

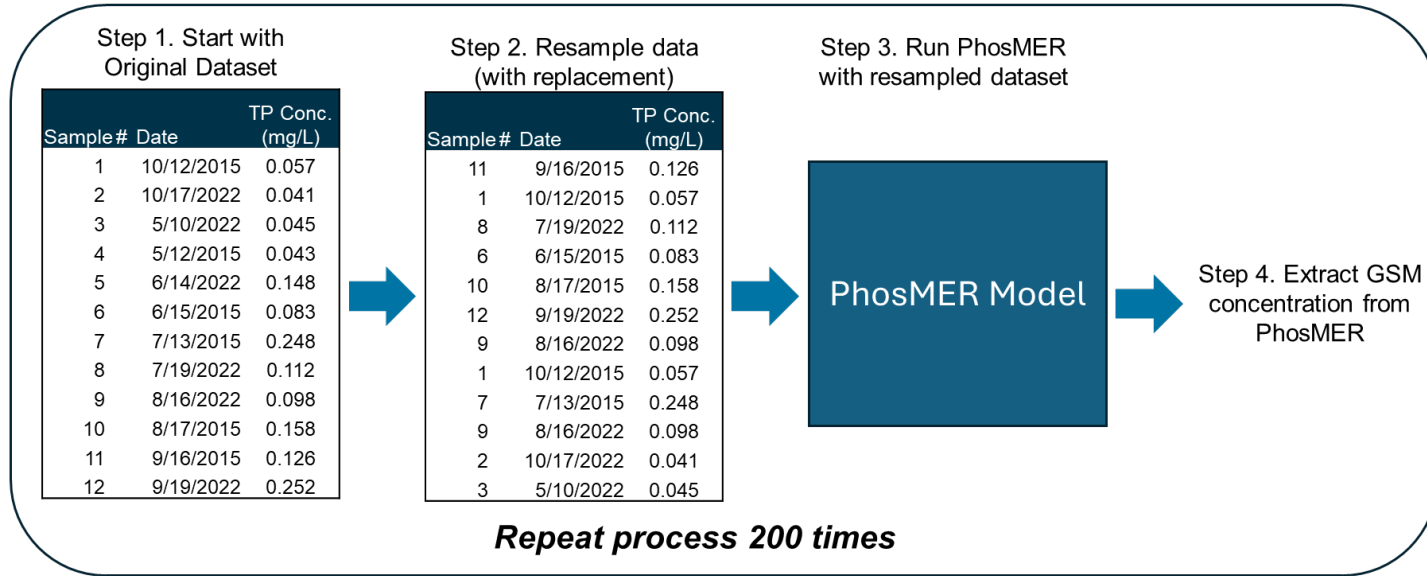
## APPENDIX I

# CALCULATION OF ASSIMILATIVE LOADING CAPACITY

Supporting the Fox Illinois River Basin Total Maximum Daily Load (TMDL) for Phosphorus and Total Suspended Solids

