Merced River Redd Site Selection (7 March 2019)

**General Goals**

The main goal is to perform a logistic regression investigating redd presence (redd=1) and absence (redd=0). Potential parameters include depth, velocity, csi, wsg, dar, for each site individually. The GIT repository can be found here <https://github.com/RMBond/Merced_Redd_selection.git>

**Description of Datasets:**

The input file “mHabVarsSite.csv” was generated by L. Harrison on 14 February 2019. The script “Redd\_logisticregression.R” was created to run the logistic regression model generation and AIC ranking. Output csv files can be found under the “Data/LR\_Output” folder.

**Output**:

Robinson data

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Model | # Param. | logL | AICc | ∆ AICc | Weight | Cumulative Weight |
| **CSI+WSG** | **3** | **-55.8618** | **117.8975** | **0** | **0.4312** | **0.4312** |
| **CSI+DAR** | **3** | **-56.0492** | **118.2723** | **0.3747** | **0.3575** | **0.7887** |
| **CSI+WSG + DAR** | **4** | **-55.5612** | **119.4143** | **1.5168** | **0.202** | **0.9907** |
| Velocity | 2 | -61.0853 | 126.2569 | 8.3593 | 0.0066 | 0.9973 |
| WSG | 2 | -62.587 | 129.2604 | 11.3628 | 0.0015 | 0.9988 |
| DAR | 2 | -62.7656 | 129.6175 | 11.72 | 0.0012 | 1 |
| Depth | 2 | -71.1216 | 146.3295 | 28.4319 | 0 | 1 |
| CSI | 2 | -73.9626 | 152.0115 | 34.114 | 0 | 1 |
| null | 1 | -76.2462 | 154.521 | 36.6234 | 0 | 1 |

Note: The top models look similar enough that the best model is **CSI+WSG + DAR.**

Merced River Ranch data

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Model | # Param. | logL | AICc | ∆ AICc | Weight | Cumulative Weight |
| **CSI** | **2** | **-70.1406** | **144.3675** | **0** | **0.5444** | **0.5444** |
| CSI+WSG | 3 | -70.1307 | 146.4353 | 2.0678 | 0.1936 | 0.738 |
| CSI+DAR | 3 | -70.1307 | 146.4353 | 2.0678 | 0.1936 | 0.9316 |
| CSI+WSG + DAR | 4 | -70.1307 | 148.5534 | 4.1859 | 0.0671 | 0.9987 |
| Depth | 2 | -76.2136 | 156.5136 | 12.1462 | 0.0013 | 1 |
| Velocity | 2 | -89.3888 | 182.8639 | 38.4965 | 0 | 1 |
| null | 1 | -98.4269 | 198.8824 | 54.5149 | 0 | 1 |
| DAR | 2 | -98.3487 | 200.7838 | 56.4163 | 0 | 1 |
| WSG | 2 | -98.3492 | 200.7847 | 56.4172 | 0 | 1 |

Note: The top models look similar to RR. Rule of parsimony means **CSI** is the best model though CSI+WSG, CSI+DAR, and CSI+WSG + DAR aren’t far behind.

Methods:

For each study reach, a candidate set of nine logistic regression models were developed to predict the probability of redd occurrence based on sedimentary, morphologic, and hydraulic variables. Models included individual variables including depth, velocity, Darcian velocity (DAR), Combined Habitat Suitability Index (CSI), and water surface gradient (WSG) and in combination (CSI+WSG, CSI+DAR, CSI+WSG + DAR). A null model was included for model comparison. Models were ranked using Akaike’s information criterion corrected for small sample size (AICc) using the methods of Burnham and Anderson (2002).

Results:

Works Cited:

Burnham, K.P., and Anderson, D.R. 2002. Model selection and multimodel inference: a practical information-theoretic approach. Springer-Verlag, NewYork.