NATIONAL SUSTAINABLE AGRICULTURE COALITION

March 15, 2024

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Deputy Chief Herbert and Coordinator Ashford-Kornburger,

Thank you for the work you do in service of the United States' farmers, ranchers, and eaters, as well as our soil and water resources. On behalf of the National Sustainable Agriculture Coalition (NSAC), I am writing to share our recommendations for additions to the list of Climate Smart Agriculture and Forestry (CSAF) practices. For nearly forty years, NSAC has advocated for sustainable ways of growing our food and fiber that not only benefit the land and water used in production, but also the farmers and farmworkers tasked with stewarding these resources. We believe NRCS has been, and should continue to be, an essential partner in these goals.

Thank you for adding the following practices and enhancements during the previous round of CSAF revisions:

317 Composting Facility
336 Soil Carbon Amendment
E528N Improved grazing management through monitoring activities (Rangeland Health Assessment).

We also thank you for adding climate as a Natural Resource Concern. This is an important step in helping farmers mitigate and adapt to climate change across the country.

Over the course of this document, we recommend several changes to the list of CSAF activities that NRCS supports through Inflation Reduction Act (IRA) conservation funding and provide detailed rationale as to why we believe these modifications should be made. For your convenience, we have provided an abridged form of our proposed changes here:

Practices to be added:

316: Animal mortality facility (composting scenario only)
331: Contour orchards and other perennial crops
511: Forage harvest management
516: Livestock water pipeline (grazing scenario only)
555: Rock wall terrace
558: Roof runoff structure (excluding concentrated animal feeding operations)
588: Cross wind ridges
589C: Cross wind trap strips

595: Pest management conservation system
600: Terrace
633: Waste recycling
635: Vegetated treatment area
658: Wetland Creation
823: Organic management system

Enhancements to be added:

E328H: Conservation crop rotation to reduce the concentration of salts
E328I: Forage harvest to reduce water quality impacts by utilization of excess soil nutrients
E340E: Use of soil health assessment for development of cover crop mix to improve soil health
E511C: Forage testing for improved harvesting methods and hay quality
E612A: Cropland conversion to trees or shrubs for long term improvement of water quality
E612D: Adding food-producing trees and shrubs to existing plantings
E612E: Cultural plantings
E643A: Restoration of sensitive coastal vegetative communities
E643B: Restoration and management of rare or declining habitat

Bundles should be added to CSAF all promotional materials.

Create additional bundles that address:

Multi-story agroforestry
Crop-livestock integration
Soil health management strategies for conventional and organic agriculture that include CPS 336, soil carbon amendment.
Advanced soil health systems that include practices both within and beyond the cropping area
Advanced grazing systems

Practices to be revised:

590: Nutrient Management
595 Pest Management Conservation System
632: Waste separation facility (to exclude concentrated animal feeding operations)
643: Restoration of rare and declining natural communities (to apply beyond just floodplains)

Practices to be removed:

366: Anaerobic digester

Over the course of this document, we will provide deeper context as to why we believe these practices, enhancements, and bundles should be added or removed from the CSAF list, or potentially revised. We also include principles for inclusion, and discussion of climate impacts, as well as impacts on farmers, citing scientific literature where possible. Lastly, some

recommendations not included in this cover sheet but included in the more in-depth recommendations are a renewed focus on certain CSAF activities that have the greatest net GHG mitigation and/or climate resilience potential.

If you have any questions regarding our recommendations, please do not hesitate to reach out. Thank you for the work you do and for your consideration.

National Sustainable Agriculture Coalition

Jesse Womack
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Overview of NSAC recommendations

In spending the Inflation Reduction Act (IRA) funding, NRCS should focus on enrolling as many farms and ranches as possible in agroecological and holistic systems of practice. In other words, the goal of fulfilling these climate mitigation targets must be approached with an eye to broader and longer-term ecological improvement of farming systems that simultaneously address water quality, water quantity, soil health, crop health, biodiversity, and health aims. Systems that accomplish all of these goals effectively do so by increasing localized nutrient cycling (i.e., decreased dependence on the input of distant, energy-intensive sources of nutrients); building up soil organic matter and creating a rich soil microbiome that provides nutrient cycling and pest/disease suppression functions; incorporating a diversity of plant and animal species including native vegetation, pollinators, birds, and other wildlife; creating spaces where there are niches for beneficial organisms including insect predators and pollinators; and incorporating deep-rooted perennial species that serve functions including soil retention, nutrient recovery (protecting groundwater), improvement of water infiltration, and provision of habitat, as well as long-term sequestration of substantial amounts of carbon. By approaching the climate mitigation work via these broader ecological goals, NRCS can help farmers build the resilience of their production systems and surrounding communities to the impacts of climate change and gain greater financial stability by reducing their dependence on imported and synthetic inputs of fertilizers and pesticides.

In addition, such an approach better incorporates a focus on racial justice. For example, farmers and ranchers of color have long been leaders in creating, maintaining, and teaching about integrated agricultural systems, including systems tied to indigenous and traditional ecological knowledge. So, a focus on holistic systems can provide more opportunities to lift up those farmers and their systems as examples of best practice and allows a clearer pathway for financially incentivizing their continuation of ecological management practices and increasing the resilience of their farmland and communities. Financial incentives through IRA funding to farmers of color can assist in the success of their farm business operations. In addition, many of the least climate-friendly practices (e.g., those associated with confined animal feeding operations and those dependent on continued use of petroleum-derived pesticides and fertilizers) are also practices that most impinge upon the health of communities of color, because these operations are disproportionately located within or in proximity to these communities.

