United States Department of Agriculture

Draft-Version2

Conservation Planning (Environmental) Benefits

CART Benefits Module

February 2021

Natural Resources Conservation Service

nrcs.usda.gov/

Environmental Benefits and Outcomes

- **Environmental Benefits** => as outlined in the 2018 Farm Bill directs NRCS to prioritize Conservation Planning and Program Delivery (e.g. most conservation for least cost)
- **Outcomes** => as outlined in the 2018 Farm Bill directs NRCS to articulate more than Conservation Outputs (i.e. # of Contracts, Acres Treated, Dollars Invested)
- Both ***Environmental Benefits*** and ***Outcomes*** can be represented similarly (e.g. tons of soil saved, expected nutrient load reductions, energy savings, etc.)
- ***Environmental Benefits*** and ***Outcomes*** are both referenced repeatedly in the 2018 Farm Bill

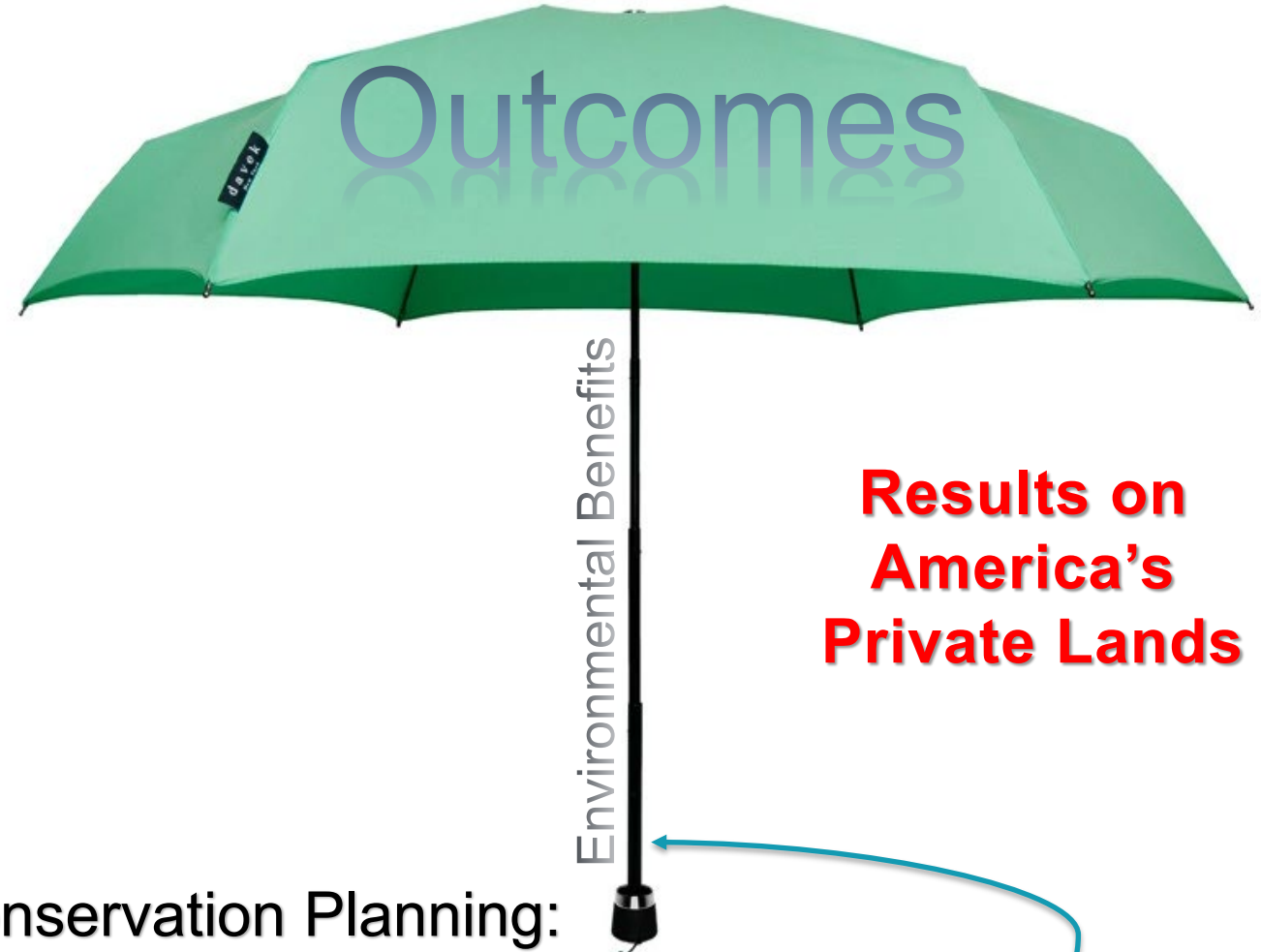
Environmental Benefits and Outcomes

- Both ***Environmental Benefits*** and ***Outcomes*** should be based on science
- ***Environmental Benefits*** => responsibility of the Conservation Planning and Technical Assistance Division
- ***Outcomes*** => responsibility of the Resource Inventory and Assessment Division
- Conservation Planning Benefits = Environmental Benefits

