Tables

Table 1: Top three predictors (columns 1, 2, and 3) for each of five flow metrics separated by time frame. The predictor type as watershed (W) or precipitation (P) is noted in parentheses.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | Timeframe | 1 | 2 | 3 |
| HighNum | 3 | PctUrbLo2011Cat.y (W) | PctUrbOp2011Ws (W) | PctImp2011Cat (W) |
|  | 5 | PctUrbLo2011Cat.y (W) | PctUrbOp2011Ws (W) | PctImp2011Cat (W) |
|  | 10 | PctUrbLo2011Cat.y (W) | PctUrbOp2011Ws (W) | PctImp2011Cat (W) |
|  | all | PctUrbLo2011Cat.y (W) | PctUrbOp2011Ws (W) | PctImp2011Cat (W) |
| Hydroperiod | 3 | Tmax8110Ws (W) | ElevWs (W) | all\_QmaxIDR (P) |
|  | 5 | Tmax8110Ws (W) | ElevWs (W) | all\_QmaxIDR (P) |
|  | 10 | Tmax8110Ws (W) | ElevWs (W) | all\_QmaxIDR (P) |
|  | all | Tmax8110Ws (W) | ElevWs (W) | all\_QmaxIDR (P) |
| LowDur | 3 | all\_MaxMonthQ (P) | RunoffWs (W) | WsAreaSqKm (W) |
|  | 5 | Precip8110Cat (W) | WsAreaSqKm (W) | all\_MaxMonthQ (P) |
|  | 10 | Precip8110Cat (W) | all\_MaxMonthQ (P) | all\_Q95 (P) |
|  | all | all\_MaxMonthQ (P) | Precip8110Cat (W) | all\_Qmax (P) |
| Q99 | 3 | WsAreaSqKm (W) | Tmin8110Ws (W) | RunoffWs (W) |
|  | 5 | WsAreaSqKm (W) | Tmin8110Ws (W) | RunoffWs (W) |
|  | 10 | WsAreaSqKm (W) | Tmin8110Ws (W) | RunoffWs (W) |
|  | all | WsAreaSqKm (W) | Tmin8110Ws (W) | RunoffWs (W) |
| SFR | 3 | all\_QmaxIDR (P) | PctUrbOp2011Ws (W) | PctUrbLo2011Ws (W) |
|  | 5 | all\_QmaxIDR (P) | PctUrbLo2011Ws (W) | PctUrbOp2011Ws (W) |
|  | 10 | all\_QmaxIDR (P) | PctUrbLo2011Ws (W) | all\_Qmax (P) |
|  | all | all\_QmaxIDR (P) | PctUrbOp2011Ws (W) | PctUrbLo2011Ws (W) |

Table 2: Performance of random forest models for each flow metric and time frame. Performance estimates are separated by calibration and validation data sets based on a random 3:1 split of the training data. Performance is based on root mean squared error and R-squared values comparing observed and predicted flow metrics and is shown only for the July model. The predictor column shows whether the full set of predictors or the top ten from the full model produced the best performance. Rows are arranged by r-squared values based on the average between time frames for the validation datasets.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Flow Metric | Time Frame | Predictors | cal rmse | val rmse | cal rsqr | val rsqr | Average validation R2 |
| R10D.5 | 3 | full | 0.00 | 0.00 | 0.98 | 0.99 | 1 |
|  | 5 | full | 0.00 | 0.00 | 0.99 | 0.99 |  |
|  | 10 | full | 0.00 | 0.00 | 1.00 | 1.00 |  |
|  | all | full | 0.00 | 0.00 | 1.00 | 1.00 |  |
| R10D.9 | 3 | full | 0.00 | 0.00 | 0.99 | 0.99 | 1 |
