

Montana's Herbaceous Wetland Reference Network

In 2008, the Montana Natural Heritage Program was awarded an EPA Wetland Program Development Grant to develop a statewide network of herbaceous reference wetlands. The project focused on Montana's herbaceous wetland ecological systems. At each site, we conducted a Level 2 rapid assessment that evaluates the general ecological condition of individual wetlands using field indicators and identifies specific stressors that correlate with wetland condition. At a subsample of wetlands, we also conducted Level 3 intensive vegetation assessments to gather quantitative data that can be used to validate rapid wetland assessments, characterize wetland condition, and diagnose causes of degradation. Wetland assessments were conducted during the summer of 2008 and 2009.

Attribute Definitions:

Owner: State or Federally owned public land

Site ID: Wetland assessment site identification.

Assessment Date: Date of wetland assessment

Ecological System: Wetland ecological system from the Ecological System Field Guide http://fieldguide.mt.gov:81/displayES_LCLU.aspx

Landscape Context Score:

The overall landscape context attribute score reflects the condition and the connectivity of the buffer within 500 meters of the wetland assessment area. This score is calculated using the buffer condition, buffer length, buffer width and landscape connectivity metrics. The following equation was used to calculate the raw landscape context score: $[\text{SQRT}(\text{buffer condition} * \text{SQRT}(\text{buffer length} * \text{buffer width})) + \text{landscape connectivity}]$. The final attribute score was calculated by dividing the raw attribute score by the total possible points (24 points) and then multiplying by 100 for a percent.

Higher scores indicate wetlands in better condition.

Relative Size Score: The relative patch size score describes the patch size of the entire wetland calculated as the current size of the wetland divided by the historic size of the wetland. The final attribute score was calculated by dividing the relative patch score by the total possible points (12) and then multiplying by 100 for a percent. Higher scores indicate wetlands that are 80% to 95% of their original size.

Biotic Score: The biotic attribute score reflects the cover of native, invasive exotic, invasive or highly tolerant natives as well as the amount of organic matter accumulation and patch interspersions in the wetland assessment area. The following equation was used to calculate the raw biotic score:

$(\text{Relative cover of native plant species} + \text{invasive exotic species cover} + \text{highly tolerant native plant species cover}/3) + \text{organic matter accumulation} + \text{patch interspersions score}$

The final biotic attribute score was calculated by dividing the raw biotic attribute score by the total possible points (36) and then multiplying by 100 for a percent.

Higher scores indicate wetlands in better condition.

Hydrology Score: The hydrology attribute score is based on water source, hydroperiod, and hydrologic connectivity metrics. The final attribute score is calculated by taking an average of the three metric scores [(water source + hydroperiod + hydrologic connectivity)/3]. The raw hydrology score was divided by the total possible points (36) and then multiplied by 100 for a percent. Higher scores indicate wetlands in better condition.

Physicochemical Score: The physicochemical attribute score reflects the amount of soil disturbance and water quality within the assessment area. The final attribute score is calculated by adding the soil surface integrity and water quality metrics and then dividing by the total possible points (24) and then multiplying by 100 for a percent. Higher scores indicate wetlands in better condition.

Overall Condition Score: The overall assessment score is an average of the landscape context, relative patch size, biotic, hydrologic and physicochemical attribute scores. Higher scores indicate wetlands in better condition.

Floristic Quality Index: The Floristic Quality Index (FQI) is a vegetation based index that is used to assess ecological integrity. This attribute is calculated by multiplying the mean coefficient of conservatism by the square root of the number of all plants. A lower FQI score indicates a more degraded system while a high FQI score indicates a healthier wetland. Level 3 assessments were not performed at every site. A blank value indicates that no Level 3 assessment was performed at that site.

Adjusted FQI for All Plant Species: The Adjusted FQI for All Plant Species is an adjusted FQI that takes into account both native and nonnative plant species. Emphasis on just native species richness can be misleading because some sites may have greater species richness but lower average coefficients of conservatism (mean C) values and receive higher FQI scores. Some herbaceous wetland systems in Montana are naturally species poor, so we calculated the adjusted FQI that uses the mean C-value of both native and non-native species. Level 3 assessments were not performed at every site. A blank value indicates that no Level 3 assessment was performed at that site. This Index is calculated as the following:

$$\text{AdjFQI} = \frac{\text{mean C-value for native plants species}}{10} * \frac{\text{SQRT(\# Native plants)}}{\text{SQRT(\# all plants)}} * 100$$