Montana State Data Insight Report - FY 2020

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Introduction

This report contains state-specific analyses conducted by the Resource Inventory and Assessment Division (RIAD), Soil Survey and Resource Assessment (SSRA) to facilitate State use of data and tools developed by RIAD, including the Landscape Planning Package. The report provides data insights and demonstrates use of tools to help states report conservation accomplishments, analyze conservation gaps and opportunities, and plan future conservation investments.
Montana State Overview

This overview section uses state-level data and tools to explore: agricultural operation trends according to the National Agricultural Statistics Service (NASS) Census of Agriculture (herein “Ag Census”); land use trends according to the National Resources Inventory (NRI); and trends in conservation implementation assessed in Soil and Water Resources Conservation Act (RCA) reports.

Agricultural Operations and Land Use Trends in Montana

Operational Trends Between 1997 and 2017 According to the Census of Agriculture

Between 1997 and 2017, the number of farms\(^1\) in Montana decreased, the amount of land in farms decreased, and average farm size increased (Figure 1). As of the 2017 Ag Census, there were 27,048 farms in Montana, a 2% decrease since 1997. Those farms accounted for 58,122,878 acres of land in farms (62% of the state’s surface area), a decrease of 1% in farmland from the 1997 level. The average size of a farm in Montana increased by 2% from 2,115 acres per farm in 1997 to 2,149 acres in 2017. During that time, the smallest (less than 50 acres) farms increased in numbers and total acres in farms. The 50-to-179-acre category slightly decreased in number and slightly increased in total acres. Although, the annual patterns for farms 50 to 179 acres and 180 to 499 acres in size show increases along both metrics from 1997 to 2007, followed by declines from 2007 to 2017. Farms 1,000 to 1,999 acres in size decreased in number and total farmland since 1997. The largest farms (greater than 2,000 acres) decreased in number but increased in total acres in farms, suggesting consolidation in this category of farm sizes. Though, total farmland occupied by farms greater than 2,000 acres in size has decreased since 2007, even though the total remains higher than the 1997 level.

\(^1\) NASS defines a “farm” as any establishment from which $1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the census year.
When aggregated by ownership type, family and individually owned farms decreased in numbers of farms and land in farms since 1997. However, family and individually owned farms did increase in number until 2007 before their decline and increased in total acres in 2002 before their decline. Farms under other\(^2\) ownership increased in numbers since 1997 and total farmland since 2007. Corporate

\(^2\) In the Ag Census, the “other” ownership category includes arrangements other than family, individual, partnership, or corporation (e.g., estate or trust, prison farm, grazing association, American Indian Reservation).
farms showed variability in increases and decreases of both number and land in farms, declining in both the numbers and acres since 2012. Since 1997, partnerships declined in number of farms while increasing in land in farms, which is indicative of farmland consolidation within that ownership category.

Family and individually owned farms still make up the most common ownership type according to numbers of farms and land in farms, declining from 78% of farms in 1997 to 77% in 2017, and declining from 49% of farmland in 1997 to 45% in 2017. Additionally, owner-operator farms increased from 55% of Montana farms in 1997 to 65% in 2017.

Changes in Land Use in Montana Between 1992 and 2017 According to NRI Assessments

The National Resources Inventory (NRI) program collects and produces scientifically credible information on status, condition, and trends of land, soil, water, and related resources on the Nation’s non-federal lands, including privately owned lands, tribal and trust lands, and lands controlled by State and local governments.

Between the 1992 and 2017 NRI Assessments, Montana saw substantial land use change on private lands. The largest land use change on non-federal rural land was conversion from CRP to cropland (1,475,700 acres) followed most closely by cropland to pasture (1,371,800 acres). Other large shifts included CRP to pasture (653,400 acres), range to cropland (579,700 acres), cropland to CRP (556,000 acres), and pasture to cropland (476,600 acres). The state saw a net loss of CRP land of 58% (1,600,600 acres), a net loss of forest of 2% (119,400 acres), and a net loss of range of 1% (400,200 acres), as well as a net gain of pasture of 38% (1,274,200 acres) and a net gain of cropland of 2% (337,200 acres).

