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CART Resource Concern Assessment (Draft)

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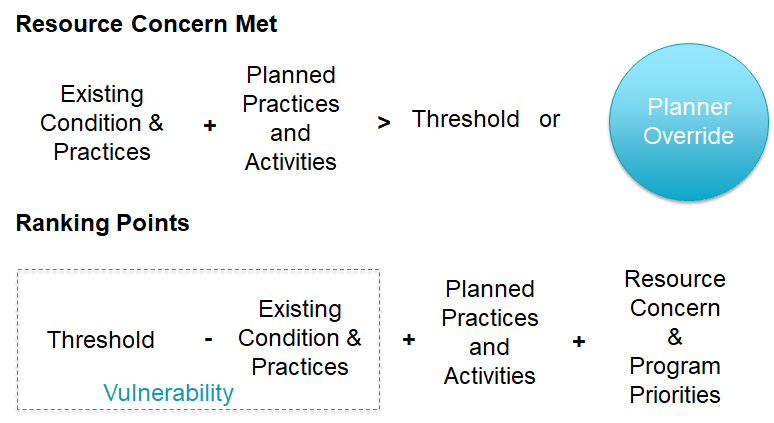
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# **CART Assessment Overview**

The Conservation Assessment Ranking Tool (CART) will assess clients’ resource concerns, planned practices, and site vulnerability as part of the conservation planning process and will rank client applications for funding. CART starts with a site-specific risk threshold for each resource concern that is based on intrinsic site characteristics, like soils and climate. The assessment then evaluates the benefits of site-specific management to determine when a resource concern is adequately treated. Management credit includes the ways crops are grown and conservation practices that are applied. Management credits are summed and compared to the threshold for existing conditions and planning alternatives. For program ranking purposes, these same points are used as the basis for prioritization, but ranking may be further modified by identified priorities, special considerations, or both.

This draft of the CART User’s Guide is intended to inform NRCS reviewers of basic CART functions and planner interface operations. Draft values for all existing condition points and conservation management points remain under review by CART technical teams. Point structures in the initial release of CART will reflect extensive user testing and incorporate results of the comprehensive review of conservation practices initiated to comply with provisions of the 2018 Farm Bill. Feedback on the assessment questions is desired. The assessment questions are not meant to document every question criteria and consideration that may be evaluated on a land unit. Rather, they are designed to document resource concerns and the need for conservation practices to planning criteria.

*Figure 1: CART Point System*



All resource concerns evaluated in CART allow the conservation planner (potentially based on job approval authority) to determine resource planning criteria independent of CART results. In cases where the planner overrides CART results, he or she must document which site-specific analysis or condition warrants a different result than identified through the CART analysis. Although the supplemental details are used to document the basis of how the planner determined that resource concerns have been met for planning purposes and CSP eligibility, the planner’s action will not affect relevant CART ranking points.

Cart resource priorities are divided into the resource concern groups summarized in *figure 2*.

*Figure 2: NRCS Resource Concerns by CART Resource Priority*

| Resource Priority | NRCS Resource Concerns |
| --- | --- |
| Soil Erosion | Sheet and rill |
| Wind |
| Ephemeral gullies |
| Classic gullies |
| Excessive bank erosion from streams, shorelines, or water conveyance channels |
| Soil Quality | Subsidence |
| Compaction |
| Organic matter depletion |
| Concentration of salts or other chemicals |
| Excess Water | Ponding and flooding |
| Seasonal high water table |
| Seeps |
| Drifted snow |
| Insufficient Water | Inefficient moisture management |
| Inefficient use of irrigation water |
| Water Quality Degradation | Excess nutrients in surface water |
| Excess nutrients in groundwater |
| Pesticides transported to surface water |
| Pesticides transported to groundwater |
| Pathogens and chemicals from manure, biosolids, or compost applications transported to surface water |
| Pathogens and chemicals from manure, biosolids, or compost applications transported to groundwater |
| Excessive salts in surface water |
| Excessive salts in groundwater |
| Petroleum, heavy metals, and other pollutants transported to surface water |
| Petroleum, heavy metals, and other pollutants transported to groundwater |
| Excessive sediment in surface water |
| Degraded Plant Condition | Undesirable plant productivity and health |
| Inadequate structure and composition |
| Excessive plant pest pressure |
| Wildfire hazard, excessive biomass accumulation |
| Inadequate Habitat for Fish and Wildlife | Terrestrial wildlife habitat: quantity, quality of food, water, cover and shelter, and habitat continuity is inadequate to meet requirements of identified terrestrial wildlife or invertebrate species. |
| Aquatic wildlife habitat: quantity, quality of food, water, cover and shelter, and habitat continuity is inadequate to meet requirements of identified aquatic wildlife or invertebrate species. |
| Elevated water temperature |
| Livestock Production Limitation | Inadequate feed and forage |
| Inadequate livestock shelter |
| Inadequate livestock water |
| Inefficient Energy Use | Equipment and facilities |
| Farming or ranching practices and field operations |
| Air Quality Impacts | Emissions of particulate matter – PM and PM precursors |
| Emissions of greenhouse gasses – GHGs |
| Emissions of ozone precursors |
| Objectionable odors |

# **Soil Erosion**

## **Sheet and Rill Erosion (Water Erosion)**

**Description:** Detachment and transport of soil particles caused by rainfall, melting snow, or irrigation.

**Objective:** Reduce sheet and rill erosion to T.

**Analysis within CART:**

**Crop:**

Each planned land unit (PLU) for crop will have a calculated PLU Erodibility Index - water (EIw) based on the dominant critical soil (see equation 1 below) in the PLU. The (EIw) will be categorized into four soil erodibility potentials through the Conservation Resource Web Services – PLU Modified Erodibility Potential-Water. The service utilizes the NRCS-published soils database (SSURGO) according to equations 1 and 2.

Equation 1: PLU Erodibility Potential – Water = K\*(LS)/T

Where K is the K factor of the surface horizon of the dominant critical soil component. The dominant critical soil component is determined as the soil with the highest surface K factor and is a major map unit component (majorcompflag=True) that is greater than 10% of the PLU. In case of a K factor tie, choose the soil component among the set having the highest percentage of the PLU. K is obtained from the SSURGO data base data element for soil erodibility factor (chorizon.kffact).

LS is derived from a simplification of the original LS calculation of Wischmeier and Smith (1978). This simplification by Stone and Hilborn (2012) removes the need for trigonometric functions in the LS calculation.

Equation 2: LS = [0.065 + 0.0456 (slope) + 0.006541 (slope)2](slope length ÷ constant)NN

Where:   
slope = slope steepness in %  
slope length = length of slope in m (ft)  
constant = 22.1 metric (72.5 Imperial)

NN is derived from the slope. For slopes <1 , NN = 0.2; for slopes equal to 1 and less than 3, NN = 0.3; for slopes equal to three and less than 5, NN = 0.5; for slopes equal to and greater than 5, NN = 0.5

Slope length is calculated using “default slope parameters” created by Lightle and Weesies (1998, data not shown) using the representative slope (conponent.slope\_r) in SSURGO.

*Figure 3: PLU Modified Erodibility Potential – Water (EIw) Categories*

|  |
| --- |
| PLU Modified Erodibility Potential – Water (EIw) |
| High (=>0.20) |
| Moderately High (=>0.10 – <0.20) |
| Moderate (=>0.05 – <0.10) |
| Low (<0.05) |

Using the R factor from R factor service, the PLU soil runoff potential is used to determine the threshold of conservation management points necessary to meet the planning criteria as seen in *figure 4* and modified by irrigation type in *figure 5*.

*Figure 4: Determining Sheet and Rill Erosion Threshold*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Runoff Vulnerability | R Factor | | | |
| ≤50 | >50-150 | >150-250 | >250 |
| High | 30 | 40 | 60 | 80 |
| Moderately High | 20 | 30 | 50 | 60 |
| Moderate | 10 | 20 | 40 | 50 |
| Low | 10 | 10 | 20 | 40 |

*Figure 5: Irrigation R Factor Modification*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Irrigation R Factor Modification** | | | | |
| R Factor Modification | R Factor Class  Inches Per Acre Per Year of Irrigation | | | |
| ≤50 | >50 – 150 | >150 – 250 | >250 |
| Move 1 Class Higher | 18 to 29.9 | 12 to 23.9 | ≥6 | N/A |
| Move 2 Classes Higher | 30 to 41.9 | ≥24 | N/A | N/A |
| Move 3 Classes Higher | ≥42 | N/A | N/A | N/A |
| * Cannot move class higher than “>250” | | | | |

The existing condition question will set the existing score as seen in *figure 6*.

*Figure 6: Existing Rotation Residue Value*

|  |  |
| --- | --- |
| Crop Rotation Residue Level | Water Erosion Credit |
| **No Residue**   * No crop (bare ground), any tillage type | 0 |
| **Very Low Residue**   * Fragile residue crops, any tillage type | 10 |
| **Low Residue**   * Fragile residue crops, cover crop, any tillage type * Durable residue crops, any tillage type * At least one conserving use crop in the rotation with the rest—   + Any crops, any tillage type | 20 |
| **Moderate Residue**   * Fragile residue crops, cover crop, reduced or no-till * Durable residue crops, harvested just for grain, reduced till * Durable residue crops, fully harvested, cover crop, reduced till * At least half the rotation in conserving use crops with the rest—   + Fragile residue crops, cover crop, reduced till   + Durable residue crops, harvested just for grain, reduced till   + Durable residue crops, fully harvested, cover crop, reduced till | 40 |
| **Moderately High Residue**   * Durable residue crops, harvested just for grain, no-till * Durable residue crops, fully harvested, cover crop, no-till * Mostly conserving use crops in the rotation with the rest—   + Fragile residue crops, cover crop, no-till   + Durable residue crops harvested just for grain, no-till   + Durable residue crops, fully harvested, cover crop, no-till | 60 |
| **High Residue**   * Conserving use crops, no tillage | 80 |

\*Fragile residue crops include vegetables and soybeans, durable residue crops include corn and wheat, and conserving use crops include sod forming perennial grasses.

Conservation practices and activities are then added to the residue management point to determine the state of the management system. Some example practice points are identified in *figure 7*.

*Figure 7: Typical Practices Affecting Sediment Transport*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Contour Buffer Strips (332) | 20 |
| Contour Farming (330) | 5 |
| Cover Crop (340) | 51 |
| Residue and Tillage Management, No-Till (329) | 40 |
| Residue and Tillage Management, Reduced Till (345) | 30 |
| Stripcropping (585) | 10 |
| Terrace (600) | 30 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

**Range, Forest, and Other Land Uses:**

Each PLU will default to a “not assessed” status for sheet and rill erosion. The planner may identify this resource concern based on site-specific conditions. A threshold value of 50 will be set and the existing condition question will be triggered. The existing condition question will set the existing score as seen in *figure 8*.

*Figure 8: Sheet and Rill Erosion Existing Condition*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Sheet and Rill Erosion is controlled | 51 |
| Sheet and Rill Erosion exists and is uncontrolled | 1 |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Some example practice points are identified in *figure 9*.

*Figure 9: Typical Practices Affecting Sheet and Rill Erosion*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Prescribed Grazing (528) |  |
| Critical Area Planting (342) |  |
| Dust Control on Unpaved Roads and Surfaces (373) |  |
| Mulching (484) |  |
| Tree/Shrub Establishment (61) |  |
| Heavy Use Area Protection (561) |  |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

## **Wind Erosion (Wind Erosion)**

**Description:** Detachment and transport of soil particles caused by wind.

**Objective:** Reduce wind erosion.

**Analysis within CART:**

**Crop:**

Each PLU for crop will have the PLU soil wind erosion potential determined based on the dominant critical soil component as described below. The (EPw) will be categorized into four soil erodibility potentials through the Conservation Resource Web Services – PLU Modified Erodibility Potential-Wind. The service utilizes the NRCS-published soils database (SSURGO).

The STEP PLU Erodibility Potential – Wind for a PLU is calculated as—

PLU Erodibility Potential – Wind = C\*I/T

Where—

C Factor (Wind erosion climatic factor). Using geolocation, the C Factor is obtained established from a digitized C Factor map.

I Factor (soil erodibility factor – wind). I factor of the surface horizon of the dominant critical soil component. Dominant critical is determined as the soil with the highest surface sand percentage, is a major map unit component (majorcompflag=Ture) that is greater than 10% of the PLU. I is obtained from the SSURGO data base data element for wind erodibility index (component.wei).

T is the soil loss tolerance factor for the component. The T factor is determined for the dominant critical soil component. T is obtained from the SSURGO data base data element for the soil loss tolerance factor (component.tfact).

*Figure 10: Determining Wind Erosion Vulnerability*

|  |  |
| --- | --- |
| Wind Erosion Vulnerability (Based on C\*I/T) | Threshold |
| High (≥16) | 100 |
| Moderately High (≥8 - <16) | 70 |
| Moderate (≥4 - <8) | 40 |
| Low (<4) | 10 |

The existing condition question will set the existing score as seen in *figure 11*.

*Figure 11: Existing Rotation Residue Value*

|  |  |
| --- | --- |
| Crop Rotation Residue Level | Wind Erosion Credit |
| **No Residue**   * No crop (bare ground), any tillage type | 0 |
| **Very Low Residue**   * Fragile residue crops, any tillage type | 5 |
| **Low Residue**   * Fragile residue crops, cover crop, any tillage type * Durable residue crops, any tillage type * At least one conserving use crop in the rotation with the rest—   + Any crops, any tillage type | 10 |
| **Moderate Residue**   * Fragile residue crops, cover crop, reduced or no-till * Durable residue crops, harvested just for grain, reduced till * Durable residue crops, fully harvested, cover crop, reduced till * At least half the rotation in conserving use crops with the rest—   + Fragile residue crops, cover crop, reduced till   + Durable residue crops, harvested just for grain, reduced till   + Durable residue crops, fully harvested, cover crop, reduced till | 15 |
| **Moderately High Residue**   * Durable residue crops, harvested just for grain, no-till * Durable residue crops, fully harvested, cover crop, no-till * Mostly conserving use crops in the rotation with the rest—   + Fragile residue crops, cover crop, no-till   + Durable residue crops harvested just for grain, no-till   + Durable residue crops, fully harvested, cover crop, no-till | 20 |
| **High Residue**   * Conserving use crops, no tillage | 25 |

\*Fragile residue crops include vegetables and soybeans, durable residue crops include corn and wheat, and conserving use crops include sod forming perennial grasses.

Conservation practices and activities are then added to the residue management point to determine the state of the management system. Some example practice points are identified in *figure 12*.

*Figure 12: Typical Practices Affecting Wind Erosion*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Conservation Crop Rotation (328) | 30 |
| Cover Crop (340) | 30 |
| Cross Wind Ridges (588) | 40 |
| Cross Wind Trap Strips (589c) | 40 |
| Residue and Tillage Management, No-Till (329) | 70 |
| Residue and Tillage Management, Reduced-Till (345) | 40 |
| Stripcropping (585) | 51 |
| Surface Roughening (609) | 15 |
| Windbreak/Shelterbest Establishment (380) | 60 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

**Range, Forest, and Other Land Uses:**

Each PLU will default to a “not assessed” status for wind erosion. The planner will identify this resource concern based on site-specific conditions. A threshold value of 50 will be set and the existing condition question will be triggered. The existing condition question will set the existing score as seen in *figure 13*.

*Figure 13: Wind Erosion Existing Condition*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Wind erosion is controlled | 51 |
| Wind erosion exists and is uncontrolled | 1 |

Conservation practices and activities are then added to the residue management point to determine the state of the management system. Some example practice points are identified in *figure 14*.

*Figure 14: Typical Practices Affecting Wind Erosion*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Prescribed Grazing (528) |  |
| Critical Area Planting (342) |  |
| Dust Control on Unpaved Roads and Surfaces (373) |  |
| Mulching (484) |  |
| Tree/Shrub Establishment (61) |  |
| Heavy Use Area Protection (561) |  |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

## **Classic Gully Erosion (Classical Gully)**

**Description:** Gullies created by runoff that can enlarge a channel progressively by head cutting, lateral widening, or both.

**Objective:** Stabilize the gully.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for classic gully erosion (potential for lidar-based mapping to provide potential classical gully maps when combined with rotation information in the future). The planner will identify this resource concern based on site-specific conditions, a threshold value of 50 will be set, and existing condition questions will be triggered. The existing condition question will set the existing score as seen in *figure 15*.

*Figure 15: Classic Gully Erosion Existing Condition*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Gully erosion is controlled | 51 |
| Classical gullies exist and are uncontrolled | 1 |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Example practice points are identified in *figure 16*.

*Figure 16: Typical Practices Affecting Classic Gully Erosion*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Access Control |  |
| Critical Area Planting |  |
| Dike (356) |  |
| Diversion (362) |  |
| Grade Stabilization Structure (410) |  |
| Grassed Waterway | 51 |
| Karst Sinkhole Treatment |  |
| Precision Land Forming |  |
| Sediment Basin (350) |  |
| Structure for Water Control (587) |  |
| Underground Outlet |  |
| Water and Sediment Control Basin (638) |  |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

## **Ephemeral Gully Erosion (Ephemeral Gully)**

**Description:** Soil erosion that results in small gullies in the same flow area that can be obscured by tillage.

**Objective:** Control the formation of ephemeral gullies.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for ephemeral gully erosion (potential for lidar-based mapping to provide potential ephemeral gully maps when combined with rotation information in the future). The planner will identify this resource concern based on site-specific conditions. A threshold value of 50 will be set and the existing condition question will be triggered. The existing condition question will set the existing score as seen in *figure 17*.

*Figure 17: Ephemeral Gully Erosion Existing Condition*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Ephemeral gully erosion is controlled | 51 |
| Ephemeral gullies exist and are uncontrolled | 1 |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Example practice points are identified in *figure 18*.

*Figure 18: Typical Practices Affecting Ephemeral Gully Erosion*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Cover Crop (340) | 10 |
| Diversion (362) | 40 |
| Grade Stabilization Structure (410) | 51 |
| Grassed Waterway (412) | 51 |
| Terrace (600) | 51 |
| Water and Sediment Control Basin (638) | 51 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

## **Bank Erosion from Streams, Shorelines, or Water Conveyance Channels (Bank Erosion)**

**Description:** Erosion resulting from poor land management practices, storm events, wave action, rain, ice, wind, runoff, loss of vegetation, hydrologic dynamics, stream isolation from floodplains, other disturbed or altered geomorphological processes, or some combination of these.

**Objective:** Restore the stability of eroding banks.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for bank erosion (potential mapping to indicate blue line streams and certain waterbodies). If bank erosion is indicated by the planner based on a visual assessment or input from the land manager or owner as a resource concern, a threshold value of 50 will be set and existing conditions question will be triggered. The existing bank condition will be classified into four categories as identified in *figure 19*. (This is equivalent to a moderately stable bank consistent with the description in the Stream Visual Assessment Protocol 2 (SVAP2).)

*Figure 19: Bank Erosion Existing Condition*

|  |  |
| --- | --- |
| Bank Condition | Conservation Management Points |
| Banks are Stable | 60 |
| Banks are Moderately Stable | 51 |
| Banks are Moderately Unstable | 25 |
| Banks are Unstable | 1 |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Example practice points are identified in *figure 20*.

*Figure 20: Typical Practices Affecting Bank Erosion*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Channel Bed Stabilization (584) | 51 |
| Clearing and Snagging (326) | 25 |
| Critical Area Planting (342) | 51 |
| Filter Strip (393) | 25 |
| Grade Stabilization Structure (410) | 25 |
| Riparian Forest Buffer (391) | 25 |
| Riparian Herbaceous Cover (390) | 25 |
| Streambank and Shoreline Protection (580) | 51 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

# **Soil Quality Degradation**

## **Subsidence (Subsidence)**

**Description:** Loss of volume and depth of organic soils due to oxidation caused by above normal microbial activity resulting from excessive water drainage, soil disturbance, or extended drought. This excludes karst, sinkholes, and issues or depressions caused by underground activities.

**Objective:** Reduce potential for subsidence to occur.

**Analysis within CART:**

Each PLU will trigger a Soil Data Access (Agricultural Organic Soil Subsidence Interpretation) web service to determine the percentage of organic soils. The Soil Data Access services utilizes the NRCS-published soils database (SSURGO). If greater than 10% organic soils are present, a threshold value will be set as determined in *figure 21* and existing condition question will be triggered. The planner may also identify this resource concern based on site-specific conditions, a threshold of 50 will be set and trigger the existing condition question. The existing condition question will set the existing score as seen in *figure 22*. (Appropriate for all land uses.)

*Figure 21: Subsidence Threshold*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Definition |
| Mineral soil | no threshold set, unless planner identified | Soils that are not organic are rated “Mineral soil.” These soils do not subside due to organic matter oxidation. |
| Low subsidence | 20 | “Low subsidence” indicates that the soil has one or more features that are unfavorable for aerobic soil organisms. With careful management, the soil can be used for crop production and be nearly sustainable. |
| Moderate subsidence | 40 | “Moderate subsidence“ indicates that the soil has features that are moderately favorable for aerobic soil organisms. The soil can be made more sustainable by careful management. |
| Severe subsidence | 50 | “Severe subsidence“ indicates that the soil has features that are very favorable for the aerobic soil organisms that cause subsidence. Very careful management will be needed to slow the subsidence rate. |

*Figure 22: Subsidence Existing Condition*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Subsidence is not a concern or is being managed to the extent possible | 51 |
| Subsidence is creating a soil limitation that can be improved through management | 1 |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Example practice points are identified in *figure 23*.

*Figure 23: Typical Practices Affecting Subsidence*

|  |  |
| --- | --- |
|  | Conservation Management Points |
| Drainage Water Management (554) | 25 |
| Wetland Restoration (657) | 51 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

## **Compaction (Compaction)**

**Description:**  Management-induced soil compaction at any level throughout the soil profile resulting in reduced plant productivity, biological activity, infiltration, aeration, or some combination of these.

**Objective:** Reduce potential for compaction to occur.

**Analysis within CART:**

Each PLU will trigger a Soil Data Access (Soil Susceptibility to Compaction Interpretation) web service to determine the percentage and acreage of compacted soils. The Soil Data Access services utilizes the NRCS-published soils database (SSURGO). If the potential for compacted soils are present, a threshold value will be set as determined in *figure 24* and existing condition question will be triggered. The planner may also identify this resource concern based on site-specific conditions and a threshold of 50 will be set. The existing condition question will set the existing score as seen in *figure 25*. (Appropriate for all land uses.)

*Figure 24: Soil Compaction Threshold*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Definition |
| Low | 1 | Low – The potential for compaction is insignificant. This soil can support standard equipment with minimal compaction. The soil is moisture insensitive, exhibiting only small changes in density with changing moisture content. |
| Medium | 30 | Medium – The potential for compaction is significant. The growth rate of seedlings may be reduced following compaction. After the initial compaction (i.e., the first equipment pass), this soil can support standard equipment with only minimal increases in soil density. The soil is intermediate between moisture insensitive and moisture sensitive. |
| High | 50 | High – The potential for compaction is significant. The growth rate of seedlings will be reduced following compaction. After initial compaction, this soil is still able to support standard equipment, but will continue to compact with each subsequent pass. The soil is moisture sensitive, exhibiting large changes in density with changing moisture content. |

*Figure 25: Compaction Existing Condition*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Compaction is not a concern or is being managed to the extent possible | 51 |
| Compaction is creating a soil limitation that can be improved through management | 1 |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Example practice points are identified in *figure 26*.

*Figure 26: Typical Practices Affecting Soil Compaction*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Access Control (472) | 5 |
| Conservation Cover (327) | 40 |
| Conservation Crop Rotation (328) | 10 |
| Control Traffic Farming (334) | 30 |
| Cover Crops (340) | 25 |
| Critical Area Planting (342) | 40 |
| Deep Tillage (324) | 15 |
| Field Border (386) | 40 |
| Filter Strip (393) | 40 |
| Forage and Biomass Planting (512) | 30 |
| Prescribed Grazing (528) | 20 |
| Range Planting (550) | 30 |
| Residue and Tillage Management, No Till (329) | 25 |
| Residue and Tillage Management, Reduced Till (340) | 25 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

## **Organic Matter Depletion (Organic Matter)**

**Description:** Management-induced depletion of any or all pools of soil organic matter resulting in limited soil function and processes that support plant productivity, biological activity, water and nutrient cycling, or some combination of these.  
  
**Objective:** Maintain, increase, or improve soil organic matter.

**Analysis within CART:**

Each PLU will trigger a Soil Data Access (Organic Matter Depletion Interpretation) web service to provide the interpretation in f*igure 27*. The Soil Data Access services utilizes the NRCS-published soils database (SSURGO). A threshold value will be set as determined in *figure 27* and existing condition question will be triggered.

*Figure 27: Organic Matter Depletion Threshold*

|  |  |  |
| --- | --- | --- |
| Answer | Threshold | Definition |
| Organic matter depletion low | 10 | “Organic matter depletion low” indicates soils that have features that are favorable for organic matter accumulation. These soils allow more management options while still maintaining favorable organic matter levels. |
| Organic matter depletion moderately low | 30 | “Organic matter depletion moderately low” is a gradient of the level of management needed to avoid organic matter depletion. |
| Organic matter depletion moderate | 50 | Prevent serious organic matter loss when these soils are farmed.  “Organic matter depletion moderately high,” “organic matter depletion moderate,” and “organic matter depletion moderately low” are a gradient of the level of management needed to avoid organic matter depletion. |
| Organic matter depletion moderately high | 60 | Prevent serious organic matter loss when these soils are farmed.  “Organic matter depletion moderately high,” “organic matter depletion moderate,” and “organic matter depletion moderately low” are a gradient of the level of management needed to avoid organic matter depletion. |
| Organic matter depletion high | 70 | “Organic matter depletion high” indicates that the soil and site have features that are very conducive to the depletion of organic matter. Very careful management will be needed to prevent serious organic matter loss when these soils are farmed. |

The existing condition question will set the existing score as seen in *figure 28*.

*Figure 28: Existing Rotation Residue Value*

|  |  |
| --- | --- |
| Crop Rotation Residue Level | Organic Matter Credit |
| **No Residue**   * No crop (bare ground), any tillage type | 0 |
| **Very Low Residue**   * Fragile residue crops, any tillage type | 10 |
| **Low Residue**   * Fragile residue crops, cover crop, any tillage type * Durable residue crops, any tillage type * At least one conserving use crop in the rotation with the rest—   + Any crops, any tillage type | 20 |
| **Moderate Residue**   * Fragile residue crops, cover crop, reduced or no-till * Durable residue crops, harvested just for grain, reduced till * Durable residue crops, fully harvested, cover crop, reduced till * At least half the rotation in conserving use crops with the rest—   + Fragile residue crops, cover crop, reduced till   + Durable residue crops, harvested just for grain, reduced till   + Durable residue crops, fully harvested, cover crop, reduced till | 40 |
| **Moderately High Residue**   * Durable residue crops, harvested just for grain, no-till * Durable residue crops, fully harvested, cover crop, no-till * Mostly conserving use crops in the rotation with the rest—   + Fragile residue crops, cover crop, no-till   + Durable residue crops harvested just for grain, no-till   + Durable residue crops, fully harvested, cover crop, no-till | 60 |
| **High Residue**   * Conserving use crops, no tillage | 80 |

\*Fragile residue crops include vegetables and soybeans, durable residue crops include corn and wheat, and conserving use crops include sod forming perennial grasses.

Conservation practices and activities are then added to the residue management point to determine the state of the management system. Example practice points are identified in *figure 29*.

*Figure 29: Typical Practices Affecting Organic Matter Depletion*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Conservation Crop Rotation (328) | 30 |
| Cover Crop (340) | 25 |
| Critical Area Planting (342) | 5 |
| Field Border (386) | 10 |
| Filter Strip (393) | 15 |
| Residue and Tillage Management, No-Till (329) | 40 |
| Residue and Tillage Management, Reduced Tillage (345) | 25 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

## **Concentration of Salts and Other Chemicals (Salts)**

**Description:** Concentration of salts leading to salinity, sodicity, or both that reduces productivity or limits desired use, or concentrations of other chemicals impacting productivity, populations of beneficial organisms, or limiting desired use.

**Objective:** Reduce concentration of chemicals of concern in the soil.

**Analysis within CART:**

Each PLU will trigger a Soil Data Access web service to determine the percentage of saline or sodic soils. The Soil Data Access services utilizes the NRCS-published soils database (SSURGO). If saline or sodic soils are present, a threshold value will be set by *figure 30* and existing condition question will be triggered. The planner may also identify this resource concern based on site specific conditions and a threshold value of 50 will be set. The existing condition question will set the existing score as seen in *figure 31*. (Appropriate for all land uses.)

*Figure 30: Concentration of Salts and Other Chemicals Threshold*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Definition |
| Low surface salinization risk | No threshold set unless identified by the planner | “Low surface salinization risk” indicates that the soil has one or more features that are unfavorable for salinization. These soils exist in climates where salinization does not occur or on landscape positions where salts are unlikely to accumulate. |
| Surface salinization risk | 30 | “Surface salinization risk” indicates that the soil has features that are somewhat favorable for surface salinization. Careful management will be needed to avoid damage from salinity. |
| High surface salinization risk or already saline | 50 | “High surface salinization risk or already saline” indicates that the soil has features that are very favorable for the accumulation of salts at the surface or are already saline. These soils are already limited by excess surface salts. |

*Figure 31: Salts Existing Condition*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Salts is not a concern or is being managed to the extent possible | 51 |
| Salts is creating a soil limitation that can be improved through management | 1 |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Example practice points are identified in *figure 32*.

*Figure 32: Typical Practices Affecting Concentration of Salts or other Chemicals*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Conservation Crop Rotation (328) | 10 |
| Irrigation System, Micro irrigation (441) | 10 |
| Irrigation Water Management (328) | 10 |
| Land Reclamation, Toxic Discharge Control (445) | 51 |
| Mulching (484) | 5 |
| Nutrient Management (590) | 10 |
| Salinity and Sodic Soil Management (610) | 51 |
| Sprinkler System (442) | 10 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

# **Excess Water**

## **Ponding and Flooding**

**Description:** Surface water restricts land use and management goals.

**Objective:** Manage surface water more efficiently.

**Analysis within CART:**

Each PLU regardless of land use will be assessed. The assessment will trigger a soil data web service to determine flood frequency rating of occasional, frequent, or very frequent and will also trigger a web service to evaluate if the PLU is within a 100-year flood plain according to FEMA maps. Either condition will trigger the resource concern for assessment and set the threshold to 50. The planner may identify the presence or absence of this resource concern based on site specific conditions and set the threshold to 50. The existing condition question will set the existing score as seen in *figure 33*.

*Figure 33: Flooding and Ponding Existing Condition*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Ponding and flooding does not occur in planning area. | 60 |
| Ponding and flooding occurs but does not negatively affect the intended use of the PLU. | 51 |
| Ponding and flooding occurs and negatively affects the intended use of the PLU. | 1 |

The existing condition will be combined with conservation practices and activity points will make up the ranking for the resource concern. Practice points are identified in *figure 34*.

*Figure 34: Typical Practices Affecting Ponding and Flooding*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Bedding | 50 |
| Clearing and Snagging | 30 |
| Dam | 20 |
| Dam, Diversion | 20 |
| Dike | 20 |
| Diversion | 20 |
| Hillside Ditch | 20 |
| Land Smoothing | 30 |
| Lined Waterway or Outlet | 20 |
| Mole Drain | 50 |
| Open Channel | 50 |
| Pond | 20 |
| Precision Land Forming | 30 |
| Stormwater Runoff Control | 40 |
| Structure for Water Control | 20 |
| Subsurface Drain | 50 |
| Subsurface Drainage, Field Ditch | 50 |
| Subsurface Drainage, Main or Lateral | 50 |
| Underground Outlet | 50 |
| Vertical Drain | 50 |
| Water and Sediment Control Basin | 20 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

## **Seasonal High Water Table**

**Description:** Groundwater or a perched water table causing saturated conditions near the surface degrades water resources or restricts capability of land to support its intended use.