FIGURE I.1  
**Uncertainty analysis for PhosMER model**

**Pewaukee River at Capitol Drive**



Result: Distribution of predicted GSMs from PhosMER

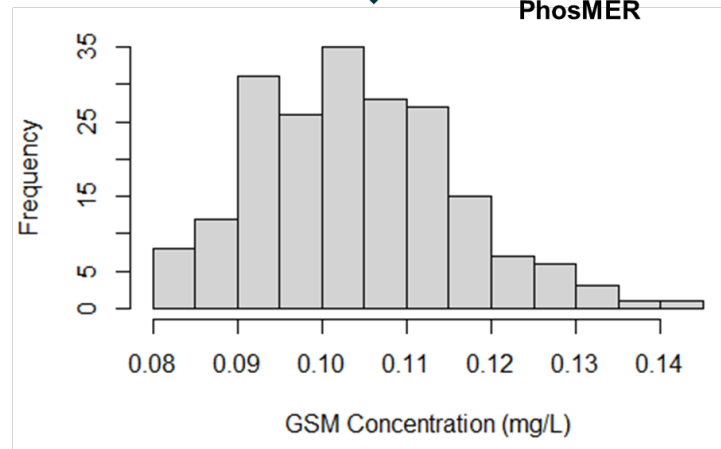


FIGURE I.2  
TP FWM/GSM ratio for SWAT+ model subbasins

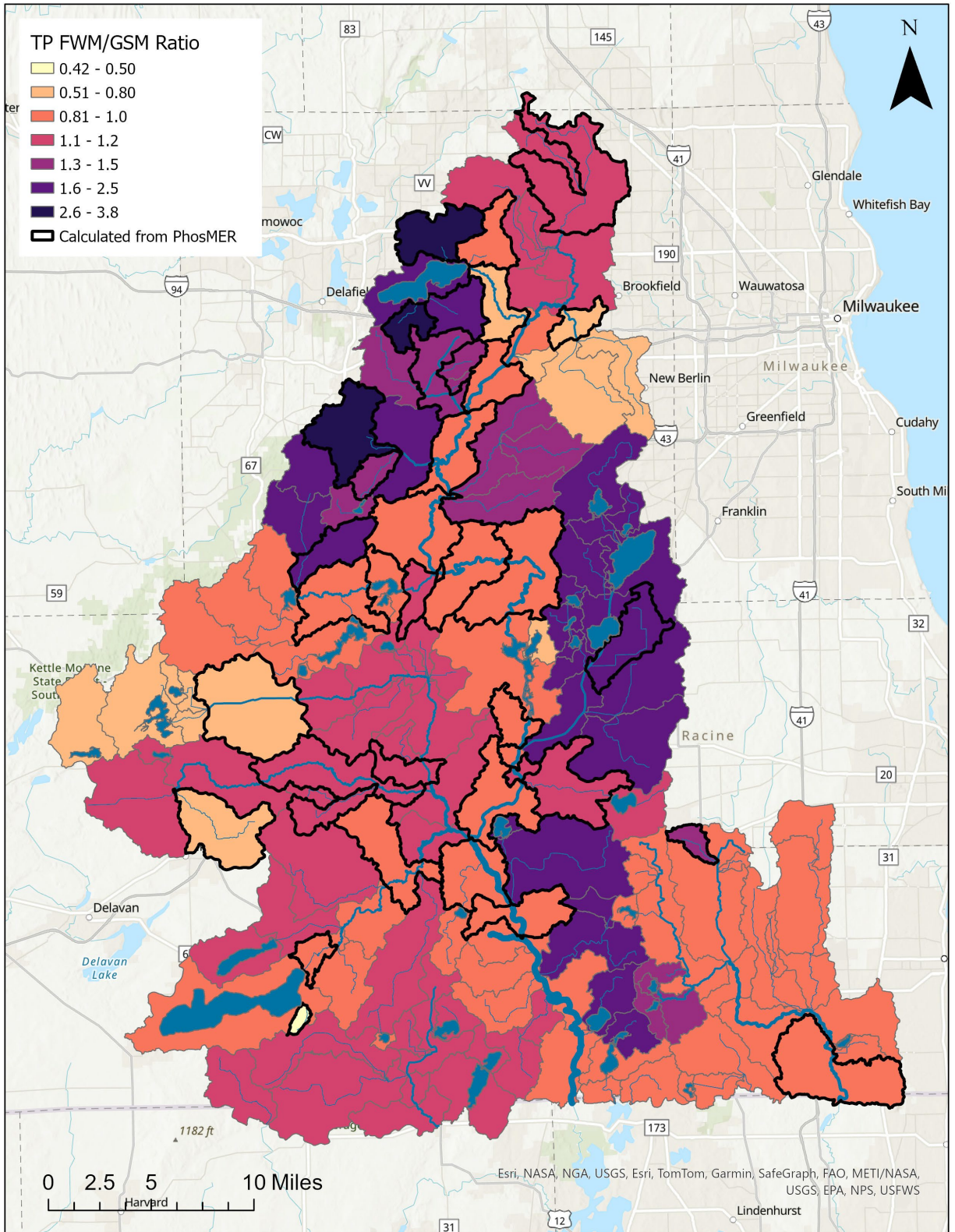


TABLE I.1  
**FWM/GSM ratios calculated from PhosMER model**

| Subbasin | Location           | WBIC   | FWM/GSM |
|----------|--------------------|--------|---------|
| 4        | Fox River          | 742500 | 1.033   |
| 6        | Coco Creek         | 772100 | 3.773   |
| 7        | Zion Creek         | 772400 | 3.023   |
| 8        | Meadow Brook Creek | 772300 | 2.133   |
| 10       | Unnamed            | 771800 | 0.949   |
| 11       | Pewaukee River     | 771700 | 0.755   |
| 14       | Poplar Creek       | 772800 | 0.788   |
| 18       | Fox River          | 742500 | 0.989   |
| 22       | Pebble Creek       | 771300 | 1.466   |
| 24       | Spring Brook       | 770300 | 1.404   |
| 25       | Genesee Creek      | 769800 | 2.941   |
| 30       | Fox River          | 742500 | 0.947   |
| 31       | Fox River          | 742500 | 0.946   |
| 34       | Jericho Creek      | 768300 | 2.336   |
| 41       | Mukwonago River    | 765500 | 0.902   |
| 43       | Mukwonago River    | 765500 | 1.063   |
| 44       | Fox River          | 742500 | 0.850   |
| 45       | Fox River          | 742500 | 0.839   |
| 46       | Fox River          | 742500 | 0.948   |
| 49       | Fox River          | 742500 | 0.948   |
| 62       | Unnamed            | N/A    | 1.520   |
| 65       | Eagle Creek        | 759500 | 1.062   |
| 67       | Fox River          | 742500 | 1.029   |
| 68       | Fox River          | 742500 | 0.992   |
| 73       | Honey Creek        | 751500 | 0.681   |
| 83       | Honey Creek        | 751500 | 1.029   |
| 85       | Baker Creek        | 753000 | 0.629   |
| 90       | Spring Brook       | 752400 | 1.184   |
| 91       | Sugar Creek        | 752100 | 1.154   |
| 94       | Button Creek       | 5E+06  | 0.422   |
| 97       | White River        | 751200 | 0.925   |
| 103      | White River        | 751200 | 0.986   |
| 106      | Fox River          | 742500 | 0.977   |

TABLE I.1 (Continued)

| Subbasin | Location          | WBIC   | FWM/GSM |
|----------|-------------------|--------|---------|
| 112      | Fox River         | 742500 | 0.970   |
| 145      | Unnamed           | 740140 | 1.442   |
| 158      | Des Plaines River | 734000 | 0.921   |

TABLE I.2

**Distributed FWM/GSM ratio for all TMDL subbasins**

| Subbasin | FWM/GSM | Location           | WBIC    | PhosMER Reference Basin |
|----------|---------|--------------------|---------|-------------------------|
| 1        | 1.033   | Lannon Creek       | 773700  | 4                       |
| 2        | 1.033   | Spring Creek       | 773400  | 4                       |
| 3        | 1.033   | Unnamed            | 3000121 | 4                       |
| 4        | 1.033   | Fox River          | 742500  | 4                       |
| 5        | 1.033   | Fox River          | 742500  | 2+3+4                   |
| 6        | 3.773   | Coco Creek         | 772100  | 6                       |
| 7        | 3.023   | Zion Creek         | 772400  | 7                       |
| 8        | 2.133   | Meadow Brook Creek | 772300  | 8                       |
| 9        | 2.133   | Pewaukee Lake      | 772000  | 8                       |
| 10       | 0.949   | Unnamed            | 771800  | 10                      |
| 11       | 0.755   | Pewaukee River     | 771700  | 11                      |
| 12       | 0.788   | Deer Creek         | 772900  | 14                      |
| 13       | 0.788   | Poplar Creek       | 772800  | 14                      |
| 14       | 0.788   | Poplar Creek       | 772800  | 14                      |
| 15       | 0.788   | Frame Park Creek   | 771650  | 14                      |
| 16       | 1.006   | Fox River          | 742500  | 17-11                   |
| 17       | 0.989   | Fox River          | 742500  | 18                      |
| 18       | 0.989   | Fox River          | 742500  | 18                      |
| 19       | 1.466   | Brandy Brook       | 771400  | 22                      |
| 20       | 1.466   | Perennial Stream C | 3000119 | 22                      |
| 21       | 1.466   | Perennial Stream D | 3000120 | 22                      |
| 22       | 1.466   | Pebble Creek       | 771300  | 22                      |
| 23       | 1.404   | Spring Lake        | 770600  | 24                      |
| 24       | 1.404   | Spring Brook       | 770300  | 24                      |
| 25       | 2.941   | Genesee Creek      | 769800  | 25                      |
| 26       | 2.469   | Genesee Creek      | 769800  | 24+25                   |

TABLE I.2 (Continued)

| Subbasin | FWM/GSM | Location            | WBIC   | PhosMER Reference Basin |
|----------|---------|---------------------|--------|-------------------------|
| 27       | 1.466   | Mill Creek          | 769700 | 22                      |
| 28       | 1.466   | Pebble Brook        | 769500 | 22                      |
| 29       | 1.466   | Mill Brook          | 769400 | 22                      |
| 30       | 0.947   | Fox River           | 742500 | 30                      |
| 31       | 0.946   | Fox River           | 742500 | 31                      |
| 32       | 2.336   | Jericho Creek       | 768300 | 34                      |
| 33       | 2.336   | Jericho Creek       | 768300 | 34                      |
| 34       | 2.336   | Jericho Creek       | 768300 | 34                      |
| 35       | 0.902   | Mukwonago River     | 765500 | 41                      |
| 36       | 0.902   | Mukwonago River     | 765500 | 41                      |
| 37       | 0.902   | Mukwonago River     | 765500 | 41                      |
| 38       | 0.902   | Eagle Spring Lake   | 768600 | 41                      |
| 39       | 0.902   | Lake Beulah         | 766600 | 41                      |
| 40       | 0.902   | Phantom Lake        | 766000 | 41                      |
| 41       | 0.902   | Mukwonago River     | 765500 | 41                      |
| 42       | 0.902   | Lower Phantom Lake  | 765800 | 41                      |
| 43       | 1.063   | Mukwonago River     | 765500 | 43                      |
| 44       | 0.850   | Fox River           | 742500 | 44                      |
| 45       | 0.839   | Fox River           | 742500 | 45                      |
| 46       | 0.948   | Fox River           | 742500 | 46                      |
| 47       | 0.681   | Tichigan Lake       | 763600 | 73                      |
| 48       | 0.948   | Fox River           | 742500 | 49                      |
| 49       | 0.948   | Fox River           | 742500 | 49                      |
| 50       | 1.520   | Little Muskego Lake | 762700 | 62                      |
| 51       | 1.520   | Muskego Creek       | 762500 | 62                      |
| 52       | 1.520   | Bass Bay Lake       | 763200 | 62                      |
| 53       | 1.520   | Big Muskego Lake    | 762400 | 62                      |
| 54       | 1.520   | Unnamed             | 762200 | 62                      |
| 55       | 1.520   | Goose Ditch         | 760400 | 62                      |
| 56       | 1.520   | Goose Lake Br Canal | 760300 | 62                      |
| 57       | 1.520   | Lake Denoon         | 761300 | 62                      |
| 58       | 1.520   | Long Lake           | 761100 | 62                      |