Example of a holistic practice standard

An example of the ways in which a suite of approaches may all be applied is with Interim Conservation Practice Standard 823, Organic Management, which is not on the national list of 2024 Conservation Practice Standards. CPS 823, adopted in a majority of states, should be included on the list of Conservation Practice Standards under the Climate Smart Agriculture and Forestry (CSAF) Mitigation Activities List for 2025. In addition, CPS 823 should be prioritized nation-wide, as 336 Soil Carbon Amendment

was recently, to build integrated, USDA certified organic and transitioning-organic systems that simultaneously reduce greenhouse gases (GHGs), soil erosion, water and air pollution, pest pressure and pesticide contamination of agricultural workers and their communities, while increasing livestock feed and forage balance and quality, soil health, moisture management, and plant productivity and health.[1]

Other examples of Conservation Practices that take a more holistic approach to addressing multiple resource concerns or addressing NRCS principles of soil health management include CPS 313 Alley Cropping, 379 Forest Farming, and 381 Silvopasture. The proposed revision CPS 528 Grazing Management and many of its Enhancements can promote holistic grazing systems that build soil, reduce the GHG footprint of livestock production, and address water quality and other resource concerns. Some of the Enhancements to 328 Crop Rotation, notably the Soil Health Crop Rotation (E328E) and perennial grain rotation (E328O), and 340 Cover Crop such as E340B Intensive Cover Cropping (maximum year round cover/living root) and E340D Intensive Orchard/vineyard Floor Cover Crop address the four NRCS principles of soil health, which provide a roadmap toward climate friendly cropping systems.

Example of effective state-level implementation

One positive model for CSAF implementation could be California's Global Warming Solutions Act (AB 32), guided by the state's Scoping Plan. The primary actions for the croplands sector of the plan is to: 1) implement climate smart practices for annual and perennial crops on ~80,000 acres annually; 2) establish land easements/ conservation on annual crops at ~5,500 acres annually; and 3) increase organic agriculture to 20% of all cultivated acres by 2045 (~65,000 acres annually). The accompanying Statutes, Executive Orders and Outcomes include mandates to: 1) Reduce short-lived climate pollutants, 2) Increase soil water holding capacity, and 3) Increase organic farming and reduce pesticide use. In addition to achieving pesticide reduction in the state's scoping plan, we continue to urge the California Department of Food and Agriculture to include the NRCS IPM practice Code 595 to the list of eligible practices in the state's Healthy Soils Program.

Working from the precautionary principle

Further, NRCS should be working from the precautionary principle–a starting point of, "first, do no harm." For example, synthetic pesticides, by their very nature, are designed to kill and are associated with detrimental impacts on soil health and biological function as well as human and environmental health.[2] For example, the soil fumigant

[1] Organic Farming Research Foundation and Natural Resources Conservation Service. "Sequestering Carbon, Reducing Greenhouse Gases, and Building Climate Resilience through Organic Soil Health Practices." August 21, 2023. https://docs.google.com/presentation/d/1CAdyYrzqynBWDTrecTj1eQPcZgASkDw3VtYyjJYcuqc/edit#slide=id.g26ba00ceb61_2_75.

[2] Pesticide Action Network, 2023. Pesticides and Climate Change: A Vicious Cycle. https://www.panna.org/resources/pesticides-and-climate-change-a-vicious-cycle/.

chloropicrin has been shown to increase nitrous oxide emissions seven-fold.[3] Similarly with soil carbon, carbon that is in place, whether in forests and other woody perennial vegetation, wetlands, or grasslands, should be kept in place. Habitat protection and restoration should be key goals of NRCS's approach to agriculture and forestry broadly written. That means building biodiversity, local nutrient cycling, and perennial systems into as many farm systems as possible. In so doing, however, NRCS should take the lead from farmers who are already leading the way on the most ecologically valuable practice systems.

Principles

In moving toward agroecological systems that will (also) achieve the GHG benefits desired, NSAC recommends that NRCS adopt the following principles.

- **Perennial systems and practices should be incentivized on all marginal, highly erodible, disaster-prone, and otherwise ecologically sensitive cropland.** The soils lost in producing annual crops on these lands equates to soil carbon lost, in addition to other ecologically detrimental effects. On the other hand, perennial production systems (e.g., CPS 311 Alley Cropping, 379 Forest Farming, 612 Tree and Shrub Establishment, 528 Prescribed Grazing, and 381 Silvopasture) and conservation buffers (e.g., CPS 391 Riparian Forest Buffer and CPS 380 Windbreak) hold soils in place, build deep extensive root systems, and develop long-lived woody biomass that can contribute substantially to carbon sequestration.[4] Perennial production systems and practices additionally reduce the intensifying effects of climate-related disasters, in which top soil is eroded and compacted by flooding, fires destroy crops, and all effects pose serious threats to human health and survival. Re-establishment and maintenance of native perennial grasses, shrubs, and trees will retain soil and reduce fire loads by competing with non-native and high fuel-load vegetation.
- **Organic farming systems and organic transition should be promoted and supported through the IRA funding because they can increase carbon sequestration and reduce nitrate leaching while improving overall soil health.** While single practices such as cover crop, conservation crop rotation, or no- or reduced-till may sequester only 100 - 240 lb C/ac-yr, organic farming systems that integrate complex diverse rotations, extensive use of cover crops, organic amendments and nutrient sources, and reduced tillage (or sometimes

[3] Spokas, K., & Wang, D. (2003). Stimulation of nitrous oxide production resulted from soil fumigation with chloropicrin. Atmospheric Environment, 37(25), 3501-3507.

[4] Biardeau, L., Crebbin-Coates, R., Keerati, R., Litke, S., & Rodríguez, H. (n.d.). Soil Health and Carbon Sequestration in US Croplands: A Policy Analysis.