Table 1: Land use change sources and sinks for all lands. Reading left-to-right within a row, acres (in 1000s) under a land use in the 2017 NRI Assessment are displayed by the land use those acres were under in the 1992 assessment. Estimates in red have a margin of error equal to or larger than the estimate or have a negative lower bound; they are usually based on very few observations (for further details, see Statistical Considerations in the NRI Summary Report). Yellow color highlights the largest shifts in land use. (USDA-NRCS, National Resources Inventory)

Overall, there was a 1% decrease in non-federal rural land (485,500 acres), due to conversion to federal land (284,100 acres) and developed land (200,700 acres). The federal land came primarily from range (216,600 acres) and forest (207,900 acres). These changes were partially offset by substantial conversion of federal land to non-federal range (157,700 acres). Developed land was converted from almost all land uses including cropland (72,000 acres), range (51,300 acres), pasture (39,400 acres), and forest (36,700 acres).
Table 2 focuses on land use changes in and out of prime farmland\(^3\) in Montana between 1992 and 2017, as well as shifts within prime land use categories. Among the low proportion of Montana’s non-federal rural lands that qualify as prime farmland (approximately 21% of non-federal rural land nationally is prime farmland versus less than 1% in Montana), much of what underwent land use changes between 1992 and 2017 retained prime farmland status. The largest conversions were from pasture to cropland (47,200 acres) and cropland to pasture (46,100 acres).

Montana saw a net loss\(^4\) of prime farmland between 1992 and 2017 of 5.5% (54,000 acres), which is higher than the national average of 3.3 % over that time period. That small loss was primarily due to conversion of prime cropland (16,400 acres) to developed land and prime pasture to federal land (12,800 acres).

Additional NRI information can be found at [http://www.nrcs.usda.gov/technical/nri/](http://www.nrcs.usda.gov/technical/nri/), and summaries from NRI Assessments for Montana can be found on the RCA Data Viewer. The RCA Data Viewer provides centralized access to data at national, regional, and state levels in support of the RCA mission to ensure that USDA conservation programs are responsive to the long-term needs of the Nation.

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\(^3\) Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses. For further explanation, see the NRCS website at [https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/pr/soils/?cid=nrcs141p2_037285](https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/pr/soils/?cid=nrcs141p2_037285).

\(^4\) Prime farmland is lost or changed to a determination of “not prime farmland” if either the land cover becomes developed land or the land capability class from the soil survey indicates it is no longer prime farmland.
Table 2: Land use change sources and sinks for prime farmland. Left-to-right within a row, acres (1000s) under prime and non-prime land uses in the 2017 NRI Assessment are displayed by the prime land uses those came from in 1992. Estimates in red have a margin of error equal to or larger than the estimate or have a negative lower bound; they are usually based on very few observations (see Statistical Considerations in the NRI Summary Report for further details). Green color highlights large shifts within prime farmland uses, and orange color highlights large losses of prime acres. (USDA-NRCS, National Resources Inventory)

Conservation on the Ground

Conservation Implementation Trends in Montana According to RCA Reports, 2014-2020

The unique land unit acres\(^5\) (LUA) treated by conservation practices each fiscal year (FY) in Montana declined from FY 2015 to FY 2016 and have since increased, particularly the substantial increase from FY 2019 to FY 2020 (Figure 3). Figure 3 also presents acre treatment by agency performance measures. From FY 2015 to FY 2019, LUA treated for the performance measures Cropland Soil Quality and Cropland Soil Health & Sustainability declined when not considering CSP, and LUA for both measures increased in FY 2020. LUA treated for Fish & Wildlife Habitat decreased from FY 2014 to FY 2016 but have increased since. LUA treated for Forest Land Conservation and Grazing Land Conservation declined from FY 2014 to FY 2019 then increased substantially in FY 2020. LUA treated for Irrigation Efficiency have been relatively consistent since FY 2014. The unique LUA treated for Water Quality decreased from FY 2015 to

\(^5\) Unique land unit acres (LUA) are calculated as the total land unit acres treated by at least one practice within a fiscal year (FY). LUA may be counted multiple times across FYs but are only counted once per FY no matter how many practices are applied on them.
FY 2017 and have been increasing since FY 2017, with a substantial increase in FY 2020 compared to FY 2019. Treatment levels for Wetlands are too low in Montana compared to other performance measures to effectively display in Figure 3 (though some practice implementation trends are shown in Figure 4).