**Objective:** Reduce seasonally high water table.

**Analysis within CART:**

Each PLU regardless of land use will default to a “not assessed” status for seasonal high water table. The planner will identify this resource concern based on site specific conditions. If the planner identifies the resource concern it will trigger a soil data web service to determine if the water table is within 18 inches of the surface. If a high water table is identified a threshold of 50 will be set. The existing condition question will set the existing score as seen in *figure 35*.

*Figure 35: Seasonal High Water Table Existing Condition*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| |  | | --- | | Seasonal high water table is not present on the PLU. | | 60 |
| Seasonal high water table occurs but does not negatively affect the intended use of the PLU. | 51 |
| Seasonal high water table occurs and does negatively affect the intended use of the PLU. | 1 |

The existing condition will be combined with conservation practices and activity points will make up the entirety of the ranking for the resource concern. Some example practice points are identified in *figure 36*.

*Figure 36: Typical Practices Affecting Seasonal High Water Table*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Alley Cropping | 20 |
| Mole Drain | 20 |
| Open Channel | 30 |
| Pumping Plant | 10 |
| Structure for Water Control | 20 |
| Subsurface Drain | 50 |
| Surface Drain, Field Ditch | 30 |
| Subsurface Drain, Main or Lateral | 30 |
| Underground Outlet | 50 |
| Vertical Drain | 50 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

## **Seeps (Seeps)**

**Description:** Subsurface saturated flows that percolate slowly to the surface, degrades water resources, or restrict capability of land to support its intended use.

**Objective:** Reduce amount of water coming from seeps.

**Analysis within CART:**

Each PLU, regardless of land use, will be assessed and a threshold value of 50 will be set. The assessment will trigger a soil data web service to determine if the soil map units have a hydric rating of 1 or greater in Web Soil Survey and occur on a slope gradient of 3% or more. If the web service doesn’t trigger a positive response to the parameters, the planner will identify the presence or absence of this resource concern based on photo interpretation and site-specific conditions. These conditions will include “wet spot” special point features on a Web Soil Survey map, aerial imagery showing vegetation color and type differences consistent with a seep pattern, or both. The site will default to an assessed status for seep if neither the web services nor planner input come back positive for the questions and an existing condition value of 50 will be set for PLUs identified for potential seeps. The existing condition question will set the existing score as seen in *figure 37*.

*Figure 37: Seep Existing Condition*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Seeps are not present on the PLU. | 60 |
| Seeps do not negatively affect the intended use of the PLU. | 51 |
| Seeps occur and do negatively affect the intended use of the PLU. | 1 |

The existing condition will be combined with conservation practices and activity points to make up the entirety of the ranking for the resource concern. Some example practice points are identified in *figure 38*.

*Figure 38: Typical Practices Affecting Seeps*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Access Control | 20 |
| Diversion | 20 |
| Lined Waterway | 20 |
| Mole Drain | 20 |
| Open Channel | 20 |
| Pond Sealing or Lining, Compacted Soil Treatment | 20 |
| Pond Sealing or Lining, Flexible Membrane | 20 |
| Pond Sealing or Lining, Concrete | 20 |
| Spring Development | 20 |
| Subsurface Drain | 40 |
| Surface Drainage, Field Ditch | 20 |
| Surface Drainage, Main or Lateral | 20 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

## **Drift Snow (Drifted Snow)**

**Description:** Wind-blown snow accumulates around and over surface structures, restricting access to humans and animals. Wind removes snow from desired locations where it can be used to accumulate water.

**Objective:** Control where snow drifts accumulate.

**Analysis within CART:**

Each PLU, regardless of land use, will default to a “not assessed” status for drift snow (potential for designated priority areas). The planner will identify this resource concern based on site-specific conditions. A threshold value of 50 will be set and existing condition question will be triggered. The existing condition question will set the existing score as seen in *figure 39*.

*Figure 39: Drifted Snow Existing Condition*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Drifted snow does not occur in planning area. | 51 |
| Drifted snow causes damage to buildings or structures; interferes with livestock accessing food, water, or shelter; interferes with access to essential agricultural operations; planner or client can document that retention or accumulation of snow in strategic locations is beneficial to the enterprise. | 1 |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Some example practice points are identified in *figure 40*.

*Figure 40: Typical Practices Affecting Drifted Snow*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Alley Cropping | 51 |
| Conservation Cover | 20 |
| Cover Crop | 10 |
| Fence | 51 |
| Hedgerow Planting | 51 |
| Strip Cropping | 51 |
| Tree/Shrub Establishment | 51 |
| Windbreak/Shelterbelt Establishment | 51 |
| Windbreak/Shelterbelt Renovation | 51 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

# **Insufficient Water**

## **Inefficient Moisture Management**

**Description:** Natural precipitation is not optimally managed to support desired land use goals or ecological processes.

**Objective:** Manage natural precipitation more efficiently.

**Analysis within CART:**

Each PLU for crop, pasture, range, and forest will default to a “not assessed” status for naturally available moisture. The planner may also identify this resource concern based on site-specific conditions. NRCS does not have a threshold value for naturally available moisture.

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Some example practice points are identified in *figure 41*.

*Figure 41: Typical Practices Affecting Naturally Available Moisture*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Conservation Crop Rotation (328) | 30 |
| Contour Buffer Strips | 20 |
| Contour Farming | 20 |
| Cover Crop (340) | 30 |
| Cross Wind Trap Strips | 20 |
| Deep Tillage | 20 |
| Forage Harvest Management | 10 |
| Forest Stand Improvement | 20 |
| Grazing Land Mechanical Treatment | 20 |
| Herbaceous Wind Barriers | 30 |
| Land Smoothing | 30 |
| Mulching | 30 |
| Precision Land Forming | 20 |
| Residue and Tillage Management, No-Till | 40 |
| Residue and Tillage Management, Mulch-Till | 40 |
| Row Arrangement | 40 |
| Salinity and Sodic Soil Management | 20 |
| Tree Shrub Establishment | 30 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

## **Inefficient use of Irrigation (Irrigation Efficiency)**

**Description:** Irrigation water is not stored, delivered, scheduled, or applied efficiently or some combination of these.

**Objective:** Manage irrigation water efficiently.

**Analysis within CART:**

Each PLU for all land uses defaults to a “not assessed” status. The planner may identify this resource concern based on site-specific conditions and a threshold value of 50 will be set. The existing condition question will set the existing score as seen in *figure 42*.

*Figure 42: Irrigation System Type*

|  |  |
| --- | --- |
| Existing Conditions – Indicator or Threshold Basis | Existing Condition Points |
| There is no irrigation water stored on or applied to the PLU. | 51 |
| Irrigation water is poorly managed and fails to meet critical crop growth states even when water is available. | 30 |
| The irrigation delivery system is inadequate to control the rate of flow through the system and to the field. | 30 |
| The conveyance system (ditches, canals, and/or reservoirs) has obvious leaks or soils that are naturally erosive, susceptible to excessive seepage, or both (e.g., sandy and gravelly soils). | 30 |
| The on-field irrigation method is uncontrolled flood. | 30 |
| The irrigation system, regardless of type, is beyond its practice lifespan and there are signs of the system operating below designed efficiency (e.g., unleveled land, leaky nozzles, broken components). | 30 |
| The FIRI rating of the irrigation system is: >80 | 51 |
| The FIRI rating of the irrigation system is: 70-79 | 40 |
| The FIRI rating of the irrigation system is: 60-69 | 30 |
| The FIRI rating of the irrigation system is: 50-59 | 20 |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Some example practice points are identified in *figure 43*.

*Figure 43: Typical Practices Affecting Irrigation Efficiency*

|  |  |
| --- | --- |
| Conservation Practices (Code) | Conservation Management Points |
| Anionic Polyacrylamide (PAM) Application (450) | 30 |
| Dam (420) | 20 |
| Irrigation Canal or Lateral (320) | 30 |
| Irrigation Ditch Lining (428) | 30 |
| Irrigation Field Ditch (388) | 30 |
| Irrigation Land Leveling (464) | 30 |
| Irrigation Pipeline (430) | 30 |
| Irrigation Reservoir (436) | 20 |
| Irrigation System, Microirrigation (441) | 40 |
| Irrigation System, Surface and Subsurface (443) | 40 |
| Irrigation System, Tailwater Recovery (447) | 20 |
| Irrigation Water Management (449) | 40 |
| Pond (378) | 20 |
| Pumping Plant (533) | 20 |
| Sprinkler System (442) | 40 |
| Structure for Water Control (587) | 30 |
| Waterspreading (640) | 10 |
| Water well (642) | 20 |
| Well Decommissioning (351) | 20 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

# **Water Quality**

## **Diffuse Nutrient Transport to Surface Water (Diffuse Nutrient Transport – Surface Water)**

**Description:** Nutrients (organic and inorganic) are transported beyond the edge of the field and therefore have the potential to contaminate surface waters in quantities that degrade water quality and limit its use. Nutrient sources can include both diffuse losses (nonpoint source) from land applied nutrients and concentrated (point source) losses associated with agrichemical and manure storage and handling, as well as direct animal access to sensitive areas. This resource concern only covers diffuse losses from land application of nutrients; concentrated losses are covered under the ***Concentrated Pollutants Transported to Surface and Ground Water*** resource concern.

**Objective:** Reduce diffuse (nonpoint source) nutrient transport beyond the edge of the field and therefore has the potential to contaminate surface water on a national basis to an average of less than 15 lbs of nitrogen loss per acre per year and 31 lbs phosphorus loss per acre per year by requiring a level of conservation management that is appropriate for each site’s potential for diffuse nutrient loss in runoff.

**Analysis within CART:**

* **Diffuse Nutrient Transport to Surface Water:**

Each PLU will have the PLU soil runoff potential determined. Each soil map unit within the PLU will be categorized into one of four soil runoff potentials through the Water Quality Management Services - Soil Runoff, based on its published map unit components. This service utilizes the NRCS-published soils database (SSURGO) according to the chart in *figure 44*. The acre weighted average for the PLU is then determined based on ratings for each soil map unit in the PLU.

*Figure 44: Determining Soil Runoff Potential*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Soil Runoff Potential | Hydrologic Group A | Hydrologic Group B | Hydrologic Group C | Hydrologic Group D |
| Low = 0 | All | Slope <4 | Slope <2 | Slope <2 and K <0.28 and no apparent or perched high water table |
| Moderate = 1 | None | ≥4 Slope <6 and K <0.32 | ≥2 Slope <6 and K <0.28 | ≥2 Slope <6 and K <0.28 and no apparent or perched high water table |
| Moderately High = 2 | None | ≥4 Slope <6 and K ≥0.32 | ≥2 Slope <6 and K ≥0.28 | ≥2 Slope <4 and no apparent or perched high water table |
| High = 3 | None | Slope >6 | Slope >6 | Slope >4 or an apparent or perched high water table |

Using the R factor from R factor service, the PLU soil runoff potential is used to determine the threshold of conservation management points necessary to meet the planning criteria. **Diffuse source nutrient loss to surface water has two components, nitrogen and phosphorus, which have separate thresholds established as seen in** *figure 45* **and** *figure 46***.**

*Figure 45: Determining Diffuse Nitrogen to Surface Water Threshold*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Soil Vulnerability to Runoff | R Factor | | | |
| ≤50 | >50-150 | >150-250 | >250 |
| High | 25 | 55 | 70 | 90 |
| Moderately High | 25 | 40 | 40 | 45 |
| Moderate | 25 | 40 | 40 | 40 |
| Low | 25 | 30 | 30 | 30 |

*Figure 46: Determining Diffuse Phosphorus to Surface Water Threshold*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Soil Vulnerability to Runoff | R Factor | | | |
| ≤50 | >50-150 | >150-250 | >250 |
| High | 25 | 60 | 75 | 100 |
| Moderately High | 20 | 40 | 50 | 75 |
| Moderate | 20 | 25 | 25 | 30 |
| Low | 15 | 15 | 20 | 20 |

The existing condition question will set the existing condition points as seen in *figure 47*.

*Figure 47: Existing Rotation Residue Value*

|  |  |  |
| --- | --- | --- |
| Crop Rotation Residue Level | N Surface Water Credit | P Surface Water Credit |
| **No Residue**   * No crop (bare ground), any tillage type | 0 | 0 |
| **Very Low Residue**   * Fragile residue crops, any tillage type | 5 | 10 |
| **Low Residue**   * Fragile residue crops, cover crop, any tillage type * Durable residue crops, any tillage type * At least one conserving use crop in the rotation with the rest—   + Any crops, any tillage type | 10 | 15 |
| **Moderate Residue**   * Fragile residue crops, cover crop, reduced or no-till * Durable residue crops, harvested just for grain, reduced till * Durable residue crops, fully harvested, cover crop, reduced till * At least half the rotation in conserving use crops with the rest—   + Fragile residue crops, cover crop, reduced till   + Durable residue crops, harvested just for grain, reduced till   + Durable residue crops, fully harvested, cover crop, reduced till | 15 | 20 |
| **Moderately High Residue**   * Durable residue crops, harvested just for grain, no-till * Durable residue crops, fully harvested, cover crop, no-till * Mostly conserving use crops in the rotation with the rest—   + Fragile residue crops, cover crop, no-till   + Durable residue crops harvested just for grain, no-till   + Durable residue crops, fully harvested, cover crop, no-till | 20 | 25 |
| **High Residue**   * Conserving use crops, no tillage | 25 | 30 |

Conservation practices and activities are then added to the residue management point score to determine the state of the management system. Some example practice points are identified in *figure 48*.

*Figure 48: Typical Practices Affecting Nutrient Transport to Surface Water*

|  |  |  |
| --- | --- | --- |
| Conservation Practices | Nitrogen Conservation Management Points | Phosphorus Conservation Management Points |
| Nutrient Management (590) | 15 | 15 |
| Contour Buffer Strips (332) | 30 | 30 |
| Cover Crop (340) | 10 | 20 |
| Denitrifying Bioreactor (605) | 30 |  |
| Wetland Creation (658) | 30 | 30 |
| Drainage Water Management (554) | 25 | 10 |
| Filter Strip (393) | 5 | 15 |
| Grassed Waterway (412) | 5 | 10 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

## **Diffuse Nutrient Transport to Groundwater (Diffuse Nutrient Transport - Groundwater)**

**Description:** Nutrients (organic and inorganic) are transported below the rootzone to groundwater in quantities that could degrade water quality and limit its use. Nutrient sources can include both diffuse losses (nonpoint source) from land applied nutrients and concentrated (point source) losses associated with agrichemical and manure storage and handling, as well as direct animal access to sensitive areas. This resource concern only covers diffuse losses from land application of nutrients - concentrated losses are covered under the ***Concentrated Pollutants Transported to Surface and Ground Water*** resource concern.

**Objective:** Reduce diffuse (nonpoint source) nutrient transport below the rootzone to groundwater on a national basis to an average of less than 25 lbs of nitrogen loss per acre per year and 1 lb of phosphorus loss per acre per year by requiring a level of management that is appropriate for each site’s potential for nutrient leaching loss. Reduce concentrated (point source) nutrient transport to groundwater by requiring appropriate management wherever concentrated sources are identified by the planner.

**Analysis within CART:**

* **Diffuse Nutrient Transport to Groundwater:**

Each PLU will the PLU soil leaching potential determined. Each soil map unit within the PLU will be categorized into one of four soil leaching potentials through the Water Quality Management Services - Soil Leaching, based on published map unit components. The service utilizes the NRCS-published soils database (SSURGO) according to the chart in *figure 49*. The acre weighted average rating for the PLU is then determined based on ratings for each soil map unit in the PLU.

*Figure 49: Determining Soil Leaching Potential*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Leaching Potential | Hydrologic Group A | Hydrologic Group B | Hydrologic Group C | Hydrologic Group D |
| Low = 0 |  | Slope ≤12 and K factor <0.24 |  | All except histosols or high water table ≤76 cm |
| Moderate = 1 |  | Slope >12 and K factor ≥0.24, except histosols or high water table ≤76 cm | All except histosols or high water table ≤76 cm |  |
| Moderately High = 2 | Slope >12, except histosols or high water table ≤76 | Slope ≥3 and ≤12 and K factor <0.24, except histosols or high water table ≤76 cm |  |  |
| High = 3 | Slope ≤12 or histosols or high water table ≤76 cm | Slope <3 and K factor <0.24 or histosols or high water table ≤76 cm | histosols or high water table ≤76 cm | histosols or high water table ≤76 cm |

Using the R factor from R factor service, the PLU soil leaching potential is used to determine the threshold of conservation management points necessary to meet the planning criteria. **Diffuse nutrient loss to groundwater has two components, nitrogen and phosphorus, which have thresholds established as seen in** *figure 50* **and** *figure 51***.**

*Figure 50: Determining Diffuse Nitrogen to Groundwater Threshold*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Leaching Vulnerability | R Factor | | | |
| ≤50 | >50-150 | >150-250 | >250 |
| High | 25 | 45 | 45 | 50 |
| Moderately High | 25 | 35 | 40 | 45 |
| Moderate | 25 | 30 | 35 | 45 |
| Low | 25 | 30 | 30 | 45 |

*Figure 51: Determining Diffuse Phosphorus to Groundwater Threshold*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Leaching Vulnerability | R Factor | | | |
| ≤50 | >50-150 | >150-250 | >250 |
| High | 15 | 20 | 35 | 55 |
| Moderately High | 10 | 15 | 35 | 55 |
| Moderate | 10 | 15 | 30 | 55 |
| Low | 10 | 10 | 20 | 45 |

Conservation practices and activities are added to determine the state of the management system. Some example practice points are identified in *figure 52*.

*Figure 52: Typical Practices Affecting Diffuse Nutrient Transport to Groundwater*

|  |  |  |
| --- | --- | --- |
| Conservation Practices | Nitrogen Conservation Management Points | Phosphorus Conservation Management Points |
| Contour Buffer Strips (332) | 10 | 5 |
| Cover Crop (340) | 10 | 20 |
| Saturated Buffer (604) | 20 | 10 |
| Riparian Forest Buffer (391) | 30 | 15 |
| Drainage Water Management (554) | 15 | 5 |
| Irrigation Water Management (449) | 20 | 20 |
| Nutrient Management (590) | 15 | 15 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

## **Diffuse Pesticide Transport to Surface Water (Diffuse Pesticide Transport – Surface Water)**

**Description:** Pesticides are lost from their application area beyond the edge of the field and therefore could be transported to surface water sources in quantities that degrade water quality and limit its use.

**Objective:** Reduce hazardous diffuse pesticide losses that can be transported to surface water sources.

**Analysis within CART:**

Each PLU will have the PLU soil runoff potential determined. Each soil map unit within the PLU will be categorized into one of four soil runoff potentials through the Water Quality Management Services - Soil Runoff, based on its published map unit components. This service utilizes the NRCS-published soils database (SSURGO) according to the chart in *figure 53*. The acre weighted average rating for the PLU is then determined based on rating for each soil map unit in the PLU.

*Figure 53: Determining Soil Runoff Potential*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Soil Runoff Potential | Hydrologic Group A | Hydrologic Group B | Hydrologic Group C | Hydrologic Group D |
| Low = 0 | All | Slope <4 | Slope <2 | Slope <2 and K <0.28 and no apparent or perched high water table |
| Moderate = 1 | None | ≥4 Slope <6 and K <0.32 | ≥2 Slope <6 and K <0.28 | ≥2 Slope <6 and K <0.28 and no apparent or perched high water table |
| Moderately High = 2 | None | ≥4 Slope <6 and K ≥0.32 | ≥2 Slope <6 and K ≥0.28 | ≥2 Slope <4 and no apparent or perched high water table |
| High = 3 | None | Slope >6 | Slope >6 | Slope >4 or an apparent or perched high water table |

All PLUs will select a cropping category for each rotation, which will be used to determine the pesticide cropping risk based on the likelihood of pesticide use and risk. If more than one cropping category is used in a rotation, the highest-risk category for the rotation will be used for the PLU analysis from the list in *figure 54* below.

*Figure 54: Cropping Risk Categories for Pesticide Loss*

|  |  |
| --- | --- |
| Cropping Category | Pesticide Cropping Risk |
| Fruit crops, including orchards, and cotton | High |
| Seed and vegetable crops | Moderately High |
| Commodity crops | Moderate |
| Grass/hay crops | Low |

A threshold for diffuse pesticide loss – surface water will be established using the PLU’s acre weighted WIN-PST soil runoff potential, R factor, and crop risk category based on *figure 55*.

*Figure 55: Determining Diffuse Pesticide Loss to Surface Water Threshold*

Dry Climate: ≤50 R Factor

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Soil Vulnerability to Runoff | Cropping Risk Category | | | |
| Low | Medium | Moderately High | High |
| High | 15 | 30 | 30 | 30 |
| Moderately High | 15 | 30 | 30 | 30 |
| Moderate | 15 | 15 | 30 | 30 |
| Low | 15 | 15 | 15 | 15 |

Humid Climate: >50 R Factor

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Soil Vulnerability to Runoff | Cropping Risk Category | | | |
| Low | Medium | Moderately High | High |
| High | 30 | 60 | 60 | 60 |
| Moderately High | 30 | 60 | 60 | 60 |
| Moderate | 15 | 30 | 60 | 60 |
| Low | 15 | 15 | 30 | 30 |

The existing condition question will set the existing score as seen in *figure 56*.

*Figure 56: Existing Rotation Residue Value*

|  |  |
| --- | --- |
| Crop Rotation Residue Level | Pesticide Runoff Credit |
| **No Residue**   * No crop (bare ground), any tillage type | 0 |
| **Very Low Residue**   * Fragile residue crops, any tillage type | 5 |
| **Low Residue**   * Fragile residue crops, cover crop, any tillage type * Durable residue crops, any tillage type * At least one conserving use crop in the rotation with the rest—   + Any crops, any tillage type | 10 |
| **Moderate Residue**   * Fragile residue crops, cover crop, reduced or no-till * Durable residue crops, harvested just for grain, reduced till * Durable residue crops, fully harvested, cover crop, reduced till * At least half the rotation in conserving use crops with the rest—   + Fragile residue crops, cover crop, reduced till   + Durable residue crops, harvested just for grain, reduced till   + Durable residue crops, fully harvested, cover crop, reduced till | 15 |
| **Moderately High Residue**   * Durable residue crops, harvested just for grain, no-till * Durable residue crops, fully harvested, cover crop, no-till * Mostly conserving use crops in the rotation with the rest—   + Fragile residue crops, cover crop, no-till   + Durable residue crops harvested just for grain, no-till   + Durable residue crops, fully harvested, cover crop, no-till | 20 |
| **High Residue**   * Conserving use crops, no tillage | 25 |

Conservation management points to meet the planning criteria are established according to selected conservation practices. Some example practice points are identified in *figure 57*.

*Figure 57: Typical Practices Affecting Diffuse Pesticides - Surface Water*

|  |  |  |
| --- | --- | --- |
| Conservation Practices | Pesticide Soluble Runoff Conservation Management Points | Pesticide Adsorbed Runoff Conservation Management Points |
| Cover Crop | 5 | 5 |
| Filter Strip | 10 | 20 |
| IPM (595) - Low | 15 | 15 |
| IPM (595) - Basic | 30 | 30 |
| IPM (595) - Advanced | 60 | 60 |

**\*Low Level IPM/PM:** Follow the label and utilize published extension recommendations that include resistance management techniques to help avoid things like herbicide-resistant weeds in no-till.

**\*Basic IPM**: IPM for production that uses all *low IPM requirements* + using all types of monitoring (current pests, past history, weed check strips, weather and conditions at the site, etc.), action thresholds for making applications, and anything else that helps make pest management decisions as efficient as possible from a production standpoint.

**\*Advanced IPM:** What 595 has traditionally supported with all *basic IPM requirements* + site-specific risk prevention and mitigation based on WIN-PST results.

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

## **Diffuse Pesticide Transport to Groundwater (Diffuse Pesticide Transport - Groundwater)**

**Description:** Pesticide losses from the application area are transported to groundwater sources in quantities that degrade water quality and limit its use.

**Objective:** Reduce hazardous nonpoint pesticide losses that can be transported to groundwater sources.

**Analysis within CART:**

Each PLU will have its WIN-PST soil leaching potential (SLP) determined.

**SLP** Algorithm:

HYD -- Hydrologic Group.  
KFACT -- Soil K factor.  
OM1 -- % surface horizon organic matter content.  
Horiz\_1\_Depth -- Depth of the first soil horizon, in inches.

If (HYD == “D”) and (KFACT is null) and the soil taxonomic class is histisol (i.e., organic soil), use a KFACT of 0.02 in the algorithm below. If the surface horizon is organic, the KFACT is null and the soil taxonomic class is not organic (i.e., mineral) then use the KFACT of the fist mineral horizon. See the definition for KFACT.

If ((HYD == “A”) and ((OM1 \* Horiz\_1\_Depth) <= 30)) or  
((HYD == “B”) and ((OM1 \* Horiz\_1\_Depth) <= 9) and (KFACT <= 0.48)) or  
((HYD == “B”) and ((OM1 \* Horiz\_1\_Depth) <= 15) and (KFACT <= 0.26))  
SLP = HIGH  
  
otherwise  
  
if ((HYD == “B”) and ((OM1 \* Horiz\_1\_Depth) >= 35) and (KFACT >= 0.40)) or  
((HYD == “B”) and ((OM1 \* Horiz\_1\_Depth) >= 45) and (KFACT >= 0.20)) or  
((HYD == “C”) and ((OM1 \* Horiz\_1\_Depth) <= 10) and (KFACT >= 0.28)) or  
((HYD == “C”) and ((OM1 \* Horiz\_1\_Depth) >= 10))  
SLP = LOW  
  
otherwise  
  
if (HYD == “D”)  
SLP = VERY LOW  
  
otherwise  
  
SLP = INTERMEDIATE

Site Conditions:

HWT : HIGH

Each soil map unit component within the PLU will be categorized into one of four WIN-PST soil leaching potentials through the Water Quality Management Services – WIN-PST Soil Leaching. The service utilizes the NRCS-published soils database (SSURGO) data according to published WIN-PST criteria. The acre weighted average is then determined and applied to the PLU.

All PLUs will select a cropping category for each rotation which will be used to determine pesticide cropping risk based on the general likelihood of pesticide use and risk. If more than one cropping category is used in a rotation, the highest risk category for the rotation will be used for the PLU analysis from the list in *figure 58* below.

*Figure 58: Cropping Risk Categories for Pesticide Loss*

|  |  |
| --- | --- |
| Cropping Category | Pesticide Cropping Risk |
| Fruit crops, including orchards, and cotton | High |
| Seed and vegetable crops | Moderately High |
| Commodity crops | Moderate |
| Grass/hay crops | Low |

A threshold for pesticide loss – groundwater will be established using the PLU’s acre weighted WIN-PST soil runoff potential, R factor, and crop risk category based on *figure 59* below.

*Figure 59: Determining Pesticide Loss to Groundwater Threshold*

Dry Climate: ≤50 R Factor

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Soil Vulnerability to Leaching | Cropping Risk Category | | | |
| Low | Medium | Moderately High | High |
| High | 15 | 30 | 30 | 30 |
| Moderately High | 15 | 30 | 30 | 30 |
| Moderate | 15 | 15 | 30 | 30 |
| Low | 15 | 15 | 15 | 15 |

Humid Climate: >50 R Factor or Dry Climate with Irrigation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Soil Vulnerability to Leaching | Cropping Risk Category | | | |
| Low | Medium | Moderately High | High |
| High | 30 | 60 | 60 | 60 |
| Moderately High | 30 | 60 | 60 | 60 |
| Moderate | 15 | 30 | 60 | 60 |
| Low | 15 | 15 | 30 | 30 |

The existing condition question will set the existing score as seen in *figure 60*.

*Figure 60: Existing Rotation Residue Value*

|  |  |
| --- | --- |
| Crop Rotation Residue Level | Pesticide Leaching Credit |
| **No Residue**   * No crop (bare ground), any tillage type | 0 |
| **Very Low Residue**   * Fragile residue crops, any tillage type | 3 |
| **Low Residue**   * Fragile residue crops, cover crop, any tillage type * Durable residue crops, any tillage type * At least one conserving use crop in the rotation with the rest—   + Any crops, any tillage type | 6 |
| **Moderate Residue**   * Fragile residue crops, cover crop, reduced or no-till * Durable residue crops, harvested just for grain, reduced till * Durable residue crops, fully harvested, cover crop, reduced till * At least half the rotation in conserving use crops with the rest—   + Fragile residue crops, cover crop, reduced till   + Durable residue crops, harvested just for grain, reduced till   + Durable residue crops, fully harvested, cover crop, reduced till | 9 |
| **Moderately High Residue**   * Durable residue crops, harvested just for grain, no-till * Durable residue crops, fully harvested, cover crop, no-till * Mostly conserving use crops in the rotation with the rest—   + Fragile residue crops, cover crop, no-till   + Durable residue crops harvested just for grain, no-till   + Durable residue crops, fully harvested, cover crop, no-till | 12 |
| **High Residue**   * Conserving use crops, no tillage | 15 |

Conservation management points to meet the planning criteria are established according to selected conservation Practices. Some example practice points are identified in *figure 61*.

*Figure 61: Typical Practices Affecting Pesticides - Groundwater*

|  |  |
| --- | --- |
| Conservation Practices | Pesticide Leaching Loss Conservation Management Points |
| Cover Crop | 5 |
| IPM (595) - Low | 15 |
| IPM (595) - Basic | 30 |
| IPM (595) - Advanced | 60 |

**\*Low Level IPM/PM:** Follow the label and utilize published extension recommendations that include resistance management techniques to help avoid things like herbicide-resistant weeds in no-till.

**\*Basic IPM**: IPM for production that uses all *low IPM requirements* + using all types of monitoring (current pests, past history, weed check strips, weather and conditions at the site, etc.), action thresholds for making applications, and anything else that helps make pest management decisions as efficient as possible from a production standpoint.

**\*Advanced IPM:** What 595 has traditionally supported with all *basic IPM requirements* + site-specific risk prevention and mitigation based on WIN-PST results.

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

## **Diffuse Pathogens and Chemicals from Manure, Biosolids, or Compost Application Transported to Surface Water (Diffuse Pathogens – Surface Water)**

**Description:** Pathogens, pharmaceuticals, and chemicals from land applied manure, biosolids, or compost are transported to surface waters in quantities that degrade water quality and limit its use. Sources can include both diffuse losses (nonpoint source) from land application and concentrated (point source) losses associated with agrichemical and manure storage and handling and direct animal access to sensitive areas. This resource concern covers diffuse losses from land application of manures or livestock on the PLU.

**Objective:** Reduce transport of pathogens, pharmaceuticals, and polluting chemicals from manure, biosolids, or compost to surface water.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for pathogens – surface water. The planner will identify this resource concern based on site-specific conditions such as application of manures, or presence of livestock on the PLU. Where identified, at least 50 points of pathogen mitigation will be required from appropriate conservation practices and activities that have pathogen credits, such as waste treatment.

* **Diffuse Pathogen Transport to Surface Water:**

Each PLU will have the PLU soil runoff potential determined. Each soil map unit within the PLU will be categorized into one of four soil runoff potentials through the Water Quality Management Services - Soil Runoff, based on its published map unit components. This service utilizes the NRCS-published soils database (SSURGO) according to the chart in *figure 62*. The acre weighted average for the PLU is then determined based on ratings for each soil map unit in the PLU.

