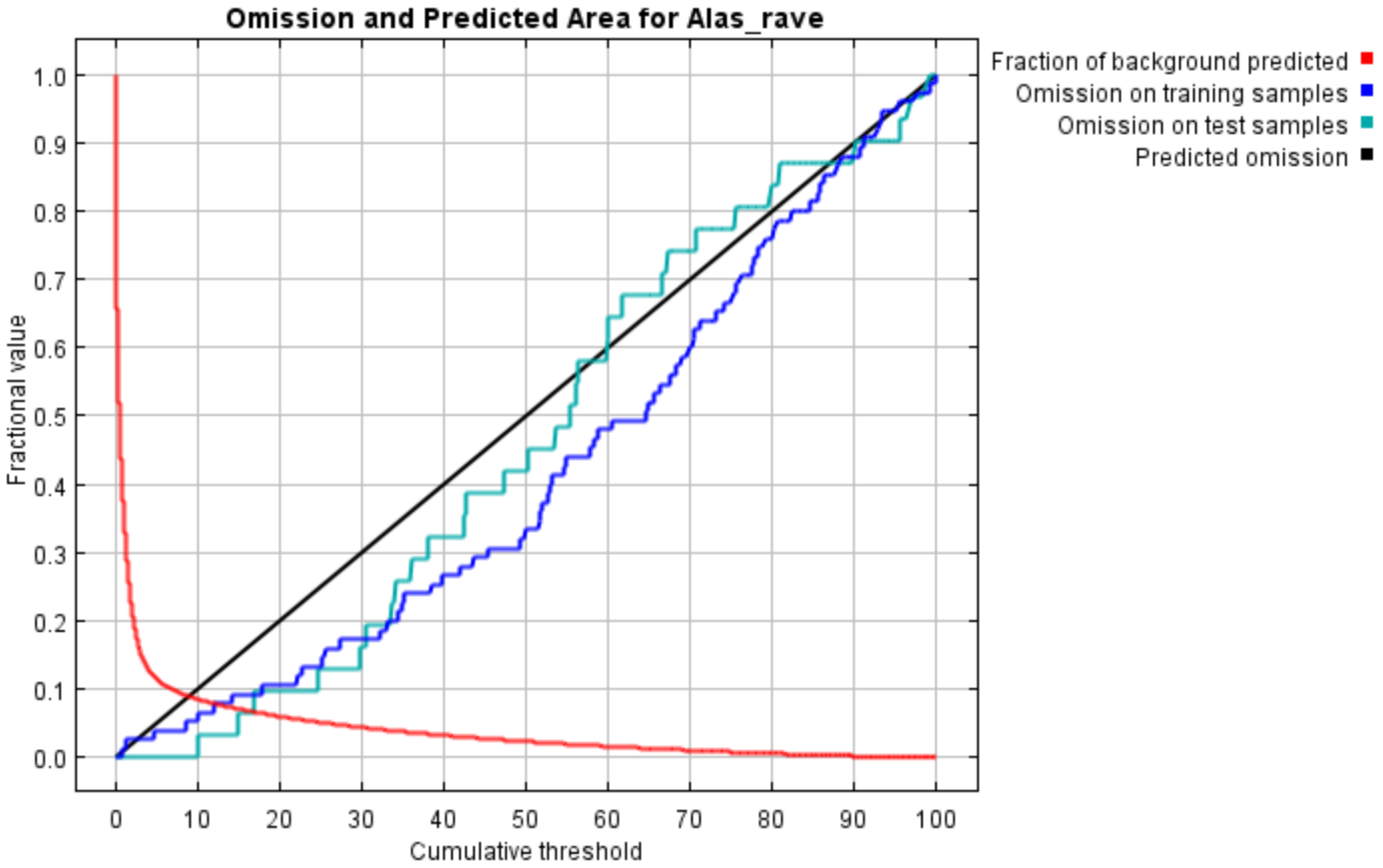
Maxent model for Alas_rave

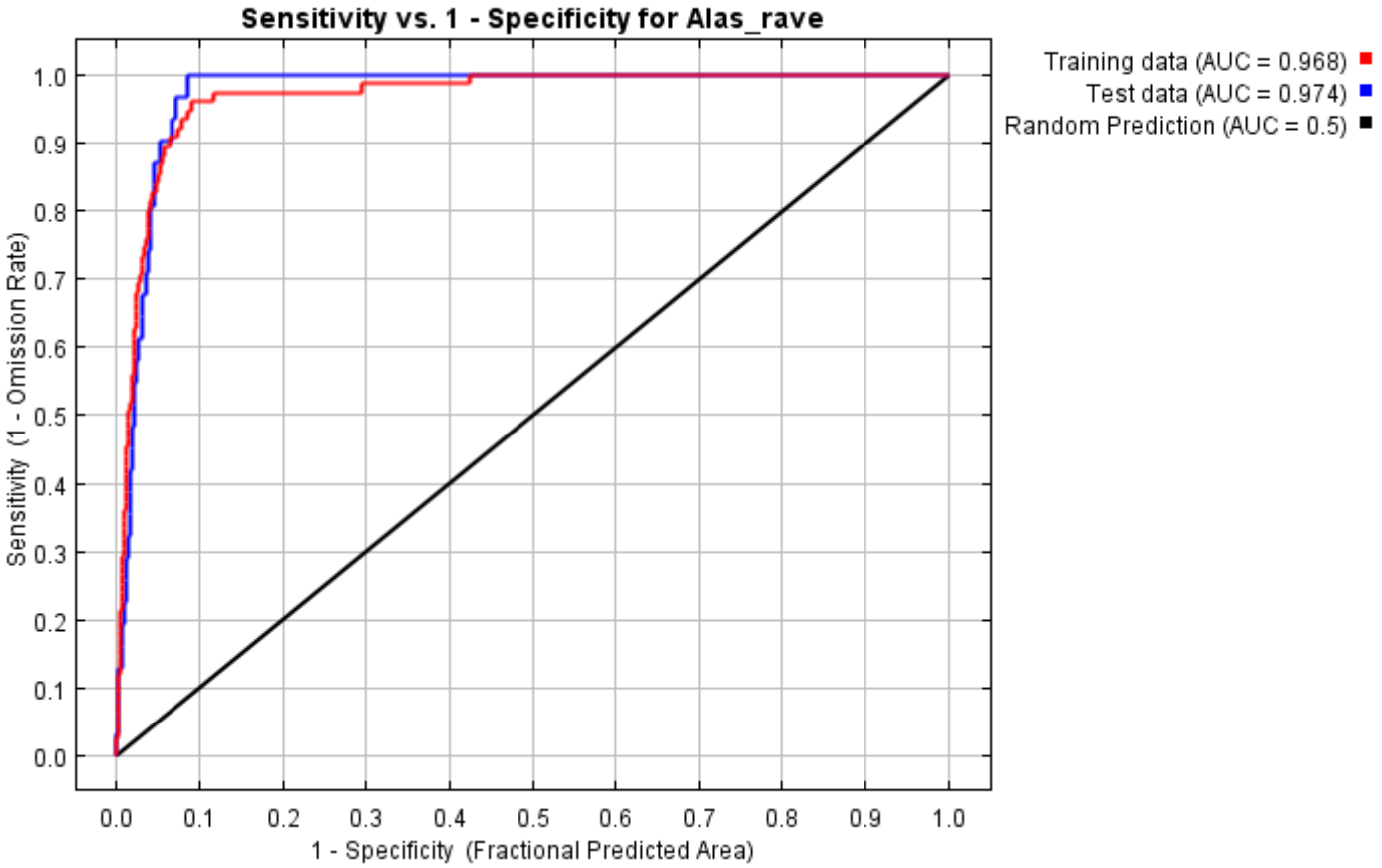
This page contains some analysis of the Maxent model for Alas_rave, created Fri Mar 17 14:40:37 EDT 2017 using Maxent version 3.3.3k. If you would like to do further analyses, the raw data used here is linked to at the end of this page.

Analysis of omission/commission

The following picture shows the omission rate and predicted area as a function of the cumulative threshold. The omission rate is is calculated both on the training presence records, and (if test data are used) on the test records. The omission rate should be close to the predicted omission, because of the definition of the cumulative threshold.



The next picture is the receiver operating characteristic (ROC) curve for the same data. Note that the specificity is defined using predicted area, rather than true commission (see the paper by Phillips, Anderson and Schapire cited on the help page for discussion of what this means). This implies that the maximum achievable AUC is less than 1. If test data is drawn from the Maxent distribution itself, then the maximum possible test AUC would be 0.958 rather than 1; in practice the test AUC may exceed this bound.



Some common thresholds and corresponding omission rates are as follows. If test data are available, binomial probabilities are calculated exactly if the number of test samples is at most 25, otherwise using a normal approximation to the binomial. These are 1-sided p-values for the null hypothesis that test points are predicted no better than by a random prediction with the same fractional predicted area. The "Balance" threshold minimizes 6 * training omission rate + .04 * cumulative threshold + 1.6 * fractional predicted area.

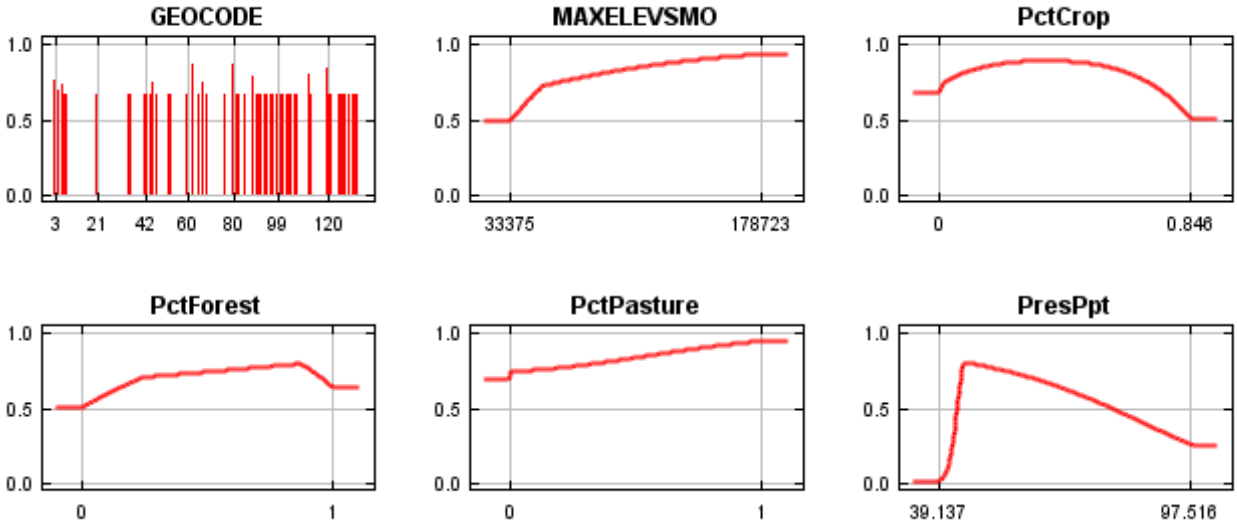
Cumulative threshold	Logistic threshold	Description	Fractional predicted area	Training omission rate	Test omission rate	P-value
1.000	0.005	Fixed cumulative value 1	0.346	0.013	0.000	9.181E-15
5.000	0.085	Fixed cumulative value 5	0.115	0.040	0.000	3.385E-54
10.000	0.222	Fixed cumulative value 10	0.086	0.053	0.000	0E0
0.654	0.004	Minimum training presence	0.425	0.000	0.000	4.705E-11
17.893	0.322	10 percentile training presence	0.065	0.093	0.097	0E0
12.072	0.261	Equal training sensitivity and specificity	0.079	0.080	0.032	0E0
8.637	0.193	Maximum training sensitivity plus specificity	0.091	0.040	0.000	0E0
16.799	0.317	Equal test sensitivity and	0.067	0.093	0.065	0E0

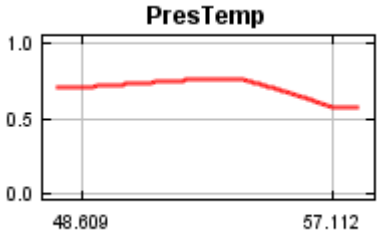
		specificity				
10.042	0.222	Maximum test sensitivity plus specificity	0.086	0.053	0.000	0E0
3.414	0.039	Balance training omission, predicted area and threshold value	0.141	0.027	0.000	2.015E-43
6.434	0.132	Equate entropy of thresholded and original distributions	0.103	0.040	0.000	3.135E-61

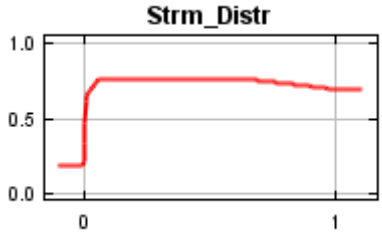
Click here to interactively explore this prediction using the Explain tool. If clicking from your browser does not succeed in starting the tool, try running the script in C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Alas_rave\Alas_rave_explain.bat directly. This tool requires the environmental grids to be small enough that they all fit in memory.

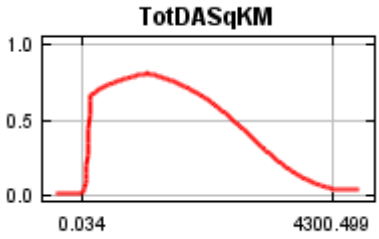
Response curves

These curves show how each environmental variable affects the Maxent prediction. The curves show how the logistic prediction changes as each environmental variable is varied, keeping all other environmental variables at their average sample value. Click on a response curve to see a larger version. Note that the curves can be hard to interpret if you have strongly correlated variables, as the model may depend on the correlations in ways that are not evident in the curves. In other words, the curves show the marginal effect of changing exactly one variable, whereas the model may take advantage of sets of variables changing together.

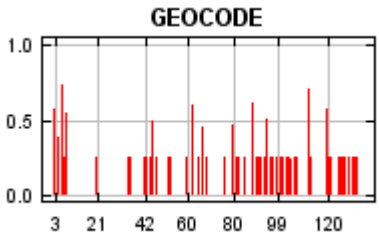


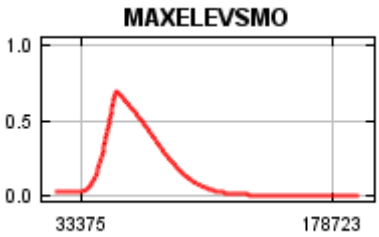


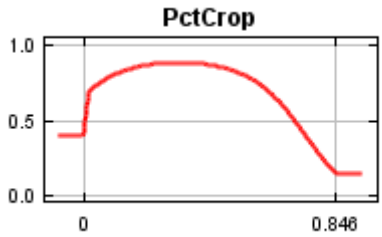


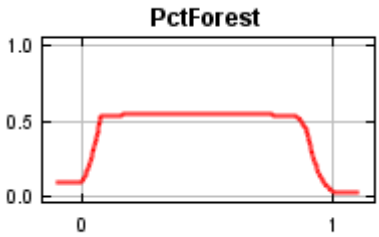


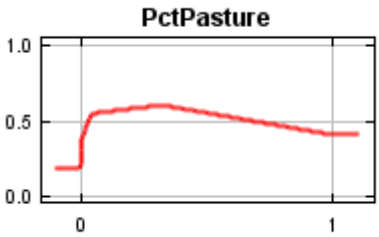
In contrast to the above marginal response curves, each of the following curves represents a different model, namely, a Maxent model created using only the corresponding variable. These plots reflect the dependence of predicted suitability both on the selected variable and on dependencies induced by correlations between the selected variable and other variables. They may be easier to interpret if there are strong correlations between variables.

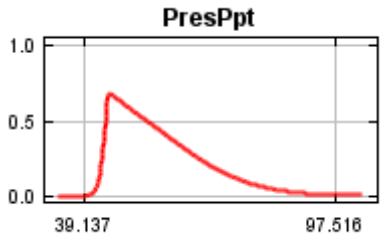


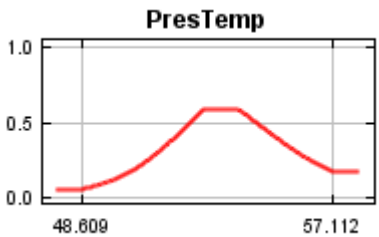


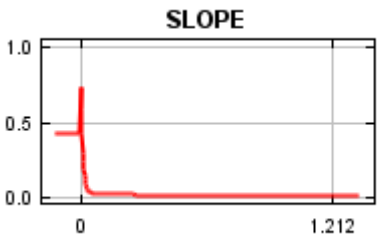


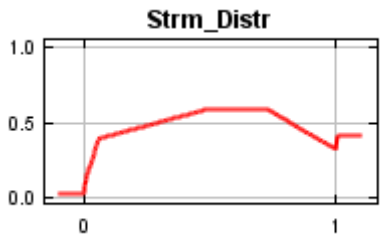


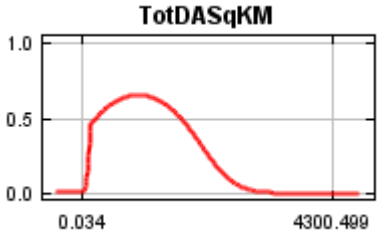










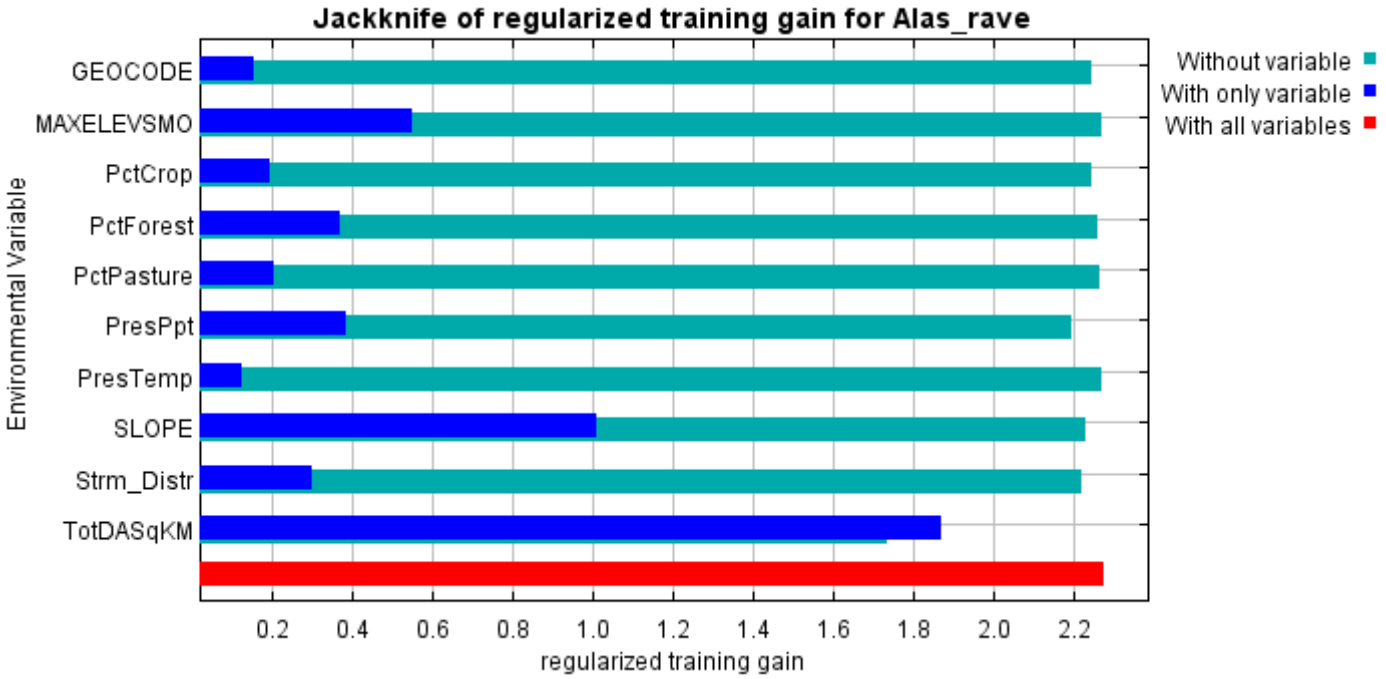


Analysis of variable contributions

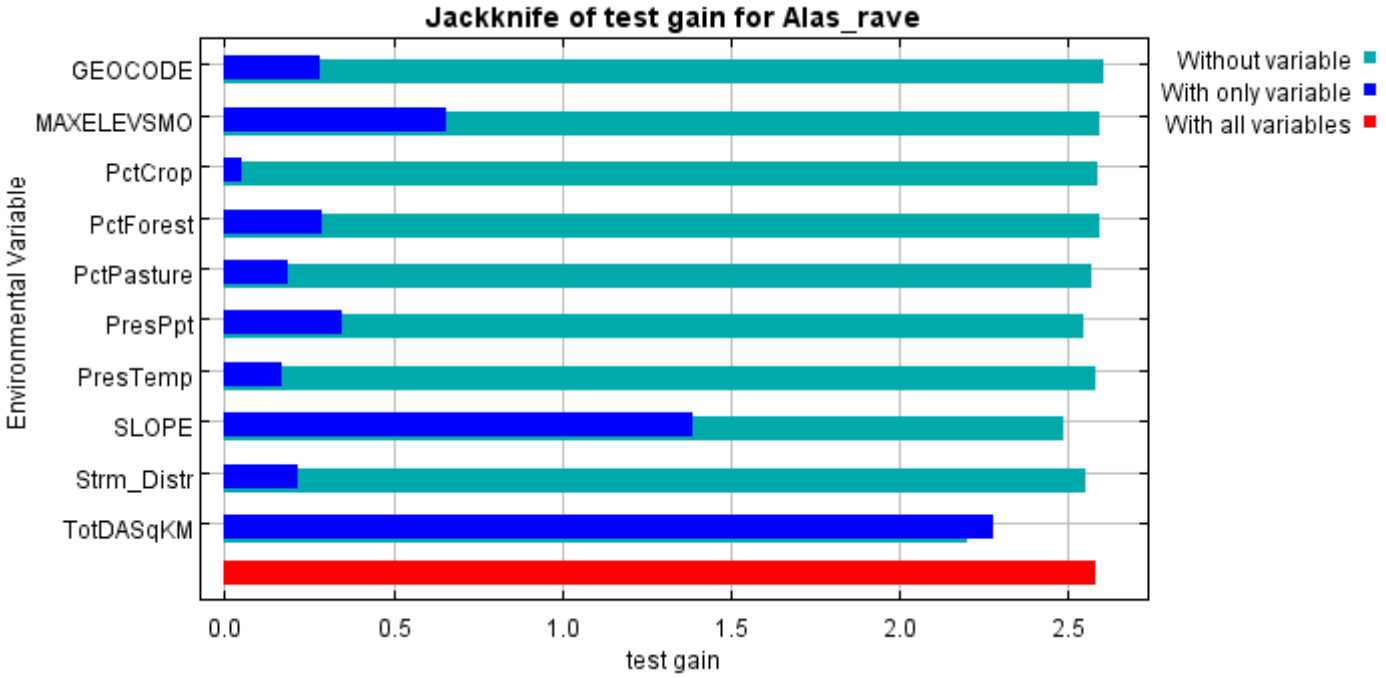
The following table gives estimates of relative contributions of the environmental variables to the Maxent model. To determine the first estimate, in each iteration of the training algorithm, the increase in regularized gain is added to the contribution of the corresponding variable, or subtracted from it if the change to the absolute value of lambda is negative. For the second estimate, for each environmental variable in turn, the values of that variable on training presence and background data are randomly permuted. The model is reevaluated on the permuted data, and the resulting drop in training AUC is shown in the table, normalized to percentages. As with the variable jackknife, variable contributions should be interpreted with caution when the predictor variables are correlated.

Variable	Percent contribution	Permutation importance
TotDASqKM	78.5	83.7
Strm_Distr	6.1	4.9
PresPpt	6	6
GEOCODE	3.2	1.6
SLOPE	2	0.9
PctPasture	1.2	0.4
PresTemp	0.9	0.3
PctCrop	0.9	0.5
PctForest	0.6	0.6
MAXELEVSMO	0.5	1

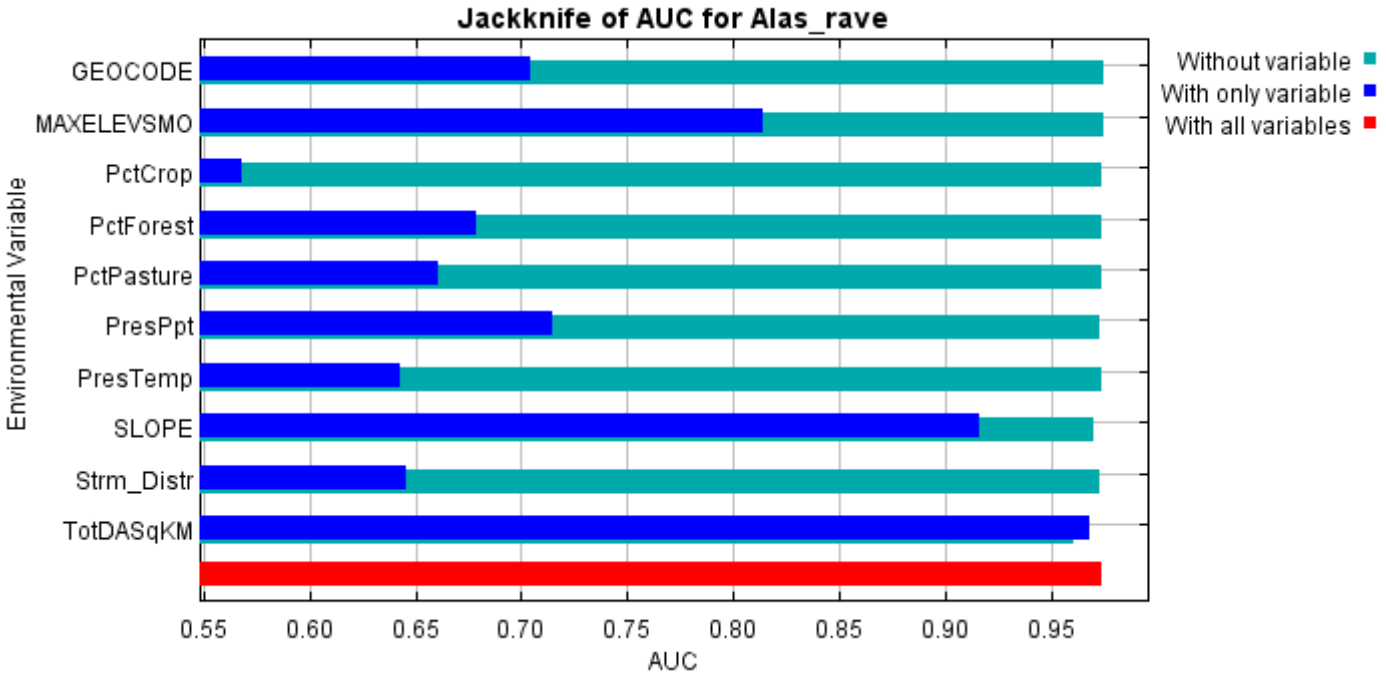
The following picture shows the results of the jackknife test of variable importance. The environmental variable with highest gain when used in isolation is TotDASqKM, which therefore appears to have the most useful information by itself. The environmental variable that decreases the gain the most when it is omitted is TotDASqKM, which therefore appears to have the most information that isn't present in the other variables.



The next picture shows the same jackknife test, using test gain instead of training gain. Note that conclusions about which variables are most important can change, now that we're looking at test data.



Lastly, we have the same jackknife test, using AUC on test data.



Raw data outputs and control parameters

The data used in the above analysis is contained in the next links. Please see the Help button for more information on these.
The model applied to the training environmental layers
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv
The coefficients of the model
The omission and predicted area for varying cumulative and raw thresholds
The prediction strength at the training and (optionally) test presence sites
Results for all species modeled in the same Maxent run, with summary statistics and (optionally) jackknife results

Regularized training gain is 2.276, training AUC is 0.968, unregularized training gain is 2.516.
Unregularized test gain is 2.582.
Test AUC is 0.974, standard deviation is 0.004 (calculated as in DeLong, DeLong & Clarke-Pearson 1988, equation 2).
Algorithm terminated after 500 iterations (14 seconds).

The follow settings were used during the run:
75 presence records used for training, 31 for testing.
6687 points used to determine the Maxent distribution (background points and presence points).
Environmental layers used: GEOCODE(categorical) MAXELEVSMO PctCrop PctForest PctPasture PresPpt

PresTemp SLOPE Strm_Distr TotDASqKM
Regularization values: linear/quadratic/product: 0.121, categorical: 0.250, threshold: 1.250, hinge: 0.500
Feature types used: hinge linear quadratic
responsecurves: true
pictures: false
jackknife: true
outputdirectory: C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Alas_rave
projectionlayers: F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv
samplesfile: C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\AlasRaveFinal.csv
environmentallayers: C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\AlasRaveFinal.csv
askoverwrite: false
randomtestpoints: 30
Command line used:

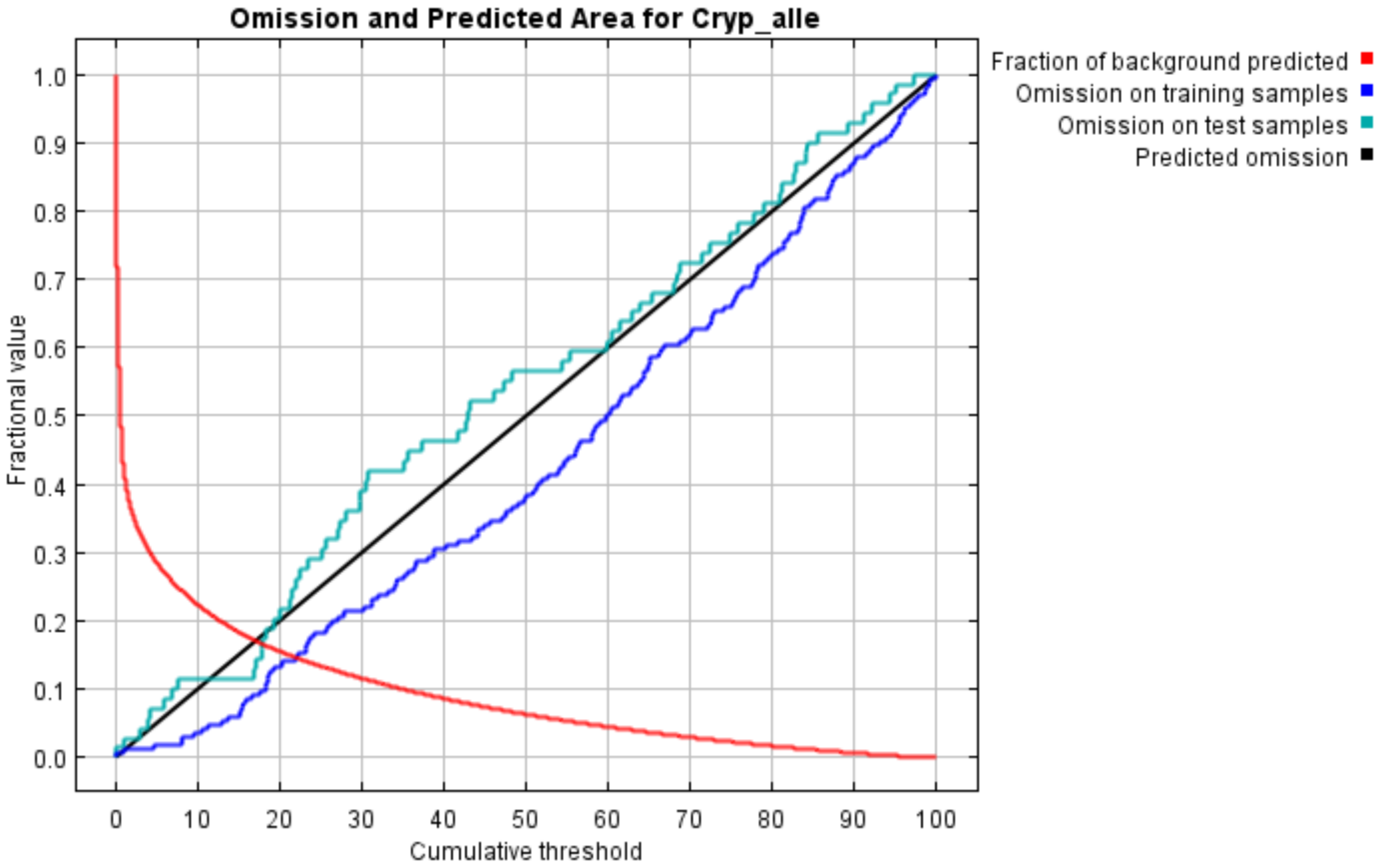
Command line to repeat this species model: java density.MaxEnt nowarnings noprefixes -E "" -E Alas_rave
responsecurves nopictures jackknife
outputdirectory=C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Alas_rave
"projectionlayers=F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv"
"samplesfile=C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\AlasRaveFinal.csv"
"environmentallayers=C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\AlasRaveFinal.csv"
noaskoverwrite randomtestpoints=30 -t GEOCODE

Maxent model for Cryp_alle

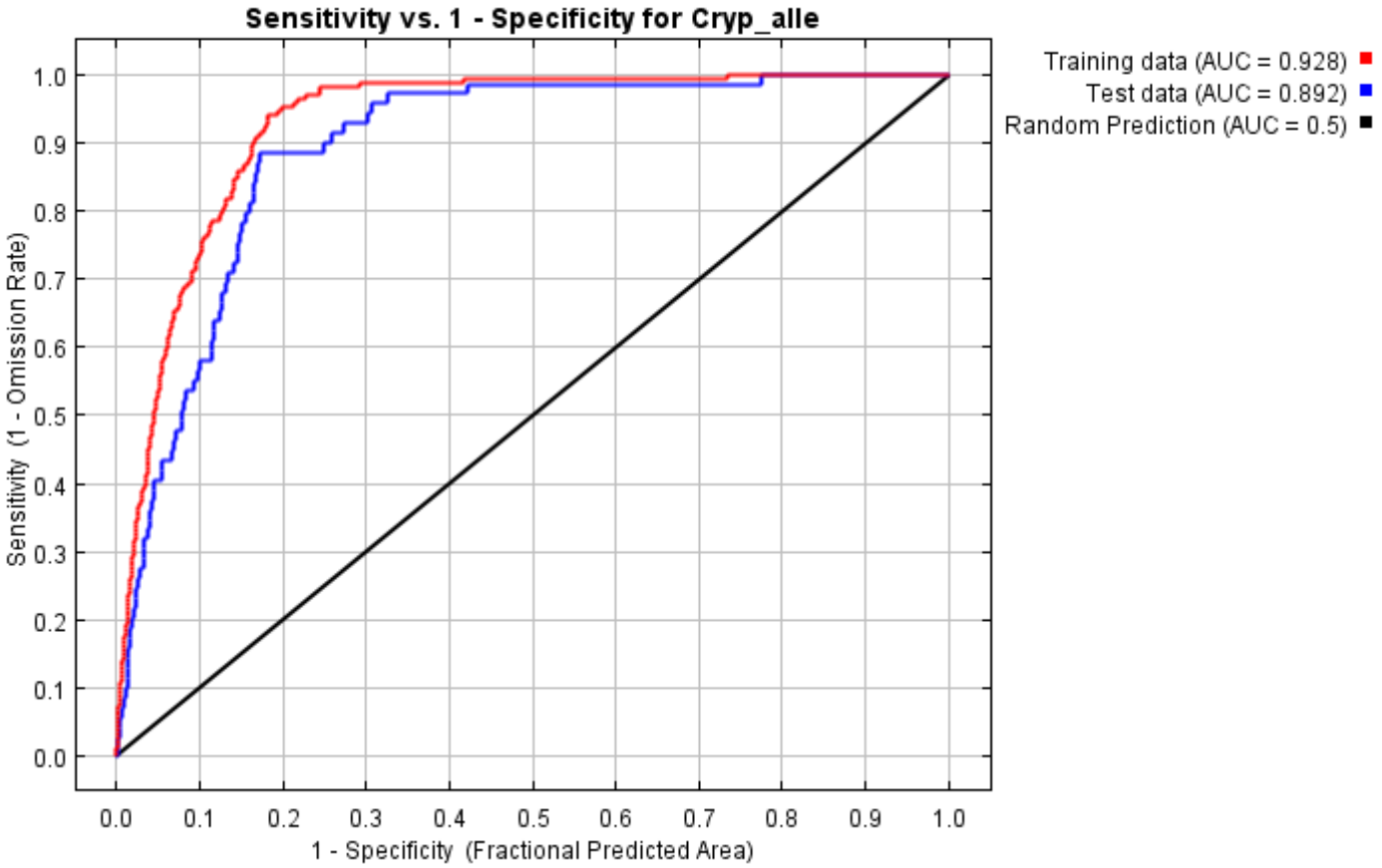
This page contains some analysis of the Maxent model for Cryp_alle, created Fri Mar 17 14:45:45 EDT 2017 using Maxent version 3.3.3k. If you would like to do further analyses, the raw data used here is linked to at the end of this page.

Analysis of omission/commission

The following picture shows the omission rate and predicted area as a function of the cumulative threshold. The omission rate is is calculated both on the training presence records, and (if test data are used) on the test records. The omission rate should be close to the predicted omission, because of the definition of the cumulative threshold.



The next picture is the receiver operating characteristic (ROC) curve for the same data. Note that the specificity is defined using predicted area, rather than true commission (see the paper by Phillips, Anderson and Schapire cited on the help page for discussion of what this means). This implies that the maximum achievable AUC is less than 1. If test data is drawn from the Maxent distribution itself, then the maximum possible test AUC would be 0.906 rather than 1; in practice the test AUC may exceed this bound.



Some common thresholds and corresponding omission rates are as follows. If test data are available, binomial probabilities are calculated exactly if the number of test samples is at most 25, otherwise using a normal approximation to the binomial. These are 1-sided p-values for the null hypothesis that test points are predicted no better than by a random prediction with the same fractional predicted area. The "Balance" threshold minimizes 6 * training omission rate + .04 * cumulative threshold + 1.6 * fractional predicted area.

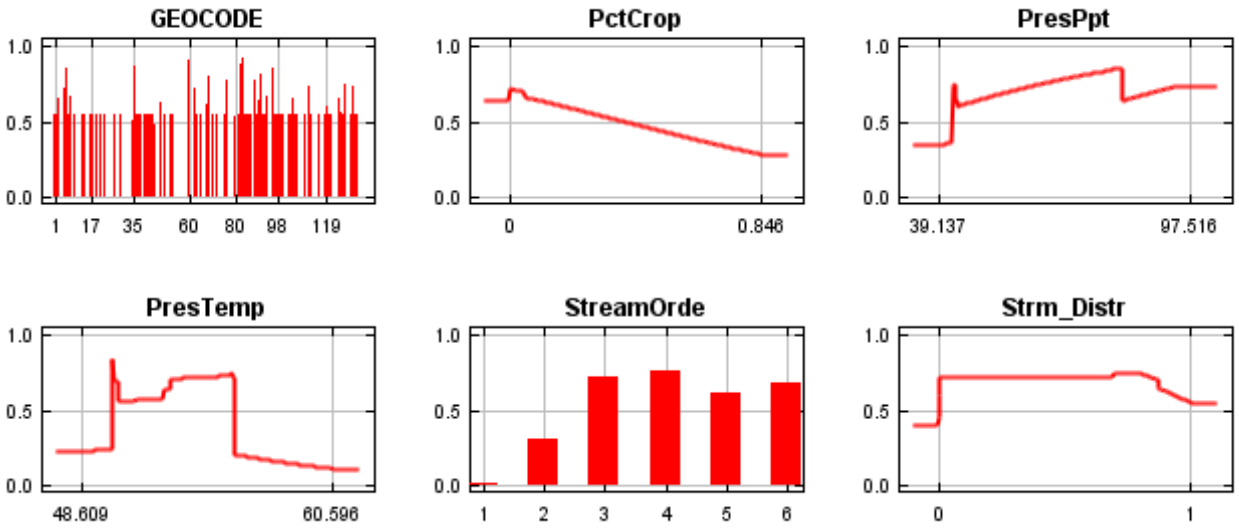
Cumulative threshold	Logistic threshold	Description	Fractional predicted area	Training omission rate	Test omission rate	P-value
1.000	0.028	Fixed cumulative value 1	0.415	0.012	0.029	3.222E-21
5.000	0.131	Fixed cumulative value 5	0.285	0.018	0.072	1.383E-32
10.000	0.207	Fixed cumulative value 10	0.224	0.037	0.116	7.444E-40
0.106	0.003	Minimum training presence	0.733	0.000	0.014	1.079E-6
18.255	0.321	10 percentile training presence	0.164	0.098	0.188	4.475E-48
22.004	0.367	Equal training sensitivity and specificity	0.146	0.146	0.246	1.594E-46
15.202	0.274	Maximum training sensitivity plus specificity	0.182	0.061	0.116	7.641E-52

17.913	0.316	Equal test sensitivity and specificity	0.166	0.098	0.159	1.442E-51
16.825	0.302	Maximum test sensitivity plus specificity	0.172	0.091	0.116	1.17E-55
3.025	0.089	Balance training omission, predicted area and threshold value	0.326	0.012	0.029	1.347E-30
7.325	0.174	Equate entropy of thresholded and original distributions	0.253	0.018	0.101	2.407E-35

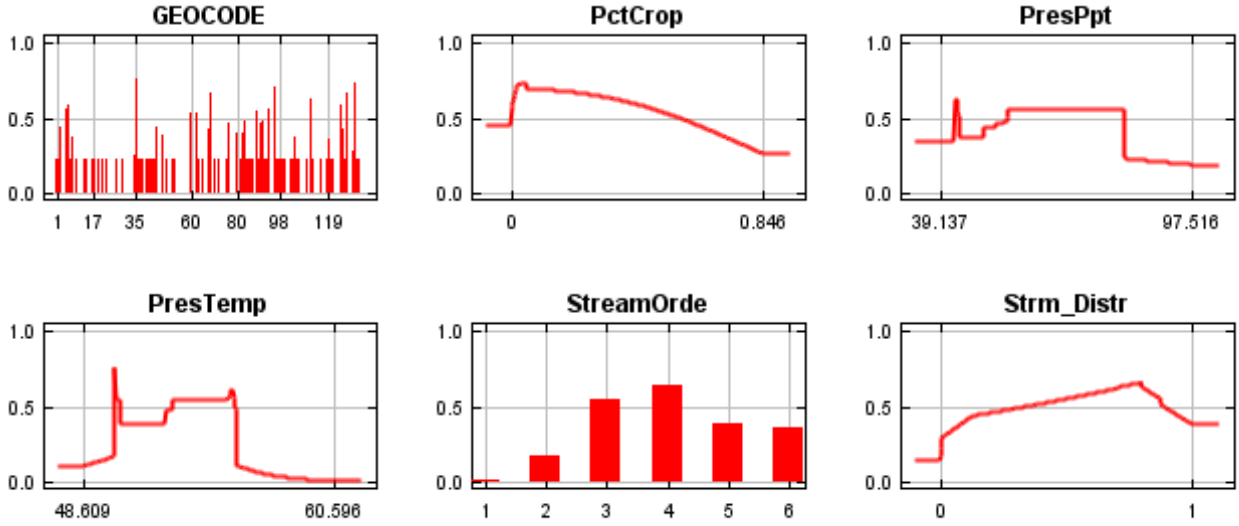
(A link to the Explain tool was not made for this model. The model uses product features, while the Explain tool can only be used for additive models.)

