# Targeting the Wetlands Reserve Easement Component of the Agricultural Conservation Easement Program Using Geographic Information System Technology in the Rainwater Basin Region of South-Central Nebraska Updated for 2015*

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The United States Department of Agriculture (USDA) wetland conservation programs are some of the most effective wetland programs for the conservation of playa wetlands in the Rainwater Basin region (RWB) of south-central Nebraska. The limited number of staff able to deliver these programs requires the Rainwater Basin Joint Venture (RWBJV) partners to be strategic in marketing the programs. To help conservation delivery staff identify eligible properties with high priority restoration potential, the RWBJV developed a geospatial model that ranks all tracts in the RWB for eligibility for the Wetlands Reserve Easement (WRE) component of the Agricultural Conservation Easement Program (ACEP).

The RWBJV, working collectively with the USDA Farm Service Agency (FSA) and Natural Resources Conservation Service (NRCS), generated a wetland restoration-targeting tool to promote WRE. The RWBJV developed a spatially explicit additive model that integrates Geographic Information System (GIS) data to complete a RWB assessment for WRE.

The Nebraska WRE ranking protocol determines WRE eligibility based on 15 factors. GIS technology can be utilized to assess 11 of the 15 ranking factors. An additive model approach sums the associated values for the 11 ranking factors to estimate tracts' eligibility. The ranking factors, or RFs, are as follows. RF 1 examines land use and existing wetland manipulations. This ranking factor scores wetlands according to the extent to which modifications are reducing wetland capacity. RF 2 is determined by the suitability of the vegetation composition within the wetland, whether the wetland is dominated by invasive or agricultural plants. RF 3 scores the percent of wetland being offered into the WRE contract, with the percentage being derived as the percent of hydric soil compared to total field acres. RF 4 derives a point value based on total acres offered within the tract boundary. RF 5 assesses a tract based on known populations of state- or federally listed threatened and endangered species and the boundaries of designated critical habitat. The sixth RF scores the tract based on its proximity to wetlands under long-term conservation. Long-term conservation properties included those with easements extending 30 years or more, state/federal wildlife management areas, and/or conservation agency properties. RF 7 examines the tract's contribution to a local-scale wetland complex. Contributing wetlands were identified by the National Wetlands Inventory (NWI) or NRCS wetland determinations. RF 8 analyzes the effect that restoration could have on carbon sequestration of a tract. RF 9 considers if restoration of an area will contribute to floodwater attenuation. RF 10 evaluated by this model assessed the average county maximum easement value. The final RF uses the Environmental

Benefit Tool developed by the NRCS to assign an Environmental Benefit Score (EBS) to an area. The EBS is then weighted for a score used in the additive model. As a by-product of the WRE ranking layer, eligibility for the FWCRP program can also be extracted, based on hydric acres within field and cropping history.

**Model Base Layer Development**

The Wetlands Reserve Easement model was designed to conduct a regional assessment of wetland program eligibility. To complete the additive model, spatial analysis was utilized to generate estimated scores reflective of the WRE ranking criteria. The model requires two base layers: the 2014 Common Land Unit (CLU) or field boundary layer developed by the FSA, and the hydric soils extracted from the SSURGO (Soil Survey Geographic Database) digital soil survey (NRCS). The CLU generated by the FSA contains field boundary geometry, field number, and land-use indication, as well as field boundary acres. From the county SSURGO data, all hydric soils were extracted. The hydric soils were merged into a seamless database for all 21 counties of the RWB and were used to identify the CLU tracts that are eligible for WRE.

**Ranking Factor 1. Existing Wetland Modification**

While it is possible to identify wetlands with hydrologic modifications using GIS, the potential for restoration of function is better determined by on-site evaluation. All modeled tracts were given the maximum score of 120.