*Figure 62: Soil Runoff Potential*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Soil Runoff Potential | Hydrologic Group A | Hydrologic Group B | Hydrologic Group C | Hydrologic Group D |
| Low = 0 | All | Slope <4 | Slope <2 | Slope <2 and K <0.28 and no apparent or perched high water table |
| Moderate = 1 | None | ≥4 Slope <6 and K <0.32 | ≥2 Slope <6 and K <0.28 | ≥2 Slope <6 and K <0.28 and no apparent or perched high water table |
| Moderately High = 2 | None | ≥4 Slope <6 and K ≥0.32 | ≥2 Slope <6 and K ≥0.28 | ≥2 Slope <4 and no apparent or perched high water table |
| High = 3 | None | Slope >6 | Slope >6 | Slope >4 or an apparent or perched high water table |

Using the R factor from R factor service, the PLU soil runoff potential is used to determine the threshold of conservation management points necessary to meet the planning criteria.

*Figure 63: Determining Pathogens to Surface Water Threshold*

Dry Climate: ≤50 R Factor

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Soil Vulnerability to Runoff (Surface Loss) | Cropping Risk Category | | | |
| Low | Medium | Moderately High | High |
| High | 15 | 30 | 30 | 30 |
| Moderately High | 15 | 30 | 30 | 30 |
| Moderate | 15 | 15 | 30 | 30 |
| Low | 15 | 15 | 15 | 15 |

Humid Climate: >50 R Factor or with Irrigation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Soil Vulnerability to Surface Loss | Cropping Risk Category | | | |
| Low | Medium | Moderately High | High |
| High | 30 | 60 | 60 | 60 |
| Moderately High | 30 | 60 | 60 | 60 |
| Moderate | 15 | 30 | 60 | 60 |
| Low | 15 | 15 | 30 | 30 |

The existing condition question will set the existing score as seen in *figure 64*.

*Figure 64: Crop Rotation Management Points*

|  |  |
| --- | --- |
| Crop Rotation Residue Level | N Surface Water Credit |
| **No Residue**   * No crop (bare ground), any tillage type | 0 |
| **Very Low Residue**   * Fragile residue crops, any tillage type | 5 |
| **Low Residue**   * Fragile residue crops, cover crop, any tillage type * Durable residue crops, any tillage type * At least one conserving use crop in the rotation with the rest—   + Any crops, any tillage type | 10 |
| **Moderate Residue**   * Fragile residue crops, cover crop, reduced or no-till * Durable residue crops, harvested just for grain, reduced till * Durable residue crops, fully harvested, cover crop, reduced till * At least half the rotation in conserving use crops with the rest—   + Fragile residue crops, cover crop, reduced till   + Durable residue crops, harvested just for grain, reduced till   + Durable residue crops, fully harvested, cover crop, reduced till | 15 |
| **Moderately High Residue**   * Durable residue crops, harvested just for grain, no-till * Durable residue crops, fully harvested, cover crop, no-till * Mostly conserving use crops in the rotation with the rest—   + Fragile residue crops, cover crop, no-till   + Durable residue crops harvested just for grain, no-till   + Durable residue crops, fully harvested, cover crop, no-till | 20 |
| **High Residue**   * Conserving use crops, no tillage | 25 |

Conservation practices and activities are then added to the residue management point score to determine the state of the management system. Some example practice points are identified in *figure 65*.

*Figure 65: Typical Practices Affecting Pathogen Transport to Surface Water*

|  |  |
| --- | --- |
| Conservation Practices | Pathogen Conservation Management Points |
| NM (590) | 5 |
| Contour Buffer Strips (332) | 15 |
| Cover Crop (340) | 5 |
| Denitrifying Bioreactor (605) | 15 |
| Drainage Water Management (554) | 15 |
| Filter Strip (393) | 5 |
| Grassed Waterway (412) | 5 |
| Wetland Creation (658) | 15 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

## **Diffuse Pathogens and Chemicals from Manure, Biosolids, or Compost Application Transported to Groundwater (Diffuse Pathogens – Groundwater)**

**Description:** Pathogens, pharmaceuticals, and chemicals from land applied manure, biosolids, or compost are transported to groundwater in quantities that degrade water quality and limit its use. Sources can include both diffuse losses (nonpoint source) from land application and concentrated (point source) losses associated with agrichemical and manure storage and handling and direct livestock access to sensitive areas. This resource concern only covers diffuse losses from land application or livestock on the PLU.

**Objective:** Reduce transport of pathogens, pharmaceuticals, and polluting chemicals from manure, biosolids, or compost to groundwater.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for pathogens – groundwater. The planner will identify this resource concern based on site-specific conditions such as application of manures, or presence of livestock on the PLU. Where identified, at least 50 points of pathogen mitigation will be required from appropriate conservation practices and activities that have pathogen credits, such as waste treatment.

* **Diffuse Pathogen Transport to Groundwater:**

Each PLU will have the PLU soil runoff potential determined. Each soil map unit within the PLU will be categorized into one of four soil runoff potentials through the Water Quality Management Services - Soil Runoff, based on its published map unit components. This service utilizes the NRCS-published soils database (SSURGO) according to the chart in *figure 66*. The acre weighted average for the PLU is then determined based on ratings for each soil map unit in the PLU.

*Figure 66: Determining Soil Leaching Potential*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Leaching Potential | Hydrologic Group A | Hydrologic Group B | Hydrologic Group C | Hydrologic Group D |
| Low = 0 |  | Slope ≤12 and K factor <0.24 |  | All except histosols or high water Table ≤76 cm |
| Moderate = 1 |  | Slope >12 and K factor ≥0.24, except histosols or high water table ≤76 cm | All except histosols or high water table ≤76 cm |  |
| Moderately High = 2 | Slope >12, except histosols or high water table ≤76 | Slope ≥3 and ≤12 and K factor <0.24, except histosols or high water table ≤76 cm |  |  |
| High = 3 | Slope ≤12 or histosols or high water table ≤76 cm | Slope <3 and K factor <0.24 or histosols or high water table ≤76 cm | histosols or high water table ≤76 cm | histosols or high water table ≤76 cm |

Using the R factor from R factor service, the PLU soil runoff potential is used to determine the threshold of conservation management points necessary to meet the planning criteria.

*Figure 67: Determining Pathogens to Groundwater Threshold*

Dry Climate: ≤50 R Factor

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Soil Vulnerability to Leaching Loss | Cropping Risk Category | | | |
| Low | Medium | Moderately High | High |
| High | 15 | 30 | 30 | 30 |
| Moderately High | 15 | 30 | 30 | 30 |
| Moderate | 15 | 15 | 30 | 30 |
| Low | 15 | 15 | 15 | 15 |

Humid Climate: >50 R Factor or Irrigated Dry Climate

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Soil Vulnerability to Leaching Loss | Cropping Risk Category | | | |
| Low | Medium | Moderately High | High |
| High | 30 | 60 | 60 | 60 |
| Moderately High | 30 | 60 | 60 | 60 |
| Moderate | 15 | 30 | 60 | 60 |
| Low | 15 | 15 | 30 | 30 |

All PLUs will be asked to select a rotation. Conservation management points for pathogens to surface water are summed separately by looking at the current rotation as modified by tillage, crop residue removal, and grazing, as well as the conservation practices implemented to address losses to surface water.

To determine the rotational conservation points, the crop residue score is multiplied by tillage and grazing modifiers as appropriate by their proportion of the rotation. The resulting residue score has associated sediment management points. Some example rotational conservation management points are included in *figure 68*.

*Figure 68: Existing Rotation Residue Value*

|  |  |
| --- | --- |
| Crop Rotation Residue Level | N Surface Water Credit |
| **No Residue**   * No crop (bare ground), any tillage type | 0 |
| **Very Low Residue**   * Fragile residue crops, any tillage type | 5 |
| **Low Residue**   * Fragile residue crops, cover crop, any tillage type * Durable residue crops, any tillage type * At least one conserving use crop in the rotation with the rest—   + Any crops, any tillage type | 10 |
| **Moderate Residue**   * Fragile residue crops, cover crop, reduced or no-till * Durable residue crops, harvested just for grain, reduced till * Durable residue crops, fully harvested, cover crop, reduced till * At least half the rotation in conserving use crops with the rest—   + Fragile residue crops, cover crop, reduced till   + Durable residue crops, harvested just for grain, reduced till   + Durable residue crops, fully harvested, cover crop, reduced till | 15 |
| **Moderately High Residue**   * Durable residue crops, harvested just for grain, no-till * Durable residue crops, fully harvested, cover crop, no-till * Mostly conserving use crops in the rotation with the rest—   + Fragile residue crops, cover crop, no-till   + Durable residue crops harvested just for grain, no-till   + Durable residue crops, fully harvested, cover crop, no-till | 20 |
| **High Residue**   * Conserving use crops, no tillage | 25 |

Conservation practices and activities are then added to the residue management point score to determine the state of the management system. Some example practice points are identified in *figure 69*.

*Figure 69: Typical Practices Affecting Pathogen Transport to Groundwater*

|  |  |
| --- | --- |
| Conservation Practices | Pathogen Conservation Management Points |
| NM (590) | 15 |
| Cover Crop (340) | 5 |
| Denitrifying Bioreactor (605) | 15 |
| Drainage Water Management (554) | 15 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

## **Salts Transported to Surface Water (Salts – Surface Water)**

**Description:** Irrigation or rainfall runoff transports salts to receiving surface waters in quantities that degrade water quality and limit its use.

**Objective:** Limit transfer of salts from site to receiving surface waters.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for salts – surface water. The planner will identify this resource concern based on site-specific conditions such as being in a known salinity project area. Where identified, at least 50 points of salinity mitigation will be required from appropriate conservation practices and activities, including irrigation water management and irrigation tailwater recovery.

## **Salts Transported to Groundwater (Salts – Groundwater)**

**Description:** Irrigation or rainfall runoff transport salts to groundwater in quantities that degrade aquifer water quality and limit its use.

**Objective:** Limit loss of salts from site to groundwater.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for salts – groundwater. The planner will identify this resource concern based on site-specific conditions such as being in a known salinity project area. Where identified, at least 50 points of salinity mitigation will be required from appropriate conservation practices and activities, including irrigation water management.

## **Concentrated Pollutants Transported to Surface and/or Ground Water (Petroleum, Agrichemicals (Pesticides and Fertilizers), Manure, Heavy Metals, and Other Pollutants (Concentrated – Surface and/or Ground Water)**

**Description:** Concentrated pollutants (petroleum, agrichemicals, manure (for both nutrients and pathogens), and heavy metals and other chemical pollutants) are lost from areas of concentration (including handling, storage, and processing areas) to receiving surface or ground waters in quantities that degrade water quality and limits its use. This resource concern does not cover naturally occurring salts. This resource concern does not cover diffuse losses (nonpoint source) from land applied nutrients, but it does cover concentrated (point source) losses associated with agrichemical and manure storage and handling as well as direct animal access to sensitive water bodies.

Reduce concentrated contaminant transport to surface water by requiring appropriate management wherever concentrated sources of contaminants are identified by the planner.

**Objective:** Reduce concentrated losses of contaminants from facilities for handling, storing, or processing of petroleum, agrichemicals, manure, heavy metals, etc. to surface or ground water.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for four subcomponent resource concerns: petroleum, agrichemicals (pesticides and fertilizers), manure and heavy metals, etc. under the Concentrated Pollutants – Surface and/or Ground Water resource concern. The planner will identify each applicable subcomponent resource concern based on site-specific conditions such as petroleum storage facilities, agrichemical mixing/loading areas, manure storage areas, mining areas, or other sources of concentrated pollutants. Where identified, at least 50 points of mitigation will be required for each subcomponent resource concern from appropriate conservation practices and activities, such as 50 points of mitigation that is needed for agrichemical mixing and loading areas can be applied with an agrichemical handling facility.

**Water Quality – Petroleum Storage**

**Description:** Petroleum products are stored and handled on site without secondary containment, so they have the potential to contaminant groundwater and surface waters.

**Objective:** Control accidental release of stored petroleum products to prevent contamination of groundwater and surface waters.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for petroleum storage. The planner will identify this resource concern based on site-specific conditions. A threshold value of 50 will be set and the existing condition question will be triggered. The existing condition question will set the existing score as seen in *figure 70*.

*Figure 70: Petroleum Storage*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Petroleum products are not stored and handled on the PLU. | 51 |
| Petroleum products are stored and handled on the PLU, but secondary containment is in place. | 51 |
| Petroleum products are stored and handled on the PLU and secondary containment is **not** in place. | 1 |

Conservation Practices are then added to the existing condition to determine the state of the management system. Example practice points are identified in *figure 71*.

*Figure 71: Typical Practices Affecting Petroleum Storage*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| On-Farm Secondary Containment Facility (319) | 51 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

**Water Quality – Agrichemicals (Pesticides and Fertilizers)**

**Description:** Agrichemical products (pesticides and fertilizers) are stored, mixed, loaded, or handled onsite, so they have the potential to contaminant groundwater and surface waters.

**Objective:** Control accidental release of stored agrichemical products to prevent contamination of groundwater and surface waters.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for agrichemical products. The planner will identify this resource concern based on site-specific conditions. A threshold value of 50 will be set and the existing condition question will be triggered. The existing condition question will set the existing score as seen in *figure 72*.

*Figure 72: Agrichemicals (Pesticides and Fertilizers)*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Agrichemical products (pesticides and fertilizers) are not stored, mixed, loaded, or handled onsite | 61 |
| Agrichemical products (pesticides and fertilizers) are stored, mixed, loaded, or handled onsite with secondary containment | 51 |
| Agrichemical products (pesticides and fertilizers) are stored, mixed, loaded, or handled onsite without secondary containment | 1 |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Example practice points are identified in *figure 73*.

*Figure 73: Typical Practices Affecting Agrichemical Handling*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Agrichemical Handling Facility (309) | 51 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

**Water Quality – Manures, Biosolids, Compost, or Other Nutrient and Pathogen Sources**

**Description:** Manures, biosolids, compost, or other soil amendment and pathogen sources are present on the PLU, so they have the potential to contaminate groundwater and surface waters. The planner will identify this resource concern based on site-specific conditions.

**Objective:** Control accidental release of manures, biosolids, compost, or other nutrient and pathogen sources products to prevent contamination of groundwater and surface waters.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for manures, biosolids, compost, or other nutrient and pathogen sources. The planner will identify this resource concern based on site-specific conditions. A threshold value of 50 will be set and the three existing condition questions will be triggered. The existing condition questions will set the existing score as seen in *figure 74*, *figure 76*, and *figure 78*.

*Figure 74: Manures, Biosolids, Compost, or Other Soil Amendment and Pathogen Sources*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Manures, biosolids, compost, or other soil amendment and pathogen sources are **not** stockpiled or stored on the PLU. | 60 |
| Manures, biosolids, compost, or other soil amendments and pathogen sources are stockpiled or stored on the PLU with adequate containment or treatment (meets State regulations). | 51 |
| Manures, biosolids, compost, or other soil amendment and pathogen sources are stockpiled or stored on the PLU without adequate containment or treatment. | 1 |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Example practice points are identified in *figure 75*.

*Figure 75: Typical Practices Affecting Manures, Biosolids, Compost, or Other Nutrient and Pathogen Sources*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Manure Storage Facility (313) | 51 |
| Short Term Storage of Animal Waste and Byproducts (318) | 51 |
| Composting Facility (317) | 51 |
| Waste Treatment (629) | 51 |
| Waste Recycling (633) | 51 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

*Figure 76: Animal Access to Surface Waterbodies*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Animals do **not** have direct access to surface water bodies | 60 |
| Animals have controlled access to surface water bodies | 51 |
| Animals have uncontrolled access to surface water bodies | 1 |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Example practice points are identified in *figure 77*.

*Figure 77: Typical Practices Affecting Animal Access to Surface Waterbodies*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Watering Facility (614) | 30 |
| Access Control (472) | 30 |
| Fence (382) | 30 |
| Stream Crossing (578) | 30 |
| Spring Development (574) | 30 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

*Figure 78: Animal Confinement Areas*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Animals are **not** present on the PLU. | 60 |
| Animals are present and runoff (including trough overflow and roof runoff) passing through the production area is controlled, and animal waste is stockpiled or stored on the PLU with adequate containment or treatment | 51 |
| Animals are present and runoff (including trough overflow and roof runoff) passing through the production area is not controlled, and animal waste stockpiled or stored on the PLU without adequate containment or treatment | 1 |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Example practice points are identified in *figure 79*.

*Figure 79: Typical Practices Affecting Animal Confinement Areas*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Diversion (362) | 30 |
| Watering Facility (614) | 30 |
| Heavy Use Area Protection (561) | 30 |
| Waste Storage Facility (313) | 30 |
| Roof Runoff Structure (558) | 30 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

**Water Quality – Heavy Metals and Other Pollutants**

**Description:** Heavy metals or other pollutants present on the PLU from mining operations or other activities including storage and handling. Materials containing these pollutant types are present, stored or handled on site, so they have the potential to contaminate groundwater and surface waters. The planner will identify this resource concern based on site-specific conditions.

**Objective:** Control release of heavy metals and other pollutants to prevent contamination of groundwater and surface waters.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for heavy metals or other pollutants present. The planner will identify this resource concern based on site-specific conditions. A threshold value of 51 will be set and the existing condition questions will be triggered. The existing condition questions will set the existing score as seen in *figure 80* and *figure 82*.

*Figure 80: Heavy Metal Contaminants*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Heavy metal contaminants are **not** present on the PLU. | 61 |
| Heavy metal contaminants are present on the PLU, and adequate control or treatment is in place. | 51 |
| Heavy metal contaminants are present on the PLU, but adequate control or treatment is **not** in place. | 1 |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Example practice points are identified in *figure 81*.

*Figure 81: Typical Practices Affecting Heavy Metals*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Land Reclamation, Currently Mined Land (544) | 51 |
| Land Reclamation, Abandoned Mined Land (543) | 51 |
| Land Reclamation, Landslide Treatment (453) | 51 |
| Land Reclamation, Toxic Discharge Control (455) | 51 |
| Waste Recycling (633) | 51 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

*Figure 82: Other Pollutants*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Other pollutants (both agricultural such including feedstocks such as grains, silage, etc. and nonagricultural such as food waste) are **not** stored on the PLU. | 61 |
| Other pollutants (both agricultural including (feedstocks and nonagricultural such as food wastes) are stored on the PLU and adequate control or treatment is in place. | 51 |
| Other pollutants (including feedstocks such as grains, silage, etc.) are stored on the PLU and adequate control or treatment is **not** in place. | 1 |

Conservation practices are then added to the existing condition to determine the state of the management system. Example practice points are identified in *figure 83*.

*Figure 83: Typical Practices Affecting Other Pollutants*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Waste Treatment (629) | 51 |
| Waste Recycling (633) | 51 |
| Waste Separation (632) | 51 |
| Vegetated Treatment Area (635) | 51 |

## **Sediment Transport to Surface Water (Sediment Transport)**

**Description:** Offsite transport of sediment to surface waters degrades water quality and limits uses.

**Objective:** Limit sediment loss from site to surface waters. Sediment delivery from working lands should be limited to less than 2 tons per acre. Appropriate upslope treatment and buffer practices should be in place to address concentrated flow, ephemeral gullies, and classic gullies.

**Analysis within CART:**

Each PLU will have the PLU soil runoff potential determined. Each soil map unit within the PLU will be categorized into one of four soil runoff potentials through the Water Quality Management Services - Soil Runoff, based on its published map unit component corresponding to the chart in *figure 84*. The acre weighted average rating for the PLU is then determined based on ratings for each soil map unit in the PLU.

*Figure 84: Determining Soil Runoff Potential*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Soil Runoff Potential | Hydrologic Group A | Hydrologic Group B | Hydrologic Group C | Hydrologic Group D |
| Low = 0 | All | Slope <4 | Slope <2 | Slope <2 and K <0.28 and no apparent or perched high water table |
| Moderate = 1 | None | ≥4 Slope <6 and K <0.32 | ≥2 Slope <6 and K <0.28 | ≥2 Slope <6 and K <0.28 and no apparent or perched high water table |
| Moderately High = 2 | None | ≥4 Slope <6 and K ≥0.32 | ≥2 Slope <6 and K ≥0.28 | ≥2 Slope <4 and no apparent or perched high water table |
| High = 3 | None | Slope >6 | Slope >6 | Slope >4 or an apparent or perched high water table |

Using the R factor from R factor service, the PLU soil runoff potential is used to determine the threshold of conservation management points necessary to meet the planning criteria, as seen in *figure 85*.

*Figure 85: Determining Sediment Transport Threshold*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Runoff Vulnerability | R Factor | | | |
| ≤50 | >50-150 | >150-250 | >250 |
| High | 5 | 50 | 85 | 100 |
| Moderately High | 5 | 30 | 50 | 85 |
| Moderate | 1 | 15 | 40 | 50 |
| Low | 1 | 1 | 25 | 40 |

The existing condition question will set the existing score as seen in *figure 86*.

*Figure 86: Existing Rotation Residue Value*

|  |  |
| --- | --- |
| Crop Rotation Residue Level | Wind Erosion Credit |
| **No Residue**   * No crop (bare ground), any tillage type | 0 |
| **Very Low Residue**   * Fragile residue crops, any tillage type | 5 |
| **Low Residue**   * Fragile residue crops, cover crop, any tillage type * Durable residue crops, any tillage type * At least one conserving use crop in the rotation with the rest—   + Any crops, any tillage type | 10 |
| **Moderate Residue**   * Fragile residue crops, cover crop, reduced or no-till * Durable residue crops, harvested just for grain, reduced till * Durable residue crops, fully harvested, cover crop, reduced till * At least half the rotation in conserving use crops with the rest—   + Fragile residue crops, cover crop, reduced till   + Durable residue crops, harvested just for grain, reduced till   + Durable residue crops, fully harvested, cover crop, reduced till | 15 |
| **Moderately High Residue**   * Durable residue crops, harvested just for grain, no-till * Durable residue crops, fully harvested, cover crop, no-till * Mostly conserving use crops in the rotation with the rest—   + Fragile residue crops, cover crop, no-till   + Durable residue crops harvested just for grain, no-till   + Durable residue crops, fully harvested, cover crop, no-till | 20 |
| **High Residue**   * Conserving use crops, no tillage | 25 |

\*Fragile residue crops include vegetables and soybeans, durable residue crops include corn and wheat, and conserving use crops include sod-forming perennial grasses.

Conservation practices and activities are then added to the residue management point to determine the state of the management system. Some example practice points are identified in *figure 87*.

*Figure 87: Typical Practices Affecting Sediment Transport*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Constructed Wetland (656) | 15 |
| Contour Buffer Strips (332) | 20 |
| Cover Crop (340) | 20 |
| Filter Strip (393) | 15 |
| Grassed Waterway (412) | 15 |
| Riparian Forest Buffer (391) | 20 |
| Terrace (600) | 30 |
| Water and Sediment Control Basin (638) | 10 |

# **Degraded Plant Condition**

## **Undesirable Plant Productivity and Health (Plant Health)**

**Description:** Improper fertility, management, or plants not adapted to site negatively impact plant productivity, vigor, quality, or some combination of these.

**Objective:** Improve poor plant productivity and health.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for plant productivity and health. The planner may identify this resource concern based on site-specific conditions. The threshold and existing condition questions will set the existing score by land use as identified below in *figure 88* and *figure 89*.

**Crop:**

Each PLU for crop will have a threshold value of 50 set and a benchmark condition set of questions.

*Figure 88: Crop Plant Productivity*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Assessment Condition |
| High | 40 | >100% of potential Crop yield based on soil, climate, and fertility (10 yr. avg. or county avg.) |
| Good | 20 | >75% of potential Crop yield based on soil, climate, and fertility (10 yr. avg.) |
| Fair | 10 | >50% of potential Crop yield based on soil, climate, and fertility (10 yr. avg.) |
| Low | 5 | >20% of potential Crop yield based on soil, climate, and fertility (10 yr. avg.) |
| Poor | 1 | ≤20% of potential Crop yield based on soil, climate, and fertility (10 yr. avg.) |

*Figure 89: Crop Plant Health*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | References for Assessment Condition |
| Plants are healthy | 30 |  |
| Evidence of nutrient deficiency is minimal | 20 |  |
| Evidence of both nutrient deficiency and disease | 5 |  |
| Evidence of plane health damage | 0 |  |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Some example practice points are identified in *figure 90*.

*Figure 90: Typical Practices Affecting Plant Productivity and Health (applied to entire PLU)*

|  |  |
| --- | --- |
| Conservation Systems, Practices, or activities | Conservation Management Points |
| Conservation Crop Rotation | 20 |
| Contour Farming (ac) | 10 |
| Cover Crop | 15 |
| Critical Area Planting | 30 |
| Residue and Tillage Management, Reduced Till (ac) | 20 |
| High Tunnel System (sf) | 5 |
| Alley Cropping | 5 |
| Tree/Shrub Establishment | 20 |
| Windbreak/Shelterbelt Establishment | 10 |
| Multistory Cropping (ac) | 5 |
| Grassed Waterway | 5 |
| Irrigation Water Management | 15 |
| Forage and Biomass Planting (ac) | 20 |
| Prescribed Grazing | 5 |
| Nutrient Management | 15 |
| Integrated Pest Management | 5 |
| Fence | 15 |
| Livestock water system | 10 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

**Pasture:**

Each PLU for Pasture will have a threshold value of 50 set and a benchmark condition set of questions as seen in *figure 91* and *figure 92*.

*Figure 91: Pasture Plant Cover*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| Excellent | 40 | More than 95% live (nondormant) leaf canopy. Remaining is either dead standing material, undesirable, or bare ground |
| Good | 30 | 80-95% live leaf canopy. Remaining is either dead standing material, undesirable, or bare ground. |
| Fair | 10 | 65-80% live leaf canopy. Remaining is either dead standing material, undesirable, or bare ground. |
| Low | 5 | 40-65% is live leaf canopy. Remaining is either dead standing material, undesirable, or bare ground |
| Poor | 1 | Less than 40% is live leaf canopy. Remaining is either dead standing material, undesirable, or bare ground. |

*Figure 92: Pasture Plant Vigor*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| Excellent | 30 | Rapid recovery of desirable forage. All healthy green forage. |
| Good | 20 | Good recovery of desirable forage. Light green and dark green forage present. |
| Fair | 10 | Adequate recovery of desirable forage. Yellowish and dark green areas due to manure and urine patches. |
| Low | 5 | Some recovery. Yellowish green forage, or moderately or slight stunting of desirable forage |
| Poor | 0 | No plant recovery after grazing/harvest. Pale, yellow or brown, or severe stunting of desirable forage |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Some example practice points are identified in *figure 93*.

*Figure 93: Typical Practices Affecting Plant Productivity and Health (Applied to Entire PLU)*

|  |  |
| --- | --- |
| Conservation Systems, Practices, or Activities | Conservation Management Points |
| Brush Management | 10 |
| Herbaceous Weed Control | 10 |
| Critical Area Planting | 10 |
| Windbreak/Shelterbelt Establishment | 5 |
| Silvopasture Establishment | 5 |
| Forage Harvest Management (ac) | 5 |
| Forage and Biomass Planting (ac) | 30 |
| Prescribed Grazing | 30 |
| Range Planting | 30 |
| Nutrient Management | 20 |
| Integrated Pest Management | 10 |
| Fence | 15 |
| Livestock water system | 10 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

**Range:**

Each PLU for range will have a threshold value of 50 set and a benchmark condition set of questions as identified in *figure 94* and *figure 95*.

*Figure 94: Range Plant Vigor*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| None to Slight | 30 | None or slight mortality and/or dying plants or plant parts concentrated in one or more functional or structural groups **or** plant vigor and capability to produce seed or vegetative tillers within one or more functional or structural groups is not reduced or within expected. |
| Slight to Moderate | 20 | Occasional mortality and/or dying plants or plant parts concentrated in one or more functional or structural groups **or** plant vigor and capability to produce seed or vegetative tillers within one or more functional or structural groups is slightly to moderately reduced. |
| Moderate | 10 | Moderate mortality and/or dying plants or plant parts concentrated in one or more functional or structural groups **or** plant vigor and capability to produce seed or vegetative tillers within one or more functional or structural groups is moderately reduced. |
| Moderate to Extreme | 5 | Widespread mortality and/or dying plants or plant parts concentrated in one or more functional or structural groups **or** plant vigor and capability to produce seed or vegetative tillers within one or more functional or structural groups is greatly reduced. |
| Extreme to Total | 0 | Extensive mortality and/or dying plants or plant parts concentrated in one or more functional or structural groups **or** plant vigor and capability to produce seed or vegetative tillers within one or more functional or structural groups is extremely reduced. |

*Figure 95: Range Plant Productivity*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| None to Slight | 30 | >80% of potential total annual production based on ecological site, accounting for recent weather |
| Slight to Moderate | 20 | 61 - 80% of potential total annual production based on ecological site conditions, accounting for recent weather |
| Moderate | 10 | >41 - 60% of potential total annual production based on ecological site conditions, accounting for recent weather |
| Moderate to Extreme | 5 | >21 - 40% of potential total annual production based on ecological site conditions, accounting for recent weather |
| Extreme to Total | 0 | <20% of potential total annual production based on ecological site conditions, accounting for recent weather |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Some example practice points are identified in *figure 96*.

*Figure 96: Typical Practices Affecting Plant Vigor and Productivity*

|  |  |
| --- | --- |
| Conservation Systems, Practices, or activities | Conservation Management Points |
| Brush Management | 20 |
| Herbaceous Weed Control | 5 |
| Prescribed Burning | 25 |
| Critical Area Planting | 1 |
| Prescribed Grazing | 30 |
| Grazing Land Mechanical Treatment (ac) | 15 |
| Range Planting | 20 |
| Fence | 15 |
| Livestock water system | 10 |

**Forest:**

Each PLU for forest will have a threshold value of 50 set and a benchmark condition set of questions as identified in *figure 97* and *figure 98* .

Figure 97: Assessment of Individual Tree Vigor (Health) Within a Forest Stand or Management Unit

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| None-Slight | 40 | Proportion of dead and dying trees or reproductive capability of species relative to the ecological site is <10% |
| Slight-Moderate | 30 | Proportion of dead and dying trees or reproductive capability of species relative to the ecological site is <20% |
| Moderate | 10 | Proportion of dead and dying trees or reproductive capability of species relative to the ecological site is <40% |
| Moderate - Extreme | 5 | Proportion of dead and dying trees or reproductive capability of species relative to the ecological site is <60% |
| Extreme - Total | 1 | Proportion of dead and dying trees or reproductive capability of species relative to the ecological site is >80% |

*Figure 98: Assessment of Individual Tree Productivity Within a Forest Stand or Management Unit*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| None-Slight | 30 | >80% of mean annual increment (MAI) potential production based on locally relevant FIA data |
| Slight-Moderate | 20 | >60% of MAI potential production based on locally relevant FIA data |
| Moderate | 10 | >40% of MAI potential production based on locally relevant FIA data |
| Moderate - Extreme | 5 | >20% of MAI potential production based on locally relevant FIA data |
| Extreme - Total | 0 | <10% of MAI potential production based on locally relevant FIA data |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Some example practice points are identified in *figure 99*.

Figure 99: Typical Practices Affecting Forest Plant Productivity and Health

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Brush Management | 10 |
| Herbaceous Weed Control | 10 |
| Prescribed Burning | 20 |
| Critical Area Planting | 10 |
| Woody Residue Treatment | 25 |
| Riparian Herbaceous Cover | 5 |
| Firebreak | 20 |
| Prescribed Grazing | 20 |
| Range Planting | 15 |
| Tree/Shrub Establishment | 20 |
| Forest Stand Improvement | 25 |
| Windbreak/Shelterbelt Establishment | 5 |
| Alley Cropping | 1 |
| Fence | 15 |
| Livestock water system | 10 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

All other land uses:

Each PLU for other will have a threshold value of 50 set and a benchmark condition set of questions as identified in *figure 100*.