Response curves

These curves show how each environmental variable affects the Maxent prediction. The curves show how the logistic prediction changes as each environmental variable is varied, keeping all other environmental variables at their average sample value. Click on a response curve to see a larger version. Note that the curves can be hard to interpret if you have strongly correlated variables, as the model may depend on the correlations in ways that are not evident in the curves. In other words, the curves show the marginal effect of changing exactly one variable, whereas the model may take advantage of sets of variables changing together.



In contrast to the above marginal response curves, each of the following curves represents a different model, namely, a Maxent model created using only the corresponding variable. These plots reflect the dependence of predicted suitability both on the selected variable and on dependencies induced by correlations between the selected variable and other variables. They may be easier to interpret if there are strong correlations between variables.

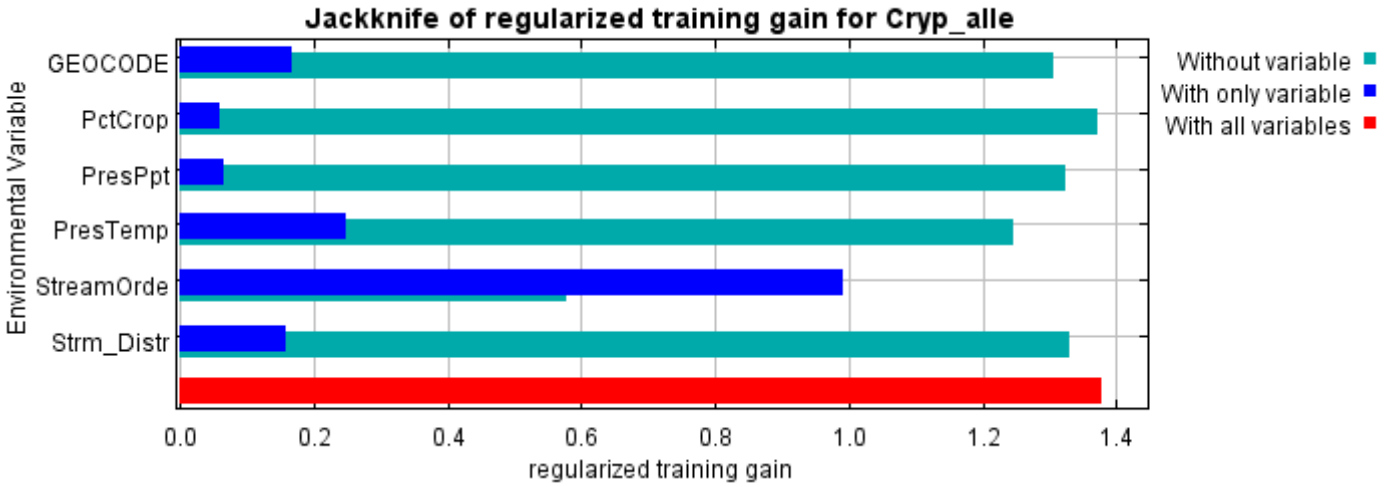


Analysis of variable contributions

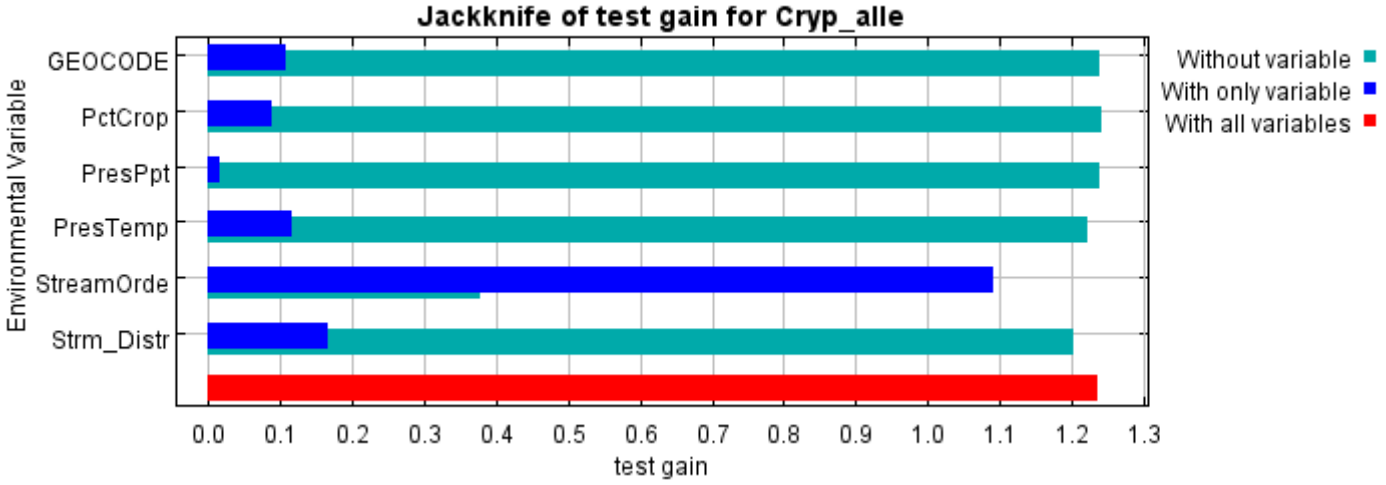
The following table gives estimates of relative contributions of the environmental variables to the Maxent model. To determine the first estimate, in each iteration of the training algorithm, the increase in regularized gain is added to the contribution of the corresponding variable, or subtracted from it if the change to the absolute value of lambda is negative. For the second estimate, for each environmental variable in turn, the values of that variable on training presence and background data are randomly permuted. The model is reevaluated on the permuted data, and the resulting drop in training AUC is shown in the table, normalized to percentages. As with the variable jackknife, variable contributions should be interpreted with caution when the predictor variables are correlated.

Variable	Percent contribution	Permutation importance
StreamOrde	70.7	70.2
PresTemp	15.2	14.5
Strm_Distr	5.4	5
GEOCODE	4.9	5.7
PresPpt	3.3	4
PctCrop	0.6	0.6

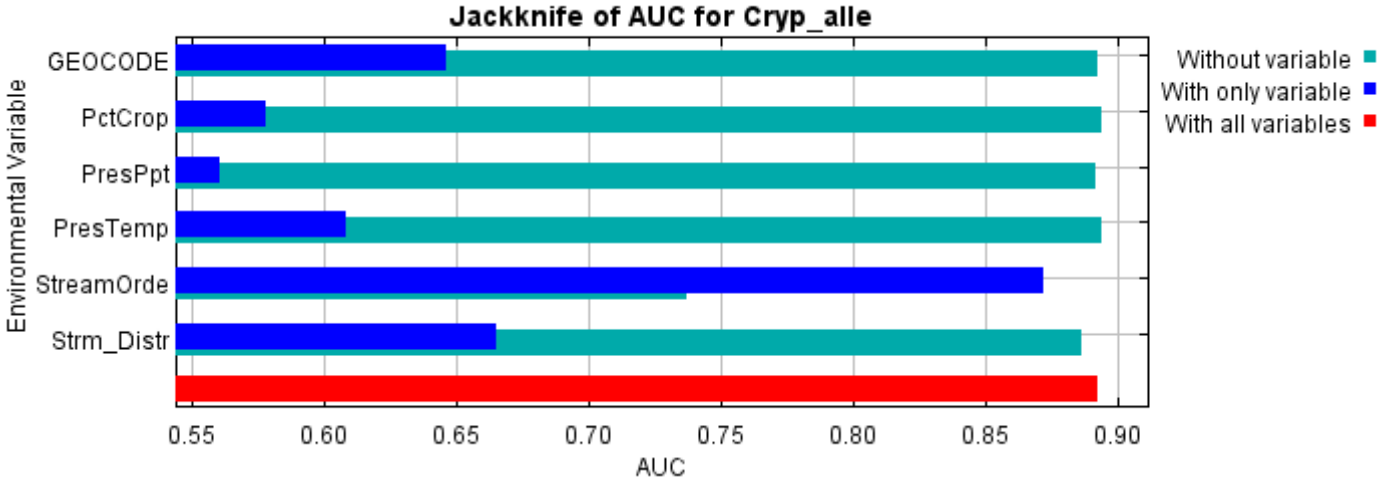
The following picture shows the results of the jackknife test of variable importance. The environmental variable with highest gain when used in isolation is StreamOrde, which therefore appears to have the most useful information by itself. The environmental variable that decreases the gain the most when it is omitted is StreamOrde, which therefore appears to have the most information that isn't present in the other variables.



The next picture shows the same jackknife test, using test gain instead of training gain. Note that conclusions about which variables are most important can change, now that we're looking at test data.



Lastly, we have the same jackknife test, using AUC on test data.



Raw data outputs and control parameters

The data used in the above analysis is contained in the next links. Please see the Help button for more information on these.
The model applied to the training environmental layers
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv
The coefficients of the model
The omission and predicted area for varying cumulative and raw thresholds
The prediction strength at the training and (optionally) test presence sites
Results for all species modeled in the same Maxent run, with summary statistics and (optionally) jackknife results

Regularized training gain is 1.379, training AUC is 0.928, unregularized training gain is 1.620.
Unregularized test gain is 1.235.
Test AUC is 0.892, standard deviation is 0.015 (calculated as in DeLong, DeLong & Clarke-Pearson 1988, equation 2).
Algorithm terminated after 500 iterations (14 seconds).

The follow settings were used during the run:
164 presence records used for training, 69 for testing.
11400 points used to determine the Maxent distribution (background points and presence points).
Environmental layers used: GEOCODE(categorical) PctCrop PresPpt PresTemp StreamOrde(categorical) Strm_Distr
Regularization values: linear/quadratic/product: 0.050, categorical: 0.250, threshold: 1.000, hinge: 0.500
Feature types used: hinge product linear threshold quadratic
responsecurves: true
pictures: false
jackknife: true
outputdirectory: C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Cryp_alle
projectionlayers: F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv
samplesfile: C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\CrypAlleFinal.csv
environmentallayers: C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\CrypAlleFinal.csv
randomtestpoints: 30
Command line used:

Command line to repeat this species model: java density.MaxEnt nowarnings noprefixes -E "" -E Cryp_alle responsecurves nopictures jackknife outputdirectory=C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Cryp_alle "projectionlayers=F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv" "samplesfile=C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\CrypAlleFinal.csv"

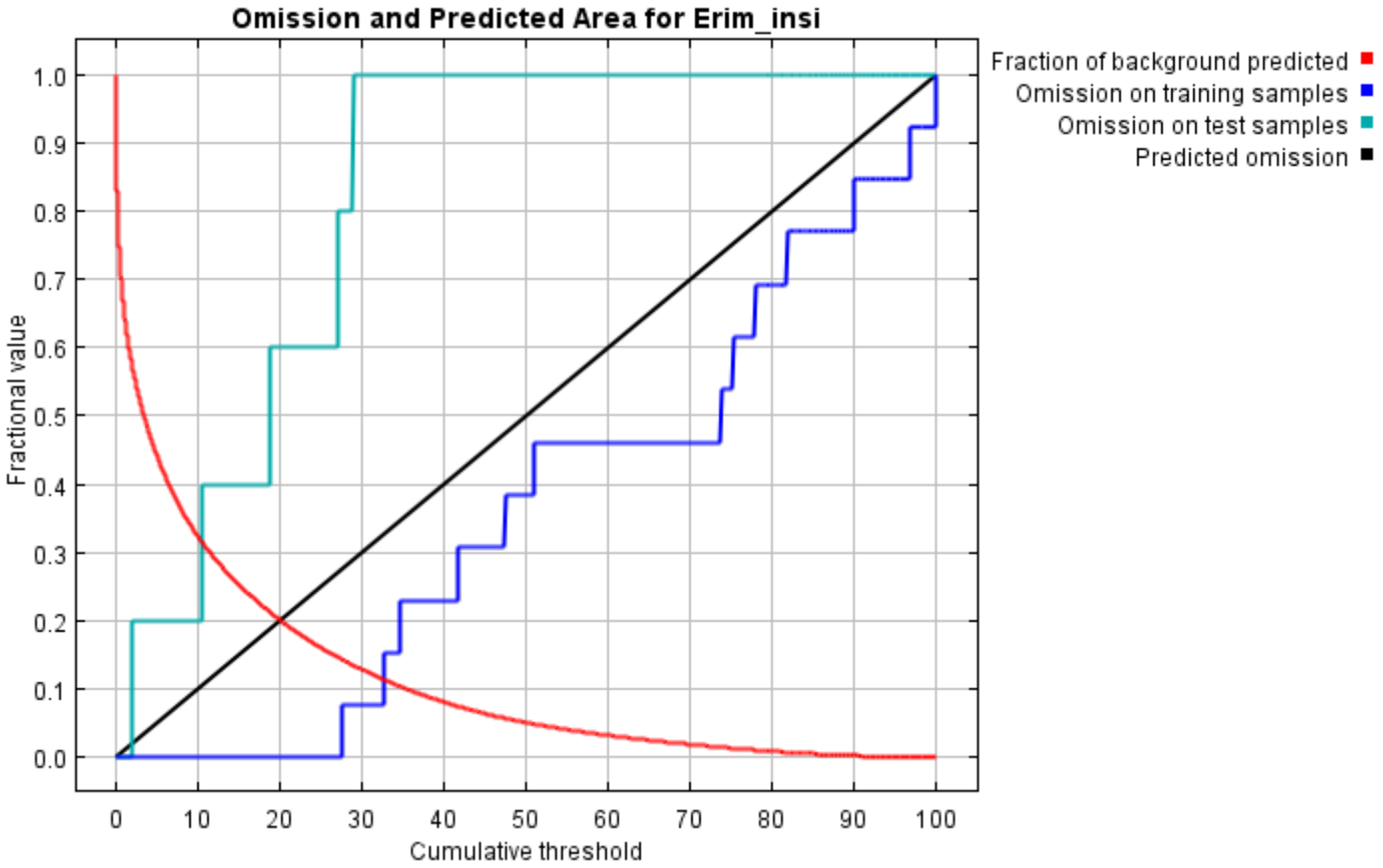
"environmentallayers=C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\CrypAlleFinal.csv" randomtestpoints=30 -t GEOCODE -t StreamOrde

Maxent model for Erim_insi

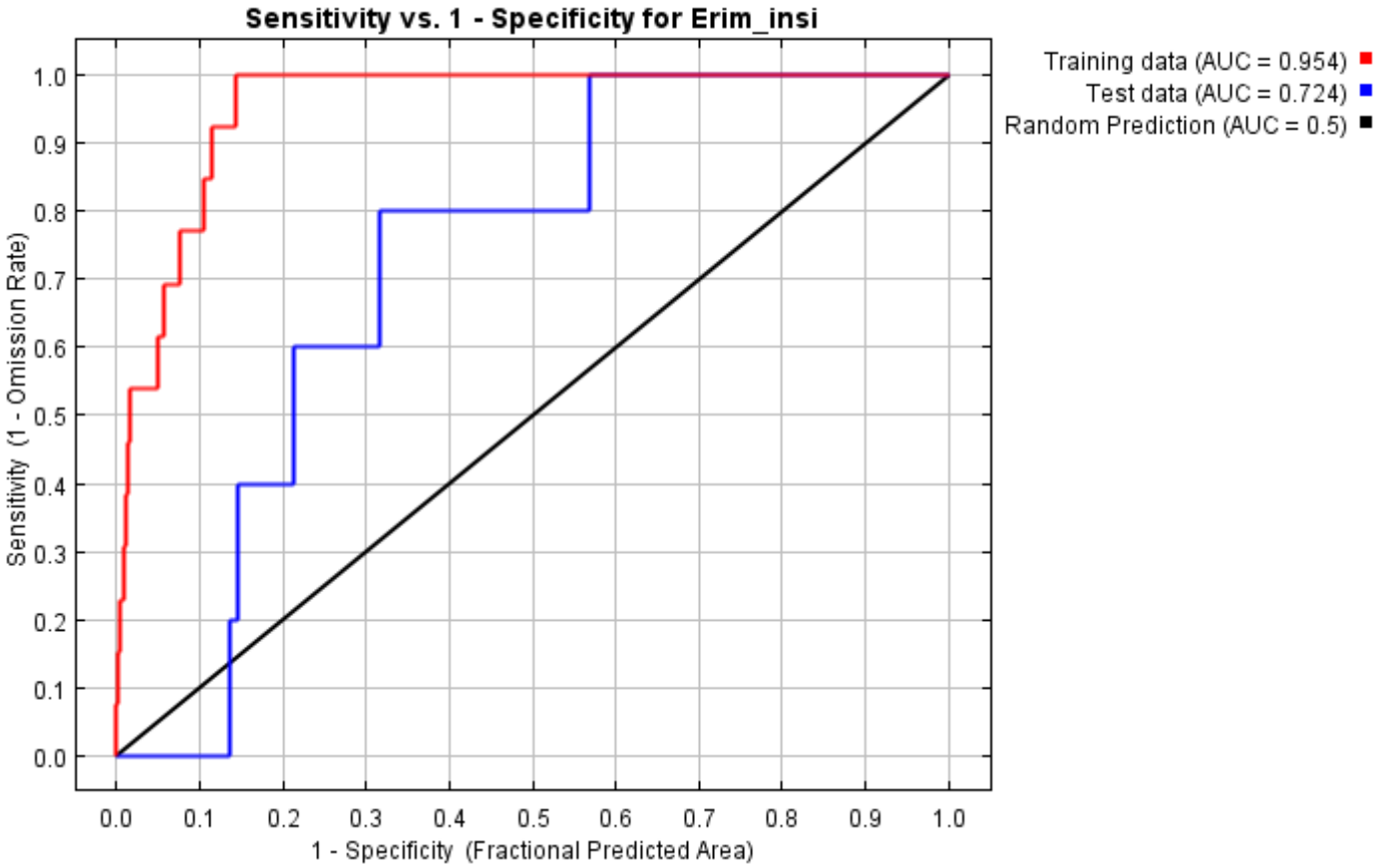
This page contains some analysis of the Maxent model for Erim_insi, created Fri Mar 17 14:47:52 EDT 2017 using Maxent version 3.3.3k. If you would like to do further analyses, the raw data used here is linked to at the end of this page.

Analysis of omission/commission

The following picture shows the omission rate and predicted area as a function of the cumulative threshold. The omission rate is is calculated both on the training presence records, and (if test data are used) on the test records. The omission rate should be close to the predicted omission, because of the definition of the cumulative threshold.



The next picture is the receiver operating characteristic (ROC) curve for the same data. Note that the specificity is defined using predicted area, rather than true commission (see the paper by Phillips, Anderson and Schapire cited on the help page for discussion of what this means). This implies that the maximum achievable AUC is less than 1. If test data is drawn from the Maxent distribution itself, then the maximum possible test AUC would be 0.882 rather than 1; in practice the test AUC may exceed this bound.



Some common thresholds and corresponding omission rates are as follows. If test data are available, binomial probabilities are calculated exactly if the number of test samples is at most 25, otherwise using a normal approximation to the binomial. These are 1-sided p-values for the null hypothesis that test points are predicted no better than by a random prediction with the same fractional predicted area. The "Balance" threshold minimizes 6 * training omission rate + .04 * cumulative threshold + 1.6 * fractional predicted area.

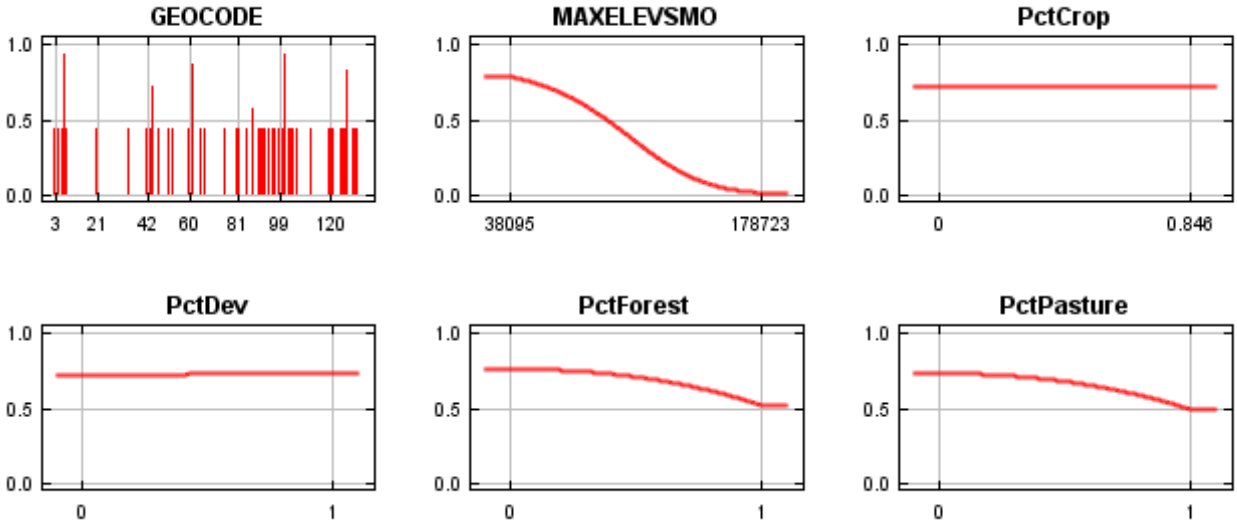
Cumulative threshold	Logistic threshold	Description	Fractional predicted area	Training omission rate	Test omission rate	P-value
1.000	0.024	Fixed cumulative value 1	0.651	0.000	0.000	1.165E-1
5.000	0.077	Fixed cumulative value 5	0.442	0.000	0.200	1.233E-1
10.000	0.134	Fixed cumulative value 10	0.324	0.000	0.200	4.064E-2
27.474	0.297	Minimum training presence	0.144	0.000	0.800	5.409E-1
32.768	0.334	10 percentile training presence	0.114	0.077	1.000	1E0
32.768	0.334	Equal training sensitivity and specificity	0.114	0.077	1.000	1E0
27.474	0.297	Maximum training sensitivity plus specificity	0.144	0.000	0.800	5.409E-1

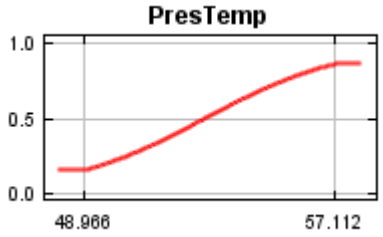
10.436	0.140	Equal test sensitivity and specificity	0.316	0.000	0.400	1.853E-1
10.436	0.140	Maximum test sensitivity plus specificity	0.316	0.000	0.200	3.739E-2
6.882	0.097	Balance training omission, predicted area and threshold value	0.389	0.000	0.200	7.852E-2
13.803	0.176	Equate entropy of thresholded and original distributions	0.268	0.000	0.400	1.233E-1

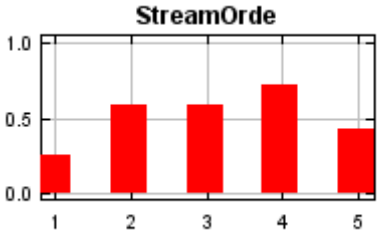
Click here to interactively explore this prediction using the Explain tool. If clicking from your browser does not succeed in starting the tool, try running the script in C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Erim_insi\Erim_insi_explain.bat directly. This tool requires the environmental grids to be small enough that they all fit in memory.

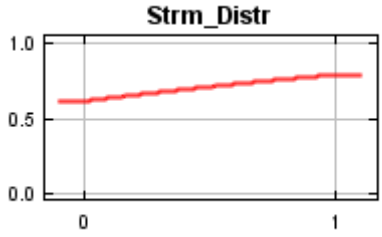
Response curves

These curves show how each environmental variable affects the Maxent prediction. The curves show how the logistic prediction changes as each environmental variable is varied, keeping all other environmental variables at their average sample value. Click on a response curve to see a larger version. Note that the curves can be hard to interpret if you have strongly correlated variables, as the model may depend on the correlations in ways that are not evident in the curves. In other words, the curves show the marginal effect of changing exactly one variable, whereas the model may take advantage of sets of variables changing together.

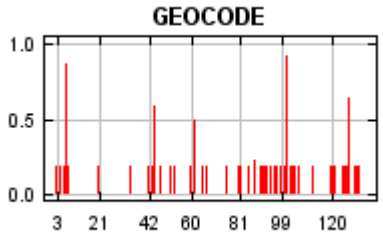


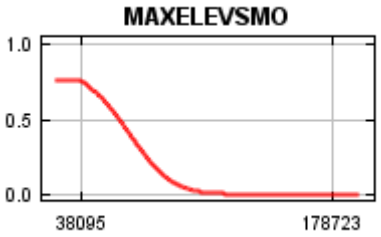


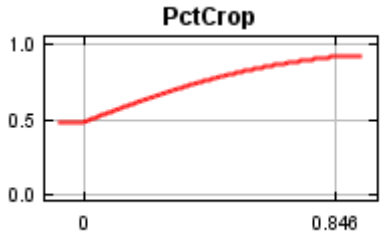


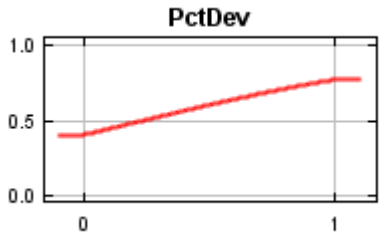


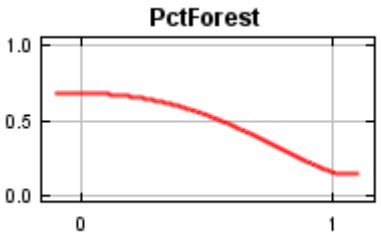
In contrast to the above marginal response curves, each of the following curves represents a different model, namely, a Maxent model created using only the corresponding variable. These plots reflect the dependence of predicted suitability both on the selected variable and on dependencies induced by correlations between the selected variable and other variables. They may be easier to interpret if there are strong correlations between variables.

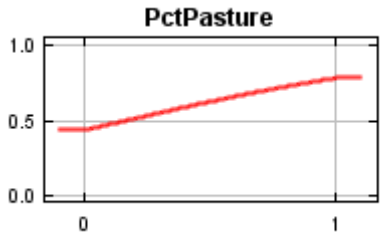


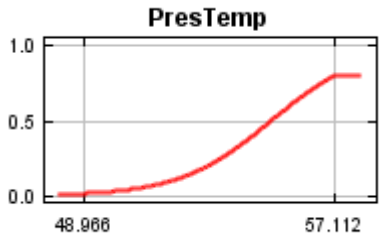


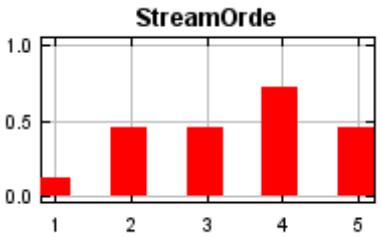


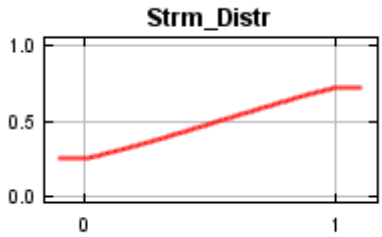










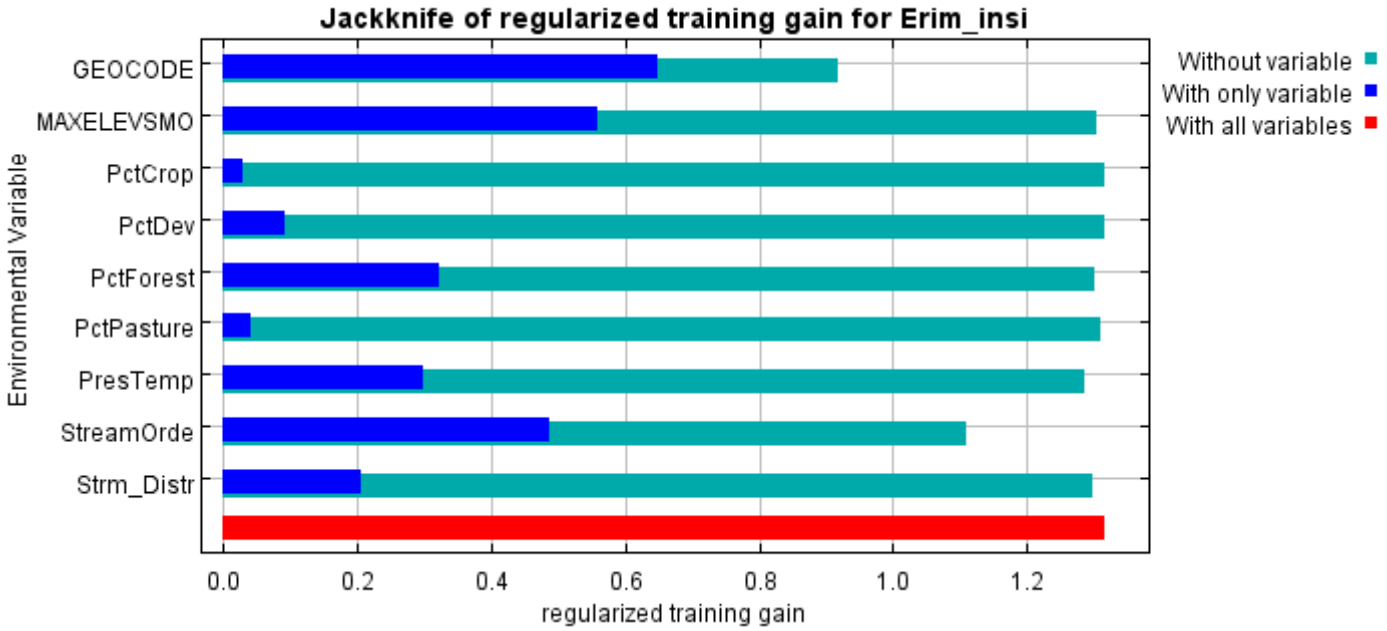


Analysis of variable contributions

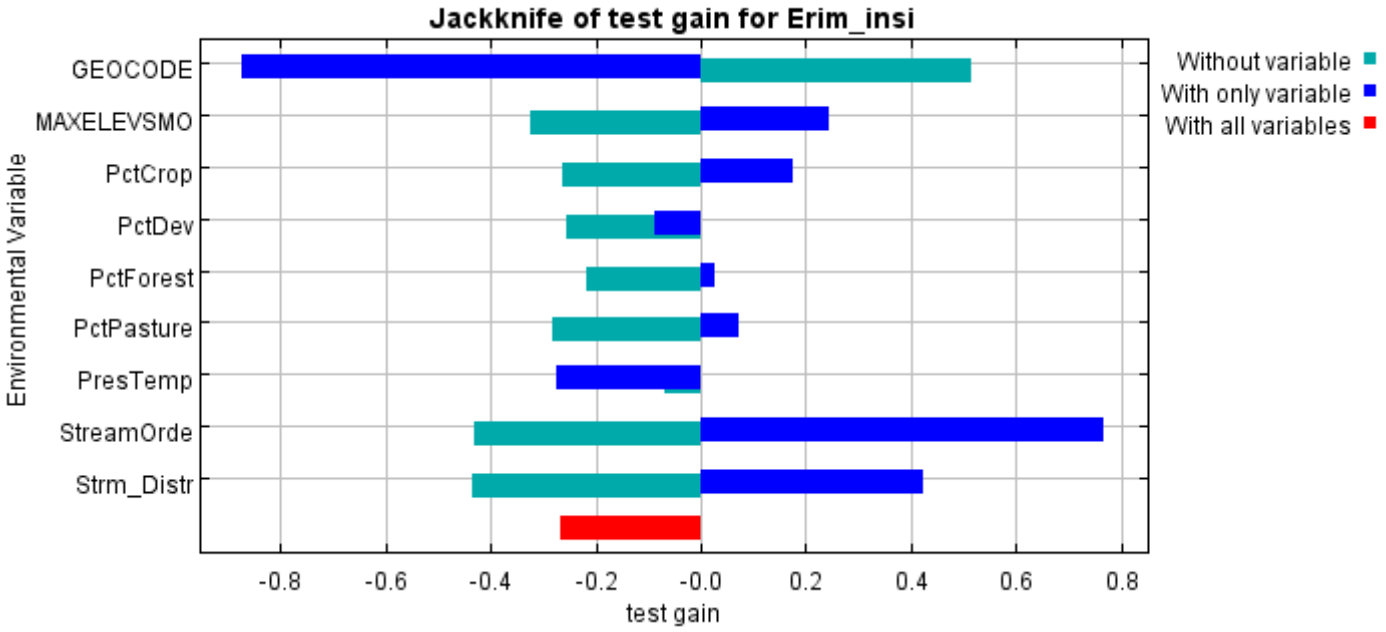
The following table gives estimates of relative contributions of the environmental variables to the Maxent model. To determine the first estimate, in each iteration of the training algorithm, the increase in regularized gain is added to the contribution of the corresponding variable, or subtracted from it if the change to the absolute value of lambda is negative. For the second estimate, for each environmental variable in turn, the values of that variable on training presence and background data are randomly permuted. The model is reevaluated on the permuted data, and the resulting drop in training AUC is shown in the table, normalized to percentages. As with the variable jackknife, variable contributions should be interpreted with caution when the predictor variables are correlated.

Variable	Percent contribution	Permutation importance
GEOCODE	44.2	44.7
StreamOrde	33.8	26.8
PctForest	14	0.9
PresTemp	6.5	16.8
MAXELEVSMO	0.7	9.9
Strm_Distr	0.6	0
PctPasture	0.2	0.9
PctDev	0	0
PctCrop	0	0

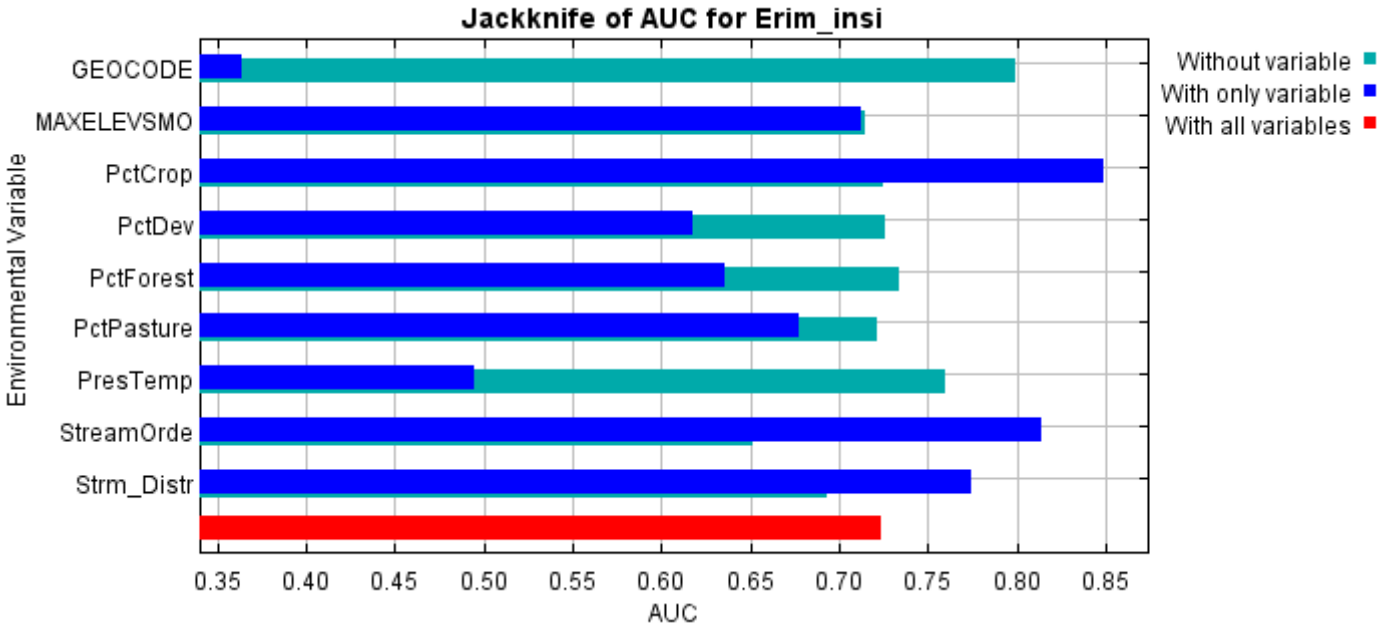
The following picture shows the results of the jackknife test of variable importance. The environmental variable with highest gain when used in isolation is GEOCODE, which therefore appears to have the most useful information by itself. The environmental variable that decreases the gain the most when it is omitted is GEOCODE, which therefore appears to have the most information that isn't present in the other variables.



The next picture shows the same jackknife test, using test gain instead of training gain. Note that conclusions about which variables are most important can change, now that we're looking at test data.



Lastly, we have the same jackknife test, using AUC on test data.



Raw data outputs and control parameters

The data used in the above analysis is contained in the next links. Please see the Help button for more information on these.
The model applied to the training environmental layers
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv

Regularized training gain is 1.316, training AUC is 0.954, unregularized training gain is 2.036.
Unregularized test gain is -0.265.
Test AUC is 0.724, standard deviation is 0.072 (calculated as in DeLong, DeLong & Clarke-Pearson 1988, equation 2).
Algorithm converged after 180 iterations (0 seconds).

The follow settings were used during the run:
13 presence records used for training, 5 for testing.
4252 points used to determine the Maxent distribution (background points and presence points).
Environmental layers used: GEOCODE(categorical) MAXELEVSMO PctCrop PctDev PctForest PctPasture PresTemp StreamOrde(categorical) Strm_Distr
Regularization values: linear/quadratic/product: 0.671, categorical: 0.393, threshold: 1.870, hinge: 0.500
Feature types used: linear quadratic
responsecurves: true
pictures: false
jackknife: true
outputdirectory: C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Erim_insi
projectionlayers: F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv
samplesfile: C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\ErimInsiFinal.csv
environmentallayers: C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\ErimInsiFinal.csv
randomtestpoints: 30
Command line used:

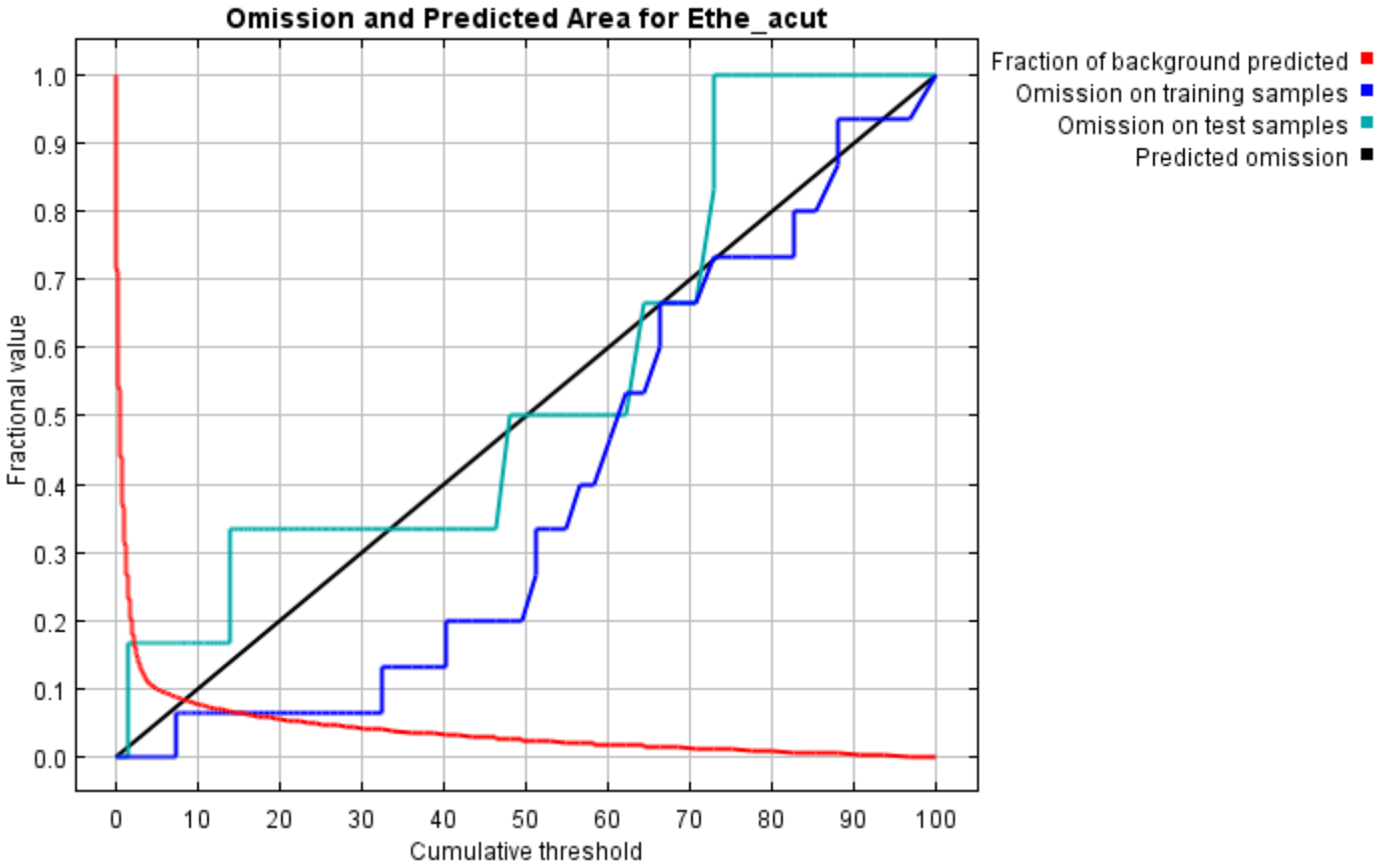
Command line to repeat this species model: java density.MaxEnt nowarnings noprefixes -E "" -E Erim_insi responsecurves nopictures jackknife outputdirectory=C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Erim_insi "projectionlayers=F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv" "samplesfile=C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\ErimInsiFinal.csv" "environmentallayers=C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\ErimInsiFinal.csv" randomtestpoints=30 -t GEOCODE -t StreamOrde

Maxent model for Ethe_acut

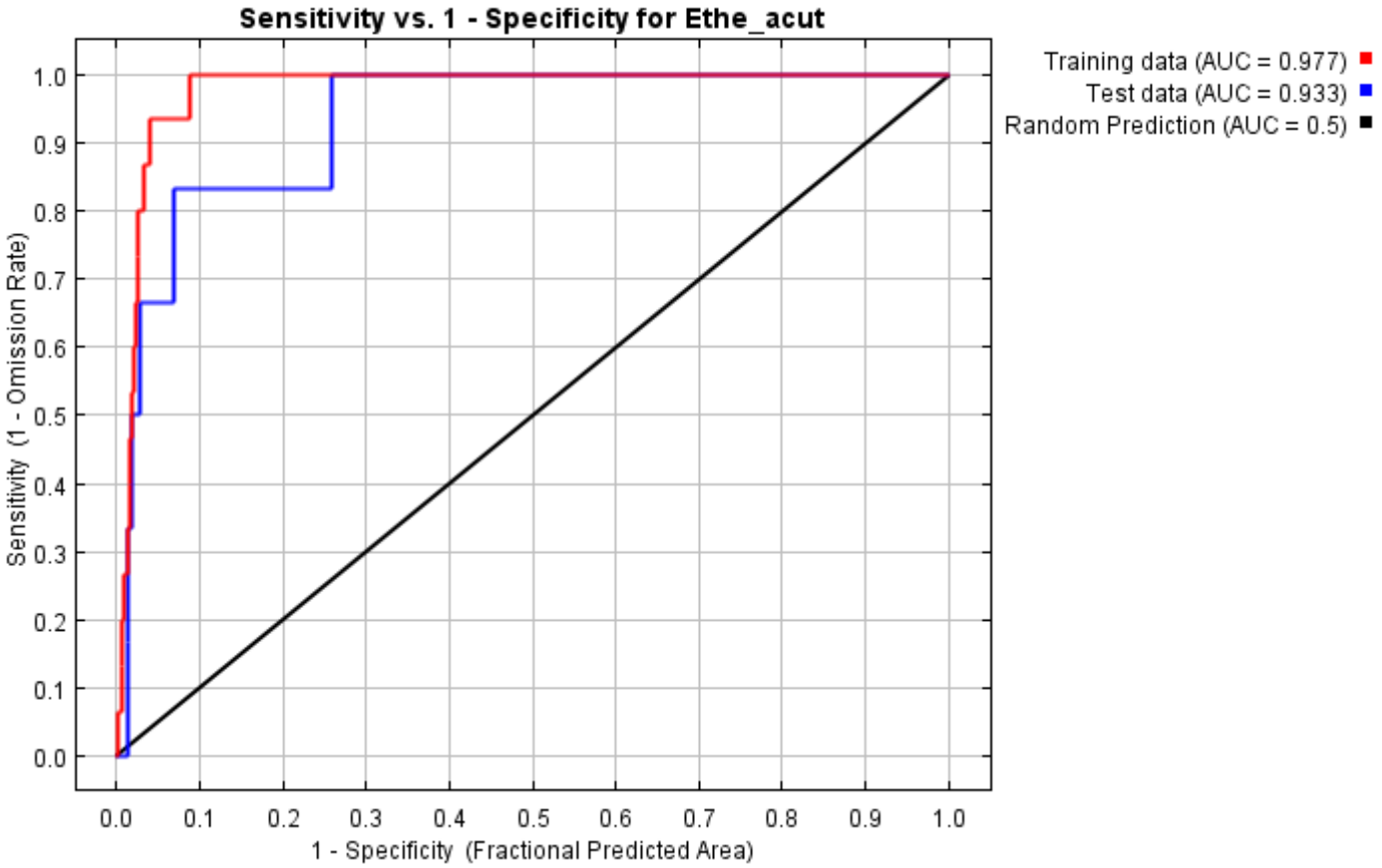
This page contains some analysis of the Maxent model for Ethe_acut, created Fri Mar 17 14:49:31 EDT 2017 using Maxent version 3.3.3k. If you would like to do further analyses, the raw data used here is linked to at the end of this page.