TABLE I.2 (Continued)

| Subbasin | FWM/GSM | Location                   | WBIC    | PhosMER Reference Basin |
|----------|---------|----------------------------|---------|-------------------------|
| 59       | 1.520   | Waubeesee Lake             | 760900  | 62                      |
| 60       | 1.520   | Unnamed                    | 760700  | 62                      |
| 61       | 1.520   | Wind Lake                  | 761700  | 62                      |
| 62       | 1.520   | Unnamed                    | N/A     | 62                      |
| 63       | 1.520   | Wind Lake Canal            | 760200  | 62                      |
| 64       | 1.062   | Eagle Lake                 | 759800  | 65                      |
| 65       | 1.062   | Eagle Creek                | 759500  | 65                      |
| 66       | 0.948   | Fox River                  | 742500  | 49                      |
| 67       | 1.029   | Fox River                  | 742500  | 67                      |
| 68       | 0.992   | Fox River                  | 742500  | 68                      |
| 69       | 0.681   | Pleasant Lake              | 741500  | 73                      |
| 70       | 0.681   | Perennial Stream B         | 755100  | 73                      |
| 71       | 0.681   | Lauderdale Lakes           | 3 lakes | 73                      |
| 72       | 0.681   | Honey Creek                | 751500  | 73                      |
| 73       | 0.681   | Honey Creek                | 751500  | 73                      |
| 74       | 1.029   | Spring Creek               | 753900  | 83                      |
| 75       | 1.029   | Honey Creek                | 751500  | 83                      |
| 76       | 1.029   | Honey Creek                | 751500  | 83                      |
| 77       | 1.029   | Potter Lake                | 753800  | 83                      |
| 78       | 1.029   | Unnamed                    | 753700  | 83                      |
| 79       | 1.029   | Perennial Stream E         | 753600  | 83                      |
| 80       | 1.029   | Perennial Stream A         | 753100  | 83                      |
| 81       | 1.029   | Honey Creek                | 751500  | 83                      |
| 82       | 1.029   | Honey Creek                | 751500  | 83                      |
| 83       | 1.029   | Honey Creek                | 751500  | 83                      |
| 84       | 1.084   | Honey Creek                | 751500  | 83+91                   |
| 85       | 0.629   | Baker Creek                | 753000  | 85                      |
| 86       | 1.154   | Sugar Creek                | 752100  | 91                      |
| 87       | 1.154   | Lake Wandawega             | 740700  | 91                      |
| 88       | 1.154   | Sugar Creek                | 752100  | 91                      |
| 89       | 1.184   | Spring Brook, North Branch | 752500  | 90                      |
| 90       | 1.184   | Spring Brook               | 752400  | 90                      |

TABLE I.2 (Continued)

| Subbasin | FWM/GSM | Location                     | WBIC    | PhosMER Reference Basin |
|----------|---------|------------------------------|---------|-------------------------|
| 91       | 1.154   | Sugar Creek                  | 752100  | 91                      |
| 92       | 1.008   | Como Lake                    | 757900  | 102-98                  |
| 93       | 1.008   | Como Creek                   | 757600  | 102-98                  |
| 94       | 0.422   | Button Creek                 | 5041807 | 94                      |
| 95       | 0.986   | Geneva Lake                  | 758300  | 103                     |
| 96       | 0.986   | Bloomfield Creek             | 758000  | 103                     |
| 97       | 0.925   | White River                  | 751200  | 97                      |
| 98       | 0.959   | White River                  | 751200  | 96+97                   |
| 99       | 1.184   | Ore Creek                    | 757000  | 90                      |
| 100      | 0.986   | Pell Lake                    | 743600  | 103                     |
| 101      | 1.184   | Spring Valley Creek          | 756200  | 90                      |
| 102      | 0.986   | White River                  | 751200  | 103                     |
| 103      | 0.986   | White River                  | 751200  | 103                     |
| 104      | 1.053   | White River                  | 751200  | 84+101+103              |
| 105      | 0.986   | Bohner Lake                  | 750800  | 103                     |
| 106      | 0.977   | Fox River                    | 742500  | 106                     |
| 107      | 1.520   | Browns Lake                  | 750300  | 62                      |
| 108      | 1.520   | Hoosier Creek                | 749500  | 62                      |
| 109      | 1.520   | Peterson Creek               | 748500  | 62                      |
| 110      | 1.520   | Peterson Creek               | 748500  | 62                      |
| 111      | 0.986   | Palmer Creek                 | 748300  | 103                     |
| 112      | 0.970   | Fox River                    | 742500  | 112                     |
| 113      | 0.970   | Fox River                    | 742500  | 112                     |
| 114      | 0.970   | Fox River                    | 742500  | 112                     |
| 115      | 1.184   | Bassett Creek                | 748200  | 90                      |
| 116      | 1.184   | Bassett Creek                | 748200  | 90                      |
| 117      | 1.520   | Silver Lake                  | 747900  | 62                      |
| 118      | 0.970   | Fox River                    | 742500  | 112                     |
| 119      | 0.970   | Fox River                    | 742500  | 112                     |
| 120      | 0.681   | North Lake                   | 741200  | 73                      |
| 121      | 1.184   | Nippersink Creek             | 742600  | 90                      |
| 122      | 1.184   | West Branch Nippersink Creek | 744400  | 90                      |

TABLE I.2 (Continued)

