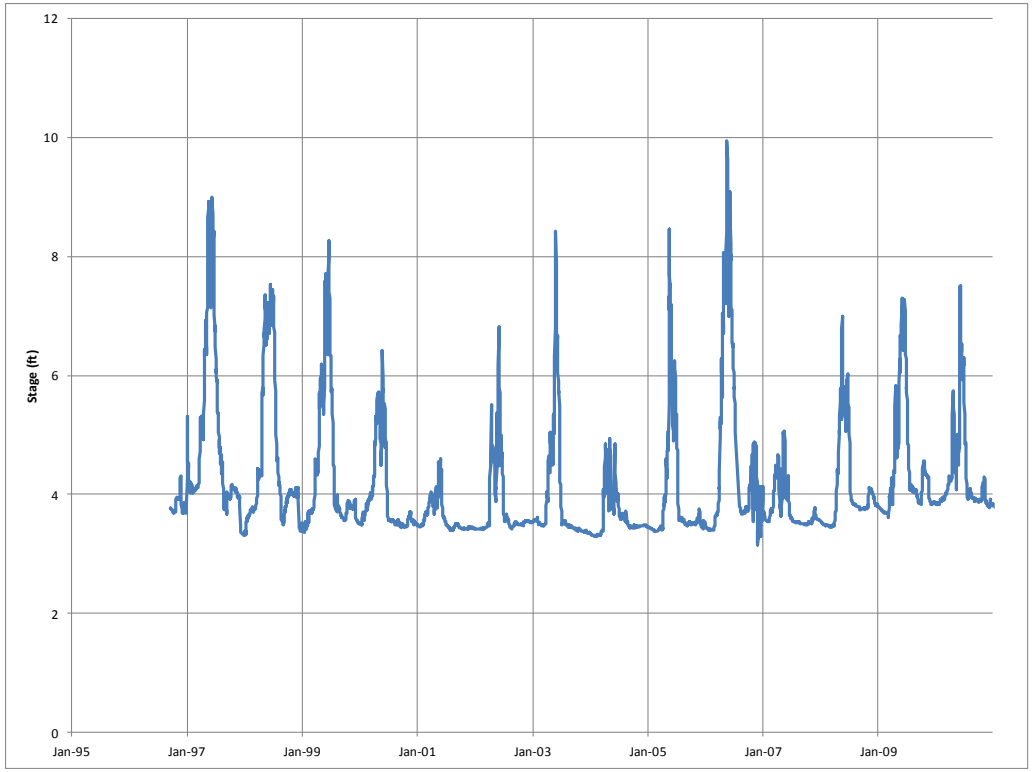
At Hailey average monthly



At Hailey monthly change

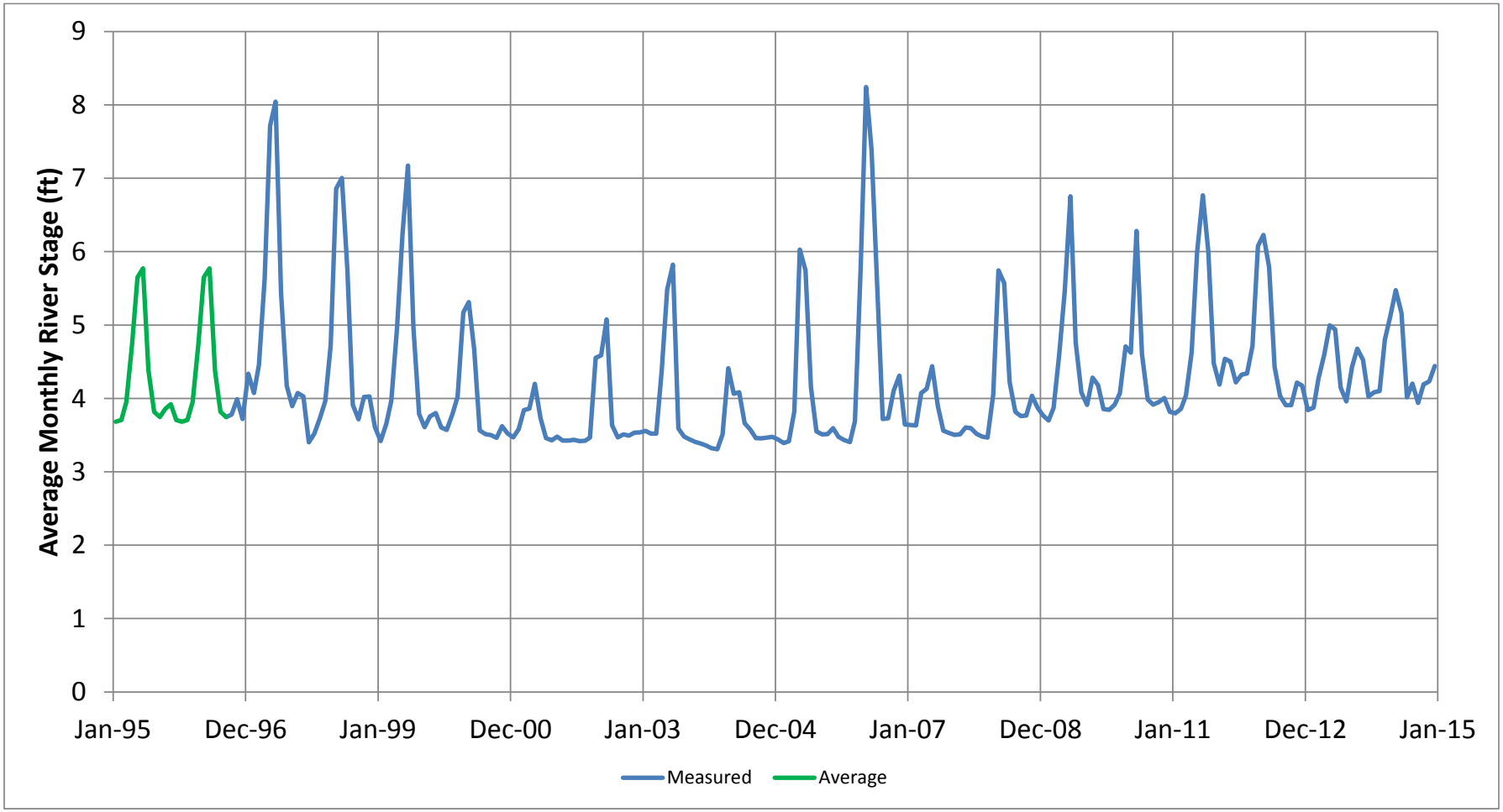


At Stanton Crossing avg daily