Analysis of omission/commission

The following picture shows the omission rate and predicted area as a function of the cumulative threshold. The omission rate is is calculated both on the training presence records, and (if test data are used) on the test records. The omission rate should be close to the predicted omission, because of the definition of the cumulative threshold.



The next picture is the receiver operating characteristic (ROC) curve for the same data. Note that the specificity is defined using predicted area, rather than true commission (see the paper by Phillips, Anderson and Schapire cited on the help page for discussion of what this means). This implies that the maximum achievable AUC is less than 1. If test data is drawn from the Maxent distribution itself, then the maximum possible test AUC would be 0.955 rather than 1; in practice the test AUC may exceed this bound.



Some common thresholds and corresponding omission rates are as follows. If test data are available, binomial probabilities are calculated exactly if the number of test samples is at most 25, otherwise using a normal approximation to the binomial. These are 1-sided p-values for the null hypothesis that test points are predicted no better than by a random prediction with the same fractional predicted area. The "Balance" threshold minimizes 6 * training omission rate + .04 * cumulative threshold + 1.6 * fractional predicted area.

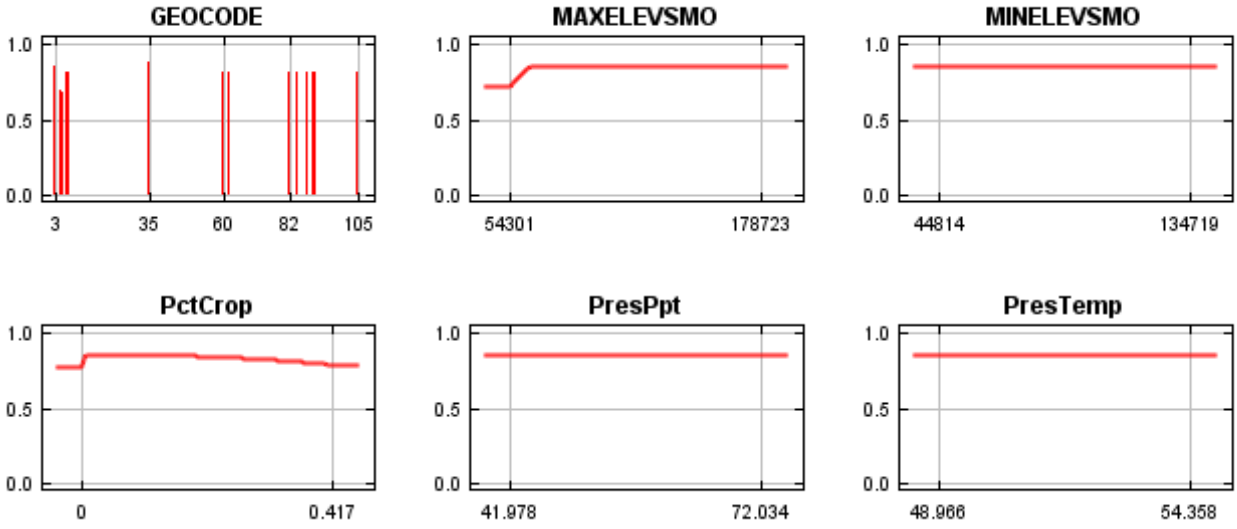
Cumulative threshold	Logistic threshold	Description	Fractional predicted area	Training omission rate	Test omission rate	P-value
1.000	0.004	Fixed cumulative value 1	0.333	0.000	0.000	1.362E-3
5.000	0.129	Fixed cumulative value 5	0.101	0.000	0.167	5.725E-5
10.000	0.220	Fixed cumulative value 10	0.079	0.067	0.167	1.676E-5
7.282	0.188	Minimum training presence	0.089	0.000	0.167	3.119E-5
32.437	0.504	10 percentile training presence	0.041	0.067	0.333	3.977E-5
14.406	0.311	Equal training sensitivity and specificity	0.067	0.067	0.333	2.68E-4
7.282	0.188	Maximum training sensitivity plus specificity	0.089	0.000	0.167	3.119E-5

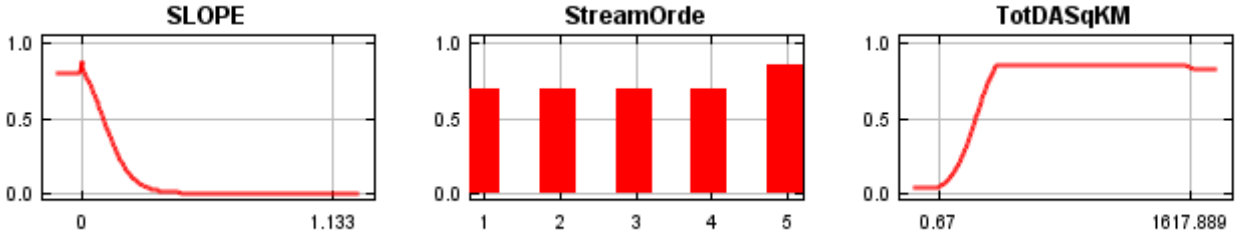
2.256	0.016	Equal test sensitivity and specificity	0.166	0.000	0.167	6.607E-4
13.876	0.299	Maximum test sensitivity plus specificity	0.068	0.067	0.167	8.226E-6
3.260	0.037	Balance training omission, predicted area and threshold value	0.124	0.000	0.167	1.594E-4
5.200	0.134	Equate entropy of thresholded and original distributions	0.100	0.000	0.167	5.406E-5

Click here to interactively explore this prediction using the Explain tool. If clicking from your browser does not succeed in starting the tool, try running the script in C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Ethe_acut\Ethe_acut_explain.bat directly. This tool requires the environmental grids to be small enough that they all fit in memory.

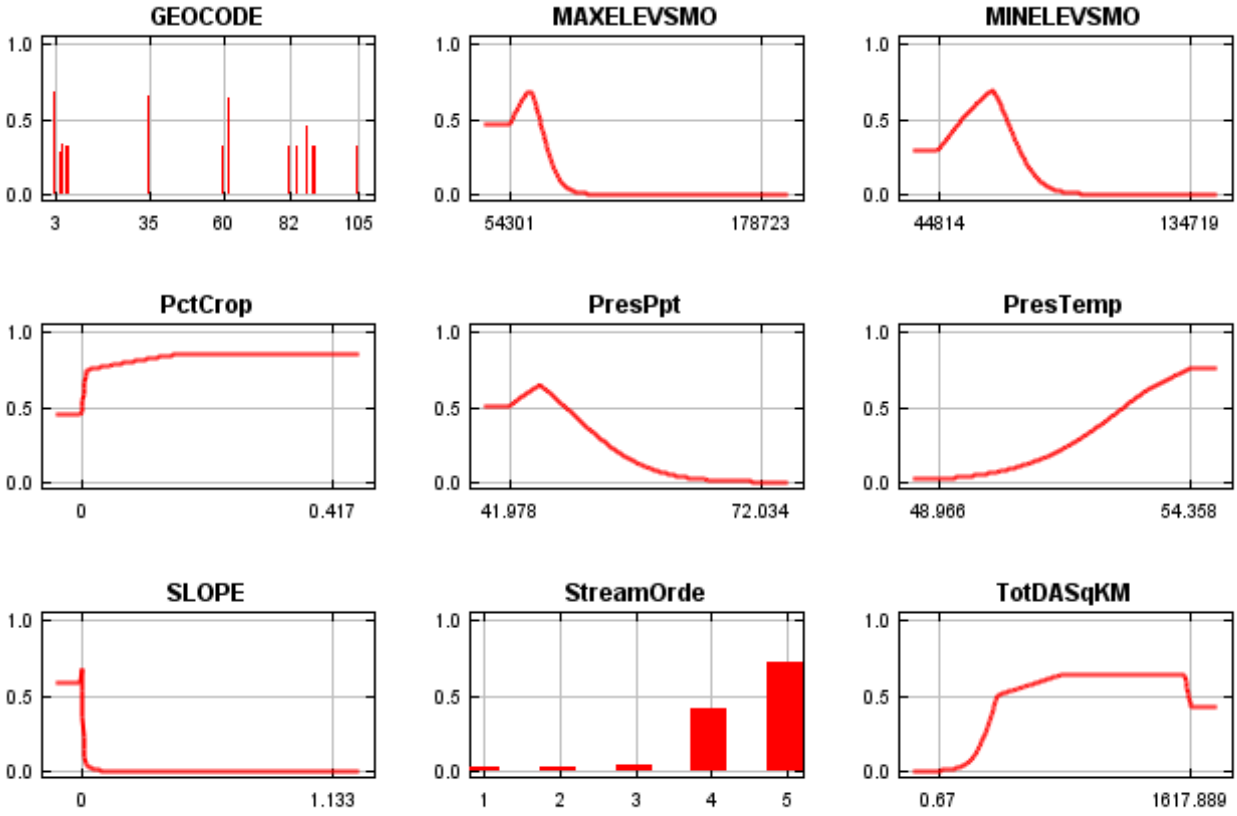
Response curves

These curves show how each environmental variable affects the Maxent prediction. The curves show how the logistic prediction changes as each environmental variable is varied, keeping all other environmental variables at their average sample value. Click on a response curve to see a larger version. Note that the curves can be hard to interpret if you have strongly correlated variables, as the model may depend on the correlations in ways that are not evident in the curves. In other words, the curves show the marginal effect of changing exactly one variable, whereas the model may take advantage of sets of variables changing together.





In contrast to the above marginal response curves, each of the following curves represents a different model, namely, a Maxent model created using only the corresponding variable. These plots reflect the dependence of predicted suitability both on the selected variable and on dependencies induced by correlations between the selected variable and other variables. They may be easier to interpret if there are strong correlations between variables.

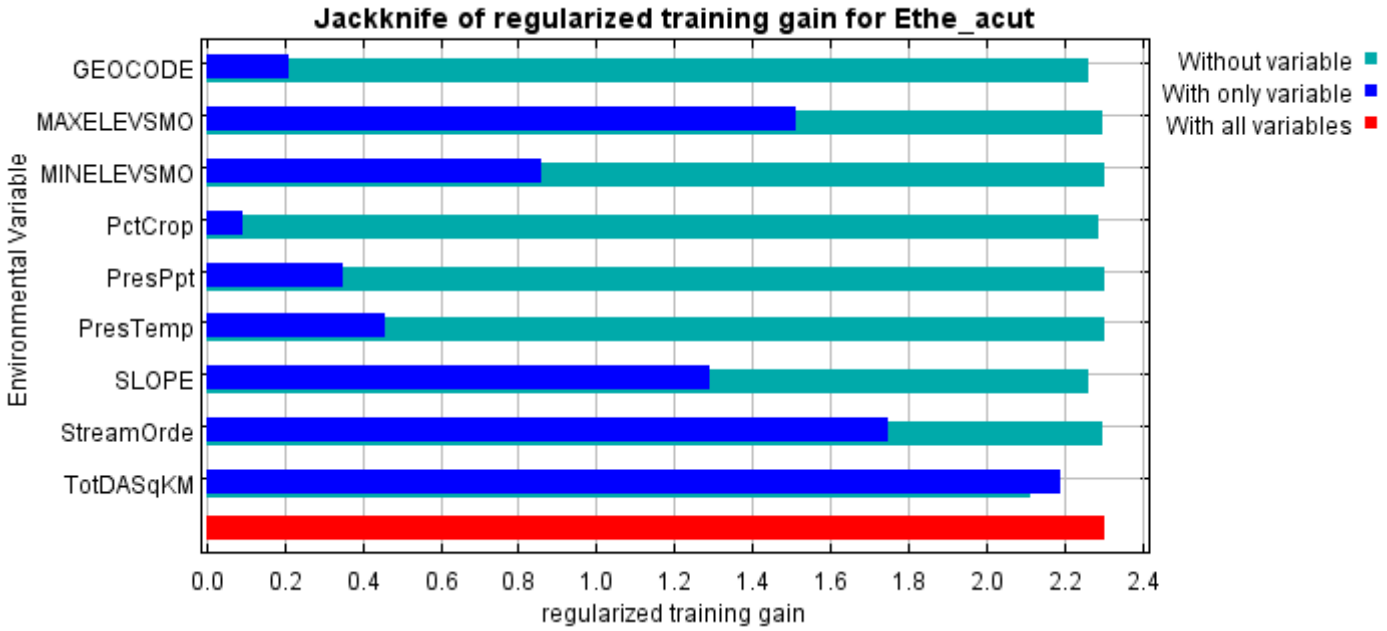


Analysis of variable contributions

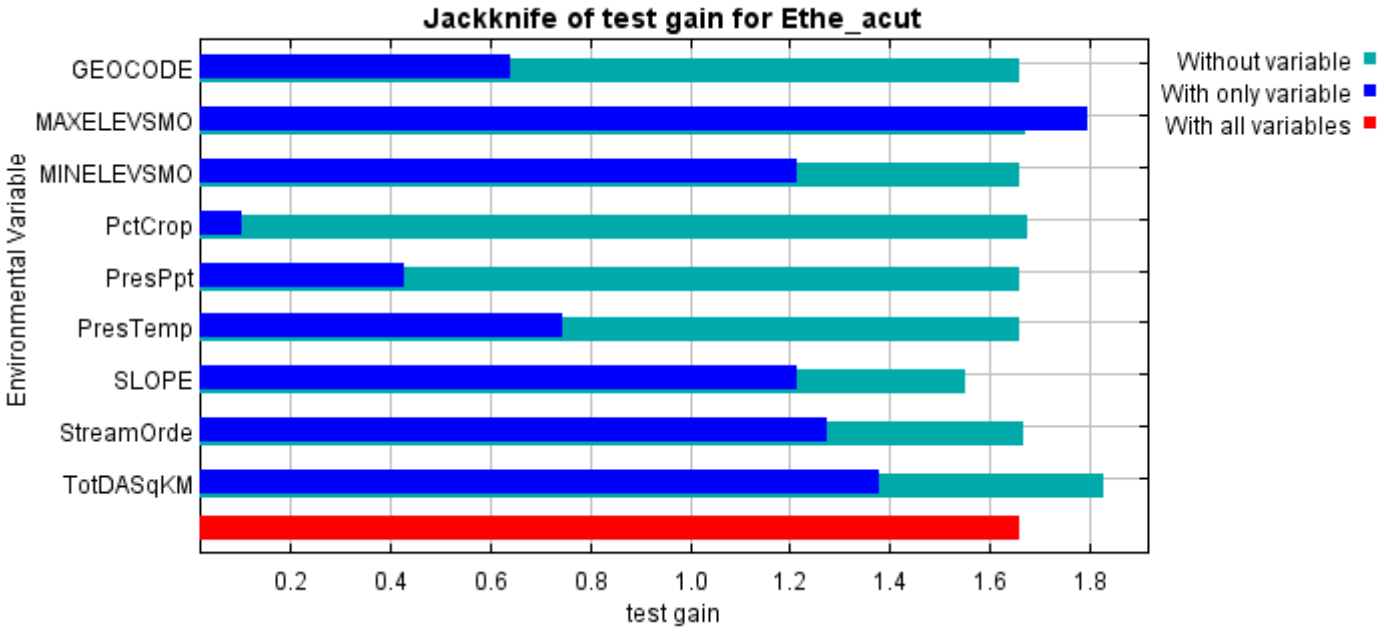
The following table gives estimates of relative contributions of the environmental variables to the Maxent model. To determine the first estimate, in each iteration of the training algorithm, the increase in regularized gain is added to the contribution of the corresponding variable, or subtracted from it if the change to the absolute value of lambda is negative. For the second estimate, for each environmental variable in turn, the values of that variable on training presence and background data are randomly permuted. The model is reevaluated on the permuted data, and the resulting drop in training AUC is shown in the table, normalized to percentages. As with the variable jackknife, variable contributions should be interpreted with caution when the predictor variables are correlated.

Variable	Percent contribution	Permutation importance
TotDASqKM	91.3	83.2
StreamOrde	4.7	3.7
GEOCODE	1.5	5.6
SLOPE	1.4	5
PctCrop	1	0
MAXELEVSMO	0.1	2.5
PresTemp	0	0
PresPpt	0	0
MINELEVSMO	0	0

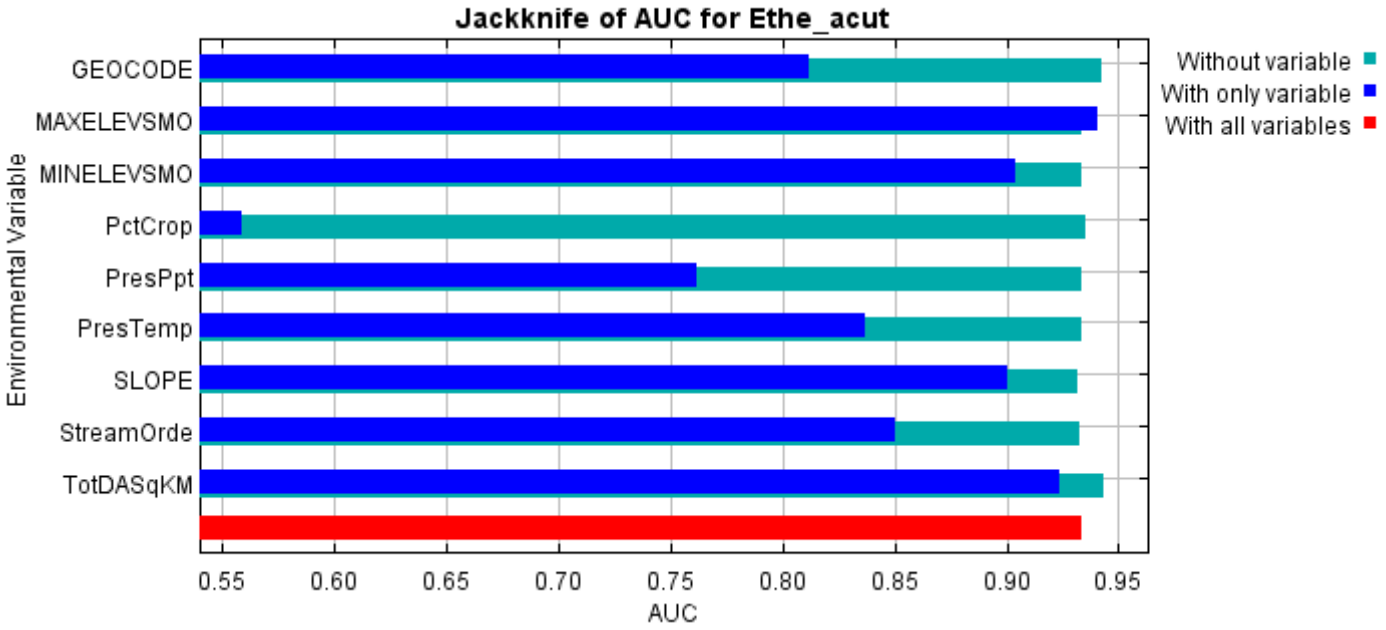
The following picture shows the results of the jackknife test of variable importance. The environmental variable with highest gain when used in isolation is TotDASqKM, which therefore appears to have the most useful information by itself. The environmental variable that decreases the gain the most when it is omitted is TotDASqKM, which therefore appears to have the most information that isn't present in the other variables.



The next picture shows the same jackknife test, using test gain instead of training gain. Note that conclusions about which variables are most important can change, now that we're looking at test data.



Lastly, we have the same jackknife test, using AUC on test data.



Raw data outputs and control parameters

The data used in the above analysis is contained in the next links. Please see the Help button for more information on these.
The model applied to the training environmental layers
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv

Regularized training gain is 2.305, training AUC is 0.977, unregularized training gain is 2.680.
Unregularized test gain is 1.658.
Test AUC is 0.933, standard deviation is 0.036 (calculated as in DeLong, DeLong & Clarke-Pearson 1988, equation 2).
Algorithm converged after 220 iterations (1 seconds).

The follow settings were used during the run:
15 presence records used for training, 6 for testing.
853 points used to determine the Maxent distribution (background points and presence points).
Environmental layers used: GEOCODE(categorical) MAXELEVSMO MINELEVSMO PctCrop PresPpt PresTemp SLOPE StreamOrde(categorical) TotDASqKM
Regularization values: linear/quadratic/product: 0.586, categorical: 0.321, threshold: 1.850, hinge: 0.500
Feature types used: hinge linear quadratic
responsecurves: true
pictures: false
jackknife: true
outputdirectory: C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Ethe_acut
projectionlayers: F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv
samplesfile: C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\EtheAcutFinal.csv
environmentallayers: C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\EtheAcutFinal.csv
randomtestpoints: 30
Command line used:

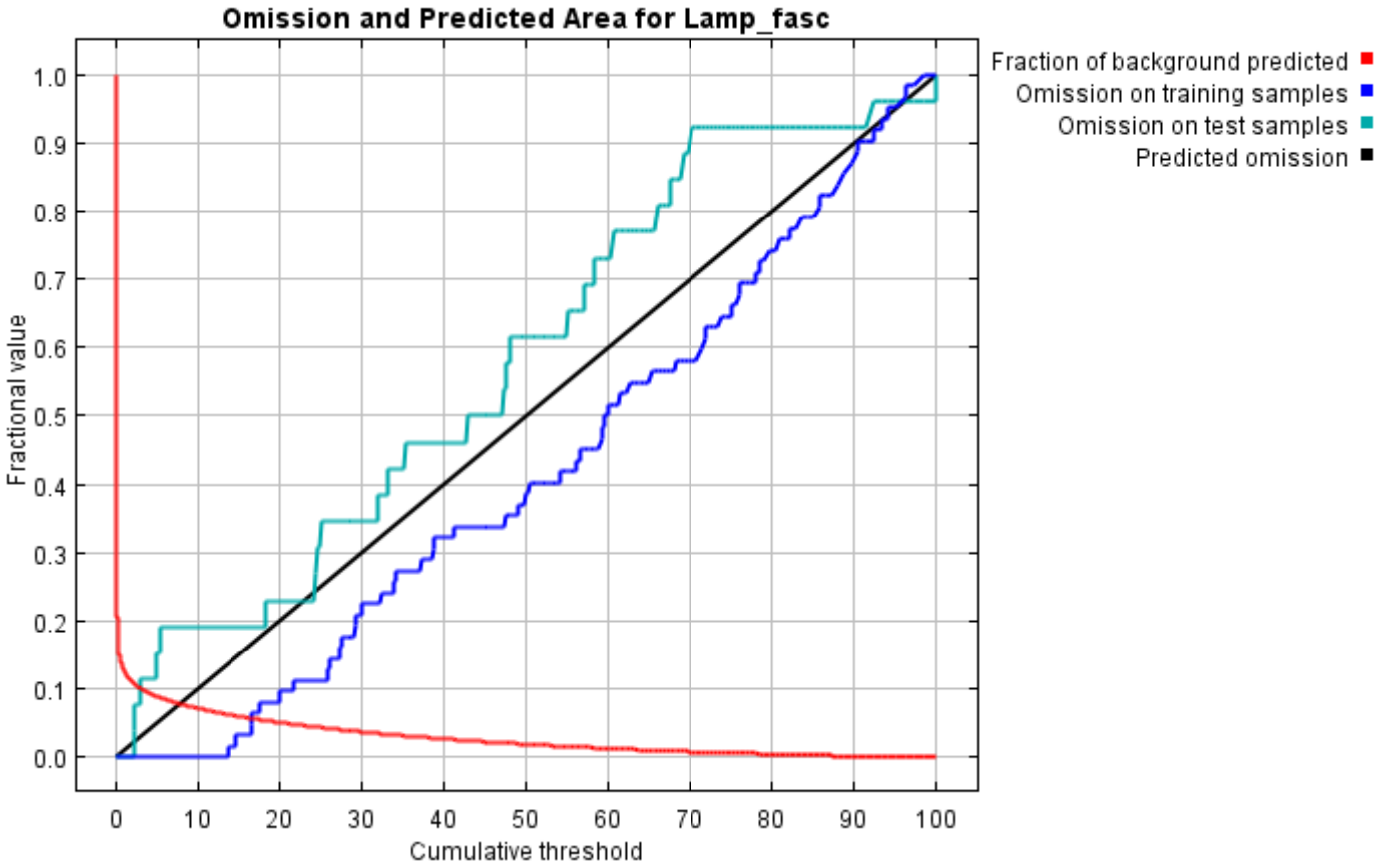
Command line to repeat this species model: java density.MaxEnt nowarnings noprefixes -E "" -E Ethe_acut responsecurves nopictures jackknife outputdirectory=C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Ethe_acut "projectionlayers=F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv" "samplesfile=C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\EtheAcutFinal.csv" "environmentallayers=C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\EtheAcutFinal.csv" randomtestpoints=30 -t GEOCODE -t StreamOrde

Maxent model for Lamp_fasc

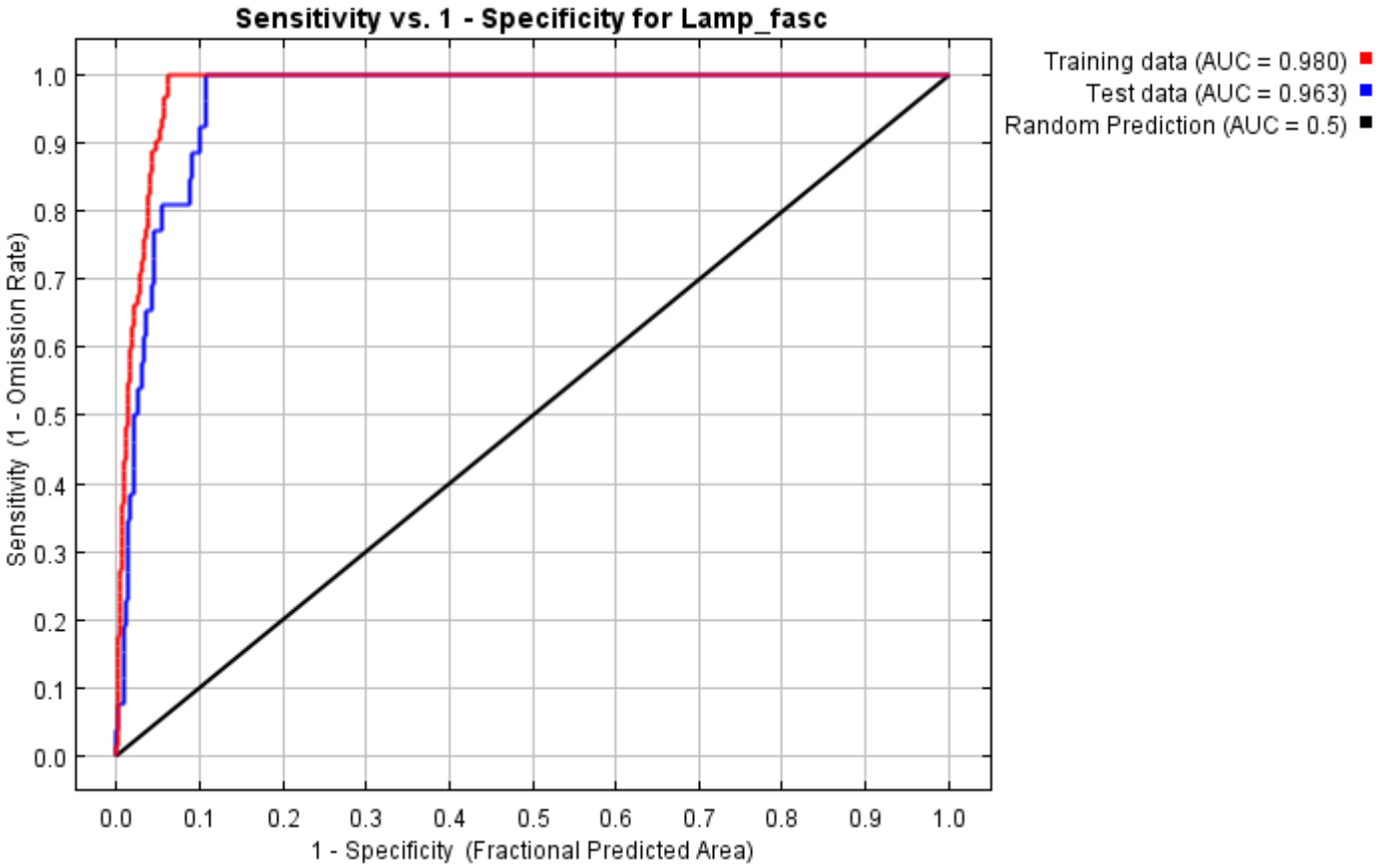
This page contains some analysis of the Maxent model for Lamp_fasc, created Fri Mar 17 14:53:11 EDT 2017 using Maxent version 3.3.3k. If you would like to do further analyses, the raw data used here is linked to at the end of this page.

Analysis of omission/commission

The following picture shows the omission rate and predicted area as a function of the cumulative threshold. The omission rate is is calculated both on the training presence records, and (if test data are used) on the test records. The omission rate should be close to the predicted omission, because of the definition of the cumulative threshold.



The next picture is the receiver operating characteristic (ROC) curve for the same data. Note that the specificity is defined using predicted area, rather than true commission (see the paper by Phillips, Anderson and Schapire cited on the help page for discussion of what this means). This implies that the maximum achievable AUC is less than 1. If test data is drawn from the Maxent distribution itself, then the maximum possible test AUC would be 0.969 rather than 1; in practice the test AUC may exceed this bound.



Some common thresholds and corresponding omission rates are as follows. If test data are available, binomial probabilities are calculated exactly if the number of test samples is at most 25, otherwise using a normal approximation to the binomial. These are 1-sided p-values for the null hypothesis that test points are predicted no better than by a random prediction with the same fractional predicted area. The "Balance" threshold minimizes 6 * training omission rate + .04 * cumulative threshold + 1.6 * fractional predicted area.

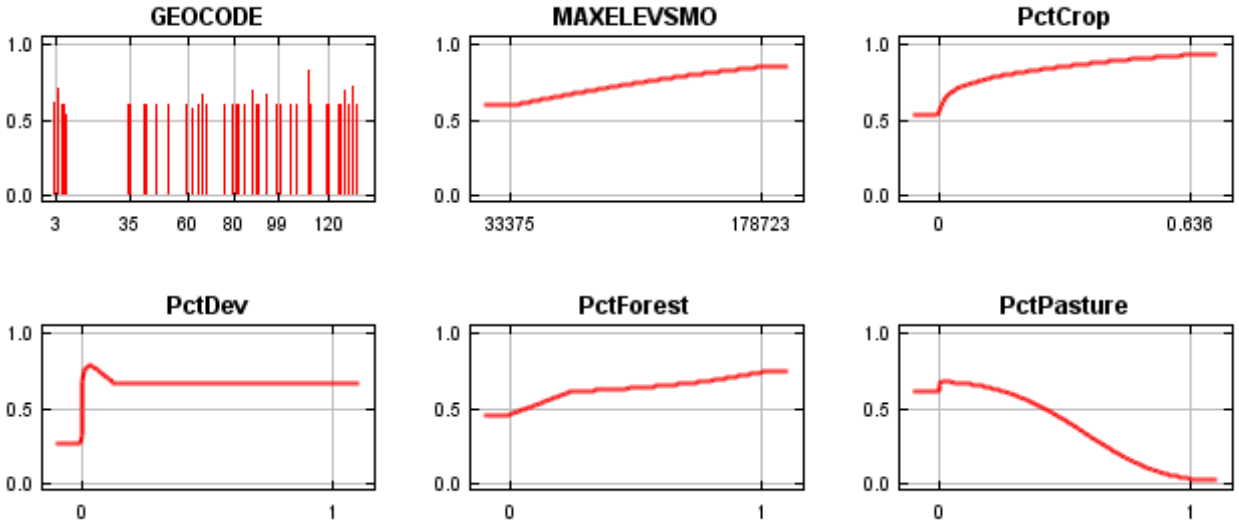
Cumulative threshold	Logistic threshold	Description	Fractional predicted area	Training omission rate	Test omission rate	P-value
1.000	0.033	Fixed cumulative value 1	0.126	0.000	0.000	1.69E-41
5.000	0.148	Fixed cumulative value 5	0.089	0.000	0.154	2.539E-42
10.000	0.223	Fixed cumulative value 10	0.072	0.000	0.192	3.079E-48
13.745	0.268	Minimum training presence	0.063	0.000	0.192	1.184E-55
21.825	0.340	10 percentile training presence	0.048	0.097	0.231	0E0
16.705	0.296	Equal training sensitivity and specificity	0.057	0.065	0.192	1.127E-61
13.745	0.268	Maximum training sensitivity plus specificity	0.063	0.000	0.192	1.184E-55

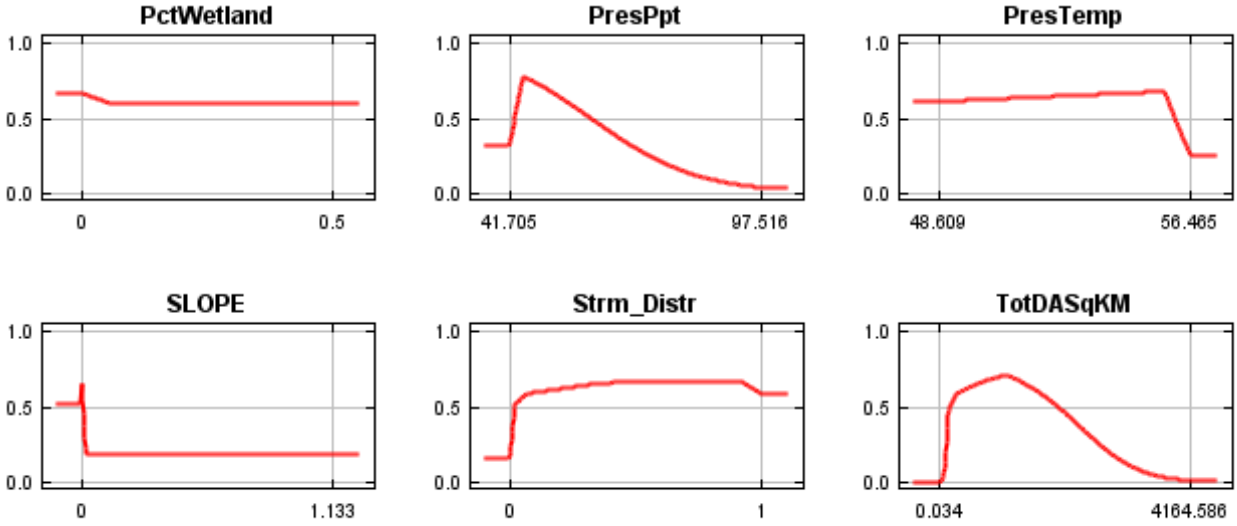
2.944	0.093	Equal test sensitivity and specificity	0.101	0.000	0.115	1.857E-40
2.141	0.072	Maximum test sensitivity plus specificity	0.108	0.000	0.000	6.009E-49
0.907	0.030	Balance training omission, predicted area and threshold value	0.128	0.000	0.000	1.186E-40
7.952	0.198	Equate entropy of thresholded and original distributions	0.078	0.000	0.192	3.007E-44

Click here to interactively explore this prediction using the Explain tool. If clicking from your browser does not succeed in starting the tool, try running the script in C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Lamp_fasc\Lamp_fasc_explain.bat directly. This tool requires the environmental grids to be small enough that they all fit in memory.

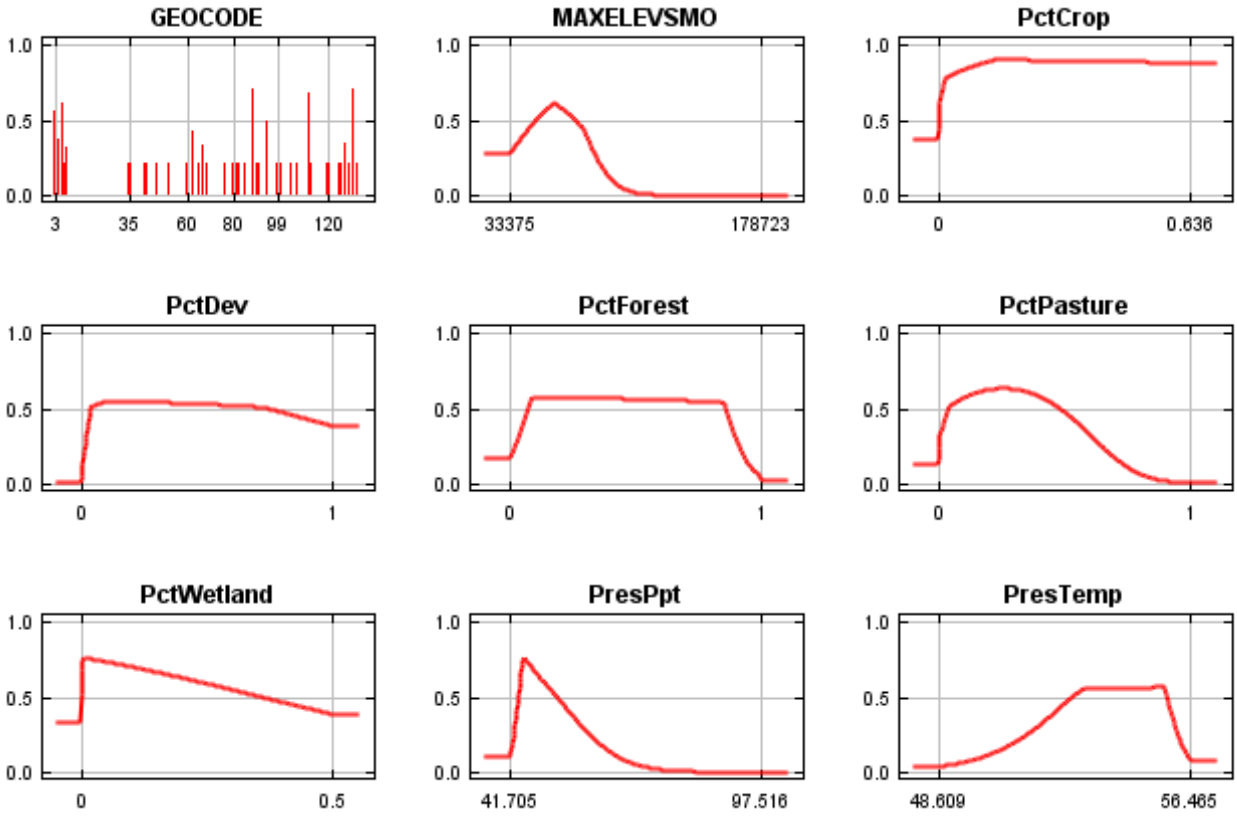
Response curves

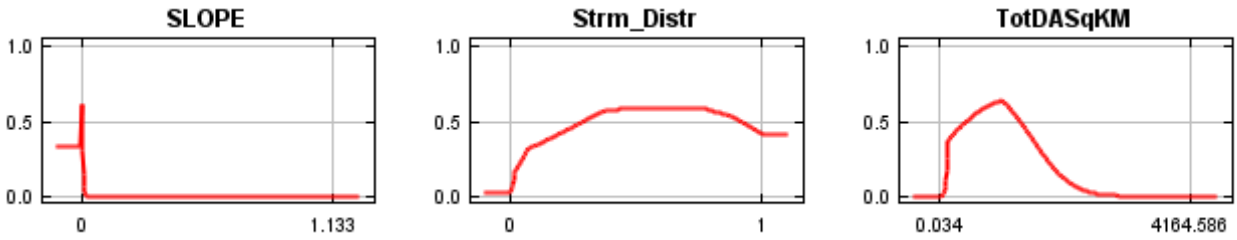
These curves show how each environmental variable affects the Maxent prediction. The curves show how the logistic prediction changes as each environmental variable is varied, keeping all other environmental variables at their average sample value. Click on a response curve to see a larger version. Note that the curves can be hard to interpret if you have strongly correlated variables, as the model may depend on the correlations in ways that are not evident in the curves. In other words, the curves show the marginal effect of changing exactly one variable, whereas the model may take advantage of sets of variables changing together.