Figure 100: Other Land Uses

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| Excellent | 51 | No significant plant productivity or health related concern exists on this PLU |
| Good | 30 | Some productivity or plant health concerns exist |
| Poor | 1 | Severe lack of health and productivity for plants in the PLU |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Some example practice points are identified in figure 101.

Figure 101: Typical Practices Affecting Forest Plant Productivity and Health

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Alley Cropping (ac) | 15 |
| Herbaceous Weed Control | 20 |
| Prescribed Burning | 5 |
| Critical Area Planting | 20 |
| Multistory Cropping (ac) | 20 |
| Windbreak/Shelterbelt Establishment | 20 |
| Silvopasture Establishment | 5 |
| Fence | 20 |
| Field Border (ac) | 20 |
| Riparian Herbaceous Cover | 20 |
| Riparian Forest Buffer | 20 |
| Filter Strip | 20 |
| Grassed Waterway | 5 |
| Forage and Biomass Planting (ac) | 20 |
| Prescribed Grazing | 10 |
| Range Planting | 1 |
| Nutrient Management | 15 |
| Integrated Pest Management | 20 |
| Saturated Buffer (ft.) | 5 |
| Denitrifying Bioreactor (no) | 5 |
| Tree/Shrub Establishment | 15 |
| Wetland Creation | 15 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

## **Inadequate Structure and Composition**

**Description:** Plant communities have insufficient composition and structure to achieve ecological functions and management objectives. This includes degradation of wetland habitat, targeted ecosystems, or unique plant communities.

**Objective:** Maintain or restore ecological function and stop or reduce degradation to threshold levels or less for the plant communities being evaluated.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for plant **structure and composition**. The planner will identify this resource concern based on site-specific conditions. The threshold and existing condition questions will set the existing score by land use as identified below:

**Crop:**

**Crop Annual: NOT APPLICABLE**

**Crop Perennial:**

Each PLU for crop perennial will have a threshold value of 50 set and a benchmark condition set of questions.

Figure 102: Crop Plant Structure and Composition Existing Condition

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| Excellent | 60 | Existing plant community meets objectives for structure and composition. 81-100% of desired plant diversity & structure are present |
| Good | 50 | 60-80% of desired plant diversity and structure are present |
| Fair | 15 | 20-60% of desired plant diversity & structure are present |
| Poor | 1 | <20% of desired plant diversity & structure are present |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Some example practice points are identified in *figure 103*.

*Figure 103: Typical Practices Affecting Crop Plant Structure and Composition*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Critical Area Planting | 15 |
| Herbaceous Weed Control | 15 |
| Forage and Biomass Planting | 20 |
| Nutrient Management | 10 |
| Silvopasture Establishment | 5 |
| Integrated Pest Management | 20 |
| Forage Harvest Management | 20 |
| Fence | 15 |
| Livestock water system | 10 |

**Pasture:**

Each PLU for pasture will have a threshold value of 50 set and a benchmark condition set of questions.

Figure 104: Pasture Plant Cover

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| Excellent | 40 | More than 95% live (nondormant) leaf canopy. Remaining is either dead standing material, undesirable, or bare ground |
| Good | 30 | 80-95% live leaf canopy. Remaining is either dead standing material, undesirable, or bare ground |
| Fair | 10 | 65-80% live leaf canopy. Remaining is either dead standing material, undesirable, or bare ground |
| Low | 5 | 40-65% is live leaf canopy. Remaining is either dead standing material, undesirable, or bare ground |
| Poor | 1 | Less than 40% is live leaf canopy. Remaining is either dead standing material, undesirable, or bare ground. |

Figure 105: Pasture Plant Diversity

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| Excellent | 30 | Four to five forage species representing three functional groups ((each ≥20% dry matter weight) with at least one being a legume |
| Good | 20 | Three to four forage species (each ≥20% dry matter weight) with at least one being a legume |
| Fair | 10 | Three forage species (each ≥20% dry matter weight) from one functional group. None avoided. Or one forage species each from two functional groups, both supply 25-50% of dry matter weight. |
| Low | 5 | Two to five forage species from one dominant functional group |
| Poor | 0 |  |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Some example practice points are identified in *figure 106*.

*Figure 106: Typical Practices Affecting Pasture Plant Cover and Diversity*

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Critical Area Planting | 10 |
| Herbaceous Weed Control | 15 |
| Forage and Biomass Planting | 10 |
| Nutrient Management | 10 |
| Integrated Pest Management | 10 |
| Prescribed Grazing | 25 |
| Fence | 15 |
| Livestock water system | 10 |

**Range:**

Each PLU for range will have a threshold value of 50 set and a benchmark condition set of questions.

Figure 107: Range Plant Structure and Composition

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| None to Slight | 60 | Vegetation meets similarity index score of 80+; or IIRH biotic integrity attribute rating of none to slight |
| Slight to Moderate | 51 | Vegetation meets similarity index score of 79-60; or IIRH biotic integrity attribute rating of slight to moderate |
| Moderate | 20 | Vegetation meets similarity index score of 59-40; or IIRH biotic integrity attribute rating of moderate |
| Moderate to Extreme | 10 | Vegetation meets similarity index score of 39-20; or IIRH biotic integrity attribute rating of moderate to extreme |
| Extreme to Total | 1 | Vegetation meets similarity index <20; or IIRH biotic integrity attribute rating is extreme to total. |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Some example practice points are identified in *figure 108*.

*Figure 108: Typical Practices Affecting Range Plant Structure and Composition*

|  |  |
| --- | --- |
| Conservation Systems, Practices, or Activities | Conservation Management Points |
| Brush Management | 10 |
| Herbaceous Weed Control | 5 |
| Prescribed Burning | 15 |
| Critical Area Planting | 1 |
| Prescribed Grazing | 30 |
| Grazing Land Mechanical Treatment (ac) | 15 |
| Range Planting | 20 |
| Restoration and Management of Rare and Declining Habitats | 5 |

**Forest:**

Each PLU for forest will have a threshold value of 50 set and a benchmark condition set of questions.

Figure 109: Forest Community Quality

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| None-Slight | 60 | Is density, composition, and age structure >80% of the expected ecological site or other documentation that demonstrates representative plant community? |
| Slight-Moderate | 51 | Is density, composition, and age structure >60% of the expected ecological site or other documentation that demonstrates representative plant community? |
| Moderate | 20 | Is density, composition, and age structure >40% of the expected ecological site or other documentation that demonstrates representative plant community? |
| Moderate - Extreme | 10 | Is density, composition, and age structure >20% of the expected ecological site or other documentation that demonstrates representative plant community? |
| Extreme - Total | 1 | Is density, composition, and age structure <10% of the expected ecological site or other documentation that demonstrates representative plant community? |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Some example practice points are identified in *figure 110*.

Figure 110: Typical Practices Affecting Forest Community Quality

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Integrated Pest Management | 20 |
| Prescribed Grazing | 15 |
| Forest Stand Improvement | 25 |
| Multistory Cropping | 1 |
| Critical Area Planting | 5 |
| Alley Cropping | 5 |
| Tree/Shrub Establishment | 15 |
| Windbreak/Shelterbelt Establishment | 5 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

**All other land uses:**

Each PLU for other will have a threshold value of 50 set and a benchmark condition set of questions.

*Figure 111: Plant Structure and Composition*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| Meets | 51 | The plant community supports the intended land use, client objectives, and the ecological processes are functional. |
| Does not meet | 0 | The plant community does not support the intended land use, client objectives, and the ecological processes are not functional. |

## **Excessive Plant Pest Pressure**

**Description:** Excessive pest damage to plants including that from undesirable plants, diseases, animals, soil borne pathogens, and nematodes. This concern addresses plant, animal, and insect species, including invasive species.

**Objective:** Reduce pest pressure on plants.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for plant pest pressure. The planner may identify this resource concern based on site-specific conditions. A threshold value of 50 will be set and existing condition questions will be triggered. The existing condition question will set the existing score.

**Crop: NRCS policy may exclude funding options on crops**

Figure 112: Plant Pest Pressure Existing Condition

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Weeds, insects, animals, and diseases are not a problem. | 61 |
| Weeds, insects, animals, and diseases are managed according to a pest management plan that is designed to manage the development of pest resistance and maintain acceptable crop quantity and quality. | 51 |
| |  | | --- | | Pest resistance is not managed and weeds, insects, animals, and diseases limit crop quantity or quality beyond tolerable limits. | | 0 |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Some example practice points are identified in *figure 113*.

Figure 113: Typical Practices Affecting Plant Pest Pressure

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Conservation Crop Rotation | 15 |
| Residue and Tillage Management, No Till (ac) | 15 |
| Cover Crop | 15 |
| Field Border (ac) | 5 |
| Nutrient Management | 10 |
| Integrated Pest Management | 51 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

**Pasture:**

Figure 114: Plant Pest Pressure Existing Condition

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Weeds, insects, animals, and diseases are not a problem. | 61 |
| Weeds, insects, animals, and diseases are managed according to a pest management plan that is designed to manage the development of pest resistance and maintain acceptable forage quantity and quality. | 51 |
| |  | | --- | | Pest resistance is not managed and weeds, insects, animals, and diseases limit forage quantity or quality beyond tolerable limits. | | 0 |

Conservation practices and activities are then added to the existing condition to determine the state of the management system.  Some example practice points are identified in *figure 115.*

Figure 115: Typical Practices Affecting Plant Pest Pressure

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Brush Management | 15 |
| Herbaceous Weed Control | 15 |
| Prescribed Burning | 5 |
| Access Control | 5 |
| Forage and Biomass Planting (ac) | 15 |
| Prescribed Grazing | 20 |
| Nutrient Management | 15 |
| Integrated Pest Management | 51 |
| Forage Harvest Management (ac) | 15 |

 \*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

**Range:**

*Figure 116: Plant Pest Pressure Existing Condition*

|  |  |
| --- | --- |
| Existing Condition | Existing Condition Points |
| Weeds, insects, animals, and diseases are not a problem. | 61 |
| Weeds, insects, animals, and diseases are managed according to a pest management plan that addresses pest resistance and maintains acceptable forage quantity and quality. | 51 |
| Pest resistance is not managed and weeds, insects, animals, and diseases limit forage quantity or quality below tolerable limits. | 0 |

Conservation practices and activities are then added to the existing condition to determine the state of the management system.  Some example practice points are identified in *figure 117.*

Figure 117: Typical Practices Affecting Plant Pest Pressure

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Brush Management | 25 |
| Herbaceous Weed Control | 5 |
| Prescribed Burning | 20 |
| Fence | 25 |
| Prescribed Grazing | 20 |
| Range Planting | 20 |
| Integrated Pest Management | 51 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

**Forest:**

Figure 118: Plant Pest Pressure Existing Condition

|  |  |
| --- | --- |
| Existing Condition | Existing Condition Points |
| Weeds, insects, animals, and diseases are not a problem. | 61 |
| Weeds, insects, animals, and diseases are managed according to a pest management plan that addresses pest resistance and maintains acceptable quantity and quality of trees. | 51 |
| Pest resistance is not managed and weeds, insects, animals, and diseases limit quantity or quality of trees below tolerable limits. | 0 |

Conservation practices and activities are then added to the existing condition to determine the state of the management system.  Some example practice points are identified in *figure 119*.

Figure 119: Typical Practices Affecting Plant Pest Pressure

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Brush Management | 15 |
| Herbaceous Weed Control | 15 |
| Forest Harvest Management | 15 |
| Forest Stand Improvement | 15 |
| Forest Trails and Landings | 15 |
| Integrated Pest Management | 51 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

**Associated Agricultural Land and Farmstead:**

Figure 120: Plant Pest Pressure Existing Condition

|  |  |
| --- | --- |
| Existing Condition | Existing Condition Points |
| Weeds, insects, animals, and diseases are not a problem. | 61 |
| Weeds, insects, animals, and diseases are managed according to a pest management plan that addresses pest resistance and maintains desired uses. | 51 |
| Pest resistance is not managed and weeds, insects, animals, and diseases limit desired uses. | 0 |

Conservation practices and activities are then added to the existing condition to determine the state of the management system.  Some example practice points are identified in *figure 121*.

Figure 121: Typical Practices Affecting Plant Pest Pressure

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Brush Management | 15 |
| Herbaceous Weed Control | 15 |
| Conservation Cover | 15 |
| Critical Area Planting | 15 |
| Access Control | 15 |
| Integrated Pest Management | 51 |
| Fence | 15 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

## **Wildfire Hazard, Excessive Biomass Accumulation**

**Description:** The kinds and amounts of plant biomass create wildfire hazards that pose risks to human safety, structures, plants, animals, and air resources.

**Objective:** Reduce biomass accumulation and the risk of wildfire hazard.

**Analysis within CART:**

Each PLU for all land uses will default to a “not assessed” status for wildfire hazard. The planner may identify this resource concern based on site-specific conditions. A threshold value of 50 will be set and existing condition question will be triggered. The existing condition questions will set the existing score as seen in *figure 122* and *figure 123*.

Figure 122: Assessment of Risk and Hazard of Wildfire within All Land Uses Except Forest:

|  |  |  |
| --- | --- | --- |
| Land Use | Answer | Existing Condition Points |
| All except Forest | Accumulation of plant biomass is being managed to reduce the potential risk of wildfire | 60 |
| All except Forest | The potential for wildfire hazard from biomass accumulation exists, but site resources are not at a risk or value level to require fire management | 51 |
| All except Forest | The potential for wildfire hazard from biomass accumulation exists | 31 |
| All except Forest | Significant wildfire hazard from biomass accumulation exists | 1 |

Figure 123: Assessment of Risk and Hazard of Wildfire within a Forest Stand Land Use:

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| None-Slight | 60 | Does the local climate and geography support infrequent fire (300 + years), **and** does the forest condition (surface fuels, and vertical and horizontal continuity) support the ignition and propagation of an active crown fire <10% of the stand or management unit |
| Slight-Moderate | 51 | Does the local climate and geography support moderately infrequent fire (200 - 300 years), **and** does the forest condition (surface fuels, and vertical and horizontal continuity) support the ignition and propagation of an active crown fire <20% of the stand or management unit |
| Moderate | 20 | Does the local climate and geography support moderately frequent fire (100 - 200 years), **and** does the forest condition (surface fuels, and vertical and horizontal continuity) support the ignition and propagation of an active crown fire <50% of the stand or management unit |
| Moderate - Extreme | 10 | Does the local climate and geography support infrequent fire (30 -100 years), **and** does the forest condition (surface fuels, and vertical and horizontal continuity) support the ignition and propagation of an active crown fire <60% of the stand or management unit |
| Extreme - Total | 1 | Does the local climate and geography support frequent fire (<30 years), **and** does the forest condition (surface fuels, and vertical and horizontal continuity) support the ignition and propagation of an active crown fire >80% of the stand or management unit |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Some example practice points are identified in *figure 124*.

Figure 124: Typical Practices Affecting Wildfire Hazard

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Forest Stand Improvement | 30 |
| Woody Residue Treatment | 20 |
| Brush Management | 20 |
| Prescribed Burning | 30 |
| Fuel Break (ac) | 10 |
| Firebreak | 20 |
| Dry Hydrant (no) | 25 |
| Land Clearing | 5 |
| Access Control | 5 |
| Prescribed Grazing | 10 |
| Access Road | 10 |
| Tree/Shrub Pruning | 20 |
| Forest Trails and Landings | 1 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

# **Inadequate Habitat for Fish and Wildlife (Wildlife Habitat)**

## **Terrestrial Habitat**

**Description:** Improper management of natural resources results in inadequate quantity and quality of food, water, and/or cover and shelter resources and/or habitat continuity for terrestrial wildlife.

**Objective:** Increase quantity and quality of food, water, and/or cover and shelter resources and/or habitat continuity for terrestrial wildlife.

**Analysis within CART:**

Each PLU with an attributed land use will trigger a web service to determine if the PLU is located within a priority terrestrial habitat area (e.g., Working Lands for Wildlife, Threatened/Endangered Species range and/or critical habitat (USFWS ECOS), NatureServe National Species Dataset). If located within a priority habitat area and if the web service data allows, a threshold value will be set by the priority area. If no threshold can be pulled from the web service data threshold, a default threshold value of 50 will be set.

The planner may identify this resource concern based on site-specific conditions, client input, or both. A threshold value of 50 will be set and existing condition question will be triggered. The existing condition question will set the existing score as seen in *figure 126*.

Figure 125: Assessment Method

|  |  |
| --- | --- |
| Answer | Description/comments |
| Working Lands for Wildlife Guide | Go to Terrestrial habitat condition |
| State Wildlife Guide | Go to Terrestrial habitat condition |
| National Land Use Assessment | Go to Land use assessments below |
| Not Assessed | 0 |

Figure 126: Terrestrial Habitat Existing Condition

|  |  |  |
| --- | --- | --- |
| Answer | Description/comments | Existing Condition Points |
| Excellent | Habitat quality is defined as *excellent* for the priority species. WHEG range 0.7 to 1.0 | 70 |
| Good | Habitat quality is defined as *good* for the priority species. WHEG range 0.5 to <0.7 | 50 |
| Fair | Habitat quality is defined as *fair* for the priority species. WHEG range 0.3 to <0.5 | 30 |
| Poor | Habitat quality is defined as *poor* for the priority species. WHEG range 0.1 to <0.3 | 10 |
| Absent | Habitat indicated by the web service is not actually present on the PLU. Because habitat is absent, resource concern identified by the web service does not apply. | NA |

**Preliminary Terrestrial Habitat Assessment Questions by Land use**

Land uses refer to those officially defined by NRCS. See NRCS Circular 180-14-1 (10/01/2013).

*Figure 127: Crop (Annual and Mixed) + (Perennial) Preliminary Assessment Questions and Answer Choices*

|  |  |  |
| --- | --- | --- |
| Question | Crop (Annual and Mixed) + (Perennial) Preliminary Assessment Questions and Answer Choices | Existing Condition Points |
|  | Is the cropland flooded annually to provide habitat for wetland wildlife, target species, or both? |  |
| a. Yes |  |
| b. No |  |
| If Yes to Question #1, continue below | | |
|  | Is surface water present sufficient in duration and depth for target species?  Instructions: Calculate by considering consecutive days of planned surface water present.  Dependable artificial water must guarantee water for the time period indicated. Natural precipitation must have >60% probability of flooding and must flood ≥33% of field, otherwise select No for Question #1. Critical months of flooding are determined by State biologist. |  |
| 1. Yes | 33 |
| 1. No | 0 |
|  | What is the frequency of the flooding or inundation?  Instructions: Must flood a minimum of 33% of the field, otherwise select No for Question #1. |  |
| 1. <2 out of 3 years. | 7 |
| 1. 2 out of 3 years with dependable artificial water or precipitation driven flooding on C or D soils. | 17 |
| 1. Annually with dependable artificial water or precipitation driven flooding on C or D soils. | 33 |
|  | What is the size of the flooded area or inundation? |  |
| 1. ≤33% of the field. | 7 |
| 1. >33 and ≤50% of the field. | 17 |
| 1. >50 and ≤75% of the field. | 27 |
| 1. >75% of the field. | 34 |
| If No to Question #1, continue below | | |
|  | What is the composition of Non-Cropland Habitat Elements (NCHE)?  Instructions: NCHE are habitat elements associated with crop fields, such as field borders, odd areas, windbreaks, wetlands, brushy draws, hedgerows, seeps, riparian areas, vegetated ditches, native vegetated communities, rare and declining habitats, and center pivot corners, occurring within the field **or** directly adjacent to the cropland field, such as CRP, woodlands, and riparian areas. Undesirable species already defined by states for CSP. |  |
| Herbaceous cover with >75% undesirable species. | 0 |
| Herbaceous cover primarily of introduced species with low wildlife value. | 2 |
| Cover composed primarily of native plants; some structural or functional groups (e.g., warm season tall grasses, warm season mid-grasses, warm season short grasses, cool season mid-grasses, perennial forbs, shrubs, and trees) expected for the site are missing; number of species are fewer than expected for the ecological site or site potential. | 6 |
| Herbaceous cover either native herbaceous vegetation or introduced species with high wildlife value, such as those often included in wildlife seed mixes. | 8 |
| Cover is composed of >75% of all structural or functional groups (e.g., warm season grasses, cool season grasses, perennial forbs, shrubs, and trees) expected for the site; number of species in each group closely matches that expected for the ecological site or site potential. | 11 |
|  | What amount of NCHE is within **or** directly adjacent to the field?  Instructions: Each of these elements must be wildlife friendly as determined by the State biologist. Eligible NCHE must be under the control of the applicant and ≥30 feet wide and ≥0.1 acre.  NCHE must meet state quality standards for wildlife habitat as defined by the NRCS State biologist with guidance from the State wildlife agency. |  |
| 1. ≤1% of the field. | 0 |
| 1. >1% and ≤5% of the field. | 3 |
| 1. >5% and ≤10% of the field. | 9 |
| 1. >10% of the field. | 11 |
|  | What is the width of NCHE within **or** directly adjacent to the field? |  |
| ≤30 feet wide. | 0 |
| >30 to and ≤75 feet wide. | 6 |
| >75 to and ≤120 feet wide. | 9 |
| >120 feet wide. | 11 |
|  | What is the maximum distance for 50% of the field (i.e., average distance) from the NCHE?  The distance can be estimated to either NCHE within the field **or** to NCHE in an adjacent field that is controlled by the applicant. |  |
| ≤330 feet. | 11 |
| >330 feet and ≤660 feet. | 9 |
| >660 feet and ≤1320 feet. | 6 |
| >1320 feet and ≤2640 feet. | 2 |
| >2640 feet. | 0 |
|  | What is the crop rotation?  Instructions: Fallow = cropland rested during the growing season. States may modify with NTSC concurrence. |  |
| Continuous row or truck crops with some value for wildlife (e.g., corn, sorghum, soybeans, etc.). | 0 |
| Continuous small grain. | 2 |
| Row crop - small grain (e.g., corn-soybeans-wheat) | 3 |
| Rotation includes small grains **and** forage crops (i.e., alfalfa, clover, etc.) | 6 |
| Small grain - summer fallow (does not include fallow that involves cultivation practices that reduce cover, e.g., summer plowing) | 8 |
| Contour strip cropping (include small grains and hay **or** row crops, small grains, and hay) | 11 |
|  | Is a winter food source provided? |  |
| Fall tilled; no winter food | 0 |
| No fall tillage | 1 |
| ¼ to ≤1 acre of food plot or unharvested grain per 40 acres of cropland (minimum 30 feet wide and next to noncrop cover). | 3 |
| >1 acre of food plot or unharvested grain per 40 acres of cropland (minimum 30 feet wide and next to noncrop cover). | 6 |
| Winter cover crop or hay/forage crop >50% and <75% of field. Crop height is adequate height for the target species. | 9 |
| Winter cover crop or hay/forage crop >75% of field. Crop height is adequate height for the target species. | 11 |
|  | What is the residue or stubble management for the over-winter condition?  Instructions: Select the condition most typical for your rotation.  Wheat-fallow rotations would select from a, b, f, or g. Crops that don't leave waste grain (cotton, peanuts, etc.) would select from a, b, c. Residue or stubble management must apply to at least 50% of the field. |  |
| Fall tillage with <30% residue.  Can restrict to this answer option based on Appendix A: Crop Groups and Tillage Types; Table A2: Cropland Tillage answer option:  -“Reduced Tillage (Fall)” | 0 |
| Fall tillage with ≥30% residue.  Can restrict to this answer option based on Appendix A: Crop Groups and Tillage Types; Table A2: Cropland Tillage answer option:  -“Reduced Tillage (Fall)” | 1 |
| Undisturbed soybean residue or corn silage.  Can be populated by Appendix A: Crop Groups and Tillage Types; Table A1: Crops answer options as appropriate. | 2 |
| Stalks chopped or shredded, no soil disturbance or grasses or legumes in rotation.  Can be populated if multiple conditions are met by Appendix A: Crop Groups and Tillage Types  Table A1: Crops answer options  -does not include a grass or legume  Table A2: Cropland Tillage answer options:  -“No-till” | 4 |
| Stalks gleaned by livestock, no mechanical disturbance.  Can restrict to this answer option based on Appendix A: Crop Groups and Tillage Types; Table A2: Cropland Tillage answer option:  -“No-till” | 6 |
| Grain stubble or hay/forage crop left standing overwinter <8 inches.  Can be populated by Appendix A: Crop Groups and Tillage Types; Table A1: Crops answer options as appropriate. | 8 |
| Grain stubble or hay/forage crop left standing overwinter >8 inches.  Can be populated by Appendix A: Crop Groups and Tillage Types; Table A1: Crops answer options as appropriate. | 12 |
|  | If hay is part of crop rotation, what is the species composition of wildlife-unfriendly species?  Can promote/mask this question based on Appendix A: Crop Groups and Tillage Types; Table A1: Crops answer options as appropriate.  Instructions: Wildlife friendly and unfriendly species are defined by the States for CSP. |  |
| Hayland composed of wildlife-unfriendly species. | 1 |
| Hayland composed of one or two wildlife-friendly species. | 3 |
| Hayland composed of three to five wildlife-friendly species. | 7 |
| Hayland composed of more than five wildlife-friendly species. | 11 |
|  | If hay is part of crop rotation, what is the harvest schedule?  Can promote or mask this question based on Appendix A: Crop Groups and Tillage Types; Table A1: Crops answer options as appropriate.  Instructions: Nesting season are defined by the states for CSP. |  |
| Entire field cut during the nesting season. | 0 |
| Portions of the field cut before the nesting season with some areas excluded for wildlife or haying methods and patterns considers wildlife needs (e.g., minimum mowing height, reduced cutting speed, flushing bars, mowing toward the outside of the field, mow only during daylight). | 2 |
| >50% of hayland unharvested until end of nesting season (as defined by State) or is hay harvested after 80% of the nesting season is concluded if wildlife-friendly harvest techniques are used. | 6 |
| Hay cut not more than once per year and is cut before or after the nesting season. Cuts before nesting season must be far enough in advance to allow for sufficient regrowth for target species. Consult with State biologist for adequate time windows for target species. | 8 |
| Hay cut before or after the nesting season. Haying methods and patterns considers wildlife needs (e.g., minimum mowing height, reduced cutting speed, flushing bars, mowing toward the outside of the field, wildlife exclusion areas, mow only during daylight). | 11 |

*Figure 128: Pasture Preliminary Assessment Questions and Answer Choices*

|  |  |  |
| --- | --- | --- |
| Question | Pasture Preliminary Assessment Questions and Answer Choices | Existing Condition Points |
|  | What is the species composition of the pasture?  Instructions: Pasture **and** Non-Pasture Habitat Elements (NPHE)- Non-pastureland cover such as field borders, odd areas, windbreaks, wetlands, brushy draws, hedgerows, seeps, riparian areas, and center pivot corners that occur within the field. Or, NPHE that occurs directly adjacent to the pasture, such as CRP, woodlands, and riparian areas. Wildlife friendly and unfriendly species are defined by the States for CSP. |  |
| 1. Composed of wildlife-unfriendly species. | 0 |
| 1. Composed of wildlife-unfriendly grass (e.g., tall fescue, bermuda grass, bahiagrass, reed canarygrass, etc., defined by State biologist) with >33% legume (e.g., clover, alfalfa, etc.). | 6 |
| 1. Composed of a mixture of one to three wildlife-friendly grasses and a legume. | 14 |
| 1. Composed of >3 wildlife-friendly grasses and legumes or forbs. | 20 |
|  | What is the grazing management?  Instructions: If managing for species of concern, consult with the State biologist. Exceptions can be made to answer descriptions at discretion of State biologist.  Light grazing (16-35% use): Key forage plants lightly to moderately used. Practically no use of low-value forage plants. Most of accessible range shows grazing.  Moderate grazing (36-65% use): Key forage plants used about right for the season of grazing and range sites involved. Some use of low-value forage plants. All fully accessible areas are grazed; some trampling damage may be evident.  Heavy grazing (66-80% use): Key forage plants closely cropped. Low-value forage plants generally being grazed. Trampling damage is widespread in accessible areas. |  |
| All forage is closely grazed, livestock trails are numerous and trampling damage is widespread. | 0 |
| Light to moderate grazing over the entire field. Little evidence of trails. | 6 |
| Livestock are rotated through less than four paddocks based on minimum forage height and condition for wildlife (defined by State biologist). | 14 |
| Livestock are rotated through four or more paddocks based on minimum forage height and condition for wildlife (defined by State biologist); one paddock is not grazed until after nesting season. | 20 |
|  | What is the species composition of NPHE within or directly adjacent to the field (e.g., not mowed, grazed, burned, spayed, etc.) during nesting season?  Instructions: NPHE areas must be ≥30 feet wide and ≥0.1 acre in area.  NPHE includes paddocks not grazed during the nesting season. During the life of the CSP contract, NPHE must be under the control of the applicant and must meet State quality standards for wildlife habitat as defined by the NRCS State biologist with guidance from the State wildlife agency. |  |
| 1. Herbaceous cover with >75% undesirable species. | 0 |
| 1. Herbaceous cover primarily of introduced species. | 3 |
| 1. Herbaceous cover either native herbaceous vegetation or introduced species with high wildlife value, such as those often included in wildlife seed mixes. | 8 |
| 1. Cover composed primarily of native plants; some structural or functional groups (e.g., warm season tall grasses, warm season mid-grasses, warm season short grasses, cool season mid-grasses, perennial forbs, shrubs, and trees) expected for the site are missing; number of species are fewer than expected for the ecological site. | 11 |
| 1. Cover is composed of all structural or functional groups (e.g., warm season tall grasses, warm season mid-grasses, warm season short grasses, cool season mid-grasses, perennial forbs, shrubs, and trees) expected for the site; number of species in each group closely matches that expected for the ecological site. | 15 |
|  | What is the amount of NPHE within or directly adjacent to the field?  Instructions: NPHE areas must be ≥30 feet wide and ≥0.1 acre in area. |  |
| 1. ≤1% of the field. | 0 |
| 1. >1 and ≤5% of the field. | 5 |
| 1. >5 and ≤10% of the field. | 12 |
| 1. >10% of the field. | 15 |
|  | What is the width of NPHE within **or** directly adjacent to the field?  Instructions: Minimum patch size ≥0.1 acre. |  |
| 1. ≤30 feet wide. | 0 |
| 1. >30 to and ≤75 feet wide. | 5 |
| 1. >75 to and ≤120 feet wide. | 12 |
| 1. >120 feet wide. | 15 |
|  | What is the maximum distance for 50% of the field (i.e., average distance) from the NPHE?  Instructions: The distance can be estimated to either NPHE within the field **or** to NPHE in a directly adjacent field that is controlled by the applicant. |  |
| 1. ≤330 feet. | 15 |
| 1. >330 feet and ≤660 feet. | 12 |
| 1. >660 feet and ≤1320 feet. | 8 |
| 1. >1320 feet and ≤2640 feet. | 3 |
| 1. >2640 feet. | 0 |