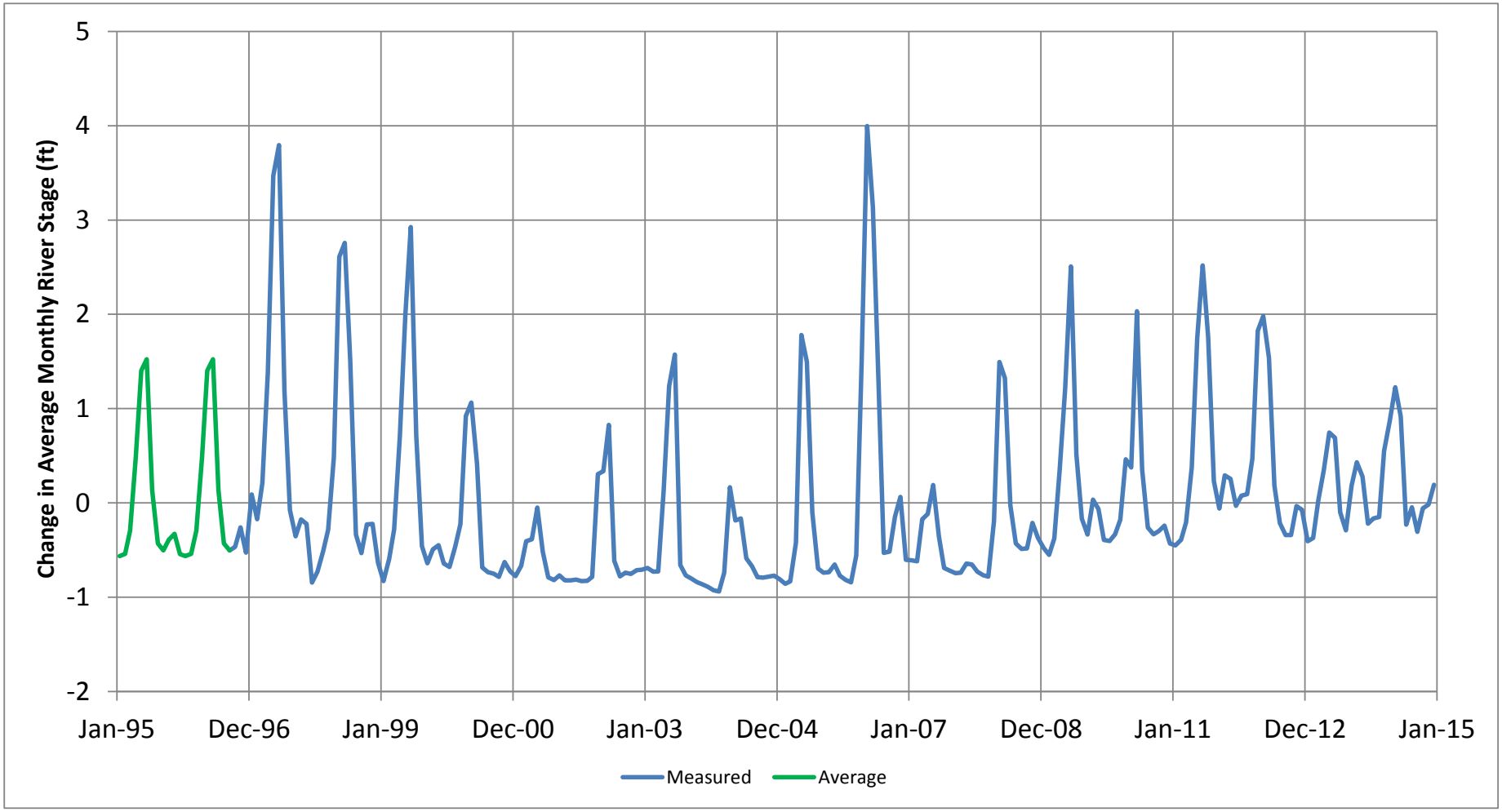


- Does not include data for the entire model period
- Compute average data to substitute for missing data