Feliciano, D., Ledo, A., Hillier, J., & Nayak, D. R. (2018). Which agroforestry options give the greatest soil and above ground carbon benefits in different world regions? Agriculture, Ecosystems & Environment, 254, 117–129. https://doi.org/10.1016/j.agee.2017.11.032.

even full tillage) can sequester 400 - 600 lb/ac-yr .[5] In addition, recent studies and meta-analyses show that organic nitrogen sources support much more biological activity and carbon sequestration (including mineral-associated organic matter or MAOM, the most stable form of soil organic carbon) and cause less N leaching to groundwater than soluble nitrogen.[6] Organic systems also protect soil micro- and macro-organisms from the adverse impacts of synthetic pesticides, which have been shown through recent research and literature review to contribute to GHG emissions both directly and indirectly from extraction, production, application and disposal.[7] Pesticides also alter microbiomes and harm earthworms, microarthropods, and other components of the soil food web that play vital roles in C sequestration and N cycling.[8]

- **Advanced rotations that maintain continuous living cover and high quality**

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[5] Biardeau, L., Crebbin-Coates, R., Keerati, R., Litke, S., & Rodríguez, H. (n.d.). Soil Health and Carbon Sequestration in US Croplands: A Policy Analysis.
Cavigelli, M. A., J. R. Teasdale, and J. T. Spargo. 2013. Increasing Crop Rotation Diversity Improves Agronomic, Economic, and Environmental Performance of Organic Grain Cropping Systems at the USDA ARS Beltsville Farming Systems Project. Crop Management 12(1) Symposium Proceedings: USDA Organic Farming Systems Research Conference. https://dl.sciencesocieties.org/publications/cm/tocs/12/1.
Chambers, A., Lal, R., & Paustian, K. (2016). Soil carbon sequestration potential of US croplands and grasslands: Implementing the 4 per Thousand Initiative. Journal of Soil and Water Conservation, 71(3), 68A-74A. https://doi.org/10.2489/jswc.71.3.68A
Delate, K., C. Cambardella, C. Chase, and R. Turnbull. 2015. A review of long term organic comparison trials in the U.S.. Sustainable Agricultural Research 4(3): 5-14.
[6] Franzluebbers, A. J., S. C. Reberg-Horton, and N. G. Creamer. 2020. Soil carbon and nitrogen fractions after 19 years of farming systems research in the Coastal Plain of North Carolina. Soil Science Society of America Journal, Volume 84, pp 856-876.
Morugán-Coronado, A., P. Pérez-Rodríguez, E. Insolia, D. Soto-Gómez, D. Fernández-Calvino, and R. Zornoza. 2022. The impact of crop diversification, tillage and fertilization type on soil total microbial, fungal and bacterial abundance: A worldwide meta-analysis of agricultural sites. Agriculture, Ecosystems, and Environment 329, Article 107867.
Young, M. D., G. H. Ros, and W. de Vries. 2022. Impacts of agronomic measures on crop, soil, and environmental indicators: A review and synthesis of meta-analysis. Agriculture, Ecosystems, and Environment 319. https://doi.org/10.1016/j.agee.2021.107551.
[7] Pesticide Action Network, 2023. Pesticides and Climate Change: A Vicious Cycle. https://www.panna.org/resources/pesticides-and-climate-change-a-vicious-cycle/.
[8] Gunstone, T., T. Cornelisse, K. Klein, A. Dubey, and N. Donley. 2021. Pesticides and soil invertebrates: a hazard assessment. Frontiers in Environmental Science, Vol. 9. https://doi.org/10.3389/fenvs.2021.643847.
Klein, K. 2019. Pesticides and Soil Health. Friends of the Earth, 9 pp.
Pelosi, C., Barot, S., Capowiez, Y., Hedde, M. and Vandenbulcke, F., 2014. Pesticides and earthworms. A review. Agronomy for Sustainable Development, 34(1), pp.199-228.
Puissant, J., C. Villenave, C. Chauvin, C. Plassard, E. Blanchart, and J.Trap. 2021. Quantification of the global impact of agricultural practices on soil nematodes: A meta-analysis. Soil Biology and Biochemistry Volume 161, October 2021, 108383.
Vahter, T., S-K Sepp, A. Astover, A. Helm, T. Kikas, S. Liu, J. Oja, M. Öpik, P. Penu, M. Vasar, E. Veromann, M. Zobel, and I. Hiiesalu. 2022. Landscapes, management practices and their interactions shape soil fungal diversity in arable fields – Evidence from a nationwide farmers' network. Soil Biology and Biochemistry, Volume 168, May 2022, 108652
Walder, F., M. W. Schmid, J. Riedo, A. Y. Valzano-Held, S. Banerjee, L. Büchi, T. D. Bucheli, and M. G.A.van der Heijden. 2022. Soil microbiome signatures are associated with pesticide residues in arable landscapes. Soil Biology and Biochemistry, Vol. 174, November, 2022.

managed grazing systems should receive priority for IRA funding. This would include integration of perennial grains, winter annual oilseeds, and pulses into field crop rotations; relay interplanting of food, forage, or cover crops into a standing production crop prior to harvest, and other strategies that maintain continuous cover. In dryland regions where the standard two-year wheat-fallow system has severely degraded soils, IRA funding should support regionally adapted green fallow systems in which living cover and residues are managed to optimize soil health and water availability and reduce pest pressure for the following cash crop, as well as encouraging the move toward permanent pasture with advanced grazing management.

- **Advanced adaptive approaches to nutrient management with the greatest potential to curb N_2O emissions should receive priority for IRA funding**. Nitrous oxide is the most powerful greenhouse gas, with more than 300 times the warming potential of carbon dioxide. Agricultural soil management is the most substantial contributor to nitrous oxide emissions in the U.S., contributing nearly three-quarters of emissions. With growing evidence that many soils need only a fraction of recommended nitrogenous fertilizer applications, and sometimes none at all, any application or interpretation of CPS 590 that results in more nitrogen being applied than is actually needed should not receive IRA funding. Instead, utilize the funds to support farmers to better estimate actual need through soil health assessments that include potentially mineralizable nitrogen and/or side-by-side nitrogen rate trials, to build soil health and nitrogen mineralization capacity to further reduce the need for nitrogenous fertilizer, to substitute organic nitrogen sources (legumes, compost, etc) for soluble nitrogen, and to budget inputs of nitrogen, phosphorous, and other nutrients to maintain but not exceed optimal soil nutrient levels. Reducing nitrous oxide emissions is an urgent and highly feasible element of reducing agricultural GHG emissions.
- **Consider human beings a necessary part of "facilitating" CSAF activities. No** CSAF practices can be implemented and maintained without taking into consideration the human beings responsible for them. Climate change poses real risks to farmers and farm workers across the country and NRCS should redouble its efforts to recognize this in its conservation planning processes, resource concern lists, and available practices and enhancements. IRA funding should be available to support farmer and farm worker health and safety while implementing and maintaining agroecological, CSAF farm systems. For example, forest buffers, windbreaks, and other woody perennial plantings along field margins can provide vital shade to mitigate heat stress for farmworkers.
- **Applying for CSAF funding should be simple.** We encourage NRCS to continue innovating in terms of connecting farmers with contracts. ACT Now has shown success and promise in several states. Many farmers, especially small