|  | 5 | full | 0.00 | 0.00 | 0.99 | 0.99 |  |
|  | 10 | full | 0.00 | 0.00 | 1.00 | 1.00 |  |
|  | all | full | 0.00 | 0.00 | 1.00 | 1.00 |  |
| HighNum | 3 | full | 0.02 | 0.02 | 0.96 | 0.95 | 0.98 |
|  | 5 | full | 0.00 | 0.03 | 0.98 | 0.99 |  |
|  | 10 | full | 0.00 | 0.01 | 1.00 | 1.00 |  |
|  | all | full | 0.00 | 0.01 | 1.00 | 1.00 |  |
| Q90 | 3 | full | 0.11 | 0.36 | 0.96 | 0.96 | 0.98 |
|  | 5 | full | 0.04 | 0.24 | 0.98 | 0.98 |  |
|  | 10 | full | 0.01 | 0.09 | 1.00 | 1.00 |  |
|  | all | full | 0.02 | 0.01 | 1.00 | 1.00 |  |
| LowNum | 3 | full | 0.03 | 0.05 | 0.94 | 0.95 | 0.98 |
|  | 5 | full | 0.02 | 0.09 | 0.97 | 0.97 |  |
|  | 10 | full | 0.01 | 0.02 | 1.00 | 1.00 |  |
|  | all | full | 0.00 | 0.01 | 1.00 | 1.00 |  |
| Qmean | 3 | full | 0.08 | 0.27 | 0.96 | 0.96 | 0.98 |
|  | 5 | full | 0.05 | 0.18 | 0.97 | 0.97 |  |
|  | 10 | full | 0.00 | 0.07 | 0.99 | 0.99 |  |
|  | all | full | 0.00 | 0.01 | 1.00 | 1.00 |  |
| Hydroperiod | 3 | full | 0.00 | 0.00 | 0.94 | 0.95 | 0.98 |
|  | 5 | full | 0.00 | 0.01 | 0.96 | 0.96 |  |
|  | 10 | full | 0.00 | 0.00 | 0.99 | 0.99 |  |
|  | all | full | 0.00 | 0.00 | 1.00 | 1.00 |  |
| Q75 | 3 | full | 0.04 | 0.18 | 0.95 | 0.94 | 0.98 |
|  | 5 | full | 0.03 | 0.13 | 0.97 | 0.97 |  |
|  | 10 | full | 0.01 | 0.05 | 0.99 | 0.99 |  |
|  | all | full | 0.01 | 0.01 | 1.00 | 1.00 |  |
| SFR | 3 | full | 0.00 | 0.00 | 0.93 | 0.93 | 0.97 |
|  | 5 | full | 0.00 | 0.01 | 0.95 | 0.96 |  |
|  | 10 | full | 0.00 | 0.00 | 1.00 | 1.00 |  |
|  | all | full | 0.00 | 0.00 | 1.00 | 1.00 |  |
| Q50 | 3 | full | 0.04 | 0.14 | 0.95 | 0.94 | 0.97 |
|  | 5 | full | 0.02 | 0.09 | 0.95 | 0.95 |  |
|  | 10 | full | 0.00 | 0.03 | 0.99 | 0.99 |  |
|  | all | full | 0.00 | 0.00 | 1.00 | 1.00 |  |
| tenyr | all | full | 5.42 | 27.33 | 0.96 | 0.97 | 0.97 |
| FracYearsNoFlow | 3 | full | 0.00 | 0.01 | 0.92 | 0.92 | 0.97 |
|  | 5 | full | 0.00 | 0.00 | 0.96 | 0.96 |  |
|  | 10 | full | 0.00 | 0.00 | 0.99 | 0.99 |  |
|  | all | full | 0.00 | 0.00 | 1.00 | 1.00 |  |
| Q99 | 3 | full | 0.50 | 3.74 | 0.93 | 0.93 | 0.97 |
|  | 5 | full | 0.48 | 2.35 | 0.95 | 0.95 |  |
|  | 10 | full | 0.07 | 0.65 | 0.99 | 0.99 |  |
|  | all | full | 0.06 | 0.12 | 1.00 | 1.00 |  |
| QmeanIDR | 3 | full | 0.13 | 0.32 | 0.92 | 0.92 | 0.97 |
|  | 5 | full | 0.07 | 0.22 | 0.96 | 0.96 |  |
|  | 10 | full | 0.03 | 0.27 | 0.99 | 0.99 |  |
|  | all | full | 0.02 | 0.02 | 1.00 | 1.00 |  |
| QmeanMEDIAN | 3 | full | 0.03 | 0.21 | 0.90 | 0.91 | 0.97 |
|  | 5 | full | 0.02 | 0.13 | 0.97 | 0.97 |  |
|  | 10 | full | 0.01 | 0.04 | 0.99 | 0.99 |  |
|  | all | full | 0.00 | 0.01 | 1.00 | 1.00 |  |
