The University of Vermont

Review of PES Programs

Vermont Payment for Ecosystem Services Technical Research Report #6

Prepared for the Vermont Soil Health and Payment for Ecosystem Services Working Group

February 2022

Contributors: Christopher Bonasia, Lindsey Ruhl, Nour El-Naboulsi

GUND INSTITUTE FOR ENVIRONMENT

THE UNIVERSITY OF VERMONT EXTENSION

SECTION 1: INTRODUCTION

The review presented here aims to give an overview of Payment for Ecosystem Services (PES) program strategies both within the U.S. and abroad and highlight program strengths and weaknesses that can be applicable to Vermont agriculture. As described in their mission statement, the Vermont (VT) PES Working Group aims to develop a program that "envisions a system in which farmers are hired to use their ingenuity and know-how in caring for the land to rebuild Vermont's natural capital."[1]

At the time that this report was written, the PES Working Group was still considering basic program design elements, such as whether the system should compensate farmers for practices or for performance and how to quantify outcomes. This review was completed to assist the working group's framing of a VT-focused PES, as directed by the PES working group. Due to the large number of existing programs, the Task 6 research team compiled a concise yet thorough list of ten programs (in Section 2, we aimed to capture the prevalence of program components by describing how many of the programs out of the total demonstrate each component). These programs were chosen based on recommendations from within the working group and an emphasis on program diversity regarding location (international, US, Vermont), practice and performance, types of ecosystem service (ES), financial structure, and administration.

SECTION 2: PROGRAM REVIEW

2.1 PES Program Background

Payment for ecosystem services programs have grown in number and size in recent decades, but PES programs are still a developing concept and as such represent a comparatively young market.[2] All the programs reviewed in this report were launched in the last twenty years, with the majority beginning in the last decade (Table 1). Of the ten programs reviewed, BushTender in Australia is the oldest (2001). Sustainable Farming Incentive (SFI) in England and Vermont Pay for Phosphorus Program (VPFP) are the newest PES programs (2021) and are currently in pilot phases. The FCP began with a pilot group with land managers in 2009. FCP is well poised to be replicated and the project may still be considered in the pilot phase Table 1).

Four of the ten markets reviewed are outside the United States: SFI in England, Lake Taupo in New Zealand, BushTender in Australia, and Glastir in Wales, United Kingdom (Table 1). Two programs are national in scope, Natural Resources Conservation Service's (NRCS) government-run Conservation Stewardship Program (CSP) and Land O'Lakes' privately-run Truterra sustainability tool. Two programs, the Soil and Water Outcomes Fund (SWOF) and Lake Taupo, span a particular region. SWOF is available to eligible farmers in Illinois, Iowa, Ohio, and particular counties from states in the Chesapeake watershed (Delaware, Maryland, New York, Pennsylvania, Virginia, West Virginia). The Lake Taupo program is available to landowners within the Lake Taupo catchment area of New Zealand. Three programs are state specific; California Healthy Soils Program (CA HSP), Vermont's FCP, and VT PFP.

[1] VT Agency of Agriculture, Food, and Markets, "Soil Conservation Practice and Payment for Ecosystem Services Working Group Report," 6, (January 15, 2020), https://legislature.vermont.gov/assets/Legislative-Reports/Soil-Conservation-Practice-and-PES-Working-Group-Report-01152020.pdf.

[2] Salzman, J., Bennett, G., Carroll, N. et al. The global status and trends of Payments for Ecosystem Services. Nat Sustain 1, 136–144 (2018). https://doi.org/10.1038/s41893-018-0033-0

Table 1. General Program Information

Program Name	Location	Year Founded	Primary Organization(s)	Financing[1]	Program Type
BushTender	Victoria, AU	2001	Dept. of Sustainability & Environment	Government	Voluntary
CA Healthy Soils Program (CA HSP)	California	2016[2]	California Department of Food and Agriculture	Compliance	Voluntary
Conservation Stewardship Program (CSP)	U.S. (nationwide)	2008	USDA NRCS	Government	Voluntary
Forest Carbon Project	Vermont	2009	Cold Hollow to Canada & Vermont Land Trust	Third-party	Voluntary
Glastir	Wales, UK	2009	Welsh Assembly Government	Government	Voluntary
Lake Taupo	Lake Taupo catchment area, New Zealand	2011	Lake Taupo Protection Trust	Government	Compliance with voluntary components
Soil and Water Outcomes Fund	Particular counties in Illinois, Iowa, Ohia, and the Chesapeake Watershed[3]	2019	AgOutcomes Inc. & ReHarvest Partners	Third party	Voluntary
Sustainable Farming Incentive	England	2021	Department for Environment Food and Rural Affairs	Government	Voluntary
Truterra	U.S. (nationwide)	2016	Land O'Lakes	Third-party and government	Voluntary
Vermont Pay for Phosphorus Program	Vermont	2021	Vermont Agency of Agriculture, Food and Markets	Compliance and Government	Voluntary

1. Financing is either categorized as third-party, government, or compliance where payments are made to farmers from third parties (direct beneficiaries and companies), government entities (typically through taxes), or compliance (regulations and enforcement penalties incentivizes participation).
2. Founded in 2016 due to 2015 CA Healthy Soils Initiative.
3. Eligible counties within the Chesapeake Watershed are in the following states: Delaware, Maryland, New York, Pennsylvania, Virginia, West Virginia.

2.2 Program Management

A variety of different entities own and manage the PES programs (Table 1). Most programs are government-run and voluntary. Two programs are managed by national government entities. Conservation Stewardship Program is managed by US government-run USDA-NRCS. Glastir is managed by the Welsh Assembly Government. Six programs are run by state entities, including the CA HSP and VT PFP. Another program is managed by a suite of NGO's, Cold Hollow to Canada and Vermont Land Trust's lead the FCP. The FCP is unique in that the carbon seller is an aggregate of landowners, not a single ES provider, as is with the other nine programs reviewed.

One program reviewed, Truterra, is privately owned. Truterra LLC is the sustainability business of Land O'Lakes. Truterra's sustainability tool is a modeling software platform that provides an avenue for both government agencies and privately owned corporations to provide payments that improve environmental health.

2.3 Program Market Scope

Nine of the programs reviewed are voluntary for the seller, meaning that the landowner is not required to participate (Table 1). The Lake Taupo program is compliance based, with some voluntary components. Five of the reviewed programs are open market (FCP, SWOF, SFI, and Truterra's). BushTender is a reverse-auction market. The Lake Taupo program is part of a cap-and-trade structure. The CA HSP program is funded by a cap-and-trade program, but like Glastir, CA HSP, and VT PfP, which are not market-based, are government conservation incentives (Table 2). Budgets for programs depend on the managing organization (Table 5). Government-run programs are funded by government funds with varying degrees of fiscal allotments. Some programs that may be government-run or privately-owned have received federal funding. For example, both SWOF and Land O'Lakes' Truterra have received grant awards from NRCS. The VT PfP program is entirely funded through NRCS.

All PES mechanisms are subject to some amount of market pressures or budget constraints. The BushTender and Forest Carbon Project are more vulnerable to market volatility as the link between buyer and seller is not strengthened by more predictable, significant government support. In the case of BushTender, the reverse auction scheme does not have a guaranteed price floor meaning that there is no minimum guaranteed payment and payment could be below the cost of investment. Comparatively, the FCP received some pilot funding from NRCS, Conservation Fund, and Landscape Scale Restoration (LSR) grants, but payment methods are dependent upon individual or corporate decision makers who are the buyers, similar to BushTender.

Table 2. Market Information

Program Name	Market Type	Buyer	Performance or Practice	Baseline or Threshold[1]	Ecosystem Services Paid For
BushTender	Reverse-Auction	Government	Practice	Baseline	Biodiversity (of native vegetation)
CA Healthy Soils Program (CA HSP)	N/A, government conservation incentives	Government and private companies	Practice	Baseline	Carbon sequestration and reduction of carbon, nitrous oxide, and methane emissions
Conservation Stewardship Program (CSP)	N/A, government conservation incentives	Government	Practice	Baseline	Various, based on state resource priorities
Forest Carbon Project	Open Market, Aggregate	Government, private companies, and individuals	Performance	Threshold	Carbon sequestration
Glastir	N/A, government conservation incentives	Government	Practice	Baseline	Biodiversity, soil, water, greenhouse gasses, woodlands, access, and recreation
Lake Taupo	Cap and trade	Government and other farmers	Performance	Threshold	Nitrogen loss reduction
Soil and Water Outcomes Fund	Open market	Government and private companies	Performance	Baseline	Carbon sequestration, nitrous oxide reduction, and water quality improvement (nitrogen and phosphorus retention)
Sustainable Farming Incentive	Open market	Government	Mix of practice bundling and monitoring	Baseline	Various, including pollinator habitat, downstream water quality, and enhanced soil conservation.
Truterra	Open market	Private companies	Performance	Baseline	Carbon sequestration
Vermont Pay for Phosphorus Program	Open market	Government	Performance	Threshold	Phosphorus loss reduction

1. When a payment is based on a ‘baseline’ it factors into account the additionality from improved or added agronomic practices. When a payment is based on a ‘threshold’ additionality is based on a defined standard.

Table 3. Program Details

Program Name	Required farm type (woodlot, dairy, veggie, farm of certain size, etc.)	Eligible Practices	Minimum Acreage	Other Eligibility Requirements	Contract duration
BushTender	Any landowner with native vegetation	At landowner discretion	n/a	Not specified	5 years, non-renewable
CA Healthy Soils Program (CA HSP)	Varies (Cropland, orchard, grazing)	Wide ranging, not limited to no-till, extended rotations, cover cropping, retiring land, wind barriers, etc.[1]	Not specified.	Applications must use the CDFA HSP Re-Plan Tool	3 years
Conservation Stewardship Program (CSP)	No required farm type	Various	None	Comply with USDA erodible and wetland provisions, exceed "stewardship threshold" for at least 2 priority resource concerns, have a Farm number registered with FSA, and receive <$900,000 annual AGI.	5 years
Forest Carbon Project	Woodlot	Not specified[2]	500 acres[3]	450 of the 500 acres enrolled must be forested	40 years[3]
Glastir	Owners of Agricultural land in Wales	Various	7.4 acres	Meet whole farm code and points threshold	5 years, renewable
Lake Taupo	Mainly sheep farms	Only controlled activities (larger-scale farming) eligible for NDA trading	By leaching rate instead of acreage	N/A	1 year, renewable
Soil and Water Outcomes Fund	Not specified	Various. Most common include: no-till, cover crops, land retirement, conversion to pasture, extended rotations	None.	Must be in eligible area and must be USDA compliant (in some geographies)	1 year, renewable
Sustainable Farming Incentive	No required farm type	Not prescribed	n/a	No existing agri-environment agreement and the land cannot be common land or used for shared grazing. Basic payment scheme applicant in 2020 or 2021.	3 years, renewable
Truterra	Not specified	Includes, but may not be limited to: cover cropping, reduced tillage, extended crop rotations	2.5 acres	Not specified	Varies by year, potential to renew
Vermont Pay for Phosphorus Program	Annual cropland or hayland (not pasture)	Not prescribed	n/a	Up to date NMP that meets the RAP standard for the farm size.	1 year, renewable

1. CA Healthy Soils solicits public to input new practices for payment consideration.
2. Implied eligible practices for the Carbon Forest Program include allowing trees to mature, managing for diverse types and age of trees and understory.
3. Typical forest carbon sequestration contract is 100 years.

2.4 Eligibility

Of the ten programs we reviewed, eight were explicitly for agricultural producers, one was for forest managers, and one was available to any landowner (Table 3, previous page). Seven of the programs specified eligibility requirements, including existing registration with governing bodies, compliance with environmental regulations, up-to-date management records, no prior program agreements, or minimum acreage. Three programs required a minimum acreage, one of which was the program concerning managed woodlots.

2.5 Pay for Practice or Pay for Performance

Half of the programs reviewed (FCP, Lake Taupo, SWOF, Truterra, and VT PfP) compensate land managers based on performance, all of which focus on ES like carbon sequestration or nutrient (nitrogen and/or phosphorus) reductions (Table 2). The remaining five programs (BushTender, CA HSP, Glastir, and SFI) were pay-for-practice. Regardless of payment based on practice or performance, there are a wide variety of eligible practices. Common accepted agricultural practices include reducing tillage, planting cover crops, extending rotations, and retiring land.

BushTender, Glastir, and CSP provide payment based on practice. CA HSP pays based on estimated cost of practice implementation, maintenance, and soil sampling over the project period. The SFI provides payment based on a mixture of practice bundling and monitoring. The programs reviewed aim to not be prescriptive and instead allow landowners to choose practices that best align with their farming system while working towards the PES program goals, though participants in some programs (notably Glastir) stated that they felt the program was administered in a way that was inflexible.