Environmental Benefits and Outcomes

1. Provides clear roles for ***Environmental Benefits*** and ***Outcomes*** within NRCS
2. Facilitates the integration of Conservation Planning (***Environmental Benefits***) and ***Outcomes***
3. Capitalizes on science of soils database, CEAP, etc. for conservation planning
4. Allows for estimation of ***Environmental Benefits*** at individual, watershed, landscape, and national level; and by program (scalable and longitudinal) for both planned and installed conservation practices
5. Improves CART planning data using the CAPP framework
6. Facilitates future development of environmental services, and economics of conservation, and expansion of Outcomes

Environmental Benefits and Outcomes



Results on America's Private Lands

Conservation Planning:

Land Use, Resource Concerns, Existing Conditions, Planned Conditions w/Practices, CART Point System

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Conservation Planning (Environmental) Benefits

CART Data Collection

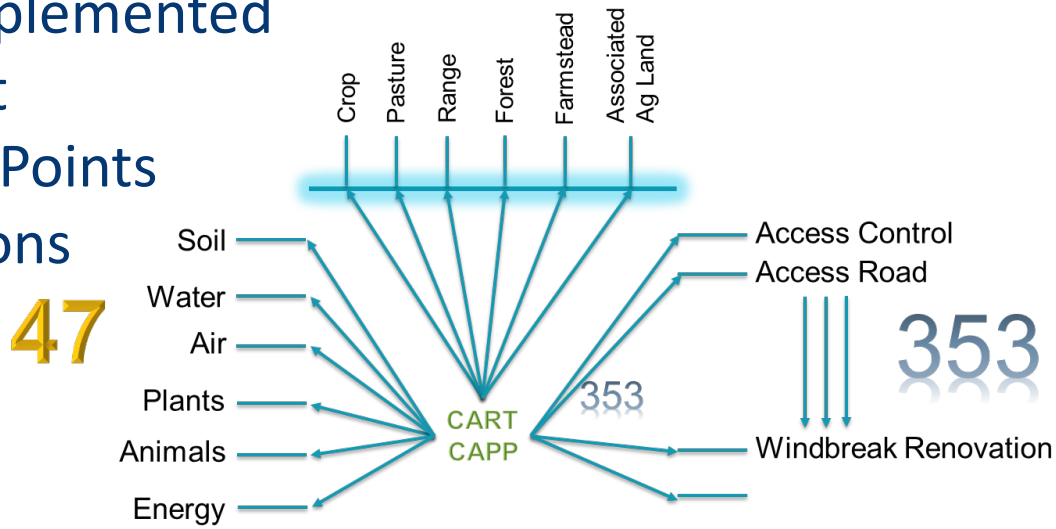
CART is now collecting tens of millions of data points annually facilitating ***Environmental Benefits*** Calculations

CART Data

- Plans
- Land Units
- Resource Concerns
- Practice/Systems of Practices
- Date Planned/Implemented
- Geospatial Extent
- Geospatial Lines/Points
- Geospatial Polygons

CART Numeric Points

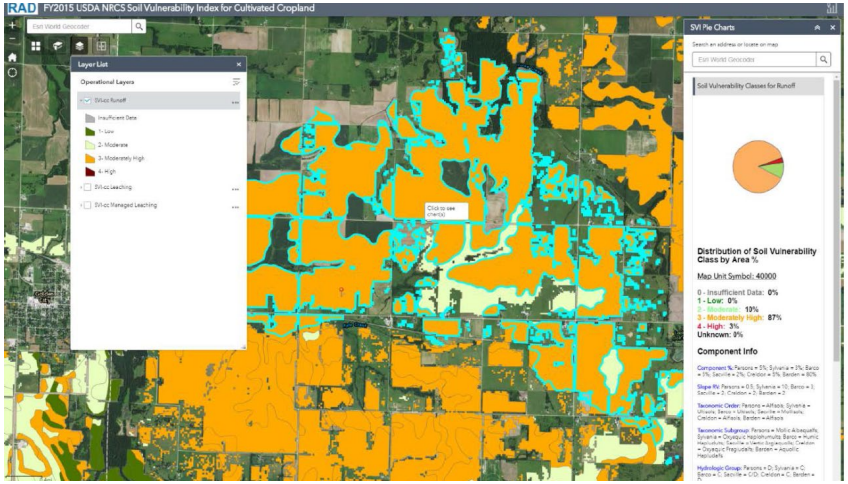
- Threshold
- Existing Condition
- Planned Condition (CAPP database)



Levels of Environmental Benefits

Benefit Development

- **Level-1** – Soil Vulnerability Index, Geospatial Layers, Planner Input, and CAPP database => conservation practice has X effect (current for most)



SVI + Geospatial Layers = Existing Condition – local based on soils

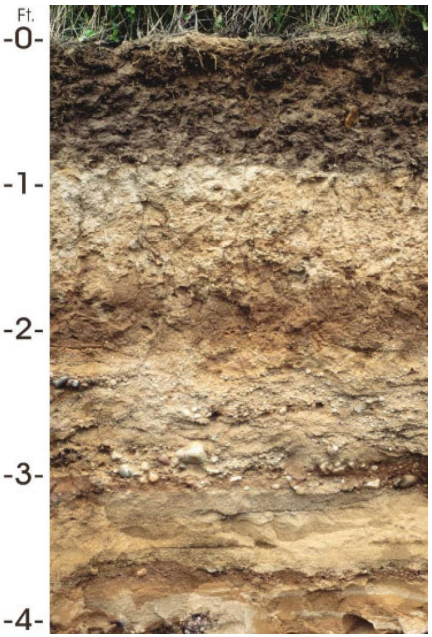
Practice Code	Practice Name	Resource Concern Component	Assoc Ag Land	Crop	Developed Land	Farmstd	Forest	Other Rural Land	Pasture	Range	Water
340	Cover Crop	Moisture Management	30	30	30	30		30	30	30	

CAPP = Planned Condition - **national** at this point

Benefit Development

- **Level-2** – CAPP database updated with soil interpretations and/or logic modeling => conservation practice on this soil has X.0 effect (soil interpretations, logic modeling, etc.)