Unique LUA treated using CSP enhancements are hard to accurately count prior to FY 2017. Accounting for additional LUA that include CSP enhancement treatments since FY 2017 show increases in LUA treated in Montana, including implementation of CSP enhancements for Cropland Soil Quality (particularly E595 IPM, E590 Nutrient Management, E328 Conservation Crop Rotation, and E340 Cover Crop), Cropland Soil Health & Sustainability (particularly E328 and E340), Fish & Wildlife Habitat (particularly E327 Conservation Cover, E645 Upland Wildlife Habitat Management, and E472 Access Control), Grazing Land Conservation (particularly E528 Prescribed Grazing and E315 Herbaceous Weed Control), Irrigation Efficiency (particularly E449 Irrigation Water Management), and Water Quality (particularly E595, E528, E590, E328, and E340).

Figure 3: [Left] Unique land unit acres (LUA) treated by performance measure and by fiscal year since FY 2014. Narrow stacked bars show additional LUA accounted for with inclusion of CSP treatments beginning in FY 2017. Since practice acres can count toward multiple performance measures, it is not accurate to sum across measures to determine aggregate treatment levels. RCA reports provide unique LUA separate from practice specific LUA treated. [Right] LUA across measures, with narrow stacked bars showing additional LUA accounted for with inclusion of CSP treatments beginning in FY 2017. (USDA-NRCS, National Planning and Agreements Database)
The practice-specific implementation underlying the LUA-by-performance-measure trends shown in Figure 3 are partly illuminated by the top practices under performance measures examined in Figure 4 (practices ranked by LUA treated in FY 2020). The top practices for Cropland Soil Quality have increased since FY 2014. The top practices for Cropland Soil Health & Sustainability peaked in FY 2015 and FY 2016, except for 340 Cover Crop, which increased substantially in FY 2020. Increases in the overall LUA treated for the measure are related to enhancements E328 and E340, which exceed the acres treated by non-CSP practices.

The top practices for LUA treated for Fish & Wildlife Habitat have increased from FY 2014 to FY 2020, but the direction and magnitude of the change for a given top practice varies from year to year. The substantial increase in FY 2020 for 645 Upland Wildlife Habitat Management and 327 Conservation Cover are also apparent in the overall LUA treated for the performance measure.

The top practices for Grazing Land Conservation show a similar u-shaped trend for LUA treated as the overall performance measure with decreases from FY 2014 to FY 2017 and increases from FY 2017 to FY 2020 (except for an increase in 614 Watering Facility in FY 2017). Top practices for Forest Land Conservation also shows a roughly u-shaped trend from FY 2014 to FY 2020, except for 384 Woody Residue Treatment that shows an increase since FY 2014.

LUA treated with the top practices for Irrigation Efficiency have generally increased since FY 2014, but the overall trend has been consistent level of LUA treatment. This indicates a shift in predominant practices for the performance measure. The decline is partially due to substantial decrease that year in 327 Conservation Cover, which had been a top practice in FY 2014 and FY 2016, but is no longer in the top practice ranking of practices for LUA treated. The practices 329 No Till and 345 Mulch Till have been top practices as of FY 2018 with LUA treated increasing since FY 2014.