In contrast to the above marginal response curves, each of the following curves represents a different model, namely, a Maxent model created using only the corresponding variable. These plots reflect the dependence of predicted suitability both on the selected variable and on dependencies induced by correlations between the selected variable and other variables. They may be easier to interpret if there are strong correlations between variables.



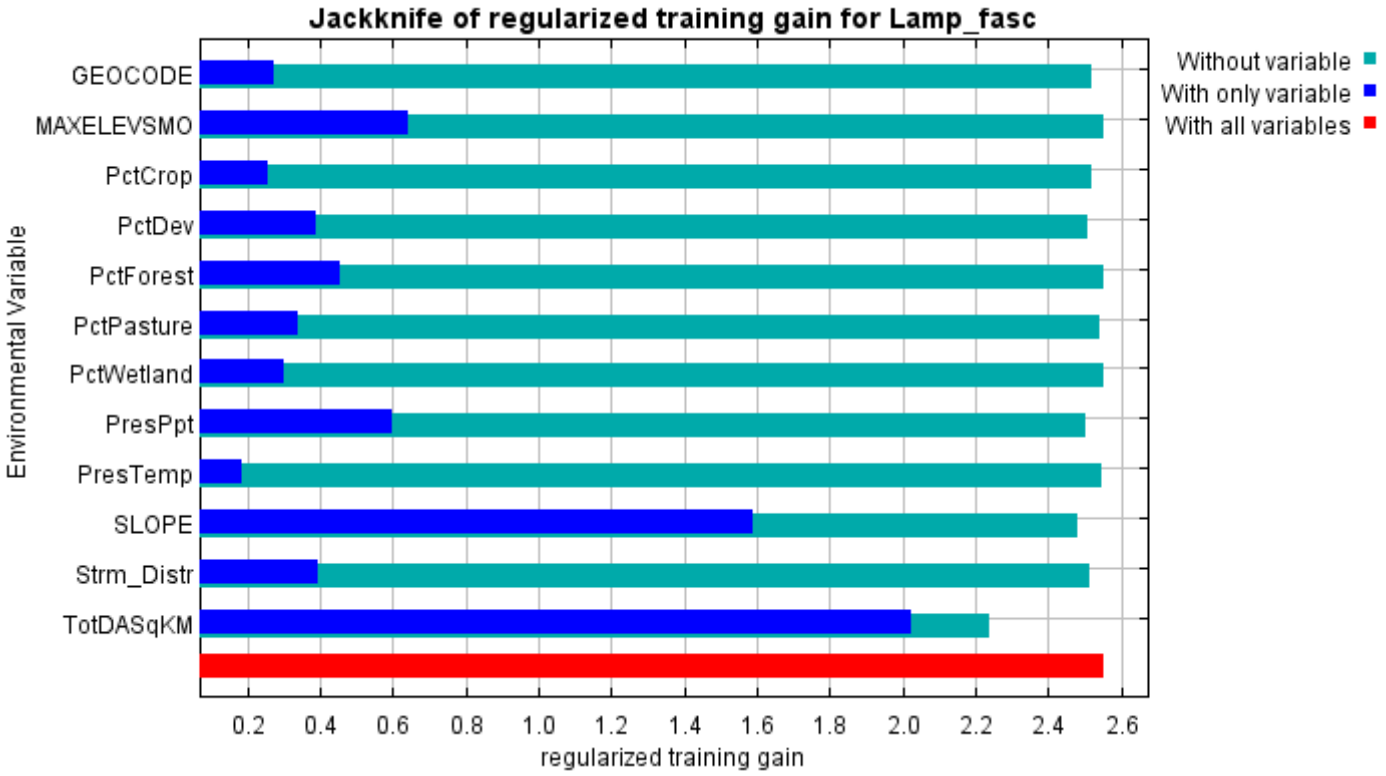


Analysis of variable contributions

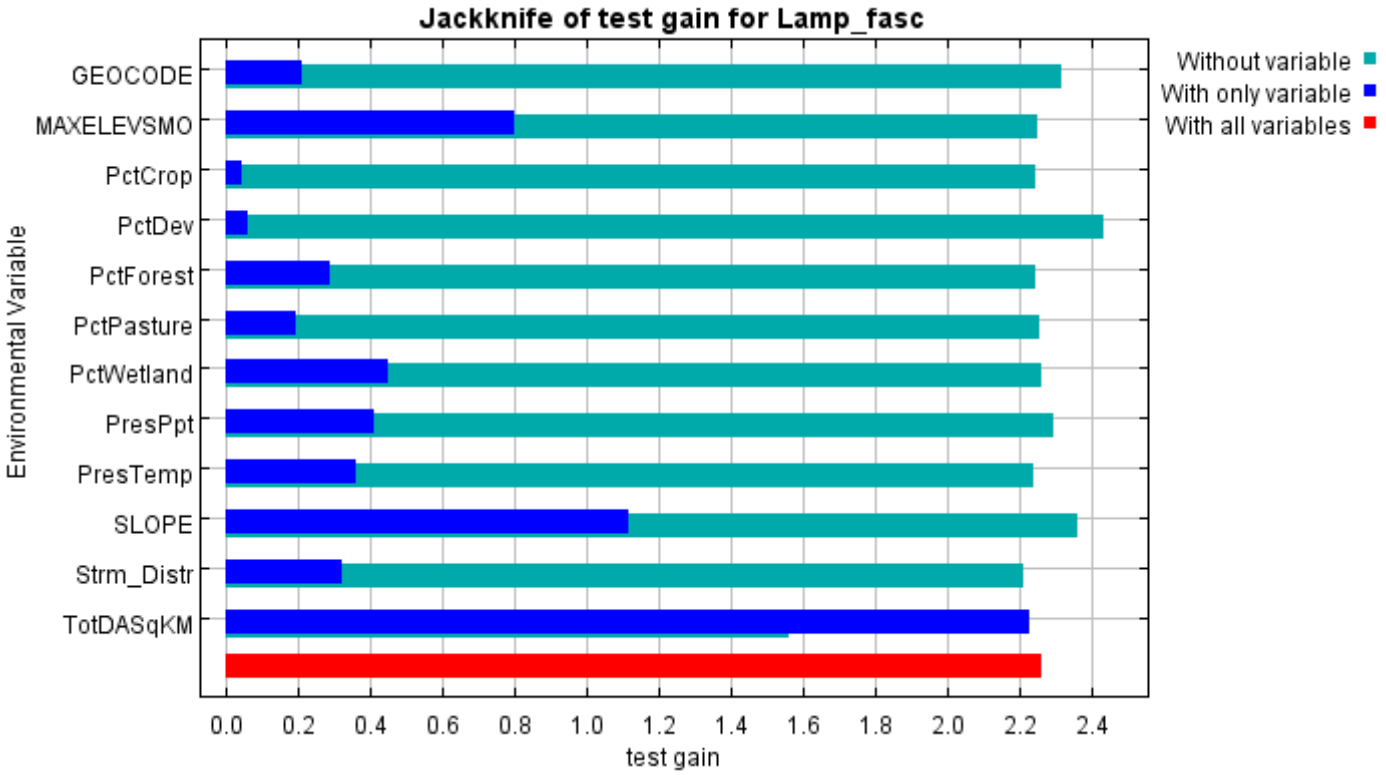
The following table gives estimates of relative contributions of the environmental variables to the Maxent model. To determine the first estimate, in each iteration of the training algorithm, the increase in regularized gain is added to the contribution of the corresponding variable, or subtracted from it if the change to the absolute value of lambda is negative. For the second estimate, for each environmental variable in turn, the values of that variable on training presence and background data are randomly permuted. The model is reevaluated on the permuted data, and the resulting drop in training AUC is shown in the table, normalized to percentages. As with the variable jackknife, variable contributions should be interpreted with caution when the predictor variables are correlated.

Variable	Percent contribution	Permutation importance
TotDASqKM	78.2	71
Strm_Distr	4.6	5.3
SLOPE	3.8	4.9
PctDev	3.7	4.7
GEOCODE	3	1.8
PresPpt	2.8	9.4
PctCrop	1.6	0.5
PctPasture	1.5	0.3
PctForest	0.5	0.5
PresTemp	0.2	0.3
PctWetland	0.1	0.2
MAXELEVSMO	0	1

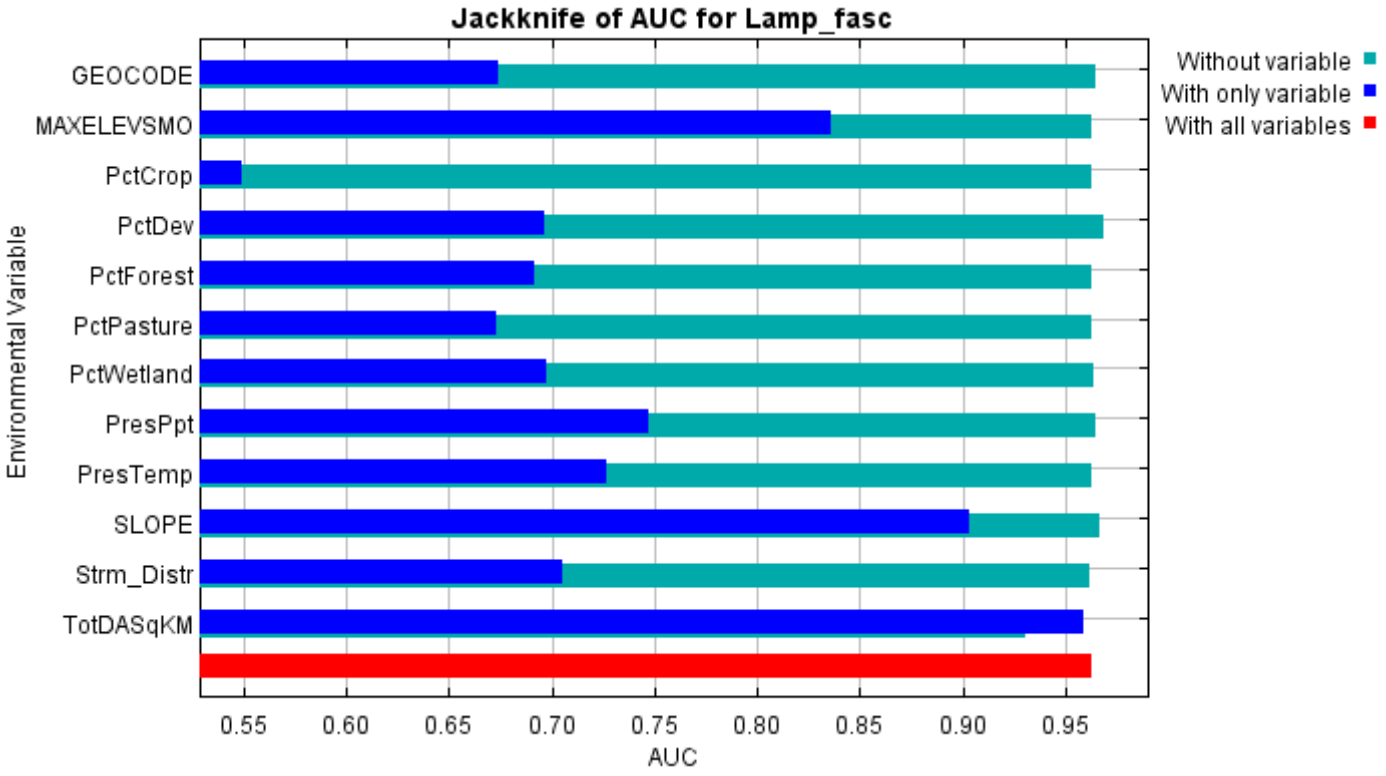
The following picture shows the results of the jackknife test of variable importance. The environmental variable with highest gain when used in isolation is TotDASqKM, which therefore appears to have the most useful information by itself. The environmental variable that decreases the gain the most when it is omitted is TotDASqKM, which therefore appears to have the most information that isn't present in the other variables.



The next picture shows the same jackknife test, using test gain instead of training gain. Note that conclusions about which variables are most important can change, now that we're looking at test data.



Lastly, we have the same jackknife test, using AUC on test data.



Raw data outputs and control parameters

The data used in the above analysis is contained in the next links. Please see the Help button for more information on these.
The model applied to the training environmental layers
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv
The coefficients of the model
The omission and predicted area for varying cumulative and raw thresholds
The prediction strength at the training and (optionally) test presence sites
Results for all species modeled in the same Maxent run, with summary statistics and (optionally) jackknife results

Regularized training gain is 2.553, training AUC is 0.980, unregularized training gain is 2.825.
Unregularized test gain is 2.259.
Test AUC is 0.963, standard deviation is 0.007 (calculated as in DeLong, DeLong & Clarke-Pearson 1988, equation 2).
Algorithm terminated after 500 iterations (12 seconds).

The follow settings were used during the run:

62 presence records used for training, 26 for testing.
4993 points used to determine the Maxent distribution (background points and presence points).
Environmental layers used: GEOCODE(categorical) MAXELEVSMO PctCrop PctDev PctForest PctPasture PctWetland PresPpt PresTemp SLOPE Strm_Distr TotDASqKM
Regularization values: linear/quadratic/product: 0.159, categorical: 0.250, threshold: 1.380, hinge: 0.500
Feature types used: hinge linear quadratic
responsecurves: true
pictures: false
jackknife: true
outputdirectory: C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Lamp_fasc
projectionlayers: F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv
samplesfile: C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\LampFascFinal.csv
environmentallayers: C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\LampFascFinal.csv
askoverwrite: false
randomtestpoints: 30
Command line used:

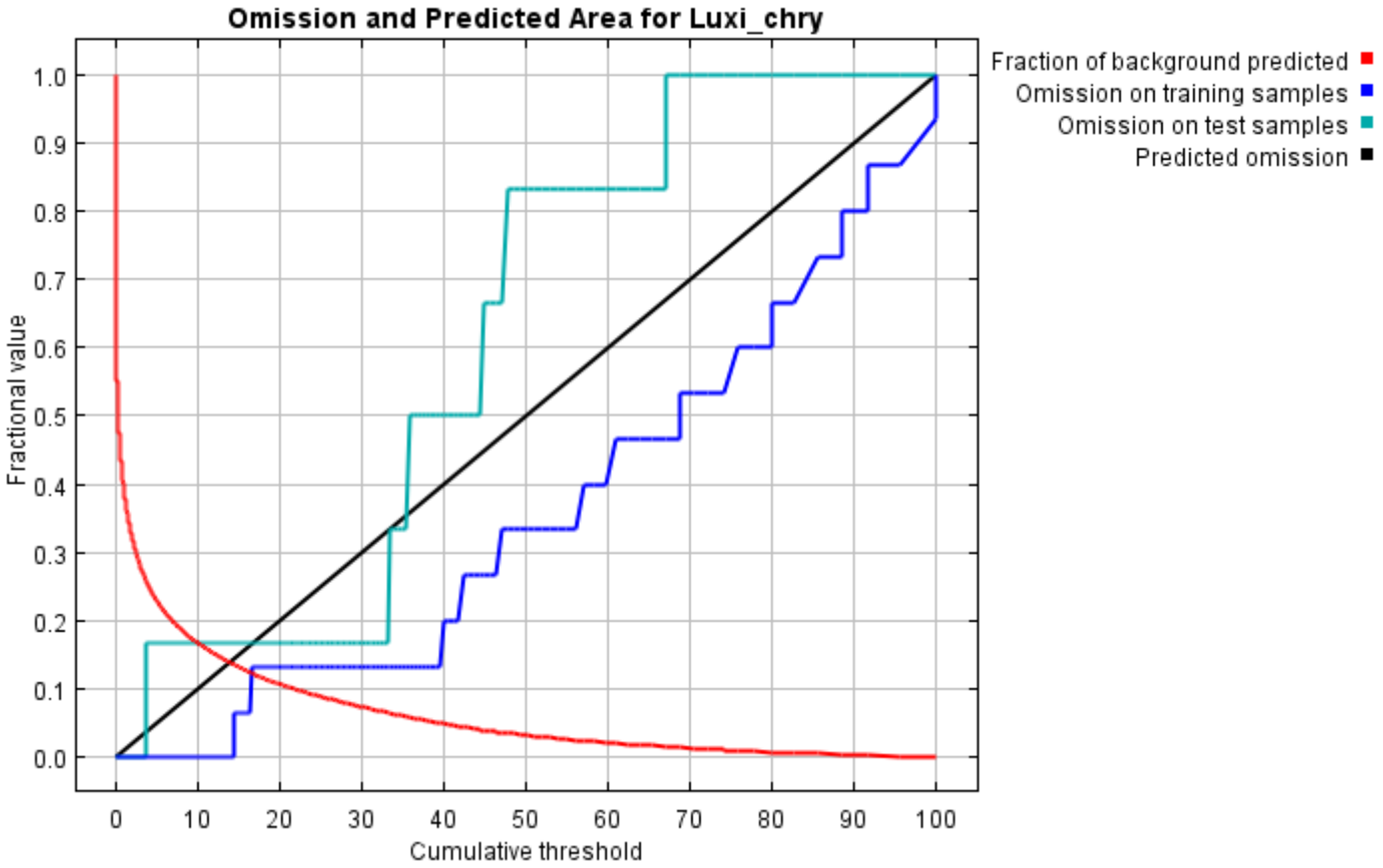
Command line to repeat this species model: java density.MaxEnt nowarnings noprefixes -E "" -E Lamp_fasc responsecurves nopictures jackknife outputdirectory=C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Lamp_fasc "projectionlayers=F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv" "samplesfile=C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\LampFascFinal.csv" "environmentallayers=C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\LampFascFinal.csv" noaskoverwrite randomtestpoints=30 -N StreamOrde -t GEOCODE

Maxent model for Luxi_chry

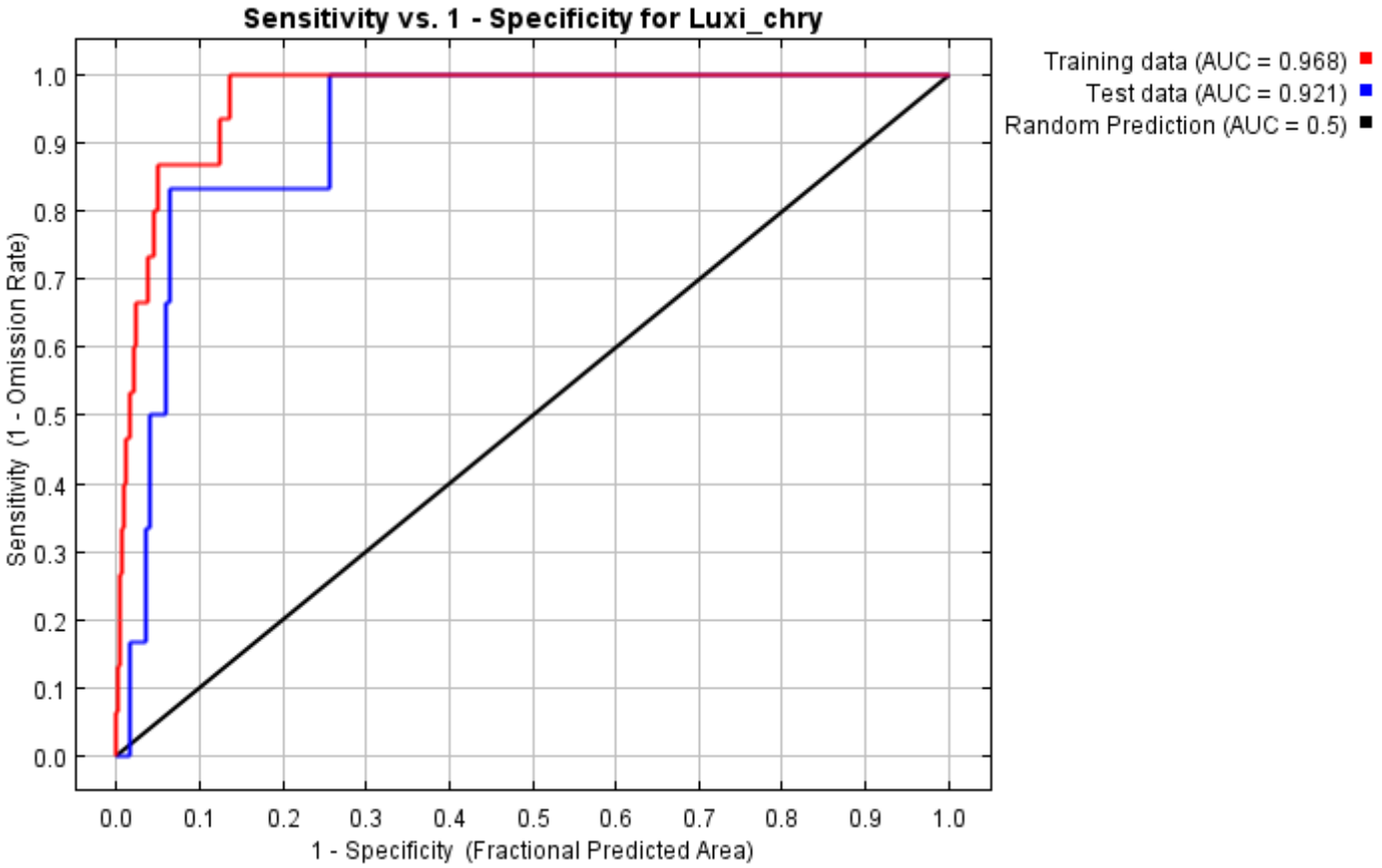
This page contains some analysis of the Maxent model for Luxi_chry, created Fri Mar 17 14:58:20 EDT 2017 using Maxent version 3.3.3k. If you would like to do further analyses, the raw data used here is linked to at the end of this page.

Analysis of omission/commission

The following picture shows the omission rate and predicted area as a function of the cumulative threshold. The omission rate is is calculated both on the training presence records, and (if test data are used) on the test records. The omission rate should be close to the predicted omission, because of the definition of the cumulative threshold.



The next picture is the receiver operating characteristic (ROC) curve for the same data. Note that the specificity is defined using predicted area, rather than true commission (see the paper by Phillips, Anderson and Schapire cited on the help page for discussion of what this means). This implies that the maximum achievable AUC is less than 1. If test data is drawn from the Maxent distribution itself, then the maximum possible test AUC would be 0.930 rather than 1; in practice the test AUC may exceed this bound.



Some common thresholds and corresponding omission rates are as follows. If test data are available, binomial probabilities are calculated exactly if the number of test samples is at most 25, otherwise using a normal approximation to the binomial. These are 1-sided p-values for the null hypothesis that test points are predicted no better than by a random prediction with the same fractional predicted area. The "Balance" threshold minimizes 6 * training omission rate + .04 * cumulative threshold + 1.6 * fractional predicted area.

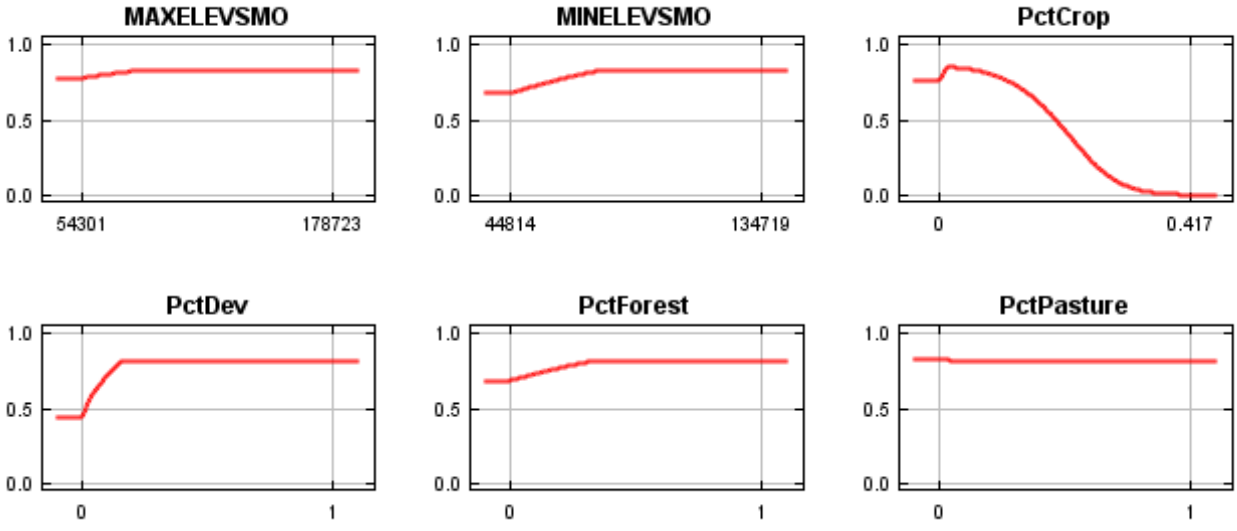
Cumulative threshold	Logistic threshold	Description	Fractional predicted area	Training omission rate	Test omission rate	P-value
1.000	0.016	Fixed cumulative value 1	0.388	0.000	0.000	3.408E-3
5.000	0.081	Fixed cumulative value 5	0.229	0.000	0.167	3.045E-3
10.000	0.163	Fixed cumulative value 10	0.167	0.000	0.167	6.757E-4
14.464	0.212	Minimum training presence	0.136	0.000	0.167	2.465E-4
16.299	0.227	10 percentile training presence	0.124	0.067	0.167	1.594E-4
16.513	0.229	Equal training sensitivity and specificity	0.124	0.133	0.167	1.594E-4
14.464	0.212	Maximum training sensitivity plus specificity	0.136	0.000	0.167	2.465E-4

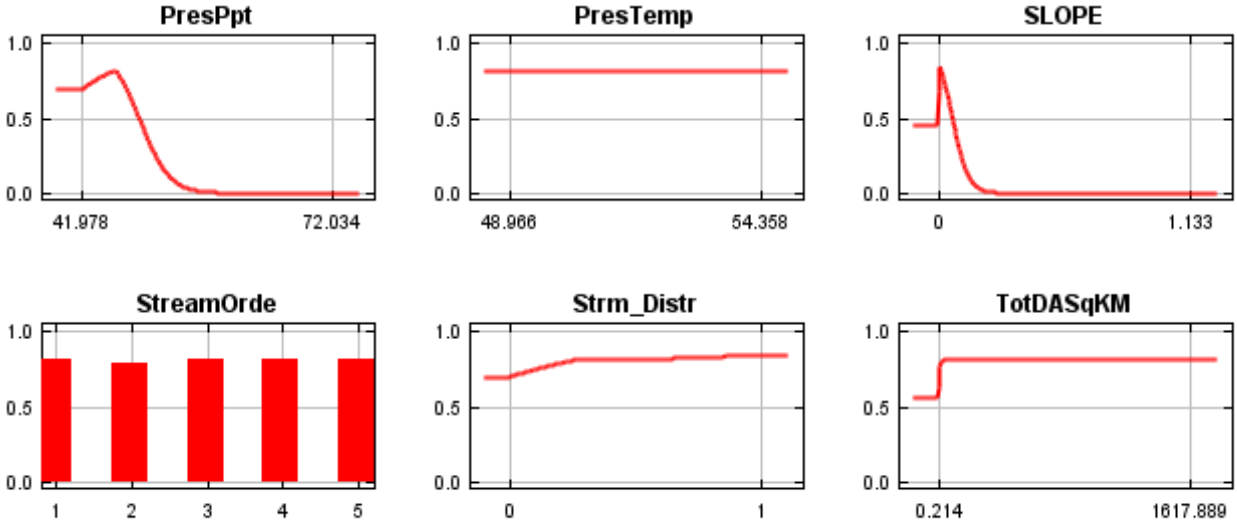
10.043	0.163	Equal test sensitivity and specificity	0.167	0.000	0.167	6.757E-4
33.055	0.383	Maximum test sensitivity plus specificity	0.065	0.133	0.167	6.605E-6
4.111	0.060	Balance training omission, predicted area and threshold value	0.247	0.000	0.167	4.413E-3
10.909	0.170	Equate entropy of thresholded and original distributions	0.160	0.000	0.167	5.499E-4

Click here to interactively explore this prediction using the Explain tool. If clicking from your browser does not succeed in starting the tool, try running the script in C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Luxi_chry\Luxi_chry_explain.bat directly. This tool requires the environmental grids to be small enough that they all fit in memory.

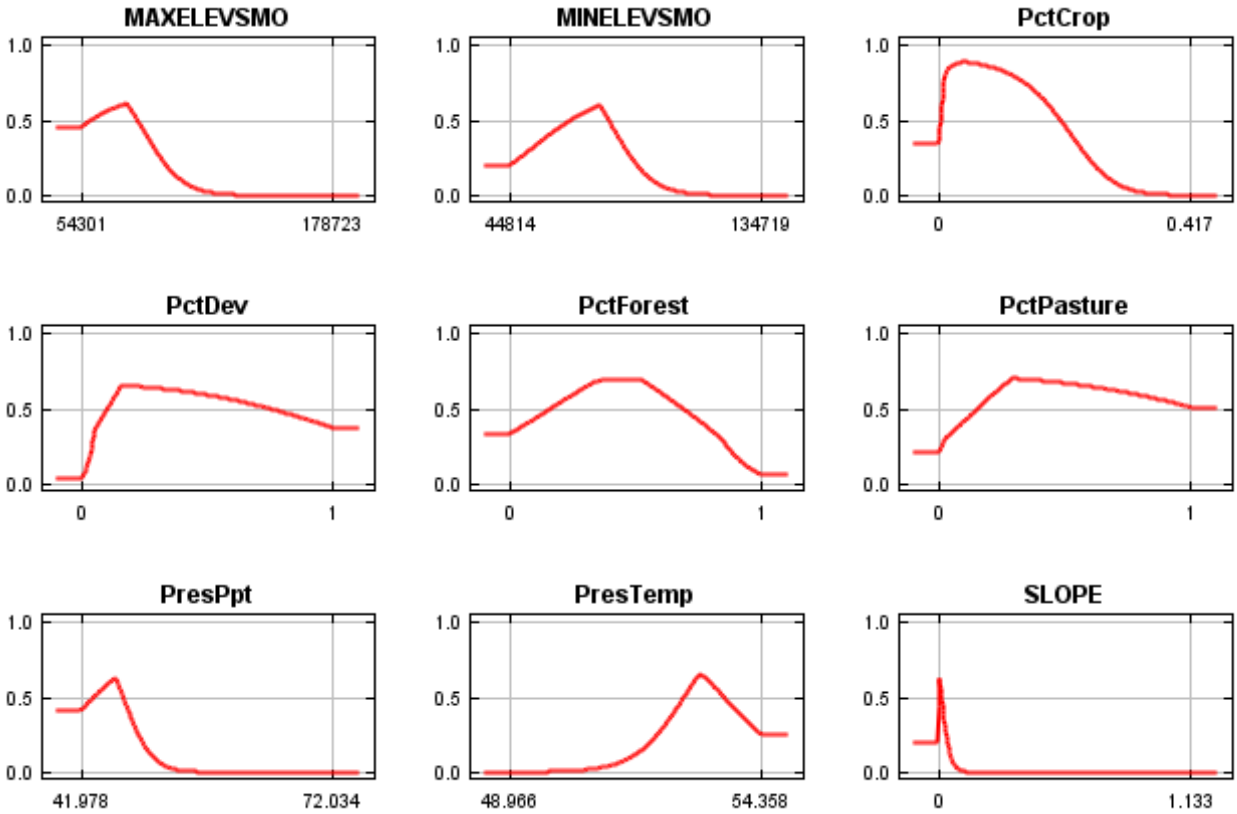
Response curves

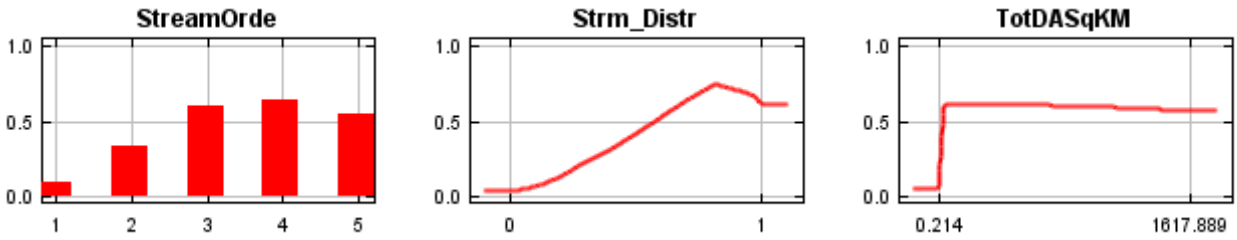
These curves show how each environmental variable affects the Maxent prediction. The curves show how the logistic prediction changes as each environmental variable is varied, keeping all other environmental variables at their average sample value. Click on a response curve to see a larger version. Note that the curves can be hard to interpret if you have strongly correlated variables, as the model may depend on the correlations in ways that are not evident in the curves. In other words, the curves show the marginal effect of changing exactly one variable, whereas the model may take advantage of sets of variables changing together.





In contrast to the above marginal response curves, each of the following curves represents a different model, namely, a Maxent model created using only the corresponding variable. These plots reflect the dependence of predicted suitability both on the selected variable and on dependencies induced by correlations between the selected variable and other variables. They may be easier to interpret if there are strong correlations between variables.



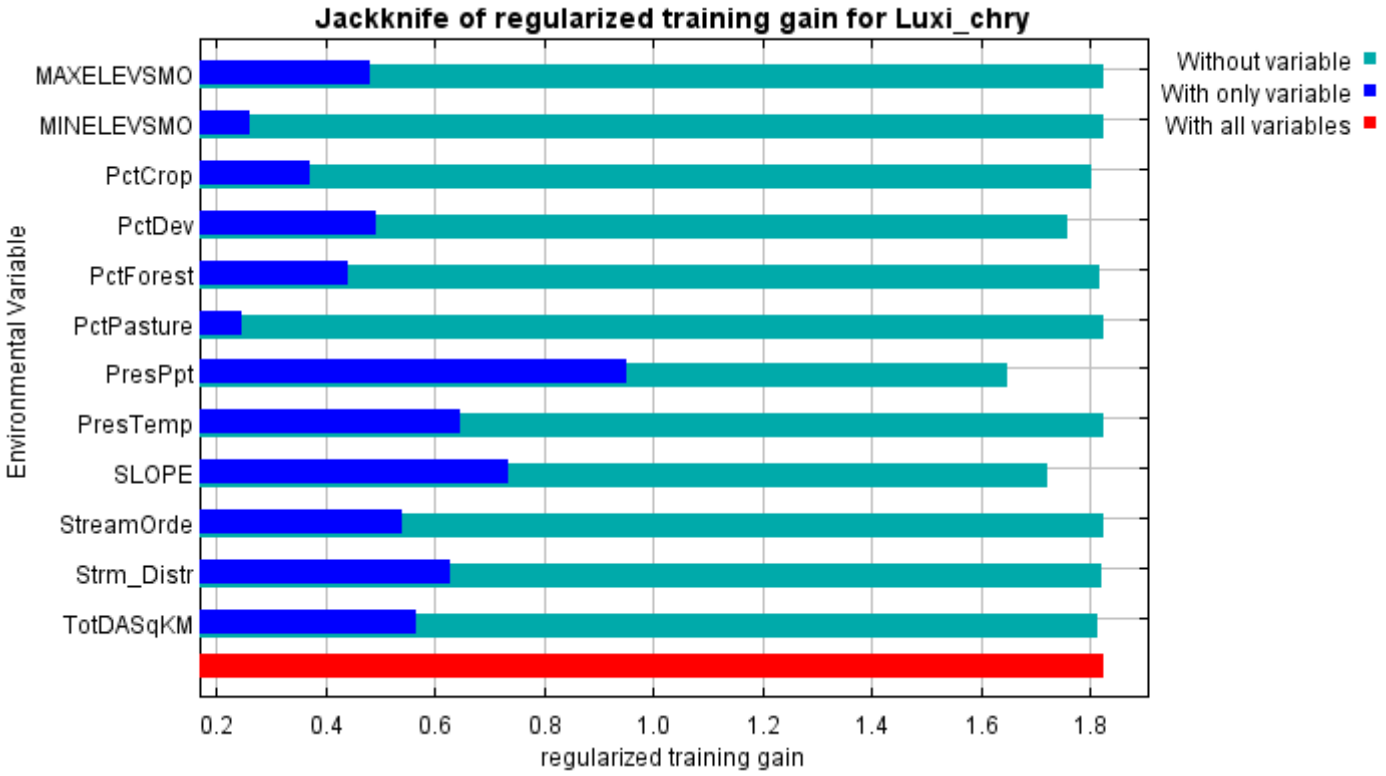


Analysis of variable contributions

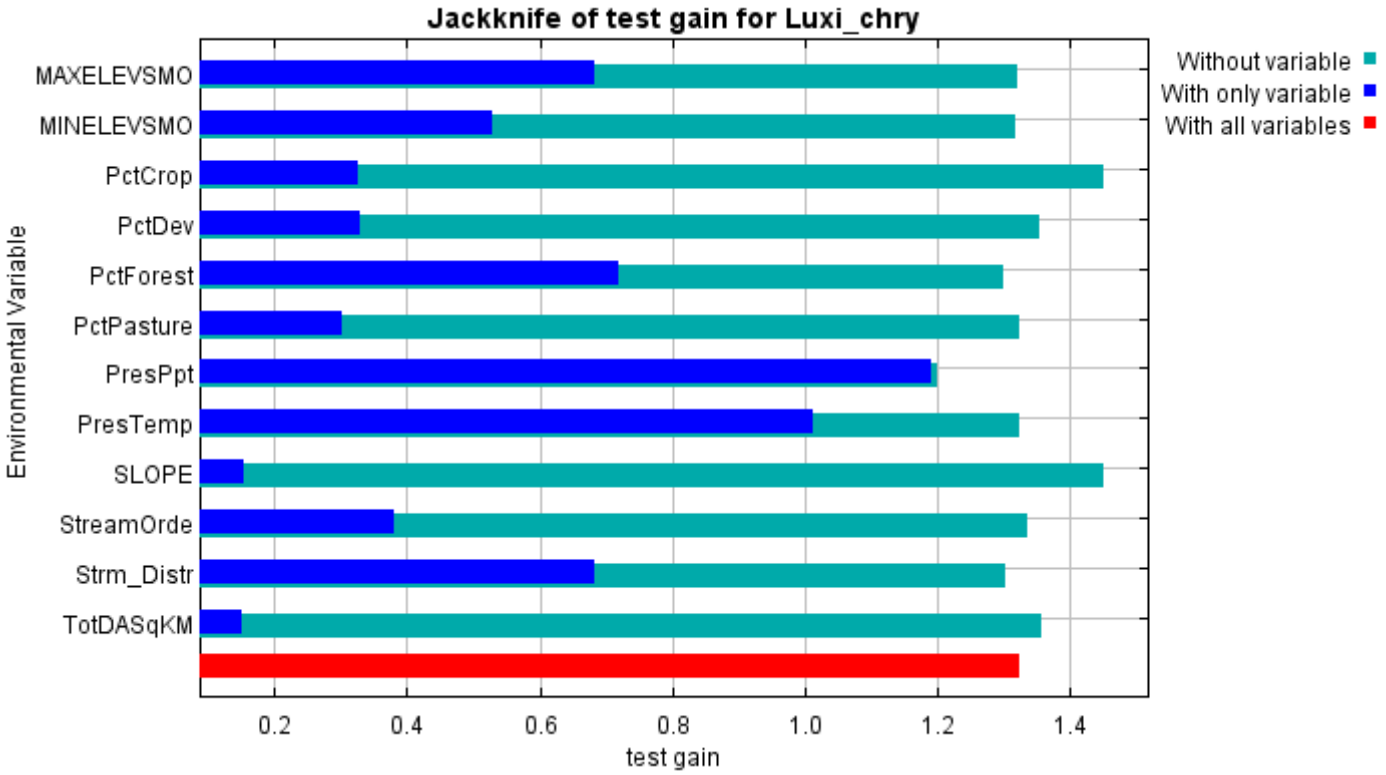
The following table gives estimates of relative contributions of the environmental variables to the Maxent model. To determine the first estimate, in each iteration of the training algorithm, the increase in regularized gain is added to the contribution of the corresponding variable, or subtracted from it if the change to the absolute value of lambda is negative. For the second estimate, for each environmental variable in turn, the values of that variable on training presence and background data are randomly permuted. The model is reevaluated on the permuted data, and the resulting drop in training AUC is shown in the table, normalized to percentages. As with the variable jackknife, variable contributions should be interpreted with caution when the predictor variables are correlated.

Variable	Percent contribution	Permutation importance
PresPpt	26.7	61.6
PctDev	17.2	3
PresTemp	14.5	0
StreamOrde	14	0.4
TotDASqKM	11.9	1.9
PctCrop	5.3	0.4
SLOPE	5	30.5
Strm_Distr	4.2	0.5
MINELEVSMO	0.7	0.6
PctForest	0.5	0.6
MAXELEVSMO	0	0.6
PctPasture	0	0

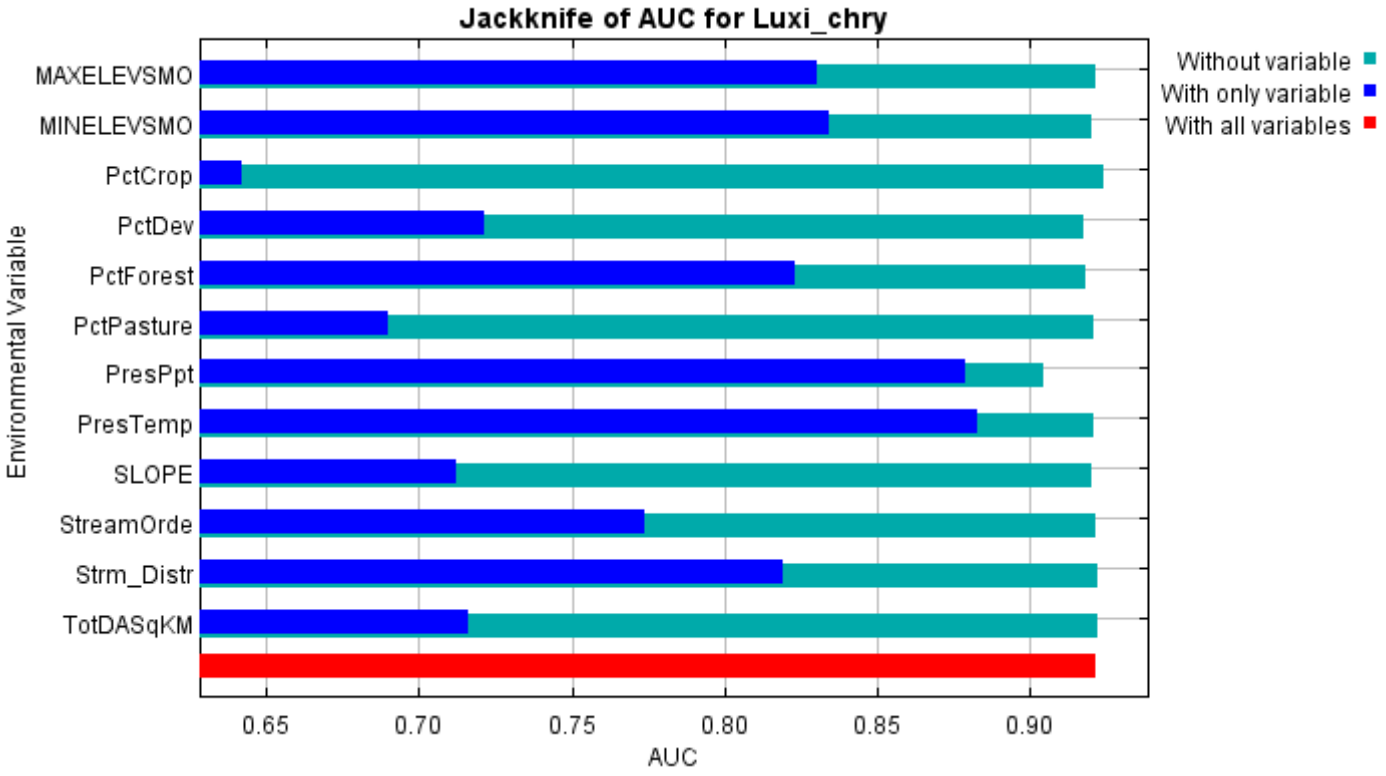
The following picture shows the results of the jackknife test of variable importance. The environmental variable with highest gain when used in isolation is PresPpt, which therefore appears to have the most useful information by itself. The environmental variable that decreases the gain the most when it is omitted is PresPpt, which therefore appears to have the most information that isn't present in the other variables.