and midsize farmers, farmers of color, and other disadvantaged farmers, choose not to apply for NRCS programs because of the burdensome applications, further tilting the distribution of CSAF funding toward larger farms with more paperwork capacity. While we may not have numbers on who is not applying, we know a substantial number are sitting out, leaving many farmers more vulnerable to economic and climate shocks.

Bundles

Among NRCS cost-share systems, Conservation Stewardship Program bundles have the most potential for supporting farmers, ranchers, and other land managers in creating agroecologically (holistically) appropriate systems that not only reduce greenhouse gas (GHG) emissions, but also reduce water pollution, sequester carbon, manage water quantity, protect wildlife and pollinator habitat and natural ecosystems, reduce particulate emissions, reduce the effects of climate-related disasters, improve human health, and reduce the need for off-farm, imported, and synthetic inputs. Because CSP incentivizes producers for their existing conservation efforts, the program has the potential to attract far more conservation and agroecological farmers who would be eager to further enhance their work. Bundles are a natural fit for such farmers who are already adept in systems approaches, especially those who wish to be local conservation leaders.

For these reasons, NSAC thanks NRCS for making nearly all CSP Bundles eligible for IRA funding in FY24. We believe strongly that this policy should be maintained in FY25. We also request that Bundles be listed alongside all other eligible practices and enhancements in public promotional materials for FY25.

However, existing bundles do not adequately address implementation and support of some of the most climate-friendly and ecologically appropriate systems. Bundles that incorporate suites of as many as 6-7 CSP enhancements and conservation practice standards when appropriate for the systems outlined below could better serve farmers by supporting a more synergistic system of solutions.

Due to the potential complexity of bundles and the regionally, (agro)ecosystem-specific needs of farms, it is likely best to develop regionally specific bundles that address some of the needs outlined below. That would reduce the complexity of the pertinent bundle while providing farmers and ranchers the ecologically-appropriate options they need for their farms and ranches.

There is need for bundles that help land managers establish systems such as:

- **Multi-story agroforestry.** Such systems integrate multiple functions through use of a diversity of selected plant species, with emphasis on perennial or perennial-annual integrated plant communities, native plant species, and a combination of deep taproot and shallower fibrous-rooted species to maximize nutrient cycling efficiency and carbon sequestration throughout the soil profile.

Such systems require few, if any, external inputs, with the majority of plant nutrients produced by plants on site or contributed by on-site livestock. They have high potential to sequester carbon, to reduce other forms of nutrient pollution to water and air, and to enhance resilience to climate change impacts and improve community food security.

- **Crop-livestock integration.** Systems in which livestock actively graze within cropping systems allow for improved nutrient cycling. With appropriate enhancements, physical soil disturbance is reduced, plant cover and living roots are increased and diversified, and a synergy is achieved to build healthy living soils, sequester carbon, protect water and other resources, and sustain plant productivity and health.
- **Advanced soil health systems that include practices both within and beyond the cropping area.** Farmers will better be able to develop advanced systems of carbon sequestration and ecological improvement when they can combine within-field practices like cover cropping with edge-of-field practices such as field borders, riparian herbaceous cover or forest buffer, or filter strip to intercept soil and nutrients in runoff as well as incorporating the establishment of trees within any part of the system. Advanced adaptive nutrient management, including options applicable to organic systems, should be a part of any advanced soil health bundle.
- **Advanced grazing systems** that include management-intensive rotational grazing (Enhancement E528R), supporting infrastructure such as electrical offsets and wire for cross-fencing (E382B), livestock watering pipeline (CPS 516) watering facility (CPS 614), and moveable shelter (CPS 576), and other enhancement activities that optimize nutrient cycling and minimize GHG emissions and nutrient transport to surface and groundwaters. The latter can include additional grazing enhancements such as protecting sensitive areas (E528I) or bale and swath grazing to optimize manure distribution (E528P), riparian conservation buffers (E390A orE391A), or nutrient management in pasture (E590C).

We would welcome an opportunity to work closely with NRCS to develop appropriate bundles that meet the above parameters. A regional approach to designing bundles could address the need for flexibility and site-specificity while keeping the complexity of bundle structure manageable and practical for field staff to implement.

Targeting funding toward highest ecological value practices

In addition to an increased focus on creating more synergistic systems via an emphasis on bundles, NSAC recommends that NRCS target Inflation Reduction Act funding to those conservation practices that establish diversified perennial vegetation and/or take a systems approach to conservation objectives. These practices offer ecological benefits

not only in terms of carbon sequestration and reduced overall GHG emissions, but in terms of factors like habitat provision (i.e., biodiversity maintenance or improvement) and pollution reduction. Based on two peer-reviewed reports,[9] we recommend that from among CPS, NRCS focus its funding on the following:

- CPS 391. Riparian forest buffers
- CPS 612. Tree/shrub establishment
- CPS 380. Windbreak/shelterbelt
- CPS 422. Hedgerow
- CPS 379. Forest farming
- CPS 311 Alley cropping
- Herbaceous perennial plantings, e.g.,
    - CPS 327 Conservation cover
    - CPS 390 Riparian herbaceous cover
    - CPS 386. Field border
    - CPS 332 Contour buffer strips
    - CPS 393. Filter strips
- CPS 590. Nutrient management, but with a focus that goes well beyond the 4Rs criteria, e.g., replacing all synthetic nitrogen with soil-derived nitrogen can save 1,000 lbs carbon equivalent without losses to yield in a number of systems.[10]
- CPS 528. Prescribed grazing (Grazing Management), with an emphasis on E528R, Advanced rotational grazing.
- CPS 381 Silvopasture and E381A Silvopasture to improve wildlife habitat, specifically the conversion of pasture to silvopasture through the planting of desirable, adapted trees and shrubs, with regionally appropriate rotational grazing practices. Adding trees to existing grazing land considerably enhances C sequestration and climate resilience (e.g. providing shade for livestock). More research is needed to determine whether conversion of existing woodlands to silvopasture by thinning the tree stand to allow forage growth would enhance net C sequestration; until this has been shown to occur, IRA funding for CPS 381 should be targeted to conversion of treeless pasture to silvopasture systems. If CPS 314 Brush Management or CPS 666 Forest Stand Improvement can be applied to forested area to prepare for Silvopasture establishment, the resource concern "climate change mitigation and adaptation" can be addressed as well as

[9] Chambers, A., Lal, R., & Paustian, K. (2016). Soil carbon sequestration potential of US croplands and grasslands: Implementing the 4 per Thousand Initiative. *Journal of Soil and Water Conservation*, *71*(3), 68A-74A. https://doi.org/10.2489/jswc.71.3.68A
Biardeau, L., Crebbin-Coates, R., Keerati, R., Litke, S., & Rodríguez, H. (n.d.). Soil Health and Carbon Sequestration in US Croplands: A Policy Analysis. https://food.berkeley.edu/wp-content/uploads/2016/05/GSPPCarbon_03052016_FINAL.pdf.

[10] Biardeau, L., Crebbin-Coates, R., Keerati, R., Litke, S., & Rodríguez, H. (n.d.). Soil Health and Carbon Sequestration in US Croplands: A Policy Analysis. https://food.berkeley.edu/wp-content/uploads/2016/05/GSPPCarbon_03052016_FINAL.pdf.

other concerns such as degraded plant condition and inadequate wildlife habitat.

Conservation Practice Standards that are missing from the 2024 list of Climate-Smart Agriculture and Forestry Mitigation Activities (CSAF)

We recommend that NRCS add several key practices that are missing from the 2024 CSAF Activities list. Below that, we also recommend a few removals from the list.

Composting and related practices to recover and utilize organic residues.
Composting has a key role to play in building soil health and soil organic carbon via addition of composted material to agricultural soils.[11] *We greatly appreciate NRCS for adding CPS 317 Composting Facility and CPS 336 Soil Carbon Amendment to the current list of CSAF Activities. In addition, recycling (CPS 633) and using for soil improvement organic residues that would otherwise go to waste and cause environmental problems can markedly reduce net GHG since landfilled leaves and food scraps emit methane, while excess manure or other on-farm organic byproducts can generate GHG if kept in lagoons or stockpiles. Composting of livestock carcasses resulting from routine animal mortality can also reduce the net GHG footprint of livestock production and provide more valuable soil amendment. Therefore, we recommend that NRCS retain/add the following Practices in the CSAF list for 2025:*

CPS 633. Waste recycling
CPS 316 Animal mortality facility - only when the carcasses are co-composted with a suitable organic carbon source to balance the Carbon:Nitrogen ratio

Organic Management System
The organic method as codified in the National Organic Program (NOP) Standards provides a legally defined roadmap toward a whole-systems approach to soil health and resource conservation through an integrated suite of practices including non-use of synthetic inputs that can harm soil life and biological function. The new Interim Practice Standard CPS 823 Organic Management System adds specific resource conservation criteria including a diverse rotation of a minimum of three crop types over three years, nutrient management that limits the use of concentrated N, and the use of NRCS conservation buffers to protect organic production areas from unintended introduction of NOP-prohibited substances and to provide beneficial habitat and other agroecosystem services. With extensive research showing that organic systems have substantial potential to reduce net GHG footprint of the operation, especially when the operation meets NRCS conservation criteria, we strongly recommend adding to the

[11] Nobile, C., Lebrun, M., Védère, C., Honvault, N., Aubertin, M.-L., Faucon, M.-P., Girardin, C., Houot, S., Kervroëdan, L., Dulaurent, A.-M., Rumpel, C., & Houben, D. (2022). Biochar and compost addition increases soil organic carbon content and substitutes P and K fertilizer in three French cropping systems. *Agronomy for Sustainable Development, 42*(6), 119. https://doi.org/10.1007/s13593-022-00848-7
Tautges, N. E., Chiartas, J. L., Gaudin, A. C. M., O'Geen, A. T., Herrera, I., & Scow, K. M. (2019). Deep soil inventories reveal that impacts of cover crops and compost on soil carbon sequestration differ in surface and subsurface soils. Global Change Biology, 25(11), 3753–3766. https://doi.org/10.1111/gcb.14762.

2024 CSAF list:

CPS 823 Organic Management System

Erosion Reduction

As established earlier in our comments, *Erosion of agricultural soils leads to increased GHG emissions and historically accounts for as much as 6% of total human-caused GHG accruals.*[12] *Consequently, practices whose main purpose is to reduce erosion and increase the maintenance of soils in place should be included in the list of activities that mitigate climate-related emissions. We recommend that the following practices be included in the 2025 CSAF list:*

CPS 330 Contour farming

CPS 331. Contour orchard and other perennial crops. Contouring perennial plantings

reduces losses of soil carbon from erosion.

CPS 588. Cross wind ridges.

CPS 589C. Cross wind trap strips.

CPS 555. Rock wall terrace.

CPS 600. Terrace.