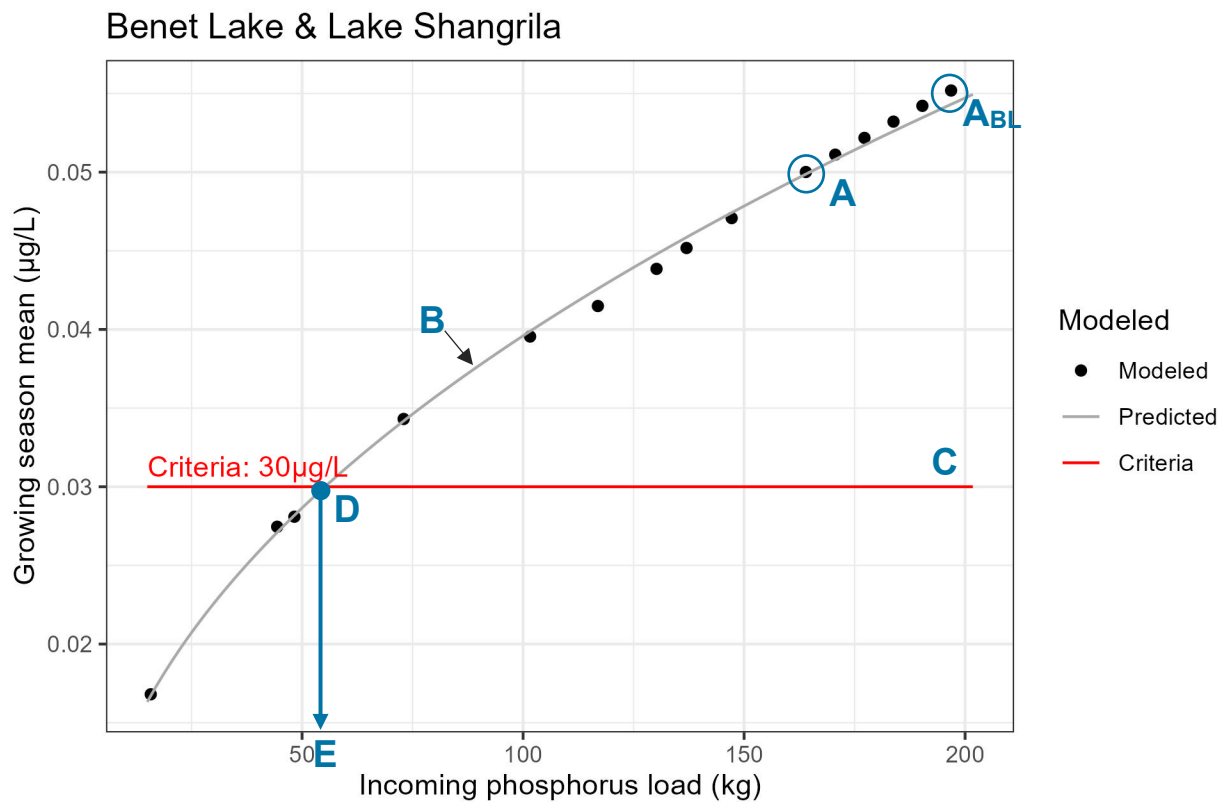
| Subbasin | FWM/GSM | Location                      | WBIC    | PhosMER Reference Basin |
|----------|---------|-------------------------------|---------|-------------------------|
| 123      | 1.184   | North Branch Nippersink Creek | 742700  | 90                      |
| 124      | 1.184   | Powers Lake                   | 744200  | 90                      |
| 125      | 1.184   | Unnamed                       | 743500  | 90                      |
| 126      | 1.184   | East Branch Nippersink Creek  | 743400  | 90                      |
| 127      | 1.184   | North Branch Nippersink Creek | 742700  | 90                      |
| 128      | 1.184   | North Branch Nippersink Creek | 742700  | 90                      |
| 129      | 1.029   | Lake Mary                     | 743000  | 83                      |
| 130      | 1.029   | Elizabeth Lake                | 742800  | 83                      |
| 131      | 1.520   | Center Lake                   | 747300  | 62                      |
| 132      | 0.921   | Camp Lake                     | 747100  | 158                     |
| 133      | 0.921   | Camp Lake Outlet              | 746600  | 158                     |
| 134      | 0.921   | Trevor Creek                  | 745600  | 158                     |
| 135      | 0.921   | Benet Lake                    | 734800  | 158                     |
| 136      | 0.921   | Lake Shangrila Outlet         | 734300  | 158                     |
| 137      | 0.921   | North Mill Creek              | 734100  | 158                     |
| 138      | 0.921   | Unnamed                       | 739600  | 158                     |
| 139      | 0.921   | Vern Wolf Lake                | 739100  | 158                     |
| 140      | 1.442   | Unnamed                       | 738500  | 145                     |
| 141      | 1.442   | Paddock Lake                  | 737900  | 145                     |
| 142      | 1.442   | Hooker Lake                   | 738400  | 145                     |
| 143      | 1.442   | Salem Branch                  | 737500  | 145                     |
| 144      | 0.921   | Brighton Creek                | 737400  | 158                     |
| 145      | 1.442   | Unnamed                       | 740140  | 145                     |
| 146      | 0.921   | Unnamed                       | 5040564 | 158                     |
| 147      | 0.921   | Unnamed                       | 737250  | 158                     |
| 148      | 0.921   | Root River                    | 737200  | 158                     |
| 149      | 0.921   | Des Plaines River             | 734000  | 158                     |
| 150      | 0.921   | Des Plaines River             | 734000  | 158                     |
| 151      | 0.921   | Des Plaines River             | 734000  | 158                     |
| 152      | 0.921   | Kilbourn Road Ditch           | 736900  | 158                     |
| 153      | 0.921   | Kilbourn Road Ditch           | 736900  | 158                     |
| 154      | 0.921   | Kilbourn Road Ditch           | 736900  | 158                     |

TABLE I.2 (Continued)

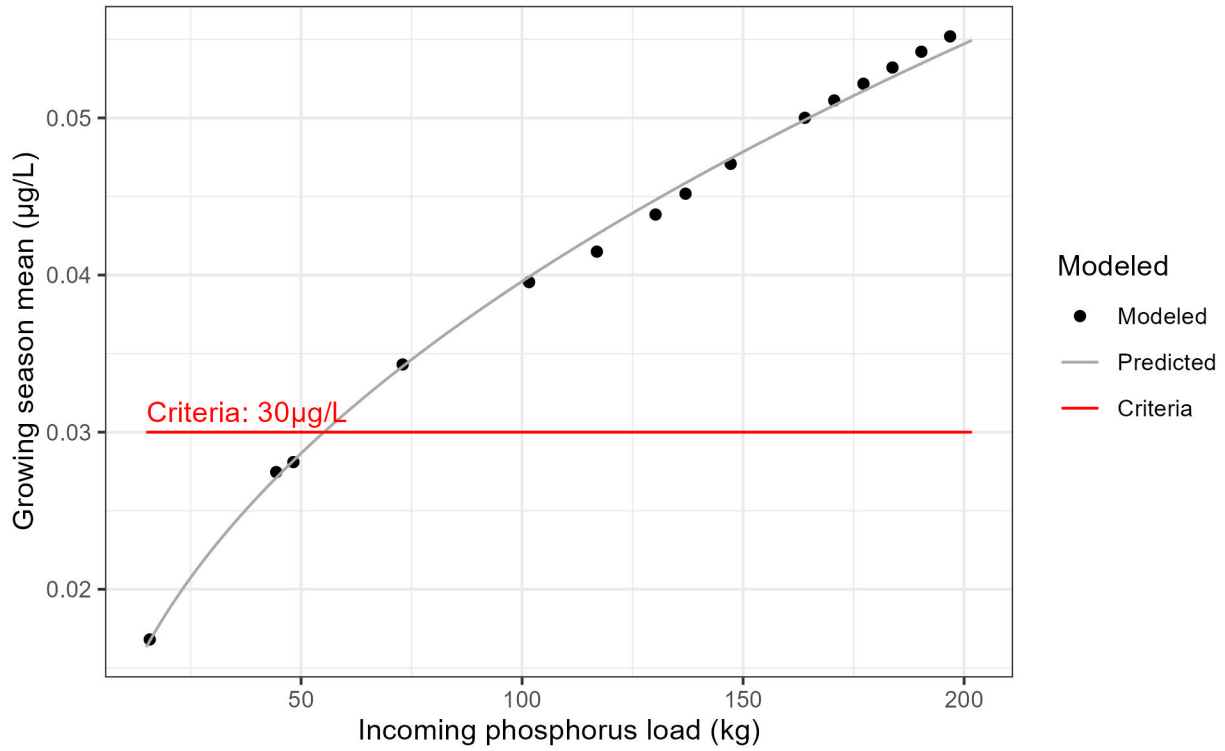
| Subbasin | FWM/GSM | Location                     | WBIC   | PhosMER Reference Basin |
|----------|---------|------------------------------|--------|-------------------------|
| 155      | 0.921   | Lake Andrea                  | 733850 | 158                     |
| 156      | 0.921   | Lower Pleasant Prairie Ditch | 736300 | 158                     |
| 157      | 0.921   | Des Plaines River            | 734000 | 158                     |
| 158      | 0.921   | Des Plaines River            | 734000 | 158                     |