The next picture shows the same jackknife test, using test gain instead of training gain. Note that conclusions about which variables are most important can change, now that we're looking at test data.



Lastly, we have the same jackknife test, using AUC on test data.



Raw data outputs and control parameters

The data used in the above analysis is contained in the next links. Please see the Help button for more information on these.
The model applied to the training environmental layers
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv
The coefficients of the model
The omission and predicted area for varying cumulative and raw thresholds
The prediction strength at the training and (optionally) test presence sites
Results for all species modeled in the same Maxent run, with summary statistics and (optionally) jackknife results

Regularized training gain is 1.824, training AUC is 0.968, unregularized training gain is 2.334.
Unregularized test gain is 1.323.
Test AUC is 0.921, standard deviation is 0.034 (calculated as in DeLong, DeLong & Clarke-Pearson 1988, equation 2).
Algorithm terminated after 500 iterations (2 seconds).

The follow settings were used during the run:

15 presence records used for training, 6 for testing.
861 points used to determine the Maxent distribution (background points and presence points).
Environmental layers used: MAXELEVSMO MINELEVSMO PctCrop PctDev PctForest PctPasture PresPpt PresTemp SLOPE StreamOrde(categorical) Strm_Distr TotDASqKM
Regularization values: linear/quadratic/product: 0.586, categorical: 0.321, threshold: 1.850, hinge: 0.500
Feature types used: hinge linear quadratic
responsecurves: true
pictures: false
jackknife: true
outputdirectory: C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Luxi_chry
projectionlayers: F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv
samplesfile: C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\LuxiChryFinal.csv
environmentallayers: C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\LuxiChryFinal.csv
randomtestpoints: 30
Command line used:

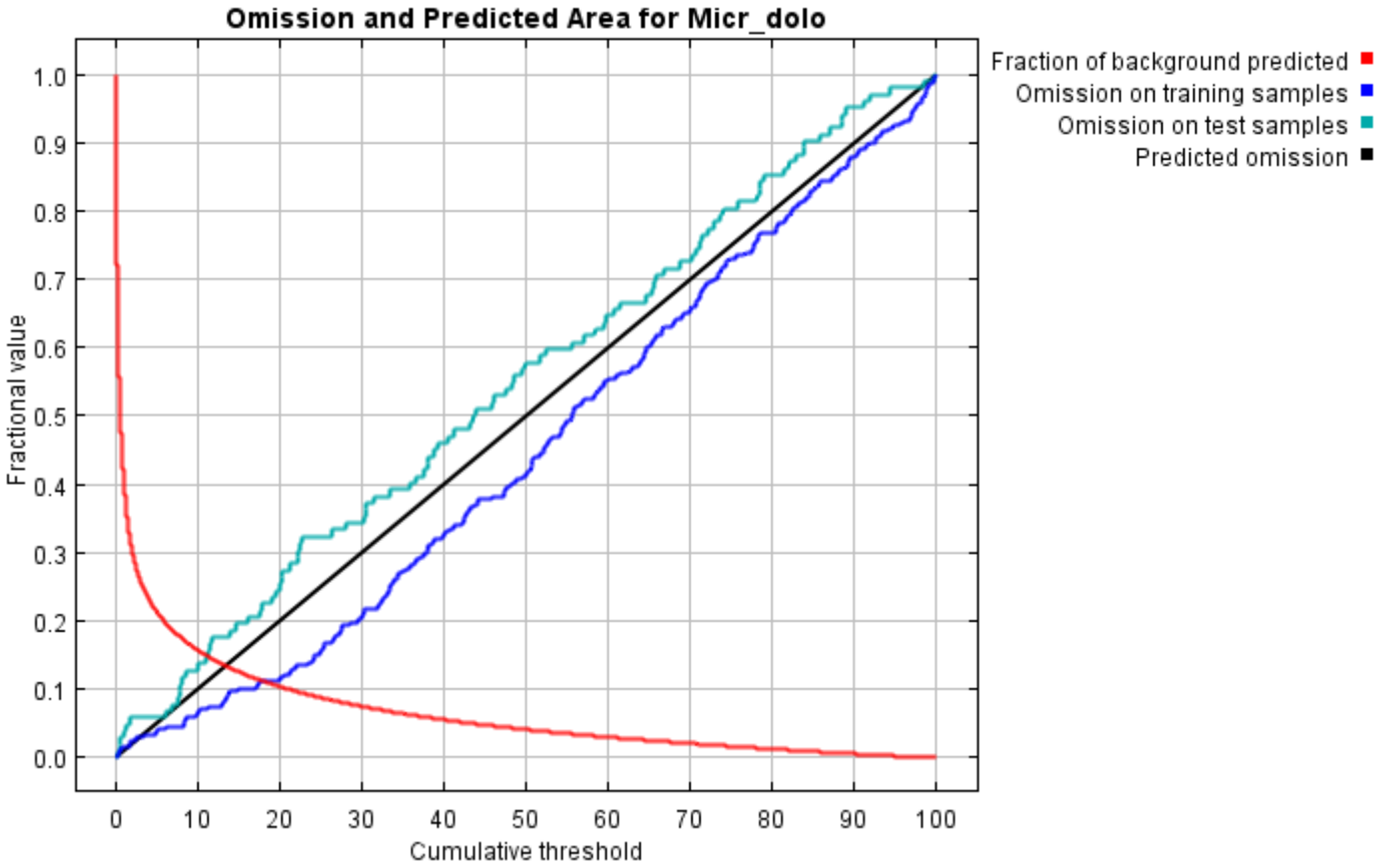
Command line to repeat this species model: java density.MaxEnt nowarnings noprefixes -E "" -E Luxi_chry responsecurves nopictures jackknife outputdirectory=C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Luxi_chry "projectionlayers=F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv" "samplesfile=C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\LuxiChryFinal.csv" "environmentallayers=C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\LuxiChryFinal.csv" randomtestpoints=30 -t StreamOrde

Maxent model for Micr_dolo

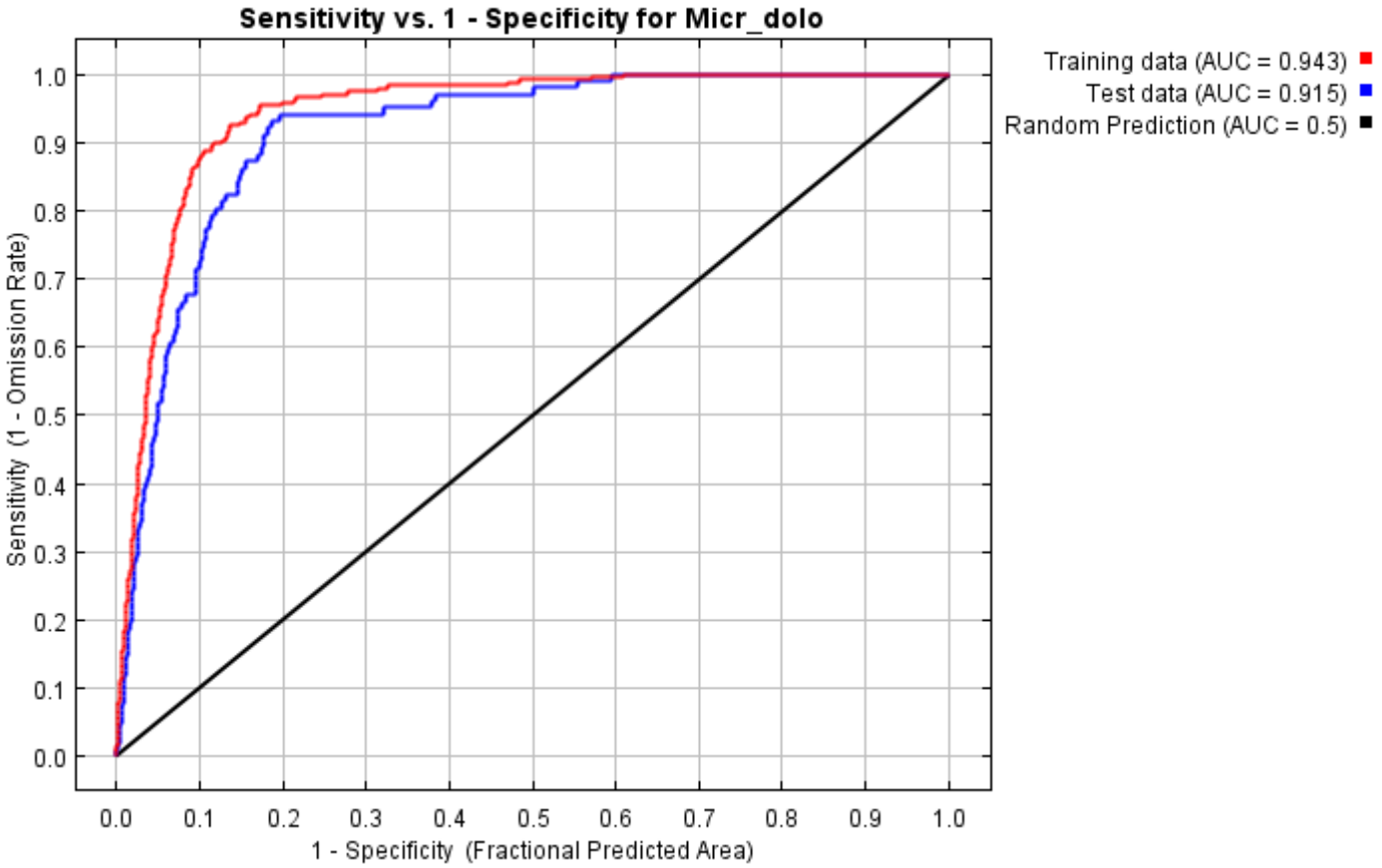
This page contains some analysis of the Maxent model for Micr_dolo, created Fri Mar 17 15:00:45 EDT 2017 using Maxent version 3.3.3k. If you would like to do further analyses, the raw data used here is linked to at the end of this page.

Analysis of omission/commission

The following picture shows the omission rate and predicted area as a function of the cumulative threshold. The omission rate is is calculated both on the training presence records, and (if test data are used) on the test records. The omission rate should be close to the predicted omission, because of the definition of the cumulative threshold.



The next picture is the receiver operating characteristic (ROC) curve for the same data. Note that the specificity is defined using predicted area, rather than true commission (see the paper by Phillips, Anderson and Schapire cited on the help page for discussion of what this means). This implies that the maximum achievable AUC is less than 1. If test data is drawn from the Maxent distribution itself, then the maximum possible test AUC would be 0.933 rather than 1; in practice the test AUC may exceed this bound.



Some common thresholds and corresponding omission rates are as follows. If test data are available, binomial probabilities are calculated exactly if the number of test samples is at most 25, otherwise using a normal approximation to the binomial. These are 1-sided p-values for the null hypothesis that test points are predicted no better than by a random prediction with the same fractional predicted area. The "Balance" threshold minimizes 6 * training omission rate + .04 * cumulative threshold + 1.6 * fractional predicted area.

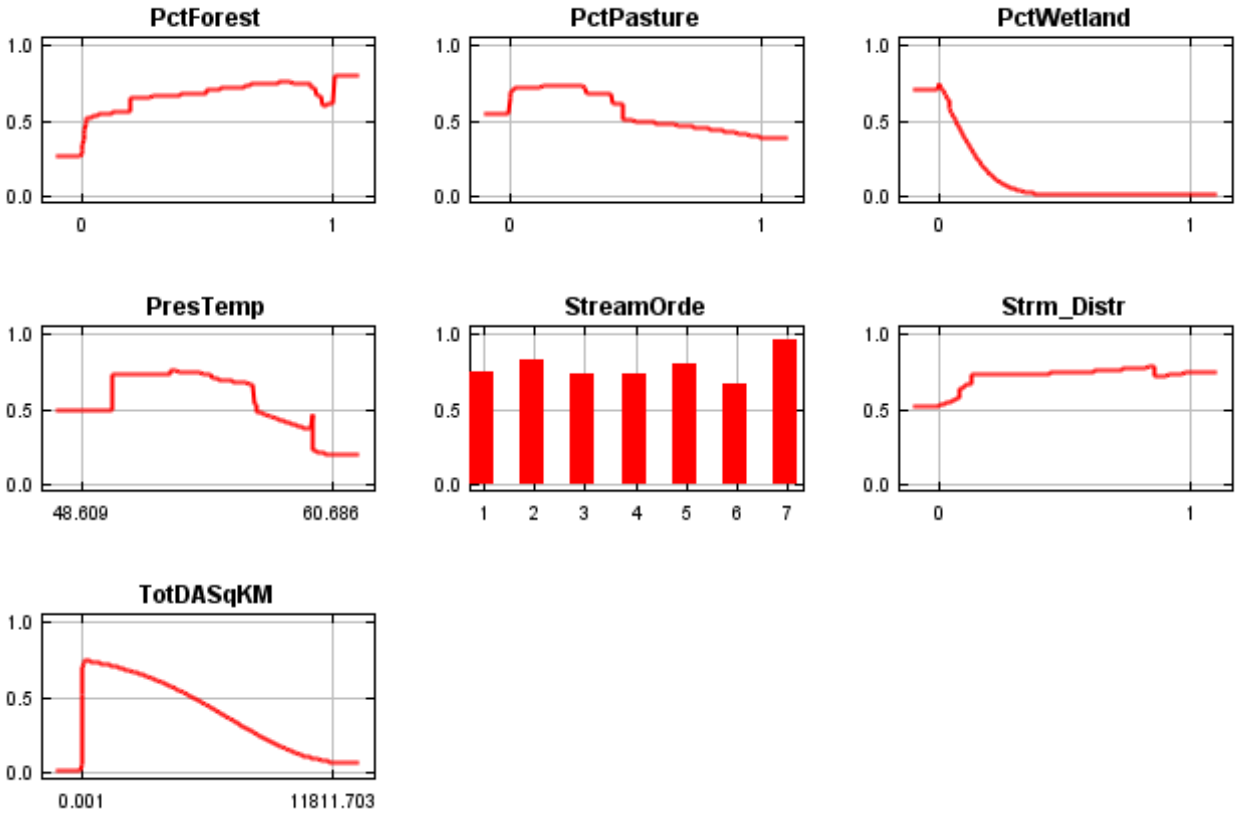
Cumulative threshold	Logistic threshold	Description	Fractional predicted area	Training omission rate	Test omission rate	P-value
1.000	0.011	Fixed cumulative value 1	0.398	0.017	0.029	1.629E-32
5.000	0.097	Fixed cumulative value 5	0.213	0.038	0.059	0E0
10.000	0.184	Fixed cumulative value 10	0.157	0.063	0.127	0E0
0.262	0.003	Minimum training presence	0.610	0.000	0.000	3.587E-16
14.922	0.261	10 percentile training presence	0.126	0.097	0.196	0E0
17.615	0.299	Equal training sensitivity and specificity	0.113	0.113	0.216	0E0
12.914	0.229	Maximum training sensitivity plus specificity	0.137	0.076	0.176	0E0
11.170	0.203	Equal test sensitivity and specificity	0.148	0.071	0.147	0E0

6.119	0.118	Maximum test sensitivity plus specificity	0.197	0.046	0.059	0E0
1.629	0.022	Balance training omission, predicted area and threshold value	0.326	0.017	0.049	1.441E-41
7.542	0.144	Equate entropy of thresholded and original distributions	0.180	0.046	0.088	0E0

(A link to the Explain tool was not made for this model. The model uses product features, while the Explain tool can only be used for additive models.)

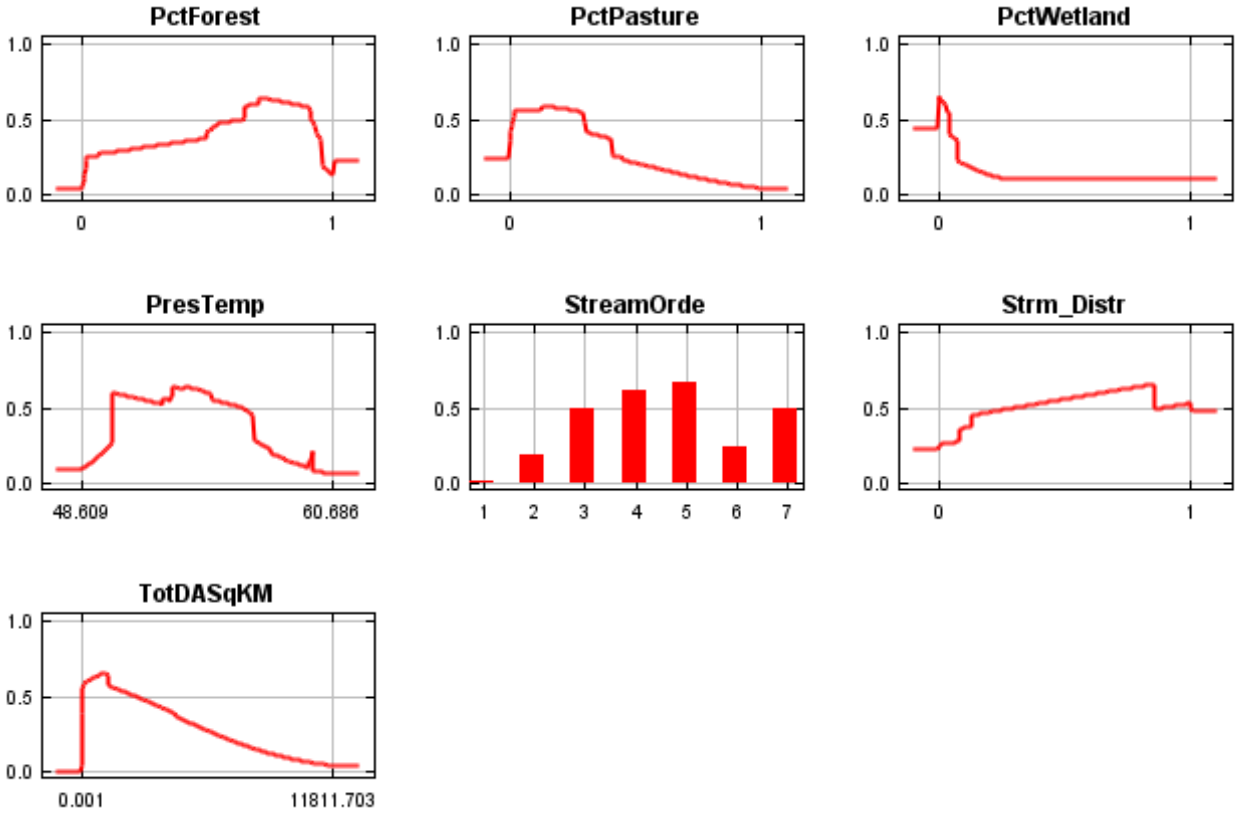
Response curves

These curves show how each environmental variable affects the Maxent prediction. The curves show how the logistic prediction changes as each environmental variable is varied, keeping all other environmental variables at their average sample value. Click on a response curve to see a larger version. Note that the curves can be hard to interpret if you have strongly correlated variables, as the model may depend on the correlations in ways that are not evident in the curves. In other words, the curves show the marginal effect of changing exactly one variable, whereas the model may take advantage of sets of variables changing together.



In contrast to the above marginal response curves, each of the following curves represents a different model, namely, a Maxent model created using only the corresponding variable. These plots reflect the dependence of

predicted suitability both on the selected variable and on dependencies induced by correlations between the selected variable and other variables. They may be easier to interpret if there are strong correlations between variables.

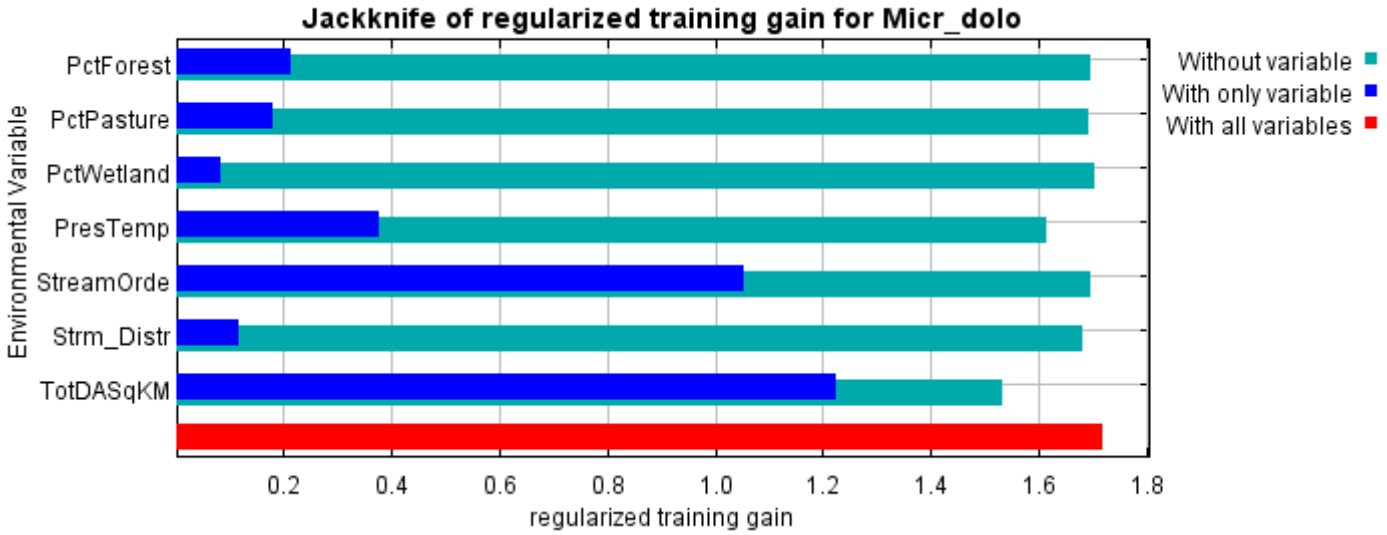


Analysis of variable contributions

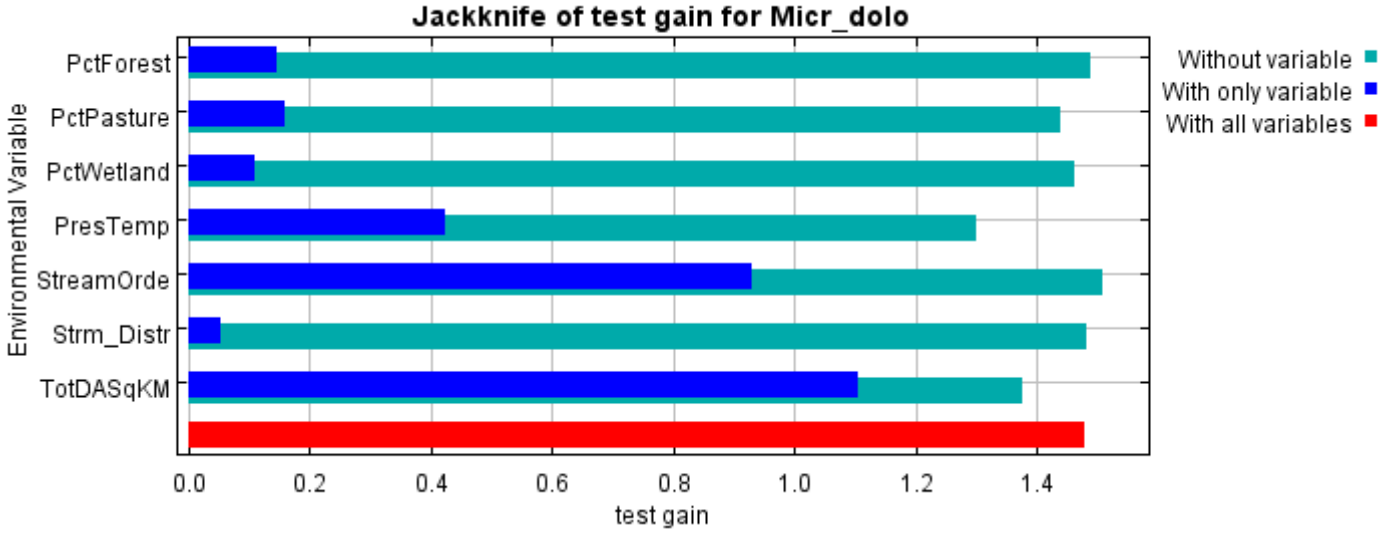
The following table gives estimates of relative contributions of the environmental variables to the Maxent model. To determine the first estimate, in each iteration of the training algorithm, the increase in regularized gain is added to the contribution of the corresponding variable, or subtracted from it if the change to the absolute value of lambda is negative. For the second estimate, for each environmental variable in turn, the values of that variable on training presence and background data are randomly permuted. The model is reevaluated on the permuted data, and the resulting drop in training AUC is shown in the table, normalized to percentages. As with the variable jackknife, variable contributions should be interpreted with caution when the predictor variables are correlated.

Variable	Percent contribution	Permutation importance
TotDASqKM	67.6	77.8
PresTemp	18.8	10
Strm_Distr	3.7	3.5
PctPasture	3.4	3.2
StreamOrde	3.3	1.3
PctForest	2.2	2.3
PctWetland	1	1.9

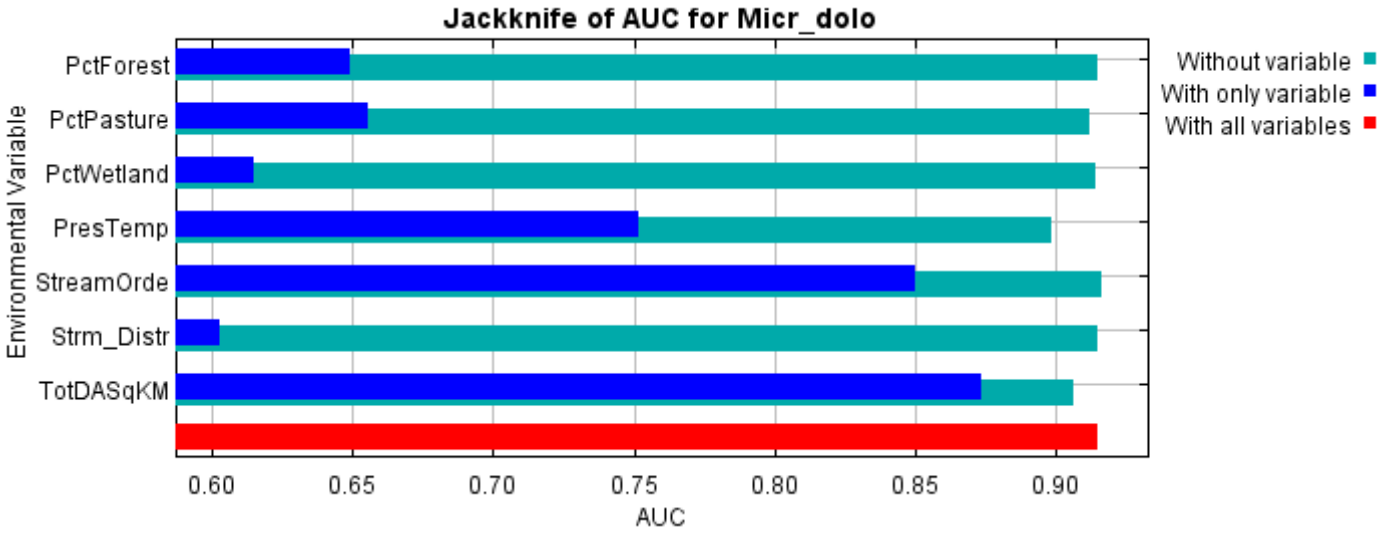
The following picture shows the results of the jackknife test of variable importance. The environmental variable with highest gain when used in isolation is TotDASqKM, which therefore appears to have the most useful information by itself. The environmental variable that decreases the gain the most when it is omitted is TotDASqKM, which therefore appears to have the most information that isn't present in the other variables.



The next picture shows the same jackknife test, using test gain instead of training gain. Note that conclusions about which variables are most important can change, now that we're looking at test data.



Lastly, we have the same jackknife test, using AUC on test data.



Raw data outputs and control parameters

The data used in the above analysis is contained in the next links. Please see the Help button for more information on these.
The model applied to the training environmental layers
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv
The coefficients of the model
The omission and predicted area for varying cumulative and raw thresholds
The prediction strength at the training and (optionally) test presence sites
Results for all species modeled in the same Maxent run, with summary statistics and (optionally) jackknife results

Regularized training gain is 1.720, training AUC is 0.943, unregularized training gain is 1.894.
Unregularized test gain is 1.480.
Test AUC is 0.915, standard deviation is 0.011 (calculated as in DeLong, DeLong & Clarke-Pearson 1988, equation 2).
Algorithm terminated after 500 iterations (45 seconds).

The follow settings were used during the run:
238 presence records used for training, 102 for testing.
27533 points used to determine the Maxent distribution (background points and presence points).
Environmental layers used: PctForest PctPasture PctWetland PresTemp StreamOrde(categorical) Strm_Distr TotDASqKM
Regularization values: linear/quadratic/product: 0.050, categorical: 0.250, threshold: 1.000, hinge: 0.500
Feature types used: hinge product linear threshold quadratic
responsecurves: true

pictures: false
jackknife: true
outputdirectory: C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Micr_dolo
projectionlayers: F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv
samplesfile: C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\MicrDoloFinal.csv
environmentallayers: C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\MicrDoloFinal.csv
randomtestpoints: 30
Command line used:

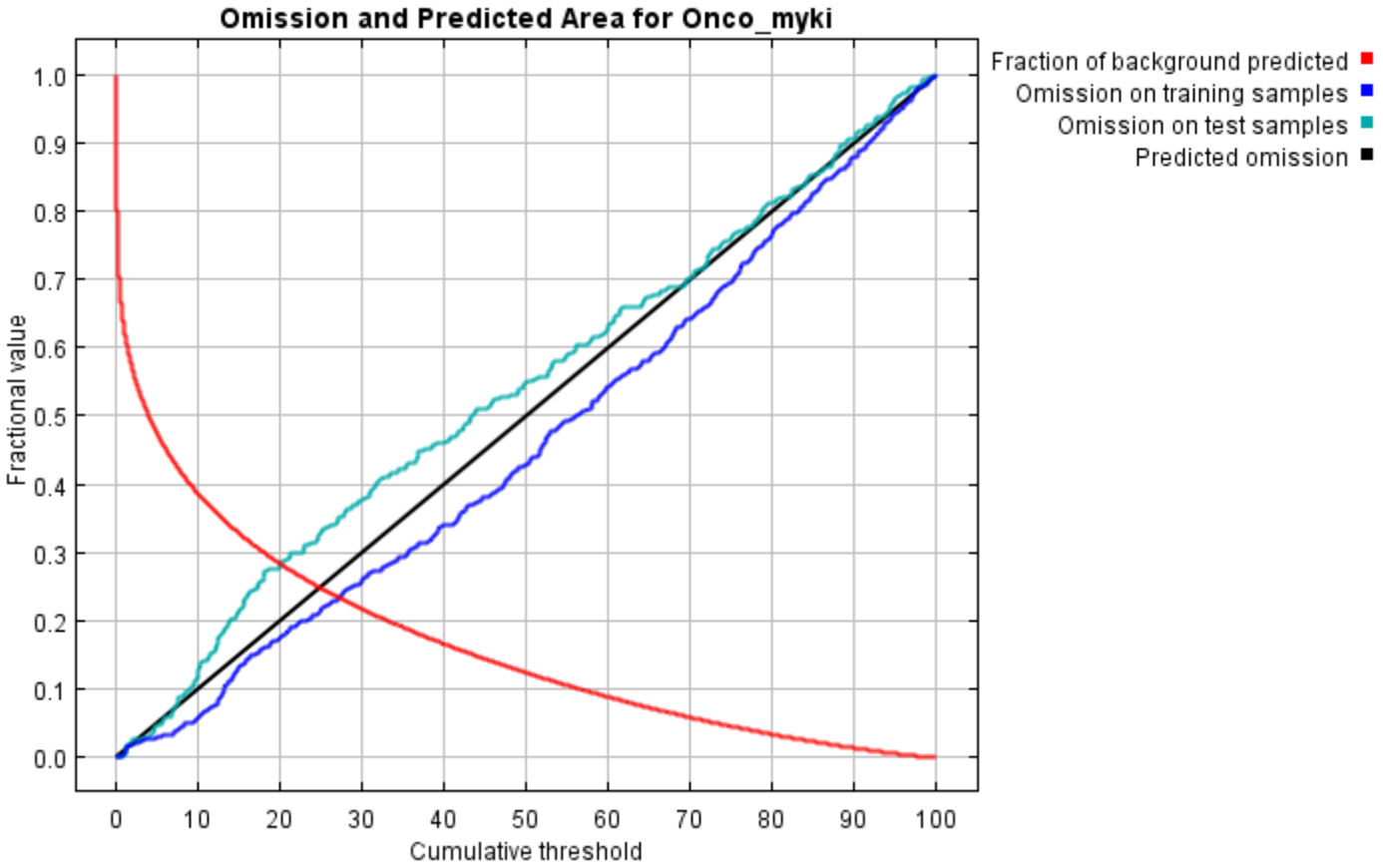
Command line to repeat this species model: java density.MaxEnt nowarnings noprefixes -E "" -E Micr_dolo
responsecurves nopictures jackknife
outputdirectory=C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Micr_dolo
"projectionlayers=F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv"
"samplesfile=C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\MicrDoloFinal.csv"
"environmentallayers=C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\MicrDoloFinal.csv"
randomtestpoints=30 -t StreamOrde

Maxent model for Onco_myki

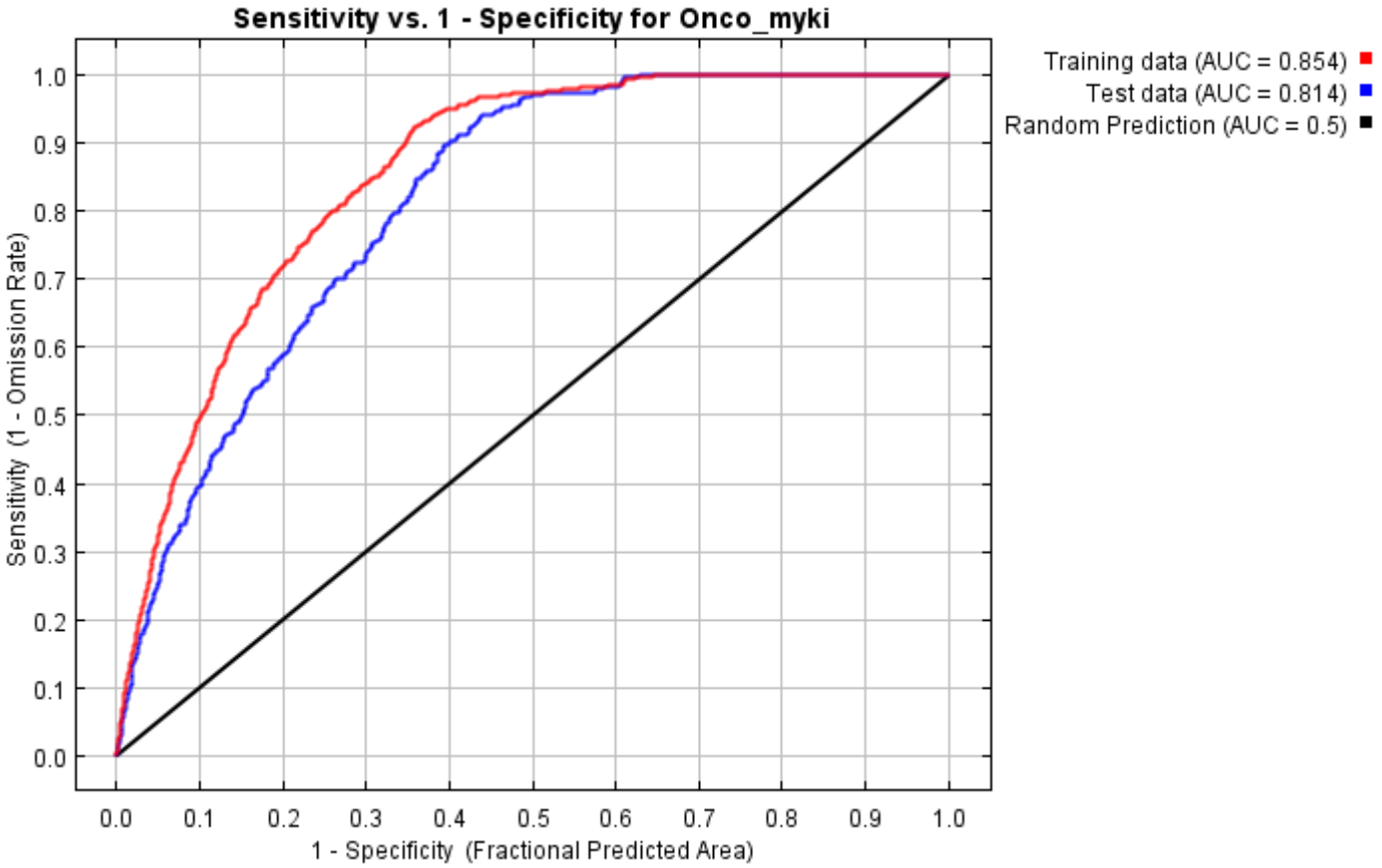
This page contains some analysis of the Maxent model for Onco_myki, created Fri Mar 17 15:15:49 EDT 2017 using Maxent version 3.3.3k. If you would like to do further analyses, the raw data used here is linked to at the end of this page.

Analysis of omission/commission

The following picture shows the omission rate and predicted area as a function of the cumulative threshold. The omission rate is is calculated both on the training presence records, and (if test data are used) on the test records. The omission rate should be close to the predicted omission, because of the definition of the cumulative threshold.



The next picture is the receiver operating characteristic (ROC) curve for the same data. Note that the specificity is defined using predicted area, rather than true commission (see the paper by Phillips, Anderson and Schapire cited on the help page for discussion of what this means). This implies that the maximum achievable AUC is less than 1. If test data is drawn from the Maxent distribution itself, then the maximum possible test AUC would be 0.833 rather than 1; in practice the test AUC may exceed this bound.



Some common thresholds and corresponding omission rates are as follows. If test data are available, binomial probabilities are calculated exactly if the number of test samples is at most 25, otherwise using a normal approximation to the binomial. These are 1-sided p-values for the null hypothesis that test points are predicted no better than by a random prediction with the same fractional predicted area. The "Balance" threshold minimizes 6 * training omission rate + .04 * cumulative threshold + 1.6 * fractional predicted area.