Restoration and enhancement of natural areas and plant communities

CPS 595: Pest Management Conservation System. This standard incentivizes farmers to transition away from toxic pesticides towards IPM practices that reduce the use of pesticides and emphasize a more holistic approach towards preventing and addressing pest pressure. In a time with dire need to reduce GHG emissions, it is now critically important to steer away from pesticides whose production entails significant GHG emissions and whose regular use is now known to compromise soil biological functions including carbon sequestration and nutrient cycling. Furthermore, minimizing pesticide use protects pollinators, beneficial arthropods, fish, wildlife, and native plants and ecosystems as well as farmworkers from the toxic impacts of these substances.. In order to ensure that farmers that adopt this conservation practice achieve the intended results, we strongly recommend that the practice standard be enhanced to require users to demonstrate a reduction in pesticide use over the project period.

CPS 658 Wetland creation: In 2014, the report, "Status and Trends of Prairie Wetlands in the United States 1997-2009" documented the loss of 107,177 individual wetland basins in the U.S. Prairie Pothole Region. Practices that expand the area in wetlands will sequester considerable carbon, and have additional benefits including nitrogen and phosphorus consumption and water storage. Both of these practices do so and should be on the CSAF list.

[12] Lal, R. (2020). Soil Erosion and Gaseous Emissions. *Applied Sciences*, *10*(8), Article 8. https://doi.org/10.3390/app10082784.

CPS 643 Restoration of rare and declining natural communities. Again, any practice that restores native plant communities, especially on land that is degraded or lacking in vegetative cover will contribute to carbon sequestration, and reduce effects of climate change such as fires in grasslands and forests with heavy fuel loads, especially non-native species. Therefore, we appreciate NRCS for adding CPS 643 and E643D for floodplain hydrology and connectivity to the 2024 CSAF list, and we encourage NRCS to add all applications of CPS 643 and all Enhancements to the 2025 CSAF list.

Practices that support Prescribed Grazing and Advanced Grazing Management
We appreciate that NRCS included in the 2024 CSAF list of "facilitating practices" for grazing management Watering Facility (614), Stream Crossing (578), Fence (382), and Livestock Shelter Structure (576). We urge NRCS to add t*he following , activities, which also provide vital infrastructure for best rotational grazing management and water quality protection:*

E382B Electrical fence offsets and wire for cross-fencing for rotational grazing.

CPS 516 Livestock water pipeline

CPS 558 Roof Runoff Structure. This practice, applied for the purpose of capturing water for other uses such as crop irrigation or livestock watering would limit farmers and ranchers use of groundwater or surface water supplies for their production, whether in field, under high tunnel, or for other watering needs. Producers in the territories are already accustomed to cistern collection systems and certain geographies will no longer support new well installation due to the risk of salinization. This practice would address NSAC's proposed resource concern "climate change mitigation and adaptation" as well as current resources concerns such as insufficient water, degraded plant condition, and improved livestock health. If CPS 367 Roofs and Covers were an associated practice and the purpose was for collecting rainwater for irrigation of crops or livestock watering, this combination would enable producers to build small structures to collect and then manage a water supply.

It is important, however, that this practice not be used for confined animal feeding operations (CAFOs). This practice can be climate-focused on a small scale, but at larger scales becomes costly and props up polluting models of agriculture, so the CPS should be edited to reflect specific, climate-friendly uses..

Other GHG-mitigating practices related to livestock management systems

CPS 511 Forage Harvest Management includes Purposes of optimizing forage quality (better quality reduces ruminant enteric methane emissions), and quantity while promoting vigorous plant regrowth (healthier forage crops generate more root and shoot biomass and more root exudation thereby enhancing long term SOC sequestration) and reducing excess soil nutrients (which in turn reduces nitrous oxide emissions). Enhancement E511C uses forage testing to fine-tune the practice for optimum quality, thereby further reducing enteric methane.

CPS 635 Vegetated Treatment Area entails planting an area that receives wastewaters from agricultural operations including livestock with vegetation that can take up excess nutrients and then be harvested to remove the excess nutrients from the area. The nutrient removal reduces nitrous oxide emissions and the vegetation sequesters carbon, especially if it is planted in a hitherto unvegetated area.

Enhancements that are missing from the 2024 CSAF Activities list.

Many of these Enhancements have similar climate-mitigation potential as others on the current list, or offer unique climate-mitigation opportunities, as noted here.

- *E328H - Conservation crop rotation to reduce the concentration of salts*. Criteria include a rotation including a minimum of three crops with no summer fallow and sufficient root depth to utilize moisture and prevent/mitigate saline seeps. By improving soil health and diversifying rotation, this enhancement is likely to sequester significant amounts of SOC in the low-rainfall areas where saline seeps occur.
- *E328I - Forage harvest to reduce water quality impacts by utilization of excess soil nutrients*. A forage crop planted immediately after harvest of a "primary annual crop" will take up leftover soluble N, which is then removed in forage harvest. This has substantial potential for mitigating N2O emissions - and each pound of N2O-N prevented is equivalent to sequestering 130 lb SOC.
- E340E Use of soil health assessment to assist with development of cover crop mix to improve soil health. E340E has potential to enhance the C sequestration, climate mitigation, and climate resilience benefits of CPS 340 Cover Crop similar to the other cover Crop Enhancements, and should be added to the CSAF list for 2024.
- *E384A Biochar production from woody residue*. Recent meta-analysis shows that biochar applications can enhance SOC sequestration and reduce N2O emissions (40%) and N leaching (35%) while improving yields (12%).[13] If the biochar is used on farm (best) or off site as a soil amendment, net GHG mitigation can result. The underlying CPS 384 Woody residue treatment may or may not mitigate GHG depending on the method chosen (piling, chipping, crushing, lop-and-scatter return the organic C to the soil while burning and off-site disposal do not). While a full LCA is warranted for biochar, it seems likely that on-farm biochar production would confer the best net GHG impact of all options for treatment of on-farm generated woody residue.
- *E612A Cropland conversion to trees or shrubs for long term improvement of water quality*. Conversion of annual cropland, especially cropland that has been