The top practices for Water Quality all show a consistent substantial increase in LUA treated in FY 2020, but only 528 Prescribed Grazing also shows a decline in LUA treated from FY 2015 to FY 2019 that the overall performance measure shows. A number of other practices had higher than typical LUA treated in FY 2014 and FY 2015 including 472 Access Control and 561 Heavy Use Protection Area in FY 2014 and 340 Cover Crop, 329 No Till, 393 Filter Strip, and 610 Toxic Salt Reduction in FY 2015. These were not top practices in those years, but LUA treated for Water Quality associated with these practices did decline substantially after FY 2014 and FY 2015, which may have contributed to the decline of the overall performance measure. These data and more on program delivery and practice implementation are available on the RCA Data Viewer.
Figure 4: Top three practices for each performance measure, ranked by unique land unit acres (LUA) treated in FY 2020. Trends in LUA treated are shown for each practice within each performance measure by fiscal year since FY 2014. Top practices do not include CSP enhancements due to limited data. (USDA-NRCS, National Planning and Agreements Database)
Montana Landscape Planning Package

Water Quality on Cropland

RIAD provides annual updates of Landscape Planning Packages for states and landscape initiatives to use in their conservation planning and performance reporting. These packages include detailed information at the county, HUC-8, and HUC-12 watershed levels. The package has three main components:

- a geospatial planning layer of inherent soil vulnerabilities, referred to as the Soil Vulnerability Index for Cultivated Cropland (SVI-cc);
- a geospatial layer that assesses where key conservation practices have been applied relative to these vulnerabilities, and identifies land units for which additional treatment is expected to provide higher relative benefits referred to as the CEAP Conservation Benefits Identifier (CCBI); and
- an assessment of the impacts of these applied practices on sediment and nutrient losses using the CEAP Water Quality Benefits Estimator procedure.

These tools build on CEAP-Cropland findings that three types of resource management strategies are necessary in agricultural production on cultivated cropland to mitigate loss of nutrients and sediment. These three resource management strategies operate by either avoiding (A), controlling (C), or trapping (T) pollutants. Definitions for these strategies are provided in NI-440-307.28. In general, using these three strategies in combination will result in the largest loss reductions that can realistically be achieved on cultivated cropland. Some fields may not need all three strategies, and for many fields there will still be some level of sediment and nutrient loss even when all three strategies are in place.

Each strategy (avoid, control, or trap) includes a set of NRCS practices that could be used alone or in combination to address the resource concern. Based on field-specific characteristics and production practices, in some cases more than one practice may be needed within a particular strategy. Some NRCS practices contribute to more than one resource management strategy, and the resource management strategy they contribute to can differ between surface and subsurface loss. For example, 340 Cover Crop is both a control and a trap practice for subsurface loss, but it is used only as a control strategy for surface loss. The Landscape Planning Package includes a “Practice Table” tab that lists each practice and which strategies the practice represents. This report will refer to water quality-related resource management strategy practices collectively as ACT practices.

The SVI-cc interprets data from the Soil Survey Geographic Database (gSSURGO) and findings from the CEAP-Cropland studies to categorize soils. It designates every cultivated cropland land unit into four categories of vulnerability to sediment and nutrient loss on cultivated cropland (low, moderate, moderately high, and high) based on inherent characteristics of the soil and slope. SVI-cc is evaluated separately for surface loss, subsurface loss, and subsurface loss with an assumption of drainage systems (e.g., tile, ditch) installed on certain types of soils with specific slope and drainage characteristics.

The CCBI assesses the relative priority of each field for additional conservation treatment based on its SVI-cc vulnerability category and known past ACT treatment. This approach identifies past treatment using the National Planning and Agreements Database (NPAD), which documents practices that NRCS supported through technical and financial assistance working with farmer operators and landowners during fiscal years 2005-2020. The CCBI can be used to highlight fields where remaining treatment needs
are greatest and could offer the largest conservation benefits. However, it lacks information on practices applied that are not recorded in NPAD.

The Landscape Planning Package identifies relative CCBI priority levels for a land unit for surface and subsurface loss using the following steps:

1) Use gSSURGO data to map soil **vulnerability** to surface or subsurface nutrient and sediment loss based on CEAP-Cropland studies.

2) Use NPAD practices applied to map levels of **treatment** according to the CEAP ACT practice groupings.

3) Overlay vulnerability and treatment layers to identify priority status (CCBI Priority 1 acres are most in need of treatment).