| Table 1 Existing Wetland Manipulations | Points |
|---|---|
| Wetland has hydrologic modification on site (fill, ditches, pits, tile, pumping, etc.) and will have the hydrology restored to the extent determined technically feasible, resulting in a **significant increase in the functions and values** of the wetland | 120 |
| Wetland has hydrologic modification on site (fill, ditches, pits, tile, pumping, etc.) and will have the hydrology restored to the extent determined technically feasible, resulting in **some increase in the functions and values** of the wetland | 105 |
| Wetland has hydrologic modification on site (fill, ditches, pits, tile, pumping, etc.) plus artificial increases in hydrology (raised water table, surface water increases, etc.) and will have additional hydrology restored to the extent determined technically feasible, resulting in **some increase in the functions and values** of the wetland | 95 |
| Wetland has **no** significant hydrologic modification but is a naturally wooded area that had been cleared or will not be restored to the extent technically feasible. | 75 |

**Ranking Factor 2. Wetland Vegetation Composition**

For this ranking factor, an assumption was made that the majority of private wetlands are dominated by either invasive species or agriculture. Using an agricultural layer derived from NASS 2014 data, the tracts that showed significant cropping (≥30%) were assigned a score of 0, tracts with some cropping (0-30%) were assigned a score of 5, and non-agriculture tracts were scored as 10. This is a reversal of RF 1, in that non-agriculture receives a higher score than agricultural tracts for RF 2 (see Table 2).

| Table 2 Wetland Vegetation Composition | |
|---|---|
| Existing plant community is not suitable to wetland type and is dominated by invasive species. Restoration/management will result in a **significant increase in functions and values** of the wetland. | 10 |
| Existing plant community is not entirely suitable to wetland type and is not dominated by invasive species, i.e. cropland. Restoration/management will result in **some increase in functions and values** of the wetland. | 5 |
| Existing plant community is appropriate for wetland type or invasive species will not be controlled to the extent determined technically feasible. | 0 |

### Ranking Factor 3. Percent of Wetlands in Offer

This ranking factor scores tracts based on the extent of hydric soils as a percentage of the total area being offered for the WRE. For the model, it is assumed that the entire tract will be put into the program. The score is determined by dividing the wetland footprint acres within the CLU tract by the total tract acres according to the values in Table 3.

| Table 3 Percent of Wetlands in Offer | POINTS |
|---|---|
| Wetland area is between 50% and 75% of the offered area | 10 |
| Wetland area is between 75% and 95% of the offered area | 8 |
| Wetland area is between 95% and 100% of the offered area | 6 |
| Wetland area is less than 50% of the offered area | 0 |

### Ranking Factor 4. Wetland Size

Ranking Factor 4 is straightforward. The CLU tract acres are simply ranked according to the values in Table 4 according to the acreage extent of the CLU tract.

| Table 4 Size of Proposed Easement or Agreement Area | |
|---|---|
| Offer is 100.0 acres or more | 12 |
| Offer is between 80.0 and 99.9 acres | 10 |
| Offer is between 40.0 and 79.9 acres | 8 |
| Offer is between 20.0 and 39.9 acres | 6 |
| Offer is between 10.0 and 19.9 acres | 2 |
| Offer is between 0.1 and 9.9 acres | 0 |

### Ranking Factor 5. Threatened and Endangered Species.

Ranking Factor 5 assesses known populations of state- or federally listed threatened and endangered (T&E) species occupying the CLU tract. RF 5 also assesses whether the CLU tract is located within the boundaries of designated critical habitat for a federally listed T&E species. CLU tracts matching this criterion scored the maximum of 5 points.

| Table 5 T & E Species | |
|---|---|
| Does this offer have a known population of state- or federally listed T&E species occupying the offer area, or is the offer area located within the boundaries of designated critical habitat for a federally listed T&E species. | 5 |
| No known populations of state- or federally listed T&E species occupy the enrollment offer area, nor is the offer area located within the boundaries of designated critical habitat for a federally listed T&E species. | 0 |

**Ranking Factor 6. Contribution to boundary configuration, and hydrology of existing long-term protected wetlands.**

Ranking Factor 6 assesses the influence that a WRE project would have on existing perpetually protected property. Wetlands under long-term conservation management are owned either by a government agency or by a conservation-oriented non-government agency, or are protected by a long-term conservation easement. These properties include state wildlife management areas, USFWS refuges and Waterfowl Production Areas, Ducks Unlimited properties, Natural Resources District easements and existing WRP/ WRE easements. For offers within the same basin, if the CLU tracts share a common wetland footprint with a Long-Term Conservation property, they were given a score of 5.