2.6 Required Data & Verification Methods

Payments are based on third-party verification of practice implementation or performance based on model predictions (Table 4). Six of the ten programs use modeling software with varying requirements for the amount and type of data the farmers must share to enroll in the program. However, three of the other four programs use geospatial modeling during the application process to determine the most efficient way to allocate resources. Seven programs measure outcomes against baselines. Those enrolled in the FCP can receive payments for exceeding thresholds and baselines. The initial forest carbon inventory is compared to a regional average. Payments for the length of the contract are based on the initial inventory baseline and the regional average threshold. If the landowners sequester more carbon above the initial inventory baseline they are compensated for that additionality. Six programs rely on third party verification—three of the remaining four are verified by government representatives, and the TruTerra program used third party verification after data collection. Seven programs verify annually. A verification schedule is unspecified for the other three.

2.7 Payments

In performance-based programs payments are provided based on a metric, such as lbs of phosphorus reduced from entering surface water, lbs/acre of nutrients retained, or tons/acre carbon sequestered (Table 5). In our review we found that four programs paid farmers on a per-acre basis, with payments ranging from $19.49 to $110 per acre across the programs; all four programs paid different per-acre rates to farmers based on specific practices, level of stewardship, and other variables. Two programs paid per unit of carbon and payment rates were dependent on market credits. SWOF paid for multiple ES provision, soil and water quality. The Lake Taupo program pays per unit of nitrogen reduced in runoff; the VT PFP similarly pays per unit of phosphorus reduced in runoff. Payments through the BushTender program varied according to the bid placed at the discretion of the farmer. Typical contracts for agricultural land managers range from 1-5 years. The FCP contract is for 40 years.

Table 4. Required data and verification method

Program Name	Data required	Baseline required	3rd Party Verification Required	Modeling Software	Verification schedule
BushTender	Landowner records	Yes	No, government verified	n/a	Annual
CA Healthy Soils Program (CA HSP)	Three years of baseline data	Yes	Yes, practices are verified by CDFA environmental scientists	CDFA HSP Re-Plan Tool	Annual
Conservation Stewardship Program (CSP)	Landowner records	Yes	No, government verified	n/a	Annual
Forest Carbon Project	Not specified	Yes	Yes	SIG Carbon provides modeling software	Annual
Glastir	Landowner records	No	Yes		Annual
Lake Taupo	All records and information needed to determine nutrient leaching cap by Overseer model. Annual accounting records to Regional Council.	Yes	Yes	Overseer (nutrient modeling)	1-2 checks per year
Soil and Water Outcomes Fund	Baseline and future cropping information	Yes	Yes, Data review conducted by Sustainable Environmental Consultants via the EcoPractices platform	COMET-Farm and Nutrient Tracking Tool	Annual
Sustainable Farming Incentive	Documentation of actions, supporting evidence, learning activities, annual declaration	No	Yes	n/a	Not specified
Truterra	Three years of baseline data	Yes	Yes, following data collection.	Various	Annual
Vermont Pay for Phosphorus Program	All nutrient and crop management info into FarmPREP for the upcoming season and updated by the end of the season.	Yes (TMDL)	Yes, provided by VACD	FarmPREP	Annual

Table 5. Payment information

Program Name	Payment range	Payment per unit	Other payments to producers
BushTender	Varies (undisclosed landowner bid); Determined through auction	Determined through auction	Initial upfront payment upon signing the Management Agreement
CA Healthy Soils Program (CA HSP)	Depends on the field type and practice. Range: $2.50/acre for adding perennial cover in strip cropping with annual crops to $30,683 for converting cropland to permanent unfertilized perennial vegetation near aquatic habitats with plug plantings. See HSP Application guidebook for detailed payment structure guidebook for more examples.	$/acre	Not specified
Conservation Stewardship Program (CSP)	NRCS pays a minimum $1,500 per year and a maximum of $40,000 per year	Payments vary by state and are allocated on a per acre basis	None
Forest Carbon Project	$25-47 per acre	Not specified	In some cases, CHC can help minimize legal fees and baseline documentation which can range between $11,000-15,000.
Glastir	US $19.49 per acre	US $19.49 per acre	Increased rates for farmers in different Glastir Elements, as well as a per acre payment under the Whole Farm Code.
Lake Taupo	Approx. $400/kg of N	$/kgN	Costs of benchmarking (similar to enrollment) and subsequent measuring and monitoring covered by Lake Taupo Protection Trust
Soil and Water Outcomes Fund	Average 2021 payment was $31/acre. Payment max is $40/acre.	Not specified	Not specified
Sustainable Farming Incentive	£16-50 introductory, £30-90 intermediate, £35-110 advanced	Hectares and meters	Learning activities and capital items
Truterra	$20/ton/year	$/ton C	In some cases, initial data entry.
Vermont Pay for Phosphorus Program	Not yet specified	$/lb P	Initial data entry payment of $15 per acre up to a $4,000 cap.

SECTION 3: DISCUSSION

There are hundreds of watershed-related PES systems globally and new programs continue to be developed.[3] The high number of existing PES programs compensating land managers for their ecosystem service provisions suggests that this can be an effective strategy for rebuilding natural capital and the variety of existing PES programs indicates that there is no single answer to how a VT PES program should look. This level of program diversity reflected in this project can provide the working group with opportunities to mix and match applicable and successful components of past PES work.

a. Fairness

The working group identified fairness as a priority for designing a PES program. Through this review, we found that program fairness was determined by different approaches to access, communication, and eligibility.

i. Access

Programs can be unfair if payments are not designed to accommodate the varying financial needs of different farms. Entering a market could require investing in new infrastructure or equipment when transitioning to conservation agronomic practices, which will prevent farmers with low capital from participating.

Not only could this discourage participation by farms that could benefit most from a new revenue opportunity, but distinct groups—like new or historically underserved farmers—will be disproportionately excluded. Some programs take steps to address this issue, like CSP which includes a higher ranking to beginning and socially disadvantaged farmers and reserves 5% of funding for each of these groups.[4] VPFP includes a similar ranking priority to historically under-resourced groups, defined in this case as a group whose members have been subject to racial or ethnic prejudice because of their identity as members of a group without regard to their individual qualities[5].

Small farmers, defined by the Agency of Agriculture, Food, and Markets (AAFM) as farmers who operate on less than 50 acres[6], may also be at a disadvantage to compete for participation with larger farms that can distribute costs of new conservation practices over more units of production. Vermont PfP makes mention of prioritizing applicants from a diversity of sizes and locations but does not go as far as indicating a change in pay rate based on this. Programs that offer different rates for smaller farms can help address this kind of issue, such as was described in the Gund Institute's proposal presented to the Vermont PES Working Group on September 30, 2019 (the Gund proposal is not included in this review).[7] Conversely, payments need to be large enough to entice large farms to enroll. Farms with large land bases, managing significant volumes of ES resources, may see the copious amount of time to enter detailed data for every field as a significant barrier to investing their time and farm in the program. For example, the VT PfP data entry incentive of $15/acre compensates data entry, but is capped at $4,000.

[3] Salzman, James, G. Bennett, N. Carroll, A. Goldstein, and M. Jenkins. "The global status and trends of Payments for Ecosystem Services." *Nature Sustainability*, vol. 1, no. 3, Mar. 2018, pp. 136–144., https://doi.org/10.1038/s41893-018-0033-0.

[4] NSAC, "Farmers' Guide to the Conservation Stewardship Program; November 2020 edition," 44-45 (2020), https://sustainableagriculture.net/wp-content/uploads/2020/11/CSP-2020-draft3-interactive-1-1.pdf.

[5] NRCS. (n.d.). Historically Underserved Farmers & Ranchers. https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/people/outreach/slbfr/?cid=nrcsdev11_001040

[6] Agency of Agriculture, Food, and Markets. (2021). *Farm Size Classifications*. https://agriculture.vermont.gov/sites/agriculture/files/documents/Water_Quality/FarmSizeClass.pdf

[7] VT Agency of Agriculture, Food, and Markets, "Soil Conservation Practice and Payment for Ecosystem Services Working Group Report," 21-31, (January 15, 2020).; Courtney Hammond Wagner et al., "Payment for Ecosystem Services for Vermont," *Gund Institute for Environment*, 24, (2019).

Likewise, CSP's limit of $40,000 per year and could dissuade some larger-operating farms from participating.

Additionally, some studies show that participation rates in conservation programs can be negatively affected by farmer-resistance to government run programs—even among farmers who expressed support for targeted conservation approaches—indicating that a program may be less accessible if it ifsimplemented by a government[8] (this should be considered with respect to our recommendation that a VT PES program should be government run, *see below*). To overcome farmer-resistance to government programs, programs should be designed to be more "palatable" to farmers by working to build relationships and establish trust,[9] which is in part addressed in the other recommendations of the synthesis.

ii. *Communication*

Proper communication and publicization also affect PES accessibility by determining whether all potential applicants receive accurate information.[10] The Glastir program in particular received negative feedback from participants about poor communication strategies that left farmers feeling unsupported, and Glastir reported low-participation rates as a result. Additionally, CSP remains under-enrolled in Vermont in part because the program is poorly suited to the state's unique farming sector, but also because many farmers have misconceptions about the program eligibility because of ineffective publicization.[11]

Additionally, programs that offer access to technology (i.e. modeling software) or trained assistance with data entry can further reduce barriers and providing well trained and accessible technical assistance can increase enrollment and program participation. For example, Lake Taupo, and VT PFP programs provide staff to help farmers enter data and provide training about the software to farmers. Truterra retailers assist farmers in data collection and ongoing conservation planning assist farmers in data collection and ongoing conservation planning. CA HSP made considerable investment to streamline its application software.

iii. *Eligibility*

The Working Group's initial report to the Legislature states that their aim is to design a VT PES program that "[ensures] all farms, regardless of size, geography or product, have the opportunity to participate."[12] Some programs use eligibility requirements to target specific outcomes (FCP, Lake Taupo, Vermont PfP). While this approach can help allocate resources it also limits program participation. Other programs prioritized inclusivity by setting low eligibility requirements to encourage participation (Glastir, CSP).

However, inclusivity can be limited by available resources (as with CSP), which can compromise the program's fairness. Several programs with resource limitations used a ranking scheme (as in CSP and BushTender) to allocate resources to those farms that could produce the highest proportion of resource returns to investment (NRCS' CART ranking tool—used for CSP—also considers a higher ranking for historically underserved farmers, rather than strictly

[8] Kalcic, M., Prokopy, L., Frankenberger, J., & Chaubey, I. (2014). An in-depth examination of farmers' perceptions of targeting conservation practices. *Environmental Management*, *54*(4), 795-813.
[9] *Id.*
[10] Equiterre and The Greenbelt Foundation, "The Power of Soil: An Agenda for Change to Benefit Farmers and Climate Resilience," 13 (no date), https://d3n8a8pro7vhmx.cloudfront.net/greenbelt/pages/14625/attachments/original/1614349880/PowerOfSoil.pdf?1614349880.
[11] Conversation with Joe Buford, Vermont State Resource Conservationist, during Vermont Small Farm Group Meeting on October 20th, 2021.
[12] VT Agency of Agriculture, Food, and Markets, "Soil Conservation Practice and Payment for Ecosystem Services Working Group Report," 8, (January 15, 2020).

environmental objectives. *See above*).[13] Only those farms that were ranked high enough to be included before funding ran out were included in the program. Vermont's PES program will likely have resource limitations, meaning that complete fairness might not be possible, and administrators and participants will need to have "hard conversations" about inclusivity and funding.[14]

b. Practice vs. Performance Based Payments

Although the measurements of a performance-based program offer greater certainty about the program's success and can give farmers greater autonomy, the equipment and labor for monitoring outcomes can be prohibitively expensive.[15] While the programs in this review cover an almost-even mix of practice and performance-based programs, the majority of existing programs are practice based because of the difficulty and expense of quantifying outcomes.[16] The performance based programs covered in this review addressed these barriers by using model, or a mix of models and measurements, to project rather than directly measure outcomes.

Therefore, if the Vermont PES Working Group decides to pursue a performance-based program, they are more likely to succeed if they use models to measure outcomes. This was already suggested by the Vermont Dairy and Water Collaborative (VDWC) in their 2019 Call to Action, where they found that "the method for measuring results needs to be carefully considered and requires further work. On-the-ground monitoring is prohibitively expensive, and models are limited by their base assumptions."[17] VDWC suggested following a mix of monitoring and modelling like that of the Lake Taupo Protection Trust nitrogen program in New Zealand. Program administrators set nitrogen discharge allowances for farmers based on individual farmer baselines and overall nitrogen reduction goals, both modelled through a software called Overseer. These nitrogen discharge allowances could be traded, changed annually through management practices, or sold to the Lake Taupo Protection Trust. Aspects of this program may be applicable for the VT PES, if ecosystem services are able to be measured through accurate software, and a fair price set for their provisioning. This would be an advantage of a performance-based payment system by providing a method of measurable. Refer to Table 5 for examples of payments based on measured outcomes.

Several programs—especially those that were administered by government, like CSP, Glastir, and BushTender—maintained low administrative costs and offered secure payments to farmers by only verifying practice implementation. The CA HSP uses a model to quantify performance, but also pays for the cost of soil sampling. In this way a program could reduce risk and cost by using a model and improve the accuracy of a model by collecting real world data from a selection of participating farms. We also feel it is important to note that the pay-for-practice programs are well-established, whereas standard structures for pay for performance programs are still in development.