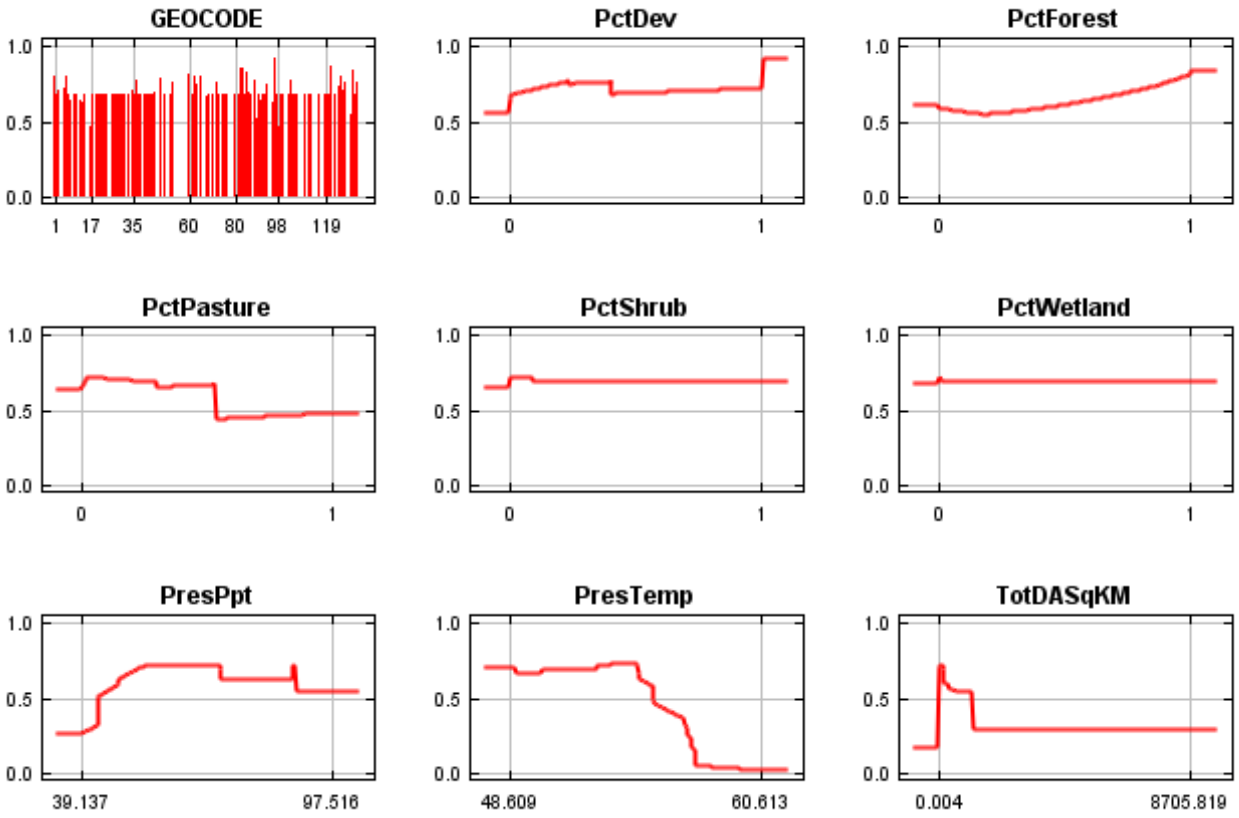
Cumulative threshold	Logistic threshold	Description	Fractional predicted area	Training omission rate	Test omission rate	P-value
1.000	0.054	Fixed cumulative value 1	0.626	0.005	0.004	4.119E-36
5.000	0.160	Fixed cumulative value 5	0.475	0.030	0.049	4.123E-55
10.000	0.246	Fixed cumulative value 10	0.386	0.058	0.120	4.809E-62
0.416	0.023	Minimum training presence	0.693	0.000	0.000	7.073E-28
13.119	0.288	10 percentile training presence	0.348	0.099	0.187	1.649E-57
27.075	0.421	Equal training sensitivity and specificity	0.235	0.236	0.348	2.309E-58
12.365	0.279	Maximum training sensitivity plus specificity	0.357	0.079	0.165	3.132E-60

19.996	0.360	Equal test sensitivity and specificity	0.284	0.175	0.285	2.724E-55
9.023	0.230	Maximum test sensitivity plus specificity	0.400	0.050	0.097	2.461E-63
0.969	0.053	Balance training omission, predicted area and threshold value	0.629	0.003	0.000	1.926E-36
6.335	0.185	Equate entropy of thresholded and original distributions	0.446	0.034	0.060	1.432E-59

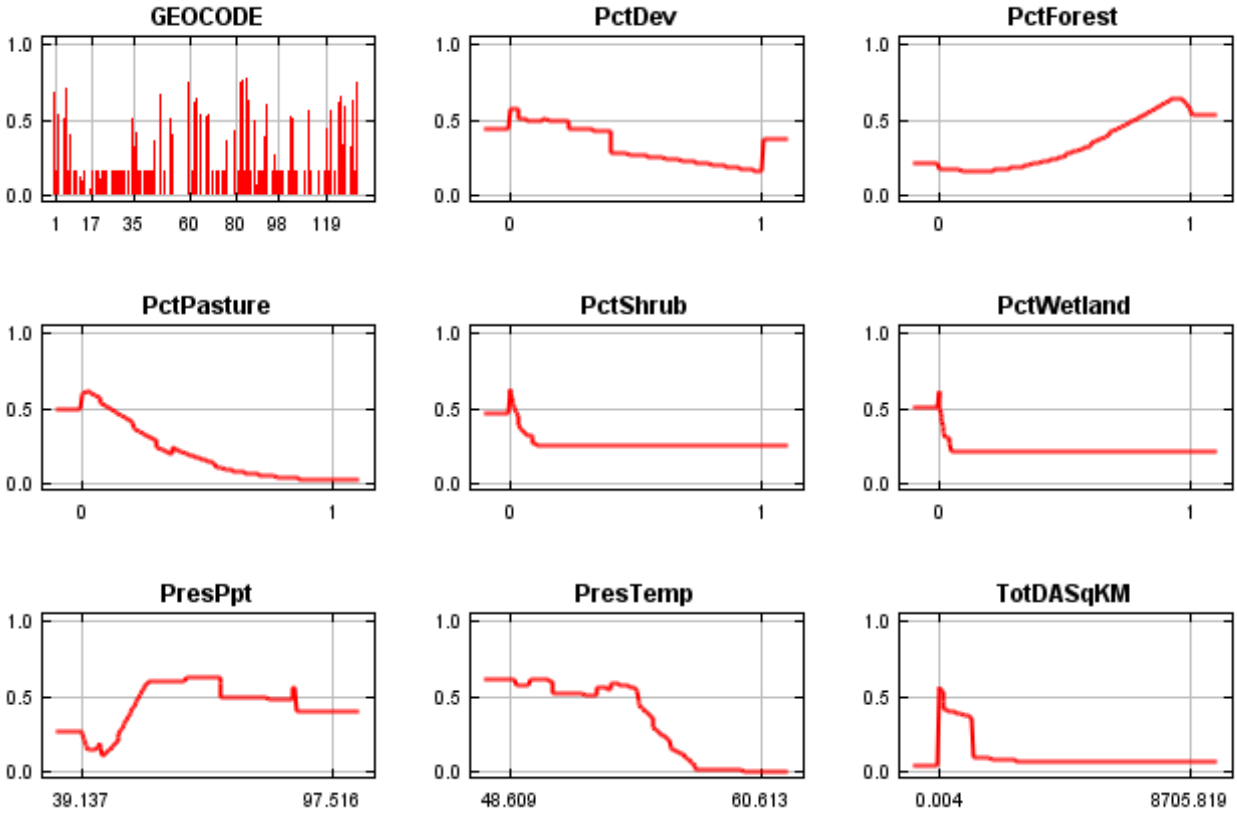
(A link to the Explain tool was not made for this model. The model uses product features, while the Explain tool can only be used for additive models.)

Response curves

These curves show how each environmental variable affects the Maxent prediction. The curves show how the logistic prediction changes as each environmental variable is varied, keeping all other environmental variables at their average sample value. Click on a response curve to see a larger version. Note that the curves can be hard to interpret if you have strongly correlated variables, as the model may depend on the correlations in ways that are not evident in the curves. In other words, the curves show the marginal effect of changing exactly one variable, whereas the model may take advantage of sets of variables changing together.



In contrast to the above marginal response curves, each of the following curves represents a different model, namely, a Maxent model created using only the corresponding variable. These plots reflect the dependence of predicted suitability both on the selected variable and on dependencies induced by correlations between the selected variable and other variables. They may be easier to interpret if there are strong correlations between variables.



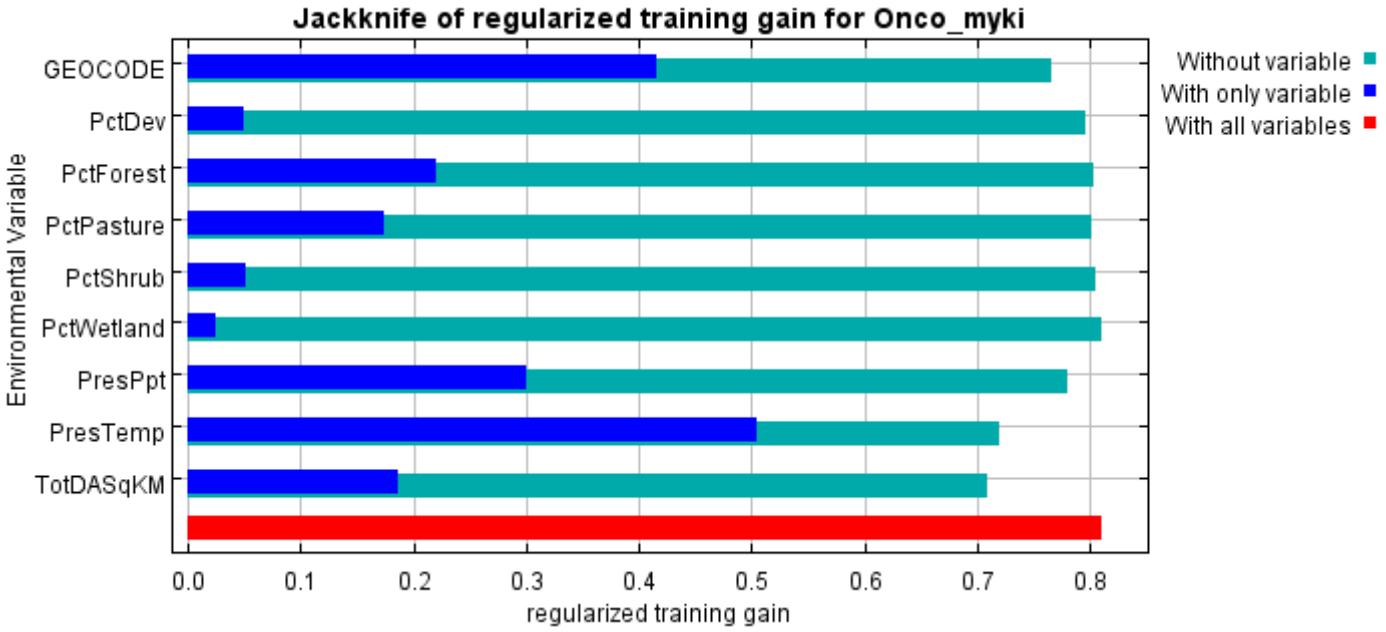
Analysis of variable contributions

The following table gives estimates of relative contributions of the environmental variables to the Maxent model. To determine the first estimate, in each iteration of the training algorithm, the increase in regularized gain is added to the contribution of the corresponding variable, or subtracted from it if the change to the absolute value of lambda is negative. For the second estimate, for each environmental variable in turn, the values of that variable on training presence and background data are randomly permuted. The model is reevaluated on the permuted data, and the resulting drop in training AUC is shown in the table, normalized to percentages. As with the variable jackknife, variable contributions should be interpreted with caution when the predictor variables are correlated.

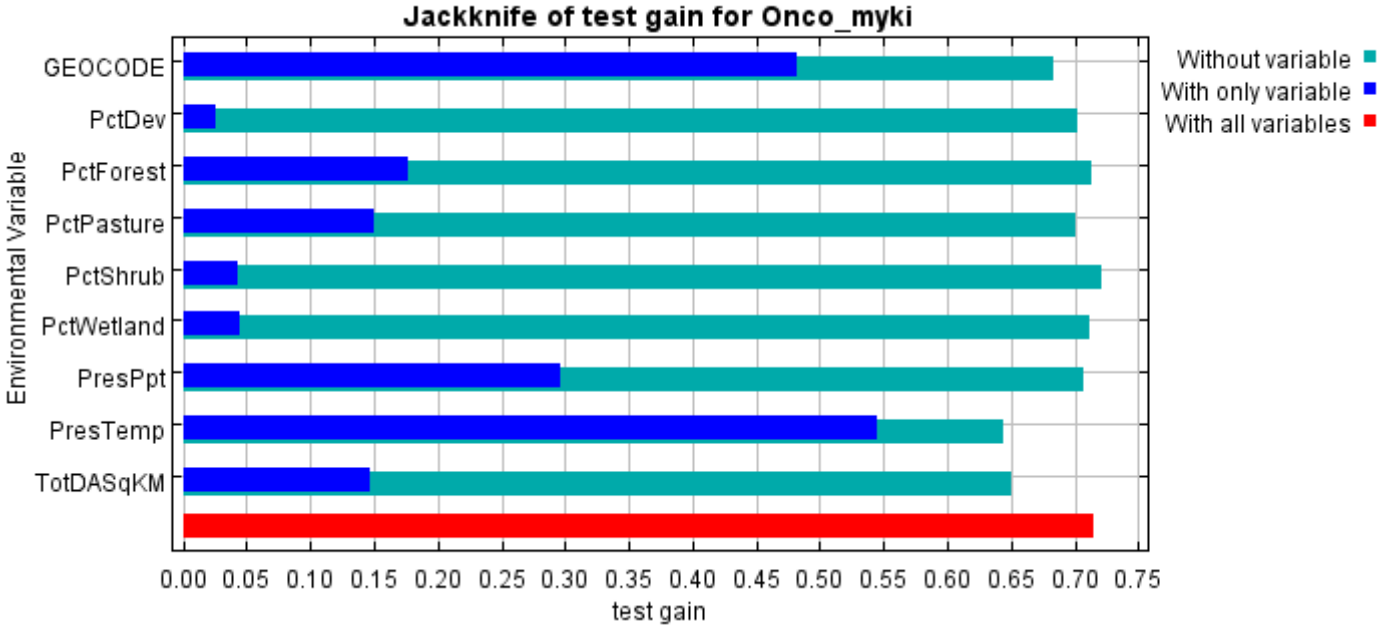
Variable	Percent contribution	Permutation importance
PresTemp	57.7	50.3
TotDASqKM	15.4	16.3
PresPpt	9.8	7.3
GEOCODE	6.7	6.4
PctForest	4.7	8.4

PctDev	3	5.6
PctShrub	1.6	1.1
PctPasture	0.9	4.2
PctWetland	0.3	0.4

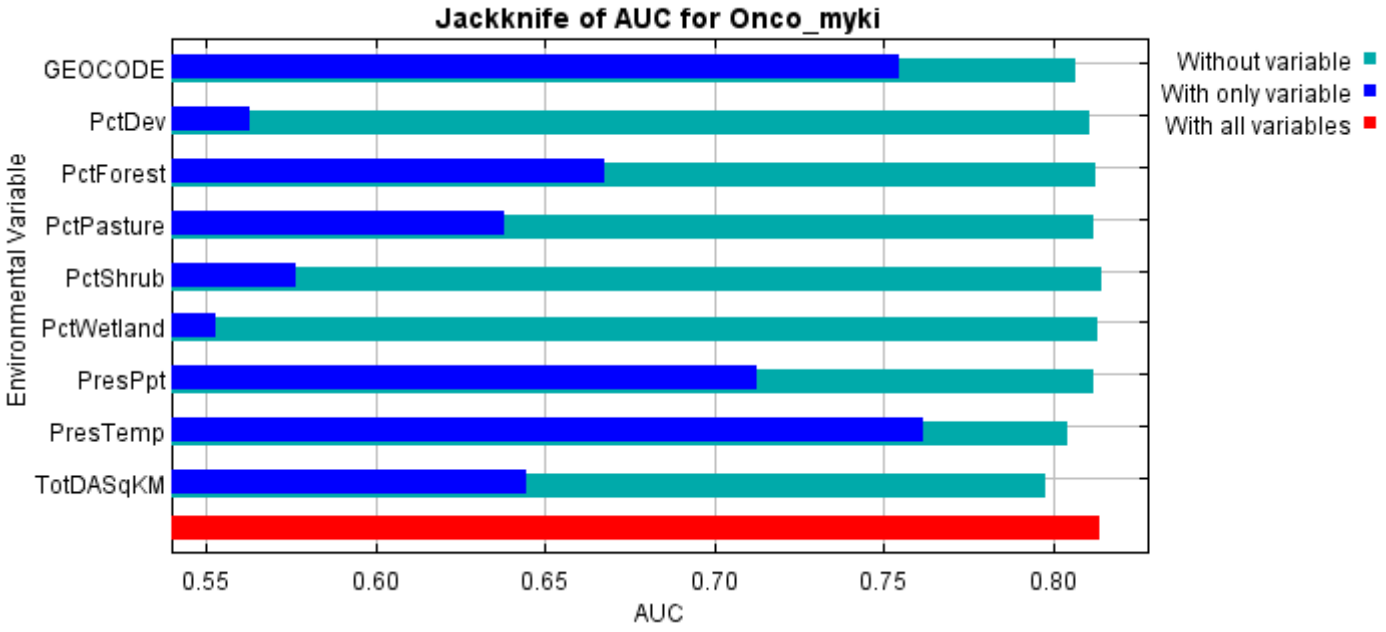
The following picture shows the results of the jackknife test of variable importance. The environmental variable with highest gain when used in isolation is PresTemp, which therefore appears to have the most useful information by itself. The environmental variable that decreases the gain the most when it is omitted is TotDASqKM, which therefore appears to have the most information that isn't present in the other variables.



The next picture shows the same jackknife test, using test gain instead of training gain. Note that conclusions about which variables are most important can change, now that we're looking at test data.



Lastly, we have the same jackknife test, using AUC on test data.



Raw data outputs and control parameters

The data used in the above analysis is contained in the next links. Please see the Help button for more information on these.
The model applied to the training environmental layers
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv
The coefficients of the model
The omission and predicted area for varying cumulative and raw thresholds
The prediction strength at the training and (optionally) test presence sites
Results for all species modeled in the same Maxent run, with summary statistics and (optionally) jackknife results

Regularized training gain is 0.811, training AUC is 0.854, unregularized training gain is 0.930.
Unregularized test gain is 0.715.
Test AUC is 0.814, standard deviation is 0.010 (calculated as in DeLong, DeLong & Clarke-Pearson 1988, equation 2).
Algorithm terminated after 500 iterations (47 seconds).

The follow settings were used during the run:
624 presence records used for training, 267 for testing.
19530 points used to determine the Maxent distribution (background points and presence points).
Environmental layers used: GEOCODE(categorical) PctDev PctForest PctPasture PctShrub PctWetland PresPpt PresTemp TotDASqKM

Regularization values: linear/quadratic/product: 0.050, categorical: 0.250, threshold: 1.000, hinge: 0.500
Feature types used: hinge product linear threshold quadratic
responsecurves: true
pictures: false
jackknife: true
outputdirectory: C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Onco_myki
projectionlayers: F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv
samplesfile: C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\OncoMykiFinal.csv
environmentallayers: C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\OncoMykiFinal.csv
randomtestpoints: 30
Command line used:

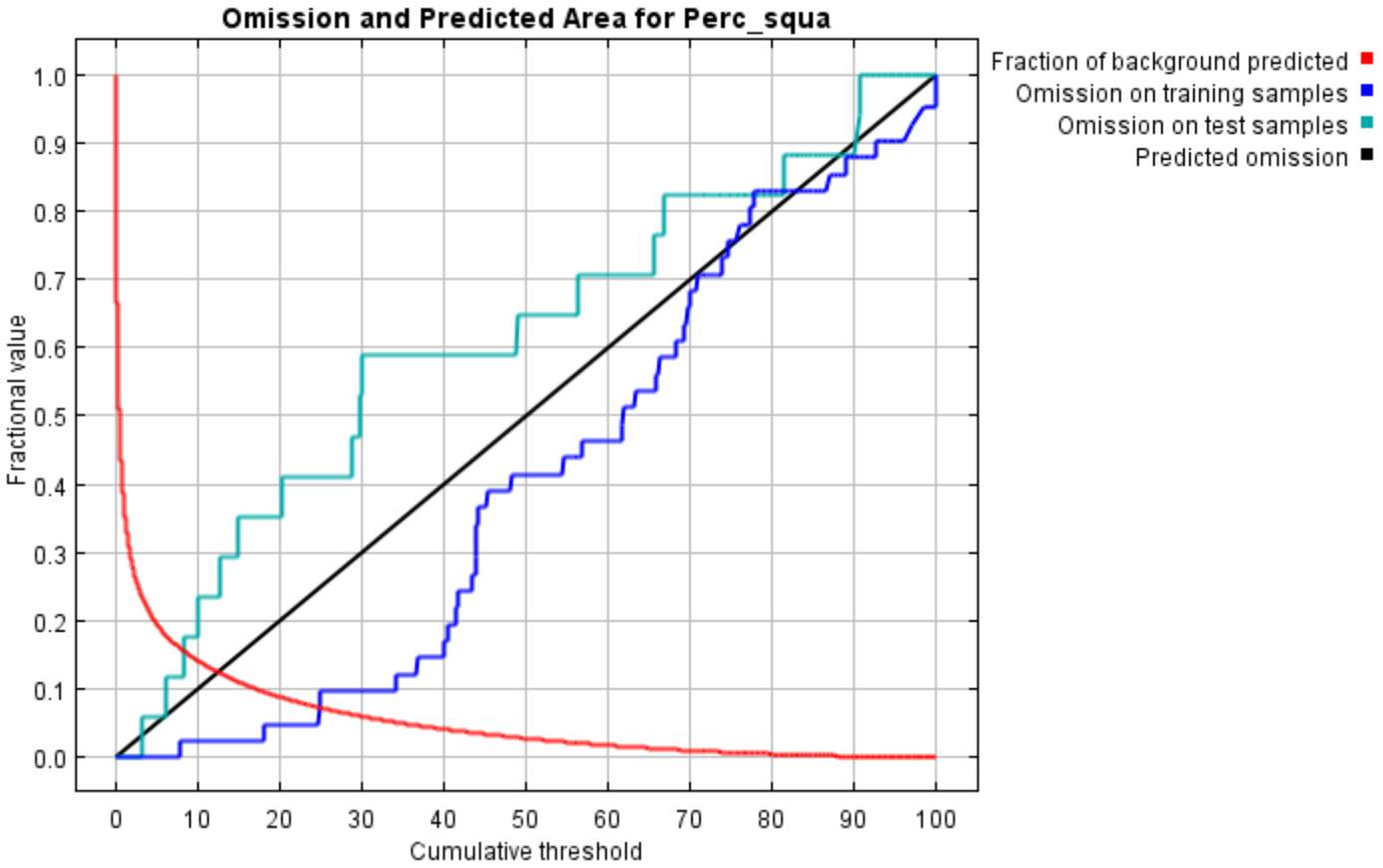
Command line to repeat this species model: java density.MaxEnt nowarnings noprefixes -E "" -E Onco_myki
responsecurves nopictures jackknife
outputdirectory=C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Onco_myki
"projectionlayers=F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv"
"samplesfile=C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\OncoMykiFinal.csv"
"environmentallayers=C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\OncoMykiFinal.csv"
randomtestpoints=30 -t GEOCODE

Maxent model for Perc_squa

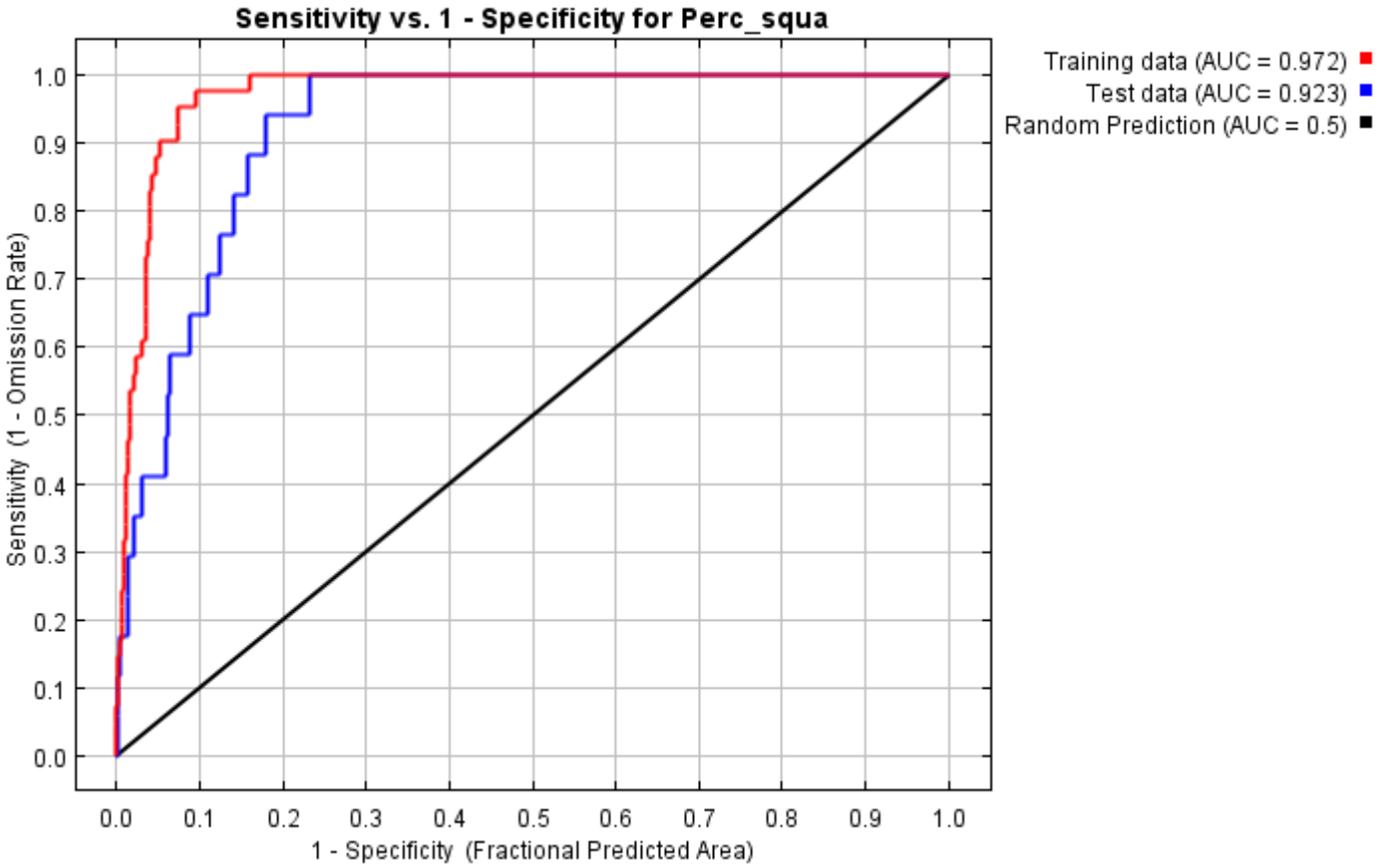
This page contains some analysis of the Maxent model for Perc_squa, created Fri Mar 17 15:31:14 EDT 2017 using Maxent version 3.3.3k. If you would like to do further analyses, the raw data used here is linked to at the end of this page.

Analysis of omission/commission

The following picture shows the omission rate and predicted area as a function of the cumulative threshold. The omission rate is is calculated both on the training presence records, and (if test data are used) on the test records. The omission rate should be close to the predicted omission, because of the definition of the cumulative threshold.



The next picture is the receiver operating characteristic (ROC) curve for the same data. Note that the specificity is defined using predicted area, rather than true commission (see the paper by Phillips, Anderson and Schapire cited on the help page for discussion of what this means). This implies that the maximum achievable AUC is less than 1. If test data is drawn from the Maxent distribution itself, then the maximum possible test AUC would be 0.942 rather than 1; in practice the test AUC may exceed this bound.



Some common thresholds and corresponding omission rates are as follows. If test data are available, binomial probabilities are calculated exactly if the number of test samples is at most 25, otherwise using a normal approximation to the binomial. These are 1-sided p-values for the null hypothesis that test points are predicted no better than by a random prediction with the same fractional predicted area. The "Balance" threshold minimizes 6 * training omission rate + .04 * cumulative threshold + 1.6 * fractional predicted area.

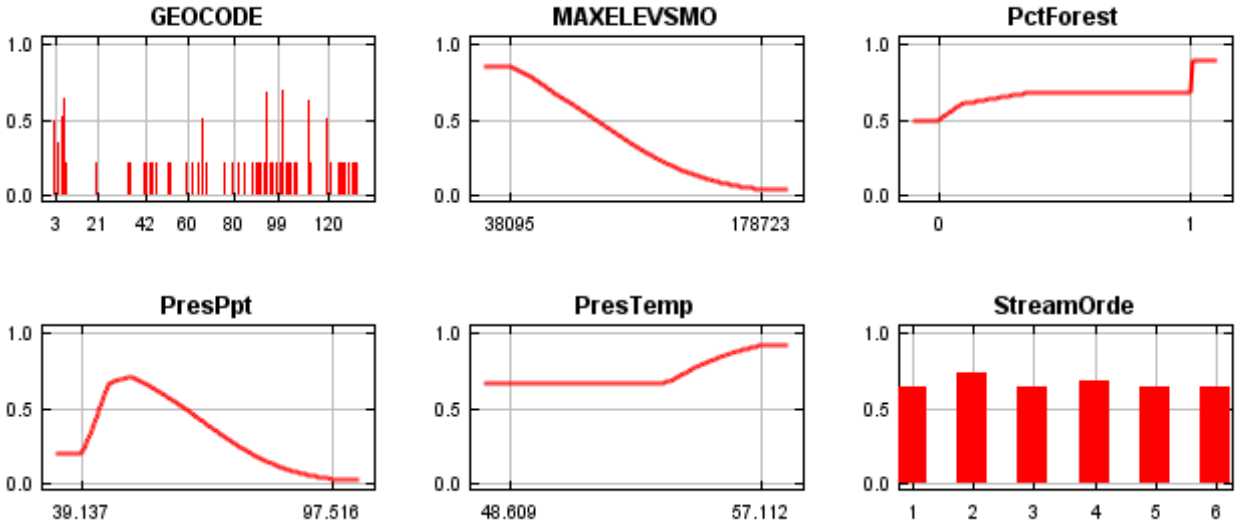
Cumulative threshold	Logistic threshold	Description	Fractional predicted area	Training omission rate	Test omission rate	P-value
1.000	0.010	Fixed cumulative value 1	0.366	0.000	0.000	3.711E-8
5.000	0.074	Fixed cumulative value 5	0.195	0.000	0.059	5.927E-11
10.000	0.153	Fixed cumulative value 10	0.142	0.024	0.176	5.926E-10
7.791	0.125	Minimum training presence	0.161	0.000	0.118	1.188E-10
34.163	0.416	10 percentile training presence	0.052	0.098	0.588	1.196E-5
24.830	0.321	Equal training sensitivity and specificity	0.073	0.073	0.412	5.375E-8
18.058	0.244	Maximum training sensitivity plus specificity	0.096	0.024	0.353	4.674E-8

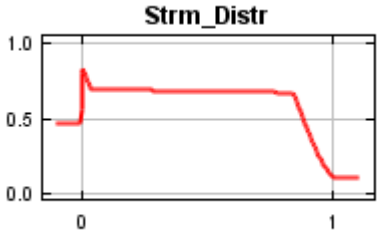
8.222	0.131	Equal test sensitivity and specificity	0.157	0.024	0.176	2.251E-9
3.254	0.046	Maximum test sensitivity plus specificity	0.233	0.000	0.000	1.721E-11
3.590	0.051	Balance training omission, predicted area and threshold value	0.224	0.000	0.059	5.39E-10
10.929	0.162	Equate entropy of thresholded and original distributions	0.135	0.024	0.235	7.017E-9

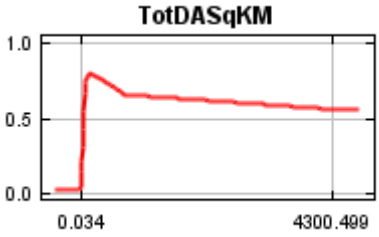
Click here to interactively explore this prediction using the Explain tool. If clicking from your browser does not succeed in starting the tool, try running the script in C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Perc_squa\Perc_squa_explain.bat directly. This tool requires the environmental grids to be small enough that they all fit in memory.

Response curves

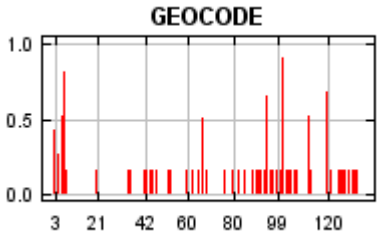
These curves show how each environmental variable affects the Maxent prediction. The curves show how the logistic prediction changes as each environmental variable is varied, keeping all other environmental variables at their average sample value. Click on a response curve to see a larger version. Note that the curves can be hard to interpret if you have strongly correlated variables, as the model may depend on the correlations in ways that are not evident in the curves. In other words, the curves show the marginal effect of changing exactly one variable, whereas the model may take advantage of sets of variables changing together.

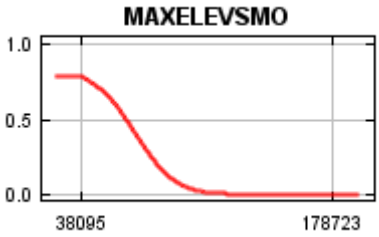


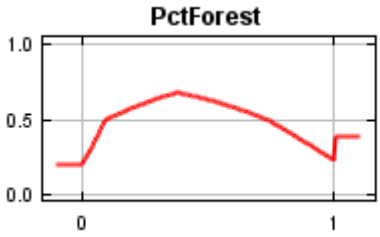


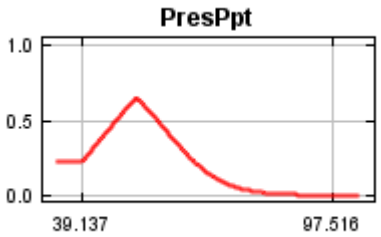


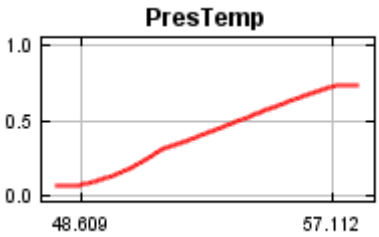
In contrast to the above marginal response curves, each of the following curves represents a different model, namely, a Maxent model created using only the corresponding variable. These plots reflect the dependence of predicted suitability both on the selected variable and on dependencies induced by correlations between the selected variable and other variables. They may be easier to interpret if there are strong correlations between variables.

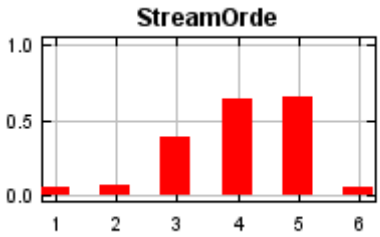


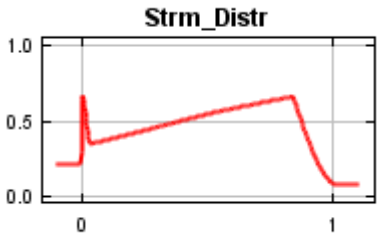


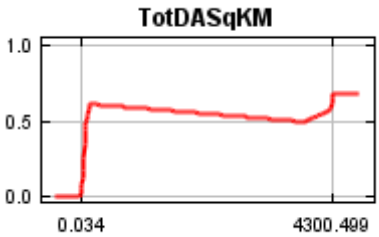










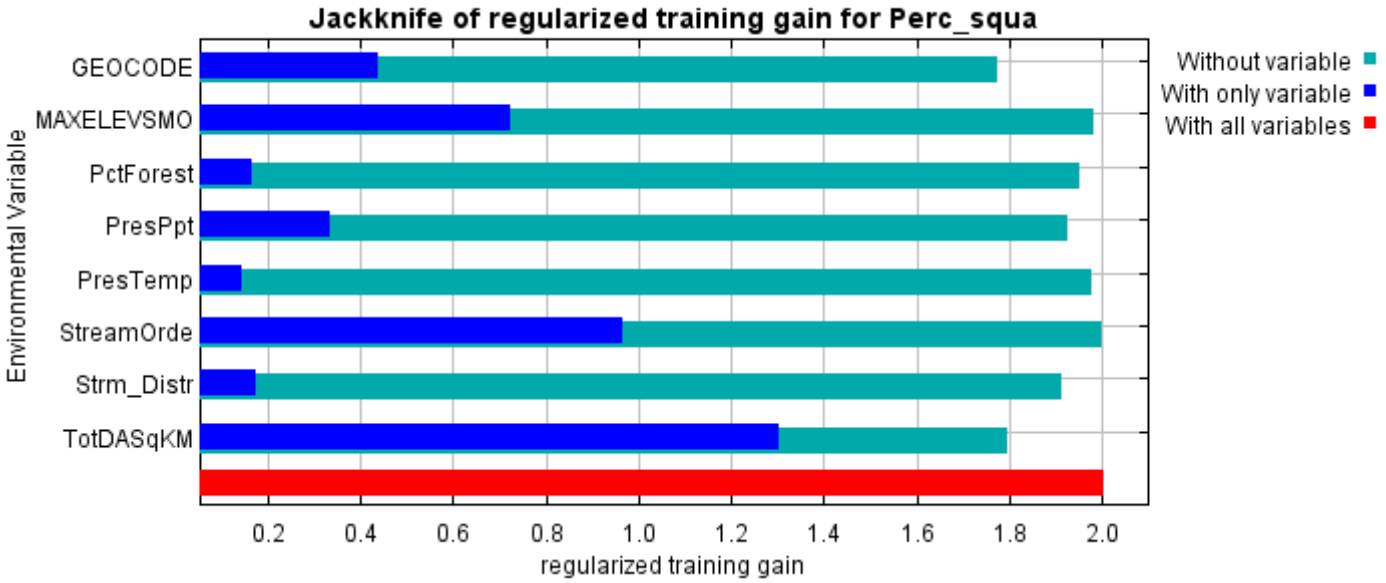


Analysis of variable contributions

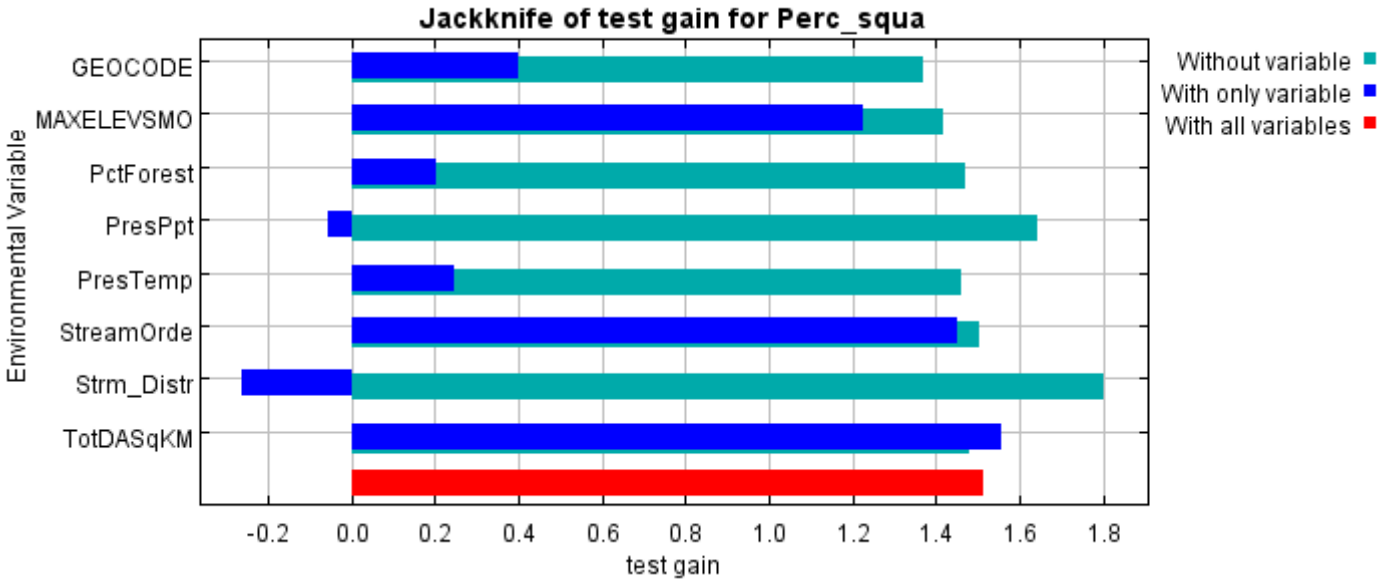
The following table gives estimates of relative contributions of the environmental variables to the Maxent model. To determine the first estimate, in each iteration of the training algorithm, the increase in regularized gain is added to the contribution of the corresponding variable, or subtracted from it if the change to the absolute value of lambda is negative. For the second estimate, for each environmental variable in turn, the values of that variable on training presence and background data are randomly permuted. The model is reevaluated on the permuted data, and the resulting drop in training AUC is shown in the table, normalized to percentages. As with the variable jackknife, variable contributions should be interpreted with caution when the predictor variables are correlated.

Variable	Percent contribution	Permutation importance
TotDASqKM	66.7	62.7
GEOCODE	15.2	12.7
PresPpt	5.6	9.9
Strm_Distr	5.3	5.1
PresTemp	2.8	1.3
PctForest	2.5	2.4
MAXELEVSMO	1.2	5.2
StreamOrde	0.8	0.7

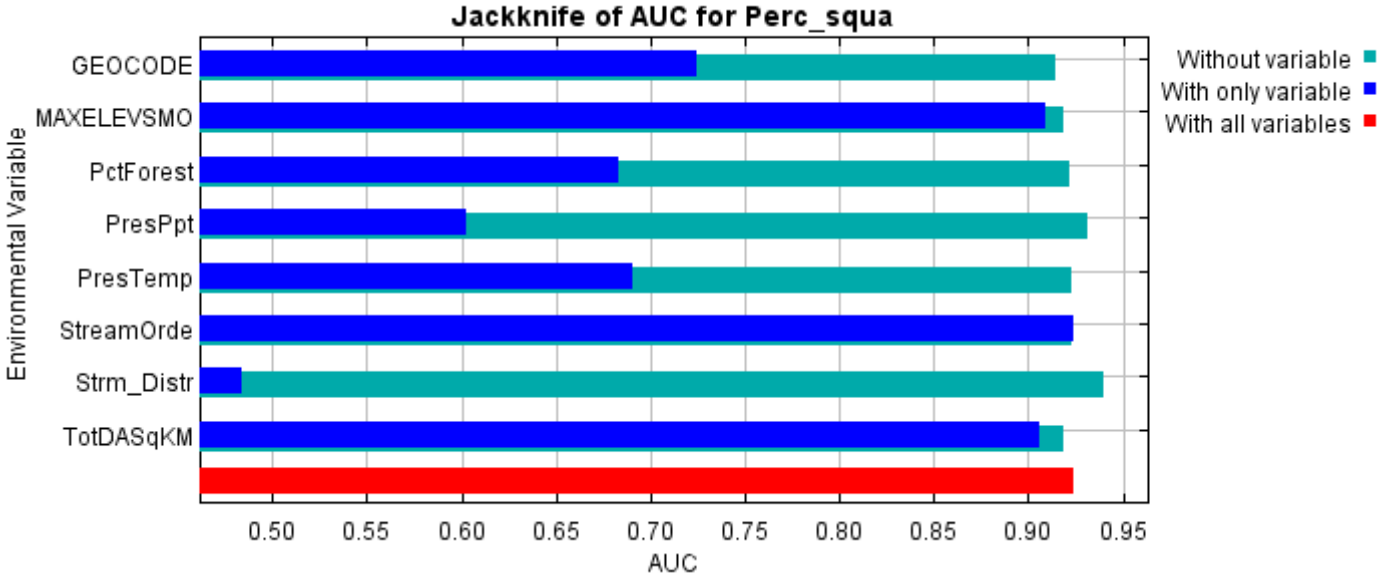
The following picture shows the results of the jackknife test of variable importance. The environmental variable with highest gain when used in isolation is TotDASqKM, which therefore appears to have the most useful information by itself. The environmental variable that decreases the gain the most when it is omitted is GEOCODE, which therefore appears to have the most information that isn't present in the other variables.



The next picture shows the same jackknife test, using test gain instead of training gain. Note that conclusions about which variables are most important can change, now that we're looking at test data.



Lastly, we have the same jackknife test, using AUC on test data.



Raw data outputs and control parameters

The data used in the above analysis is contained in the next links. Please see the Help button for more information on these.
The model applied to the training environmental layers
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv
The coefficients of the model

The omission and predicted area for varying cumulative and raw thresholds
The prediction strength at the training and (optionally) test presence sites
Results for all species modeled in the same Maxent run, with summary statistics and (optionally) jackknife results

Regularized training gain is 2.004, training AUC is 0.972, unregularized training gain is 2.473.
Unregularized test gain is 1.513.
Test AUC is 0.923, standard deviation is 0.017 (calculated as in DeLong, DeLong & Clarke-Pearson 1988, equation 2).
Algorithm terminated after 500 iterations (10 seconds).