**Figure 5: Overview of process to identify CCBI Priority 1 acres**

Cropland acres are assigned to a CCBI priority category (1, 2, 3, or 4) according to a matrix of vulnerability and ACT treatment level. CCBI Priority 1 acres are those that have the greatest need for treatment and could offer the largest conservation benefit through reductions in nutrient and sediment loss. For surface loss, CCBI Priority 1 acres include both highly vulnerable soils with low or no treatment and moderately high vulnerability soils with no treatment. CCBI Priority 1 acres for subsurface loss contain highly vulnerable soils with low or no treatment. The other CCBI priority categories are similarly defined in the package. See the “Notes & Sources” and “CCBI Matrix” tabs in the Landscape Planning Package for more information. The numbers provided in the “CCBI Matrix” tab are illustrative and not necessarily applicable to a given state, region, or resource concern. The prioritization categories displayed, however, are consistent across the country.

The movement of acres out of the CCBI Priority 1 designation through lower priority levels reflects the intensity and distribution of ACT treatment across a landscape. Acres identified as achieving full treatment have received a set of practices including all three ACT strategies and have migrated to CCBI Priority 4 from higher priority levels since 2005. Partially treated acres have practices contributing to only one or two of the strategies. Acres identified as migrating toward full treatment were CCBI Priority 1 or 2 in 2005 and have improved to a lower CCBI priority level through implementation of ACT practices since then but have not yet received a full suite of ACT practices.

The “Surface Loss”, “Subsurface Loss”, and “Subsurface Undrained” tabs of the Landscape Planning Package summarize data by HUC-12 watershed outlining portions of the SVI and CCBI calculations, including acres:

- of cultivated cropland
- of treatment by ACT practices
- under different levels of vulnerability and treatment (SVI and CCBI)
- estimated to have decreased vulnerability due to treatment
- that have achieved full ACT treatment

The Landscape Planning Package tables also include a characterization of evidence indicating whether practices have been prioritized to highly vulnerable acres. Additional tabs provide practice-specific data at the state level as well as estimates of water quality benefits at the HUC-8 watershed and county scale. The “Notes & Sources” tab provides explanations of the data found throughout the Landscape Planning Package.
The SVI-cc and CCBI are incorporated in the Landscape Planning Package as tools for field and landscape level planning as well as program and practice evaluation. They are both relative measures that are best used in conjunction with other information for planning and evaluation. They are not intended for explicit reporting outside the agency, but aggregate results could be shared with partners working on landscape planning to address water quality resource concerns on cropland.

Conservation Impacts

The Landscape Planning Package identifies lands that have been treated by ACT practices and provides estimates of the conservation benefits associated with those applied practices. Estimates of conservation benefits by county and HUC-8 watershed are derived in the Landscape Planning Package from the CEAP Water Quality Benefits Estimator for Cultivated Cropland. Specifically, this tool models the annual amount, or load, of sediment, nitrogen, and phosphorus associated with:

- known practices on the ground in 2006 as a baseline
- the loads from the CEAP cropland model under an “achievable treatment” scenario where the landscape had a suite of likely ACT practices applied
- the potential for reductions (difference of potential additional treatment from the 2006 baseline)
- reductions associated with ACT treatments during a given timeframe

The “achievable treatment” scenario estimates the rate of ACT practice adoption by type of practice that producers are likely to adopt based on CEAP-Cropland studies and calculates reductions in sediment and nutrients associated with those practices. The total load under the “achievable treatment” scenario was estimated under the assumption that in 2006 conservation tillage was at saturation of adoption across cropland and that cover crop was not likely to be adopted at significantly higher rates, so the potential reductions in sediment and nutrient loads achievable through expansion of those practices is not accounted for in the current estimate of achievable load reductions.