Practice-based and performance-based programs have different effects on risk placement.[18] Practice based programs offer secure payments to farmers who successfully implement practices, and place the risk on the ecosystem service buyer (State of Vermont) that the practice may not

[13] NSAC, "Farmers' Guide to the Conservation Stewardship Program; November 2020 edition," 44-45 (2020), https://sustainableagriculture.net/wp-content/uploads/2020/11/CSP-2020-draft3-interactive-1-1.pdf.
[14] Webinar presented to the VT PES Working Group by James Salzman, UC Santa Barbara, (11/1/2019), https://www.youtube.com/watch?v=Tv6mU6lSql8.
[15] Vermont Dairy and Water Collaborative, "A Call to Action," 27, (March 15, 2019), https://www.vtfarmtoplate.com/assets/resource/files/VDWC%20Final%20Report%20Compilation.pdf
[16] Webinar presented to the VT PES Working Group by Jim Salzman, UC Santa Barbara, (11/1/2019), https://www.youtube.com/watch?v=Tv6mU6lSql8.
[17] Vermont Dairy and Water Collaborative, "A Call to Action," 27, (March 15, 2019), https://www.vtfarmtoplate.com/assets/resource/files/VDWC%20Final%20Report%20Compilation.pdf.
[18] Webinar presented to the VT PES Working Group by Jon Winsten, Winrock International, (10/13/2019), https://www.youtube.com/watch?v=LajIazIPHmM.; Webinar presented to the VT PES Working Group by Jim Salzman, UC Santa Barbara, (11/1/2019), https://www.youtube.com/watch?v=Tv6mU6lSql8.

deliver the expected outcomes—in essence, the buyer enters the agreement with strong confidence that their modelling tool and research is accurate enough to identify which practices will achieve the desired outcomes.[19] In comparison, a performance-based program may place a high level of risk on the farmer if their management strategy fails to deliver the desired outcomes.[20] In some cases, the farmer may not achieve the desired outcomes because of factors outside the farmer's control, such as an abundance or absence of rain.[21] The Vermont PfP program partially addresses these issues by offering an enrollment payment. Farmers enrolled in the program will be paid per acre to enter relevant field data into the FarmPREP software, regardless of future performance.

c. Credibility

Credibility of the PES program is necessary for program success. The public and potential participants must trust that the institution(s) administrating the program is trustworthy, fair and uses sound verification methods. The institution(s) cannot be seen as giving any special favor or disfavor to any individual participant or groups of participants.

Several of the programs administered by governments are assumed to be credible because they can be held accountable through democratic processes (CSP, Glastir, Vermont PfP, etc.). Some programs used third-party verifiers (Lake Taupo, SWOF, Vermont PfP) or use third party verifiers after initial data collection (Truterra) to ensure credibility. Additionally, programs aimed to maintain trust and fairness by using the best measuring and modelling, such as Vermont's investment in developing the Farm-PREP tool used for the Vermont PfP program[22].

d. Longevity

Another aspect for the working group to consider is longevity.[23] Farmers will be taking certain risks when participating in these programs and changes in government policy or loss of government support have been identified as key risk factors that affect farmer engagement in conservation programs.[24] A guarantee of program longevity will enhance farmer ability to cover liabilities like investments in new equipment and time to learn alternative management systems or yield losses from new management approaches. A long-term funding stream is necessary to ensure longevity, so many of the programs use a multi-year contract (CSP, Glastir, BushTender, FCP, SFI).

e. Regulation

PES programs operate within a market and require a driver of demand. Demand for ecosystem services is largely created through regulation because the services are externalized in traditional markets and are not subject to physical scarcity or social demand.[25] Many PES programs (like Glastir, CSP, SFI, VT PFP, Lake Taupo, and BushTender) are therefore directly administered by a

[19] Webinar presented to the VT PES Working Group by Jon Winsten, Winrock International, (10/13/2019), https://www.youtube.com/watch?v=LajIazIPHmM.; Webinar presented to the VT PES Working Group by Jim Salzman, UC Santa Barbara, (11/1/2019), https://www.youtube.com/watch?v=Tv6mU6lSql8.

[20] Webinar presented to the VT PES Working Group by Jon Winsten, Winrock International, (10/13/2019), https://www.youtube.com/watch?v=LajIazIPHmM.; Webinar presented to the VT PES Working Group by Jim Salzman, UC Santa Barbara, (11/1/2019), https://www.youtube.com/watch?v=Tv6mU6lSql8.

[21] Webinar presented to the VT PES Working Group by Jon Winsten, Winrock International, (10/13/2019), https://www.youtube.com/watch?v=LajIazIPHmM.; Webinar presented to the VT PES Working Group by Jim Salzman, UC Santa Barbara, (11/1/2019), https://www.youtube.com/watch?v=Tv6mU6lSql8.

[22] Agency of Agriculture, Food and Markets. (2021). *The Vermont Pay-For-Phosphorus (VPFP) Program Overview*. https://agriculture.vermont.gov/sites/agriculture/files/documents/VPFP_Overview_FAQs.pdf

[23] Byrne, J., Bonasia, C., and White A. Focus groups with Vermont farmers in spring 2021. Unpublished data.

[24] Greiner, R., Patterson, L., & Miller, O. (2009). Motivations, risk perceptions and adoption of conservation practices by farmers. *Agricultural systems*, *99*(2-3), 86-104.

[25] Webinar presented to the VT PES Working Group by Jon Winsten, Winrock International, (10/13/2019), https://www.youtube.com/watch?v=LajIazIPHmM.; Webinar presented to the VT PES Working Group by Jim Salzman, UC Santa Barbara, (11/1/2019), https://www.youtube.com/watch?v=Tv6mU6lSql8.

government entity.[26] This indicates that the PES Working Group's aim to design a program administered by a state agency is a good option.

As noted above, administering the program through a government does have some challenges caused by farmer mistrust of government regulation and implementation, and these challenges will need to be overcome by building relationships and establishing trust.[27] Research finds that this mistrust was largely generated by skepticism about the objective of implementing the practices, suggesting that better communication of the program goals can help improve participation.[28]

f. Baselines or Thresholds?

There are trade-offs of additionality and fairness between programs that use baseline or threshold measurements to determine compensation. Threshold measurements pay all farmers meeting a degree of stewardship, which is fairer but also costs more for the administrator to achieve additional outcomes. Furthermore, payments based on thresholds have the potential to result in no additional ecosystem service benefits on farms that are already providing those benefits anyway and could instead only regard those farmers that have not practices good stewardship. Baselines ensure outcomes but don't compensate those who have already achieved high stewardship levels.[29]

CSP aimed to target compensation to good land stewards by requiring participating farms to already exhibit and meet stewardship thresholds for at least two resource concerns. Glastir similarly required farms to display good stewardship but took the added step of providing 10% greater compensation to farms willing to accept a conservation plan with a more limited range of eligible practices that were targeted to regionally-specific resource concerns—this also helped address disparities in applying threshold measurements for varying conditions between farms, like location, crop type, or soil series. The SFI and VT PfP programs similarly set thresholds to account for farmers' existing stewardship. In VT PfP, the threshold is set as the Lake Champlain Basin phosphorus TMDL reduction requirements. Additional reductions beyond this threshold will be paid per pound of phosphorus reduced. In SFI, farmers select certain standards, which can also be thought of as thresholds, and associated practices to try and achieve. For example, a certain standard may include cover cropping a % of land, reduction in tillage, and executing a nutrient management plan. If a farmer was cover cropping and completing nutrient management plans prior to the SFI, they will need to implement fewer actions to achieve the standard and will receive payment for actions they were already doing.

SECTION 4: PES PROGRAM RECOMMENDATIONS

Based on discussions with the working group as well as the program review, we have identified certain components of a successful PES programs. These include:

a) prioritizing fairness;

b) hybridizing compensation in a tiered approach to include pay for practice and performance;

c) establishing credibility;

d) guaranteeing longevity; and,

---

[26] Salzman James, et al., "The Global Status and Trends of Payments for Ecosystem Services," Nature, 140 (2018).; Webinar presented to the VT PES Working Group by Jon Winsten, Winrock International, (10/13/2019), https://www.youtube.com/watch?v=LajIazIPHmM.; Webinar presented to the VT PES Working Group by Jim Salzman, UC Santa Barbara, (11/1/2019), https://www.youtube.com/watch?v=Tv6mU6lSql8.

[27] Kalcic, M., Prokopy, L., Frankenberger, J., & Chaubey, I. (2014). An in-depth examination of farmers' perceptions of targeting conservation practices. *Environmental Management*, *54*(4), 795-813.

[28] *Id.*

[29] Webinar presented to the VT PES Working Group by Jim Salzman, UC Santa Barbara, (11/1/2019), https://www.youtube.com/watch?v=Tv6mU6lSql8.

e) administering through a government to create demand through regulation.

f) Additionally, determining whether to measure from a baseline or threshold will also influence a program's success, but various other factors need to be established before deciding which option is best. A cost-benefit analysis is needed that examines the trade-offs between specific program goals and resource constraints. This would impact the number of farmers enrolled, acres with implemented practices, or number of units reduced or retained.

Farmers care about being supported and compensated fairly for involvement in agri-environment programs. One of the programs we reviewed—Glastir—is being replaced partly in response to participants dissatisfied with the programs poor technical support and communication.[30] Similarly, pilot testing of the Sustainable Farming Incentive program has identified issues with the application process and guidance as areas of concern. Further, out of the initial 938 farmers enrolled in the program, over 700 have already reached out to the administering body for support with the application and project implementation. The Vermont PES Working Group should emphasize the importance of technical assistance, communication, and trust in program design for Vermont.

PES programs that pay for performance can complement other payment for practice programs like the USDA NRCS EQIP. It is the responsibility of the administrating institutions to provide outreach to potential participants through trade-offs among different programs. We recommend that as a part of PES publicization efforts, potential participants are aware of program enrollment rules including which programs can accommodate dual enrollment (for example, land enrolled in EQIP can be enrolled in CSP, but CSP cannot pay for practices already covered by EQIP). Some programs highlight their compatibility with other agri-environment schemes, such as VT PfP, while others may prohibit dual enrollment as part of their eligibility requirements, like the SFI program in England.

Payment for practice may be considered unfair to farmers who have exceeded the standard. Conversely, payment for performance may be considered unfair to farmers who have not had sufficient investment support to implement conservation practices (typically small farms and other historically underserved farmers). Therefore, where resource and budgetary constraints allow, we recommend a tiered hybrid approach where farmers are paid for both practices and outcomes. By paying for practices, the administering body takes certain financial risks away from the farmer who is meeting conservation standards. By paying for performance, farmers are compensated for exceeding the standard.

Successful PES programs often include incentive payments for things such as enrollment, data entry, and learning activities. The BushTender, CSP, and Glastir all had the support of federal or regional governments and therefore enjoyed strong capacity, credibility, secure data management and easy verification of practices. As mentioned earlier, the VPFP program offers an enrollment payment to farmers of $15/acre up to $5,000 simply for data entry into the program modelling software. The FCP partners with other organizations to offer to help minimize legal fees and baseline documentation, the cost of which can range between $11,000-$15,000.

Furthermore, some programs indicate a stronger chance of success when pursuing multiple objectives (social, economic, etc.) in addition to environmental outcomes.[31] Particular to Vermont, the program may add to its chance of success by also pursuing the Working Group's objective to use the PES program to help achieve parity in the agriculture sector by compensating farmers for their stewardship of ecosystem

[30] Llywodraeth Cymru, " Co-design for a Sustainable Farming Scheme for Wales," 33-39 (2021), https://gov.wales/sites/default/files/publications/2021-09/sustainable-farming-scheme-co-design-future-farming_0.pdf.

[31] Heidi R. Huber-Stearns et al, "Social-ecological enabling conditions for payments for ecosystem services," Ecology and Society (2017), https://www.jstor.org/stable/pdf/26270112.pdf.

services[32][33] Though several of the programs evaluated in this project focus strictly on environmental outcomes, like BushTender, programs like CSP were partially established to support the agriculture sector by" [offering] farmers the opportunity to earn payments for actively managing, maintaining, and expanding conservation activities."[34]

To address issues of fairness, any PES program implemented should be widely publicized and be open to all farms regardless of farm type, size, or location. Additional effort should be made to reduce barriers to entry and participation in the program for farmers who are owners of small operations, first generation, or are historically underserved. We also want to acknowledge that there are multiple pathways to providing environmental outcomes. As Engle, Pagiola, and Wunder wrote, "PES is not a silver bullet...but a tool tailored to address a specific set of problems: those in which ecosystems are mismanaged..." [35]

Carefully crafted program design and outreach can help to avoid unintended consequences. PES programs have been framed by some organizations as a "false solution" to environmental issues.[36] By quantifying and selling natural capital, these organizations say that PES programs do not transition away from "extractive industries," rather than buy into the same system that allowed the market failure.[37] Furthermore, PES programs may also continue to undermine small farmers and maintain power imbalance if not strategically designed with those pitfalls in mind.[38] Overemphasis on designing for individual additionality and efficiency can cause new externalities and crowd out intrinsic stewardship motivations.[39] However, programs that frame PES payments through the lens of a reward or compensation for stewardship, offer flexibility in supported activities, and address multiple ecosystem service targets have been documented to reinforce stewardship identities and promote long term shared responsibility for ecosystem health.[40]

SECTION 5: CONCLUSION

The strengths and weaknesses exhibited by the wide variety of existing programs offers the Vermont PES Working Group an opportunity to explore other PES approaches to date. While many factors still need to be decided, the outcomes of this review indicate that a Vermont PES program is most likely to succeed in line with the Working Group's goals if it prioritizes fairness, compensates for a hybridized approach of paying for practices and performance, establishes credibility, guarantees permanence, and is administered by a government.