In the works!



Soil Interpretations help localize the *Environmental Benefits* for conservation practices like Cover Crops during conservation planning

70,000 kinds of soil

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Antigo Silt Loam Tifton Loamy Sand

Benefit Development

- **Level-3** – CAPP database updated with practice narratives (e.g. practice intensity) => conservation practice of this intensity, and on this soil, has X.00 effect

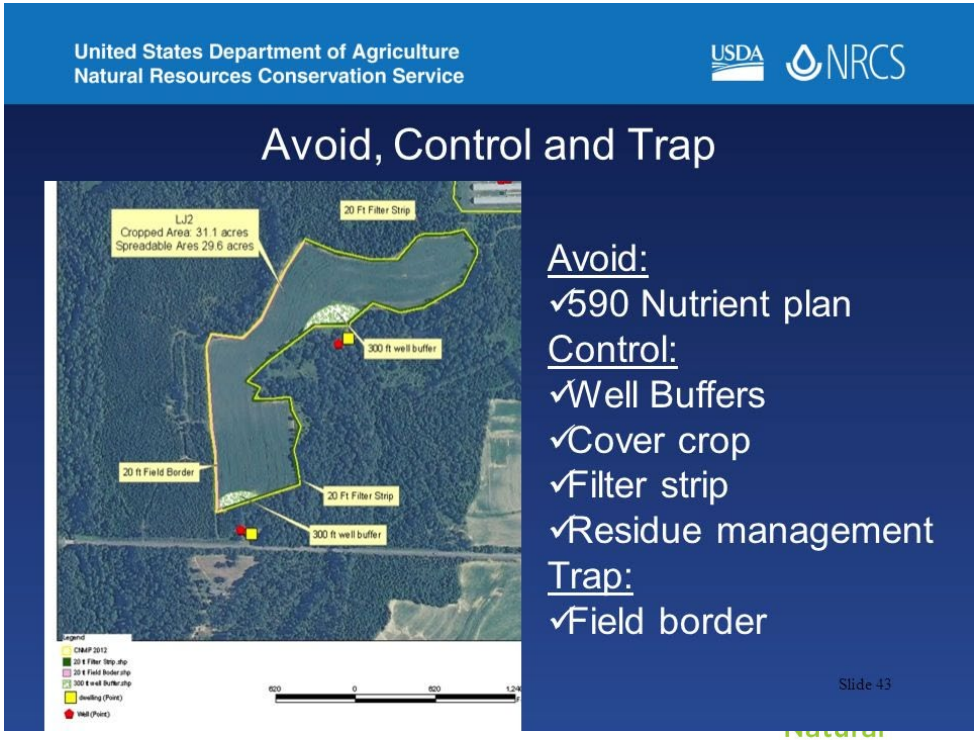
Nutrient Management	Basic NM (Non-Organic/Organic)
Nutrient Management	HU-Basic NM (Non-Organic/Organic)
Nutrient Management	Wp_Basic NM (Non-Organic/Organic)
Nutrient Management	Basic NM with Manure and/or Compost (Non-Organic/Organic)
Nutrient Management	HU-Basic NM with Manure and/or Compost (Non-Organic/Organic)
Nutrient Management	Wp_Basic NM with Manure and/or Compost (Non-Organic/Organic)
Nutrient Management	Basic NM with Manure Injection or Incorporation
Nutrient Management	HU-Basic NM with Manure Injection or Incorporation
Nutrient Management	Wp_Basic NM with Manure Injection or Incorporation
Nutrient Management	Basic Precision NM (Non-Organic/Organic)
Nutrient Management	HU-Basic Precision NM (Non-Organic/Organic)
Nutrient Management	Wp_Basic Precision NM (Non-Organic/Organic)
Nutrient Management	Small Farm NM (Non-Organic/Organic)
Nutrient Management	HU-Small Farm NM (Non-Organic/Organic)

Including practice "narratives" adds to location details of *Environmental Benefits* for conservation planning

Benefit Development

- **Level-4** – CAPP database updated with CEAP data => conservation practice with CEAP modeling, of this intensity, and on this soil has X.000 effect

Including CEAP Science and Modeling principles further improves Planned Conditions of *Environmental Benefits* for conservation planning



Benefit Development

- **Level-5** – CAPP database updated with all the above and empirical data and/or localized literature