### PHOSPHORUS LAKE RESPONSE CURVES

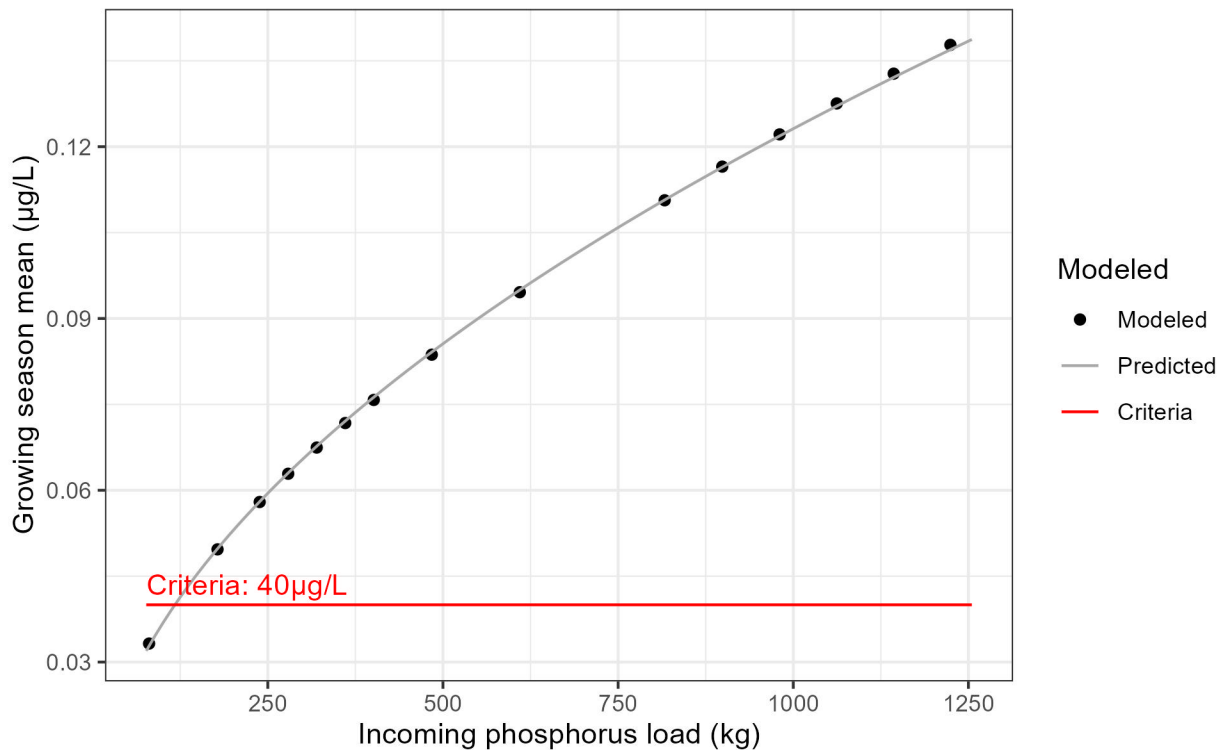
The phosphorus lake response curve for lakes in the TMDL project area that exceed criteria or are close to exceeding criteria are provided below. The lake response curves were developed using the calibrated SWAT+ model under multiple loading scenarios. In each figure, the black points (A) represent individual SWAT+ simulations that predict the in-lake phosphorus concentration as a function of incoming phosphorus load. The black point furthest to the right on the x-axis corresponds to the baseline loading scenario ( $A_{BL}$ ), while the black points to the left represent alternative loading scenarios. The grey line is the log-log regression line (B) that best fits the individual scenarios. The red horizontal line (C) indicates the applicable phosphorus criterion for the lake being evaluated. The point where the criterion intersects the predicted response curve (D) identifies the maximum external load at which the lake will meet the criterion (E).