---

[32] VT Agency of Agriculture, Food, and Markets, "Soil Conservation Practice and Payment for Ecosystem Services Working Group Report," 13, (January 15, 2020).
[33] Webinar presented to the VT PES Working Group by Jim Salzman, UC Santa Barbara, (11/1/2019), https://www.youtube.com/watch?v=Tv6mU6lSql8. *Salzman considers targeting farm viability through his discussion on 'wealth distribution.'*
[34] NSAC, "Conservation Stewardship Program," (updated April 2019; access 10-29-21), https://sustainableagriculture.net/publications/grassrootsguide/conservation-environment/conservation-stewardship-program/.
[35] Engle, Stefania, S. Pagiola, and S. Wunder. "Designing payment for environmental services in theory and practice: An overview of the issues," *Ecological Economics*, 663-674 (2008).
[36] Tamra Gilbertson, "Carbon Pricing: A Critical Perspective for Community Resistance," Indigenous Environmental Network & Climate Justice Alliance, 5, (2017).; Also see Richard Conniff, "What's Wrong With Putting a Price on Nature?," Yale Environment 360, (2012), https://e360.yale.edu/features/ecosystem_services_whats_wrong_with_putting_a_price_on_nature.
[37] Tamra Gilbertson, "Carbon Pricing: A Critical Perspective for Community Resistance," Indigenous Environmental Network & Climate Justice Alliance, 5, (2017).; Also see Richard Conniff, "What's Wrong With Putting a Price on Nature?," Yale Environment 360, (2012), https://e360.yale.edu/features/ecosystem_services_whats_wrong_with_putting_a_price_on_nature.
[38] *Id.*
[39] Chan, K. M., Anderson, E., Chapman, M., Jespersen, K., & Olmsted, P. (2017). Payments for ecosystem services: Rife with problems and potential—for transformation towards sustainability. *Ecological Economics*, *140*, 110-122.
[40] *Id.*

APPENDICES (click to link directly to specific program)

Appendix I: BushTender

1. **Basic Program Information**
   - **Program name:** Bush Tender[1]
   - **Program location:** Victoria, Australia[2]
   - **Year founded:** 2001[3]
   - **Size of program (# of farms, landowners, etc.):** 89 (in 2012)[4]
   - **Acreage of program:** 87,107.12 acres (35,251 hectares)[5]
   - **Minimum acreage required**: There is no minimum size for a site to be eligible.[6]
   - **Program administrator**: Government of Victoria[7]
   - **Targeted participants:** Victoria landholders with native vegetation on their land[8]
   - **Prerequisites for enrollment:** Any landholder with pre-existing natural vegetation[9]
   - **Required data sharing**: Information gathered during site assessment.[10]
   - **Budget (overall, annual, etc.):** Approximately ranging from AU$1.9 to >AU$2 million per year (based on 2012 information)[11]
   - **Funding source/who pays:** Government of Victoria[12]
   - **Duration of program:** Either a 5 Year Management Agreement *or* a 5 Year Management Agreement plus a Permanent Protection Agreement.[13]
   - **Goal/expected outcome(s): Increase** in biodiversity of native vegetation[14]
   - **Specific conservation practices mentioned/measured:** Practices are at the discretion of the landowner/field representative.[15]
   - **Ecosystem services measured**: Native Vegetation/ Biodiversity. Specific metrics vary.[16]
   - **Method of ecosystem services measurement**: Practices are verified through self-reporting by the farmer, preferably with a photographic record.[17] A habitat hectares methodology is used to assess vegetation condition.[18]

---

[1] Victoria State Government, "BushTender," Environment, Land, Water, and Planning, (last updated 25/07/2019), https://www.environment.vic.gov.au/innovative-market-approaches/bushtender. [*hereafter* BushTender Homepage]
[2] *Id*.
[3] *Id*.
[4] John Rolfe, Stuart Whitten, and Jill Windle, "The Australia Experience in Using Tenders for Conservation," Land Use Policy, 63 (2017). [*hereafter* Rolfe et al.]
[5] *see* BushTender Homepage.; *The Victoria Government also measures the program by Habitat Hectares (HHA), "defined as a site-based measure of quality and quantity of native vegetation that is assessed in the context of the relevant native vegetation type." Total HHA for BushTender is 5,560.*
[6] Department of Sustainability and Environment, "BushTender: Frequently Asked Questions," (2009), http://www.dse.vic.gov.au/__data/assets/pdf_file/0010/100162/BT2009_Information_sheet_2_-_frequently_asked_questions.pdf. [*hereafter* BushTender FAQ]
[7] *Id*.
[8] Department of Sustainability and Environment, "BushTender: General Information—Information Sheet No. 1," (2011), https://vgls.sdp.sirsidynix.net.au/client/search/asset/1016886. [*hereafter* Info Sheet 1]
[9] *Id,*
[10] Department of Sustainability and Environment, "BushTender: The Site Visit—Information Sheet No. 3," (2007), https://www.vgls.vic.gov.au/client/en_AU/search/asset/1012331/0. [*hereafter* Info Sheet 3]
[11] *see* Rolfe et al. at 63.
[12] *Id*.
[13] Department of Sustainability and Environment, "BushTender: Frequently Asked Questions—Information Sheet No. 2," (2009), http://www.dse.vic.gov.au/__data/assets/pdf_file/0010/100162/BT2009_Information_sheet_2_-_frequently_asked_questions.pdf.
[14] *see* BushTender FAQ
[15] *Id.*
[16] *see* Rolfe et al. at 63.
[17] Department of Sustainability and Environment, "BushTender: Photopoint Monitoring—Information Sheet No. 17," (2008), https://vgls.sdp.sirsidynix.net.au/client/search/asset/1012712.
[18] Convention on Biological Diversity, "Bush Tender Programme," (date estimated to be 2012) https://www.cbd.int/financial/pes/australia-pesbush.pdf. [*hereafter* CBD]

Appendix I: BushTender

1. **Basic Program Information (cont.)**
   - **Practice or performance**: Practice (performance is recorded, but payments are based on a budget for practices)[19]
   - **What is paid for**: A proposed budget for new practices to implement a conservation plan.[20]
   - **Payment (cost) per unit of service**: Variable, depends on bidding process.[21]
   - **Payment mechanism**: Initial upfront payment upon signing the Management Agreement, with annual payments made following completion of agreed actions. Payments are made directly to the Landholder by cheque or electronic funds transfer[22]
   - **Average payment**: Variable, depends on bidding process.[23]
   - **Total payments/percentage of budget towards payments**: Not specified
   - **Selling point/tagline**: Not specified

2. **History/Brief Overview**

   BushTender is a voluntary incentive-based program that "is aimed at improving the quality of native vegetation and its value as habitat for rare or threatened plants and animals."[24] The program is one of several market-based incentive programs used to achieve environmental objectives in Australia, with others including the EcoTender Programme and the Environmental Stewardship Programme.[25]

   BushTender uses a reverse auction system through which landholders submit bids for government investment in return for providing improved biodiversity outcomes.[26] Investments are allocated to landholders who can provide the greatest economic return relative to the investment.[27] Chosen landholders receive periodic payments for management activities under a 5 year agreement with the Victorian Government. BushTender supports landholders to "[manage] native vegetation that is above their current obligations and legislation."[28] There is no minimum size for a site to be eligible.[29]

3. **Program Process**

   Details of application, prerequisites, baseline assessments, objectives, payment calculation, etc.

   i. Expression of Interest[30]

   Landholders with native vegetation on their land can submit an "expression of interest" to the Department of Land, Water and Planning (DELWP). The Department stops accepting expressions of interest when "participation levels are considered sufficient."

---

[19] Department of Sustainability and Environment, "BushTender: Bidding Process—Information Sheet No. 5," (2008), https://vgls.sdp.sirsidynix.net.au/client/search/asset/1012721. [*hereafter* Info Sheet 5]
[20] *Id.*
[21] *Id.*
[22] *see* BushTender FAQ.
[23] *Id.*
[24] *see* BushTender FAQ
[25] *see* CBD.
[26] *Id.*
[27] *see* Rolfe et al. at 63.
[28] *see* BushTender Homepage.
[29] *see* BushTender FAQ.
[30] *see* Info Sheet 1.

3. <u>Program Process (cont'd)</u>

ii. Site Assessment[31]

Site Assessments are conducted by Field Officers who conduct vegetation and habitat quality assessments. The Field Officer and landholder then discuss possible management options. The specific parameters assessed are:

a. <u>Biodiversity Significance Score:</u> This score reflects the conservation significance of each site. The score is based on 1) distinct native vegetation sites on the property, 2) conservation status of vegetation on the site, 3) vegetation quality as indicated by site conditions and landscape context (e.g., presence of old trees and healthy tree canopy, size of vegetation patch), 4) significance of vegetation in the broader landscape (e.g., opportunity for connection habitats), and 5) native plant and animal species likely to be present, based on information from the DSE database.

b. <u>Habitat Services Score</u>: This score measures of the potential improvements in for natural vegetation following management commitments and actions. The score is based on 1) commitments to protect the current site quality, 2) actions to improve site quality, 3) amount of area proposed for management, and 4) the length of the agreement.

iii. Development of draft Management Plan [32]

After the site assessment, the landholder receives a BushTender approved draft Management Plan developed from discussions with the Field Officer, along with information that will help the landholder manage the existing native vegetations. If the landholder wishes to make changes to the plan, they should contact the BushTender Regional Implementation Manager as soon as possible to discuss changes, which must be discussed before an approved bid is place.

iv. Submission of Bid [33] [34] [35]

Landholders may place one bid per site assessed. The price of the bid is entirely determined by the landholder to balance the current biodiversity values of their site against the costs of implementing the plan, like labor costs, materials, risk, and new or emerging threats.

The landholder can consider the current biodiversity field values of their site as communicated by the Field Officer. Landholders can improve the likely success of their bid by agreeing to the broadest range of commitments and management actions, increasing the area covered by the bid, identifying threatened plants or animals on the land, and authorizing program officials to record any threatened species found during assessment.

Multiple landholders can submit a joint bid together. In this case, a single party will represent the group and will be accountable for the delivery and reporting on management actions.

---

[31] *see* Info Sheet 3.

[32] Dept. of Sustainability and Environment, "BushTender: Grasslands: Specifications for Management—Information Sheet No. 5," (2011), https://www.vgls.vic.gov.au/client/en_AU/search/asset/1146063/0.

[33] Department of Sustainability and Environment, "BushTender: Submitting a bid—Information Sheet No. 12," (2008), https://vgls.sdp.sirsidynix.net.au/client/search/asset/1012728.

[34] *see* Info Sheet 5.

[35] Department of Sustainability and Environment, "BushTender: Group Participation—Frequently Asked Questions—Information Sheet No. 18," (2011), https://www.vgls.vic.gov.au/client/en_AU/search/asset/1017705/0.

Appendix I: BushTender

3. Program Process

v. Bid Assessment[36] [37]

After all participants submit their bids, an evaluation team compares the bids against each other. "This comparison will include consideration of the biodiversity values of the site, the expected biodiversity outcomes resulting from the proposed commitments and management actions, and the bid price." The evaluators use a *Biodiversity Benefits Index* calculated for each bid, which quantifies the conservation significance for each site, expected outcomes, and the bid price.

> Biodiversity Benefits Index = (Biodiversity Significance Score X Habitat Services)/ (Score Bid Price submitted by landholder)

Bids are then ranked according to their Index score and funds are allocated to those plans representing the greatest "value for money."

vi. Details of actions by participants/funder.

If a bid is accepted, the farmer implements the proposed plan and submits annual reporting. Because specific practices vary according to each bid, participant actions are unique to each site.

vii. Detail of monitoring, reporting, payment process. [38] [39]

Reporting is done annually and is conducted by the landholder. Landholders submit a report describing 1) site details, 2) management actions and commitments, 3) action status, and 4) action descriptions, as well as 5) any comments or observations of unexpected outcomes, etc. Landholders are also encouraged to submit photographs to provide a visual record of land improvements.

3. Concerns/Issues

Pre-existing land stewardship values drive a tendency of landholders to underbid in reverse auctions, leading to inadequate compensation for management changes.[40] This can have an additional "crowding-in" ("leveraging and increasing non-monetary motivations to participate") effect.[41]

---

[36] *see* Info Sheet 5.

[37] Department of Sustainability and Environment, "BushTender: Assessment of Bids—Information Sheet No. 6," (2007), https://vgls.sdp.sirsidynix.net.au/client/search/asset/1012334.