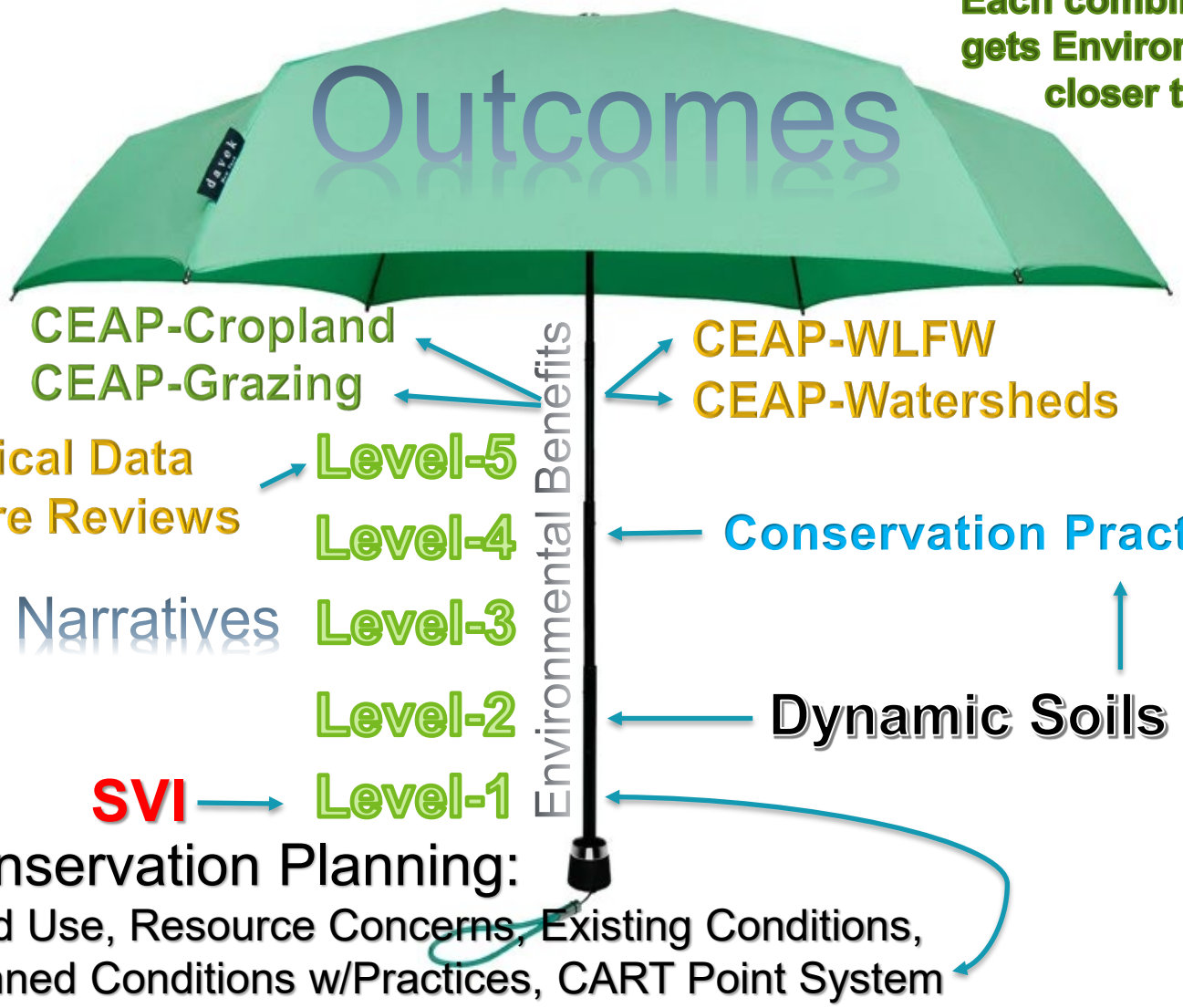
Empirical Data Collection will help fill in the gaps to calibrate our CAPP database

Benefit Development

- **Level-1** – Soil Vulnerability Index, Geospatial Layers, Planner Input, and CAPP database => conservation practice has X effect (current for most)
- **Level-2** – CAPP database updated with soil interpretations and/or logic modeling => conservation practice on this soil has X.0 effect (soil interpretations, logic modeling, etc.)
- **Level-3** – CAPP database updated with practice narratives (e.g. practice intensity) => conservation practice of this intensity, and on this soil, has X.00 effect
- **Level-4** – CAPP database updated with CEAP data => conservation practice with CEAP modeling, of this intensity, and on this soil has X.000 effect
- **Level-5** – CAPP database updated with all the above and empirical data and/or localized literature

Note: Levels don't have to be developed sequentially

Environmental Benefits and Outcomes



Conservation Planning (CART) Benefits Module

Technical Review Team

- Further Develop ***Environmental Benefits*** Framework
- Evaluate Existing ***Environmental Benefits*** Data for readiness
- Populate Version 1 ***Environmental Benefits*** Data
- Explore options to expand and refine (CIG, Academic Study, Data Mining, Partners, CEAP Integration, Soil Interpretations, TSP Program, etc. [i.e. mature Levels of ***Environmental Benefits*** on priority basis])

CART Integration

- Expand Metis Capacity (Get Funding)
- Build Data Structure
- Build UI
- Build Data Engine
- Build Reports and Products

Technical Review

Technical Review

Small group to evaluate considerations for module framework

- Established a baseline for comparison
- Consider time horizon of ***Environmental Benefits***
- Further develop Data Structure (CART Benefits Module)
- Initiate process for modelling and date stamping
- Explore public friendly reporting metrics and language, such as dump trucks of soil saved.
- Incorporation of data caveats for reporting and usage for:
    - Conservation Planning and Program Delivery Reporting
    - Exporting to SSRA for Open Data Reporting and ***Outcomes***

Technical Review

Create a cross Deputy Chief Search Team for ***Environmental Benefits*** data to:

- Explore existing data sets for readiness
- Develop translations and calculation methodologies
- Populate ready data into ***Environmental Benefits*** database
- Repeat

Technical Review

Create one or more cross Deputy Chief teams to:

- Develop requirements for new ***Environmental Benefits*** data development
- Advertise opportunities to expand and/or update ***Environmental Benefits***, such as CIG
- Explore partnership opportunities and data sharing
- Explore added client value opportunities, such as environmental service valuation and environmental markets.