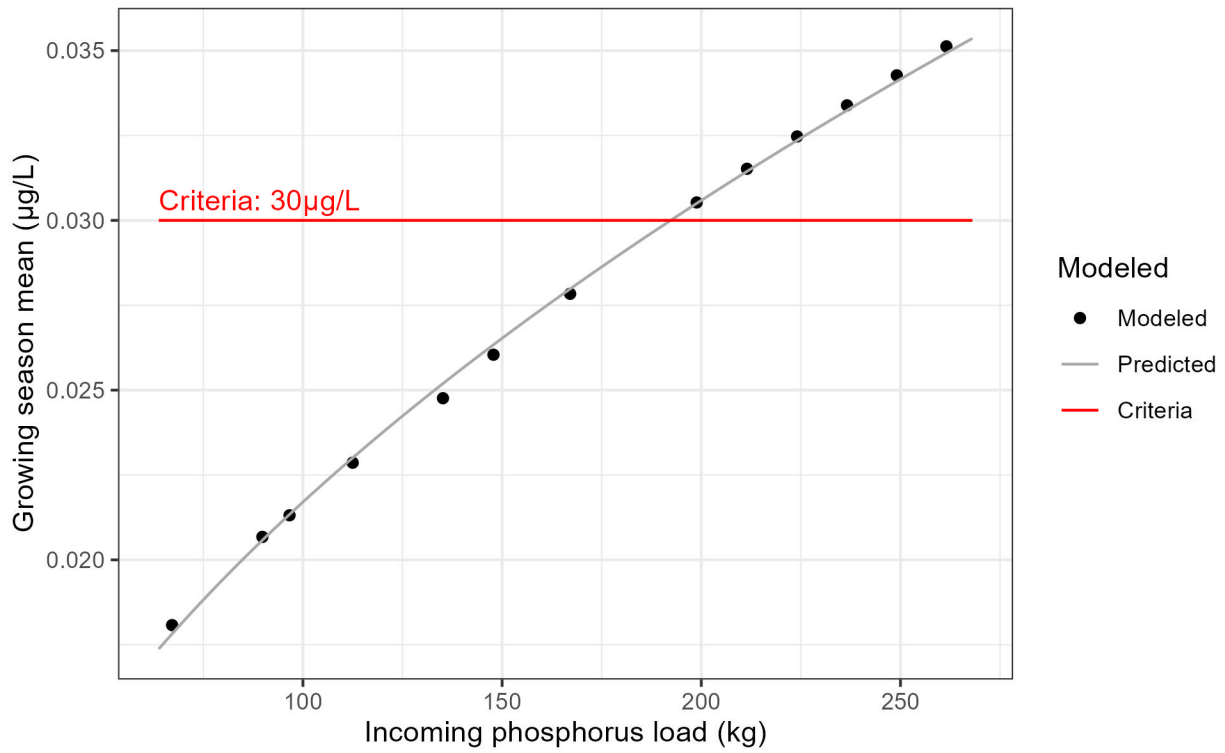
### Benet Lake & Lake Shangrila



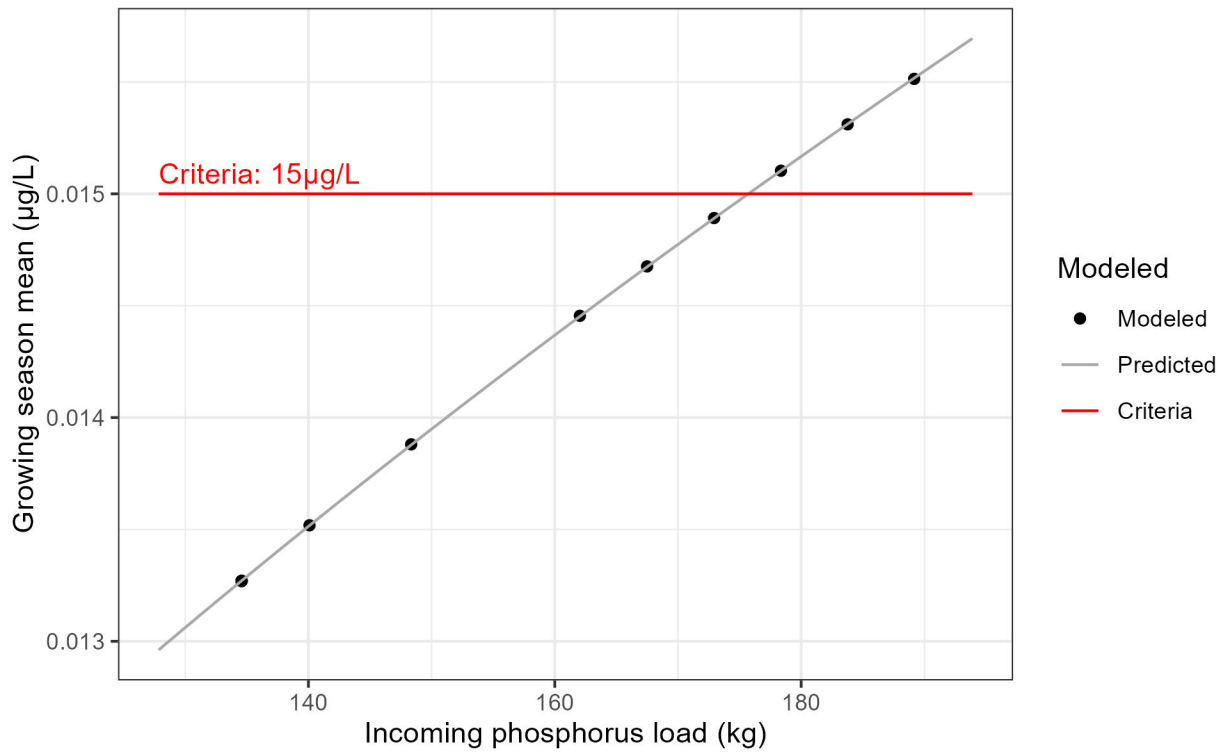
### Eagle Lake



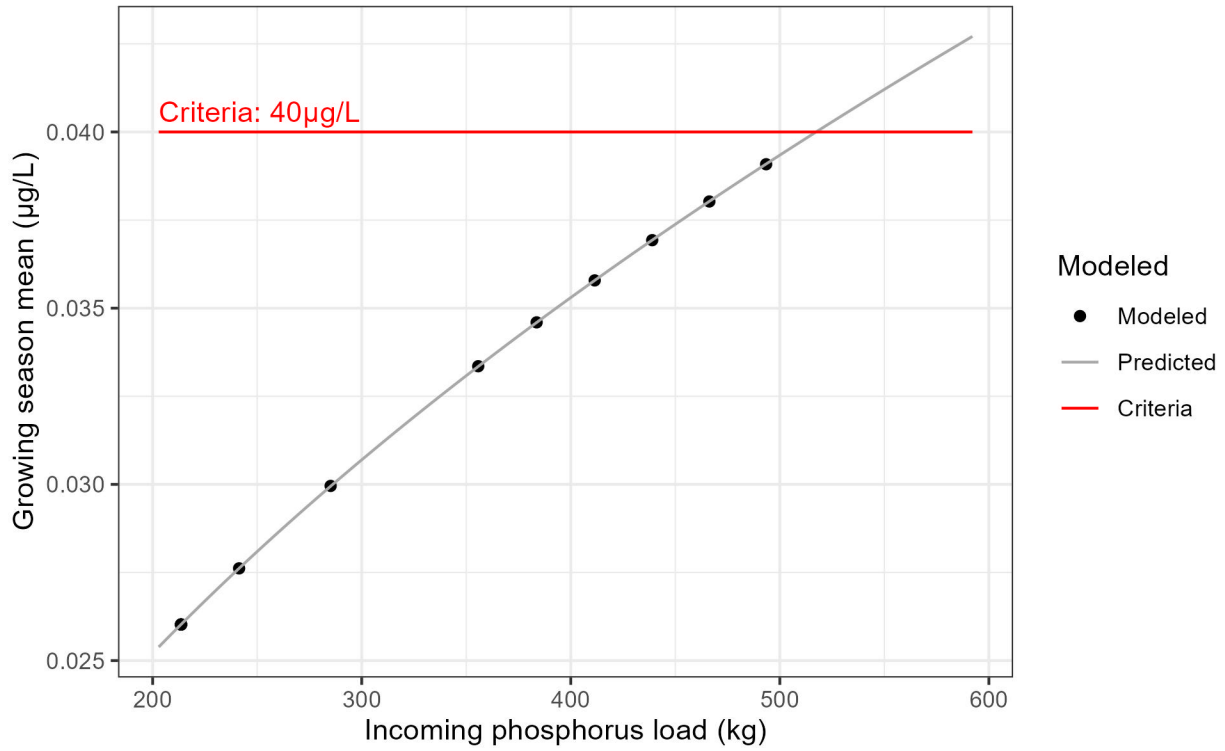