[38] Department of Sustainability and Environment, "BushTender: Annual Reporting—Information Sheet No. 16," (2008), https://vgls.sdp.sirsidynix.net.au/client/search/asset/1012732 .

[39] Department of Sustainability and Environment, "BushTender: Photopoint Monitoring—Information Sheet No. 17," (2008), https://vgls.sdp.sirsidynix.net.au/client/search/asset/1012712.

[40] Chan et al., "Payments for Ecosystem Service: Rife with Problems and Potential—for Transformation towards Sustainability," Ecological Economics, 10 (2017), https://open.library.ubc.ca/soa/cIRcle/collections/facultyresearchandpublications/52383/items/1.0348746

[41] *Id.*; *Also see:* Jurist Legal News, "Recognizing Nature's Value: The Environment Does Not Work for Free," (February 26, 2021), https://www.youtube.com/watch?v=5awJKSw0IqE.

Appendix II: California Healthy Soils Program (CA HSP)

1.1. Basic Program Information

- **Location**: California
- **Year founded**: Established in 2016 and launched in 2017 as a result of CA's 2015 Healthy Soils Program[42,43]
- **Program administrator**: California Department of Food and Agriculture (CDFA)
- **Size of program**: 646 projects[44,] covering 54,084 acres.[45]
- **Affiliates**: "CDFA has funded technical assistance providers, comprising of university cooperative extension specialists and Resource Conservation Districts (RCDs) across major agricultural counties in California, and, non-profits in expertise with agricultural management and conservation…In 2019, CDFA expanded the available expertise by developing a collaboration with the University of California Agricultural and Natural Resources, where dedicated staff resources (Community Education Specialists) have been hired to assist farmers in applying for funding and implementing their projects" [46]. For a full list of technical assistance providers see "List of CDFA-Funded Technical Assistance Providers and University of California Cooperative Extension Climate Smart Agriculture Community Education Specialists for 2020 HSP Incentives Program."[47]

1.2 General Program Details

- **Program target participants:** California farmers, ranchers and Federal and California Recognized Native American Indian Tribes. Eligible agricultural operations include row, vineyard, field and tree crops, commercial nurseries, nursery stock production, and livestock and livestock product operations. Farmers can also concurrently use funds from EQIP, but HSP funds cannot be used for activities or costs covered by other state or federal programs. University farms, research farms, and community gardens are not eligible nor are fields or crops that are not suitable based on NRCS Conservation Standards or NRCS California Practice Scenarios.[48]
- **Prerequisites for enrollment**: Must use must use the CDFA HSP Re-Plan Tool.[49] Enrollment is voluntary.[50] See below for more information.
- **Required data**: Three years of baseline data on leased or owned fields. [51]

---

[42] CalCan. Healthy Soils Program. 2021. https://calclimateag.org/hsp/ Accessed: October 24, 2021.
[43] CDFA. "An Interagency Plan to Reduce Greenhouse Gases and Improve Drought Resiliency by Innovating Farm and Ranchland Practices." Healthy Soils Action Plan. September 14, 2016. https://www.cdfa.ca.gov/oefi/healthysoils/docs/ca-healthysoilsactionplan.pdf Accessed: October 24, 2021.
[44] CalCan. Healthy Soils Program. 2021. https://calclimateag.org/hsp/ Accessed: October 24, 2021.
[45] Gunasekara, Amrith. California's Healthy Soils Program: an interview with Dr. Amrith Gunasekara. Climate Group. July 31, 2020. https://www.theclimategroup.org/our-work/news/californias-healthy-soils-program-interview-dr-amrith-gunasekara. Accessed: October 24, 2021.
[46] *Id.*
[47] CDFA. List of CDFA-Funded Technical Assistance Providers and University of California Cooperative Extension Climate Smart Agriculture Community Education Specialists for 2020 HSP Incentives Program. August 27, 2021. https://www.cdfa.ca.gov/oefi/healthysoils/docs/2020_HSP_Incentives-TAPWorkshops.pdf Accessed: October 24, 2021.
[48] CDFA. 2020 Healthy Soils Program Incentives Program Request for Grant Applications. February 27, 2020. https://www.cdfa.ca.gov/oefi/healthysoils/docs/2020_HSP_Incentives_RGA.pdf Accessed: October 24, 2021.
[49] *Id.*
[50] CDFA. "An Interagency Plan to Reduce Greenhouse Gases and Improve Drought Resiliency by Innovating Farm and Ranchland Practices." Healthy Soils Action Plan. September 14, 2016. https://www.cdfa.ca.gov/oefi/healthysoils/docs/ca-healthysoilsactionplan.pdf Accessed: October 24, 2021.
[51] CDFA. 2020 Healthy Soils Program Incentives Program Request for Grant Applications. February 27, 2020. https://www.cdfa.ca.gov/oefi/healthysoils/docs/2020_HSP_Incentives_RGA.pdf Accessed: October 24, 2021.

Appendix II: California Healthy Soils Program (CA HSP)

1.2 General Program Details (cont'd)

- **Length of contract**: 3 years[52]
- **Annual budget**:
  FY 2021-2022 budget: $50 million
  Grants awarded to date (2021): $41.5 million[53]
- **Funding source**: Between 2016 and 2019, HSP received $40.5 million in funding from California's Climate Investment (CCI), California's cap and trade proceeds. Through the California Drought, Water, Parks, Climate, Coastal Protection and Outdoor Access for all Act of 2018, HSP received $10 million.[54] Funding also comes from Greenhouse Gas Reduction Fund and Proposition 68. [55,] "After an initial allocation of $7.5 Million, the California State Legislature appropriated to CDFA $15 Million in 2018-19 and $28 Million in 2019-20." [56]
- **Payment mechanism**: Through CDFA and CARB. Is a flat-rate payment systems based on yearly verification and invoicing.
- **Goals/expected outcome(s)**: Reduced GHG emissions at 40% below 1990 levels by 2030.[57] Healthy Soils Initiative short-term actions: establish short and long-term goals for building SOM, identify knowledge gaps, provide healthy soils guidance and long-term actions: identify financing opportunities, develop the market, provide research, education and technical assistance, increase government efficiency, ensure interagency
- **Goals/expected outcome(s) (cont'd)**: coordination.[58,59] CDFA estimates greenhouse gas reductions over 3 years to total 109,809 metric tons CO2.[60]
- **Accepted conservation practices**: Practices that may be compensated include, but are not limited to cover cropping, no-till, reduced-till, mulching, compost application, and conservation plantings. [61] For full list, see end of Appendix A. Expected lifespan for most practices is 3 years, except those with woody cover practices which is 10 years.[62]
- **Ecosystem services measured**: carbon sequestration and reduction of carbon, nitrous oxide, and methane emissions.

---

[52] CDFA. 2020 Healthy Soils Program Incentives Program Request for Grant Applications. February 27, 2020. https://www.cdfa.ca.gov/oefi/healthysoils/docs/2020_HSP_Incentives_RGA.pdf October 24, 2021.
[53] CalCan. Healthy Soils Program. 2021. https://calclimateag.org/hsp/ Accessed: October 24, 2021.
[54] State of California. "How is the Healthy Soils Program Funded?" Healthy Soils Program. 2021. https://www.cdfa.ca.gov/oefi/healthysoils/ Accessed: October 24, 2021.
[55] CalCan. Healthy Soils Program. 2021. https://calclimateag.org/hsp/ Accessed: October 24, 2021.
[56] Gunasekara, Amrith. California's Healthy Soils Program: an interview with Dr. Amrith Gunasekara. Climate Group. July 31, 2020. https://www.theclimategroup.org/our-work/news/californias-healthy-soils-program-interview-dr-amrith-gunasekara Accessed: October 24, 2021.
[57] CDFA. "An Interagency Plan to Reduce Greenhouse Gases and Improve Drought Resiliency by Innovating Farm and Ranchland Practices." Healthy Soils Action Plan. September 14, 2016. https://www.cdfa.ca.gov/oefi/healthysoils/docs/ca-healthysoilsactionplan.pdf Accessed: October 24, 2021.
[58] CDFA. "Healthy Soils Initiative." Administration/Department of Food and Agriculture Work Product. n.d. https://www.cdfa.ca.gov/EnvironmentalStewardship/pdfs/ShortTermActions.pdf Accessed: October 24, 2021.
[59] CDFA. "An Interagency Plan to Reduce Greenhouse Gases and Improve Drought Resiliency by Innovating Farm and Ranchland Practices." Healthy Soils Action Plan. September 14, 2016. https://www.cdfa.ca.gov/oefi/healthysoils/docs/ca-healthysoilsactionplan.pdf Accessed: October 24, 2021.
[60] CalCan. Healthy Soils Program. 2021. https://calclimateag.org/hsp/ Accessed 24.10.2021
[61] State of California. "How is the Healthy Soils Program Funded?" Healthy Soils Program. 2021. https://www.cdfa.ca.gov/oefi/healthysoils/ Accessed: October 24, 2021.
[62] CDFA. 2020 Healthy Soils Program Incentives Program Request for Grant Applications. February 27, 2020. https://www.cdfa.ca.gov/oefi/healthysoils/docs/2020_HSP_Incentives_RGA.pdf Accessed: October 24, 2021.

1.2 General Program Details (cont'd)

- **Method of ecosystem services measurement**:
  1. "White paper titled 'Compost Application Rates for California Croplands and Rangelands for a CDFA Healthy Soils Incentives Program', available at: https://www.cdfa.ca.gov/oefi/healthysoils/docs/CompostApplicationRate_WhitePaper.pdf
  2. California Air Resources Board (CARB) Healthy Soils Quantification Methodology (QM) available at: https://ww2.arb.ca.gov/resources/documents/cci-quantificationbenefits-and-reporting-materials.
  3. COMET-Planner Report: This report explains the scientific approaches that the quantification methodology has been utilized to estimate greenhouse gas reduction benefits for the CDFA HSP and is available at: http://bfuels.nrel.colostate.edu/health/COMET-Planner_Report_Final.pdf
  4. CDFA's Report on Whole Orchard Recycling https://www.cdfa.ca.gov/oefi/efasap/docs/WORforPublicCommentReport.pdf"[63]

1.3 Payment Details

- **Practice or performance:** Performance (based on modeling and soil samples/OM analysis)
- **Ecosystem services paid**: Improved soil health, sequestered carbon, and reduced greenhouse gas emissions.[64] Co-benefits include enhanced soil water-holding capacity, promoting bio-diversity, preventing erosion, enhancing air and water quality.[65]
  CDFA seeks public input on new practices to be eligible for the HSP. See HSP New Management Practices 2020 for a recent list of proposed eligible practices.[66]
- **Payment (cost) per unit of service**: Payment structure is clear, but this may be newly implemented in 2020.[67] See Healthy Soils Program Incentive Application guidebook for detailed payment structure for other cropland practices, orchard/vineyard, and grazing operations.[68] For example, on cropland, applying compost can be compensated up to $50/ton, converting to unfertilized perennials can range from $231.54-1,741.14/acre, depending on species, increase rotations or include perennials in rotation can range from $20.06-53.50/acre, cover cropping can range from $89.20-106.70/acre, adding a field border ranges from $130.64-1,396.19/acre depending on species, nutrient management planning that results in 15% fertilizer reduction rate by $14.72/acre, no-till or strip till is $33.82/acre, reduced till is $29.00/acre.
- **Average payment**: The 2020 maximum Healthy Soils Incentives Program grant award is $100,000.[69] See Table 1 for more information.