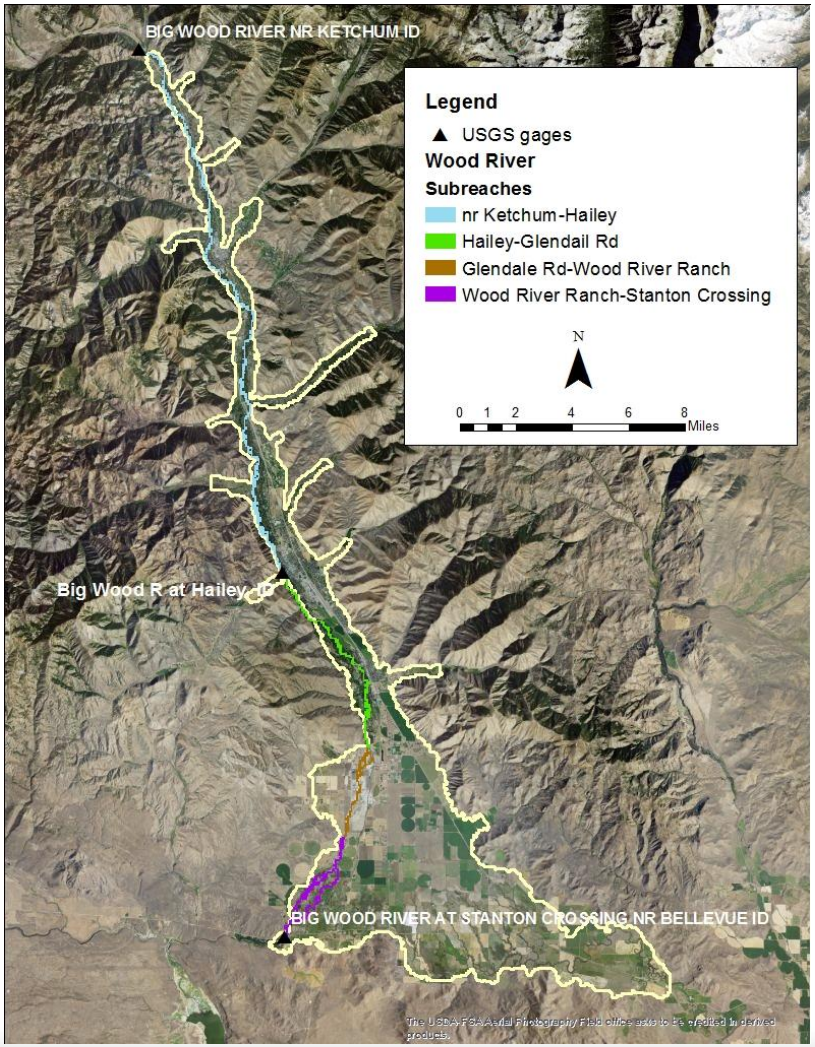
Stanton Crossing avg monthly



Stanton Crossing monthly chng



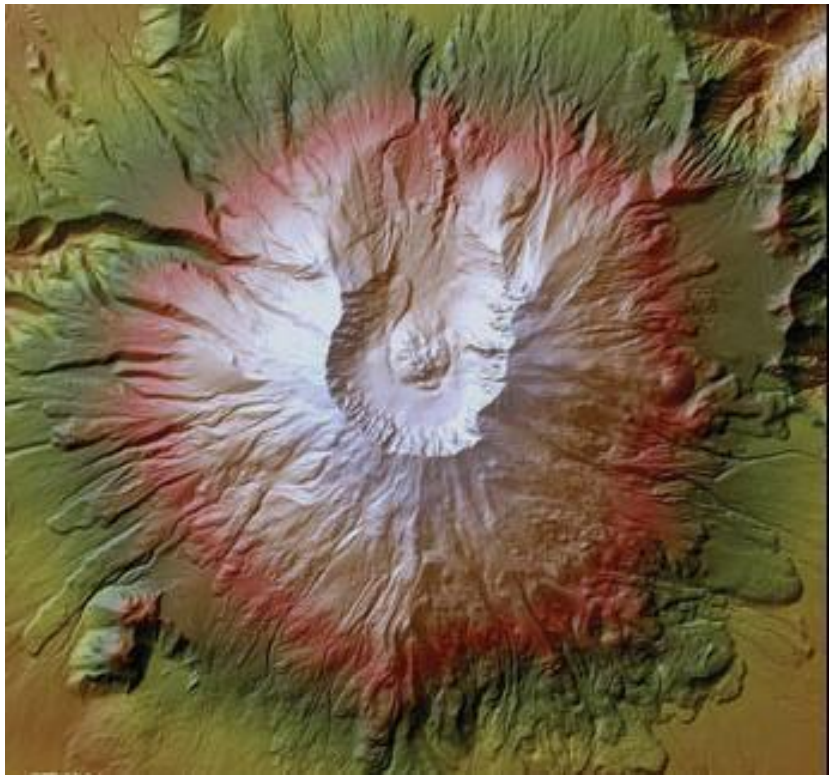
Recommendation



- Nr Ketchum to Hailey
  - Interpolate change between Nr Ketchum and At Hailey
- Hailey to Glendale Rd
  - Interpolate change at Hailey to steady state stage at Glendale Rd
- Glendale Rd to Wood River Ranch
  - Use steady state stage when river is not dry
  - Stage = river bottom when dry
- Wood River Ranch to At Stanton Crossing
  - Interpolate between steady state stage at Wood River Ranch to change at Stanton Crossing

Recommendation (continued)

- Steady state river file has stage extracted from National Elevation Dataset (NED)
- Add monthly change in stage to stage extracted from NED.

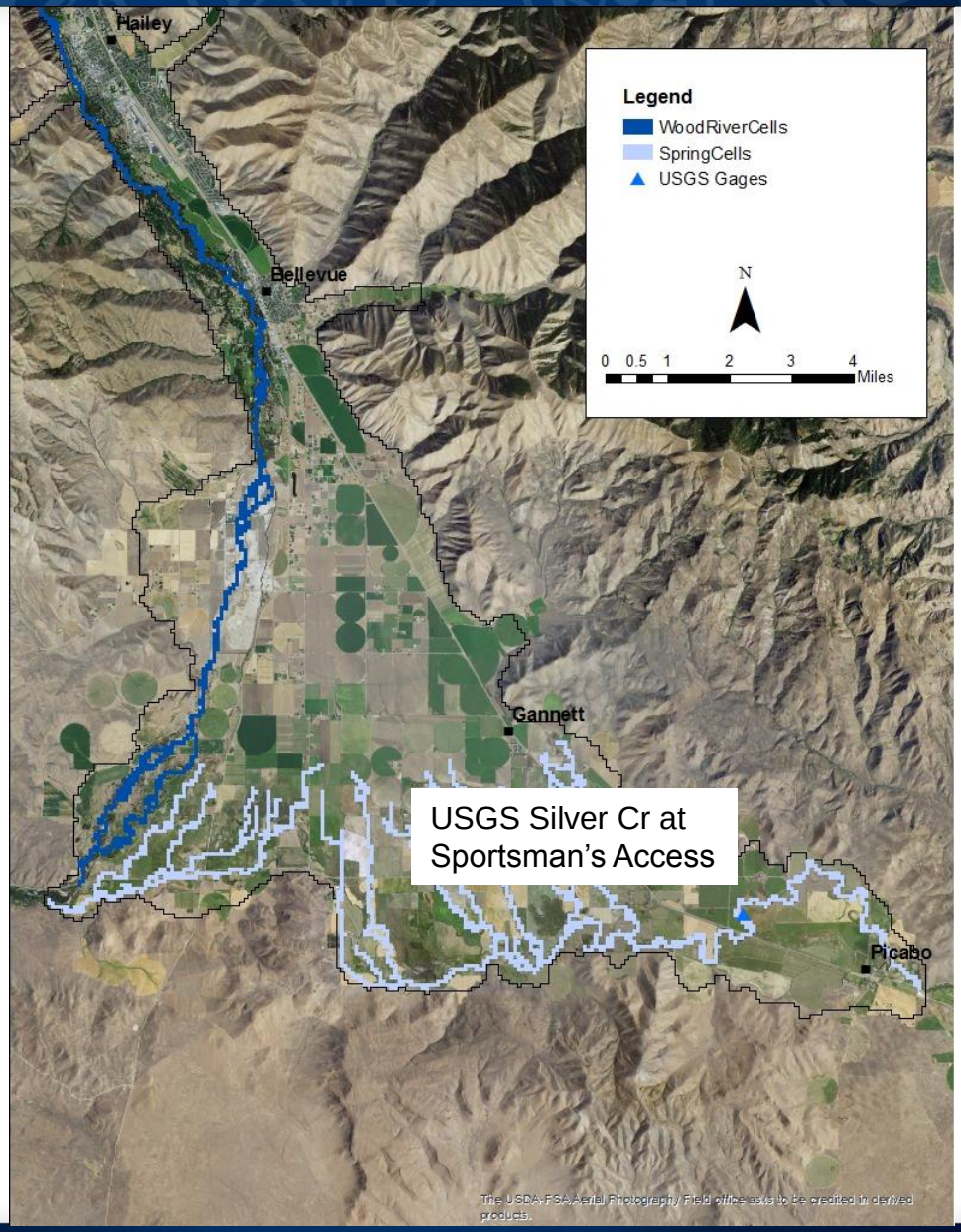


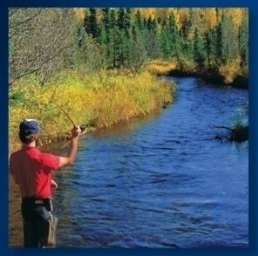
Recommendation (continued)

- Check resulting transient river file for anomalous river stage and river bottom elevations
  - River stage elevation should decrease in the down stream direction
  - River bottom elevation should decrease in the down stream direction, but with some latitude

Silver Creek and Willow Creek

- Willow Creek and Silver Creek above Sportsman Access
  - •Set stage equal to river bottom
  - • Allows stream to gain from aquifer but does not allow stream to leak into the aquifer
- Silver Creek below Sportsman Access
  - • Set stage equal to NED