### Hooker Lake



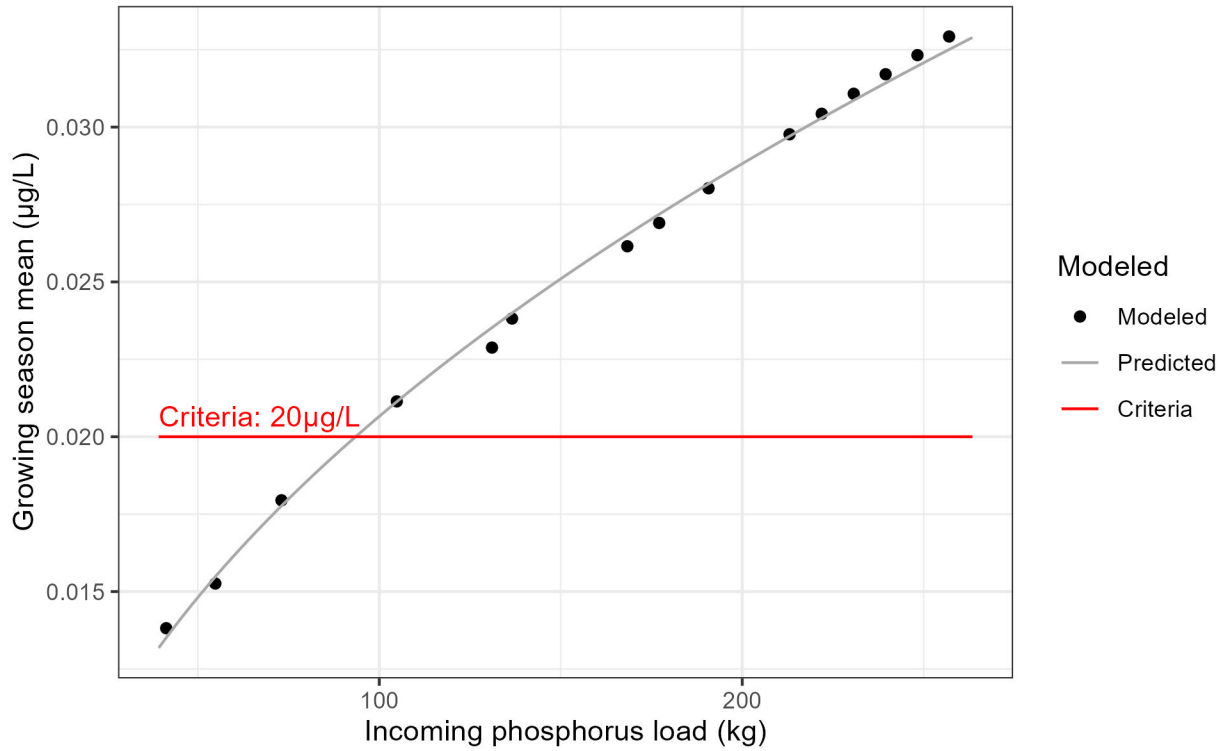
### Lake Beulah



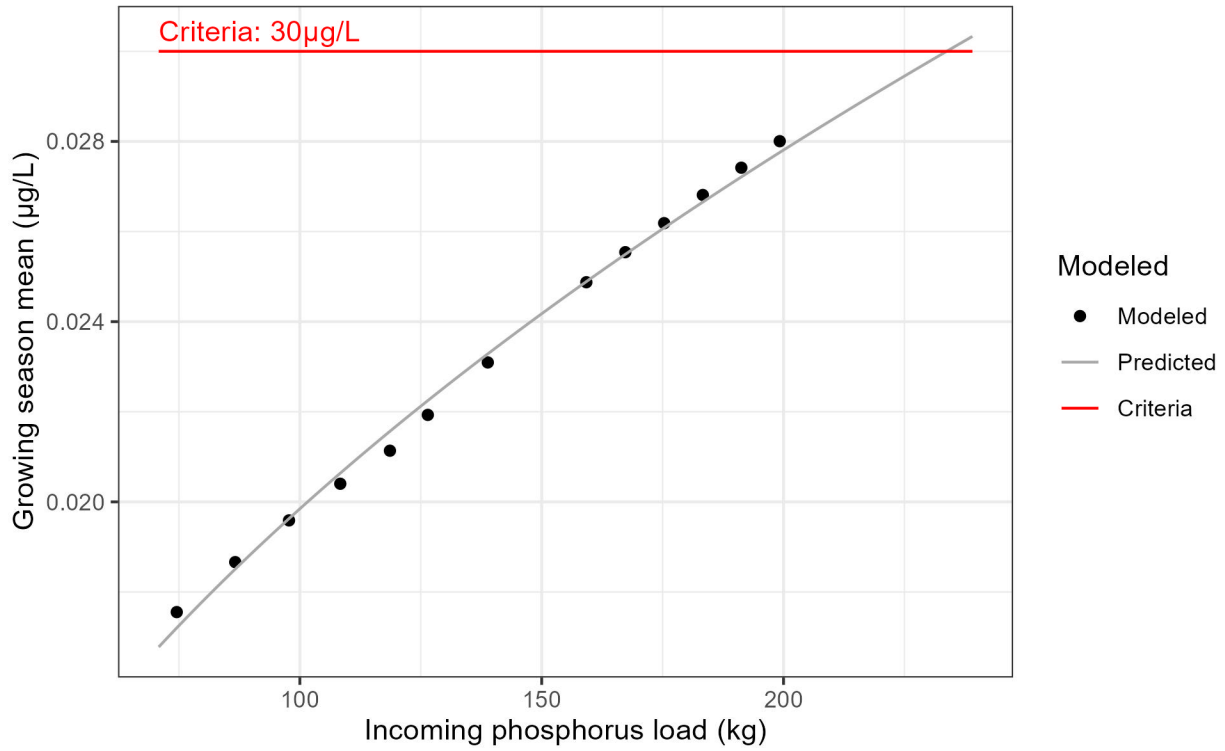
### Lake Como



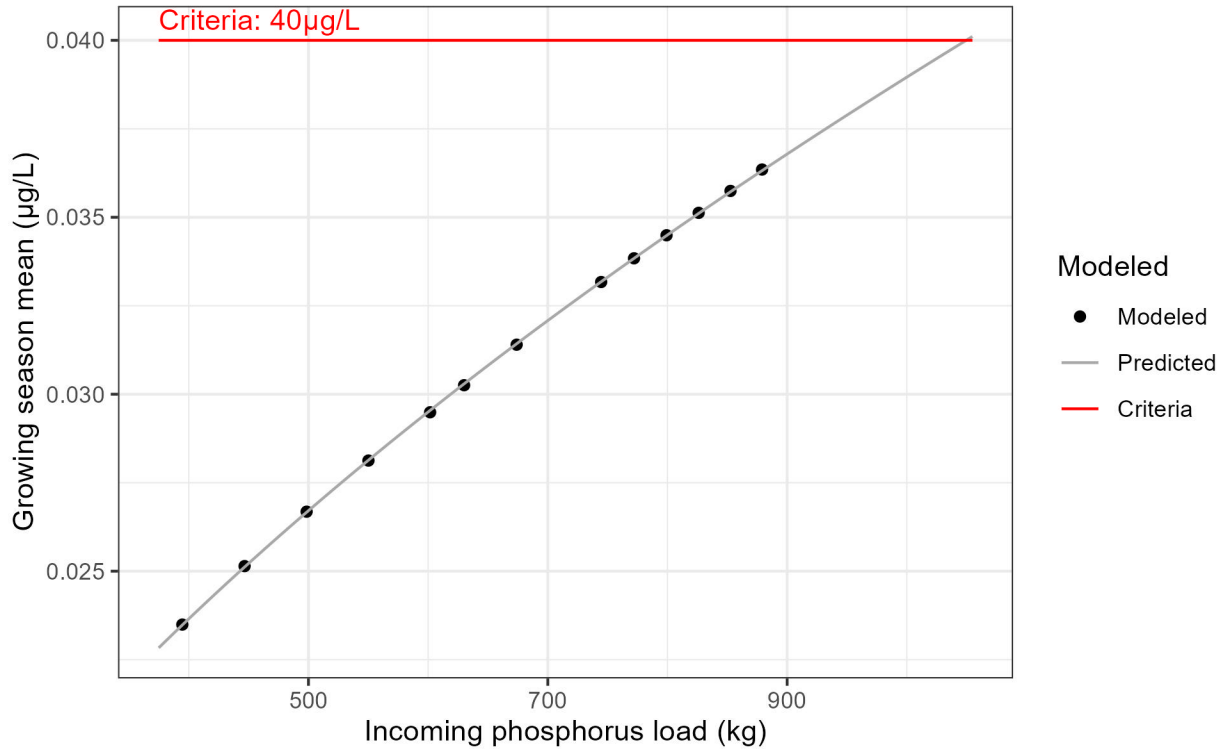
### Lake Denoon



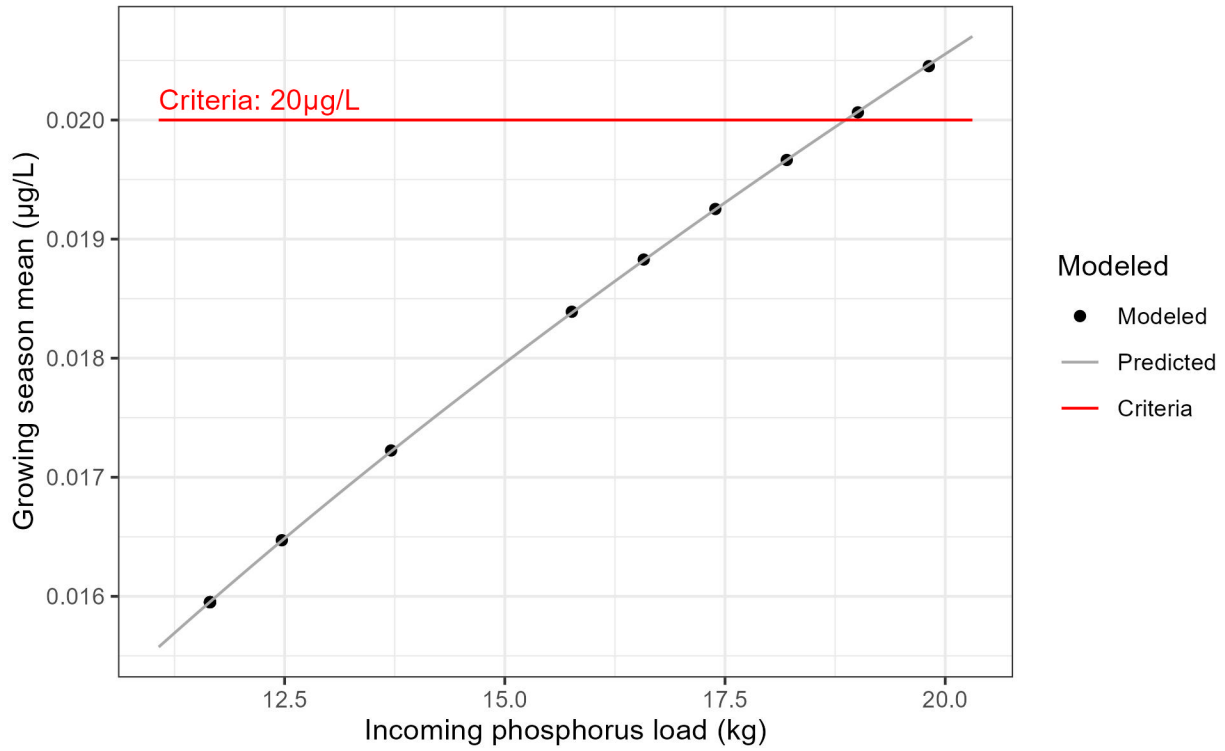