---

[63] CDFA. 2020 Healthy Soils Program Incentives Program Request for Grant Applications. February 27, 2020. https://www.cdfa.ca.gov/oefi/healthysoils/docs/2020_HSP_Incentives_RGA.pdf Accessed: October 24, 2021.
[64] State of California. "Funding." California's Healthy Soils Initiative. 2021. https://www.cdfa.ca.gov/healthysoils/ Accessed: October 24, 2021.
[65] Gunasekara, Amrith. California's Healthy Soils Program: an interview with Dr. Amrith Gunasekara. Climate Group. July 31, 2020. https://www.theclimategroup.org/our-work/news/californias-healthy-soils-program-interview-dr-amrith-gunasekara Accessed: October 24, 2021.
[66] CDFA. "CDFA Healthy Soils Program (HSP) New Management Practices Proposals Recommendations for Public Comment." HSP New Management Practices 2020. 2020. https://www.cdfa.ca.gov/oefi/healthysoils/docs/hsp_new_management_practices_cdfa_recommendations_july_2021.pdf Accessed: October 24, 2021.
[67] Lyle, Steve and Victor Hernandez. "CDFA Announces Changes for Next Round of Healthy Soils Program Grants." News Release. February 24, 2020. https://www.nrcs.usda.gov/wps/portal/nrcs/detail/ca/newsroom/releases/?cid=NRCSEPRD1549218 Accessed: October 24, 2021.
[68] CDFA. 2020 Healthy Soils Program Incentives Program Request for Grant Applications. February 27, 2020. https://www.cdfa.ca.gov/oefi/healthysoils/docs/2020_HSP_Incentives_RGA.pdf Accessed: October 24, 2021.
[69] *Id.*

2. **Program History**

"California's Healthy Soils Initiative is a collaboration of state agencies and departments, led by the California Department of Food and Agriculture, to promote the development of healthy soils. A combination of innovative farm and land management practices contribute to building adequate soil organic matter that can increase carbon sequestration and reduce overall greenhouse gas emissions."[70] The Healthy Soils Incentive Program is a part of California's Healthy Soils Initiative. The Healthy Soils Incentive Program is funded through California Department of Agriculture and Food in coordination with the California Air Resources Board.[71]

3. **Program Process**

- **Project funding:** In 2020, the California Department of Food and Agriculture appropriated $28 million to the Healthy Soil Program through the Budget Act of 2019. [72] For FY 2021-2022, the California Department of Food and Agriculture appropriated $50 million to the Healthy Soil Program through the Budget Act of 2021.[73] (Lyle, 2021)
- **Project application process:**
  Farmers must enter baseline data of management history and yield for past three years and future 3 years. [74] "Applicants proposing to include Compost Application and/or Whole Orchard Recycling practices in their projects must use the CDFA HSP Re-Plan Tool to check if the project site is eligible for the practice." Those applying to reduce GHG emissions must submit as a part of their application estimated GHG reduction and projected cost as produced by the COMET-Planner tool. [75] Project design must be submitted using the CDFA-HSP Re-Plan tool. Providing an optional Conservation Plan (created by NRCS, CCA, or other specialist) will give the application additional points.
- **Project implementation**
  "Eligible agricultural management practices can be implemented alone or in combinations, except where specified, on one APN or several APNs. Specific fields within each APN where agricultural management practice(s) will be implemented should be named by Field (Such as Field 1, Field 2, Field 3, etc.). o Each field must be outlined clearly on the APN map. All fields must have the selected agricultural management practices implemented each year for the duration of the project term. Implementations must begin prior to the end (i.e. December 31) of each project year. Multiple management practices may be included within the same APN (except for Non-Overlapping Practices), and multiple APNs within the same agricultural operation may be included in the project. Once awarded, recipients may not change the APNs included in the grant application through the duration of the project. Implementation of eligible management practices will be incentivized based on payment rates. [76] See 2020 grant application guidebook for specifics by agricultural and practice type (orchard, grazing, row, etc.).

---

[70] State of California. "Funding." California's Healthy Soils Initiative. 2021. https://www.cdfa.ca.gov/healthysoils/ Accessed: October 24, 2021.
[71] CDFA. 2020 Healthy Soils Program Incentives Program Request for Grant Applications. February 27, 2020. https://www.cdfa.ca.gov/oefi/healthysoils/docs/2020_HSP_Incentives_RGA.pdf Accessed: October 24, 2021.
[72] *Id.*
[73] Lyle, Steve. "CDFA Accepting Public Comments on Healthy Soils Program Guidelines." News Release. Release #21-113. September 9, 2021. https://www.cdfa.ca.gov/egov/Press_Releases/Press_Release.asp?PRnum=21-113 Accessed: October 24, 2021.
[74] CDFA. 2020 Healthy Soils Program Incentives Program Request for Grant Applications. February 27, 2020. https://www.cdfa.ca.gov/oefi/healthysoils/docs/2020_HSP_Incentives_RGA.pdf Accessed: October 24, 2021.
[75] *Id.*
[76] *Id.*

3. **Program Process (cont'd)**
   - **Monitoring, reporting, payment process**
     Awardees must submit baseline soil samples, soil samples after each year of implementation, and annual reports. [77]. Practices are verified by CDFA environmental scientists. [78]
   - **Post-project review and evaluation**
     If project has been completed, detail of self-evaluation and project review. Awardees are expected to maintain documentation on management practices and any soil samples for three years after completion of the project as well as SOM analysis three years after project implementation/project closeout. [79]

4. **Concerns/Issues**
   Although this program supports a variety of practices, it does not compensate farmers who already have adopted the practice. Dr. Amrith Gunasekara, Science Advisor to the Secretary at the California Department of Food and Agriculture, noted issues in initiating the program included creating an easy application process, advertising the program, ensuring adequate government accountability, and building trust between operators and government. Gunasekara found that collaborating with partners was essential to engage farmers. [80]

[77] CDFA. 2020 Healthy Soils Program Incentives Program Request for Grant Applications. February 27, 2020. https://www.cdfa.ca.gov/oefi/healthysoils/docs/2020_HSP_Incentives_RGA.pdf Accessed: October 24, 2021.
[78] *Id.*
[79] *Id.*
[80] Gunasekara, Amrith. California's Healthy Soils Program: an interview with Dr. Amrith Gunasekara. Climate Group. July 31, 2020. https://www.theclimategroup.org/our-work/news/californias-healthy-soils-program-interview-dr-amrith-gunasekara Accessed: October 24, 2021.

Appendix II: California Healthy Soils Program (CA HSP)

List of all eligible practices[81]:

I. Cropland
- Alley Cropping (USDA NRCS CPS 311)
- Compost Application
  - Compost Purchased from a Certified Facility
  - On-farm Produced Compost
- Conservation Cover (USDA NRCS CPS 327)
- Conservation Crop Rotation (USDA NRCS CPS 328)
- Contour Buffer Strips (USDA NRCS CPS 332)
- Cover Crop (USDA NRCS CPS 340)
- Field Border (USDA NRCS CPS 386)
- Filter Strip (USDA NRCS CPS 393)
- Forage and Biomass Planting (USDA NRCS 512)
- Grassed Waterway (USDA NRCS CPS 412)
- Hedgerow Planting (USDA NRCS CPS 422)
- Herbaceous Wind Barrier (USDA NRCS CPS 603)
- Mulching (USDA NRCS CPS 484)
- Multi-story Cropping (USDA NRCS CPS 379)
- Nutrient Management (USDA NRCS CPS 590) (15% reduction in fertilizer application only)
- Residue and Tillage Management – No-Till (USDA NRCS CPS 329)
- Residue and Tillage Management − Reduced Till (USDA NRCS CPS 345)
- Riparian Forest Buffer (USDA NRCS CPS 391)
- Riparian Herbaceous Cover (USDA NRCS CPS 390)
- Strip Cropping (USDA NRCS CPS 585)
- Tree/Shrub Establishment (USDA NRCS CPS 612)
- Vegetative Barriers (601) (USDA NRCS CPS 601)
- Windbreak/Shelterbelt Establishment (USDA NRCS CPS 380)

II. Orchard or Vineyard
- Compost Application
  - Compost Purchased from a Certified Facility
  - On-farm Produced Compost
- Conservation Cover (USDA NRCS CPS 327)
- Cover Crop (USDA NRCS CPS 340)
- Filter Strip (USDA NRCS CPS 393)
- Hedgerow Planting (USDA NRCS CPS 422)
- Mulching (USDA NRCS CPS 484)
- Nutrient Management (USDA NRCS CPS 590) (15% reduction in fertilizer application only)
- Residue and Tillage Management – No-Till (USDA NRCS CPS 329)
- Residue and Tillage Management − Reduced Till (USDA NRCS CPS 345)
- Whole Orchard Recycling
- Windbreak/Shelterbelt Establishment (USDA NRCS CPS 380)

III. Grazing Land
- Compost Application
  - Compost Purchased from a Certified Facility
  - On-farm Produced Compost
- Hedgerow Planting (USDA NRCS CPS 422)
- Prescribed Grazing (USDA NRCS CPS 528)
- Range Planting (USDA NRCS CPS 550)
- Riparian Forest Buffer (USDA NRCS CPS 391)
- Silvopasture (USDA NRCS CPS 381)
- Tree/Shrub Establishment (USDA NRCS CPS 612)
- Windbreak/Shelterbelt Establishment (USDA NRCS CPS 380)

[81] CDFA. 2020 Healthy Soils Program Incentives Program Request for Grant Applications. February 27, 2020. https://www.cdfa.ca.gov/oefi/healthysoils/docs/2020_HSP_Incentives_RGA.pdf Accessed: October 24, 2021.

Appendix II: California Healthy Soils Program (CA HSP)

Other resources not cited:

2021 HSP list of New Management Proposals: https://www.cdfa.ca.gov/oefi/healthysoils/docs/2021/cdfa_responses_to_public_comments_sep_2021.pdf

2020 HSP list of applicants: https://www.cdfa.ca.gov/oefi/healthysoils/docs/2020-HSPIncentives-SubmittedApplications.pdf

2020 CA HSP awarded- Updated January 11, 2021 (first come, first serve): https://www.cdfa.ca.gov/OEFI/healthysoils/docs/2020_HSP_Incentives_Projects_Selected_for_Awards.pdf

2018 HSP list of applicants:https://www.cdfa.ca.gov/oefi/healthysoils/docs/2018-HSPIncentives-SubmittedApplications.pdf

2018 CA HSP awarded:https://www.cdfa.ca.gov/oefi/healthysoils/docs/2018-HSPIncentives-SelectedProjects.pdf

Appendix III. Conservation Stewardship Program

1. **Basic Program Information:**
   - **Program name:** Conservation Stewardship Program (CSP)
   - **Program location:** United States (National)[82]
   - **Year founded:** Began as the Conservation Security Program in the 2002 Farm Bill, evolved into CSP in 2008 when it first became available in all states and counties every year.[83] The program's continuation depends on reauthorization in each new farm bill—so far, it has been reauthorized in 2014 and 2018.[84]
   - **Size of program (# of farms, landowners, etc.):** 4,922 active contracts [2020][85],
   - **Acreage of program**: 6,426,631.8 acres on active contracts[86]
   - **Minimum acreage required**: No minimum[87]
   - **Program administrator:** Natural Resource Conservation Service (NRCS)[88]
   - **Targeted participants**: Agricultural and forest producers looking to increase conservation actions on their land.[89]
   - **Prerequisites for enrollment**:[90]
     - Enrolled land must be private agricultural land, agricultural Indian land, nonindustrial private forest land, farmstead, associated agricultural land or public land controlled by the applicant and part of their operation.
     - No minimum acreage requirement, but an entire operation is enrolled into the program, not specific fields.
     - "All land must be in compliance with USDA highly erodible land and wetland conservation provisions to be eligible for CSP."
     - Applicants must currently be meetings or exceeding the 'stewardship threshold'[91] for at least two priority resource concerns.
     - Applicants must have a Farm number registered with the FSA.
     - CSP is limited to farmers with less than $900,000 annual adjusted gross income.
   - **Required data sharing**: Geospatial data during application[92]
   - **Budget (overall, annual, etc.):** Between $700 million and $1 billion authorized each year for new enrollments (total funding available in 2021, for new and existing enrollments, equals $1,697,000,000).[93]
   - **Funding source/who pays:** Mandatory funding authorized through the Farm Bill.[94]
   - **Duration of program:** 5 year contract.[95]

---

[82] NSAC, "Farmers' Guide to the Conservation Stewardship Program; November 2020 edition," 8 (2020), https://sustainableagriculture.net/wp-content/uploads/2020/11/CSP-2020-draft3-interactive-1-1.pdf. [*hereafter* NSAC Guide]
[83] *Id.* at 5
[84] *Id.*
[85] NRCS, "NRCS Conservation Programs: Conservation Stewardship Program," (updated 2-24-21; accessed 10-29-21), https://www.nrcs.usda.gov/Internet/NRCS_RCA/reports/fb08_cp_cstp.html. [*hereafter* NRCS]
[86] *Id.*
[87] USDA, "Conservation Stewardship Program: Is CSP Right for Me?" 2 (July 2021).
[88] NSAC, "Conservation Stewardship Program," (updated April 2019; access 10-29-21), https://sustainableagriculture.net/publications/grassrootsguide/conservation-environment/conservation-stewardship-program/. [*hereafter* NSAC CSP]
[89] *see* NSAC Guide at 8.
[90] *Id.* at 8-9.
[91] *Id.* at 19: "*Stewardship thresholds are science-based metrics that establish a sustainable use level for a particular natural resource. Meeting or exceeding the threshold means that you are satisfactorily addressing the resource concern*."
[92] *Id.* at 13.
[93] *see* NSAC CSP
[94] Congressional Research Service, "FY2021 Appropriations for Agricultural Conservation," 7 (3/19/2021), https://www.everycrsreport.com/reports/R46728.html.
[95] *see* NSAC Guide at 6.