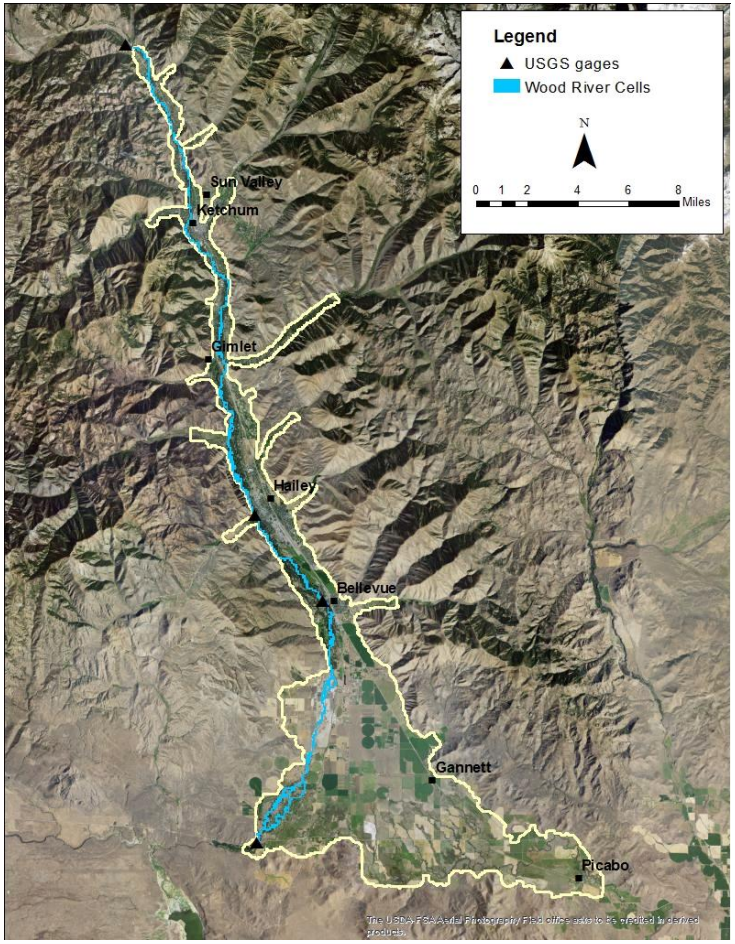


End

Stream Gaging Upgrades

- Continue gaging Silver Creek at Picabo
- Collect stage at selected sub-reach stations several times a year
- Conduct seepage run during runoff
- Test chemical hydrograph separation technique for calculating gains during runoff
- Gage near Bellevue

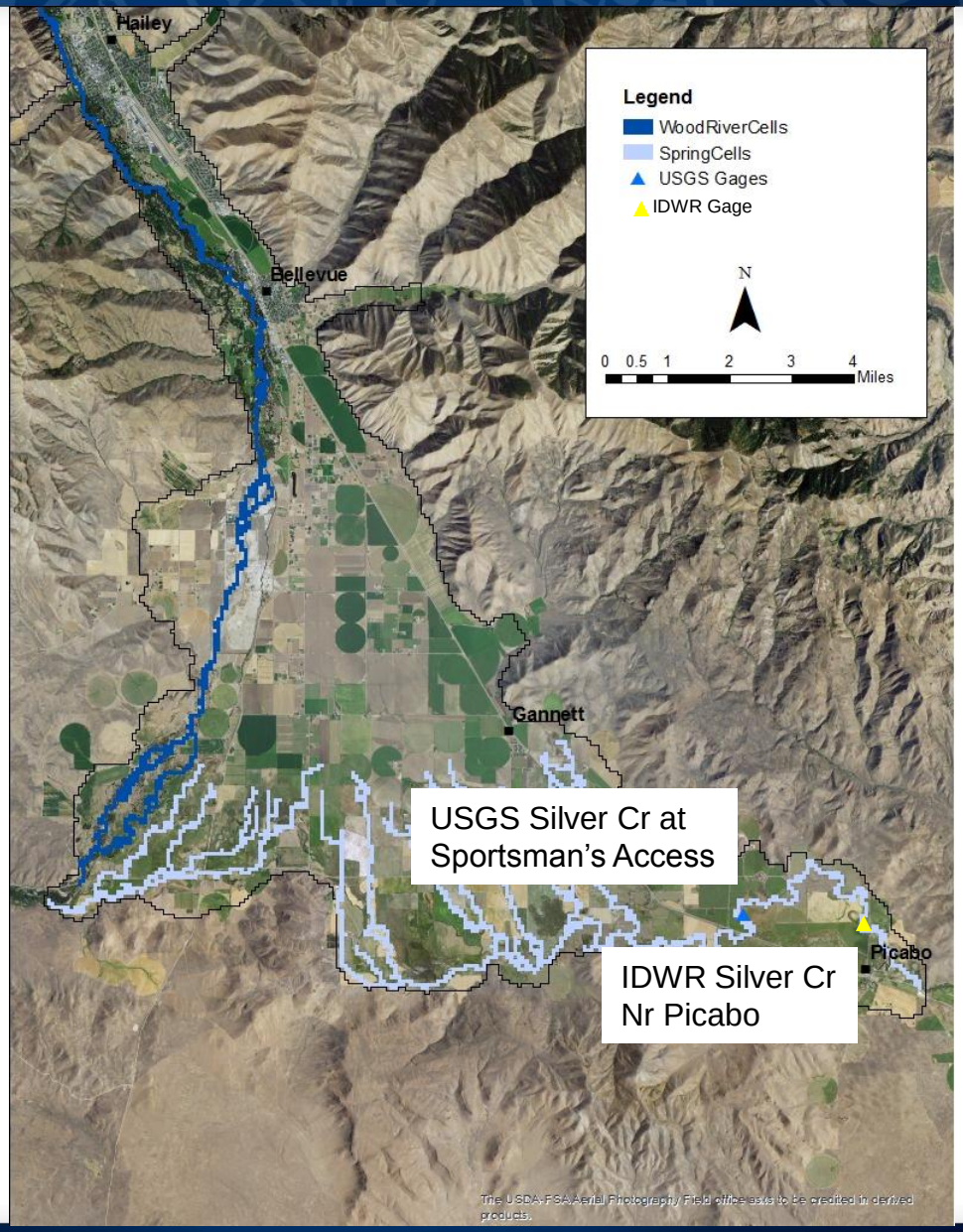
Continuous Stream Gages Along Big Wood River