Note that estimates of treatment impact prior to fiscal year 2017 do not include Conservation Security Program or Conservation Stewardship Program enhancements, so Table 3 does not account for the historical conservation impacts related to those programs. Additionally, changes in cropland conditions and in technology over time can alter potential treatment needs, so the potential benefits from ACT treatment are point-in-time estimates based on the first CEAP cropland assessment; these estimates will be updated once the second CEAP cropland assessment modeling is complete.
ACT practices applied on cultivated cropland in Montana had the following estimated impacts on sediment and nutrient transported to surface and groundwater:

Table 3: Statewide conservation impacts of avoid, control, and trap practices on cropland

<table>
<thead>
<tr>
<th>Load at 2006 Baseline</th>
<th>Sediment</th>
<th>Total Nitrogen</th>
<th>Total Phosphorus</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(tons)</td>
<td>(lbs)</td>
<td>(lbs)</td>
</tr>
<tr>
<td>Load at 2006 Baseline</td>
<td>9,915,200</td>
<td>181,574,700</td>
<td>7,862,900</td>
</tr>
<tr>
<td>Load Under “Achievable Treatment” Scenario</td>
<td>2,455,100</td>
<td>166,182,800</td>
<td>3,335,900</td>
</tr>
<tr>
<td>Potential Reductions from “Achievable Treatment” Scenario</td>
<td>7,460,100</td>
<td>15,391,900</td>
<td>4,527,000</td>
</tr>
<tr>
<td>Load Under “Achievable Treatment” Scenario</td>
<td>2,455,100</td>
<td>166,182,800</td>
<td>3,335,900</td>
</tr>
<tr>
<td>Potential Reductions as percent of 2006 baseline</td>
<td>75%</td>
<td>8.5%</td>
<td>58%</td>
</tr>
<tr>
<td>Reductions in Fiscal Year 2020</td>
<td>106,400</td>
<td>6,731,900</td>
<td>810,500</td>
</tr>
<tr>
<td>Reductions in Fiscal Year 2019</td>
<td>54,600</td>
<td>3,551,000</td>
<td>429,000</td>
</tr>
<tr>
<td>Reductions during 2014-2018 Farm Bill Cycle</td>
<td>286,100</td>
<td>17,832,900</td>
<td>2,220,400</td>
</tr>
</tbody>
</table>

Table 3 shows the conservation impacts on water quality from ACT practices implemented on cultivated cropland in Montana, illustrating the recent progress made by NRCS in the state, as well as a measure of “achievable” reductions estimated using an “achievable treatment” scenario that assumes that additional treatments are applied.

To evaluate the results of conservation impacts, we investigated the relative results in the table comparing across sediment and nutrients:

- the load at 2006 baseline compared to the potential reductions from the “achievable treatment” scenario
- reductions in fiscal year 2020 compared to reductions during the 2014-2018 Farm Bill cycle
- reductions during the 2014-2018 Farm Bill cycle compared to the potential reductions

We discuss unique findings here. This analysis shows Montana has an opportunity to address nitrogen losses with additional treatment, with a high absolute amount of reduction possible (over 15 million lbs.) but is limited in proportional reductions to 8% based on the “achievable treatment” scenario. Montana has more latitude for proportional reductions of phosphorus and sediment losses, where full treatment could reduce phosphorus losses by 58% and sediment by 75%.

Sediment reduction under the 2014 Farm Bill shows that substantial opportunity still exists, with only 4% of modeled potential treatment achieved during that period. However, nitrogen reduction during that same period shows that Montana has achieved higher reductions in loss just during the 5-year 2014-2018 Farm Bill cycle than the “achievable treatment” scenario predicted during the period after the 2006 baseline. This may suggest a need to revisit the assumptions associated with water quality benefits modeling, particularly as they apply to cultivated cropland in Western states.

This analysis shows Montana had substantial reductions in losses in FY 2020, where the progress made was equivalent to 37% of the progress made during the 2014-2018 Farm Bill cycle. FY 2020 also showed nearly twice as much reduction in nutrient and sediment loss compared to FY 2019. Reviewing Figures 3 and 4 shows marked increases in acres treated for cropland soil quality and water quality, especially including CSP. These increases are especially clear in 327 Conservation Cover (which is an avoid practice...
Evidence of Applying Practices to the Fields in Most Need

Within Figure 6, the proportion of CCBI Priority 1 acreage versus lower priority acreage on the landscape and the percent of each type of land that is treated for both surface and subsurface loss are illustrated. Note that producers may have adopted additional conservation practices on cropland through state or local programs or without adoption assistance; such practices are not captured in NPAD or in this analysis. The category listed as under-treated highlights that landowners may have applied some treatment that is not recorded in NPAD.