Appendix III. Conservation Stewardship Program

1. **Basic Program Information (cont'd):**
   - **Goal/expected outcome(s):** "CSP provides financial assistance for conservation activities that improve soil health, sequester carbon, reduce greenhouse gas emissions, slow erosion, improve water and air quality, increase biodiversity, support wildlife and pollinator habitat, and conserve water and energy."[96]
   - **Specific conservation practices mentioned/measured**: Wide-ranging and dependent on contract. *See* "CSP FY 2021 Enhancements and Bundles" *for more information.*[97]
   - **Ecosystem services measured:** Varies by contract. *See* "CSP FY 2021 Enhancements and Bundles" *for more information.*[98]
   - **Method of ecosystem services measurement**: Reporting/ verification that practices were implemented.[99]
   - **Practice or performance**: Practice[100]
   - **What is paid for**: verified implementation of practices as specified by the conservation plan.[101]
   - **Payment (cost) per unit of service**: Payments vary by state and are allocated on a per acre basis; NRCS pays a minimum $1,500 per year and a maximum of $40,000 per year ($200,000 over a 5 year contract).[102]
   - **Payment mechanism**: Payment amount = (Number of acres enrolled x per acre payment rate by land use) + (Number of resource concerns met x Payment per resource concern) + (Number of acres treated x Enhancement payment rate)[103]
   - **Average payment**: National: 1,319 acres, $15,477; Northeast: 767 acres, $8,556[104]

2. **History/Brief Overview**

   CSP's main objective is to provide technical and financial assistance to reward farmers and ranchers for ongoing conservation efforts and incentive additional conservation enhancements.[105]

   CSP began in the 2002 Farm Bill as the Conservation Security Program and changed to its current name when it was reauthorized in the 2008 Bill.[106] The program underwent significant changes in the 2018 Bill when it transitioned from and acreage-based program to a payment-based program, meaning that the USDA was capped on the amount spent rather than the acreage enrolled.[107] Additionally, participants were no longer guaranteed re-enrollment after the end of a 5 year contract.[108] The 2018 Bill also cut the program's funding to instead bolster other programs, and this change made CSP more competitive.[109]

---

[96] *Id.* at 4.
[97] USDA, "CSP FY 2021 Enhancements and Bundles," (accessed 10-21-29), https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/financial/csp/?cid=nrcseprd1708431.
[98] *Id.*
[99] *see* NSAC Guide at 38-39.
[100] USDA, "CSP—Learn More," (accessed 10-29-21), https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/programs/financial/csp/?cid=nrcseprd1288524.
[101] *see* NSAC Guide 14-15.
[102] USDA, "CSP Payments," (accessed 10-29-21), https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/programs/financial/csp/?cid=nrcseprd1297344.
[103] *see* NSAC Guide 30-31.
[104] *Id.* at 49
[105] *Id.* at 6.
[106] National Association of Conservation Districts, "2018 Farm Bill Breakdown: Conservation Stewardship Program," (01/15/2019; accessed 11/22/2021), https://www.nacdnet.org/2019/01/15/2018-farm-bill-breakdown-conservation-stewardship-program/.
[107] *Id.*
[108] *Id.*
[109] *Id.*

3. Program Process

Details of application, prerequisites, baseline assessments, objectives, payment calculation, etc.

i. Pre-implementation of project/funding[110]

Participants apply through their local NRCS office. The participant's application is then ranked through the Conservation Application Ranking Tool (CART), which selects farms based current resource conditions, which are given point values determined by information gathered through geospatial analysis data of soil and landscape features, current practices reported by the farmer, and on-site observation by a local conservationist.

Each condition's point score is compared with its stewardship threshold, following which the participant identifies the best conservation practices to implement. The combined information ranks the farm and compares it to others and determines how much funding the farmer will receive if accepted.

ii. Details of actions by participants/funder for monitoring, reporting, & payment process.[111]

If application is approved, an NRCS representative works with the farmer to develop a conservation plan. The farmer is then responsible for implementing the various enhancements detailed in the plan, and for reporting on those implementations each year.

Reporting requirements are different for each conservation activity. Below is a hypothetical example of a contract process for a soil health rotation:

- The farmer provides NRCS with current and planned crop rotations
- While implementing the conservation plan, the farmer notifies NRCS of any changes and keeps records of management, including dated pictures at least once every three months to record progress.
- The farmer reports review pictures and records to NRCS annually.
- Payments are delivered each October, contingent on successful reporting.

4. Concerns/Issues

Unlike a proper PES program, which would pay for the value of services produced, CSP operates through an 'income-foregone framework' that focuses payments on compensating farmers for profits lost for pursuing conservation practices.[112] Limited funding makes the program highly competitive and limits the extent of its impact.[113] Furthermore, the program's ranking system selects for the greatest return on investment which is often received from farms with more degraded land and ranks farms with fewer resource concerns lower.[114]

---

[110] *see* NSAC Guide at 12-13.
[111] *Id.* at 38.
[112] Gordon Merrick, "A Lens for Analysis of Payment for Ecosystem Services Systems: Transitioning the Working Lands Economic Sector from Extractive Industry to Regenerative System," *Land* 646 (2021), https://doi.org/10.3390/land10060637.
[113] Lindsay Campbell, "Conservation Stewardship Program is Falling Short, Say Critics," Modern Farmer, (March 15, 2020), https://modernfarmer.com/2020/03/conservation-stewardship-program-is-falling-short-say-critics/.
[114] *Id.*

Appendix IV: Carbon Forest Project (FCP)

1.1 Basic Program Information

- **Location**: Seven Vermont towns (Bakersfield, Belvidere, Enosburgh, Fletcher, Montgomery, Richford, and Waterville). CHC encompasses nearly 170,000 acres.[115]
- **Year founded**: Founded in 2009. 2008 (year community had first meeting to identify important forest areas. [116] CHC became incorporated in 2011.[117] In 2013, the Cold Hollow to Canada Regional Conservation Partnership volunteer group was established as a non-profit.[118] In 2019, the Vermont Forest Carbon Company (VFC), a third party subsidiary of VLT was formed.[119]
- **Program Administrator**: Cold Hollow to Canada and The Vermont Land Trust (VLT) are the lead administrating organizations. The FCP may also be referred toa s the Carbon Aggregation Project. CHC acts as convener agent for FCP. Third party measures and verifies results.[120] The Carbon Aggregation Project pools the forested acres of multiple landowners together to put on the carbon market.[121] "VFC purchases carbon credits from individual forestland owners, pools and sells the credits as a single project, and then compensates the forestland owners generating the credits. In this model, VLT took some of the credit share to cover the cost of risk. Landowners would therefore receive a lower price per credit in exchange for the lower risk."[122] This program is helpful because the economics to set-up carbon offsets works well for parcels of 5,000 acres, but the burden of market entry may be too great for more typical Vermont parcels of 500 acres or less.[123]
- **Program mission statement**: Our mission is to maintain ecosystem integrity, biological diversity, and forest resiliency throughout the Cold Hollow to Canada region, with a focus on community-led stewardship and the conservation of our working landscape in the face of a changing climate.[124]
- **Partners**: The Vermont Land Trust to help coordinate easements. Intentions to increase collaboration with, the Forest Legacy Program, and Northeast Wilderness Trust in order to leverage funds and hold easements for the permanent protection of forestland.[125]CHC partners with local communities to develop forest management plans and in some cases helps set-up conservation funds (like in Enosburgh and Montgomery) to leverage with CHC funds for

---

[115] CHC. 2021-2025 Strategic Plan. 2021 https://www.coldhollowtocanada.org/about/strategic-plan#c302 Accessed: October 30,2021.
[116] *Id.*
[117] opencorporates. Cold Hollow to Canada Incorporated. 2021. https://opencorporates.com/companies/us_vt/0091728 Accessed 30.10.2021
[118] Macleod, Kavita. "Cold Hollow Carbon: A Vermont Forest Carbon Cooperative for Climate Change Mitigation." Case Profile Series on Land Trusts as Climate Change Solution Providers. January 2021. https://www.coldhollowtocanada.org/fileadmin/files/Case_Profile_Cold_Hollow_Carbon_VT_03_24_21_.pdf Accessed: October 30,2021.
[119] *Id.*
[120] Hancock, Charlie. "Forest Carbon: A Natural Climate Solution and Tool for Advancing the Pace of Conservation." News and Events. Cold Hollow to Canada. July 6, 2020. https://www.coldhollowtocanada.org/what/news/article/forest-carbon-a-natural-climate-solution-and-tool-for-advancing-the-pace-of-conservation Accessed: October 30,2021.
[121] CHC. 2021-2025 Strategic Plan. 2021 https://www.coldhollowtocanada.org/about/strategic-plan#c302 Accessed: October 30,2021.
[122] Macleod, Kavita. "Cold Hollow Carbon: A Vermont Forest Carbon Cooperative for Climate Change Mitigation." Case Profile Series on Land Trusts as Climate Change Solution Providers. January 2021. https://www.coldhollowtocanada.org/fileadmin/files/Case_Profile_Cold_Hollow_Carbon_VT_03_24_21_.pdf Accessed: October 30,2021.
[123] CHC. 2021-2025 Strategic Plan. 2021 https://www.coldhollowtocanada.org/about/strategic-plan#c302 Accessed: October 30,2021.
[124] *Id.*
[125] *Id.*

Appendix IV: Carbon Forest Project (FCP)

1.1 Basic Program Information (cont'd)

- **Partners (cont'd)**:
  bigger impact.[126] CHC partners with Vermont Fish & Wildlife Department for the WildCam project where seven game cameras are set up to film, track, and monitor wildlife as wildlife is an indicator of the health of the forest.[127] For full list, see end of Appendix B.
- **Size of program**: There are 8,625 acres enrolled across 12 parcels and 10 landowners.[128] Current FCP is a pilot and is no longer accepting applications.[129]

1.2 General Program Details

- **Program target participants**: Forest owners within the seven towns for CHC and pilot FCP.
- **Prerequisites for enrollment**: Participants must meet American Carbon Registry standards [130] For the Conservation Fund (up to $10,000 to landowners for conservation transaction costs) requires a minimum of 60% forest cover on a minimum of 50 acres in one of the seven towns in a priority area (plus more).[131] The SIG Carbon group "will take on all risk and cover all upfront development costs. A monitoring fund will cover costs through the lifetime of the project, eliminating surprise expenses."[132] "Current use tax policies do not preclude carbon offset eligibility." [133] Those enrolled in VT Current Use, Forest Legacy, EQIP, Sustainable Forestry Initiative (SFI), Forest Stewardship Council (FSC), or American Tree Farm are eligible and conservation easement on forestland should not restrict eligibility.[134] Minimum acreage required for feasibility study is 500 acres, 450 of which must be forested [135]
- **Required data**: It is not clear if there is more than granting land access for forest for inventory and assessments.

---

[126] CHC. 2021-2025 Strategic Plan. 2021 https://www.coldhollowtocanada.org/about/strategic-plan#c302 Accessed: October 30,2021.
[127] *Id.*
[128] CHC. "Forest Carbon Aggregation." Programs. 2021. https://www.coldhollowtocanada.org/programs/carbon Accessed: October 30,2021.
[129] *Id.*
[130] Hancock, Charlie. "Forest Carbon: A Natural Climate Solution and Tool for Advancing the Pace of Conservation." News and Events. Cold Hollow to Canada. July 6, 2020. https://www.coldhollowtocanada.org/what/news/article/forest-carbon-a-natural-climate-solution-and-tool-for-advancing-the-pace-of-conservation Accessed: October 30,2021.
[131] CHC. "Conservation Fund." Programs. 2021. https://www.coldhollowtocanada.org/programs/conservation-fund Accessed: October 30,2021.
[132] SIG Carbon. "SIG Carbon Aggregation Program." Aggregation. 2021.https://www.sigcarbon.com/scap Accessed: October 30,2021.
[133] Macleod, Kavita. "Cold Hollow Carbon: A Vermont Forest Carbon Cooperative for Climate Change Mitigation." Case Profile Series on Land Trusts as Climate Change Solution Providers. January 2021. https://www.coldhollowtocanada.org/fileadmin/files/Case_Profile_Cold_Hollow_Carbon_VT_03_24_21_.pdf Accessed: October 30,2021.
[134] Kosiba, AM. "Forest Carbon Markets for Vermont Landowners." Vermont Department of Forests, Parks and Recreation. 2021. https://fpr.vermont.gov/sites/fpr/files/Forest_and_Forestry/Climate_Change/Files/ForestCarbonOffsetsForVermontLandowners_Mar2021.pdf Accessed: October 30,2021.
[135] Macleod, Kavita. "Cold Hollow Carbon: A Vermont Forest Carbon Cooperative for Climate Change Mitigation." Case Profile Series on Land Trusts as Climate Change Solution Providers. January 2021. https://www.coldhollowtocanada.org/fileadmin/files/Case_Profile_Cold_Hollow_Carbon_VT_03_24_21_.pdf Accessed: October 30,2021.

1.2 General Program Details (cont'd)

- **Length of contract**: Per American Carbon Registry standards, the duration is 40 years for Carbon Aggregation Project.[136] Price range in the Carbon Aggregation Project is projected for the first 10 years.[137] The agreement is connected with the land and is "binding on any transfer of ownership of the property."[138]
- **Budget**: The FCP is a pilot project and it looks like funds were awarded amounting to $795,000 to implement the program.[139] "CHC project is funded by grant money that created a starting pool of resources and will be replenished by VLT's share of the credit purchases, which will in turn be used to develop other projects. This differs from other carbon offset projects that are funded by the sale of credits to either a landowner or to a private carbon development company, depending on which one assumes the transaction costs, In other words, instead of landowners or a private company paying for the transaction costs associated with developing a forest carbon project, VLT, a land trust, maintains a revolving fund that covers transaction costs in exchange for credits that replenish the fund and allow it to finance additional projects."[140]
- **Funding source**: CHC which supports FCP is funded by a variety of organizations: Farnsworth Fund, The High Meadows Fund, Jessie B. Cox Charitable Trust, Lintilhac Foundation, Natural Resources Conservation Service, The Nature Conservancy, US Forest Service, Vermont Agency of Natural Resources, Vermont Land Trust, Vermont Natural Resource Council.[141] Donations are also accepted e.g. Switchback donated 5% of taproom sales on March 5, 2020)[142]
- **Payment mechanism**: Carbon credit market. Amazon has committed $10 million to restore and conserve four million acres of forest in the Appalachians in partnership with The Nature Conservancy.[143,144]. Of the $10 million, $2.5 million worth of carbon credits through the Carbon Aggregation Project.[145] Another purchaser is Gratitude Railroad (CIG Carbon, 2021).