- Nr Ketchum
- At Hailey
- Nr Bellevue
- At Stanton Crossing

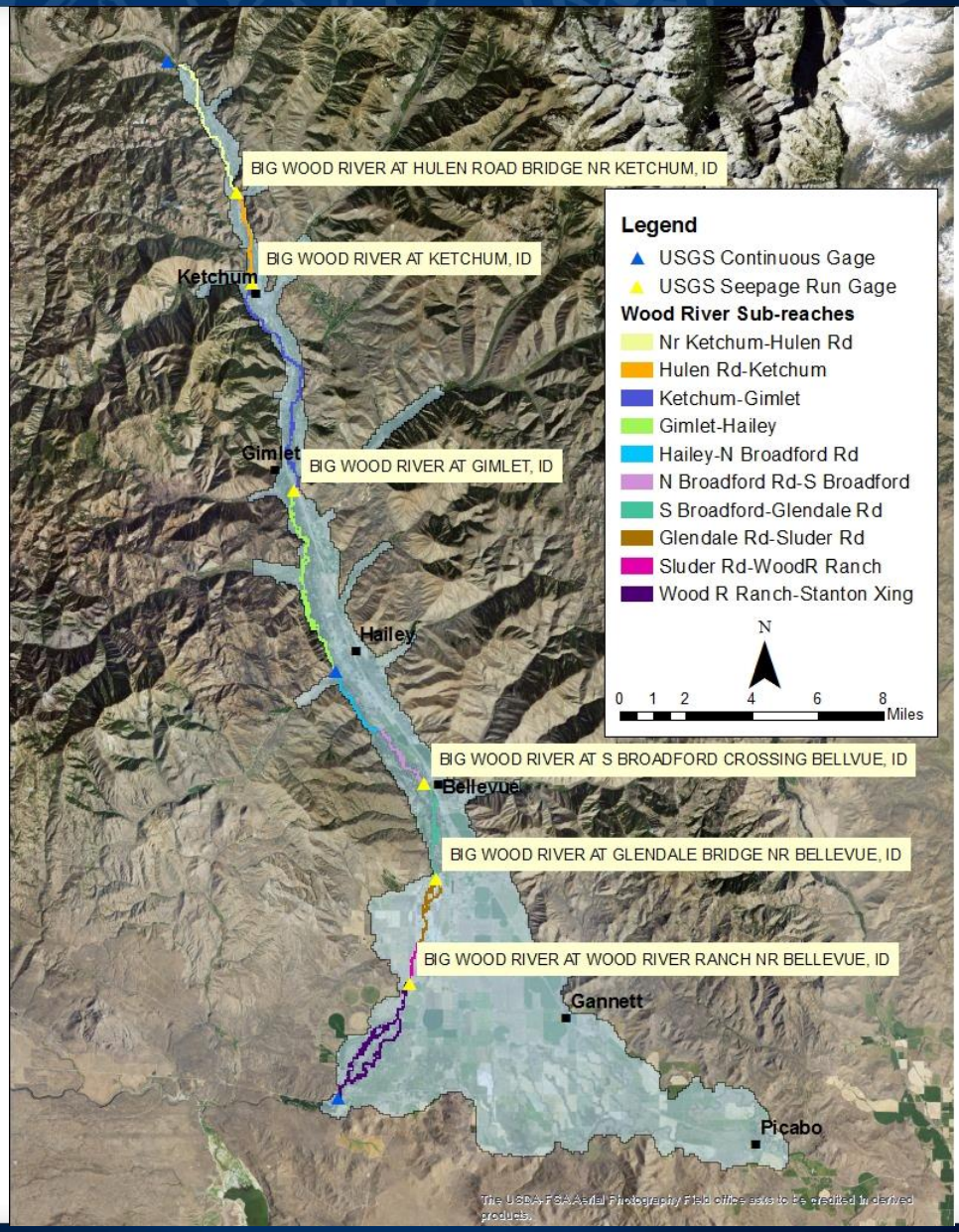
Continue gaging Silver Creek at Picabo

• Gage Silver Creek near Picabo twice a year during the non-irrigation season to verify the near zero gains below the Sportsman's Access gage.



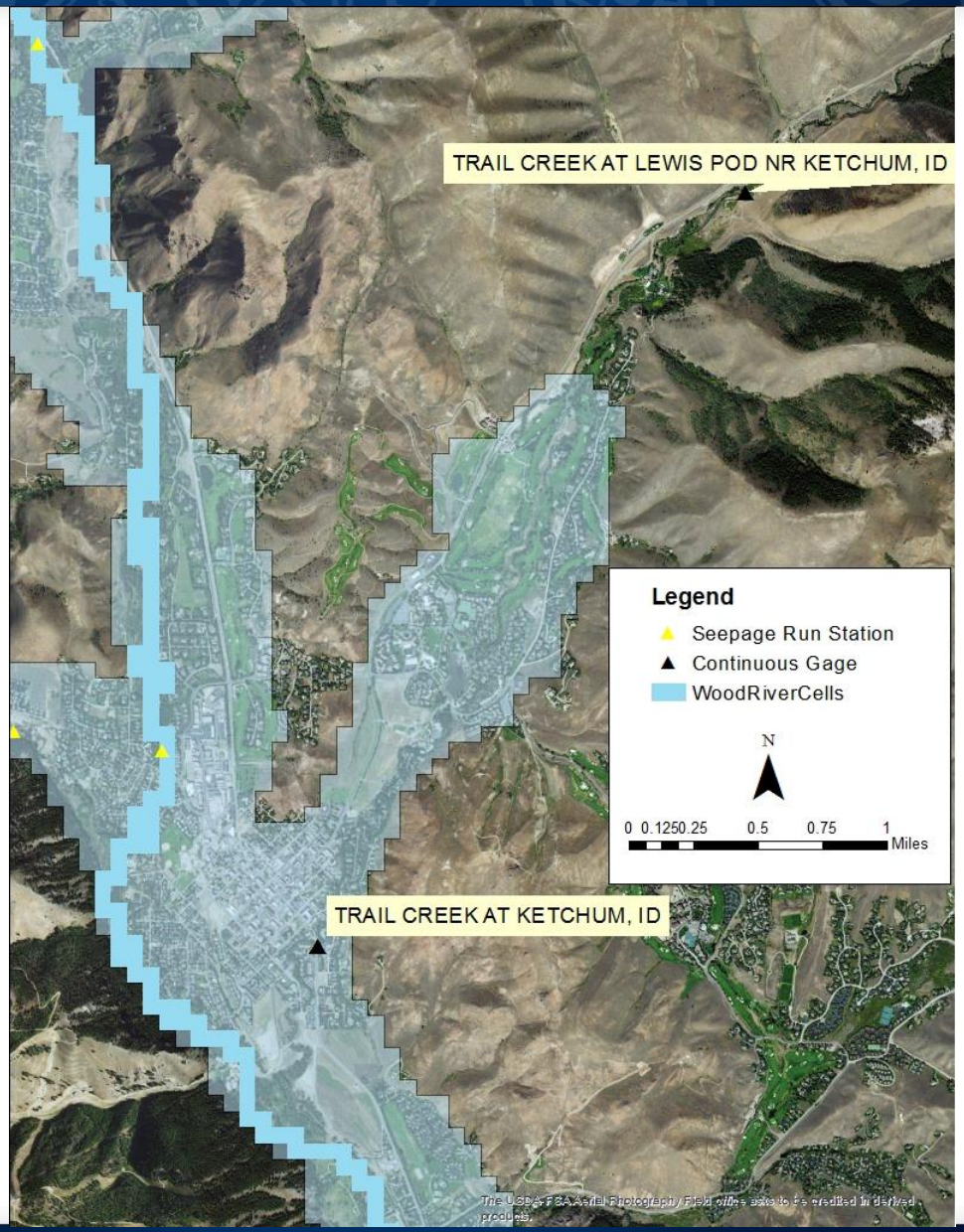
Measure stage at sub-reach gaging stations