CART Integration

Current CART Results

Table View

CONSERVATION ASSESSMENT RANKING TOOL

Surveys | Rank Tool | Assessment | Help | EM

Home / Assessment Search / Assessment Summary / Results

Assessment Results: EQIP2020* - demo

Select different PLU below to view additional results for this Assessment

Results to show: Plan Rollup

Table view | Graph view

EQIP2020* - demo Plan Rollup

Category	Resource Concerns	Components	Existing Conditions	Existing Practices	Existing Total	Existing Total Override	Planned Practices	Planned Total	Planned Total Override	Threshold
Concentrated erosion	Classic gully erosion	Classic gully erosion	47.6	0	47.6 ⚠	--	0	47.6 ⚠	--	50
	Ephemeral gully erosion	Ephemeral gully erosion	47.6	23.3	70.9 ⚠	--	0	70.9 ⚠	--	50
Degraded plant condition	Plant productivity and health	Plant productivity and health	70	23.3	93.3	--	0	93.3	--	50
Field pesticide loss	Pesticides transported to groundwater	Nonpoint pesticide leaching loss	20	27.9	47.9 ⚠	--	0	47.9 ⚠	--	60
Field sediment, nutrient and pathogen loss	Nutrients transported to groundwater	Nonpoint nitrogen leaching loss	0	9.3						
	Nutrients transported to groundwater	Nonpoint phosphorus leaching loss	0	9.3						
Pest pressure	Plant pest pressure	Chemical resistance	0	14						
	Plant pest pressure	Invasive species	0	0						
	Plant pest pressure	Plant pest pressure	0	14						
Soil quality limitations	Aggregate instability	Aggregate instability	41	18.6						
	Compaction	Compaction	51	23.3						
	Organic matter depletion	Organic matter depletion	51	18.6						
	Soil organism habitat loss or degradation	Soil organism habitat loss or degradation	51	18.6						

Graph View

CONSERVATION ASSESSMENT RANKING TOOL

Surveys | Rank Tool | Assessment | Help | EM

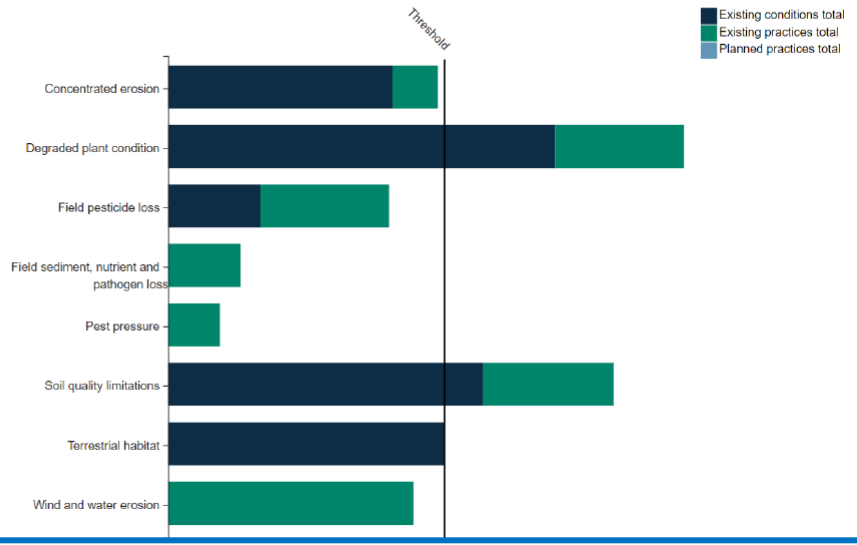
Home / Assessment Search / Assessment Summary / Results

Assessment Results: EQIP2020* - demo

Select different PLU below to view additional results for this Assessment

Results to show: Plan Rollup

Table view | Graph view



Individual Land Unit Benefits

CONSERVATION ASSESSMENT RANKING TOOL

Surveys | Rank Tool | Assessment | Help | EM

Home / Assessment Search / Assessment Summary / Results

Assessment Results: EQIP2020* - demo

Select different PLU below to view additional results for this Assessment

Results to show: Land Unit 3 Tract 12922

Table view | Graph view | Benefits

Soil

- 5 Tons of soil saved annually
- 1 % Organic Matter Increase on 120 acres

Water

- 20 lbs. per acre of nitrogen loss prevented annually on 120
- 3000 gallons annual savings of irrigation water

Air

- 2% reduction in Green House Gas emissions
- 3% reduction in Particulate Matter

Plants

- 50 acres of reduce Wildfire Risk
- 40 areas of increased Plant Productivity

Animals

- 100 animal units benefited from production limitation removal
- 15 acres of sage-grouse habitat enhanced and/or created