**Surface Loss**

Montana contains approximately 17,306,700 acres of cultivated cropland, of which 57% were identified as CCBI Priority 1 for surface loss in 2005 (Figure 6a). Montana-NRCS has worked with producers to treat 2,662,800 acres of cultivated cropland for surface loss since 2005, of which 71% were CCBI Priority 1 and 29% were CCBI Priority 2, 3, or 4. Figure 6a uses Landscape Planning Package data to show that Montana-NRCS has worked with producers to treat 11% of CCBI Priority 2, 3, or 4 acres using at least one ACT practice compared to treating 19% of CCBI Priority 1 acres.

*Figure 6a: For surface loss, proportions of the total cultivated cropland acres by CCBI priority level and amount of ACT treatment 2005-2020. As the dark blue bar gets wider, it indicates an increasing proportion of CCBI Priority 1 acres on the landscape. A dark blue bar taller than the light blue bar indicates the state is treating CCBI Priority 1 acres at a proportionally higher rate than lower priority acreage, providing evidence that the state is emphasizing its most vulnerable acres in its treatment decisions.*

Prioritizing treatment of cultivated cropland vulnerable to surface losses would result in the percentage of CCBI Priority 1 acres treated (19%) exceeding the percentage of lower priority acres treated (11%). This analysis of Montana provides evidence that the cultivated croplands most vulnerable to surface losses were prioritized for treatment.
For **subsurface loss**, 10% of cultivated cropland was identified as CCBI Priority 1 in 2005 (Figure 6b). Montana-NRCS has worked with producers to treat 2,204,600 acres of cultivated cropland since 2005 with practices that limit subsurface nutrient loss, and 17% of those acres were CCBI Priority 1 for subsurface loss.

**Figure 6b:** For subsurface loss, proportions of the total cultivated cropland acres by CCBI priority level and amount of ACT treatment 2005-2020. Subsurface loss is based on the drainage management vulnerability assessment, as described in the Landscape Planning Package. As the dark blue bar gets wider, it indicates an increasing proportion of CCBI Priority 1 acres on the landscape. A dark blue bar taller than the light blue bar indicates the state is treating CCBI Priority 1 acres at a proportionally higher rate than lower priority acreage, providing evidence that the state is emphasizing its most vulnerable acres in its treatment decisions.

In estimating subsurface loss, this analysis assumes that all fields on certain types of soils with specific slope and drainage characteristics have drainage systems (e.g., tile, ditch) installed, as described in the Landscape Planning Package for the drainage management vulnerability assessment. Figure 6b uses Landscape Planning Package data to show that Montana-NRCS has worked with producers to treat 12% of CCBI Priority 2, 3, or 4 acres using at least one ACT practice compared to treating 22% of CCBI Priority 1 acres.

Prioritizing treatment of cultivated cropland vulnerable to subsurface losses would result in the percentage of CCBI Priority 1 acres treated (22%) exceeding the percentage of lower priority acres treated (12%). This analysis of Montana provides evidence that the cultivated croplands most vulnerable to subsurface losses were prioritized for treatment.
Treatment Intensity

The Landscape Planning Package includes information on the movement of cultivated cropland acres to lower CCBI priority levels through application of one or more ACT strategies to a land unit. Compared to migrating a land unit to a lower CCBI priority level with one or two ACT strategies, movement of a land unit to full treatment with all three ACT strategies can require a larger investment of technical and financial assistance. Limited resources may force a state into navigating trade-offs between broad treatment, represented as migrating multiple land units to lower priority levels, and intense treatment, represented as full treatment of a smaller number of land units. We used the “Surface Loss” and “Subsurface Loss” tabs of the Landscape Planning Package for this section of the analysis.