Figure 129: Range Preliminary Assessment Questions and Answer Choices

|  |  |  |
| --- | --- | --- |
| Question | Range Preliminary Assessment Questions and Answer Choices | Existing Condition Points |
|  | What is the species composition of the rangeland?  Instructions: Plant group types (e.g., structural and functional groups) are suites or groups of plant species that are grouped together because they share similarities, such as shoot or root structure, photosynthetic pathways, nitrogen-fixing ability, life cycle, etc. Examples include cool-season tall grasses, cool-season midgrasses, warm-season tall grasses, warm season midgrasses, warm season short grasses, annual grasses, perennial forbs, biennial forbs, annual forbs, shrubs, half-shrubs, deciduous trees, evergreen trees, cacti, yucca/yucca-like plants, succulent forbs, and leafy forbs (National Range and Pasture Handbook, p.3.1-13). Invasive or noxious species may not be used to represent a plant group type or structural type. |  |
| 1. Number of plant group types (structural or functional groups) <25% of ecological potential, relative dominance of structural or functional groups has been dramatically altered, number of species within structural or functional groups dramatically reduced, or some combination of these. | 2 |
| 1. Number of plant group types (structural or functional groups) represents 25-50% of potential, one dominant group and/or one or more subdominant group replaced by structural or functional groups not expected for the site, number of species within structural or functional groups has been significantly reduced, or some combination of these. | 5 |
| 1. Number of plant group types (structural or functional groups) represents 51 to 75%, one or more subdominant structural or functional groups replaced by structural or functional groups not expected for the site, the number of species within the structural or functional groups has been moderately reduced, or some combination of these. | 12 |
| 1. Number of plant group types (structural or functional groups) (e.g., warm season tall grasses, warm season midgrasses, warm season short grasses, cool season midgrasses, perennial forbs, and shrubs) represents >75% of site potential and number of species in each group closely match that expected for the ecological site. | 17 |
|  | What is the grazing management?  Instructions: If managing for species of concern, consult with the State biologist. Exceptions can be made to answer descriptions at discretion of State biologist.  Light grazing (16-35% use): Key forage plants lightly to moderately used. Practically no use of low-value forage plants. Most of accessible range shows grazing.  Moderate grazing (36-65% use): Key forage plants used about right for the season of grazing and range sites involved. Some use of low-value forage plants. All fully accessible areas are grazed; some trampling damage may be evident.  Heavy grazing (66-80% use): Key forage plants closely cropped. Low-value forage plants generally being grazed. Trampling damage is widespread in accessible areas. |  |
| The unit is heavily to severely grazed.  No over winter cover.  No evidence of key wildlife food and cover plants. | 0 |
| The unit is moderately grazed without ungrazed or lightly grazed patches.  Standing grass or forb cover is only seasonally available.  Key wildlife food and cover plants are absent. | 5 |
| The unit is moderately grazed with some ungrazed or lightly grazed patches.  Standing grass or forb cover is present during the winter and through the reproductive season. Key wildlife food and cover plants are present and in a good state of vigor. | 12 |
| The unit is ungrazed or lightly grazed with numerous ungrazed areas creating a patchy appearance. Standing grass or forb cover is present during the winter and through the reproductive season (for example, 5-8 inch height of grass or forb cover is maintained on mid to tall grasses through winter and reproductive seasons). Key wildlife food and cover plants are abundant and in a good state of vigor. | 17 |
|  | What percentage of fence does not meet the wildlife friendly criteria (ref. Montana Fish, Wildlife & Parks, A Landowner's Guide to Wildlife Friendly Fences: How to Build Fence with Wildlife in Mind, 2008; Wyoming Game & Fish Department, Fencing Guidelines for Wildlife, 2004)? |  |
| ≤25%. | 17 |
| >25 and ≤50%. | 14 |
| >50% and ≤75%. | 7 |
| >75%. | 0 |
|  | What percentage of watering facilities (e.g., tanks, troughs, etc.) provide for safe access and escape for wildlife, provide year-round water, and are free of hazards for aerial drinking wildlife (e.g., bats, swallows, etc., ref. BCI Wildlife Water Handbook, 2007)?  Instructions: Use only if applicable for the area. |  |
| 1. ≤25%. | 0 |
| 1. >25 and ≤50%. | 7 |
| 1. >50% and ≤75%. | 14 |
| 1. >75%. | 17 |
|  | What is the degree of woody species management? |  |
| Woody species are not managed for wildlife. There is an evident browse line or brush is totally eliminated with brush control measures. | 0 |
| Woody species are managed so that populations are consistent with the desired ecological state or beneficial to targeted wildlife species. There is absence of a browse line, although hedging on key browse plants may be observed. Brush is only partially eliminated with brush control measures. | 8 |
| Woody species (such as mesquite, juniper, sage, chamise, and creosote) are managed so that populations are consistent with the desired ecological state or targeted wildlife species. There is absence of a browse line or hedging on key browse plants. If brush is controlled, it is done only partially in patterns that fit the landscape with wildlife considerations. | 16 |
|  | What is the proportion of invasive or noxious plants (as determined by state lists)? |  |
| ≤5% of the site has invasive or noxious plants that appear controlled. | 16 |
| >5 and ≤20% of the site has invasive or noxious plants that appear controlled. | 8 |
| >20% of the site has invasive or noxious plants. | 0 |

*Figure 130: Forest Preliminary Assessment Questions and Answer Choices*

|  |  |  |
| --- | --- | --- |
| Question | Forest Preliminary Assessment Questions and Answer Choices | Existing Condition Points |
|  | Do you have a forest or woodland management plan that contains prescriptions for a target species?  Instructions: History of past or current forest or woodland management. |  |
| 1. Yes | 12 |
| 1. No | 0 |
|  | Based on land resource inventory data (soil survey, ESD, historical research, etc.), are trees within the forest stand native and likely to have historically existed on site? |  |
| Yes | 12 |
| No | 0 |
|  | Does your forest stand or woodlands type, extent, and management provide sufficient habitat for target wildlife or pollinators?  Instructions: Guidance on sufficient habitat for target wildlife or pollinators set by State biologist. |  |
| Yes | 12 |
| No | 0 |
|  | Are invasive plants, insects, or diseases (as determined by State lists) contributing to the degradation of the forest or woodland habitat such that it negatively impacts target wildlife or pollinator species?  Only ask question if:  - Figure 118: Plant Pest Pressure Existing Condition Existing Condition answer = “Pest resistance is not managed and weeds, insects, animals, and diseases limit quantity or quality of trees below tolerable limits.” |  |
| Yes | 0 |
| No  Can be populated by figure 118: Plant Pest Pressure Existing Condition. Answer option = “Weeds, insects, animals, and diseases are not a problem” **or** “Weeds, insects, animals, and diseases are managed according to a pest management plan that is designed to manage the development of pest resistance and maintain acceptable quantity and quality of trees.” | 12 |
|  | What is the percent cover of native shrubs, vines and herbaceous plants combined, within the understory? |  |
| Primarily nonnative plants | 0 |
| ≤10% | 2 |
| >10% and ≤25% | 4 |
| >25% and ≤50% | 7 |
| >50% | 12 |
|  | What is the extent and management of invasive plant species? |  |
| No invasive plants identified, no damage/infestation.  Can be populated by figure 118: Plant Pest Pressure Existing Condition. Answer option = “Weeds, insects, animals, and diseases are not a problem” **or** “Weeds, insects, animals, and diseases are managed according to a pest management plan that is designed to manage the development of pest resistance and maintain acceptable quality and quantity of trees.” | 16 |
| ≤15%, active management.  Mask answer if figure 118: Plant Pest Pressure Existing Condition answer option = “Pest resistance is not managed and weeds, insects, animals, and diseases limit quantity or quality of trees beyond tolerable limits. ” | 11 |
| ≤15%, no active management.  Mask answer if figure 118: Plant Pest Pressure Existing Condition answer option = “Weeds, insects, animals, and diseases are not a problem” or “Weeds, insects, animals, and diseases are managed according to a pest management plan that is designed to manage the development of pest resistance and maintain acceptable quality and quantity of trees.” | 8 |
| >15%, active management.  Mask answer if figure 118: Plant Pest Pressure Existing Condition answer option = “Pest resistance is not managed and weeds, insects, animals, and diseases limit quantity or quality of trees beyond tolerable limits. ” | 5 |
| >15%, no active management.  Mask answer if figure 118: Plant Pest Pressure Existing Condition answer option = “Weeds, insects, animals, and diseases are not a problem” or “Weeds, insects, animals, and diseases are managed according to a pest management plan that is designed to manage the development of pest resistance and maintain acceptable quality and quantity of trees.” | 0 |
|  | Are livestock present in the forested area? |  |
| 1. Yes, grazing management plan absent and grazing is not done to manage for wildlife. | -12 |
| 1. Yes, livestock are used to maintain wildlife habitat. | 6 |
| 1. Yes, livestock are being utilized to maintain or enhance wildlife habitat according to a Prescribed Grazing Plan. | 12 |
| 1. No | 12 |

**Associated**

Not being assessed by preliminary assessment questions for wildlife potential at this time due to the diversity of this land use. This land use should still be subject to filtering or prepopulating done by geoprocessing operations of spatial datasets.

**Farmstead**

Not being assessed by preliminary assessment questions for wildlife potential at this time due to the diversity of this land use. This land use should still be subject to filtering or prepopulating done by geoprocessing operations of spatial datasets.

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Practice points for core practices that will benefit wildlife terrestrial habitat are identified in *figure 131.* Practices with an activity listed should only be awarded points if the practice is guided by that activity condition.

Figure 131: Typical Practices Affecting Terrestrial Habitat

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Early Successional Habitat Development/Mgt. (647) | 40 |
| Restoration and Management of Rare or Declining Habitats (643) | 40 |
| Shallow Water Development and Management (646) | 40 |
| Stream Habitat Improvement and Management (395) | 40 |
| Upland Wildlife Habitat Management (645) | 40 |
| Wetland Enhancement (659) | 40 |
| Wetland Restoration (657) | 40 |
| Wetland Wildlife Habitat Management (644) | 40 |
| Forage Harvest Management (511) | 10 |
| Hedgerow Planting (422) | 10 |
| Prescribed Burning (338) | 10 |
| Riparian Forest Buffer (391) | 10 |
| Riparian Herbaceous Cover (390) | 10 |
| Structures for Wildlife (649) | 10 |
| Tree/Shrub Establishment (612) | 10 |
| Wildlife Habitat Plantings (420) | 10 |
| Conservation Cover (327) | 5 |
| Fence (382) | 5 |
| Field Border (386) | 5 |
| Herbaceous Weed Treatment (315) | 5 |
| Prescribed Grazing (528) | 5 |
| Road/Trail/Landing Closure and Treatment (654) | 5 |
| Trails and Walkways (575) | 5 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total. See appendix B for list of supporting practices applicable to wildlife, terrestrial habitat.

## **Aquatic Habitat**

**Description:** Improper management of natural resources results in inadequate quantity and quality of food, water, cover or shelter resources, habitat continuity, or some combination of these for aquatic wildlife.

**Objective:** Increase quantity and quality of food, water, cover or shelter resources, habitat continuity, or some combination of these for aquatic wildlife.

**Analysis within CART:**

Each PLU with an attributed land use will trigger a web service to determine if the PLU is located within or contains a priority aquatic habitat area (e.g., Threatened/Endangered Species (USFWS ECOS, NOAA NMFS Endangered Species Act Critical Habitat), Essential Fish Habitat, Section 303(d) of the Clean Water Act for temperature and sediment, NatureServe National Species Dataset). If located within a priority habitat area and if the web service data allows, a threshold value will be set by the priority area. If no threshold can be pulled from the web service data threshold, a default threshold value of 50 will be set.

The planner may identify this resource concern based on site-specific conditions, client input, or both. A threshold value of 50 will be set and existing condition question will be triggered. The existing condition question will set the existing score as seen in *figure 133*.

Figure 132: Assessment Method

|  |  |
| --- | --- |
| Answer | Description/comments |
| Working Lands for Wildlife Guide | Go to aquatic habitat condition |
| State Wildlife Guide | Go to aquatic habitat condition |
| National Land Use Assessment | Go to aquatic use assessments below |
| Not Assessed | 0 |

*Figure 133: Aquatic Habitat Existing Condition*

|  |  |  |
| --- | --- | --- |
| Answer | Description/comments | Existing Condition Points |
| Excellent | Habitat quality is defined as *excellent* for the priority species. WHEG range 0.7 to 1.0 | 70 |
| Good | Habitat quality is defined as *good* for the priority species. WHEG range 0.5 to <0.7 | 50 |
| Fair | Habitat quality is defined as *fair* for the priority species. WHEG range 0.3 to <0.5 | 30 |
| Poor | Habitat quality is defined as *poor* for the priority species. WHEG range 0.1 to <0.3 | 10 |
| Absent | Habitat indicated by the web service is not actually present on the PLU. Because habitat is absent, resource concern identified by the web service does not apply. | NA |

Figure 134: Preliminary Aquatic Habitat Assessment Questions and Answer Choices

|  |  |  |
| --- | --- | --- |
| Question | Lakes and Ponds Preliminary Assessment Questions and Answer Choices | Existing Condition Points |
|  | What water features are present on the PLU?  Instructions: Select all that apply. (Might be prepopulated by geoprocessing USGS NHD/NHDPlus HR geospatial dataset. Should also have a text entry box or link to/instructions to complete Conservation Assistance Notes to indicate and describe multiple water features of the same type on the PLU as well as specific on individual features of the same type so they can be distinguished in the future.) |  |
| Lake/Pond | *See Lake/Pond questions* |
| River | *See River questions* |
| Stream | *See Stream questions* |
| Wetland | *See Wetland questions* |
| ***Lake/Pond*** | | |
|  | What is the extent of the natural vegetation surrounding the lake and pond?  Instructions: For this element, “natural vegetation” means plant communities with species native to the site or introduced species that have become “naturalized” and function similarly to native species. Plant species should consist of multiple structural layers (grasses and forbs, shrubs, and trees) of different age-classes. |  |
| ≤10% of the perimeter of the lake/pond suitable for plant growth consists of at least a 33-foot-wide zone of native or natural vegetation. | 0 |
| >10% but ≤50% of the perimeter of the lake/pond that is suitable for plant growth consists of at least a 33-foot-wide zone of native or natural vegetation. | 13 |
| >50% but ≤75% of the perimeter of the lake/pond that is suitable for plant growth consists of at least a 33-foot-wide zone of native or natural vegetation. | 26 |
| >75% of the perimeter of the lake/pond that is suitable for plant growth consists of at least a 33-foot-wide zone of native or natural vegetation. | 40 |
|  | What is the quality of the riparian zone?  Instructions: This element rates the functional value of the riparian zone to protect the lake or pond from shoreline erosion, and provide habitat components for fish and wildlife. Plant species should consist of multiple structural layers (e.g., grasses, forbs, shrubs, and trees). For the highest ratings, there should be no evidence of concentrated flows through the riparian zone. |  |
| Little or no natural vegetation in the riparian zone, >50% invasive species, and evidence of concentrated flows into the lake/pond. | 0 |
| Natural vegetation present, but compromised by poor management; evidence of concentrated flows; invasive species common (>40%). | 13 |
| Natural and diverse riparian vegetation with composition, density, and age structure appropriate for the site, invasive species present but controlled, no concentrated flows. | 26 |
| Natural and diverse riparian vegetation with composition, density, and age structure appropriate for the site, no invasive species present, and no evidence of concentrated flows. | 40 |
| ***River*** | | |
|  | Is water available year-round or in quality and extent to support habitat requirements for target species?  Instructions: Guidance on habitat requirements for target species set by State biologist. |  |
| 1. Yes | 17 |
| 1. No | 0 |
| ***If b) No is selected for question number 1, the following additional question should be answered.*** | | |
|  | Is the lack of water caused by offsite conditions?  Instructions: Lack of water may be due to conditions outside of control of the producer and landowner. This question is a way to note that situation. |  |
| Yes | 0 |
| No | -50 |
|  | Are there physical structures, water withdrawals, water quality, or some combination of these that restricts or prohibits movement of aquatic species?  Instructions: (This should be prepopulated by a spatial dataset (Fish Passage Barriers (known and potential)). If detected should prompt for a requirement of verification onsite for habitat presence.) |  |
| 1. Yes, verified in field. | -30 |
| 1. No, verified in field. | 17 |
|  | Is natural and diverse riparian vegetation that extends at least one bankfull width onto the floodplain, with vegetation gaps not exceeding 10% of the property length present?  Instructions: Riparian vegetation must be of appropriate composition, density, and age structure appropriate to the site. |  |
| 1. Yes | 17 |
| 1. No | 0 |
| ***Stream*** | | |
|  | Are there eight or more aquatic habitat features present on the PLU stream reach?  Instructions: Aquatic habitat features include: 1) Logs &/or large wood- 2/reach; 2) Small wood accumulations- 1/reach; 3)Deep pools- 2/reach; 4) Secondary pools- 4/reach; 5) Overhanging veg- 3/reach; 6) Large boulders-3/reach if no wood, 2/reach if wood present; 7) Small boulder clusters- 3/reach; 8) Cobble riffles- 2/reach; 9) Undercut banks- 3/reach; 10) Thick root mats- 3/reach; 11) Macrophyte beds- 1/reach; 12) Off-channel habitats- 2/reach; 13) Other locally important habitat feature. From SVAP manual. |  |
| Yes | 14 |
| No | 0 |
|  | Is water available year-round or in quality and extent to support habitat requirements for target species?  Instructions: Guidance on habitat requirements for target species set by State biologist. |  |
| 1. Yes | 14 |
| 1. No | 0 |
| ***If b) No is selected for question number 2, the following additional question should be answered.*** | | |
|  | Is the lack of water caused by off-site conditions?  Instructions: Lack of water may be due to conditions outside of control of the producer and landowner. This question is a way to note that situation. |  |
| 1. Yes | 0 |
| 1. No | -50 |
|  | Are there physical structures, water withdrawals, water quality, or some combination of these that restricts or prohibits movement of aquatic species?  Instructions: (This should be prepopulated by a spatial dataset (Fish Passage Barriers (known and potential)). If detected should prompt for a requirement of verification on-site for habitat presence.) |  |
| 1. Yes, verified in field. | -30 |
| 1. No, verified in field. | 14 |
|  | Is natural and diverse riparian vegetation that extends at least one bankfull width onto the floodplain, with vegetation gaps not exceeding 10% of the property length present?  Instructions: Riparian vegetation must be of appropriate composition, density, and age structure appropriate to the site. |  |
| 1. Yes | 14 |
| 1. No | 0 |
| ***Wetland*** | | |
|  | What is the extent of the riparian buffer around the wetland?  Instructions: This element rates the extent of buffer around the perimeter of a wetland. Estimate the width of the vegetation zone from the edge of the wetland out to the edge of the cropland field. |  |
| 1. <10% of the perimeter of the wetland is buffered by a ≥33-ft-wide strip of perennial vegetative cover. | 10 |
| 1. ≥10% but <50% of the perimeter of the wetland is buffered by a >33-ft-wide strip of perennial vegetative cover. | 20 |
| 1. ≥50% but ≤75% of the perimeter of wetland is buffered by a >33-ft-wide strip of perennial vegetative cover. | 30 |
| 1. >75% of the perimeter of the wetland is buffered by a >33-ft-wide strip of perennial vegetative cover. | 40 |
|  | What is the quality of the riparian bugger around the wetland?  Instructions: For this element, “natural vegetation” means plant communities with species native to the site or introduced species that have become “naturalized” and function similarly to native species. Plant species should consist of multiple structural layers (e.g., grasses and forbs, shrubs, and trees). |  |
| Little or no natural vegetation. Invasive species widespread (>50 % of plant cover). | 4 |
| Natural vegetation compromised by poor management; invasive species (>30% but <50% of plant cover). | 12 |
| Natural and diverse riparian vegetation with composition, density, and age structure appropriate for the site, invasive species (<30% of plant cover), and landowner is taking measures to control their spread. | 28 |
| Natural and diverse riparian vegetation with composition, density, and age structure appropriate for the site. Little or no invasive species present. | 40 |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Some example practice points are identified below.

Figure 135: Typical Practices Affecting Aquatic Habitat

|  |  |
| --- | --- |
| Conservation Practices\* | Conservation Management Points |
| Aquatic Organism Passage (396) | 40 |
| Restoration and Management of Rare or Declining Habitats (643) | 40 |
| Shallow Water Development and Management (646) | 40 |
| Stream Habitat Improvement and Management (395) | 40 |
| Wetland Enhancement (659) | 40 |
| Wetland Restoration (657) | 40 |
| Wetland Wildlife Habitat Management (644) | 40 |
| Riparian Forest Buffer (391) | 10 |
| Riparian Herbaceous Cover (390) | 10 |
| Structures for Wildlife (649) | 10 |
| Tree/Shrub Establishment (612) | 10 |
| Critical Area Planting (342) | 5 |
| Fence (382) | 5 |
| Field Border (386) | 5 |
| Hedgerow Planting (422) | 5 |
| Herbaceous Weed Treatment (315) | 5 |
| Prescribed Grazing (528) | 5 |
| Road/Trail/Landing Closure and Treatment (654) | 5 |
| Trails and Walkways (575) | 5 |
| Watering Facility (614) | 5 |
| Wildlife Habitat Plantings (420) | 5 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total. See Appendix B for list of supporting practices applicable to Wildlife, Aquatic Habitat.

## **Elevated Water Temperature (Water Temperature)**

**Description:** Surface water temperatures exceed State or Federal standards in downstream receiving waters.

**Objective:** To lower stream water temperature or prevent additional water temperature increases in downstream receiving waters.

**Analysis within CART:**

Each PLU with an attributed land use will trigger a web service to determine if the PLU is located within or contains a section 303(d) of the Clean Water Act for temperature or is within an elevated water temperature priority area. If the PLU meets one of the aforementioned conditions, a threshold value of 50 will be set. A question about existing condition will be triggered and points will be assigned based on the answers seen in *figure 136*.

Figure 136: Elevated Water Temperature Existing Condition

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| PLU contains a section 303(d) of Clean Water Act for temperature **and** is caused by conditions on the PLU or landowner’s property. | 1 |
| PLU contains a section 303(d) of Clean Water Act for temperature **and** is caused by offsite conditions. | 30 |
| Condition indicated by the web service is not actually present on the PLU. | 50 |

Preliminary assessment questions will be asked to further assess PLU existing condition, see *figure 137*. The planner may also identify this resource concern based on site-specific conditions. Conservation practices and activities are then added to the existing condition to determine the state of the management system. Some example practice points are identified in figure 138 .

*Figure 137: Preliminary Elevated Water Temperature Assessment Question*

|  |  |  |  |
| --- | --- | --- | --- |
| Question | Elevated Water Temperature Preliminary Assessment Questions and Answer Choices |  | Existing Condition Points |
|  | Is natural and diverse riparian vegetation that extends at least one bankfull width onto the floodplain, with vegetation gaps not exceeding 10% of the property length present?  Instructions: Riparian vegetation must be of appropriate composition, density, and age structure appropriate to the site. Based on planning criteria for elevated water temperature that is conditional on SVAP elements 4 & 5 riparian area quantity and quality. |  |  |
| 1. Yes |  | 25 |
| 1. No |  | 0 |
|  | Is ≥50% of water surface shaded within the length of the stream in landowner’s property?  Instructions: Applicable to both cold-water and warm-water streams. Based on planning criteria for elevated water temperature that is conditional on SVAP element 6 canopy cover. |  |  |
| Yes |  | 25 |
| No |  | 0 |

Figure 138: Typical Practices Affecting Elevated Water Temperature

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Stream Habitat Improvement and Management (395) | 40 |
| Riparian Forest Buffer (391) | 10 |
| Riparian Herbaceous Cover (390) | 10 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

# **Livestock Production Limitations**

## **Inadequate Feed and Forage**

**Description:** Feed and forage quality or quantity is inadequate for nutritional needs and production goals of the kinds and classes of livestock.

**Objective:** Livestock forage, roughage, and supplemental nutritional requirements addressed.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for inadequate feed and forage. The planner may identify this resource concern based on site-specific conditions, a threshold value of 50 will be set and existing condition questions will be triggered. The existing condition question will set the existing score as seen in *figure 139.*

Figure 139: Inadequate Livestock Feed and Forage Existing Condition

|  |  |  |
| --- | --- | --- |
| Land Use | Answer | Existing Condition Points |
| All but Farmstead | Livestock feed and forage balance calculation exists that shows livestock quantity and body condition score (BCS) is equal to or greater than 5 or desired production goals. | 60 |
| All but Farmstead | |  | | --- | | Livestock feed and forage balance calculation shows that livestock quantity needs are being met but BCS is less than 5 and producer-desired production goals are being met. | | 51 |
| All but Farmstead | Livestock feed and forage balance calculation, the BCS, desired production goals, or some combination of these indicate that nutritional requirements are not being met. | 1 |
| Farmstead | Livestock feed, roughage, and supplemental nutritional requirements are met. | 51 |
| Farmstead | Livestock feed, roughage, and supplemental nutritional requirements are **not met**. | 1 |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Some example practice points are identified in *figure 140*.

Figure 140: Typical Practices Affecting Inadequate Feed and Forage

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Forage and Biomass Planting (ac) | 10 |
| Prescribed Grazing | 40 |
| Range Planting | 10 |
| Silvopasture Establishment | 10 |
| Prescribed Burning | 10 |
| Nutrient Management (Cropland, Pasture Only) | 10 |
| Fence | 30 |
| Livestock Watering System | 25 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

## **Inadequate Livestock Shelter**

**Description:** Livestock lack adequate shelter from climatic conditions to maintain health or production goals.

**Objective:** Artificial or natural shelters meet animal health needs and client objectives.

**Analysis within CART:**

Each PLU for all land uses will default to a “not assessed” status for inadequate livestock shelter. The planner may identify this resource concern based on site-specific conditions, a threshold value of 50 will be set and existing condition questions will be triggered. The existing condition question will set the existing score as seen in *figure 141*.

Figure 141: Inadequate Livestock Shelter Existing Condition

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Livestock are adapted to local climatic conditions and do not require additional shelter. (NRPH thermal neutral zones, or local Extension Service guidelines, producer or planner observations) | 61 |
| Livestock have adequate shelter (artificial or natural) | 51 |
| Minor Improvements Needed: Production goals not being met due to livestock stresses caused by local climatic conditions or lack of shelter (artificial or natural)? | 20 |
| Significant Improvement Needed: Production goals not being met due to livestock death or stresses caused by local climatic conditions or lack of shelter (artificial or natural)? | 10 |
| Major Improvements Needed: Production goals not being met due to livestock death or stresses caused by local climatic conditions or lack of shelter (artificial or natural)? | 1 |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Some example practice points are identified in *figure 142*.

Figure 142: Typical Practices Affecting Inadequate Livestock Shelter

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Windbreak/Shelterbelt Establishment | 30 |
| Livestock Shelter Structure (no) | 10 |
| Windbreak/Shelterbelt Renovation | 20 |
| Winter Feeding Station | 25 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

## **Inadequate Livestock Water**

**Description:** Drinking water quantity, quality, distribution, or some combination of these are insufficient to maintain health or production goals for the kinds and classes of livestock.

**Objective:** Water of acceptable quality and quantity adequately distributed to meet animal needs throughout the PLU. \***Lack** of adequate water in **any grazed portion** of the PLU creates this resource concern.

**Analysis within CART:**

Each PLU for all land uses will default to a “not assessed” status for inadequate livestock water. The planner may identify this resource concern based on site-specific conditions, a threshold value of 50 will be set and existing condition questions will be triggered. The existing condition questions will set the existing score as seen in figure 143.

Figure 143: Inadequate Livestock Water Existing Condition (Quality and Quantity)

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| All three livestock water factors (water quantity, quality, and distribution) are met. | 60 |
| Two of the three water factors (quantity, quality, and distribution), are met. | 40 |
| One of the three water factors (quantity, quality, and distribution) are met. | 20 |
| None of the three water factors (quantity, quality, and distribution) are met | 0 |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Some example practice points are identified in *figure 144*.

Figure 144: Typical Practices Affecting Inadequate Livestock Water

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Livestock Watering Systems - Source | |
| Dam, Diversion | 10 |
| Pond (s) | 30 |
| Dam (no & ac-ft.) (s) | 15 |
| Spring Development (s) | 30 |
| Water Well (s) | 25 |
| Irrigation Canal or Lateral | 10 |
| Aquaculture Ponds (ac) | 10 |
| Irrigation Reservoir | 10 |
| Pumping Plant (no) | 10 |
| Water Harvesting Catchment | 5 |
| Stream, Creek, Bayou, River, Lake | 30 |
| Livestock Watering Systems – Delivery and Consumption point | |
| Livestock Pipeline (s) | 15 |
| Watering Facility (s) | 15 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total.

# **Inefficient Energy Use**

## **Equipment and Facilities**

**Description:** Existing stationary equipment or facilities are using energy inefficiently.

**Objective:** Improve energy efficiency of stationary equipment and facilities to reduce energy use.

**Analysis within CART:**

Each PLU for all land uses will default to a “not assessed” status for energy efficiency - equipment and facilities. The planner may identify this resource concern based on site-specific conditions. A threshold value of 50 will be set and existing condition question will be triggered. The existing condition question will set the existing score as seen in *figure 145*.

*Figure 145: Energy Use Intensity for Energy Efficiency - Equipment and Facilities*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Assessment Condition |
| High | 51 | EUI Range: >75th percentile. No resource concern (minor or negligible risk). |
| Medium | 45 | EUI Range: 51st to ≤75th percentile. Low risk for resource concern. |
| Low | 35 | EUI range: 26th to ≤50th percentile. Moderate risk for resource concern. |
| Poor | 25 | EUI Range: ≤25th percentile. High risk for resource concern. |
| N/A | 0 | Does not apply; no appreciable use of supplemental energy to operate the farm. |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Some example practice points are identified in *figure 146*.

Figure 146: Typical Practices Affecting Inefficient Energy Use - Equipment and Facilities

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Lighting System Improvement (670) | See below |
| Building Envelope Improvement (672) | See below |
| Farmstead Energy Improvement | See below |
| Pumping Plant | 10 |
| Irrigation Water Management | 10\* |
| Sprinkler System | 5\* |
| Irrigation System, Surface & Subsurface | 5\* |
| Irrigation System, Microirrigation | 5\* |

\*Indicates an enabling practice where energy savings may be predicated on a subsequent practice. For example, an irrigation system that operates at lower pressure or flow enables a change to operation of a pumping plant. Minimal energy savings is realized if flow and pressure is reduced by use of a manual valve where a change to the pump impeller or use of a VSD capture more of the available conservation. In other cases, other supporting practices may be necessary to allow a listed practice to perform as intended. These will be identified as necessary supporting practices that do not add conservation management points to the total.

*Figure 147: Applications of Conservation Practice Standards With an Energy Purpose*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Conservation Practice (Code) | Application | Dairy | Swine | Poultry | Maple | Greenhouse |
| Lighting System Improvement (670) | LED | 20 | 10 | 10 | 5 | 30 |
| T5/T8 | 19 | 10 | 10 | 5 | 25 |
| HPS Installation | 19 | 10 | 10 |  | 25 |
| Building Envelope Improvement (672) | Wall R-value |  | 5 | 15 |  | 10 |
| Roof R-value |  | 5 | 15 |  |  |
| Greenhouse screens |  |  |  |  | 15 |
| Tunnel Doors |  |  | 10 |  |  |
| Seal Air Leaks |  |  | 15 |  | 5 |
| Cooler R-value |  |  | 10 |  |  |
| Farmstead Energy Improvement (374) | Vacuum Pump VSD | 12 |  |  |  |  |
| Radiant Heat |  | 20 | 20 |  | 10 |
| Ventilation Cones |  | 5 | 5 |  |  |
| Plate Cooler | 13 |  |  |  |  |
| RHR DHW | 2 |  |  |  |  |
| HVLS Fans | 8 |  |  |  |  |
| Scroll Comp. | 5 |  | 10 |  | 10 |
| Fan (VER) |  |  | 5 |  |  |
| Combustion System Improvement (372) |  |  |  |  |  |  |

* DHW: Domestic Hot Water (generically refers to heated water – regardless of facility type – not meant for process or space heat. “Domestic” does not mean “residential,” so this doesn’t violate program rules)
* HPS: High-Pressure Sodium
* HVLS: High-Volume Low-Speed
* RHR: Refrigerant Heat Recovery
* VER: Ventilation Efficiency Ratio (typically rendered as CFM/W or CFM/HP)
* VSD: Variable Speed Drive, also Adjustable Speed Drive (ASD) & Variable Frequency Drive (VFD)

## **Farming/Ranching Practices and Field Operations**

**Description:** Existing mobile on-farm, ranching, forestry, or field operations are using energy inefficiently.

**Objective:** Improve energy efficiency of mobile farming, ranching, forestry practices and field operations to reduce energy use.