The follow settings were used during the run:
41 presence records used for training, 17 for testing.
6317 points used to determine the Maxent distribution (background points and presence points).
Environmental layers used: GEOCODE(categorical) MAXELEVSMO PctForest PresPpt PresTemp StreamOrde(categorical) Strm_Distr TotDASqKM
Regularization values: linear/quadratic/product: 0.219, categorical: 0.250, threshold: 1.590, hinge: 0.500
Feature types used: hinge linear quadratic
responsecurves: true
pictures: false
jackknife: true
outputdirectory: C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Perc_squa
projectionlayers: F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv
samplesfile: C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\PercsquaFinal.csv
environmentallayers: C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\PercsquaFinal.csv
randomtestpoints: 30
Command line used:

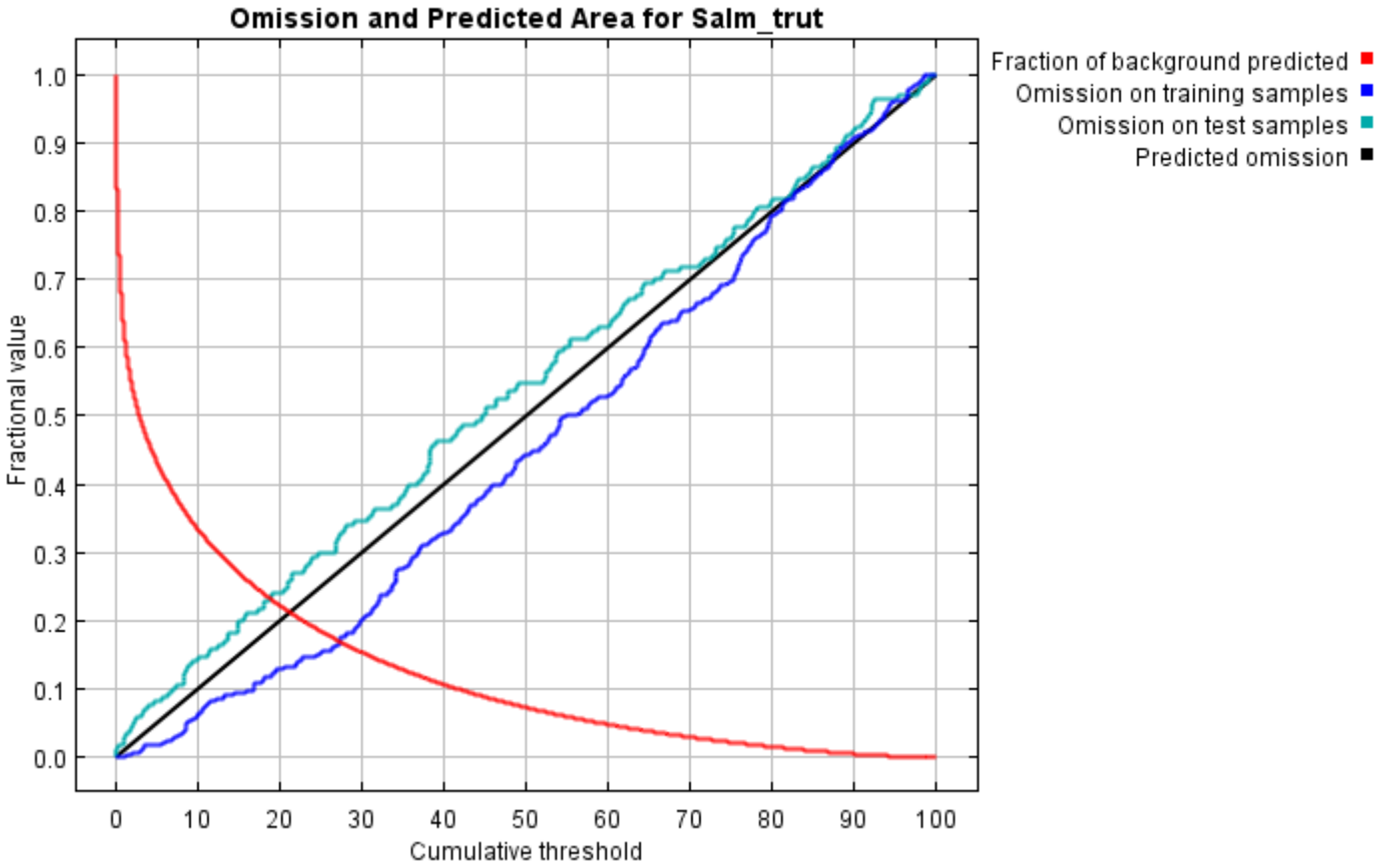
Command line to repeat this species model: java density.MaxEnt nowarnings noprefixes -E "" -E Perc_squa responsecurves nopictures jackknife outputdirectory=C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Perc_squa "projectionlayers=F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv, F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv" "samplesfile=C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\PercsquaFinal.csv" "environmentallayers=C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\PercsquaFinal.csv" randomtestpoints=30 -t GEOCODE -t StreamOrde

Maxent model for Salm_trut

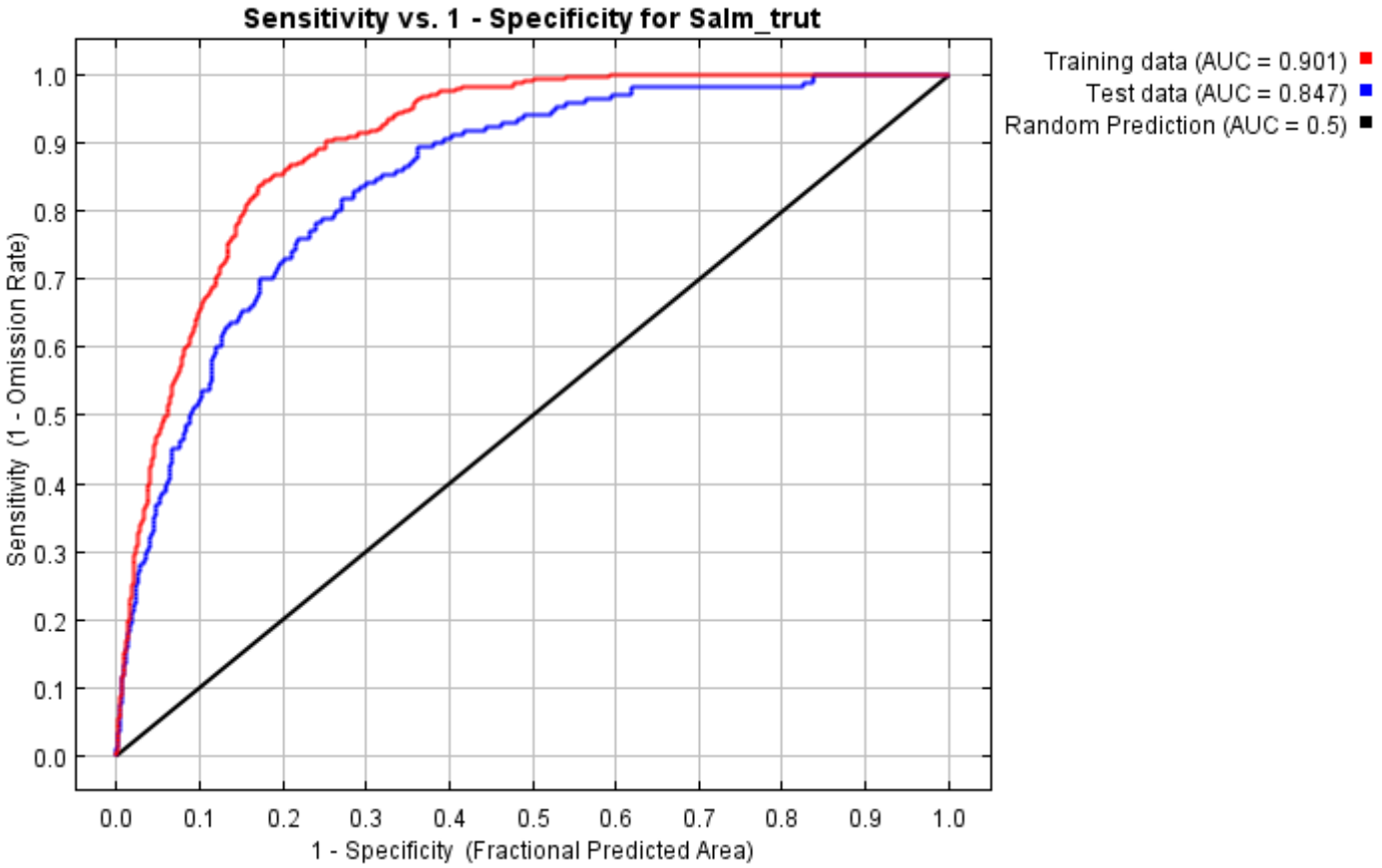
This page contains some analysis of the Maxent model for Salm_trut, created Fri Mar 17 15:39:28 EDT 2017 using Maxent version 3.3.3k. If you would like to do further analyses, the raw data used here is linked to at the end of this page.

Analysis of omission/commission

The following picture shows the omission rate and predicted area as a function of the cumulative threshold. The omission rate is is calculated both on the training presence records, and (if test data are used) on the test records. The omission rate should be close to the predicted omission, because of the definition of the cumulative threshold.



The next picture is the receiver operating characteristic (ROC) curve for the same data. Note that the specificity is defined using predicted area, rather than true commission (see the paper by Phillips, Anderson and Schapire cited on the help page for discussion of what this means). This implies that the maximum achievable AUC is less than 1. If test data is drawn from the Maxent distribution itself, then the maximum possible test AUC would be 0.872 rather than 1; in practice the test AUC may exceed this bound.



Some common thresholds and corresponding omission rates are as follows. If test data are available, binomial probabilities are calculated exactly if the number of test samples is at most 25, otherwise using a normal approximation to the binomial. These are 1-sided p-values for the null hypothesis that test points are predicted no better than by a random prediction with the same fractional predicted area. The "Balance" threshold minimizes 6 * training omission rate + .04 * cumulative threshold + 1.6 * fractional predicted area.

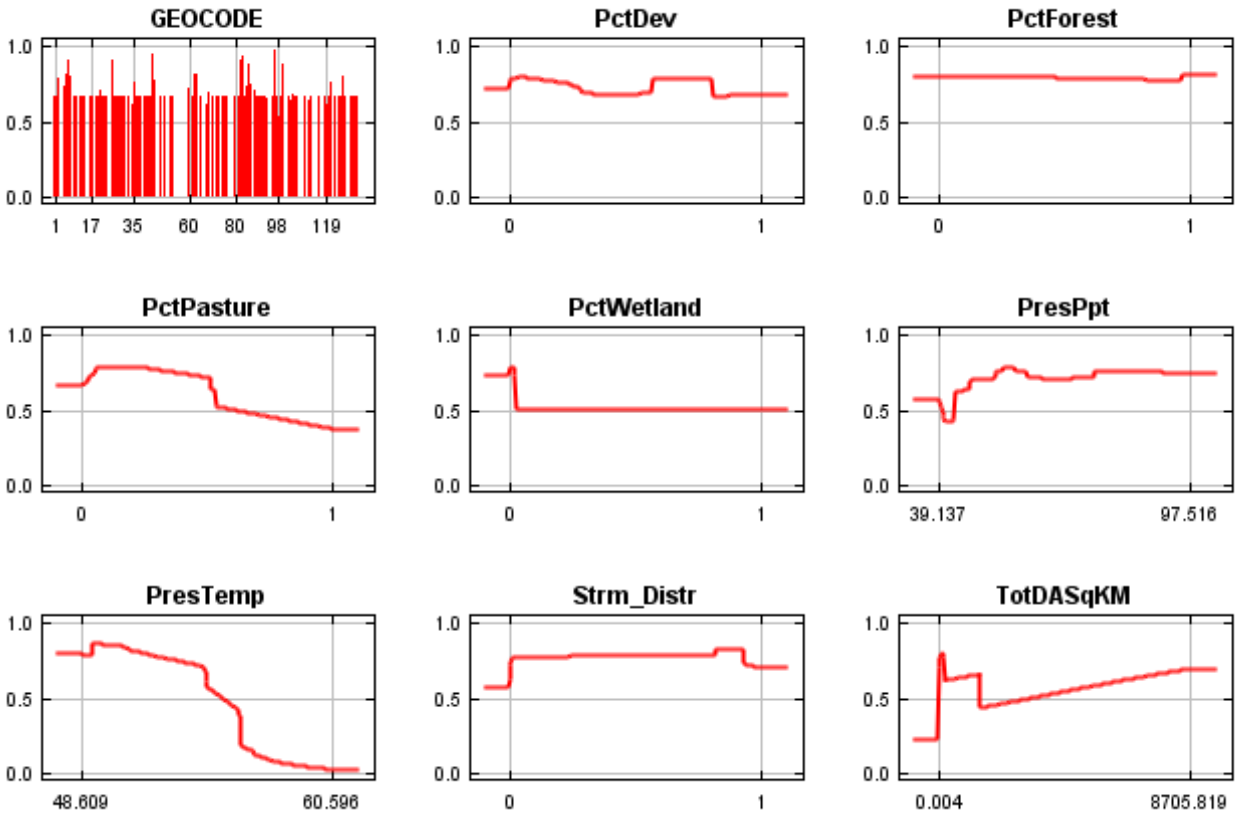
Cumulative threshold	Logistic threshold	Description	Fractional predicted area	Training omission rate	Test omission rate	P-value
1.000	0.027	Fixed cumulative value 1	0.621	0.003	0.018	1.457E-22
5.000	0.113	Fixed cumulative value 5	0.432	0.020	0.082	1.191E-37
10.000	0.176	Fixed cumulative value 10	0.334	0.060	0.147	6.299E-47
0.256	0.009	Minimum training presence	0.770	0.000	0.018	2.277E-11
16.783	0.250	10 percentile training presence	0.252	0.098	0.212	9.87E-59
27.242	0.345	Equal training sensitivity and specificity	0.170	0.169	0.324	0E0
26.281	0.337	Maximum training sensitivity plus specificity	0.176	0.156	0.300	0E0

18.799	0.270	Equal test sensitivity and specificity	0.233	0.118	0.235	9.477E-61
14.903	0.231	Maximum test sensitivity plus specificity	0.271	0.096	0.182	4.362E-58
2.861	0.075	Balance training omission, predicted area and threshold value	0.500	0.008	0.059	6.313E-31
10.438	0.182	Equate entropy of thresholded and original distributions	0.328	0.065	0.147	1.593E-48

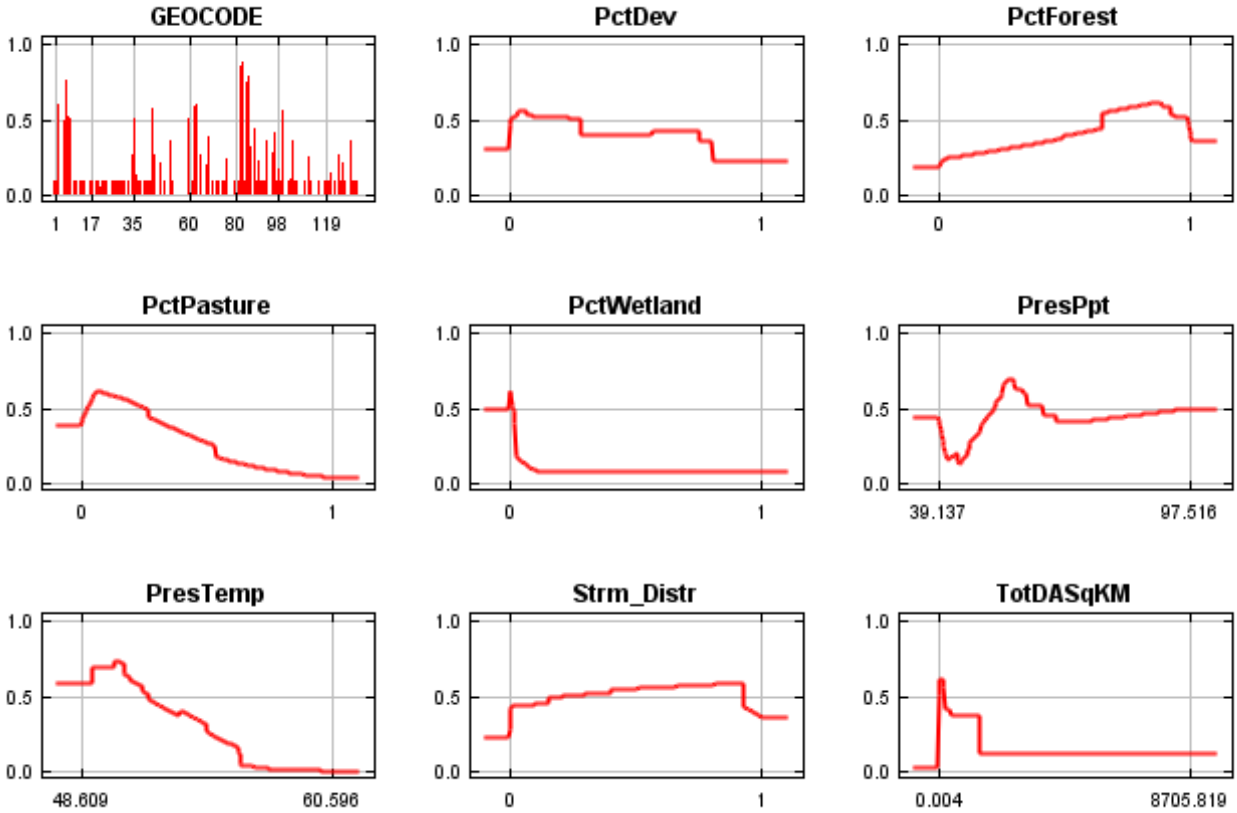
(A link to the Explain tool was not made for this model. The model uses product features, while the Explain tool can only be used for additive models.)

Response curves

These curves show how each environmental variable affects the Maxent prediction. The curves show how the logistic prediction changes as each environmental variable is varied, keeping all other environmental variables at their average sample value. Click on a response curve to see a larger version. Note that the curves can be hard to interpret if you have strongly correlated variables, as the model may depend on the correlations in ways that are not evident in the curves. In other words, the curves show the marginal effect of changing exactly one variable, whereas the model may take advantage of sets of variables changing together.



In contrast to the above marginal response curves, each of the following curves represents a different model, namely, a Maxent model created using only the corresponding variable. These plots reflect the dependence of predicted suitability both on the selected variable and on dependencies induced by correlations between the selected variable and other variables. They may be easier to interpret if there are strong correlations between variables.



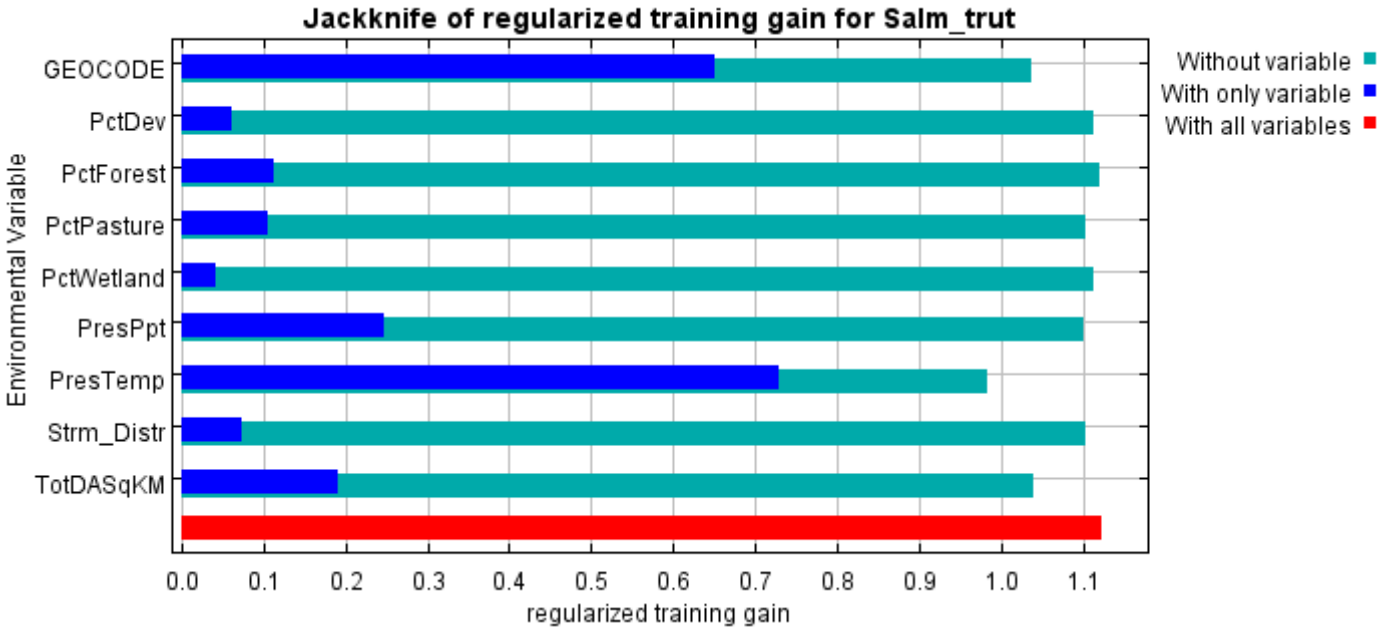
Analysis of variable contributions

The following table gives estimates of relative contributions of the environmental variables to the Maxent model. To determine the first estimate, in each iteration of the training algorithm, the increase in regularized gain is added to the contribution of the corresponding variable, or subtracted from it if the change to the absolute value of lambda is negative. For the second estimate, for each environmental variable in turn, the values of that variable on training presence and background data are randomly permuted. The model is reevaluated on the permuted data, and the resulting drop in training AUC is shown in the table, normalized to percentages. As with the variable jackknife, variable contributions should be interpreted with caution when the predictor variables are correlated.

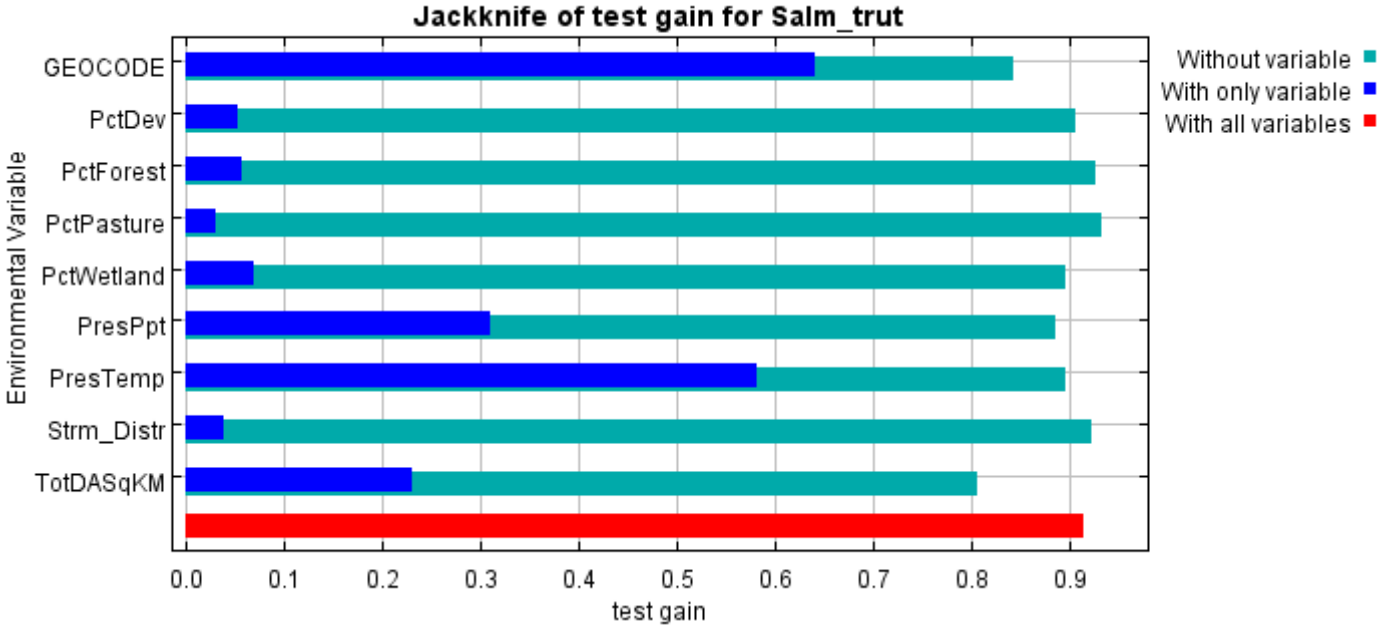
Variable	Percent contribution	Permutation importance
PresTemp	65.2	64.6
TotDASqKM	9.7	14.2
GEOCODE	8.9	6.3
Strm_Distr	7.1	4
PctPasture	4.7	3.5

PresPpt	2.2	3.2
PctWetland	1.3	1.9
PctDev	0.7	1.4
PctForest	0.2	0.8

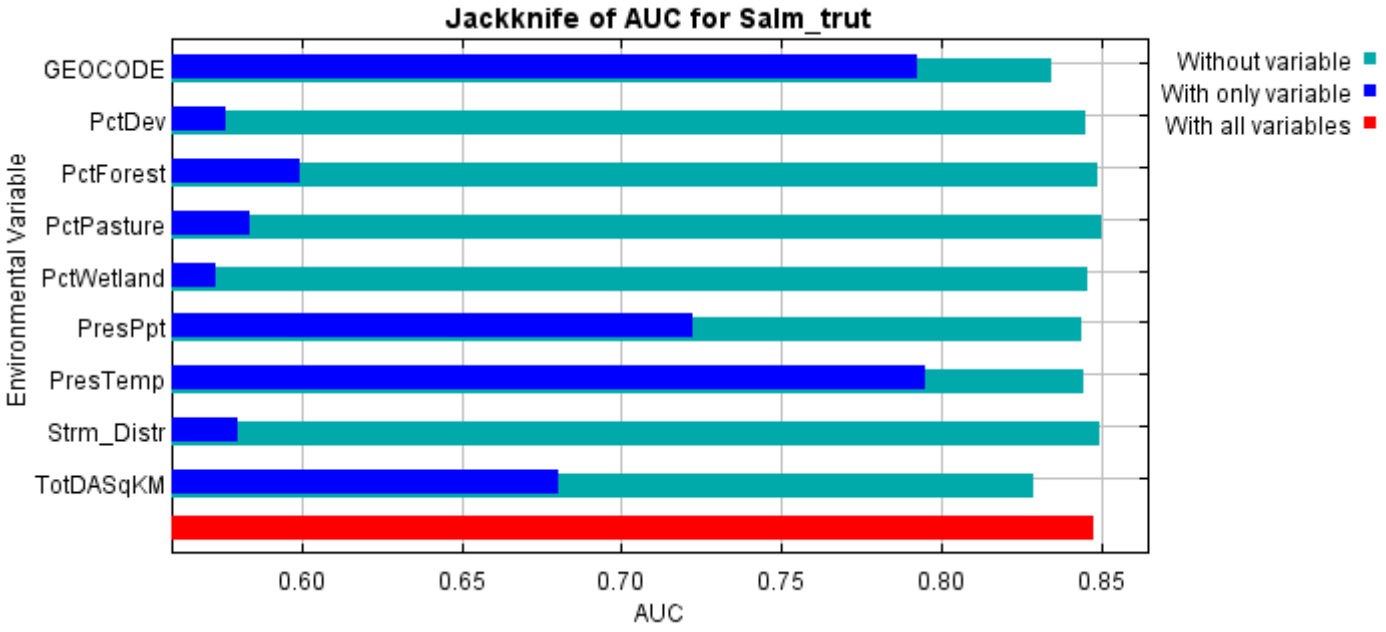
The following picture shows the results of the jackknife test of variable importance. The environmental variable with highest gain when used in isolation is PresTemp, which therefore appears to have the most useful information by itself. The environmental variable that decreases the gain the most when it is omitted is PresTemp, which therefore appears to have the most information that isn't present in the other variables.



The next picture shows the same jackknife test, using test gain instead of training gain. Note that conclusions about which variables are most important can change, now that we're looking at test data.



Lastly, we have the same jackknife test, using AUC on test data.



Raw data outputs and control parameters

The data used in the above analysis is contained in the next links. Please see the Help button for more information on these.
The model applied to the training environmental layers
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv
The coefficients of the model
The omission and predicted area for varying cumulative and raw thresholds
The prediction strength at the training and (optionally) test presence sites
Results for all species modeled in the same Maxent run, with summary statistics and (optionally) jackknife results

Regularized training gain is 1.124, training AUC is 0.901, unregularized training gain is 1.314.
Unregularized test gain is 0.915.
Test AUC is 0.847, standard deviation is 0.013 (calculated as in DeLong, DeLong & Clarke-Pearson 1988, equation 2).
Algorithm terminated after 500 iterations (45 seconds).

The follow settings were used during the run:
397 presence records used for training, 170 for testing.
18839 points used to determine the Maxent distribution (background points and presence points).
Environmental layers used: GEOCODE(categorical) PctDev PctForest PctPasture PctWetland PresPpt PresTemp Strm_Distr TotDASqKM

Regularization values: linear/quadratic/product: 0.050, categorical: 0.250, threshold: 1.000, hinge: 0.500
Feature types used: hinge product linear threshold quadratic
responsecurves: true
pictures: false
jackknife: true
outputdirectory: C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Salm_trut
projectionlayers: F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv
samplesfile: C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\SalmTrutFinal.csv
environmentallayers: C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\SalmTrutFinal.csv
randomtestpoints: 30
Command line used:

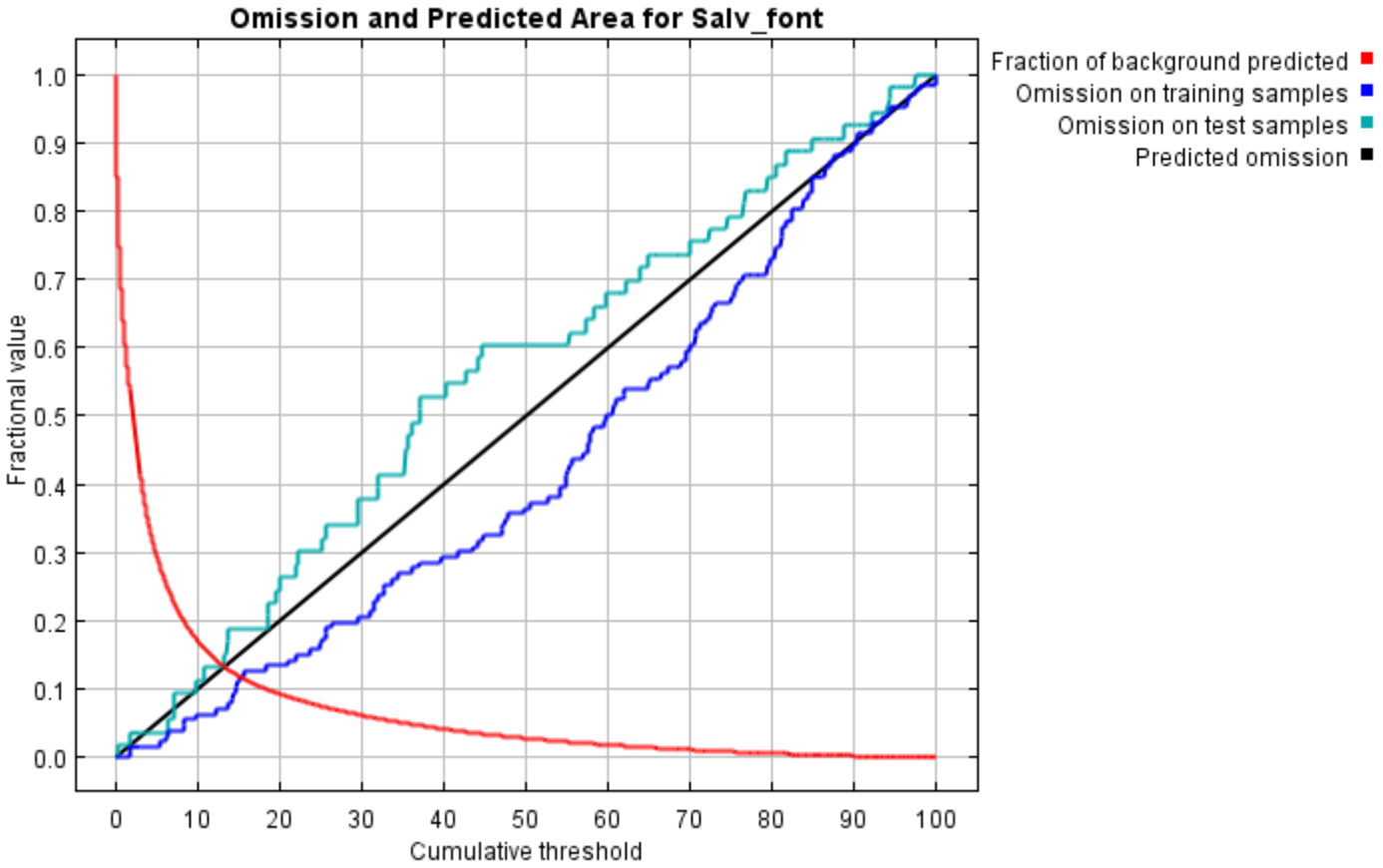
Command line to repeat this species model: java density.MaxEnt nowarnings noprefixes -E "" -E Salm_trut
responsecurves nopictures jackknife
outputdirectory=C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Salm_trut
"projectionlayers=F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv"
"samplesfile=C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\SalmTrutFinal.csv"
"environmentallayers=C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\SalmTrutFinal.csv"
randomtestpoints=30 -t GEOCODE

Maxent model for Salv_font

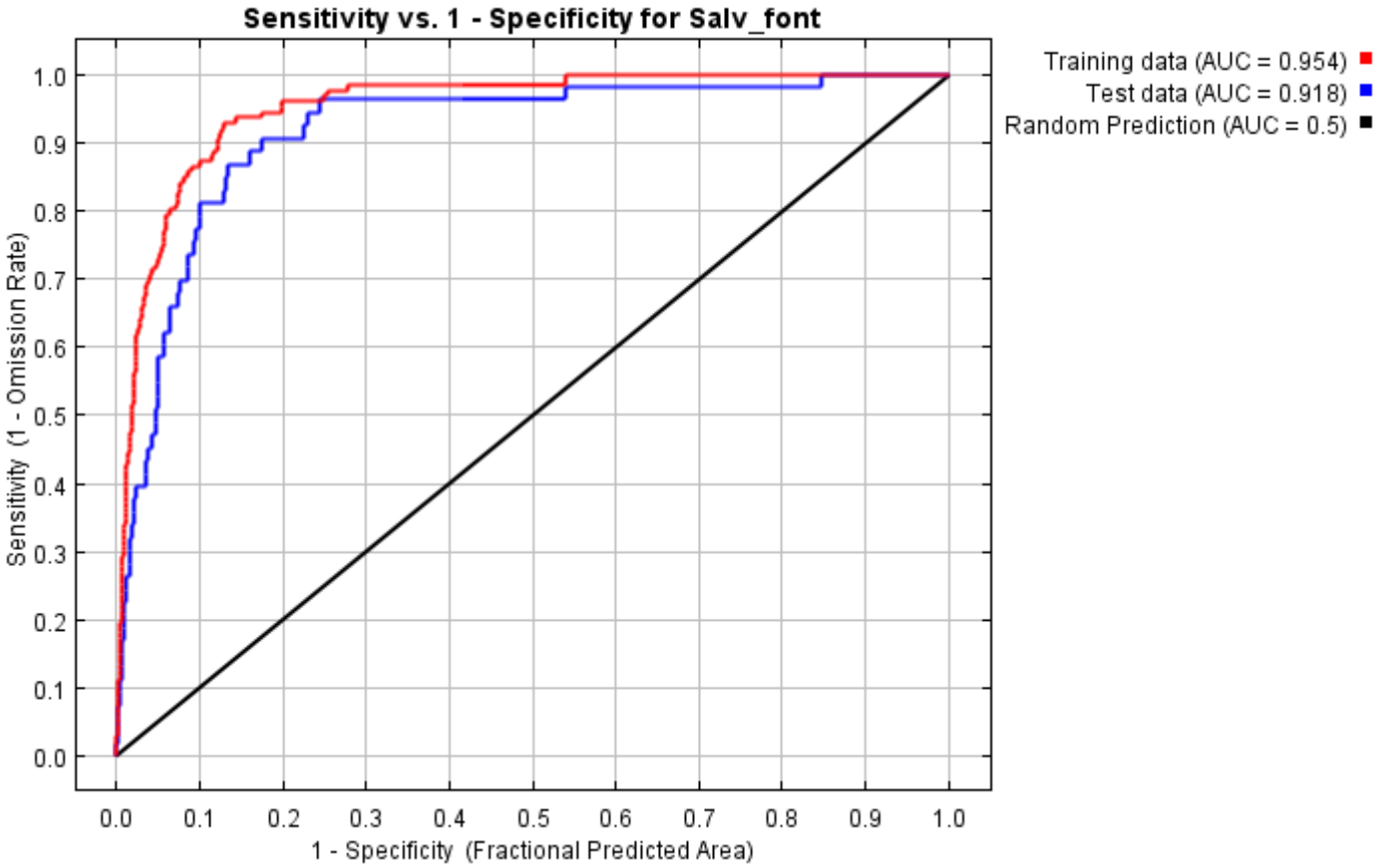
This page contains some analysis of the Maxent model for Salv_font, created Fri Mar 17 15:49:06 EDT 2017 using Maxent version 3.3.3k. If you would like to do further analyses, the raw data used here is linked to at the end of this page.

Analysis of omission/commission

The following picture shows the omission rate and predicted area as a function of the cumulative threshold. The omission rate is is calculated both on the training presence records, and (if test data are used) on the test records. The omission rate should be close to the predicted omission, because of the definition of the cumulative threshold.



The next picture is the receiver operating characteristic (ROC) curve for the same data. Note that the specificity is defined using predicted area, rather than true commission (see the paper by Phillips, Anderson and Schapire cited on the help page for discussion of what this means). This implies that the maximum achievable AUC is less than 1. If test data is drawn from the Maxent distribution itself, then the maximum possible test AUC would be 0.929 rather than 1; in practice the test AUC may exceed this bound.



Some common thresholds and corresponding omission rates are as follows. If test data are available, binomial probabilities are calculated exactly if the number of test samples is at most 25, otherwise using a normal approximation to the binomial. These are 1-sided p-values for the null hypothesis that test points are predicted no better than by a random prediction with the same fractional predicted area. The "Balance" threshold minimizes 6 * training omission rate + .04 * cumulative threshold + 1.6 * fractional predicted area.

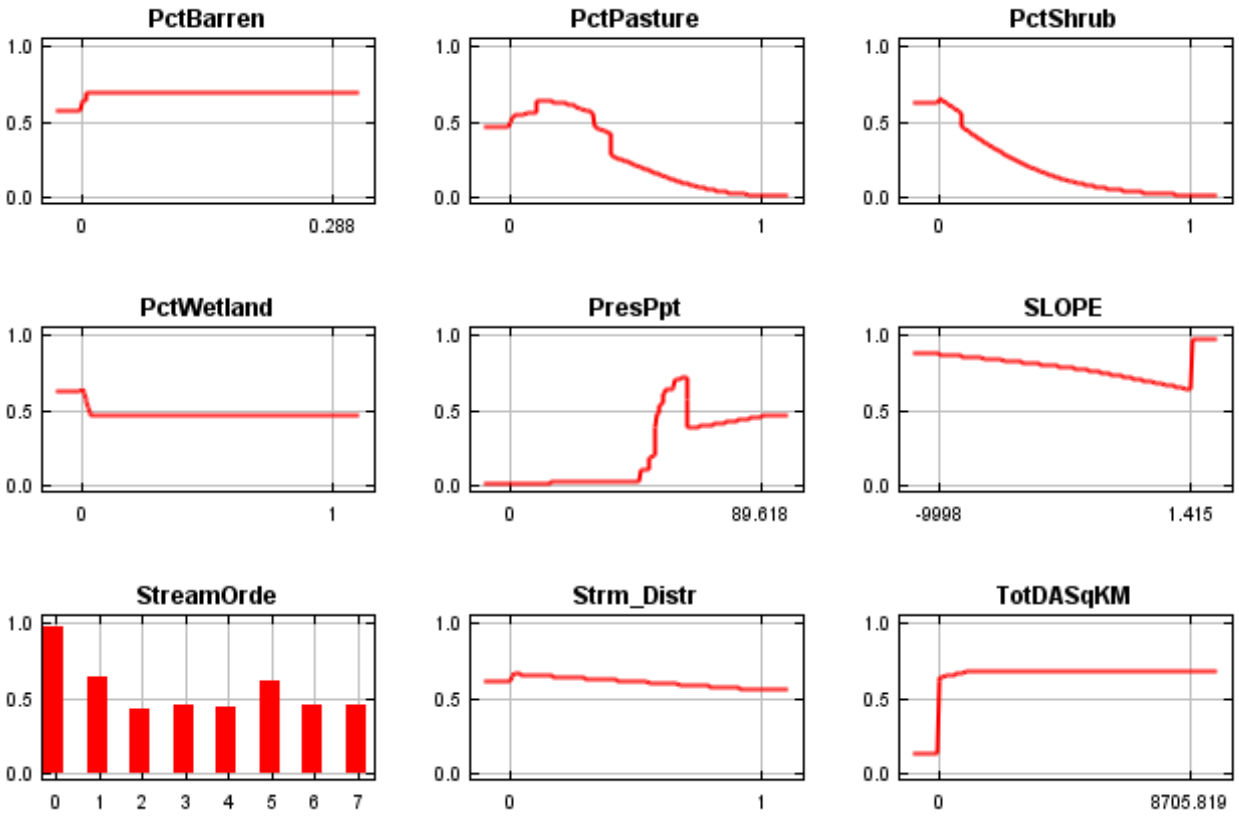
Cumulative threshold	Logistic threshold	Description	Fractional predicted area	Training omission rate	Test omission rate	P-value
1.000	0.011	Fixed cumulative value 1	0.617	0.000	0.019	2.393E-8
5.000	0.037	Fixed cumulative value 5	0.293	0.016	0.038	5.16E-27
10.000	0.098	Fixed cumulative value 10	0.171	0.063	0.113	5.178E-44
1.663	0.016	Minimum training presence	0.539	0.000	0.019	5.274E-11
14.685	0.182	10 percentile training presence	0.121	0.095	0.189	1.189E-53
15.191	0.190	Equal training sensitivity and specificity	0.118	0.119	0.189	1.671E-55
13.709	0.157	Maximum training sensitivity plus specificity	0.129	0.071	0.189	5.249E-50

13.080	0.145	Equal test sensitivity and specificity	0.135	0.071	0.132	1.792E-55
13.080	0.145	Maximum test sensitivity plus specificity	0.135	0.071	0.132	1.792E-55
5.401	0.041	Balance training omission, predicted area and threshold value	0.278	0.016	0.038	4.742E-29
10.989	0.111	Equate entropy of thresholded and original distributions	0.157	0.063	0.132	3.687E-46

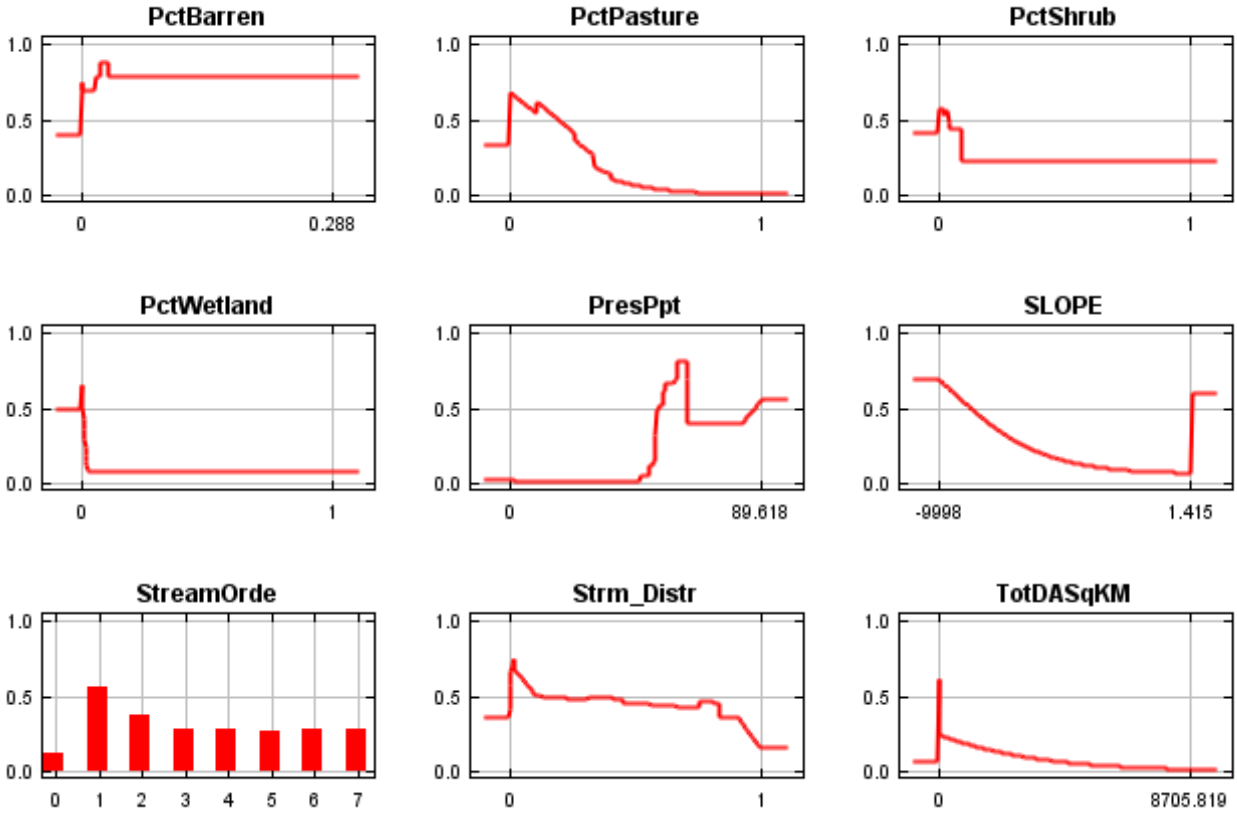
(A link to the Explain tool was not made for this model. The model uses product features, while the Explain tool can only be used for additive models.)