[13] Young, M. D., G. H. Ros, and W. de Vries. 2022. Impacts of agronomic measures on crop, soil, and environmental indicators: A review and synthesis of meta-analysis. Agriculture, Ecosystems, and Environment 319. https://doi.org/10.1016/j.agee.2021.107551.

depleted or eroded, to permanent forest or shrubland cover shows one of the highest per-acre annual C sequestration potentials of all conservation activities (Feliciano et al., 2018). Its absence from the 2024 CSAF list and from the 2024 CSP Enhancement Activities list is a glaring omission which must be corrected in both lists for FY2025. . In addition, we strongly urge NRCS to promote and fully support the widespread adoption of this enhancement through targeted use of IRA funds, so that the nation's steepest, most erodible, and otherwise most vulnerable land that is now under annual cropping systems can be protected through tree and shrub planting, and thereby become a major carbon sink rather than an ongoing source of GHG, catastrophic soil losses, and threats to water quality.

- *E612D Adding food-producing trees and shrubs to existing plantings* and *E612E Cultural plantings* seem to have similar C sequestration potential as E 612C Establishing trees/shrubs to restore native plant communities which is on the CSAF list.
- *E643A Restoration of sensitive coastal vegetative communities* and *E643B Restoration and management of rare or declining habitat*. Note that E643C Restoration of glade communities entails thinning or burning of woody vegetation, so it will likely sacrifice some C to restore habitat for target species.

Remove the following from the CSAF Activities list

CPS 366. Anaerobic digester. Anaerobic digesters are a Band-Aid on a system that is inherently a significant greenhouse gas emitter and source of water quality and soil health degradation: producing synthetic-fertilizer intensive crops on separate operations from those where livestock are raised and managed in confined conditions. The high financial cost of digesters combined with the human health threats posed by intensive confinement operations mean low ecological value for communities broadly, an impact which falls disproportionately on communities of color. In addition, the GHG reductions attained with digesters are exceeded by the overall GHG emissions of the system as a whole, given its dependence on GHG-intensive fertilizers, pesticides, low-diversity rotations of shallow-rooted annual crops, either herbicide-intensive no-till or routine tillage, transportation, and more, that are often unnecessary with more integrated crop-livestock systems. Rather than installing digesters, we would advocate for more support for installing and improving pasture-based systems of animal husbandry, advanced adaptive grazing management, and crop-livestock integrated production systems. NRCS could alternatively develop a Pasture Transition Initiative to support confined animal facility operators to undertake a transition to pasture-based systems by providing needed infrastructure, adequate cost-share for CPS 528 Grazing Management and Enhancements thereof, and training and technical assistance in implementation of advanced, adaptive, and regionally appropriate grazing systems.

Recognize Traditional, Ecological, Knowledge-Based (TEK) Conservation

The FY24 CSAF Activities list makes no mention of TEK practices, despite their value in addressing climate change. As an ally organization to the Native Farm Bill Coalition (NFBC), NSAC supports the Native Farm Bill Coalition's recommendation to recognize traditional, ecological, knowledge-based conservation in NRCS programs, as detailed on page 33 of NFBC's report *Gaining Ground*. On page 20 of USDA's Equity Plan, the Department includes an explicit intention to "Incorporate Indigenous Values and Perspectives," including by hiring individuals with TEK expertise in each agency. IRA implementation provides an opportunity for USDA to recognize and support the climate benefits of TEK conservation, and should be part of the agency's implementation plan. We urge NRCS to refer to NFBC's Gaining Ground report and consult with its authors as they move forward.

Increased Payment Rates for High Impact CSAF Practices

To fully maximize the impact of IRA investments, NRCS should strategically offer increased payments to farmers across conservation programs. These increased payments should be based on the impact of the practices adopted, the natural farmer demand for individual practices, and the real costs of implementing each practice, enhancement, and bundle.

Increase Cost Share for CSAF Practices in CSP

NRCS has long missed an opportunity to fully invest in CSAF practices through CSP, and implementation of IRA funding presents a great opportunity to correct this. Currently, all individual conservation practices (CPS) farmers adopt via CSP contracts are compensated at 10% of the total cost scenario estimate, compared to 75% (90% for historically underserved producers) for implementing the same practices under an EQIP contract. This is antithetical to good climate policy, since CSP incentivizes producers to continue and further enhance their current conservation practices and new practices adopted through CSP have the chance to be enhanced overtime, thus building their overall climate impact. Therefore, equivalent practices available to farmers in CSP and EQIP are by default more likely to create climate benefits when adopted through the CSP program. NRCS should recognize this by providing, at minimum, equivalent cost share payments for all CSAF CPS implemented through CSP as those same CPS receive in EQIP.

We are grateful to NRCS for the recent work of the CSP Improvement Team, who, among other issues, are currently addressing widespread concerns about the low cost-share percentage for Practices under CSP. While our preference is to make cost share for all Practices adopted under CSP contracts commensurate with the EQIP cost share percentages, we place top priority on doing so for Practices included on the 2025 CSAF list.

Furthermore, some of the Practices included on the 2024 CSAF list, such as CPS 391 Riparian Forest Buffer, CPS 379 Forest Farming, CPS 314 Alley Cropping, and CPS 381 Silvopasture, entail both tremendous C sequestration and climate mitigation potential and substantial initial costs for the participating producer. These are high-level practices that are more likely to be chosen and implemented by advanced land stewards working at the level of CSP than by farmers

seeking to address the most severe resource degradation issues at the level of EQIP. Faced with only a 10% cost share, even the most dedicated conservation farmer may be financially unable to implement one of these highly climate-smart practices as part of their CSP contract. Therefore, we strongly urge NRCS to provide at least 75% and ideally 90% cost share for implementation of any CSAF list practice, and especially perennial based practices, as part of a CSP contract.