| Table 6 Proximity to Wetlands Under Long-Term Conservation Management (30 or more years) | |
|---|---|
| Offer is within the same wetland (water moves back and forth) and enrollment of this offer will increase the likelihood that hydrology can be fully restored, or the enrollment will create a boundary configuration such that it improves overall management and restorability of an existing long-term protected wetland(s). | 5 |
| Offer has separate wetlands but enrollment of the offer will create a boundary configuration such that it improves overall management and restorability. Offer boundary must connect directly to an existing long-term protected wetland complex. | 3 |
| Offer does not connect directly connect to an existing long-term protected wetland(s) or the offer would not improve overall management and restorability of an existing long-term protected wetland complex easement. | 0 |

**Ranking Factor 7 Contribution to a Local Wetland Complex**

Contribution to a wetland complex was determined using USFWS National Wetland Inventory supplemented with Rainwater Basin Joint Venture annual habitat survey data. All pit features with excavated "x" modifiers were removed from the NWI. Stock dams and impoundments with an "h" modifier were also removed except where these features were located on a conservation property. The assumption here is that these features are diked wetlands and not stock dams and reservoirs.

| Table 7 Contribution to a Wetland Complex (NRCS wetland determination [excludes PC's] or FWS national wetland inventory) | |
|---|---|
| 8 or more distinct wetlands are in the offer and/or within one mile of the offer | 5 |
| 3 to 7 distinct wetlands are in the offer and/or within one mile of the offer | 3 |
| 1 to 2 distinct wetlands are within the offer and no additional wetlands are within one mile of the offer | 1 |

**Ranking Factors 8 Carbon Sequestration**
Ranking Factor 8 examines the potential for carbon sequestration after restoration for a CLU tract. Amount of cropping was used to determine the impact of restoration on carbon sequestration of a CLU tract. Restored agricultural tracts would likely increase carbon sequestration more than non-agricultural tracts already sequestering carbon. Using the same agricultural layer from RF 2, tracts that are mostly agriculture (≥75%) received a score of 3 while tracts with a smaller percentage of agriculture (≤75%) received a score of 1.

| Table 8 Carbon Sequestration | |
|---|---|
| Offer after restoration would likely increase carbon sequestration | 3 |
| Offer after restoration would likely maintain current level of carbon sequestration | 1 |
| Offer after restoration would likely reduce carbon sequestration | 0 |

**Ranking Factor 9. Floodwater Attenuation**
Floodwater attenuation looks at the ability of a CLU tract to help reduce the impact of floodwaters. Floodwater attenuation is better determined by on-site evaluation; therefore, all modeled tracts received a maximum score of 5

| Table 9 Floodwater Attenuation | |
|---|---|
| After restoration the offer **will** contribute to floodwater attenuation | 5 |
| After restoration the offer **will not** contribute to floodwater attenuation | 0 |

**Ranking Factor 10. County Maximum Easement Value**
The county land value-ranking factor divides the state into regions based on county boundaries. The scores were calculated simply by identifying the county for each CLU tract according to the regions in table 10 (See Figure 1).

| Table 10 County Land Value Rating | |
|---|---|
| Easement Application – West | 5 |
| Easement Application – North, Southeast, Missouri River, Southwest | 3 |
| Easement Application – Northeast & Central | 2 |

**Ranking Factor 11. Environmental Benefit Score (EBS) and Weighted EBS**
Ranking Factor 11 uses the Environmental Benefit Tool developed by the NRCS, using different factors such as water, vegetation, T&E species, and habitat to assign an EBS.

The score is then weighted by multiplying the EBS by 7 for the WRE model. EBS scores ranged from 0 to 11 for a maximum score of 77.

After generation of the WRE criteria described above, the ranking factor columns were summed into a total WRE score. The entire sections of RF 10, 12, 13, and 14 are not estimated in this spatial model. These factors evaluate cost, cost sharing, and length of protection that vary by site, landowner, and agreement. It is important to note that this model only provides a WRE score estimate based on site potential; however, not all ranking factors are spatially explicit. Final scores ranged from 149 to 223 with a mean of 191.

Figure 1. County Values as determined by the NRCS