Response curves

These curves show how each environmental variable affects the Maxent prediction. The curves show how the logistic prediction changes as each environmental variable is varied, keeping all other environmental variables at their average sample value. Click on a response curve to see a larger version. Note that the curves can be hard to interpret if you have strongly correlated variables, as the model may depend on the correlations in ways that are not evident in the curves. In other words, the curves show the marginal effect of changing exactly one variable, whereas the model may take advantage of sets of variables changing together.



In contrast to the above marginal response curves, each of the following curves represents a different model, namely, a Maxent model created using only the corresponding variable. These plots reflect the dependence of predicted suitability both on the selected variable and on dependencies induced by correlations between the selected variable and other variables. They may be easier to interpret if there are strong correlations between variables.



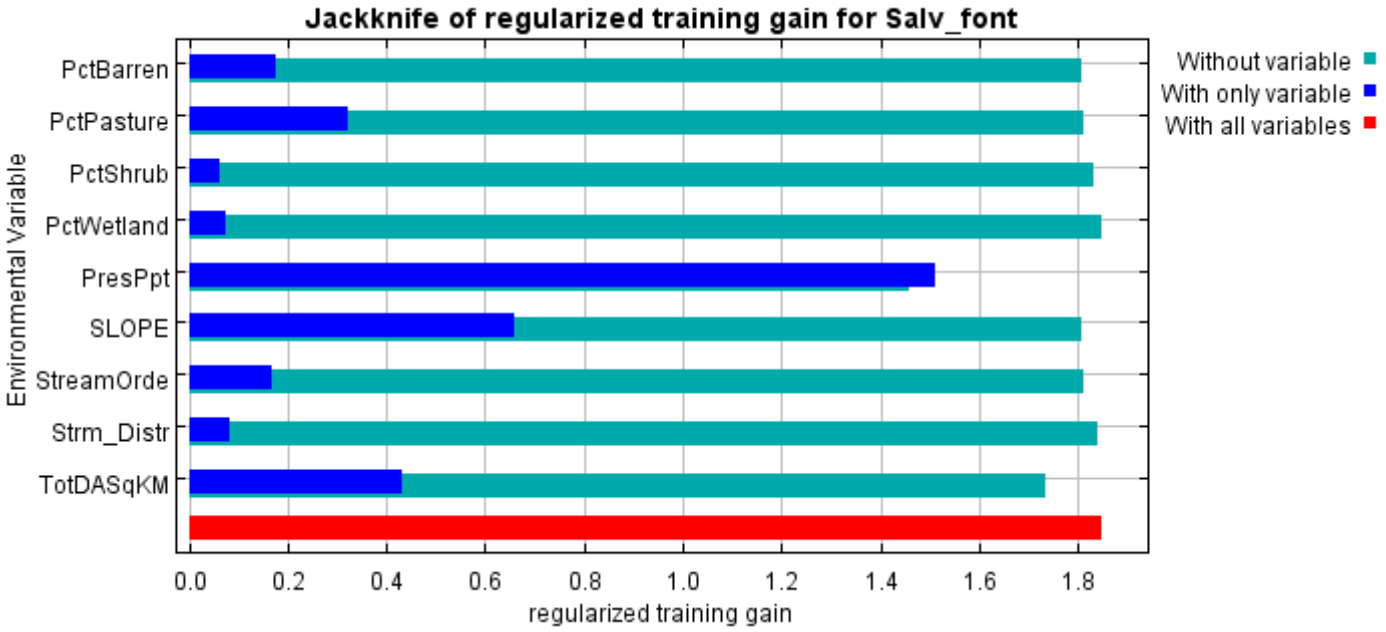
Analysis of variable contributions

The following table gives estimates of relative contributions of the environmental variables to the Maxent model. To determine the first estimate, in each iteration of the training algorithm, the increase in regularized gain is added to the contribution of the corresponding variable, or subtracted from it if the change to the absolute value of lambda is negative. For the second estimate, for each environmental variable in turn, the values of that variable on training presence and background data are randomly permuted. The model is reevaluated on the permuted data, and the resulting drop in training AUC is shown in the table, normalized to percentages. As with the variable jackknife, variable contributions should be interpreted with caution when the predictor variables are correlated.

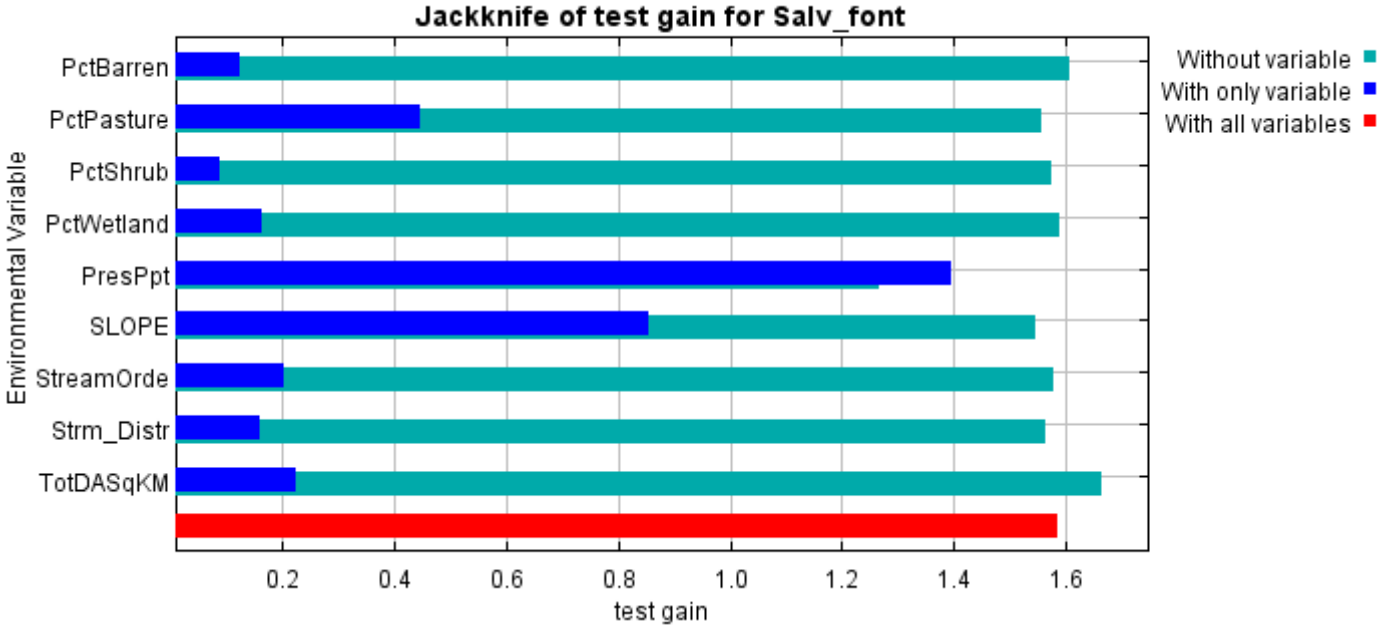
Variable	Percent contribution	Permutation importance
PresPpt	77.4	59.9
SLOPE	5.8	3.4
TotDASqKM	5.4	15.8
StreamOrde	3.7	10.1
PctBarren	3.4	0.7

PctPasture	3.3	8.9
PctShrub	0.6	1.1
Strm_Distr	0.2	0
PctWetland	0.1	0

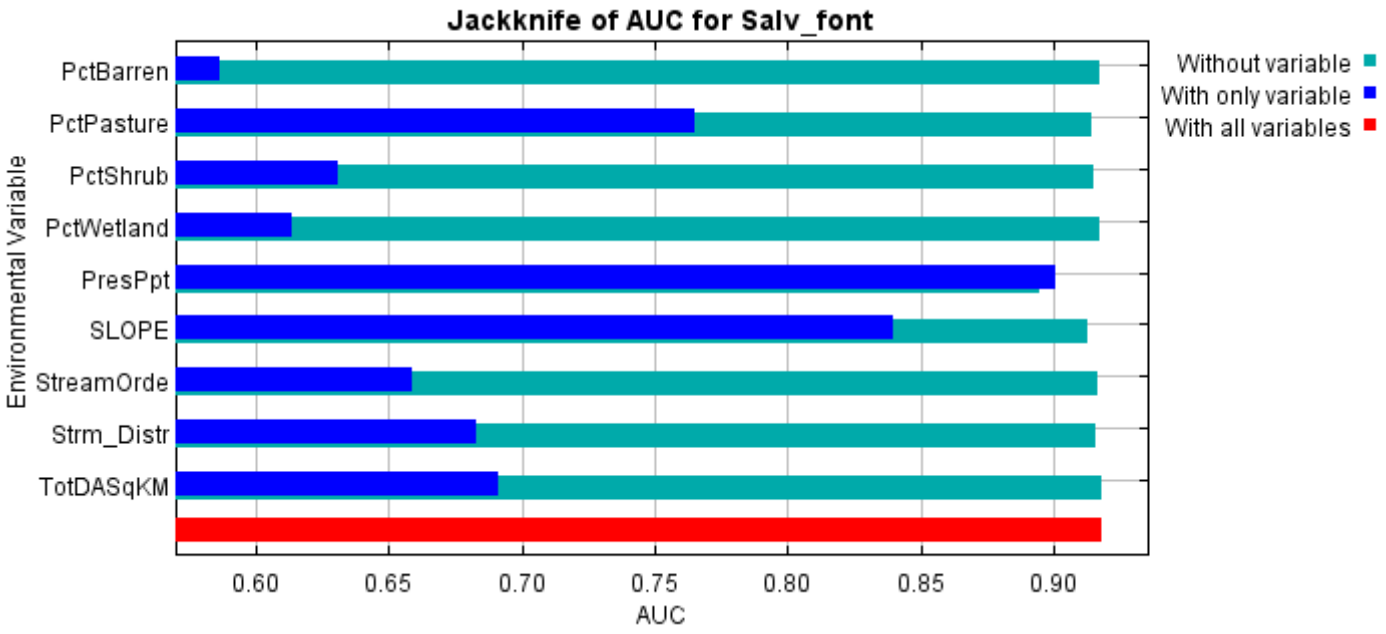
The following picture shows the results of the jackknife test of variable importance. The environmental variable with highest gain when used in isolation is PresPpt, which therefore appears to have the most useful information by itself. The environmental variable that decreases the gain the most when it is omitted is PresPpt, which therefore appears to have the most information that isn't present in the other variables.



The next picture shows the same jackknife test, using test gain instead of training gain. Note that conclusions about which variables are most important can change, now that we're looking at test data.



Lastly, we have the same jackknife test, using AUC on test data.



Raw data outputs and control parameters

The data used in the above analysis is contained in the next links. Please see the Help button for more information on these.
The model applied to the training environmental layers
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv
The coefficients of the model
The omission and predicted area for varying cumulative and raw thresholds
The prediction strength at the training and (optionally) test presence sites
Results for all species modeled in the same Maxent run, with summary statistics and (optionally) jackknife results

Regularized training gain is 1.849, training AUC is 0.954, unregularized training gain is 2.199.
Unregularized test gain is 1.583.
Test AUC is 0.918, standard deviation is 0.019 (calculated as in DeLong, DeLong & Clarke-Pearson 1988, equation 2).
Algorithm terminated after 500 iterations (18 seconds).

The follow settings were used during the run:
126 presence records used for training, 53 for testing.
9453 points used to determine the Maxent distribution (background points and presence points).
Environmental layers used: PctBarren PctPasture PctShrub PctWetland PresPpt SLOPE StreamOrde(categorical) Strm_Distr TotDASqKM

Regularization values: linear/quadratic/product: 0.050, categorical: 0.250, threshold: 1.000, hinge: 0.500
Feature types used: hinge product linear threshold quadratic
responsecurves: true
pictures: false
jackknife: true
outputdirectory: C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Salv_font
projectionlayers: F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv
samplesfile: C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\SalvFontFinal.csv
environmentallayers: C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\SalvFontFinal.csv
randomtestpoints: 30
Command line used:

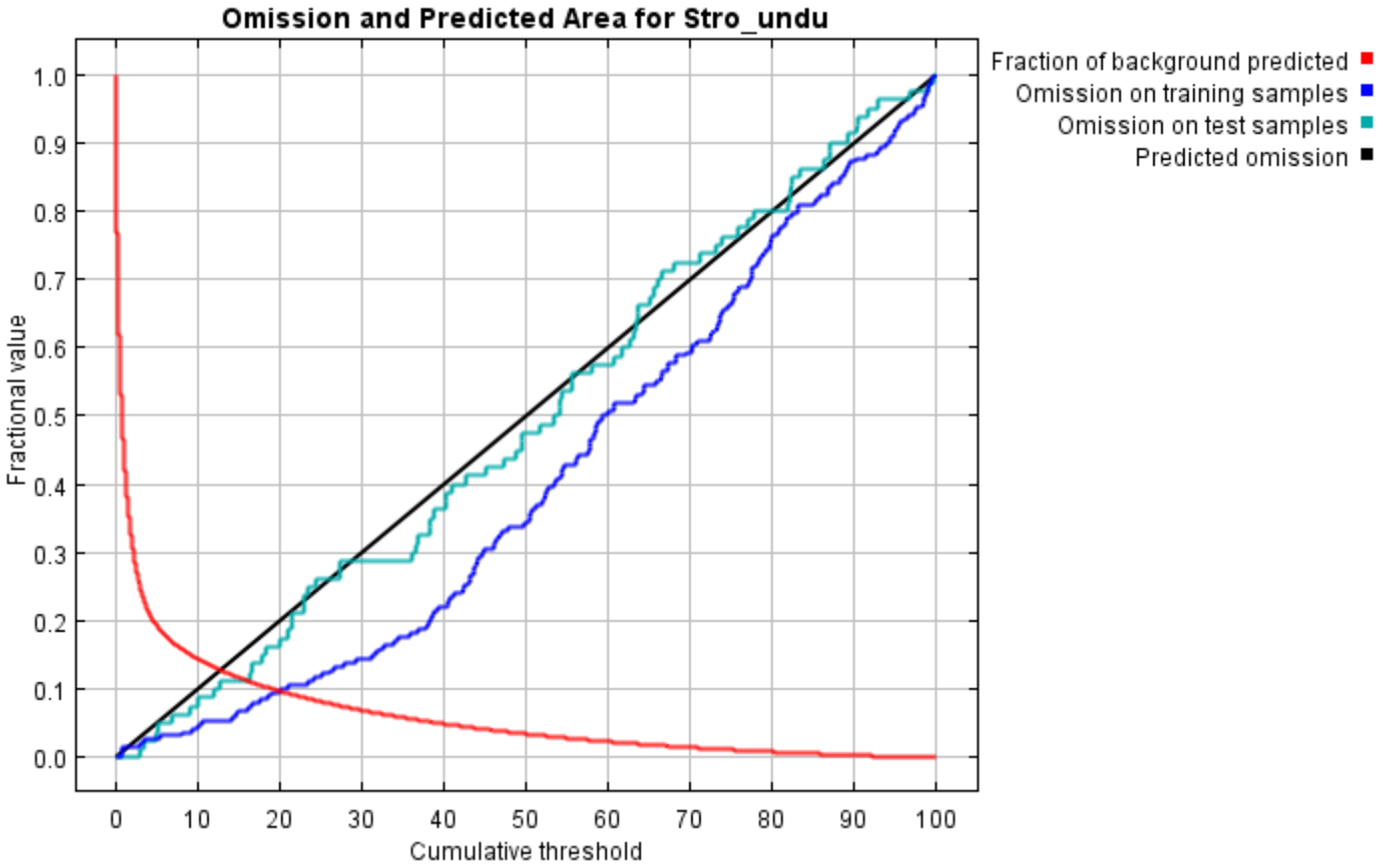
Command line to repeat this species model: java density.MaxEnt nowarnings noprefixes -E "" -E Salv_font
responsecurves nopictures jackknife
outputdirectory=C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Salv_font
"projectionlayers=F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv"
"samplesfile=C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\SalvFontFinal.csv"
"environmentallayers=C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\SalvFontFinal.csv"
randomtestpoints=30 -t StreamOrde

Maxent model for Stro_undu

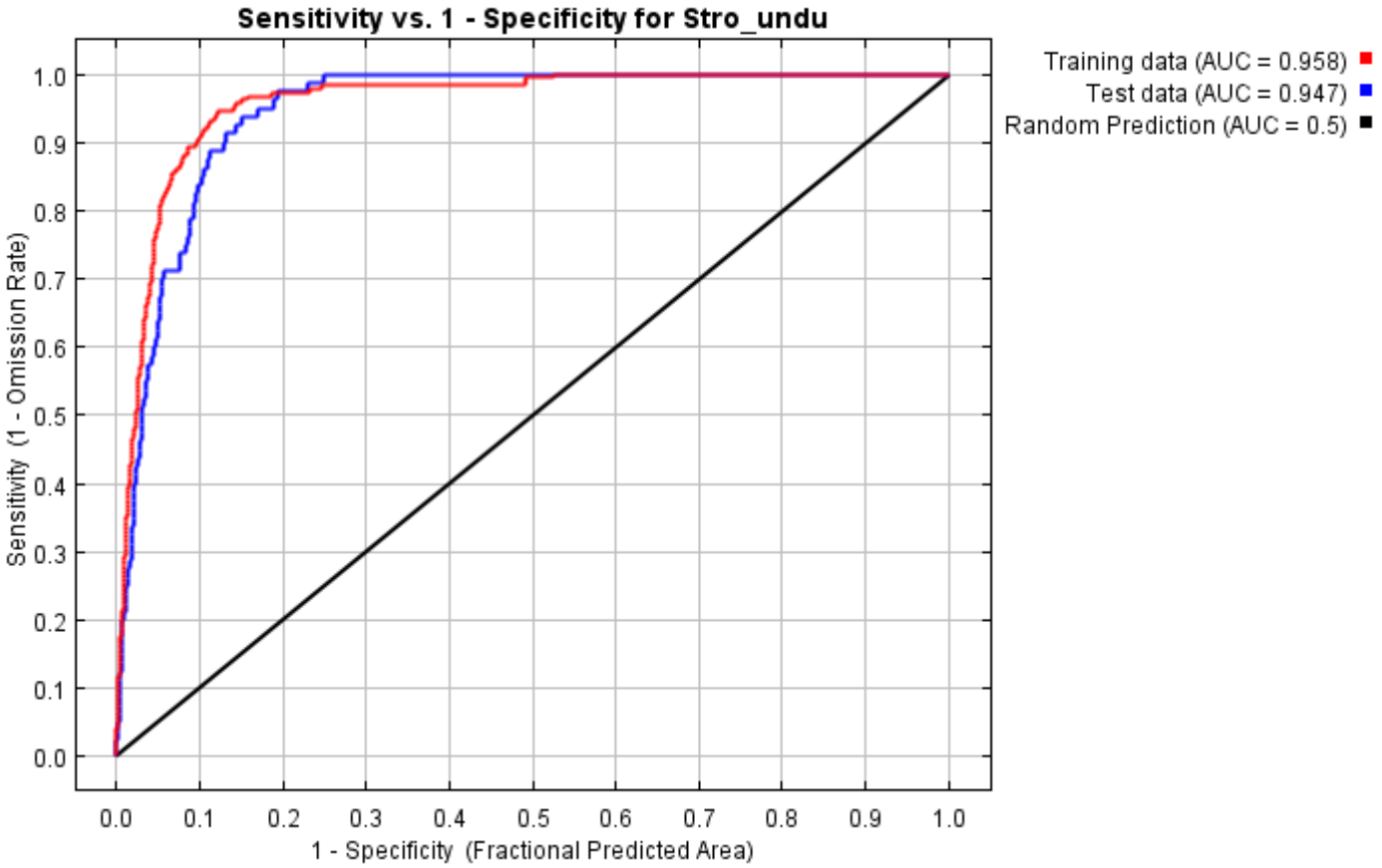
This page contains some analysis of the Maxent model for Stro_undu, created Fri Mar 17 15:58:03 EDT 2017 using Maxent version 3.3.3k. If you would like to do further analyses, the raw data used here is linked to at the end of this page.

Analysis of omission/commission

The following picture shows the omission rate and predicted area as a function of the cumulative threshold. The omission rate is is calculated both on the training presence records, and (if test data are used) on the test records. The omission rate should be close to the predicted omission, because of the definition of the cumulative threshold.



The next picture is the receiver operating characteristic (ROC) curve for the same data. Note that the specificity is defined using predicted area, rather than true commission (see the paper by Phillips, Anderson and Schapire cited on the help page for discussion of what this means). This implies that the maximum achievable AUC is less than 1. If test data is drawn from the Maxent distribution itself, then the maximum possible test AUC would be 0.938 rather than 1; in practice the test AUC may exceed this bound.



Some common thresholds and corresponding omission rates are as follows. If test data are available, binomial probabilities are calculated exactly if the number of test samples is at most 25, otherwise using a normal approximation to the binomial. These are 1-sided p-values for the null hypothesis that test points are predicted no better than by a random prediction with the same fractional predicted area. The "Balance" threshold minimizes 6 * training omission rate + .04 * cumulative threshold + 1.6 * fractional predicted area.

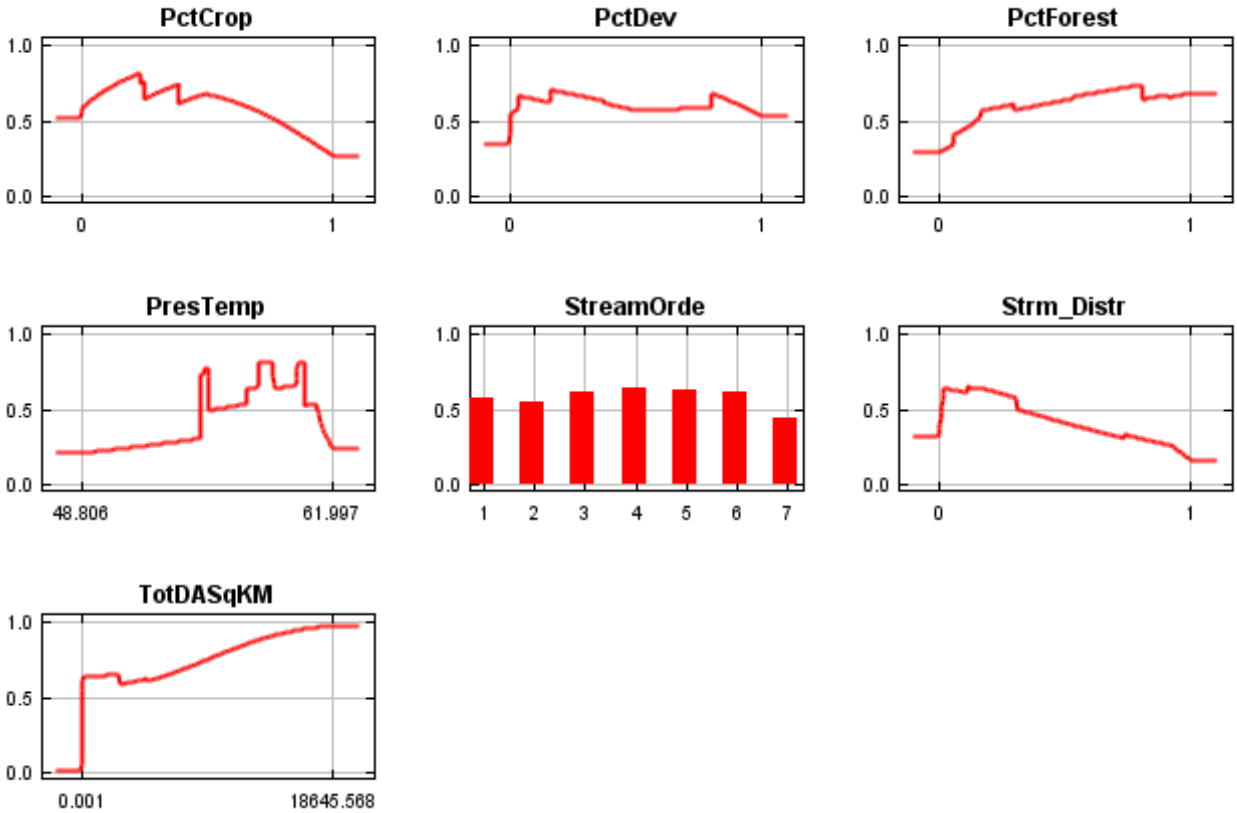
Cumulative threshold	Logistic threshold	Description	Fractional predicted area	Training omission rate	Test omission rate	P-value
1.000	0.008	Fixed cumulative value 1	0.437	0.016	0.000	1.734E-24
5.000	0.090	Fixed cumulative value 5	0.193	0.027	0.037	0E0
10.000	0.193	Fixed cumulative value 10	0.144	0.043	0.075	0E0
0.628	0.005	Minimum training presence	0.524	0.000	0.000	7.683E-18
20.018	0.318	10 percentile training presence	0.097	0.096	0.175	0E0
20.018	0.318	Equal training sensitivity and specificity	0.097	0.096	0.175	0E0
14.254	0.251	Maximum training sensitivity plus specificity	0.121	0.053	0.113	0E0
16.055	0.273	Equal test sensitivity and specificity	0.112	0.075	0.113	0E0

8.999	0.177	Maximum test sensitivity plus specificity	0.151	0.037	0.062	0E0
3.038	0.034	Balance training omission, predicted area and threshold value	0.246	0.016	0.013	7.317E-54
7.964	0.158	Equate entropy of thresholded and original distributions	0.159	0.032	0.062	0E0

(A link to the Explain tool was not made for this model. The model uses product features, while the Explain tool can only be used for additive models.)

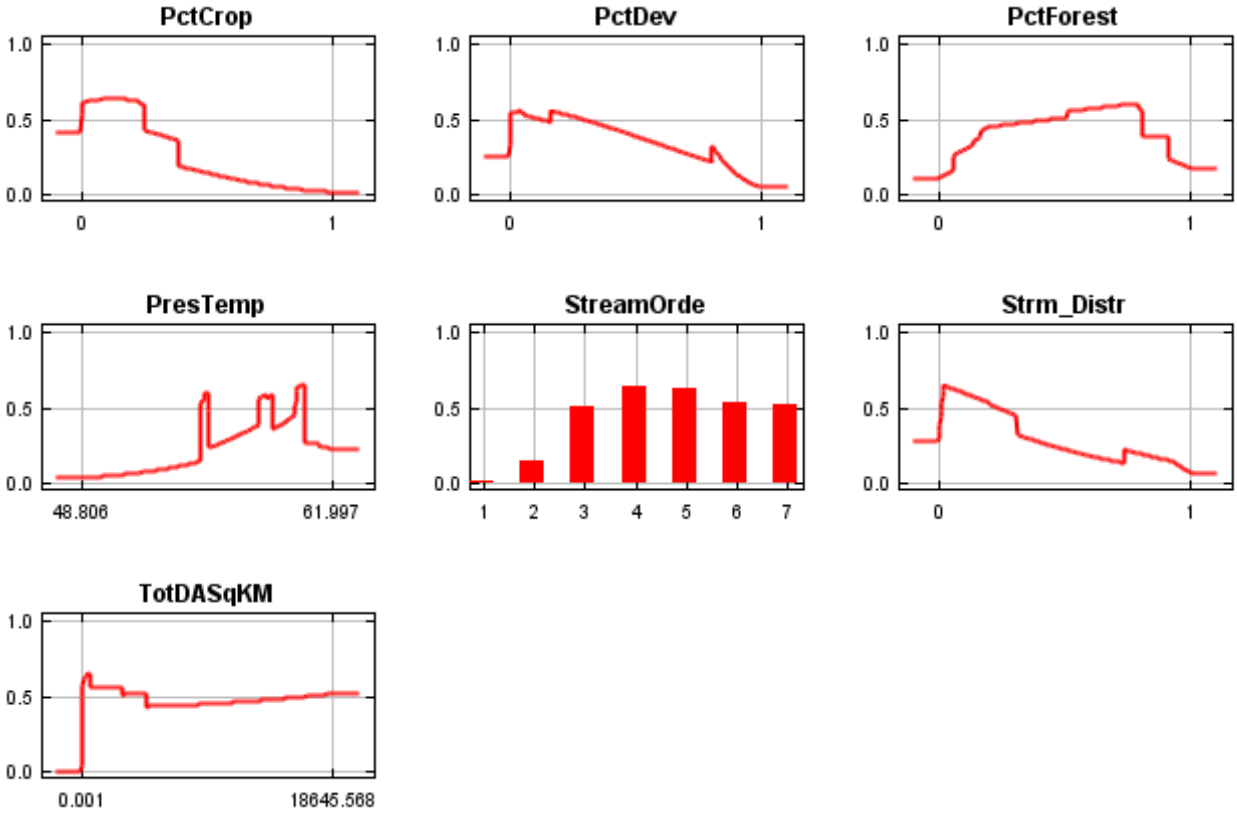
Response curves

These curves show how each environmental variable affects the Maxent prediction. The curves show how the logistic prediction changes as each environmental variable is varied, keeping all other environmental variables at their average sample value. Click on a response curve to see a larger version. Note that the curves can be hard to interpret if you have strongly correlated variables, as the model may depend on the correlations in ways that are not evident in the curves. In other words, the curves show the marginal effect of changing exactly one variable, whereas the model may take advantage of sets of variables changing together.



In contrast to the above marginal response curves, each of the following curves represents a different model, namely, a Maxent model created using only the corresponding variable. These plots reflect the dependence of

predicted suitability both on the selected variable and on dependencies induced by correlations between the selected variable and other variables. They may be easier to interpret if there are strong correlations between variables.

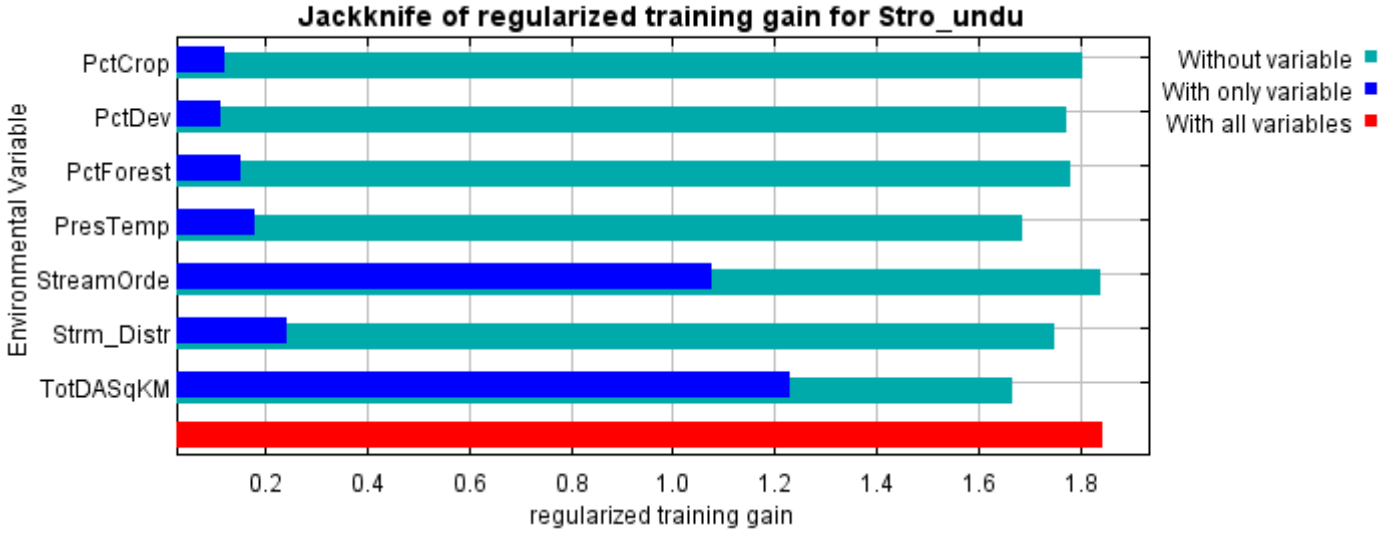


Analysis of variable contributions

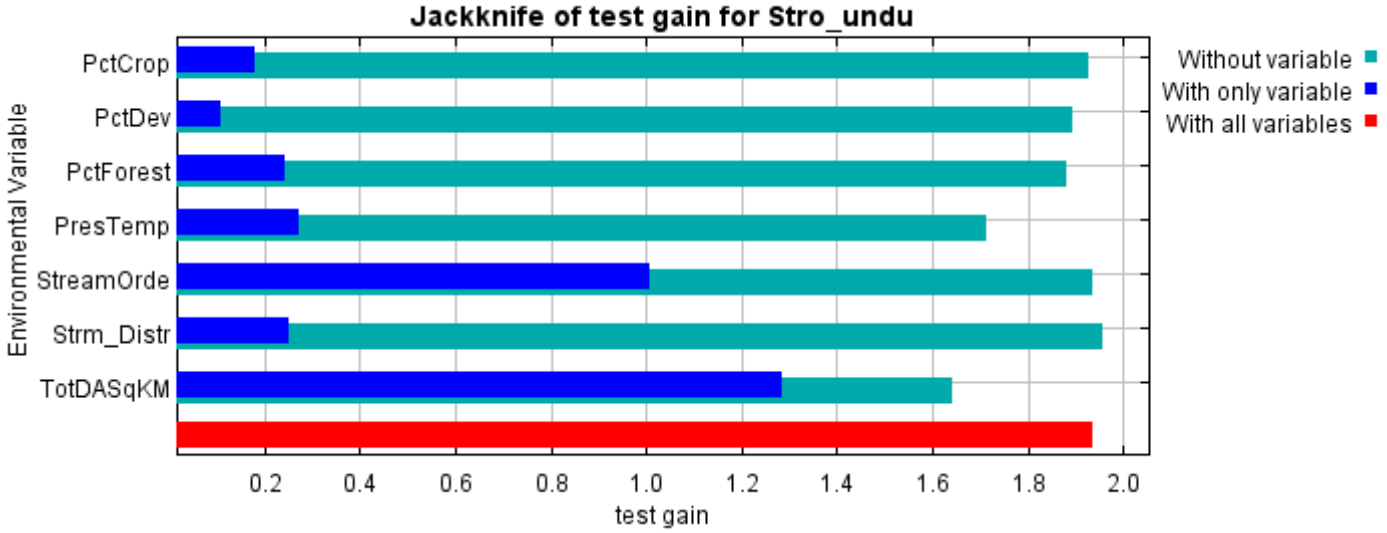
The following table gives estimates of relative contributions of the environmental variables to the Maxent model. To determine the first estimate, in each iteration of the training algorithm, the increase in regularized gain is added to the contribution of the corresponding variable, or subtracted from it if the change to the absolute value of lambda is negative. For the second estimate, for each environmental variable in turn, the values of that variable on training presence and background data are randomly permuted. The model is reevaluated on the permuted data, and the resulting drop in training AUC is shown in the table, normalized to percentages. As with the variable jackknife, variable contributions should be interpreted with caution when the predictor variables are correlated.

Variable	Percent contribution	Permutation importance
TotDASqKM	68.9	73.1
PresTemp	10.5	9.2
Strm_Distr	8	6.1
PctForest	5.1	5.2
PctDev	5	3.5
PctCrop	2.4	2.6
StreamOrde	0.1	0.3

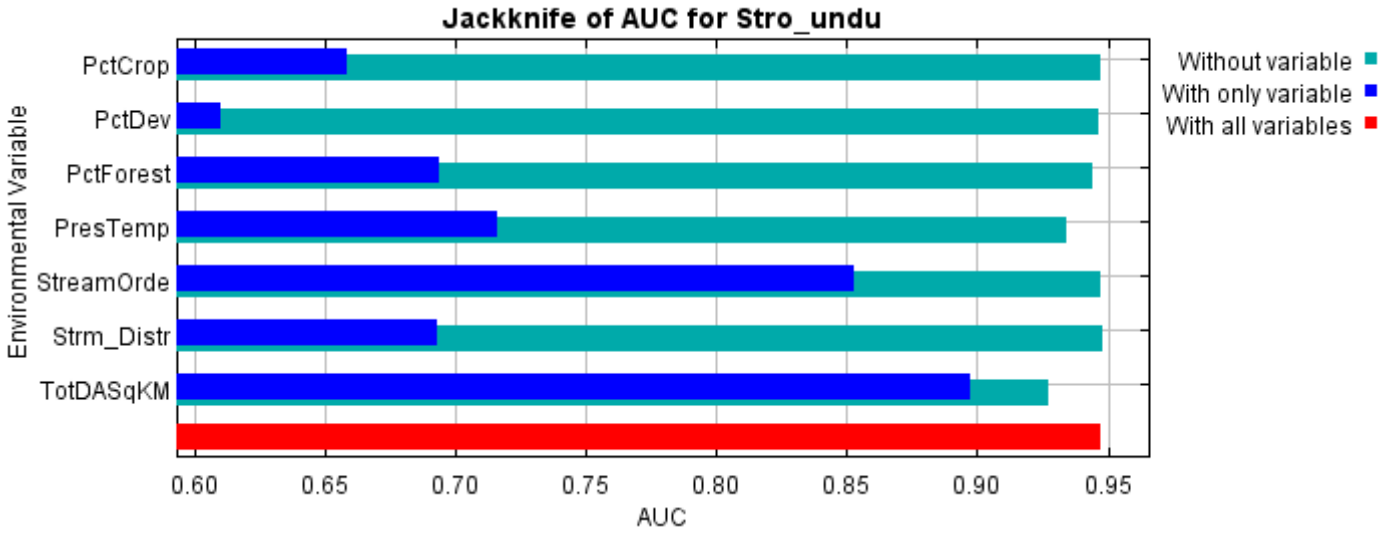
The following picture shows the results of the jackknife test of variable importance. The environmental variable with highest gain when used in isolation is TotDASqKM, which therefore appears to have the most useful information by itself. The environmental variable that decreases the gain the most when it is omitted is TotDASqKM, which therefore appears to have the most information that isn't present in the other variables.



The next picture shows the same jackknife test, using test gain instead of training gain. Note that conclusions about which variables are most important can change, now that we're looking at test data.



Lastly, we have the same jackknife test, using AUC on test data.



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The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv
The model applied to the environmental layers in F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv
The coefficients of the model
The omission and predicted area for varying cumulative and raw thresholds
The prediction strength at the training and (optionally) test presence sites
Results for all species modeled in the same Maxent run, with summary statistics and (optionally) jackknife results

Regularized training gain is 1.846, training AUC is 0.958, unregularized training gain is 2.195.
Unregularized test gain is 1.935.
Test AUC is 0.947, standard deviation is 0.006 (calculated as in DeLong, DeLong & Clarke-Pearson 1988, equation 2).
Algorithm terminated after 500 iterations (56 seconds).

The follow settings were used during the run:
187 presence records used for training, 80 for testing.
36296 points used to determine the Maxent distribution (background points and presence points).
Environmental layers used: PctCrop PctDev PctForest PresTemp StreamOrde(categorical) Strm_Distr TotDASqKM
Regularization values: linear/quadratic/product: 0.050, categorical: 0.250, threshold: 1.000, hinge: 0.500
Feature types used: hinge product linear threshold quadratic
responsecurves: true

pictures: false
jackknife: true
outputdirectory: C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Stro_undu
projectionlayers: F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv
samplesfile: C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\StroUnduFinal.csv
environmentallayers: C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\StroUnduFinal.csv
randomtestpoints: 30
Command line used:

Command line to repeat this species model: java density.MaxEnt nowarnings noprefixes -E "" -E Stro_undu
responsecurves nopictures jackknife
outputdirectory=C:\Users\admin\Documents\KatieSync\MP\Maxent_SWD_Results\031717\Stro_undu
"projectionlayers=F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_Present_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCDev_A2_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_CCOnly_A2_Final.csv,
F:\MP\MaxentSWD\Data\EnvVars\CSVs\Final\EnvVars_2050_DevOnly_Final.csv"
"samplesfile=C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\StroUnduFinal.csv"
"environmentallayers=C:\Users\admin\Documents\KatieSync\MP\CSV Spp Data\Final\StroUnduFinal.csv"
randomtestpoints=30 -t StreamOrde