Each PLU for all land uses will default to a “not assessed” status for energy efficiency - farming/ranching practices and field operations. The planner may identify this resource concern based on site-specific conditions. A threshold value of 50 will be set and existing condition question will be triggered. The existing condition question will set the existing score as seen in *figure 148*.

*Figure 148: Energy Use Intensity for Energy Efficiency – Farming/Ranching Practices and Field Operations*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Assessment Condition |
| High | 51 | EUI Range: >75th percentile. No Resource Concern (minor or negligible risk). |
| Medium | 45 | EUI Range: 51st to ≤75th percentile. Low risk for resource concern. |
| Low | 35 | EUI range: 26th to ≤50th percentile. Moderate risk for resource concern. |
| Poor | 25 | EUI Range: ≤25th percentile. High risk for resource concern. |
| N/A | 0 | Does not apply; no appreciable use of supplemental energy to operate the farm. |

Conservation practices and activities are then added to the existing condition to determine the state of the management system. Some example practice points are identified in *figure 149*.

Figure 149: Typical Practices Affecting Inefficient Energy Use - Farming/Ranching Practices and Field Operations

|  |  |
| --- | --- |
| Conservation Practices | Conservation Management Points |
| Combustion System Improvement | 30 |
| Integrated Pest Management | 10 |
| Irrigation Water Management | 10 |
| Nutrient Management | 10 |
| Pumping Plant | 20 |
| Residue and Tillage Management, No Till | 20 |
| Residue and Tillage Management, Reduced Till | 10 |

\*Supporting practices may be necessary to support the above practices, and will be identified as necessary supporting practices, but do not add conservation management points to the total. All other conservation practices are rated at 5, 1, or not applicable.

# **Air Quality**

## **Emissions of Particulate Matter (PM) and PM Precursors (Particulate Matter)**

**Description:** Direct emissions of particulate matter – dust and smoke – as well as the formation of fine particulate matter in the atmosphere from other agricultural emissions – ammonia, NOx, and VOCs – can cause multiple negative environmental impacts.

**Component 1:** Emissions of PM and PM precursors from combustion equipment do not excessively contribute to negative impacts to human, plant, or animal health and do not excessively contribute to regional visibility degradation.

**Analysis within CART:**

Each PLU for all land uses will trigger an intersection with the PM2.5 and PM10 nonattainment maps. If the PLU is within a nonattainment area for either PM2.5 or PM10, a threshold value of 50 will be set, and the following existing condition questions will be triggered:

* Is there any combustion equipment (i.e., burns fuel) in operation at the PLU? **Note**: If yes, document all combustion equipment larger than 25 brake horsepower or equivalent.
  + Is all documented combustion equipment properly operated and maintained according to manufacturer’s recommendations?
    - Has the client developed a site-specific or equipment-specific plan for properly operating and maintaining all documented combustion equipment, and can the client demonstrate or certify that the plan is being followed?
    - Does the client intend to apply additional practices to reduce air emissions from combustion equipment?

The existing condition questions will set the existing condition score as seen in *figure 150*.

*Figure 150: Particulate Matter Component 1 (Combustion Equipment) Existing Condition*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Score | Additional Information |
| No combustion equipment | N/A | There is no combustion equipment larger than 25 brake horsepower or equivalent in operation at the PLU. |
| Proper operation and maintenance and no interest in additional practices | 51 | The client can certify that all combustion equipment larger than 25 brake horsepower or equivalent in operation at the PLU is properly operated and maintained (either according to manufacturer’s recommendations or according to a site-specific or equipment-specific plan for proper operation and maintenance), and the client does not intend to apply additional practices to reduce PM or PM precursor emissions from combustion equipment. |
| Proper operation and maintenance, interest in additional practices, and minor improvement opportunities | 40 | The client can certify that all combustion equipment larger than 25 brake horsepower or equivalent in operation at the PLU is properly operated and maintained (either according to manufacturer’s recommendations or according to a site-specific or equipment-specific plan for proper operation and maintenance), the client intends to apply additional practices to reduce PM or PM precursor emissions from combustion equipment, and there are minor improvement opportunities for combustion equipment at the PLU. |
| Proper operation and maintenance, interest in additional practices, and moderate improvement opportunities | 25 | The client can certify that all combustion equipment larger than 25 brake horsepower or equivalent in operation at the PLU is properly operated and maintained (either according to manufacturer’s recommendations or according to a site-specific or equipment-specific plan for proper operation and maintenance), the client intends to apply additional practices to reduce PM or PM precursor emissions from combustion equipment, and there are moderate improvement opportunities for combustion equipment at the PLU. |
| Proper operation and maintenance, interest in additional practices, and major improvement opportunities | 10 | The client can certify that all combustion equipment larger than 25 brake horsepower or equivalent in operation at the PLU is properly operated and maintained (either according to manufacturer’s recommendations or according to a site-specific or equipment-specific plan for proper operation and maintenance), the client intends to apply additional practices to reduce PM or PM precursor emissions from combustion equipment, and there are major improvement opportunities for combustion equipment at the PLU. |
| No proper operation and maintenance | 1 | The client cannot certify that all combustion equipment larger than 25 brake horsepower or equivalent in operation at the PLU is properly operated and maintained (either according to manufacturer’s recommendations or according to a site-specific or equipment-specific plan for proper operation and maintenance). |

There is currently no conservation practice or activity to implement proper operation or maintenance of combustion equipment by following manufacturer’s recommendations or by implementing a site‑specific or equipment-specific plan for proper operation and maintenance. However, technical assistance can be provided to the client to implement one of these options. If the client can certify that all combustion equipment larger than 25 brake horsepower or equivalent in operation at the PLU is properly operated and maintained (either according to manufacturer’s recommendations or according to a site-specific or equipment-specific plan for proper operation and maintenance), and the client intends to apply additional practices to reduce PM or PM precursor emissions from combustion equipment, conservation practices and activities related to reducing PM or PM precursor emissions from combustion equipment are added to the existing condition to determine the state of the planned management system. Example practice and activity points are identified in *figure 151*.

*Figure 151: Practices and Activities for Reducing PM or PM Precursor Emissions from Combustion Equipment*

|  |  |
| --- | --- |
| Conservation Practices and Activities | Conservation Management Points |
| Combustion Equipment PM or PM Precursor Mitigation Major Improvements | 50 |
| Combustion Equipment PM or PM Precursor Mitigation Moderate Improvements | 25 |
| Combustion Equipment PM or PM Precursor Mitigation Minor Improvements | 10 |

\*Practices to reduce PM or PM precursor emissions from combustion equipment include Combustion System Improvement (372) and Pumping Plant (533). Additional practices may be necessary to support these practices.

**Component 2:**  Emissions of PM and PM precursors from fire do not excessively contribute to negative impacts to human, plant, or animal health and do not result in safety or nuisance visibility restrictions.

**Analysis within CART:**

Each PLU for all land uses will trigger an intersection with the PM2.5 and PM10 nonattainment maps. If the PLU is within a nonattainment area for either PM2.5 or PM10, separate threshold values of 50 will be set for prescribed fire and for open burning, and the following existing condition questions will be triggered:

* Is prescribed fire applied at the PLU? **Note**: If yes, document average annual prescribed fire events and acres subject to prescribed fire.
  + Is a prescribed burn plan that includes basic smoke management practices developed, implemented, and followed for each prescribed fire event?
    - Does the client intend to apply additional practices to reduce use of prescribed fire?
* Is open burning of biomass residue conducted at the PLU? **Note**: If yes, document average annual open burning events.
  + Are basic smoke management practices implemented for each open burning event?
    - Does the client intend to apply additional practices to reduce open burning of biomass residue?

The existing condition questions will set the existing condition scores for prescribed fire and open burning as seen in *figure 152* and *figure 154*, respectively.

***Prescribed Fire:***

*Figure 152: Particulate Matter Component 2 Prescribed Fire Existing Condition*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Score | Additional Information |
| No prescribed fire | N/A | Prescribed fire is not applied at the PLU. |
| Basic smoke management practices for all prescribed fire events and no interest in additional practices | 51 | The client can certify that prescribed fire is applied according to a prescribed burn plan that includes basic smoke management practices for all prescribed fire events at the PLU, and the client does not intend to apply additional practices to reduce use of prescribed fire. |
| Basic smoke management practices for all prescribed fire events and interest in additional practices | 49 | The client can certify that prescribed fire is applied according to a prescribed burn plan that includes basic smoke management practices for all prescribed fire events at the PLU, and the client intends to apply additional practices to reduce use of prescribed fire. |
| Basic smoke management practices for ≥75% of prescribed fire acres | 40 | A prescribed burn plan that includes basic smoke management practices is developed, implemented, and followed for ≥75% of average annual prescribed fire acres |
| Basic smoke management practices for ≥50% but <75% of prescribed fire acres | 25 | A prescribed burn plan that includes basic smoke management practices is developed, implemented, and followed for ≥50% but <75% of average annual prescribed fire acres |
| Basic smoke management practices for ≥25% but <50% of prescribed fire acres | 10 | A prescribed burn plan that includes basic smoke management practices is developed, implemented, and followed for ≥25% but <50% of average annual prescribed fire acres |
| Basic smoke management practices for <25% of prescribed fire acres | 1 | A prescribed burn plan that includes basic smoke management practices is developed, implemented, and followed for <25% of average annual prescribed fire acres |

If less than 100% of all prescribed fire events at the PLU are conducted according to a prescribed burn plan that includes basic smoke management practices, apply Prescribed Burning (338) to develop, implement, and follow a prescribed burn plan that includes basic smoke management practices for all prescribed fire events. Additional practices may be necessary to support Prescribed Burning (338). If the client can certify that prescribed fire is applied according to a prescribed burn plan that includes basic smoke management practices for all prescribed fire events at the PLU, and the client intends to apply additional practices to reduce use of prescribed fire, conservation practices and activities for reducing the average annual acres subject to prescribed fire can be applied to achieve the practice and activity points identified in *figure 153*.

*Figure 153: Practices and Activities for Reducing Prescribed Fire*

|  |  |
| --- | --- |
| Conservation Practices and Activities | Conservation Management Points |
| Reduce average annual acres subject to prescribed fire by ≥75% | 50 |
| Reduce average annual acres subject to prescribed fire by ≥50% but ≤75% | 35 |
| Reduce average annual acres subject to prescribed fire by ≥25% but ≤50% | 20 |
| Reduce average annual acres subject to prescribed fire by <25% | 5 |

\*Practices to reduce prescribed fire include Brush Management (314), Firebreak (394), Forest Stand Improvement (666), Fuel Break (383), Grazing Land Mechanical Treatment (548), Herbaceous Weed Treatment (315), Land Clearing (460), Prescribed Grazing (528), Tree/Shrub Pruning (660), and Woody Residue Treatment (384). Additional practices may be necessary to support these practices.

***Open Burning:***

*Figure 154: Particulate Matter Component 2 Open Burning Existing Condition*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Additional Information |
| No open burning | N/A | Open burning is not conducted at the PLU. |
| Basic smoke management practices for all open burning events and no interest in additional practices | 51 | The client can certify that basic smoke management practices are implemented for all open burning events at the PLU, and the client does not intend to apply additional practices to reduce open burning of biomass residue. |
| Basic smoke management practices for all open burning events and interest in additional practices | 49 | The client can certify that basic smoke management practices are implemented for all open burning events at the PLU, and the client intends to apply additional practices to reduce open burning of biomass residue. |
| Basic smoke management practices for ≥75% of open burning events | 40 | Basic smoke management practices are implemented for ≥75% of average annual open burning events |
| Basic smoke management practices for ≥50% but <75% of open burning events | 25 | Basic smoke management practices are implemented for ≥50% but <75% of average annual open burning events |
| Basic smoke management practices for ≥25% but <50% of open burning events | 10 | Basic smoke management practices are implemented for ≥25% but <50% of average annual open burning events |
| Basic smoke management practices for <25% of open burning events | 1 | Basic smoke management practices are implemented for <25% of average annual open burning events |

If basic smoke management practices are implemented for less than 100 percent of all open burning events at the PLU, provide technical assistance to ensure basic smoke management practices are implemented for all open burning events. If the client can certify that basic smoke management practices are implemented for all open burning events at the PLU, and the client intends to apply additional practices to reduce open burning of biomass residue, conservation practices and activities for reducing the number of average annual open burning events can be applied to achieve the practice and activity points identified in *figure 155*.

*Figure 155: Practices and Activities for Reducing Open Burning*

|  |  |
| --- | --- |
| Conservation Practices and Activities | Conservation Management Points |
| Reduce average annual open burning events by ≥75% | 50 |
| Reduce average annual open burning events by ≥50% but ≤75% | 35 |
| Reduce average annual open burning events by ≥25% but ≤50% | 20 |
| Reduce average annual open burning events by <25% | 5 |

\*Practices to reduce open burning of biomass residue include Obstruction Removal (500), Tree/Shrub Pruning (660), Waste Recycling (633), Waste Treatment (629), and Woody Residue Treatment (384). Additional practices may be necessary to support these practices.

**Component 3:**  Pesticide use does not result in unwanted chemical droplet drift.

**Analysis within CART:**

Each PLU for all land uses will default to a “not assessed” status for this objective. The planner may identify a particulate matter resource concern for this objective based on site-specific conditions. A threshold value will be set at 50, and the following existing condition questions will be triggered:

* Are chemical pesticides applied at the PLU?
  + Have there been any previous chemical drift complaints or has the planner or client observed any chemical drift issues related to chemical pesticide application at the PLU?
    - Has the client previously applied any practices or techniques to address the previous chemical drift complaints or observed issues?

The existing condition questions will set the existing condition score as seen in *figure 156*.

*Figure 156: Particulate Matter Component 3 (Chemical Pesticide Drift) Existing Condition*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Additional Information |
| No chemical pesticide application | N/A | Chemical pesticides are not applied at the PLU. |
| Previous chemical drift issues, but practices previously applied | 51 | The client has previously applied practices or techniques to address the previous chemical drift complaints or observed issues, and the applied practices or techniques have been documented. |
| Previous chemical drift issues, and practices not previously applied | 26 | The client has not previously applied practices or techniques to address the previous chemical drift complaints or observed issues. |

Conservation practices and activities related to reducing chemical drift are added to the existing condition to determine the state of the planned management system. Example practice and activity points are identified in *figure 157*.

*Figure 157: Practices and Activities for Reducing Chemical Drift*

|  |  |
| --- | --- |
| Conservation Practices and Activities | Conservation Management Points |
| Chemical Drift Significant Improvements | 75 |
| Chemical Drift Moderate Improvements | 50 |
| Chemical Drift Minor Improvements | 25 |

\*Practices to reduce chemical drift include Integrated Pest Management (595) and Pesticide Mitigation (596). Additional practices may be necessary to support these practices.

**Component 4:** Emissions of ammonia (a PM precursor) from nitrogen fertilizer application do not excessively contribute to negative impacts to human, plant, or animal health and do not excessively contribute to regional visibility degradation.

**Analysis within CART:**

Each PLU for the crop, pasture, forest, and associated agricultural land uses will default to a “not assessed” status for this objective. The planner may identify a particulate matter resource concern for this objective based on site-specific conditions. A threshold value will be set at 50, and the following existing condition questions will be triggered:

* Are nitrogen fertilizers (organic or inorganic) applied at the PLU?
  + Are all nitrogen fertilizers applied at the PLU according to an NRCS-approved nutrient management plan that utilizes the 4R approach for nitrogen?

The existing condition questions will set the existing condition score as seen in *figure 158*.

*Figure 158: Particulate Matter Component 4 (Nitrogen Fertilizer) Existing Condition*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Additional Information |
| No nitrogen fertilizer application | N/A | Nitrogen fertilizers (organic or inorganic) are not applied at the PLU. |
| Approved nutrient management plan for nitrogen | 51 | All nitrogen fertilizers are applied at the PLU according to an NRCS-approved nutrient management plan that utilizes the 4R approach for nitrogen. |
| No approved nutrient management plan for nitrogen | 1 | There is no NRCS-approved nutrient management plan that utilizes the 4R approach for nitrogen for the PLU. |

Conservation practices and activities related to reducing nitrogen volatilization from nitrogen fertilizer application are added to the existing condition to determine the state of the planned management system. Example practice and activity points are identified in *figure 159*.

*Figure 159: Practices and Activities for Reducing Nitrogen Volatilization from Nitrogen Fertilizer Application*

|  |  |
| --- | --- |
| Conservation Practices and Activities | Conservation Management Points |
| Nitrogen Fertilizer Significant Improvements | 75 |
| Nitrogen Fertilizer Moderate Improvements | 50 |
| Nitrogen Fertilizer Minor Improvements | 25 |

\*Practices to reduce nitrogen volatilization from nitrogen fertilizer application include Nutrient Management (590). Additional practices may be necessary to support Nutrient Management (590).

**Objective 5:** Mechanically generated emissions of PM from field operations (including tillage, seed bed preparation, planting, harvest operations, or any combination of these) do not excessively contribute to negative impacts to human, plant, or animal health; do not excessively contribute to unwanted deposition on surfaces; and do not result in safety or nuisance visibility restrictions.

**Analysis within CART:**

Each PLU for the crop and pasture land uses will default to a “not assessed” status for this objective. The planner may identify a particulate matter resource concern for this objective based on site-specific conditions. A threshold value will be set at 50, and the following existing condition questions will be triggered:

* Are field operations (including tillage, seed bed preparation, planting, harvesting, etc.) conducted at the PLU?
  + Have there been any previous PM or dust complaints or has the planner or client-observed any PM or dust issues related to field operations at the PLU?
    - Has the client previously applied any practices or techniques to address the previous PM or dust complaints or observed issues?
    - Does the client intend to apply additional practices to reduce PM or dust emissions from field operations?

The existing condition questions will set the existing condition score as seen in *figure 160*.

*Figure 160: Particulate Matter Component 5 (Field Operations) Existing Condition*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Additional Information |
| No field operations | N/A | Field operations (including tillage, seed bed preparation, planting, harvesting, etc.) are not conducted at the PLU. |
| Previous PM or dust issues related to field operations, but practices previously applied and no interest in additional practices | 51 | The client has previously applied practices or techniques to address the previous PM or dust complaints or observed issues, the applied practices or techniques have been documented, and the client does not intend to apply additional practices to reduce PM or dust emissions from field operations. |
| Previous PM or dust issues related to field operations, but practices previously applied and interest in additional practices | 49 | The client has previously applied practices or techniques to address the previous PM or dust complaints or observed issues, the applied practices or techniques have been documented, and the client intends to apply additional practices to reduce PM or dust emissions from field operations. |
| Previous PM or dust issues related to field operations and practices not previously applied | 26 | The client has not previously applied practices or techniques to address the previous PM or dust complaints or observed issues. |

Conservation practices and activities related to reducing PM or dust emissions from field operations are added to the existing condition to determine the state of the planned management system. Example practice and activity points are identified in *figure 161*.

*Figure 161: Practices and Activities for Reducing PM/Dust Emissions from Field Operations*

|  |  |
| --- | --- |
| Conservation Practices and Activities | Conservation Management Points |
| Field Operations PM Mitigation Significant Improvements | 50 |
| Field Operations PM Mitigation Moderate Improvements | 25 |
| Field Operations PM Mitigation Minor Improvements | 10 |

\*Practices to reduce PM or dust emissions from field operations include Field Operations Emissions Reduction (376), Residue and Tillage Management, No-Till (329), Residue and Tillage Management, Reduced Till (345), and Windbreak/Shelterbelt Establishment (380). Additional practices may be necessary to support these practices.

**Component 6:**  Emissions of PM from vehicle and machinery travel on unpaved roads and surfaces do not excessively contribute to negative impacts to human, plant, or animal health; do not excessively contribute to unwanted deposition on surfaces; and do not result in safety or nuisance visibility restrictions.

**Analysis within CART:**

Each PLU for all land uses will default to a “not assessed” status for this objective. The planner may identify a particulate matter resource concern for this objective based on site-specific conditions. A threshold value will be set at 50, and the following existing condition questions will be triggered:

* Are unpaved roads or other unpaved travel surfaces used for vehicle or machinery movement at the PLU?
  + Have there been any previous PM or dust complaints or has the planner or client observed any PM or dust issues related to vehicle or machinery travel on unpaved surfaces at the PLU?
    - Has the client previously applied any practices or techniques to address the previous PM or dust complaints or observed issues?
    - Does the client intend to apply additional practices to reduce PM or dust emissions from vehicle or machinery travel on unpaved surfaces?

The existing condition questions will set the existing condition score as seen in *figure 162*.

*Figure 162: Particulate Matter Component 6 (Unpaved Roads) Existing Condition*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Additional Information |
| No unpaved roads | N/A | Unpaved roads or other unpaved travel surfaces used for vehicle or machinery movement are not present at the PLU. |
| Previous PM or dust issues related to unpaved roads, but practices previously applied and no interest in additional practices | 51 | The client has previously applied practices or techniques to address the previous PM or dust complaints or observed issues, the applied practices or techniques have been documented, and the client does not intend to apply additional practices to reduce PM or dust emissions from unpaved roads. |
| Previous PM or dust issues related to unpaved roads, but practices previously applied and interest in additional practices | 49 | The client has previously applied practices or techniques to address the previous PM or dust complaints or observed issues, the applied practices or techniques have been documented, and the client intends to apply additional practices to reduce PM or dust emissions from unpaved roads. |
| Previous PM or dust issues related to unpaved roads and practices not previously applied | 26 | The client has not previously applied practices or techniques to address the previous PM or dust complaints or observed issues. |

Conservation practices and activities related to reducing PM or dust emissions from unpaved roads are added to the existing condition to determine the state of the planned management system. Example practice and activity points are identified in *figure 163*.

*Figure 163: Practices and Activities for Reducing PM or Dust Emissions from Unpaved Roads*

|  |  |
| --- | --- |
| Conservation Practices and Activities | Conservation Management Points |
| Unpaved Roads PM Mitigation Significant Improvements | 51 |
| Unpaved Roads PM Mitigation Moderate Improvements | 25 |
| Unpaved Roads PM Mitigation Minor Improvements | 10 |

\*Practices to reduce PM or dust emissions from unpaved roads include Dust Control on Unpaved Roads and Surfaces (373), Heavy Use Area Protection (561), Access Control (472), and Windbreak/Shelterbelt Establishment (380). Additional practices may be necessary to support these practices.

**Component 7:**  Wind-generated emissions of PM do not excessively contribute to negative impacts to human, plant, or animal health; do not excessively contribute to unwanted deposition on surfaces; and do not result in safety or nuisance visibility restrictions.

**Analysis within CART:**

Each PLU for all land uses will default to a “not assessed” status for this objective. The planner may identify a particulate matter resource concern for this objective based on site-specific conditions. A threshold value will be set at 50, and the following existing condition questions will be triggered:

* Has wind erosion been identified as a resource concern at the PLU?
* Have there been any previous PM or dust complaints or has the planner or client observed any PM or dust issues related to windblown dust at the PLU?
  + Has the client previously applied any practices or techniques to address the previous PM or dust complaints or observed issues?
  + Does the client intend to apply additional practices to reduce PM or dust emissions from vehicle or machinery travel on unpaved surfaces?

The existing condition questions will set the existing condition score as seen in *figure 164*.

*Figure 164: Particulate Matter Component 7 (Windblown Dust) Existing Condition*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Additional Information |
| No windblown dust | N/A | Wind erosion has not been identified as a resource concern and there have been no previous windblown dust complaints or issues at the PLU. |
| Previous windblown dust issues, but practices previously applied, and no interest in additional practices | 55 | Wind erosion has not been identified as a resource concern, the client has previously applied practices or techniques to address the previous PM or dust complaints or observed issues, the applied practices or techniques have been documented, and the client does not intend to apply additional practices to reduce windblown dust emissions. |
| Wind erosion is a resource concern, previous windblown dust issues, but practices previously applied and no interest in additional practices | 51 | Wind erosion has been identified as a resource concern, the client has previously applied practices or techniques to address the previous PM or dust complaints or observed issues, the applied practices or techniques have been documented, and the client does not intend to apply additional practices to reduce windblown dust emissions. |
| Previous windblown dust issues, but practices previously applied and interest in additional practices | 49 | Wind erosion has not been identified as a resource concern, the client has previously applied practices or techniques to address the previous PM or dust complaints or observed issues, the applied practices or techniques have been documented, and the client intends to apply additional practices to reduce windblown dust emissions. |
| Wind erosion is a resource concern, previous windblown dust issues, but practices previously applied and interest in additional practices | 26 | Wind erosion has been identified as a resource concern, the client has previously applied practices or techniques to address the previous PM or dust complaints or observed issues, the applied practices or techniques have been documented, and the client intends to apply additional practices to reduce windblown dust emissions. |
| Wind erosion is a resource concern, previous windblown dust issues, and practices not previously applied | 1 | Wind erosion has been identified as a resource concern, and the client has not previously applied practices or techniques to address the previous windblown dust complaints or observed issues. |

Conservation practices and activities related to reducing windblown dust emissions are added to the existing condition to determine the state of the planned management system. Example practice and activity points are identified in *figure 165*.

*Figure 165: Practices and Activities for Reducing Windblown Dust Emissions*

|  |  |
| --- | --- |
| Conservation Practices and Activities | Conservation Management Points |
| Windblown Dust Mitigation Significant Improvements | 51 |
| Windblown Dust Mitigation Moderate Improvements | 25 |
| Windblown Dust Mitigation Minor Improvements | 10 |

\*Practices to reduce PM or dust emissions from unpaved roads include: Anionic Polyacrylamide (PAM) Erosion Control (450), Conservation Cover (327), Cover Crop (340), Critical Area Planting (342), Cross Wind Ridges (588), Cross Wind Trap Strips (589c), Dust Control from Animal Activity on Open Lot Surfaces (375), Dust Control on Unpaved Roads and Surfaces (373), Heavy Use Area Protection (561), Hedgerow Planting (422), Herbaceous Wind Barriers (603), Mulching (484), Prescribed Grazing (528), Range Planting (550), Residue and Tillage Management, No-Till (329), Residue and Tillage Management, Reduced Till (345), Stripcropping (585), Surface Roughening (609), and Windbreak/Shelterbelt Establishment (380). Additional practices may be necessary to support these practices.

**Component 8:** Emissions of PM and PM precursors from confinement-based animal production do not excessively contribute to negative impacts to human, plant, or animal health; do not excessively contribute to regional visibility degradation; and do not result in safety or nuisance visibility restrictions.

**Analysis within CART:**

Each PLU for the Farmstead land use will default to a “not assessed” status for this objective. The planner may identify a particulate matter resource concern for this objective based on site-specific conditions. A threshold value will be set at 50, and the following existing condition questions will be triggered:

* Does the client raise livestock at the PLU?
  + Is there confinement-based livestock production at the PLU?
    - Have there been any previous PM or dust complaints or has the planner or client observed any PM or dust issues related to confinement-based livestock production at the PLU?
      * Has the client previously applied any practices or techniques to address the previous PM or dust complaints or observed issues?
      * Does the client intend to apply additional practices to reduce PM or dust emissions from confinement-based livestock production?

The existing condition questions will set the existing condition score as seen in *figure 166*.

*Figure 166: Particulate Matter Component 8 (Confinement-Based Livestock) Existing Condition*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Additional Information |
| No confinement-based livestock production | N/A | There is no confinement-based livestock production at the PLU. |
| Previous PM or dust issues related to livestock, but practices previously applied, and no interest in additional practices | 51 | The client has previously applied practices or techniques to address the previous PM or dust complaints or observed issues, the applied practices or techniques have been documented, and the client does not intend to apply additional practices to reduce PM or dust emissions from confinement-based livestock or poultry production. |
| Previous PM or dust issues related to livestock, but practices previously applied and interest in additional practices | 49 | The client has previously applied practices or techniques to address the previous PM or dust complaints or observed issues, the applied practices or techniques have been documented, and the client intends to apply additional practices to reduce PM or dust emissions from confinement-based livestock or poultry production. |
| Previous PM or dust issues related to livestock and practices not previously applied | 26 | The client has not previously applied practices or techniques to address the previous PM or dust complaints or observed issues. |

Conservation practices and activities related to reducing PM or dust emissions from confinement-based livestock or poultry production are determined based on an analysis of the PLU using the National Air Quality Site Assessment Tool (NAQSAT – [http://naqsat.tamu.edu](http://naqsat.tamu.edu/)) and the USDA/EPA Agricultural Air Quality Conservation Measures Guide for Poultry and Livestock Production and are added to the existing condition to determine the state of the planned management system. Practices to reduce PM or dust emissions from confinement-based livestock or poultry production include Air Filtration and Scrubbing (371), Amendments for Treatment of Agricultural Waste (591), Composting Facility (317), Dust Control from Animal Activity on Open Lot Surfaces (375), Dust Control on Unpaved Roads and Surfaces (373), Feed Management (592), Heavy Use Area Protection (561), Nutrient Management (590), Sprinkler System (442), Waste Treatment (629), and Windbreak/Shelterbelt Establishment (380). Additional practices may be necessary to support these practices.

## **Emissions of Greenhouse Gases (GHGs)**

**Description:** Emissions of agricultural greenhouse gases – methane, nitrous oxide, and carbon dioxide – increase atmospheric concentrations of these gases.

**Component 1:**  Emissions of nitrous oxide from nitrogen fertilizer application do not excessively contribute to increased atmospheric concentrations of greenhouse gases.

**Analysis within CART:**

Each PLU for all land uses will default to a “not assessed” status for this objective. The planner may identify a greenhouse gas resource concern for this objective based on site-specific conditions. A threshold value will be set at 50, and the following existing condition questions will be triggered:

* Are nitrogen fertilizers (organic or inorganic) applied at the PLU?
  + Are all nitrogen fertilizers applied at the PLU according to an NRCS-approved nutrient management plan that utilizes the 4R approach for nitrogen?

The existing condition questions will set the existing condition score as seen in *figure 167*.

*Figure 167: Greenhouse Gas Component 1 (Nitrogen Fertilizer) Existing Condition*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Additional Information |
| No nitrogen fertilizer application | N/A | Nitrogen fertilizers (organic or inorganic) are not applied at the PLU. |
| Approved nutrient management plan for nitrogen | 51 | All nitrogen fertilizers are applied at the PLU according to an NRCS-approved nutrient management plan that utilizes the 4R approach for nitrogen. |
| No approved nutrient management plan for nitrogen | 1 | There is no NRCS-approved nutrient management plan that utilizes the 4R approach for nitrogen for the PLU. |

Conservation practices and activities related to reducing nitrogen volatilization from nitrogen fertilizer application are added to the existing condition to determine the state of the planned management system. Example practice and activity points are identified in *figure 168*.

*Figure 168: Practices and Activities for Reducing Nitrogen Volatilization from Nitrogen Fertilizer Application*

|  |  |
| --- | --- |
| Conservation Practices and Activities | Conservation Management Points |
| Nitrogen Fertilizer Significant Improvements | 75 |
| Nitrogen Fertilizer Moderate Improvements | 50 |
| Nitrogen Fertilizer Minor Improvements | 25 |

\*Practices to reduce nitrogen volatilization from nitrogen fertilizer application include Nutrient Management (590). Additional practices may be necessary to support Nutrient Management (590).

**Component 2:**  Emissions of methane from rice production do not excessively contribute to increased atmospheric concentrations of greenhouse gases.

**Analysis within CART:**

Each PLU for the crop land use will default to a “not assessed” status for this objective. The planner may identify a greenhouse gas resource concern for this objective based on site-specific conditions. A threshold value will be set at 50, and the following existing condition questions will be triggered:

* Is irrigation used at the PLU?
  + Is there rice production at the PLU?
    - Is the client willing to implement alternate wetting and drying (AWD) for rice production?
    - Is the client willing to implement dry seeding for rice production?