| Qmed | 3 | full | 0.03 | 0.11 | 0.93 | 0.92 | 0.96 |
|  | 5 | full | 0.03 | 0.11 | 0.95 | 0.95 |  |
|  | 10 | full | 0.01 | 0.04 | 0.99 | 0.99 |  |
|  | all | full | 0.00 | 0.00 | 1.00 | 1.00 |  |
| Q95 | 3 | full | 0.28 | 1.20 | 0.89 | 0.91 | 0.96 |
|  | 5 | full | 0.21 | 1.37 | 0.94 | 0.93 |  |
|  | 10 | full | 0.06 | 0.35 | 0.99 | 0.99 |  |
|  | all | full | 0.01 | 0.03 | 1.00 | 1.00 |  |
| MedianNoFlowDays | 3 | full | 0.32 | 2.83 | 0.90 | 0.91 | 0.96 |
|  | 5 | full | 0.49 | 2.06 | 0.93 | 0.93 |  |
|  | 10 | full | 0.33 | 1.68 | 0.97 | 0.98 |  |
|  | all | full | 0.24 | 0.20 | 1.00 | 1.00 |  |
| MinMonthQ | 3 | full | 0.04 | 0.10 | 0.92 | 0.92 | 0.96 |
|  | 5 | full | 0.02 | 0.06 | 0.92 | 0.92 |  |
|  | 10 | full | 0.01 | 0.03 | 0.98 | 0.98 |  |
|  | all | full | 0.00 | 0.00 | 1.00 | 1.00 |  |
| Qmin | 3 | full | 0.05 | 0.13 | 0.90 | 0.89 | 0.96 |
|  | 5 | full | 0.03 | 0.09 | 0.94 | 0.94 |  |
|  | 10 | full | 0.01 | 0.02 | 0.98 | 0.99 |  |
|  | all | full | 0.00 | 0.00 | 1.00 | 1.00 |  |
| Q25 | 3 | full | 0.03 | 0.09 | 0.93 | 0.91 | 0.95 |
|  | 5 | full | 0.03 | 0.09 | 0.92 | 0.92 |  |
|  | 10 | full | 0.01 | 0.03 | 0.97 | 0.97 |  |
|  | all | full | 0.00 | 0.00 | 1.00 | 1.00 |  |
| LowDur | 3 | full | 0.67 | 5.03 | 0.86 | 0.86 | 0.94 |
|  | 5 | full | 0.77 | 4.75 | 0.92 | 0.92 |  |
|  | 10 | full | 0.42 | 4.05 | 0.97 | 0.97 |  |
|  | all | full | 0.95 | 0.86 | 1.00 | 1.00 |  |
| BFR | 3 | full | 0.00 | 0.00 | 0.84 | 0.85 | 0.93 |
|  | 5 | full | 0.00 | 0.00 | 0.90 | 0.90 |  |
|  | 10 | full | 0.00 | 0.00 | 0.98 | 0.98 |  |
|  | all | full | 0.00 | 0.00 | 1.00 | 1.00 |  |
| NoDisturb | 3 | full | 0.32 | 6.13 | 0.87 | 0.87 | 0.93 |
|  | 5 | full | 0.76 | 4.02 | 0.92 | 0.92 |  |
|  | 10 | full | 0.98 | 5.06 | 0.93 | 0.94 |  |
|  | all | full | 0.86 | 0.85 | 1.00 | 1.00 |  |
| MaxMonthQ | 3 | full | 0.09 | 0.78 | 0.82 | 0.85 | 0.92 |
|  | 5 | full | 0.17 | 0.55 | 0.89 | 0.89 |  |
|  | 10 | full | 0.02 | 0.26 | 0.97 | 0.96 |  |
|  | all | full | 0.00 | 0.01 | 1.00 | 1.00 |  |
| Q05 | 3 | full | 0.03 | 0.09 | 0.87 | 0.86 | 0.92 |
|  | 5 | full | 0.02 | 0.03 | 0.90 | 0.91 |  |
|  | 10 | full | 0.01 | 0.02 | 0.93 | 0.93 |  |
|  | all | full | 0.00 | 0.00 | 1.00 | 1.00 |  |
| QminIDR | 3 | full | 0.05 | 0.22 | 0.83 | 0.82 | 0.92 |
|  | 5 | full | 0.05 | 0.12 | 0.91 | 0.90 |  |
|  | 10 | full | 0.01 | 0.07 | 0.98 | 0.98 |  |
|  | all | full | 0.00 | 0.00 | 1.00 | 1.00 |  |
| Q10 | 3 | full | 0.02 | 0.09 | 0.87 | 0.86 | 0.92 |
|  | 5 | full | 0.02 | 0.03 | 0.89 | 0.92 |  |
|  | 10 | full | 0.01 | 0.06 | 0.94 | 0.91 |  |
|  | all | full | 0.00 | 0.00 | 1.00 | 1.00 |  |