- Currently we interpolate stage from Nr Ketchum to Hailey
- Hailey to Glendale Rd
- Wood River Ranch to Stanton Crossing
- We then adjust stage to account for operation of the Bypass Canal
- Improvement
  - Measure stage at key sub-reach stations when the technicians check on the continuous gages
  - Technicians check the gages about every 6 weeks
  - Key gages
    - Hulen Rd
    - At Ketchum
    - At Gimlet
    - S Broadford
    - Glendale Rd
    - Wood River Ranch

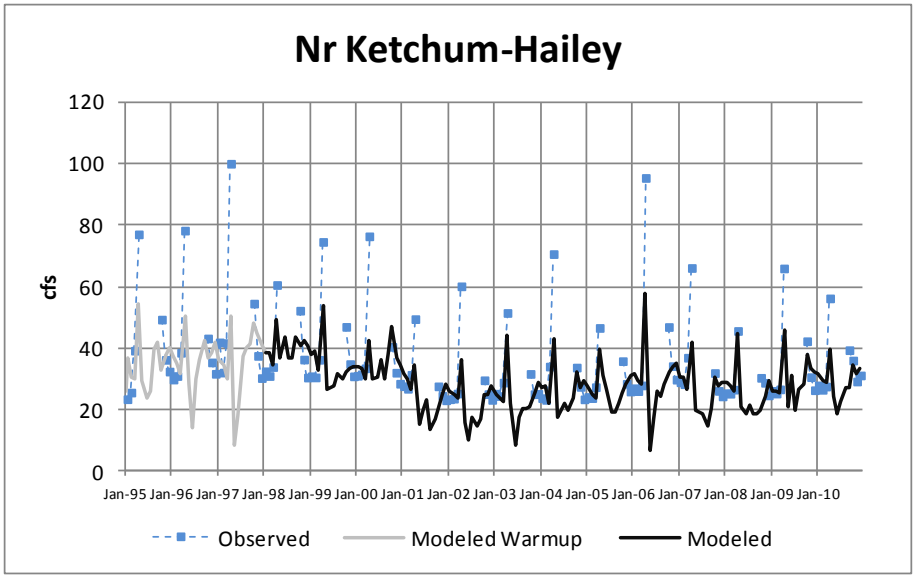


Trail Creek Gages

- Continuous gage near model boundary
  - Installed
- Monitor seepage loses
- Allow inclusion of Trail Creek as MODFLOW River



Nr Ketchum-Hailey Gains

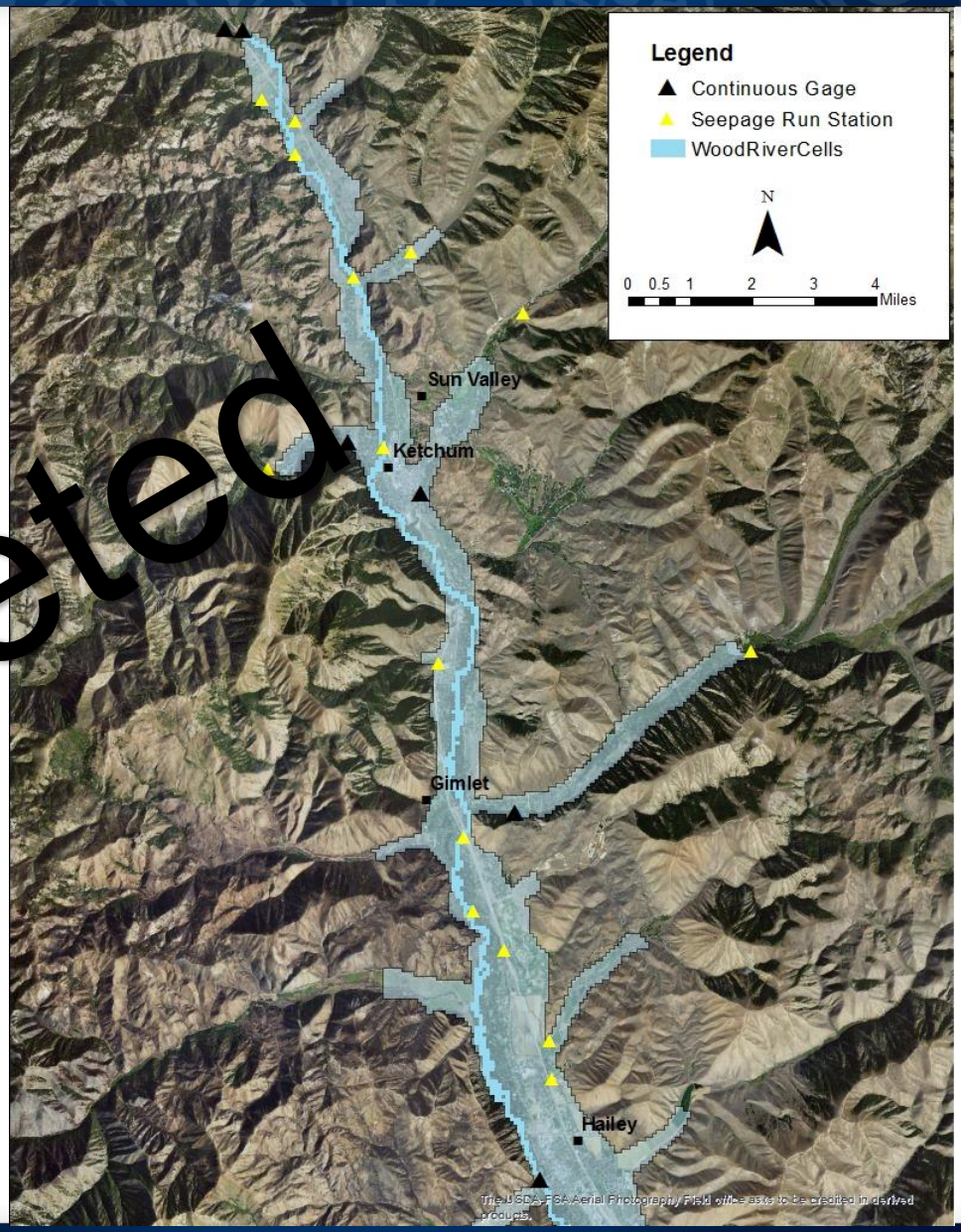


- Currently we have no calibration targets during the summer months
- Model would be stronger if we had summer reach gain targets