Since 2005, NRCS has worked with producers to apply 94,000 ACT practices to address surface loss of nutrients from approximately 2,662,800 acres (15%) of cultivated cropland. This work has achieved full treatment on approximately 56,900 acres (0%) and migrated an additional approximately 2,014,400 acres (12%) to a lower priority level. For subsurface loss in those watersheds, approximately 65,000 ACT practices have been applied on approximately 2,204,600 acres (13%) since 2005, achieving full treatment on approximately 176,400 acres (1%), while migrating approximately 253,400 acres (1%) toward full treatment. Figure 7 displays these accomplishments.

Figure 7: Intensity of ACT treatment for surface and subsurface pathways among HUC-12 watersheds. Acres identified as achieving full treatment are those that have received a set of practices including all three ACT strategies and have improved to CCBI Priority 4 from higher priority levels. Acres migrating toward full treatment have improved from CCBI Priority 1 to CCBI Priority 2 or 3 or CCBI Priority 2 to CCBI Priority 3 but have not reached full treatment (CCBI Priority 4). All other acres, which have received treatment but have not changed in priority level, are identified under partial treatment. Proportions in labels and charts may not add to 100% due to rounding.
Feedback and Next Steps

Upcoming Resources

RIAD will continue to develop analyses to support the agency’s mission. Two notable analyses relevant to this work include:

- Updated landscape planning packages will come out annually. The latest update that we used includes 2020 output data.
- CEAP II results are expected in 2021 and will further refine our knowledge of the effects of conservation on cultivated cropland. Please note the CEAP II results will be presented based on production regions rather than major river basins.

The Division is also working on increasing communication around national assessment efforts that states can use. Notable communications include the Conservation Outcomes Webinar Series and the Conservation Outcomes Newsletter. Please look for those communications and suggest how those products or others can be most valuable to you.

Points of Contact

- Aaron Pratt (202-720-3360, aaron.pratt@usda.gov) is a general contact for this summary.
- Peter Chen (301-504-2327, chieh.chen@usda.gov) is the contact for the landscape planning packages.
- Liz Marshall (301-504-1763, elizabeth.marshall@usda.gov) leads the Outcomes Team and can connect you with CEAP component leaders.

Questions for Feedback from States

- How do you envision using this report?
  - Does it help you to meet objectives such as gauging progress toward treating a resource concern, reporting out accomplishments, or identifying areas to target within your state?
  - Does this summary help your state make use of the landscape planning package data to report accomplishments related to water quality on cropland?
- What portions of the report are most and least useful to you?
- What major data sets do you use in your state that are not included in this report?
- What else would you like to see in such a report?
Reference Data

Resource Conservation Act (RCA) Data

NRCS Conservation Programs (Obligations) and Practice Implementation (practice counts, acres treated)
https://www.nrcs.usda.gov/Internet/NRCS_RCA/reports/cp_mt.html

NRCS Program Reports (can get state-level annual contracts, acres, obligations by program)
https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/rca/ida/?cid=stelprdb1187042

Economic Research Service (ERS) & Census of Agriculture


NASS Ag Census State Profile
https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Montana/cp99030.pdf

NASS 2017 Ag Census state-level reports page
https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_1_State_Level/Montana/

ERS Farm Income and Wealth Statistics State-Level Data Files

Ranked Commodities by State and Year

Value Added (Ag) by State
https://data.ers.usda.gov/reports.aspx?ID=17830#P1b65ded33b18480d880dc678be4c33df_2_109iT0R0x4

ERS Charts/Rankings by State

NRI Data

Land Use https://www.nrcs.usda.gov/Internet/NRCS_RCA/reports/nri_mt.html

Cropland https://www.nrcs.usda.gov/Internet/NRCS_RCA/reports/nri_crop_mt.html

Developed Land https://www.nrcs.usda.gov/Internet/NRCS_RCA/reports/nri_dev_mt.html


Wetlands https://www.nrcs.usda.gov/Internet/NRCS_RCA/reports/nri_wet_mt.html