The existing condition questions will set the existing condition score as seen in *figure 169*.

*Figure 169: Greenhouse Gas Component 2 (Rice Production) Existing Condition*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Score | Additional Information |
| No rice production | N/A | There is no rice production at the PLU. |
| Rice production and no interest in additional practices | 51 | The client does not intend to implement either alternate wetting and drying (AWD) or dry seeding for rice production. |
| Rice production and interest in one of the additional practices | 49 | The client intends to implement either AWD or dry seeding for rice production. |
| Rice production and interest in both additional practices | 48 | The client intends to implement both AWD and dry seeding for rice production. |

There is currently no conservation practice or activity to implement either alternate wetting and drying or dry seeding for rice production. However, technical assistance can be provided to the client to implement either or both options, if the client intends to apply one or both options.

**Component 3:**  Maintain or increase total carbon stored in soils, perennial biomass, or both to reduce atmospheric concentrations of carbon dioxide and enhance carbon sequestration.

**Analysis within CART:**

Each PLU for the crop, pasture, range, forest, and associated agricultural land uses will default to a “not assessed” status for this objective. The planner may identify a greenhouse gas resource concern for this objective based on site-specific conditions. Separate threshold values will be set at 50 for both carbon stocks and hydric and organic soils, and the following existing condition questions will be triggered:

* Is a strategy for maintaining or increasing carbon stocks in soils and perennial biomass being implemented at the PLU?
* Are there hydric or organic soils at the PLU? **Note**: This can likely be determined from soils data layers.

***Carbon Stocks:***

If the client is not implementing a strategy for maintaining or increasing carbon stocks in soils and perennial biomass at the PLU, the planner will make a determination of whether a resource concern exists for this objective for carbon stocks. The resource concern determination for carbon stocks will include an analysis of the PLU using either COMET-Farm or COMET-Planner to analyze overall carbon stocks in soils and perennial biomass at the PLU. If the analysis shows that overall carbon stocks in soils and perennial biomass are stable or increasing, an existing score of 51 will be applied. If the analysis shows that overall carbon stocks in soils and perennial biomass are decreasing, an existing score of 1 will be applied. Conservation practices and activities related to maintaining or increasing carbon stocks in soils and perennial biomass are determined based on an alternative scenario analysis of the PLU using either COMET-Farm or COMET-Planner and are added to the existing condition to determine the state of the planned management system. Practices to maintain or increase carbon stocks in soils and perennial biomass include Alley Cropping (311), Conservation Cover (327), Conservation Crop Rotation (328), Cover Crop (340), Critical Area Planting (342), Field Border (386), Forage and Biomass Planting (512), Forest Stand Improvement (666), Hedgerow Planting (422), Multi‑Story Cropping (379), Prescribed Burning (338), Prescribed Grazing (528), Range Planting (550), Residue and Tillage Management, No-Till (329), Residue and Tillage Management, Reduced Till (345), Riparian Forest Buffer (391), Riparian Herbaceous Cover (390), Silvopasture Establishment (381), Tree/Shrub Establishment (612), and Windbreak/Shelterbelt Establishment (380). Additional practices may be necessary to support these practices.

***Hydric and Organic Soils:***

If there are hydric or organic soils at the PLU, the existing condition questions will set the existing condition score for hydric and organic soils as seen in *figure 170*.

*Figure 170: Greenhouse Gas Component 3 Existing Condition for Hydric and Organic Soils*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Score | Additional Information |
| No hydric or organic soils | N/A | There are no hydric or organic soils at the PLU. |
| All hydric and organic soils with perennial cover | 51 | All hydric and organic soils at the PLU are maintained with perennial cover |
| ≥75% of hydric and organic soils with perennial cover | 40 | ≥75% of hydric and organic soil acreage is maintained with perennial cover |
| ≥50% but <75% of hydric and organic soils with perennial cover | 26 | ≥50% but <75% of hydric and organic soil acreage is maintained with perennial cover |
| ≥25% but <50% of hydric and organic soils with perennial cover | 10 | ≥25% but <50% of hydric and organic soil acreage is maintained with perennial cover |
| <25% of hydric and organic soils with perennial cover | 1 | <25% of hydric and organic soil acreage is maintained with perennial cover |

If less than 100 percent of hydric and organic soils at the PLU are maintained with perennial cover, apply Conservation Cover (327) to ensure that 100 percent of hydric and organic soils at the PLU are maintained with perennial cover. Additional practices may be necessary to support Conservation Cover (327).

**Component 4:** Emissions of methane and nitrous oxide from animal production do not excessively contribute to increased atmospheric concentrations of greenhouse gases.

**Analysis within CART:**

Each PLU for all land uses will default to a “not assessed” status for this objective. The planner may identify a greenhouse gas resource concern for this objective based on site-specific conditions. Separate threshold values will be set at 50 for both grazing animals and confinement-based livestock production, and the following existing condition questions will be triggered:

* Does the client raise livestock at the PLU?
* Are there grazing animals at the PLU?
  + Is a grazing management plan implemented at the PLU to balance the energy and nutrition requirements of the grazing animals with the productivity of the grazing lands?
* Is there confinement-based livestock production at the PLU?

***Grazing Animals:***

If there are grazing animals at the PLU, the existing condition questions will set the existing condition score for grazing animals as seen in *figure 171*.

*Figure 171: Greenhouse Gas Component 4 Existing Condition for Grazing Animals*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Score | Additional Information |
| No grazing animals | N/A | There are no grazing animals at the PLU. |
| Grazing management plan | 51 | The client can certify that a grazing management plan to balance the energy and nutrition requirements of the grazing animals with the productivity of the grazing lands is being implemented at the PLU. |
| No grazing management plan | 1 | A grazing management plan to balance the energy and nutrition requirements of the grazing animals with the productivity of the grazing lands is not being implemented at the PLU. |

If a grazing management plan to balance the energy and nutrition requirements of the grazing animals with the productivity of the grazing lands is not being implemented at the PLU, apply Prescribed Grazing (528) to develop, implement, and follow a prescribed grazing plan that balances the energy and nutrition requirements of the grazing animals with the productivity of the grazing lands. Additional practices may be necessary to support Prescribed Grazing (528).

***Confinement-Based Livestock Production:***

If there is confinement-based livestock or poultry production at the PLU, the planner will make a determination of whether a resource concern exists. NRCS does not have a threshold value for Greenhouse Gas Objective 4 for emissions of greenhouse gases from confinement-based animal production. The resource concern determination for emissions of greenhouse gases from confinement‑based animal production will include an analysis of the PLU using the National Air Quality Site Assessment Tool (NAQSAT – [http://naqsat.tamu.edu](http://naqsat.tamu.edu/)) and other relevant information. If a greenhouse gas resource concern is determined to exist for emissions of greenhouse gases from confinement-based animal production for this objective based on this analysis of the PLU, conservation practices and activities related to reducing greenhouse gas emissions from confinement‑based livestock or poultry production are determined based on an alternative scenario analysis of the PLU using the National Air Quality Site Assessment Tool (NAQSAT – [http://naqsat.tamu.edu](http://naqsat.tamu.edu/)) and the USDA/EPA Agricultural Air Quality Conservation Measures Guide for Poultry and Livestock Production and are added to the benchmark condition to determine the state of the planned management system. Practices to reduce greenhouse gas emissions from confinement-based livestock or poultry production include Air Filtration and Scrubbing (371), Amendments for Treatment of Agricultural Waste (591), Anaerobic Digester (366), Composting Facility (317), Feed Management (592), Nutrient Management (590), Roofs and Covers (367), and Waste Treatment (629). Additional practices may be necessary to support these practices.

## **Emissions of Ozone Precursors (Ozone Precursors)**

**Description:** Emissions of ozone precursors (NOx and VOCs) result in formation of ground-level ozone, which can have negative impacts to human, plant, and animal health.

**Component 1:**  Emissions of ozone precursors from combustion equipment do not excessively contribute to negative impacts to human, plant, or animal health.

**Analysis within CART:**

Each PLU for all land uses will trigger an intersection with the ozone nonattainment maps. If the PLU is within a nonattainment area for ozone, a threshold value of 50 will be set, and the following existing condition questions will be triggered:

* Is there any combustion equipment (i.e., burns fuel) in operation at the PLU? **Note**: If yes, document all combustion equipment larger than 25 brake horsepower or equivalent.
  + Is all documented combustion equipment properly operated and maintained according to manufacturer’s recommendations?
    - Has the client developed a site-specific or equipment-specific plan for properly operating and maintaining all documented combustion equipment, and can the client demonstrate or certify that the plan is being followed?
    - Does the client intend to apply additional practices to reduce air emissions from combustion equipment?

The existing condition questions will set the existing condition score as seen in *figure 172*

*Figure 172: Ozone Component 1 (Combustion Equipment) Existing Condition*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Score | Additional Information |
| No combustion equipment | N/A | There is no combustion equipment larger than 25 brake horsepower or equivalent in operation at the PLU. |
| Proper operation and maintenance and no interest in additional practices | 51 | The client can certify that all combustion equipment larger than 25 brake horsepower or equivalent in operation at the PLU is properly operated and maintained (either according to manufacturer’s recommendations or according to a site-specific or equipment-specific plan for proper operation and maintenance), and the client does not intend to apply additional practices to reduce ozone precursor emissions from combustion equipment. |
| Proper operation and maintenance, interest in additional practices, and minor improvement opportunities | 40 | The client can certify that all combustion equipment larger than 25 brake horsepower or equivalent in operation at the PLU is properly operated and maintained (either according to manufacturer’s recommendations or according to a site-specific or equipment-specific plan for proper operation and maintenance), the client intends to apply additional practices to reduce ozone precursor emissions from combustion equipment, and there are minor improvement opportunities for combustion equipment at the PLU. |
| Proper operation and maintenance, interest in additional practices, and moderate improvement opportunities | 25 | The client can certify that all combustion equipment larger than 25 brake horsepower or equivalent in operation at the PLU is properly operated and maintained (either according to manufacturer’s recommendations or according to a site-specific or equipment-specific plan for proper operation and maintenance), the client intends to apply additional practices to reduce ozone precursor emissions from combustion equipment, and there are moderate improvement opportunities for combustion equipment at the PLU. |
| Proper operation and maintenance, interest in additional practices, and major improvement opportunities | 10 | The client can certify that all combustion equipment larger than 25 brake horsepower or equivalent in operation at the PLU is properly operated and maintained (either according to manufacturer’s recommendations or according to a site-specific or equipment-specific plan for proper operation and maintenance), the client intends to apply additional practices to reduce ozone precursor emissions from combustion equipment, and there are major improvement opportunities for combustion equipment at the PLU. |
| No proper operation and maintenance | 1 | The client cannot certify that all combustion equipment larger than 25 brake horsepower or equivalent in operation at the PLU is properly operated and maintained (either according to manufacturer’s recommendations or according to a site-specific or equipment-specific plan for proper operation and maintenance). |

There is currently no conservation practice or activity to implement proper operation or maintenance of combustion equipment by following manufacturer’s recommendations or by implementing a site‑specific or equipment-specific plan for proper operation and maintenance. However, technical assistance may be provided to the client to implement one of these options. If the client can certify that all combustion equipment larger than 25 brake horsepower or equivalent in operation at the PLU is properly operated and maintained (either according to manufacturer’s recommendations or according to a site-specific or equipment-specific plan for proper operation and maintenance), and the client intends to apply additional practices to reduce ozone precursor emissions from combustion equipment, conservation practices and activities related to reducing ozone precursor emissions from combustion equipment are added to the existing condition to determine the state of the planned management system. Example practice and activity points are identified in *figure 173*.

*Figure 173: Practices and Activities for Reducing Ozone Precursor Emissions from Combustion Equipment*

|  |  |
| --- | --- |
| Conservation Practices and Activities | Conservation Management Points |
| Combustion Equipment Ozone Precursor Mitigation Major Improvements | 51 |
| Combustion Equipment Ozone Precursor Mitigation Moderate Improvements | 25 |
| Combustion Equipment Ozone Precursor Mitigation Minor Improvements | 10 |

\*Practices to reduce ozone precursor emissions from combustion equipment include Combustion System Improvement (372) and Pumping Plant (533). Additional practices may be necessary to support these practices.

**Component 2:** Emissions of ozone precursors from fire do not excessively contribute to negative impacts to human, plant, or animal health.

**Analysis within CART:**

Each PLU for all land uses will trigger an intersection with the ozone nonattainment maps. If the PLU is within a nonattainment area for ozone, separate threshold values of 50 will be set for prescribed fire and for open burning, and the following existing condition questions will be triggered:

* Is prescribed fire applied at the PLU? **Note**: If yes, document average annual prescribed fire events and acres subject to prescribed fire.
  + Is a prescribed burn plan that includes basic smoke management practices developed, implemented, and followed for each prescribed fire event?
    - Does the client intend to apply additional practices to reduce use of prescribed fire?
* Is open burning of biomass residue conducted at the PLU? **Note**: If yes, document average annual open burning events.
  + Are basic smoke management practices implemented for each open burning event?
    - Does the client intend to apply additional practices to reduce open burning of biomass residue?

The existing condition questions will set the existing condition scores for prescribed fire and open burning as seen in *figure 174* and *figure 176*, respectively.

***Prescribed Fire:***

*Figure 174: Ozone Component 2 Prescribed Fire Existing Condition*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Additional Information |
| No prescribed fire | N/A | Prescribed fire is not applied at the PLU. |
| Basic smoke management practices for all prescribed fire events and no interest in additional practices | 51 | The client can certify that prescribed fire is applied according to a prescribed burn plan that includes basic smoke management practices for all prescribed fire events at the PLU, and the client does not intend to apply additional practices to reduce use of prescribed fire. |
| Basic smoke management practices for all prescribed fire events and interest in additional practices | 49 | The client can certify that prescribed fire is applied according to a prescribed burn plan that includes basic smoke management practices for all prescribed fire events at the PLU, and the client intends to apply additional practices to reduce use of prescribed fire. |
| Basic smoke management practices for ≥75% of prescribed fire acres | 40 | A prescribed burn plan that includes basic smoke management practices is developed, implemented, and followed for ≥75% of average annual prescribed fire acres |
| Basic smoke management practices for ≥50%, but <75% of prescribed fire acres | 25 | A prescribed burn plan that includes basic smoke management practices is developed, implemented, and followed for ≥50%, but <75% of average annual prescribed fire acres |
| Basic smoke management practices for ≥25%, but <50% of prescribed fire acres | 10 | A prescribed burn plan that includes basic smoke management practices is developed, implemented, and followed for ≥25%, but <50% of average annual prescribed fire acres |
| Basic smoke management practices for <25% of prescribed fire acres | 1 | A prescribed burn plan that includes basic smoke management practices is developed, implemented, and followed for <25% of average annual prescribed fire acres |

If less than 100% of all prescribed fire events at the PLU are conducted according to a prescribed burn plan that includes basic smoke management practices, apply Prescribed Burning (338) to develop, implement, and follow a prescribed burn plan that includes basic smoke management practices for all prescribed fire events. Additional practices may be necessary to support Prescribed Burning (338). If the client can certify that prescribed fire is applied according to a prescribed burn plan that includes basic smoke management practices for all prescribed fire events at the PLU, and the client intends to apply additional practices to reduce use of prescribed fire, conservation practices and activities for reducing the average annual acres subject to prescribed fire can be applied to achieve the practice and activity points identified in *figure 175*.

*Figure 175: Practices and Activities for Reducing Prescribed Fire*

|  |  |
| --- | --- |
| Conservation Practices and Activities | Conservation Management Points |
| Reduce average annual acres subject to prescribed fire by ≥75% | 50 |
| Reduce average annual acres subject to prescribed fire by ≥50%, but ≤75% | 35 |
| Reduce average annual acres subject to prescribed fire by ≥25%, but ≤50% | 20 |
| Reduce average annual acres subject to prescribed fire by <25% | 5 |

\*Practices to reduce prescribed fire include Brush Management (314), Firebreak (394), Forest Stand Improvement (666), Fuel Break (383), Grazing Land Mechanical Treatment (548), Herbaceous Weed Treatment (315), Land Clearing (460), Prescribed Grazing (528), Tree/Shrub Pruning (660), and Woody Residue Treatment (384). Additional practices may be necessary to support these practices.

***Open Burning:***

*Figure 176: Ozone Component 2 Open Burning Existing Condition*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Additional Information |
| No open burning | N/A | Open burning is not conducted at the PLU. |
| Basic smoke management practices for all open burning events and no interest in additional practices | 51 | The client can certify that basic smoke management practices are implemented for all open burning events at the PLU, and the client does not intend to apply additional practices to reduce open burning of biomass residue |
| Basic smoke management practices for all open burning events and interest in additional practices | 49 | The client can certify that basic smoke management practices are implemented for all open burning events at the PLU, and the client intends to apply additional practices to reduce open burning of biomass residue |
| Basic smoke management practices for ≥75% of open burning events | 40 | Basic smoke management practices are implemented for ≥75% of average annual open burning events |
| Basic smoke management practices for ≥50% but <75% of open burning events | 25 | Basic smoke management practices are implemented for ≥50% but <75% of average annual open burning events |
| Basic smoke management practices for ≥25% but <50% of open burning events | 10 | Basic smoke management practices are implemented for ≥25% but <50% of average annual open burning events |
| Basic smoke management practices for <25% of open burning events | 1 | Basic smoke management practices are implemented for <25% of average annual open burning events |

If basic smoke management practices are implemented for less than 100 percent of all open burning events at the PLU, provide technical assistance to ensure basic smoke management practices are implemented for all open burning events. If the client can certify that basic smoke management practices are implemented for all open burning events at the PLU, and the client intends to apply additional practices to reduce open burning of biomass residue, conservation practices and activities for reducing the number of average annual open burning events can be applied to achieve the practice and activity points identified in *figure 177*.

*Figure 177: Practices and Activities for Reducing Open Burning*

|  |  |
| --- | --- |
| Conservation Practices and Activities | Conservation Management Points |
| Reduce average annual open burning events by ≥75% | 51 |
| Reduce average annual open burning events by ≥50% but ≤75% | 35 |
| Reduce average annual open burning events by ≥25% but ≤50% | 20 |
| Reduce average annual open burning events by <25% | 5 |

\*Practices to reduce open burning of biomass residue include Obstruction Removal (500), Tree/Shrub Pruning (660), Waste Recycling (633), Waste Treatment (629), and Woody Residue Treatment (384). Additional practices may be necessary to support these practices.

**Component 3:** Emissions of ozone precursors from pesticide use do not excessively contribute to negative impacts to human, plant, or animal health.

**Analysis within CART:**

Each PLU for all land uses will trigger an intersection with the ozone nonattainment maps. If the PLU is within a nonattainment area for ozone, a threshold value of 50 will be set, and the following existing condition questions will be triggered:

* Are chemical pesticides applied at the PLU?
  + Is a fully integrated pest management system utilizing prevention, avoidance, monitoring, and suppression to minimize or eliminate pesticide use implemented at the PLU?

The existing condition questions will set the existing condition score as seen in *figure 178*.

*Figure 178: Ozone Component 3 (Pesticide Application) Existing Condition*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Additional Information |
| No chemical pesticides | N/A | Chemical pesticides are not applied at the PLU. |
| Full IPM | 90 | The client has implemented a full integrated pest management system utilizing prevention, avoidance, monitoring, and suppression to minimize or eliminate pesticide use at the planning site. |
| No full IPM and ozone maintenance or marginal nonattainment | 40 | The client has not implemented a full Integrated pest management system utilizing prevention, avoidance, monitoring, and suppression to minimize or eliminate pesticide use at the planning site, and the planning site is located in an ozone maintenance area or a marginal ozone nonattainment area. |
| No full IPM and ozone moderate nonattainment | 30 | The client has not implemented a full integrated pest management system utilizing prevention, avoidance, monitoring, and suppression to minimize or eliminate pesticide use at the planning site, and the planning site is located in a moderate ozone nonattainment area. |
| No full IPM and ozone serious nonattainment | 20 | The client has not implemented a full integrated pest management system utilizing prevention, avoidance, monitoring, and suppression to minimize or eliminate pesticide use at the planning site, and the planning site is located in a serious ozone nonattainment area. |
| No full IPM and ozone severe nonattainment | 10 | The client has not implemented a full integrated pest management system utilizing prevention, avoidance, monitoring, and suppression to minimize or eliminate pesticide use at the planning site, and the planning site is located in a severe ozone nonattainment area. |
| No full IPM and ozone extreme nonattainment | 5 | The client has not implemented a full integrated pest management system utilizing prevention, avoidance, monitoring, and suppression to minimize or eliminate pesticide use at the planning site, and the planning site is located in an extreme ozone nonattainment area. |

Conservation practices and activities related to reducing VOC emissions from chemical pesticides are added to the existing condition to determine the state of the planned management system. Example practice and activity points are identified in *figure 179*.

*Figure 179: Practices and Activities for Reducing VOC Emissions from Chemical Pesticides*

|  |  |
| --- | --- |
| Conservation Practices and Activities | Conservation Management Points |
| Chemical Pesticide VOC Mitigation Significant Improvements | 50 |
| Chemical Pesticide VOC Mitigation Moderate Improvements | 25 |
| Chemical Pesticide VOC Mitigation Minor Improvements | 10 |

\*Practices to reduce VOC emissions from chemical pesticides include Integrated Pest Management (595) and Pesticide Mitigation (596). Additional practices may be necessary to support these practices.

**Component 4:**  Emissions of ozone precursors from confinement-based animal production do not excessively contribute to negative impacts to human, plant, or animal health.

**Analysis within CART:**

Each PLU for the farmstead land use will trigger an intersection with the ozone nonattainment maps. If the PLU is within a nonattainment area for ozone, each PLU for the farmstead land use will default to a “not assessed” status for this objective. The planner may identify an ozone resource concern for this objective based on site-specific conditions. NRCS does not have a threshold value for Ozone Objective 4 for emissions of ozone precursors from confinement-based animal production. If there are no livestock or poultry at the PLU, this objective is not applicable. If there is no confinement‑based livestock or poultry production at the PLU, this objective is not applicable. If there is confinement-based livestock or poultry production at the PLU, the planner will make a determination of whether or not a resource concern exists. This determination will include an analysis of the PLU using the National Air Quality Site Assessment Tool (NAQSAT – [http://naqsat.tamu.edu](http://naqsat.tamu.edu/)) and other relevant information. If an ozone resource concern is determined to exist based on this analysis of the PLU, conservation practices and activities related to reducing VOC emissions from confinement-based livestock or poultry production are determined based on an alternative scenario analysis of the PLU using the NAQSAT and the USDA/EPA Agricultural Air Quality Conservation Measures Guide for Poultry and Livestock Production and are added to the benchmark condition to determine the state of the planned management system. Practices to reduce VOC emissions from confinement-based livestock or poultry production include Air Filtration and Scrubbing (371), Amendments for Treatment of Agricultural Waste (591), Composting Facility (317), Feed Management (592), and Waste Treatment (629). Additional practices may be necessary to support these practices.

## **Objectionable Odors (Odor)**

**Description:** Emissions of odorous compounds (VOCs, ammonia, and odorous sulfur compounds) can cause nuisance conditions.

**Component 1:** Emissions of volatile organic compounds (VOCs), ammonia, and odorous sulfur compounds from confinement-based animal production do not excessively contribute to negative odor impacts.

**Analysis within CART:**

Each PLU for the crop, pasture, associated agricultural land, and farmstead land uses will default to a “not assessed” status for this objective. The planner may identify an odor resource concern for this objective based on site-specific conditions. Separate threshold values of 50 will be set for confinement-based livestock production, for nitrogen fertilizer application, and for chemical pesticide application, and the following existing condition questions will be triggered:

* Does the client raise livestock at the PLU?
  + Is there confinement-based livestock production at the PLU?
    - Have there been any previous odor complaints or has the planner observed any odor issues related to confinement-based livestock production at the PLU?
      * Has the client previously applied any practices or techniques to address the previous odor complaints or observed issues?
      * Does the client intend to apply additional practices to reduce odors from confinement-based livestock production?
* Are nitrogen fertilizers (organic or inorganic) applied at the PLU?
  + Are all nitrogen fertilizers applied at the PLU according to an NRCS-approved nutrient management plan that utilizes the 4R approach for nitrogen?
* Are chemical pesticides applied at the PLU?
  + Have there been any previous odor complaints or has the planner or client observed any odor issues related to chemical pesticide application at the PLU?
    - Has the client previously applied any practices or techniques to address the previous odor complaints or observed issues?

The existing condition questions will set the existing condition scores for confinement-based livestock production, nitrogen fertilizers, and chemical pesticides, as seen in *figure 180*, *figure 181*, and *figure 183*, respectively.

***Confinement-Based Livestock Production:***

*Figure 180: Odor Existing Condition for Confinement-Based Livestock Production*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Additional Information |
| No confinement-based livestock production at the PLU | N/A | There is no confinement-based livestock production at the PLU |
| Previous odor issues related to livestock, but practices previously applied and no interest in additional practices | 51 | The client has previously applied practices or techniques to address the previous odor complaints or observed issues, the applied practices or techniques have been documented, and the client does not intend to apply additional practices to reduce odor emissions from confinement-based livestock or poultry production. |
| Previous odor issues related to livestock, but practices previously applied and interest in additional practices | 49 | The client has previously applied practices or techniques to address the previous odor complaints or observed issues, the applied practices or techniques have been documented, and the client intends to apply additional practices to reduce odor emissions from confinement-based livestock or poultry production. |
| Previous odor issues related to livestock and practices not previously applied | 26 | The client has not previously applied practices or techniques to address the previous odor complaints or observed issues. |

Conservation practices and activities related to reducing odor emissions from confinement-based livestock production are determined based on an analysis of the PLU using the National Air Quality Site Assessment Tool (NAQSAT – [http://naqsat.tamu.edu](http://naqsat.tamu.edu/)) and the USDA/EPA Agricultural Air Quality Conservation Measures Guide for Poultry and Livestock Production and are added to the existing condition to determine the state of the planned management system. Practices to reduce odor emissions from confinement-based livestock or poultry production include Air Filtration and Scrubbing (371), Amendments for Treatment of Agricultural Waste (591), Anaerobic Digester (366), Animal Mortality Facility (316), Composting Facility (317), Feed Management (592), Nutrient Management (590), Roofs and Covers (367), Waste Separation Facility (632), Waste Treatment (629), and Windbreak/Shelterbelt Establishment (380). Additional practices may be necessary to support these practices.

***Nitrogen Fertilizers:***

*Figure 181: Odors Existing Condition for Nitrogen Fertilizer*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Additional Information |
| No nitrogen fertilizer application at the PLU | N/A | Nitrogen fertilizers (organic or inorganic) are not applied at the PLU. |
| Approved nutrient management plan for nitrogen | 51 | All nitrogen fertilizers are applied at the PLU according to an NRCS-approved nutrient management plan that utilizes the 4R approach for nitrogen. |
| No approved nutrient management plan for nitrogen | 1 | There is no NRCS-approved nutrient management plan that utilizes the 4R approach for nitrogen for the PLU. |

Conservation practices and activities related to reducing nitrogen volatilization from nitrogen fertilizer application are added to the existing condition to determine the state of the planned management system. Example practice and activity points are identified in *figure 182*.

*Figure 182: Practices and Activities for Reducing Nitrogen Volatilization from Nitrogen Fertilizer Application*

|  |  |
| --- | --- |
| Conservation Practices and Activities | Conservation Management Points |
| Nitrogen Fertilizer Significant Improvements | 75 |
| Nitrogen Fertilizer Moderate Improvements | 50 |
| Nitrogen Fertilizer Minor Improvements | 25 |

\*Practices to reduce nitrogen volatilization from nitrogen fertilizer application include Nutrient Management (590). Additional practices may be necessary to support Nutrient Management (590).

***Chemical Pesticides:***

*Figure 183: Odors Existing Condition for Chemical Pesticides*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Additional Information |
| No chemical pesticide application | N/A | Chemical pesticides are not applied at the PLU. |
| Previous odor issues, but practices previously applied | 51 | The client has previously applied practices or techniques to address the previous odor complaints or observed issues related to chemical pesticides, and the applied practices or techniques have been documented. |
| Previous odor issues, and practices not previously applied | 26 | The client has not previously applied practices or techniques to address the previous odor complaints or observed issues related to chemical pesticides. |

Conservation practices and activities related to reducing odors from chemical pesticides are added to the existing condition to determine the state of the planned management system. Example practice and activity points are identified in *figure 184*.

*Figure 184: Practices and Activities for Reducing Odors from Chemical Pesticides*

|  |  |
| --- | --- |
| Conservation Practices and Activities | Conservation Management Points |
| Chemical Pesticide Odor Significant Improvements | 75 |
| Chemical Pesticide Odor Moderate Improvements | 51 |
| Chemical Pesticide Odor Minor Improvements | 25 |

\*Practices to reduce odors from chemical pesticides include Integrated Pest Management (595) and Pesticide Mitigation (596). Additional practices may be necessary to support these practices.

## **Emissions of Airborne Reactive Nitrogen (Airborne Nitrogen)**

**Description:** Emissions of airborne reactive nitrogen (NH3 and NOx) can negatively impact atmospheric chemistry, cause unwanted fertilization by deposition in sensitive ecosystems, and degrade regional visibility.

**Component 1:** Emissions of airborne reactive nitrogen from fire do not excessively contribute to negative atmospheric impacts, ecosystem impacts, or both.

**Analysis within CART:**

Each PLU for all land uses will default to a “not assessed” status for this objective. Separate threshold values of 50 will be set for prescribed fire and for open burning, and the following existing condition questions will be triggered:

* Is prescribed fire applied at the PLU? **Note**: If yes, document average annual prescribed fire events and acres subject to prescribed fire.
  + Is a prescribed burn plan that includes basic smoke management practices developed, implemented, and followed for each prescribed fire event?
    - Does the client intend to apply additional practices to reduce use of prescribed fire?
* Is open burning of biomass residue conducted at the PLU? **Note**: If yes, document average annual open burning events.
  + Are basic smoke management practices implemented for each open burning event?
    - Does the client intend to apply additional practices to reduce open burning of biomass residue?

The existing condition questions will set the existing condition scores for prescribed fire and open burning as seen in figures *figure 185* and *figure 187* respectively.

***Prescribed Fire:***

*Figure 185: Airborne Reactive Nitrogen Component 1 Prescribed Fire Existing Condition*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Additional Information |
| No prescribed fire | N/A | Prescribed fire is not applied at the PLU. |
| Basic smoke management practices for all prescribed fire events and no interest in additional practices | 51 | The client can certify that prescribed fire is applied according to a prescribed burn plan that includes basic smoke management practices for all prescribed fire events at the PLU, and the client does not intend to apply additional practices to reduce use of prescribed fire. |
| Basic smoke management practices for all prescribed fire events and interest in additional practices | 49 | The client can certify that prescribed fire is applied according to a prescribed burn plan that includes basic smoke management practices for all prescribed fire events at the PLU, and the client intends to apply additional practices to reduce use of prescribed fire. |
| Basic smoke management practices for ≥75% of prescribed fire acres | 40 | A prescribed burn plan that includes basic smoke management practices is developed, implemented, and followed for ≥75% of average annual prescribed fire acres |
| Basic smoke management practices for ≥50% but <75% of prescribed fire acres | 25 | A prescribed burn plan that includes basic smoke management practices is developed, implemented, and followed for ≥50% but <75% of average annual prescribed fire acres |
| Basic smoke management practices for ≥25% but <50% of prescribed fire acres | 10 | A prescribed burn plan that includes basic smoke management practices is developed, implemented, and followed for ≥25% but <50% of average annual prescribed fire acres |
| Basic smoke management practices for <25% of prescribed fire acres | 1 | A prescribed burn plan that includes basic smoke management practices is developed, implemented, and followed for <25% of average annual prescribed fire acres |

If less than 100% of all prescribed fire events at the PLU are conducted according to a prescribed burn plan that includes basic smoke management practices, apply Prescribed Burning (338) to develop, implement, and follow a prescribed burn plan that includes basic smoke management practices for all prescribed fire events. Additional practices may be necessary to support Prescribed Burning (338). If the client can certify that prescribed fire is applied according to a prescribed burn plan that includes basic smoke management practices for all prescribed fire events at the PLU, and the client intends to apply additional practices to reduce use of prescribed fire, conservation practices and activities for reducing the average annual acres subject to prescribed fire can be applied to achieve the practice and activity points identified in *figure 186*.