Energy

- 3 gallons per acre fuel annual savings on 120 acres

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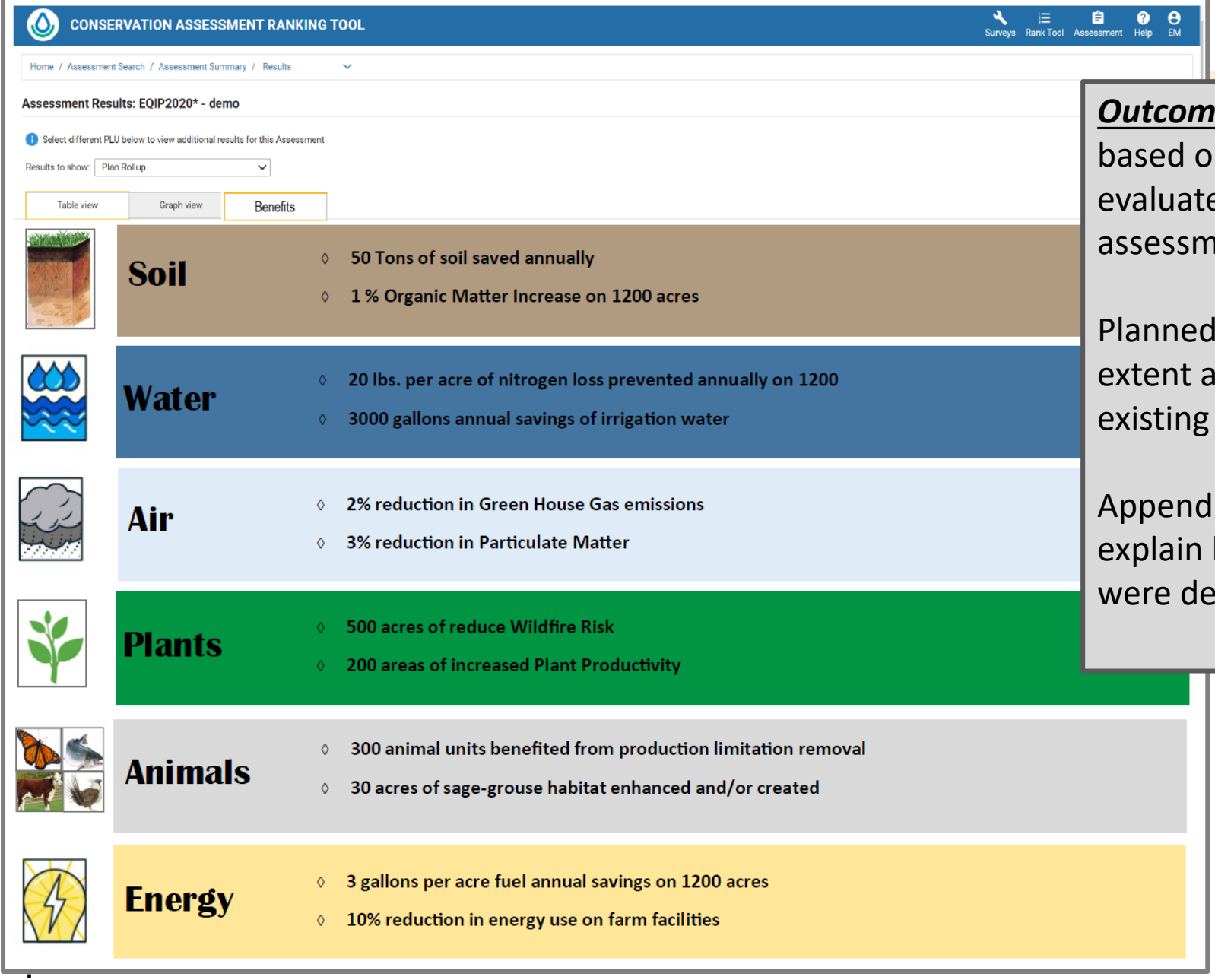
Plan Roll Up Benefits



Outcomes would be based on the RCs evaluated in the assessment

Planned condition – extent above existing benchmark

Appendix would explain how figures were derived

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Landscape Benefits

USDA United States Department of Agriculture

Chesapeake Bay
FY 21 Benefits - Planned Practices

Soil

- 50,000 Tons of soil saved annually
- 1 % Organic Matter Increase on 100,000 acres

Water

- 20 lbs. per acre of nitrogen loss prevented annually on 250,000
- 3000 gallons annual savings of irrigation water

Air

- 2% reduction in Green House Gas emissions
- 3% reduction in Particulate Matter

Plants

- 20,000 acres of reduce Wildfire Risk
- 400,000 areas of increased Plant Productivity

Animals

- 30,000 animal units benefited from production limitation removal
- 50 miles of oyster beds enhanced and/or created

Energy

- 3 gallons per acre fuel annual savings on 1200 acres
- 10% reduction in energy use on 50 farm facilities

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USDA United States Department of Agriculture

Planned, Funded, Implemented

Chesapeake Bay
FY 21 Benefits - Planned Practices

- **Soil**
  - ◊ 50,(
  - ◊ 1 %
- **Water**
  - ◊ 20 l
  - ◊ 300(
- **Air**
  - ◊ 2% r
  - ◊ 3% r
- **Plants**
  - ◊ 20,0
  - ◊ 400,
- **Animals**
  - ◊ 30,(
  - ◊ 50 r
- **Energy**
  - ◊ 3 ga
  - ◊ 10%