### Long Lake



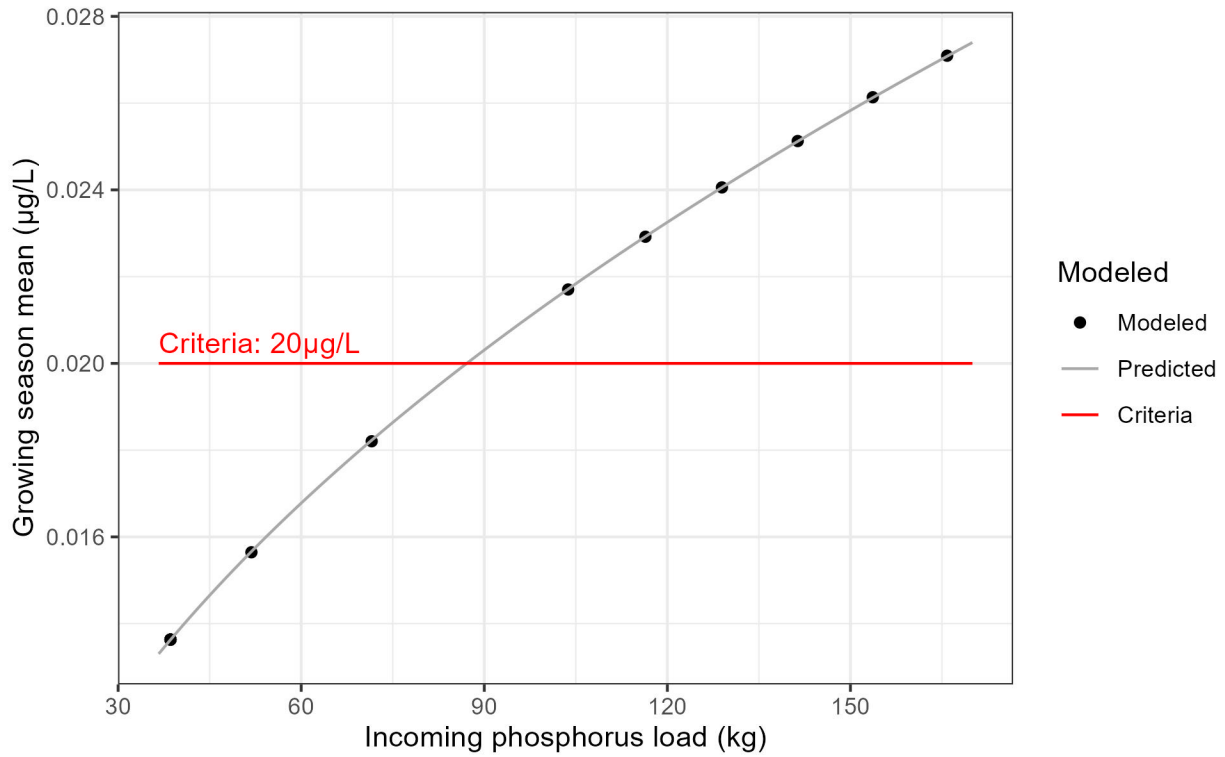
### Muskego Lake



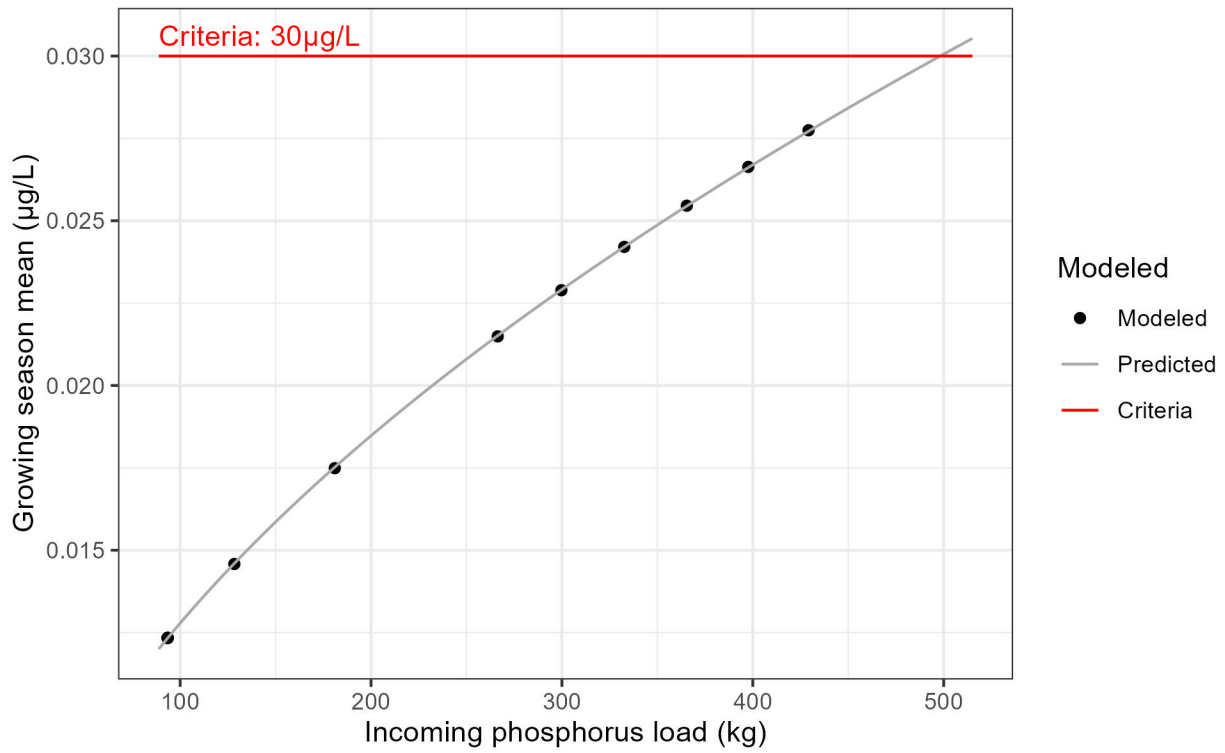
### Phantom Lake



### Potter Lake



### Tichigan Lake



### Wind Lake