Seepage run during runoff

- Nr Ketchum to Hailey
- Check modeled gains for nr Ketchum to Hailey reach

Budgeted



Nr Ketchum-Hailey Gains

$$Q_{BF} = Q\frac{SC - SC_{RO}}{SC_{BF} - SC_{RO}}$$

Q_{BF} = baseflow discharge

Q = total discharge

SC = specific conductance

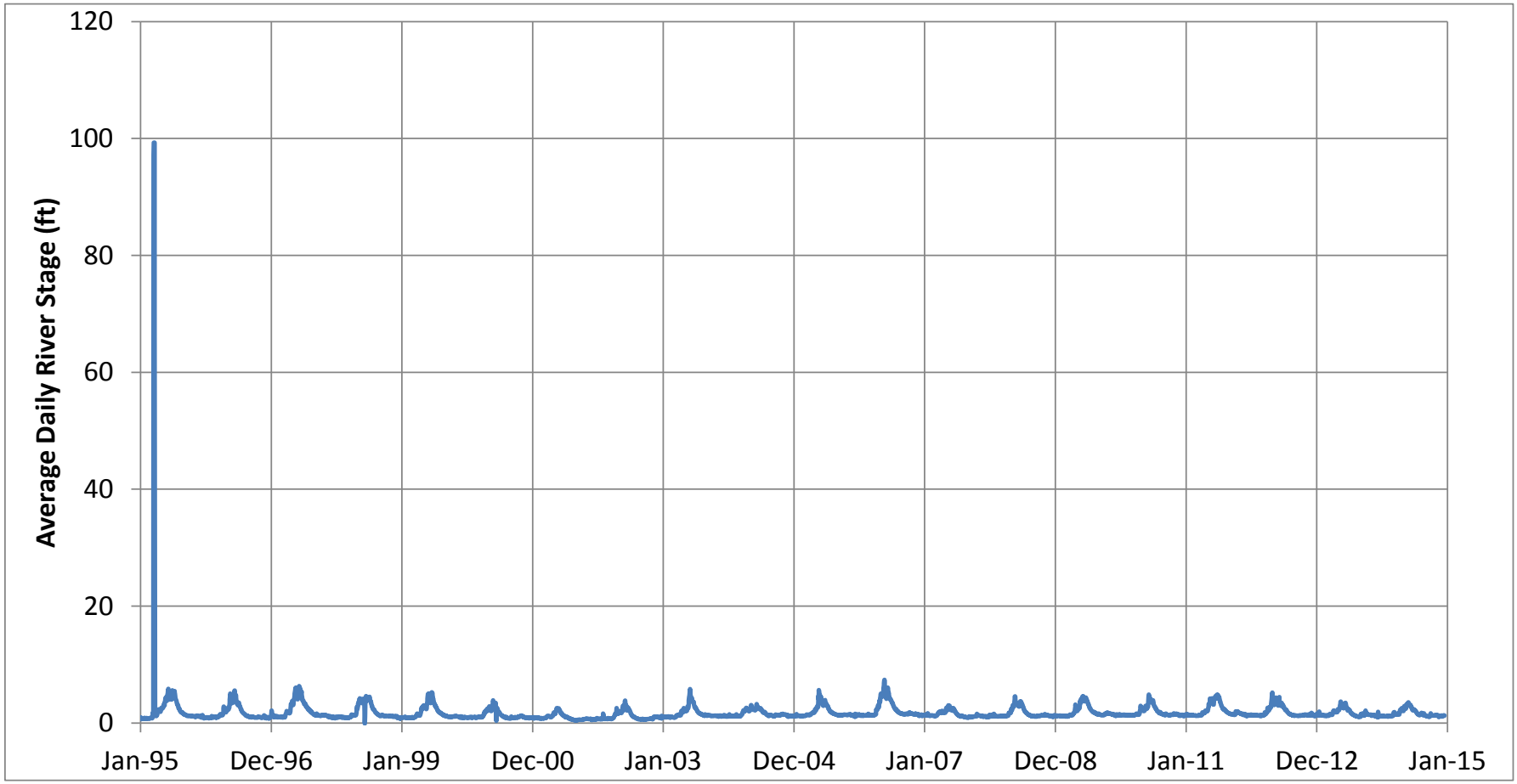
SC_{RO} = SC of the runoff

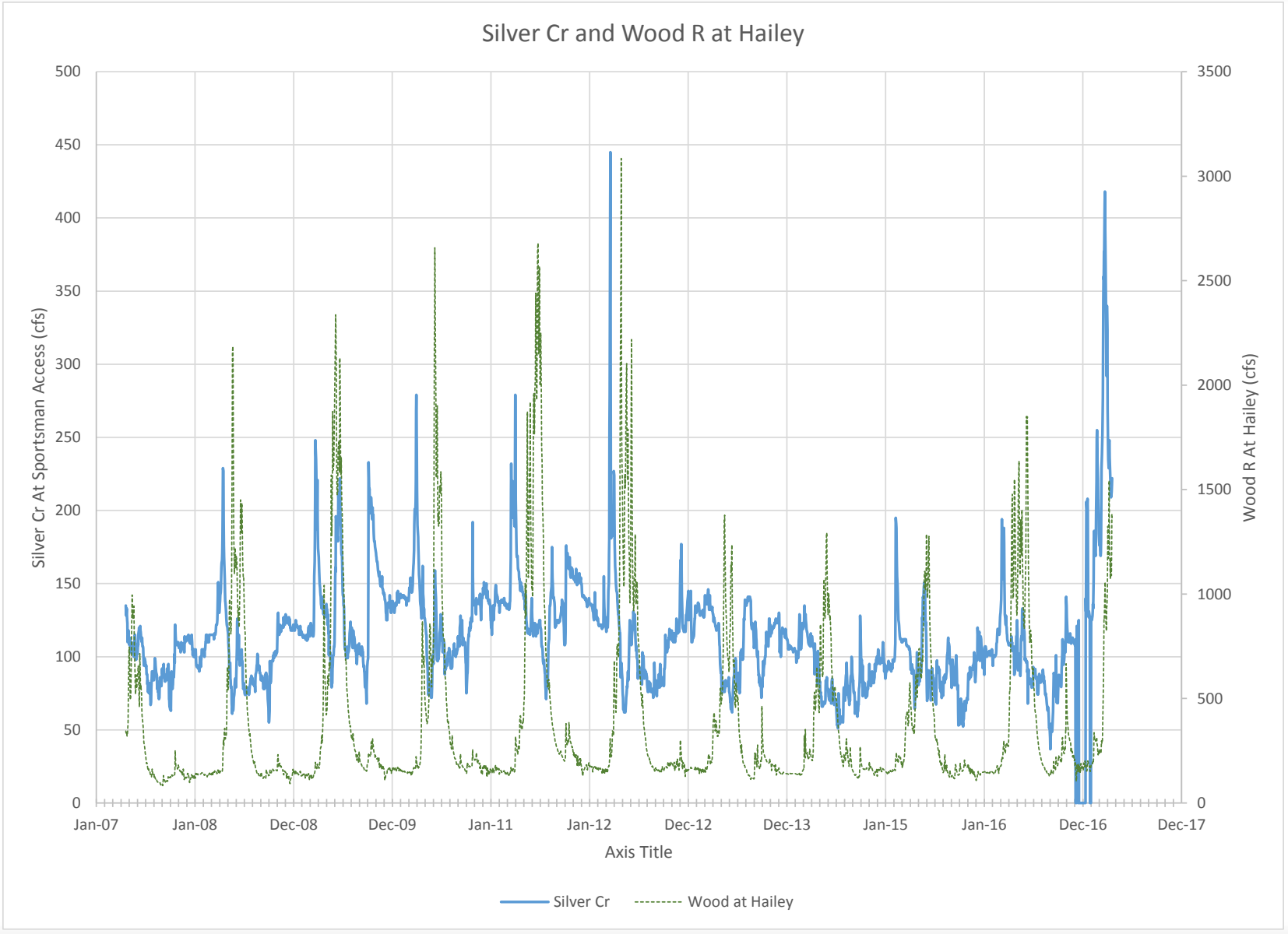
SC_{BF} = SC of the baseflow

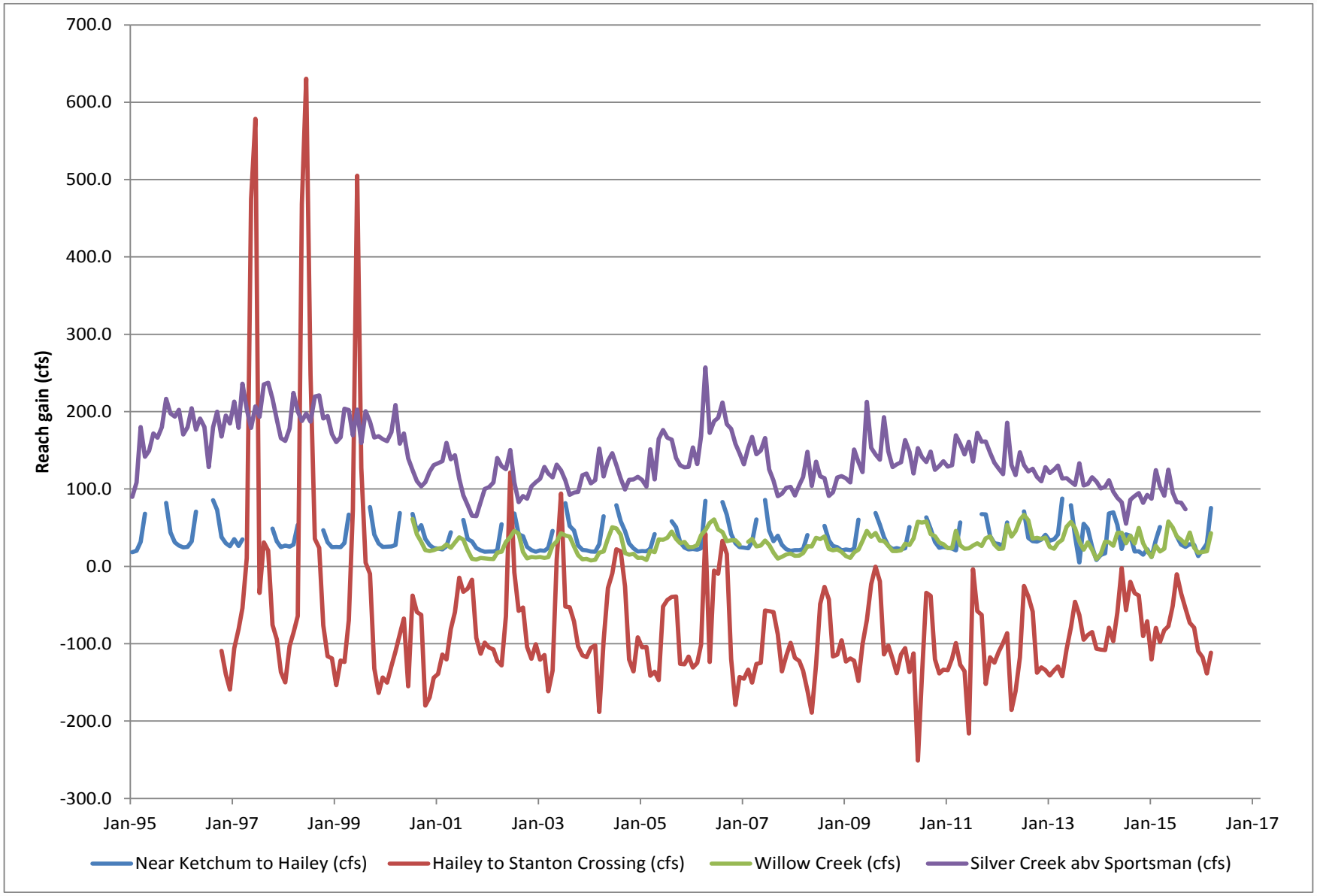
Budgeted

- Attempt calculation of Nr Ketchum-Hailey gains using chemical hydrograph separation (Miller and others, 2014)
  - Miller, M.P., D.D. Susong, C.L. Shope, V.M. Heilweil, B.J. Stolp, 2014. Continuous estimation of baseflow in snowmelt-dominated streams and rivers in the Upper Colorado River Basin: a chemical hydrograph separation approach. Water Resources Research, V50, No 8, p 6986-6999.
- Collect SC for nr Ketchum-Hailey reach during seepage run.
  - Nr Ketchum, Hailey and tributary valleys
  - SC early spring runoff high in trib
  - SC late season baseflow
- Calculate reach gains
- Compare with results from seepage run.

At Hailey average daily




Silver Cr and Wood R at Hailey
Silver Cr At Sportsman Access (cfs)
Wood R At Hailey (cfs)
0
50
100
150
200
250
300
350
400
450
500
0
500
1000
1500
2000
2500
3000
3500
Jan-07
Jan-08
Dec-08
Dec-09
Jan-11
Jan-12
Dec-12
Dec-13
Jan-15
Jan-16
Dec-16
Dec-17
Axis Title
Silver Cr
Wood at Hailey


700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
-300.0
Reach gain (cfs)
Jan-95
Jan-97
Jan-99
Jan-01
Jan-03
Jan-05
Jan-07
Jan-09
Jan-11
Jan-13
Jan-15
Jan-17
Near Ketchum to Hailey (cfs)
Hailey to Stanton Crossing (cfs)
Willow Creek (cfs)
Silver Creek abv Sportsman (cfs)