Chesapeake Bay
FY 21 Benefits - Funded Practices

- **Soil**
  - ◊
  - ◊
- **Water**
  - ◊
  - ◊
- **Air**
  - ◊
  - ◊
- **Plants**
  - ◊
  - ◊
- **Animals**
  - ◊
  - ◊
- **Energy**
  - ◊
  - ◊

Chesapeake Bay
Implemented Practices
Benefits
10/1/18 - Present

- **Soil**
  - ◊ 50,000 Tons of soil saved annually
  - ◊ 1 % Organic Matter Increase on 100,000 acres
- **Water**
  - ◊ 20 lbs. per acre of nitrogen loss prevented annually on 250,000
  - ◊ 3000 gallons annual savings of irrigation water
- **Air**
  - ◊ 2% reduction in Green House Gas emissions
  - ◊ 3% reduction in Particulate Matter
- **Plants**
  - ◊ 20,000 acres of reduce Wildfire Risk
  - ◊ 400,000 areas of increased Plant Productivity
- **Animals**
  - ◊ 30,000 animal units benefited from production limitation removal
  - ◊ 50 miles of oyster beds enhanced and/or created
- **Energy**
  - ◊ 3 gallons per acre fuel annual savings on 1200 acres

FPAC EXECUTIVE DASHBOARDS | Applied Conservation Practices

PROGRAMS: All (FY 2020)

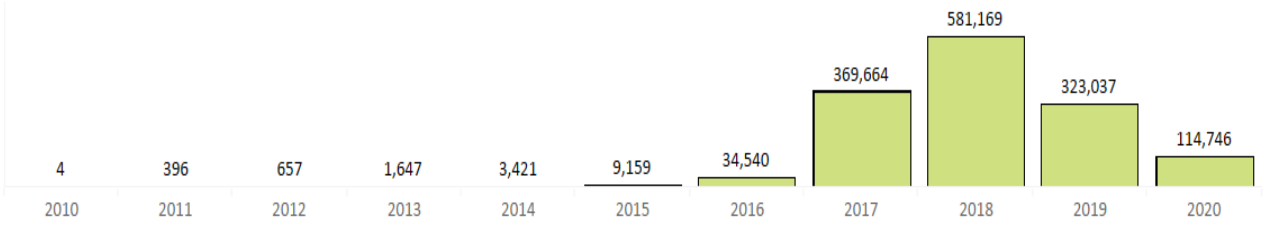
*data from **PROTRACTS***
*as of **2/6/2021***

CERTIFICATION YEAR	CERTIFICATION DATE	NRCS REGION	STATE	HUC 2	INITIATIVE NAME	PRACTICE NAME	PROGRAM CODE	PRACTICE COMPLEXITY
FY 2020	All values	All	All	All	All	All	All	All