Further, NRCS has the opportunity to maximize this programmatic change by applying it to recently signed contracts retroactively. NSAC calls on NRCS to adjust scheduled payments to any farmers that committed to implementing a CSAF practice via a CSP contract in the last five years, provided that that practice will be implemented in FY2024 or later.

Drive Demand for Underutilized Practices

While some practices on the CSAF list are broadly popular and recognizable to farmers, and may even be among the most commonly funded practices in a program like EQIP or CSP, many are less well known or have less broad interest from farmers, partly because NRCS field staff know too little to advise or even suggest such practices. This creates a problem where some of the highest impact practices are touching down on the fewest acres across our country. Similarly, farmers may be missing an opportunity to implement one of the most essential building blocks to a new holistic farming system. NSAC calls on NRCS to review its list of CSAF practices, determine which of the high impact practices NSAC has identified are underutilized, and then dramatically raise the payment rates for those practices to farmers in CSP, EQIP, and RCPP. Increasing cost share for Practices under CSP from 10% to 75% or 90% is a vital part of this payment increase. This will help ensure that the IRA investment results in transformation of ag systems on the ground that would otherwise have not taken place.

Similarly, developing more CSP climate bundles represents a great opportunity for maximum impact spending, though bundles have historically not been applied to many acres. We reiterate our call for NRCS to develop additional, more robust climate bundles and further recommend increased payment rates for climate bundles to drive farmer interest in this high impact element of the CSP program.

Create Climate Focused Payment Scenarios

Beyond just raising payment rates for high impact CSAF practices, NRCS should take the IRA implementation as a chance to update all payment scenarios involving CSAF practices, enhancements, and bundles with several factors in mind, including:

- Forgone income when implementing a CSAF practice.
- Recent inflation's impact on cost of materials.

All of these should be taken into consideration in concert to create appropriately supportive payment scenarios for each CSAF practice, enhancement, and bundle offered through CSP and EQIP.

Appendix

Explanation for inclusion of pesticide reduction practices

Pesticides contribute to GHG emissions[i]

- 99% of synthetic chemicals—including pesticides—are derived from fossil fuels.
- Most synthetic pesticides are derived from fossil fuels

- Manufacture of 1 kg of pesticides requires 10x more energy than 1 kg of N fertilizers
- The fumigant sulfuryl fluoride is a GHG nearly 5,000 times more potent than CO2.
- N2O levels increase 7-8 times following fumigant applications. Top 5 fumigants applied in California in 2018 was more than 22 million lbs of active ingredient.
- Eighty to ninety percent of pesticides may volatilize within a few days of application., Volatile organic compounds (VOCs), including pesticide VOCs, react with sunlight and NOx to form tropospheric ozone (O3), the third most important greenhouse gas after carbon dioxide (CO2) and methane (CH4). Ozone is very harmful to people and plants. In plants, ozone accelerates senescence, reduces leaf longevity, decreases water use efficiency, and inhibits pollen tube growth among other impacts. In people, ozone causes coughing and sore throat, inflamed airways and breathing difficulty, increases susceptibility to infection, and aggravates asthma and other lung diseases.

Pesticides degrade soil health and function[ii]

- Synthetic chemicals including pesticides have been shown to inhibit nitrogen-fixing rhizobia bacteria, increase dependence on synthetic fertilizers, and reduce overall plant yield.
- Pesticide applications have been shown to shift populations from dominant beneficial nematodes to plant-parasitic nematodes.
- Pesticides (including glyphosate and parathion) decrease reproductive success, juvenile survival, and overall development in earthworms.
- Fungicide applications are linked to decreases in both the number and type of soil fungi, especially arbuscular mycorrhizal fungi (AMF), and the associated reduction in formation of macroaggregates essential to good soil structure. Furthermore, robust root-AMF symbioses significantly reduce soil N2O emissions by enhancing crop nutrient and water uptake efficiency; thus disruption of AMF communities by fungicides can aggravate emissions of this GHG.
- Widespread use of glyphosate has been associated with disruptions of nutrient cycling processes, reduced bioavailability of essential nutrients leading to lower content in associated crops, and greater reliance on synthetic fertilizers.
- Use of soil fumigants has been associated with lower proportions of mycorrhizal fungi, reduced microbial biomass, altered community structures, and lower levels of macronutrients and soil organic carbon.
- Insecticide use has been shown to lower the fungal/bacteria ratio, a shift associated with higher sensitivity to disturbance and lower rates of carbon sequestration.
- A 2021 review of nearly 400 studies, 284 different pesticide active ingredients or unique mixtures of active ingredients and their effects on soil invertebrates. It reported that 70.5% of tested parameters showed negative effects, whereas 1.4% and 28.1% of tested parameters showed positive or no significant effects from pesticide exposure, respectively [iii]

- Neonicotinoids accounted for 92% of the increase in invertebrate toxicity loading. Neonicotinoid seed treatments—the most common application method—are estimated to be used in over half of soybean acres and nearly all non-organic corn grown in the United States. 80% or more of the active ingredients from neonicotinoid seed treatments remain in the soil.
- Large-scale use of seed-treatment with fungicides presents another serious risk, as almost all United States corn seed is treated with fungicides.

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[i] Sharma, A and M Reeves. 2023. Pesticides and Climate Change: A Vicious Cycle. Pesticide Action Network. https://www.panna.org/resources/pesticides-and-climate-change-a-vicious-cycle/.
[ii] Matta, TJ & M Reeves. 2020. Pesticides and Soil Health: State of the Science and Viable Alternatives. Pesticide Action Network. https://www.panna.org/resources/pesticides-and-soil-health-state-science-and-viable-alternatives/.
[iii] Tari Gunstone, Tara Cornelisse,, Kendra Klein, Aditi Dubey and Nathan Donley. 2021. Pesticides and Soil Invertebrates: A Hazard Assessment. Frontiers in Environmental Science Volume 9 | Article 643847 | www.frontiersin.org.