*Figure 186: Practices and Activities for Reducing Prescribed Fire*

|  |  |
| --- | --- |
| Conservation Practices and Activities | Conservation Management Points |
| Reduce average annual acres subject to prescribed fire by ≥75% | 51 |
| Reduce average annual acres subject to prescribed fire by ≥50% but ≤75% | 35 |
| Reduce average annual acres subject to prescribed fire by ≥25% but ≤50% | 20 |
| Reduce average annual acres subject to prescribed fire by <25% | 5 |

\*Practices to reduce prescribed fire include Brush Management (314), Firebreak (394), Forest Stand Improvement (666), Fuel Break (383), Grazing Land Mechanical Treatment (548), Herbaceous Weed Treatment (315), Land Clearing (460), Prescribed Grazing (528), Tree/Shrub Pruning (660), and Woody Residue Treatment (384). Additional practices may be necessary to support these practices.

***Open Burning:***

*Figure 187: Airborne Reactive Nitrogen Component 1 Open Burning Existing Condition*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Additional Information |
| No open burning | N/A | Open burning is not conducted at the PLU. |
| Basic smoke management practices for all open burning events and no interest in additional practices | 51 | The client can certify that basic smoke management practices are implemented for all open burning events at the PLU, and the client does not intend to apply additional practices to reduce open burning of biomass residue. |
| Basic smoke management practices for all open burning events and interest in additional practices | 49 | The client can certify that basic smoke management practices are implemented for all open burning events at the PLU, and the client intends to apply additional practices to reduce open burning of biomass residue. |
| Basic smoke management practices for ≥75% of open burning events | 40 | Basic smoke management practices are implemented for ≥75% of average annual open burning events |
| Basic smoke management practices for ≥50% but <75% of open burning events | 25 | Basic smoke management practices are implemented for ≥50% but <75% of average annual open burning events |
| Basic smoke management practices for ≥25% but <50% of open burning events | 10 | Basic smoke management practices are implemented for ≥25% but <50% of average annual open burning events |
| Basic smoke management practices for <25% of open burning events | 1 | Basic smoke management practices are implemented for <25% of average annual open burning events |

If basic smoke management practices are implemented for less than 100 percent of all open burning events at the PLU, provide technical assistance to ensure basic smoke management practices are implemented for all open burning events. If the client can certify that basic smoke management practices are implemented for all open burning events at the PLU, and the client intends to apply additional practices to reduce open burning of biomass residue, conservation practices and activities for reducing the number of average annual open burning events can be applied to achieve the practice and activity points identified in *figure 188*.

*Figure 188: Practices and Activities for Reducing Open Burning*

|  |  |
| --- | --- |
| Conservation Practices and Activities | Conservation Management Points |
| Reduce average annual open burning events by ≥75% | 51 |
| Reduce average annual open burning events by ≥50% but ≤75% | 35 |
| Reduce average annual open burning events by ≥25% but ≤50% | 20 |
| Reduce average annual open burning events by <25% | 5 |

\*Practices to reduce open burning of biomass residue include Obstruction Removal (500), Tree/Shrub Pruning (660), Waste Recycling (633), Waste Treatment (629), and Woody Residue Treatment (384). Additional practices may be necessary to support these practices.

**Component 2:**  Emissions of airborne reactive nitrogen from nitrogen fertilizer application do not excessively contribute to negative atmospheric or ecosystem impacts.

**Analysis within CART:**

Each PLU for all land uses will default to a “not assessed” status for this objective. The planner may identify an airborne reactive nitrogen resource concern for this objective based on site-specific conditions. A threshold value will be set at 50, and the following existing condition questions will be triggered:

* Are nitrogen fertilizers (organic or inorganic) applied at the PLU?
  + Are all nitrogen fertilizers applied at the PLU according to an NRCS-approved nutrient management plan that utilizes the 4R approach for nitrogen?

The existing condition questions will set the existing condition score as seen in *figure 189*.

*Figure 189: Airborne Reactive Nitrogen Component 2 (Nitrogen Fertilizer) Existing Condition*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Additional Information |
| No nitrogen fertilizer application | N/A | Nitrogen fertilizers (organic or inorganic) are not applied at the PLU. |
| Approved nutrient management plan for nitrogen | 51 | All nitrogen fertilizers are applied at the PLU according to an NRCS-approved nutrient management plan that utilizes the 4R approach for nitrogen. |
| No approved nutrient management plan for nitrogen | 1 | There is no NRCS-approved nutrient management plan that utilizes the 4R approach for nitrogen for the PLU. |

Conservation practices and activities related to reducing nitrogen volatilization from nitrogen fertilizer application are added to the existing condition to determine the state of the planned management system. Example practice and activity points are identified in *figure 190*.

*Figure 190:* Practices and Activities for Reducing Nitrogen Volatilization from Nitrogen Fertilizer Application

|  |  |
| --- | --- |
| Conservation Practices and Activities | Conservation Management Points |
| Nitrogen Fertilizer Significant Improvements | 75 |
| Nitrogen Fertilizer Moderate Improvements | 51 |
| Nitrogen Fertilizer Minor Improvements | 25 |

\*Practices to reduce nitrogen volatilization from nitrogen fertilizer application include Nutrient Management (590). Additional practices may be necessary to support Nutrient Management (590).

**Component 3:**  Emissions of airborne reactive nitrogen from confinement-based animal production do not excessively contribute to negative atmospheric impacts, ecosystem impacts, or both.

**Analysis within CART:**

Each PLU for the farmstead land use will default to a “not assessed” status for this objective. The planner may identify an airborne reactive nitrogen resource concern for this objective based on site-specific conditions. NRCS does not have a threshold value for Airborne Reactive Nitrogen Objective 3 for emissions of ammonia from confinement-based animal production. If there are no livestock or poultry at the PLU, this objective is not applicable. If there is no confinement‑based livestock or poultry production at the PLU, this objective is not applicable. If there is confinement-based livestock or poultry production at the PLU, the planner will determine whether a resource concern exists. This determination will include an analysis of the PLU using the National Air Quality Site Assessment Tool (NAQSAT – [http://naqsat.tamu.edu](http://naqsat.tamu.edu/)) and other relevant information. If an airborne reactive nitrogen resource concern is determined to exist based on this analysis of the PLU, conservation practices and activities related to reducing ammonia emissions from confinement-based livestock or poultry production are determined based on an alternative scenario analysis of the PLU using the NAQSAT and the USDA/EPA Agricultural Air Quality Conservation Measures Guide for Poultry and Livestock Production and are added to the benchmark condition to determine the state of the planned management system. Practices to reduce ammonia emissions from confinement-based livestock or poultry production include Air Filtration and Scrubbing (371), Amendments for Treatment of Agricultural Waste (591), Composting Facility (317), Feed Management (592), Nutrient Management (590), Waste Treatment (629), and Windbreak/Shelterbelt Establishment (380). Additional practices may be necessary to support these practices.

# **Appendix**

## **Appendix A: Crop Groups and Tillage Types**

*Table A.1: Crops*

|  |
| --- |
| **Crop Group** |
| Vegetable Crops |
| Close Grown Crops |
| Close Grown Crops – Flooded Rice |
| Row Crops – All Removed or Fragile |
| Row Crops – Seed/Grain Removed |
| Turfgrass for Sod, Nursery Crops |
| Hayland – Hay, Forage or Seed |
| Orchard, Vineyard, Berries, Nuts, Christmas trees |

*Table A.2: Cropland Tillage*

|  |
| --- |
| Tillage Type |
| Full Field Tillage |
| Reduced Tillage (Fall) |
| Reduced Tillage (Spring) |
| No-Till |
| Perennial Crop |

## **Appendix B: List of Facilitating Practices for** **Inadequate Habitat for Fish and Wildlife (Wildlife Habitat)**

**Terrestrial Habitat**

Table B.1: Supporting Practices Affecting Terrestrial Habitat

|  |
| --- |
| Conservation Practices |
| Brush Management (314) |
| Conservation Crop Rotation (328) |
| Dike (356) |
| Forage and Biomass Planting (512) |
| Forest Stand Improvement (666) |
| Integrated Pest Management (595) |
| Livestock Pipeline (516) |
| Open Channel (582) |
| Pond (378) |
| Pumping Plant (533) |
| Residue and Tillage Management, No Till (329) |
| Roof Runoff Structure (558) |
| Silvopasture (381) |
| Spring Development (574) |
| Streambank and Shoreline Protection (580) |
| Structure for Water Control (587) |
| Tree/Shrub Site Preparation (490) |
| Water Harvesting Catchment (636) |
| Watering Facility (614) |
| Water Well (642) |
| Windbreak/Shelterbelt Establishment (380) |
| Windbreak/Shelterbelt Renovation (650) |
| Woody Residue Treatment (384) |

**Aquatic Habitat**

Table B.2: Supporting Practices Affecting Aquatic Habitat

|  |
| --- |
| Conservation Practices |
| Bivalve Aquaculture Gear and Biofouling Control (400) |
| Brush Management (314) |
| Conservation Cover (327) |
| Dam (402) |
| Dike (356) |
| Fishpond Management (399) |
| Pond (378) |
| Pumping Plant (533) |
| Roof Runoff Structure (558) |
| Streambank and Shoreline Protection (580) |
| Structure for Water Control (587) |
| Water Harvesting Catchment (636) |

## **Appendix C.1: CART energy module and interaction with off-CART tools**

CART v1 provides a limited analysis of energy resource concerns and possible practices to mitigate negative benchmark conditions. CART v1 operates within a comprehensive, streamlined methodology to perform these parts of the nine-step planning process at a high cut:

* Step 1, Identify Problems & Opportunities
* Step 2, Determine Objectives
* Step 3, Inventory Resources
* Step 4, Analyze Resources
* Step 6, Evaluate Alternatives
* Step 7, Make Decisions

Future versions of CART are expected to incorporate many of functions initially provided by off-CART tools. See table C.1.1 for a summary of actions that a planner (or NRCS partner) will complete outside of CART compared to those embedded in CART v1. In very simple terms, the streamlined process supported by CART and the off-CART tools assists a planner with these actions:

1. Estimate the energy use intensity of a client’s principal enterprises.
2. Prioritize the order of followup to address higher-risk energy resource concerns.
3. Assess equipment, systems, and management decisions that determine the client’s energy use intensity.
4. Identify well-proven practices, eligible for rapid contract action, to increase the energy efficiency of the client’s operations and reduce energy use.

CART will reduce the administrative burden on planners (and clients) imposed by existing protocols. CART functions will be leveraged through an expanded set of off-CART tools. Together, the revised protocols and tools will simplify nine-step planning for energy resource concerns. The full CART rollout will allow NRCS planners to more quickly and effectively deliver energy conservation based on customer need and interest.

See appendix C.4 for step-by-step process to assess energy using CART and off-CART tools.

*Table C.1.1: Tools & Functions to Assess and Address Energy Resource Concerns*

| **Type** | **Tool / Doc.** | **Function** | **Status** | **Notes** |
| --- | --- | --- | --- | --- |
| CART v1 | Intake Module | Client & Site Data.  (Manual export to EUI / CART tool.) | In process. |  |
| Off-CART | EUI / CART Converter | Calculates enterprise energy use intensity (EUI).  Converts EUI value to an existing condition points value on a scale of 1-100.  (The planner enters this value in CART to assess risk of an energy concern.) | In process. |  |
| CART v1 | Establish Risk of Resource Concern, by Client | Assess client’s risk based on existing condition point value. | In process | [1] |
| CART v1 | Identify Practices | Identifies a suite of practices to mitigate the identified energy resource concern based on various user intake data or secondary questions. | In process  (Appendix C.5 flow charts) | [2] |
| CART v1 | Rank for Funding | Per resource concern risk category: extreme-severe-high-moderate-low-none.  Modified by local priorities and other factors. |  |  |
| Off-CART | CPS 670, Lighting  CPS 672, Building Envelope | Revised practice criteria provide simplified means to implement common, straightforward energy practices. | CPD-DMS for internal review closed Jan. 30, 2018. | [3] |
| Off-CART | CPS 374, Farmstead Energy | As noted for CPS 670, 672. | In process | [3] |
| Off-CART | Title 210 - National Instruction: Part 302 – Agricultural Facility Energy Efficiency Improvements | Technical Reference:   * Tiered Approach Overview * Prescriptive Upgrades Overview * Energy Analysis Methods * Guides to Identify & Implement Upgrades * Lifecycle Cost Analysis * Glossary of Energy Terms * Exhibits   + Prescriptive Lists   (374, 670, 672)   * + Prescriptive Implementation Template   + Assessment Templates | In Process | [3, 4] |
| Off-CART | Energy Planning Criteria | Distinct indicators and threshold values for common energy-using equipment and systems simplifies early planning steps. | Initial draft submitted; awaits action on review of all Resource Concerns. |  |

Table Notes

[1] An N/A existing condition indicates that the resource of interest is not present for the identified PLU.

An N/A existing condition for energy resources is highly unusual.

Zero indicates an agricultural operation that relies entirely on renewable energy inputs for all substantive activities.

[2] CART v1, based on resources for build and rollout, may require various aspects of the CPS list to be evaluated with off-CART tools.

[3] Projected timeline of core energy CPS revisions.

2019.04.15 release:

* + - * Draft 2 of 670 & 672 for second internal review (via CPD-DMS)
      * Draft 1 of 374 for internal review (CPD-DMS)
      * Draft 1 of national instruction

Note that Farm Bill mandate for a comprehensive CPS review, CART, NRCS of the Future, and various other demands may affect this timeline.

[4] The draft NI may include any conservation practice standard with a purpose clearly related to energy conservation. The NI will emphasize CPS 374, Farmstead Energy; 670, Lighting Systems; and 672, Building Envelope, on initial release.

See appendix C.2 for a more detailed list of CPS with an energy purpose.

Planners are expected to use off-CART tools and CART v1 for 60-80 percent of the NRCS client pool. Planners will continue to rely on existing methods to assist the other 20-40 percent of the client pool. Future CART releases are expected to help planners identify which, if any, PLU can or should be assessed through the legacy protocols.

## **Appendix C.2: Conservation Practice Standards with Energy Purposes**

366 Anaerobic Digester

450 Anionic Polyacrylamide (PAM) Application

672 Building Envelope Improvement

372 Combustion System Improvement

374 Farmstead Energy Improvement

595 Integrated Pest Management

428 Irrigation Ditch Lining

430 Irrigation Pipeline

436 Irrigation Reservoir

441 Irrigation System, Microirrigation

443 Irrigation System, Surface and Subsurface

447 Irrigation System, Tailwater Recovery

449 Irrigation Water Management

670 Lighting System Improvement

516 Livestock Pipeline

484 Mulching

590 Nutrient Management

533 Pumping Plant

329 Residue and Tillage Management, No-Till

345 Residue and Tillage Management, Reduced Till

442 Sprinkler System

612 Tree/Shrub Establishment

650 Windbreak / Shelterbelt Renovation

380 Windbreak/Shelterbelt Establishment

## **Appendix C.3: CART Data Fields**

(As noted elsewhere, which of these components will be included in CART v1 is under review.)

Planner acquires two sets of data to assess the CART existing condition points value.

* + - 1. Energy input data, per table C.3.a.
      2. Primary, relevant enterprises data, per table C.3.b.

Note that an NRCS agricultural energy management plan (AgEMP) will generally include the data needed for these tables.

See appendix C.4 for a step-by-step overview of the process to assess energy concerns with CART.

*Table C.3.a: Annual Energy Input Data Table*

| **Category [A]** | **Budget ($/yr) [B]** | **Est. Quantity (Units) [B]** | | **Type** | **Notes** |
| --- | --- | --- | --- | --- | --- |
| Diesel Fuel |  |  | gal/yr | n/a |  |
| Nitrogen Fertilizer |  |  | Lb/yr |  | [1] |
| Electricity |  |  | kWh/yr | n/a |  |
| Propane |  |  | gal/yr | n/a |  |
| Natural Gas |  |  | Varies | n/a | [2] |
| Purchases TBD |  |  | Varies |  | [3] |
| Onsite Generation |  |  | kWh/yr |  | [4] |
| Onsite RR Heat |  |  | Varies |  | [5] |

Table Notes

▪ n/a: not applicable.

▪ RR: renewable resource.

▪ TBD: to be determined.

▪ Expand rows to accommodate multiple energy resources for onsite generation, heat sources, or allocate a specific resource to two or more distinct parts of the operation (see note [A]).

▪ Take notes of contracted work (e.g., harvesting) that includes fuel used and purchased by others. That can help resolve problems with energy balance or indicate conditions that can’t be handled in CART v1.

[A] Record cases where individual electric meters, multiple propane tanks, or other energy purchases can be more closely linked to a specific part of the operation.

* Irrigation pumps, residences, farm offices, or groups of farm buildings (e.g., farm stands or stores) may have independent electric meters.
* Note where electric service meters or fuel sources (e.g., propane or diesel tank) include any residential dwellings. (The tools use this to isolate enterprise energy use from residential structures.)

[B] Estimated budget serves as a minimum data tier to proceed with CART. Estimated purchase quantities increases accuracy.

* An annual budget estimate is good enough to use the EUI-CART converter. A planner might ask, “About how much do budget for diesel every year?”
* Some producers will track actual energy purchases.
* Collect both cost and energy values when possible to reduce errors in downstream analysis.
* Three significant digits are typically adequate for budget or quantity values.
  + Two digits is fine for values below 1,000.
* Notes for CART developers:
  + Initial CART screen presents a two-column matrix of “Category” and “Est. Budget ($/yr)” entry cells.
  + An adjacent question asks something like, “Do you have data or estimates of quantities of energy purchases?”
  + If planner selects “yes” to “quantity” question, CART toggles to add these columns to the matrix: “Est. Quantity” with “(Units)” and “Type.”
  + Include marker of some kind for “Serves Residential Dwelling” indicator. (Bonus if: “Approx. Size (SF)” & “Typical Use (Mo./Yr)” entries.)
  + (Standard sanity check functions will flag entry errors.)

[1] Record use of green or animal manures if more than a marginal contributor of fertilizer. (For purposes of CART and the EUI-CART converter, consider a contribution of less than 10% from nonsynthetic fertilizers as “marginal.”)

[2] Record natural gas units of purchase that apply to the producer. The standard unit of sale varies by location. Refer to the EUI-CART Converter User Guide for further detail.

[3] Allows entries for less typical energy sources.

[4] Onsite generation is recorded to learn if renewable resources (biogas, PV, wind, hydro, etc.) and/or fossil-resources (diesel, propane, etc.) support farm operations on a regular and substantive basis.

* Infrequent use of emergency generators can be ignored.
* A planner might ask, “About how many days a year do you use the generator?”
* Further analysis may be required to resolve issues related to onsite generation.

[5] Onsite RR heat is recorded to learn if biogas, wood, solar, or other renewable resources are used to provide onsite heat. (See note [4] for methods to assess this use.)

*Table C.3.b: Primary, Relevant Enterprises Data Table*

| **Enterprise Categories [A]** | | | | **Scale of Operation** | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **#** | **Primary** | **Secondary** | **Condition** | **Value** | **Unit** | **Type** | **Notes** |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

The planner uses the data to derive the existing condition points value with the EIU-CART converter.

CART methodology establishes risk categories shown in the energy use intensity figures in figures 145 and 148.

Draft structure of underlying CART data tables are shown in table C.3.c and table C.3.d.

*Table C.3.c: CART Data Exported to EUI-CART Converter*

|  |  |  |
| --- | --- | --- |
| Item | Description | Intake Set |
| 1 | Unique Customer ID | Core |
| 2 | Enterprise Data | Enterprise Data (Table C.3.2) |
| 3 | Energy Input Data | Energy Input Data Table (Table C.3.1) |

*Table C.3.d: Enterprise Data Fields*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Item | Description | Entry | Unit | Note |
| 1 | Enterprise Category | Drop-Down | N/A | Enterprise Data (Table C.3.2) |
| 2 | Enterprise Subcategory | Drop-Down | N/A | Enterprise Data (Table C.3.2) |
| 3 | Scale (Size Basis) | Value | Varies | Energy Input Data (Table C.3.2) |
| 4 | Scale (Production Basis) | Value | Varies |  |

CART is configured to provide SME administrator rights to create items, noted below, to maintain functions aligned with field needs.

* Enterprise category and subcategory classes.
* Associated scale (size and production) fields.
* Energy input data resource type fields.

Programming to support related entry fields to supplement as-yet-undefined core or primary data (whether drawn from GIS, derived from similar data set, or producer-provided) will be part of a continuous improvement strategy.

## **Appendix C.4: CART Process to Assess Energy Concerns, Step-by-Step**

1. Planner collects basic information to estimate EUI for applicable enterprises.
   1. This information is intended to be approximate, annual values based on typical, expected conditions. Typical conditions include normal weather and markets, an absence of avian flu or similar illness, or other events that disrupt usual operations. (See EUI-CART converter for other details.)
   2. Ask if the producer has a previously completed energy analysis related to the PLU you have been asked to evaluate. (The analysis may be an NRCS CAP 128, *Agricultural Energy Management Plan,* or similar report from USDA-RD, an electric or natural gas utility, State energy office, conservation district, or others.)
      * The CAP 128 plan criteria require the primary energy input data needed to complete most of table C.3.a. Other studies will typically have this data also.
      * Be aware that an acceptable analysis may be tagged with a variety of names: audit, assessment, report, etc. The scope or quality of the content cannot be reliably predicted by the title of the document.
      * Find out if the operation associated with the PLU is significantly different than when the energy analysis was done.
        + See item A.1. and confirm that any analysis reflected “typical, expected” conditions.
        + Generally, operations that remain within about 15 percent of scope or scale of production when evaluated will not require updated information.
        + Talk a bit further with the producer if, for example, the energy analysis looked at a 200-cow dairy herd that has grown by more than about 40 cows. (At a more detailed level, if the producer indicates that milk yield has changed more about 15 percent due to a change in the herd size combined with a different feed regime.)
      * Find out if the producer plans to modify operations in the near-term (next year or two) in similarly substantive way. (In order to plan for future conditions rather than the past.)
   3. If no energy study is available, or some gaps remain, ask about the producer’s approximate, annual energy inputs to complete table C.3.a.
      * Refer to table C.3.a notes about individual electric meters, residential dwellings, and other details to record that improve the analysis of energy concerns and potential practices to address identified concerns appropriately.
   4. Ask the producer about their most important enterprises, crops, or other operations.
      * Learn about the producer’s objectives and priorities in terms of principal crops or livestock to complete table C.3.b.
      * As with energy input, the planner will need details at an order of magnitude to understand what matters most to the producer (or keeps them up at night).
   5. Planner enters the enterprise and energy input data into CART.

The energy team proposed a modified description for energy resource concerns in August 2018.

*Table C.4.a: Description for Energy Resource Concerns*

|  |  |  |
| --- | --- | --- |
| **Resource Concern** | **Description of Concern** | **Land Use** |
| *Energy efficiency of equipment and facilities.* | Stationary equipment or facilities are using energy inefficiently. | Any |
| *Energy efficiency of farming and ranching practices and field operations.* | Mobile equipment for on-farm, ranching, or forestry field operations are using energy inefficiently. | Cropland  Forestland  Rangeland  Pastureland  Farmsteads |

Draft language, as follows, has been considered to clarify the terms used in each description.

Stationary equipment is typically fixed in place for long-term use (many months or years). A variety of farm equipment (e.g., tractors, irrigation systems) may be moved for use in multiple locations but may be operated with a fixed position when in use. This equipment is typically kept in a fixed location for shorter-term use (many hours, days, or weeks) but falls into “equipment and facilities” for that use category relative to the farm operation.

In contrast, “mobile equipment” related to field operations refers to equipment that is not constrained to a fixed position when in use.

Which energy resource concern applies is based on the operation under review. A given piece of equipment may be evaluated for both energy concerns under different circumstances.

A tractor parked to drive an irrigation pump with the PTO is evaluated as “equipment and facilities.” A tractor (in motion) used to till, fertilize, harvest, etc. is evaluated as “field operations.”

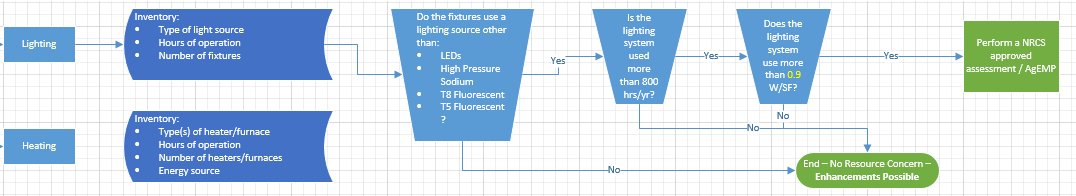
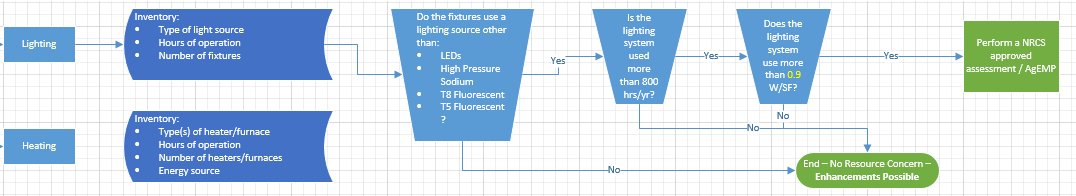
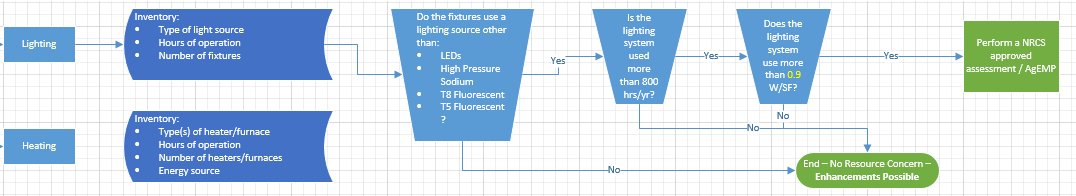
A table to designate certain equipment and applications will be included in the national instructions previously noted to accompany revised energy practices 670, 672, and 374.

## **Appendix C.5: Equipment and Systems Indicator & Threshold Flowcharts**

These flowcharts preview work-in-process to assist NRCS to more quickly and effectively identify and implement practices to address energy concerns.

*Fig. C.5.a:* Simplified Flowchart for Lighting Systems

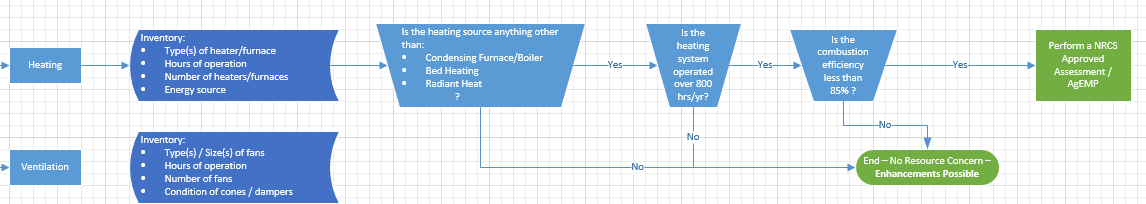
(..) (..)



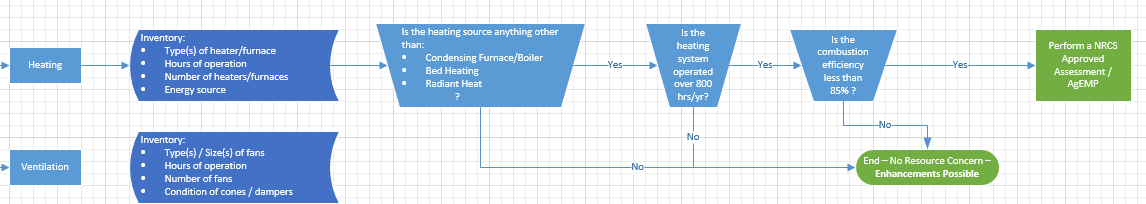
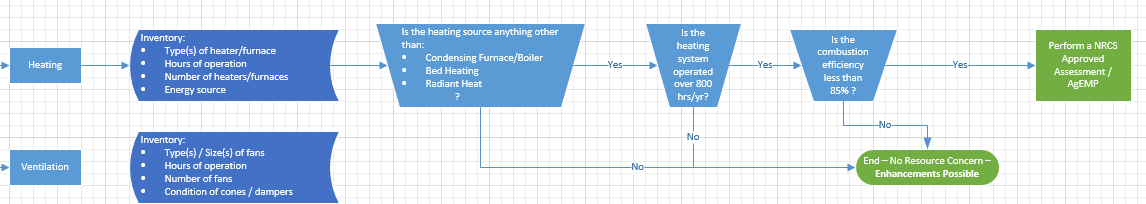
Note that significant lighting systems characteristics are based on source efficacy, power density, and control systems.

*Fig. C.5.b:* Simplified Flowchart for Heating Systems

(..)



(..)



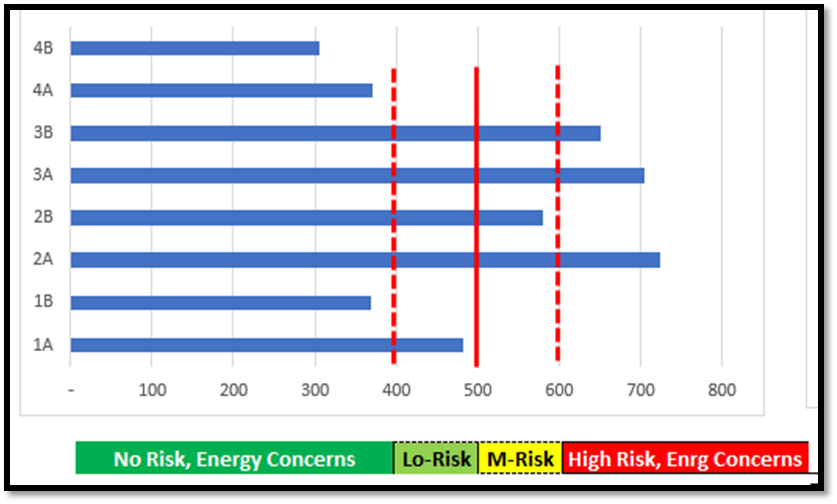
Flowcharts for ventilation, building envelope, refrigeration, and other systems are in process.

## **Appendix C.6: EUI-CART Converter Overview**

This figure is a mock-up display of EUI converter results based on preliminary existing condition point scale where lower scores indicated a lower risk and a resource concern threshold of 75.

Scale range, risk categories, and threshold value will be revised based on reviewer comments and further analysis of empirical data.

*Figure C.6.a: Example of Poultry Broiler EUI (Btu/Lb.) Quartile*



Btu = British Thermal Unit (normalized energy inputs)

Lb. = Harvest weight of birds

Energy and yield data based on 12-month operation, minimum.

EUI-to-CART converter results:

400 Btu/Lb. = 25 CART existing condition point value.

500 Btu/Lb. = 50 CART existing condition point value.

600 Btu/Lb. = 75 CART existing condition point value.

EUI: Existing condition point value. Ratio varies by enterprise.