| Q01 | 3 | full | 0.03 | 0.08 | 0.87 | 0.85 | 0.91 |
|  | 5 | full | 0.01 | 0.04 | 0.92 | 0.92 |  |
|  | 10 | full | 0.01 | 0.03 | 0.90 | 0.88 |  |
|  | all | full | 0.00 | 0.00 | 1.00 | 1.00 |  |
| R10D4D | 3 | full | 0.00 | 0.01 | 0.78 | 0.79 | 0.9 |
|  | 5 | full | 0.00 | 0.00 | 0.84 | 0.85 |  |
|  | 10 | full | 0.00 | 0.00 | 0.95 | 0.96 |  |
|  | all | full | 0.00 | 0.00 | 1.00 | 1.00 |  |
| HighDur | 3 | full | 1.65 | 6.05 | 0.79 | 0.80 | 0.89 |
|  | 5 | full | 1.64 | 3.25 | 0.84 | 0.85 |  |
|  | 10 | full | 1.28 | 3.22 | 0.93 | 0.91 |  |
|  | all | full | 0.00 | 0.00 | 1.00 | 1.00 |  |
| Qmax | 3 | full | 1.37 | 6.04 | 0.76 | 0.79 | 0.89 |
|  | 5 | full | 1.42 | 3.49 | 0.84 | 0.84 |  |
|  | 10 | full | 0.30 | 4.63 | 0.91 | 0.92 |  |
|  | all | full | 0.03 | 0.03 | 1.00 | 1.00 |  |
| QmaxIDR | 3 | top 10 | 0.90 | 54.82 | 0.78 | 0.74 | 0.88 |
|  | 5 | full | 4.77 | 19.10 | 0.87 | 0.87 |  |
|  | 10 | full | 4.58 | 24.85 | 0.89 | 0.92 |  |
|  | all | full | 0.55 | 0.30 | 1.00 | 1.00 |  |
| May | all | full | 0.07 | 0.27 | 0.88 | 0.87 | 0.87 |
| Apr | all | full | 0.17 | 0.36 | 0.85 | 0.86 | 0.86 |
| RecessMaxLength | 3 | full | 2.57 | 10.15 | 0.72 | 0.71 | 0.85 |
|  | 5 | full | 1.48 | 5.92 | 0.79 | 0.80 |  |
|  | 10 | full | 0.63 | 5.75 | 0.85 | 0.89 |  |
|  | all | full | 0.29 | 0.27 | 1.00 | 1.00 |  |
| Jun | all | full | 0.06 | 0.28 | 0.87 | 0.84 | 0.84 |
| Jan | all | top 10 | 0.69 | 1.31 | 0.81 | 0.83 | 0.83 |
| Mar | all | full | 0.32 | 1.78 | 0.77 | 0.83 | 0.83 |
| RBI | 3 | full | 0.01 | 0.01 | 0.70 | 0.71 | 0.82 |
|  | 5 | full | 0.00 | 0.01 | 0.66 | 0.68 |  |
|  | 10 | full | 0.00 | 0.01 | 0.90 | 0.90 |  |
|  | all | full | 0.00 | 0.00 | 1.00 | 1.00 |  |
| Jul | all | full | 0.05 | 0.28 | 0.86 | 0.82 | 0.82 |
| MinMonth | 3 | full | 0.03 | 0.12 | 0.68 | 0.68 | 0.81 |
|  | 5 | full | 0.01 | 0.12 | 0.72 | 0.73 |  |
|  | 10 | full | 0.02 | 0.07 | 0.81 | 0.82 |  |
|  | all | full | 0.00 | 0.00 | 1.00 | 1.00 |  |
| Feb | all | top 10 | 0.44 | 1.81 | 0.79 | 0.78 | 0.78 |
| Aug | all | full | 0.15 | 0.38 | 0.73 | 0.75 | 0.75 |
| Oct | all | full | 0.14 | 0.33 | 0.73 | 0.74 | 0.74 |
| Sep | all | full | 0.14 | 0.34 | 0.72 | 0.74 | 0.74 |
| Nov | all | full | 0.13 | 0.30 | 0.72 | 0.73 | 0.73 |
| Dec | all | top 10 | 0.05 | 0.43 | 0.69 | 0.67 | 0.67 |
| twoyr | all | full | 13.56 | 21.00 | 0.66 | 0.65 | 0.65 |
| fivyr | all | full | 12.14 | 60.23 | 0.61 | 0.62 | 0.62 |
| MaxMonth | 3 | full | 0.06 | 0.11 | 0.53 | 0.55 | 0.59 |
|  | 5 | full | 0.07 | 0.15 | 0.46 | 0.44 |  |
|  | 10 | full | 0.04 | 0.09 | 0.34 | 0.37 |  |
|  | all | full | 0.00 | 0.00 | 1.00 | 1.00 |  |