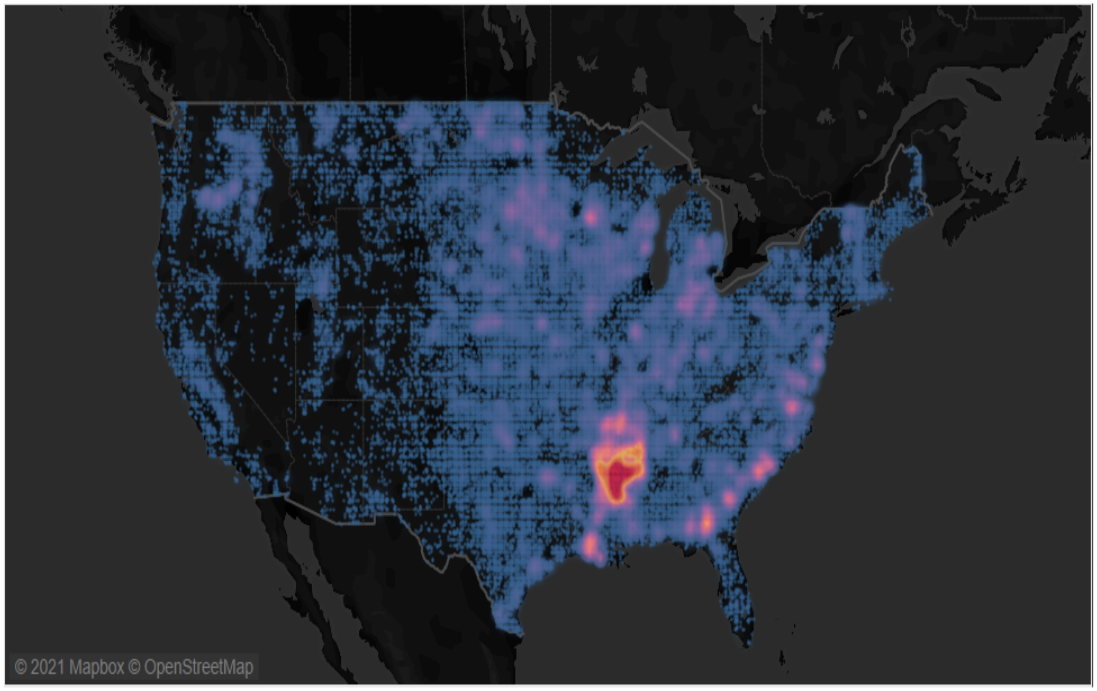
1,438,440
APPLIED PRACTICES
FY 2020

97,002
CONTRACTS WITH PRACTICES APPLIED

PRACTICES APPLIED IN FY 2020 BY CONTRACT FY



MAP OF APPLIED PRACTICES BY Practice Locations

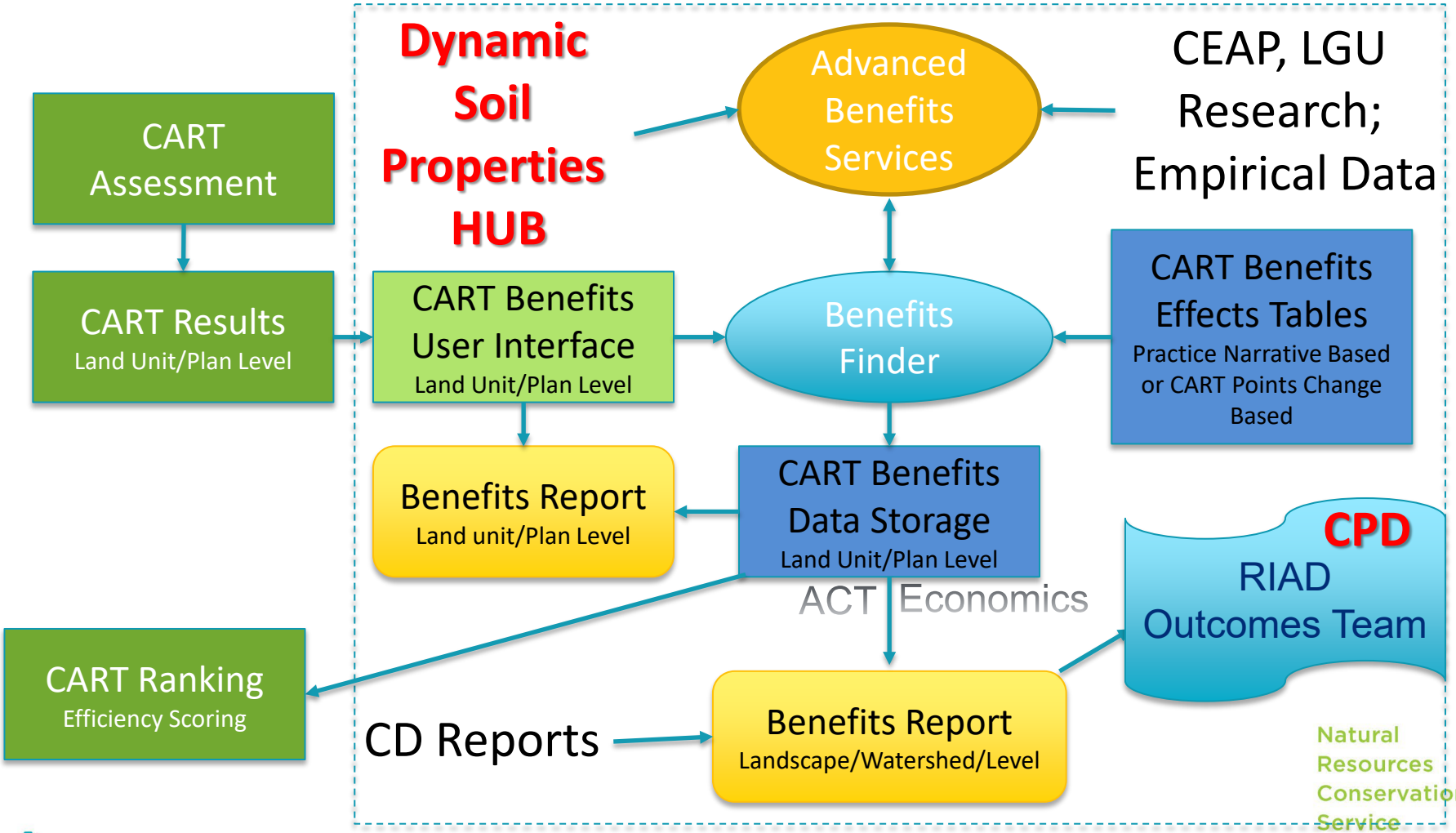


1 — 2,786

TOP PRACTICES | Select a practice code to filter dashboard

Practice Name	Count of Practices
Cover Crop	224,740
Reduce risks of nutrient losses to surface water by utilizing precision ag technologies	120,562
Reduce risk of pesticides in surface water by utilizing precision pesticide application techniques	86,057
Reduced tillage to increase soil health and soil organic matter content	81,998
Pest Management Conservation System	72,058
Existing Activity Payment-Land Use	69,405
Residue and Tillage Management, No Till	51,756
Nutrient Management	42,856

CART Benefits Module



CART Benefits Module

Features Needed:

- Configurable Data Structure at the Land Unit Level
- Configurable Benefit Finder and Supporting Benefit Tables
- Configurable Land Unit/Plan Level Products
- Configurable Landscape/Watershed Level Reports

Beyond MVP:

- Service Engine for Advanced Benefits (Integrated w/ surveys)
- ***Environmental Benefits*** Area Planning Tools (e.g link w/ACPF)

Part of 3-Year IRB Plan