---

[136] Hancock, Charlie. "Forest Carbon: A Natural Climate Solution and Tool for Advancing the Pace of Conservation." News and Events. Cold Hollow to Canada. July 6, 2020. https://www.coldhollowtocanada.org/what/news/article/forest-carbon-a-natural-climate-solution-and-tool-for-advancing-the-pace-of-conservation Accessed: October 30,2021.
[137] SIG Carbon. "LandTrusts Vermont Land Trust Aggregation Project." Projects. 2021.https://www.sigcarbon.com/case-study/cold-hollow-to-canada-carbon-cooperative-vernmont-land-trustAccessed 30.10.2021.
[138] Macleod, Kavita. "Cold Hollow Carbon: A Vermont Forest Carbon Cooperative for Climate Change Mitigation." Case Profile Series on Land Trusts as Climate Change Solution Providers. January 2021. https://www.coldhollowtocanada.org/fileadmin/files/Case_Profile_Cold_Hollow_Carbon_VT_03_24_21_.pdf Accessed 31.10.2021
[139] CHC. "Our Vision."2018. http://www.wildlandsandwoodlands.org/sites/default/files/B4.%20Hancock%20%20RCPNG%202018.pdf Accessed 31.10.2021.
[140] Macleod, Kavita. "Cold Hollow Carbon: A Vermont Forest Carbon Cooperative for Climate Change Mitigation." Case Profile Series on Land Trusts as Climate Change Solution Providers. January 2021. https://www.coldhollowtocanada.org/fileadmin/files/Case_Profile_Cold_Hollow_Carbon_VT_03_24_21_.pdf Accessed 31.10.2021
[141] CHC. 2021-2025 Strategic Plan. 2021 https://www.coldhollowtocanada.org/about/strategic-plan#c302 Accessed 30.10.2021
[142] Switchback, "Switchback Gives Back to Cold Hollow to Canada." Events. 2020. https://www.switchbackvt.com/calendar/2020/3/5/switchback-gives-back-to-cold-hollow-to-canada Accessed 30.10.2021.
[143] Hancock, Charlie. "Forest Carbon: A Natural Climate Solution and Tool for Advancing the Pace of Conservation." News and Events. Cold Hollow to Canada. July 6, 2020. https://www.coldhollowtocanada.org/what/news/article/forest-carbon-a-natural-climate-solution-and-tool-for-advancing-the-pace-of-conservation Accessed: October 30,2021.
[144] Amazon. "As Part of Its Plan to be Net Zero Carbon by 2040, Amazon Commits $10 Million to Restore and Conserve 4 Million Acres of Forest in the Appalachians and other U.S. Regions in Partnership with The Nature Conservancy." Press Release. Amazon Press Center. April 21, 2020. https://press.aboutamazon.com/news-releases/news-release-details/part-its-plan-be-net-zero-carbon-2040-amazon-commits-10-million Accessed: October 30,2021.
[145] CHC. "Forest Carbon Aggregation." Programs. 2021. https://www.coldhollowtocanada.org/programs/carbon Accessed: October 30,2021.

1.2 General Program Details (cont'd)

- **Payment mechanism (cont'd)**:
  Vermont Gas System (VGS) announced its partnership with Vermont Land Trust to purchase carbon credits through the Forest Carbon Cooperative.[146]
  It is not clear if this is a part of CHC Carbon Aggregation Project, but VGS lists CHC as one of the contributing partners and the Forest Carbon Cooperative has similar farm and acres numbers as the Carbon Aggregation Project.[147,148] Members of VLT purchased credits to offset personal emissions.[149]
- **Goal/expected outcome**(s): "Vision: A resilient and connected ecosystem across the entire Northern Forest that is supported through permanent protection, sustainable stewardship, and engaged local communities.[150] Conserve another 23,000 acre by 2030 (double the amount conserved when CHC started).[151]
  - "Increased carbon sequestration by the acres of forest enrolled in such efforts;
  - Income for landowners over 20 years to pay for enhanced forest management practices;
  - Healthier forests, cleaner water, and reduced damage from future floods;
  - A greater diversity of plants and animals, and healthier wildlife habitat;
  - Continued timber harvests and maple sugaring;
  - Potential reduction of summer heat island effects in the nearby towns and cities; and long-term protection of the Northern Forest, and the more general environmental and economic values it provides."[152]

  Net revenue of the Forest Carbon Project is expected to reach $3.5 million over 10 years.[153]
- **Accepted conservation practices**: Woodlots Program conducts a forest management climate change analysis and an interior songbird habitat assessment.[154] The FCP helps landowners sell carbon offset credits.[155] To sequester carbon, landowners can engage in a number of practices, reduced timber harvest, allowing trees to grow older, extended rotations restoring wetlands, etc.[156]

---

[146] Johnson, Corey. "VGS Announces Partnership with Vermont Land Trust to Offset Vehicle Emissions and Support Sustainable Forest Management." General. April 22, 2021. https://www.vermontgas.com/vgs-announces-partnership-with-vermont-land-trust-to-offset-vehicle-emissions-and-support-sustainable-forest-management/ Accessed: October 30,2021.
[147] *Id.*
[148] Vermont Land Trust. "Forests that Reduce Carbon Pollution." 2021. https://vlt.org/forestcarbon Accessed: October 30,2021.
[149] Macleod, Kavita. "Cold Hollow Carbon: A Vermont Forest Carbon Cooperative for Climate Change Mitigation." Case Profile Series on Land Trusts as Climate Change Solution Providers. January 2021. https://www.coldhollowtocanada.org/fileadmin/files/Case_Profile_Cold_Hollow_Carbon_VT_03_24_21_.pdf Accessed: October 30,2021.
[150] CHC. 2021-2025 Strategic Plan. 2021 https://www.coldhollowtocanada.org/about/strategic-plan#c302 Accessed: October 30,2021.
[151] *Id.*
[152] Macleod, Kavita. "Cold Hollow Carbon: A Vermont Forest Carbon Cooperative for Climate Change Mitigation." Case Profile Series on Land Trusts as Climate Change Solution Providers. January 2021. https://www.coldhollowtocanada.org/fileadmin/files/Case_Profile_Cold_Hollow_Carbon_VT_03_24_21_.pdf Accessed: October 30,2021.
[153] *Id.*
[154] CHC. 2021-2025 Strategic Plan. 2021 https://www.coldhollowtocanada.org/about/strategic-plan#c302 Accessed: October 30,2021.
[155] *Id.*
[156] Macleod, Kavita. "Cold Hollow Carbon: A Vermont Forest Carbon Cooperative for Climate Change Mitigation." Case Profile Series on Land Trusts as Climate Change Solution Providers. January 2021. https://www.coldhollowtocanada.org/fileadmin/files/Case_Profile_Cold_Hollow_Carbon_VT_03_24_21_.pdf Accessed: October 30,2021.

1.2 General Program Details (cont'd)

- **Ecosystem services measured**: Carbon sequestration, plant and animal diversity, plant structure diversity.[157]
- **Method of ecosystem services measurement**: Verification methods not provided in detail. It appears SIG or other group conducts inventory and provides management plans to meet management and carbon sequestration goals.

1.3 Payment Details

- **Practice or performance**: Performance (based on inventory, verification, and modeling).
- **Ecosystem services paid**: Carbon sequestration.[158]
- **Baseline or threshold**: Both. The initial inventory is compared to a regional average. Payments for the length of the contract are based on the initial inventory baseline and the regional average threshold. If the landowners sequester more carbon above the initial inventory baseline they are compensated for that additionality.[159]
- **Average Payment**: Landowners can expect to receive $25-47 per acre per year.[160] Carbon payment based on market prices. For the Forest Carbon Cooperative, and average of $282 per acre will be paid to landowners, in addition to income from timber and sugaring.[161] This may be over the life of the 40-year contract which would be an average payment of $7.05/acre/year.
- **Other payments to producers**: CHC can eliminate or minimize the costs of donating an easement. These costs can range from $11,000-15,000 for legal fees and baseline documentation.[162] In some cases, CHC can purchase easements at bargain sale prices.[163]

2. Program History

Vermont forests contribute $57.3 million dollars and 23,500 jobs through logging (and logging related enterprises), recreation, and sugaring.[164] More than 2/3 of Vermont forests are privately owned.[165] Only 20% of Vermont forests are conserved.[166] Vermont is losing forest cover for the first time since the mid 1800's.[167] CHC helps facilitate landowner entry into global carbon markets through the nation's first aggregated carbon offset project.[168] In 2017, VLT commissioned a Vermont forest carbon program

---

[157] CHC. 2021-2025 Strategic Plan. 2021 https://www.coldhollowtocanada.org/about/strategic-plan#c302 Accessed: October 30, 2021.
[158] *Id.*
[159] Macleod, Kavita. "Cold Hollow Carbon: A Vermont Forest Carbon Cooperative for Climate Change Mitigation." Case Profile Series on Land Trusts as Climate Change Solution Providers. January 2021. https://www.coldhollowtocanada.org/fileadmin/files/Case_Profile_Cold_Hollow_Carbon_VT_03_24_21_.pdf Accessed: October 30, 2021.
[160] SIG Carbon. "LandTrusts Vermont Land Trust Aggregation Project." Projects. 2021.https://www.sigcarbon.com/case-study/cold-hollow-to-canada-carbon-cooperative-vernmont-land-trust Accessed: October 30,2021.
[161] Macleod, Kavita. "Cold Hollow Carbon: A Vermont Forest Carbon Cooperative for Climate Change Mitigation." Case Profile Series on Land Trusts as Climate Change Solution Providers. January 2021. https://www.coldhollowtocanada.org/fileadmin/files/Case_Profile_Cold_Hollow_Carbon_VT_03_24_21_.pdf Accessed: October 30, 2021.
[162] CHC. 2021-2025 Strategic Plan. 2021 https://www.coldhollowtocanada.org/about/strategic-plan#c302 Accessed: October 30, 2021.
[163] *Id.*
[164] *Id.*
[165] *Id.*
[166] *Id.*
[167] *Id.*
[168] *Id.*

2. **Program History (cont'd)**

feasibility study from UVM's Carbon Dynamic's Lab.[169] In 2017, CHC received a $640,000 award from NRCS for forest management.[170] The goal of this award was to expand enrolled acres from 2,000 to 8,000 and increase the number of land owners from 10 to 50, and increase number of town from Enosburg to Montgomery and Richford.[171] CHC has also received $105,000 from the Conservation Fund and $50,000 from LSR.[172] In 2018, Vermont Land Trust received funding from Meadows Fund and the Vermont Housing and Conservation Board to conduct a study on the feasibility of a carbon credit market Vermont landowners could participate in.[173]

3. **Program Process**

- **Project application process**:
  The Woodlots Program begins with CHC connecting landowners with contiguous or near-contiguous forested properties to coordinate management activities at a landscape scale.[174] This is a peer-to-peer model.[175]
  For the Forest Carbon Company, two contracts are created, one with the landowners and VFC and the landowners and another one amongst the landowners.[176]
- **Project implementation**
  Identify willing landowners, in the case of the Carbon Aggregation project, this was confined to landowners working with CHC.[177]. Then, conduct feasibility assessment, followed by two years of outreach to landowners.[178] A guide was developed "…on techniques for managing carbon stocks that was not prescriptive but allowed landowners to understand the general bounds of what they could do for project eligibility."[179] Education was not only targeted at landowners, but also County Foresters, "County foresters are crucial because they can facilitate folding carbon projects into the state's Current Use Value Appraisal program."[180] "VFC has been structured to support all stages of forest carbon program development, from providing upfront financing to forestland

[169] White, Abby. "A Local Solution with a Global Impact: Carbon offsets protect woodland and rural livelihoods." News and Stories. Vermont Land Trust. 2021. https://vlt.org/forests-wildlife-nature/local-solution-global-impact-forest-carbon Accessed: October 31, 2021.
[170] CHC. 2021-2025 Strategic Plan. 2021 https://www.coldhollowtocanada.org/about/strategic-plan#c302 Accessed: October 30, 2021.
[171] Overstreet, Amy and Bridgett Butler. "USDA to Invest $640,000 in Vermont's "Cold Hollow to Canada" Conservation Partnership to Enhance Private Forest Management." News Release. Vermont NRCS. https://www.coldhollowtocanada.org/press Accessed: October 30, 2021.
[172] CHC. "Our Vision."2018. http://www.wildlandsandwoodlands.org/sites/default/files/B4.%20Hancock%20%20RCPNG%202018.pdf Accessed: October 30, 2021.
[173] Hancock, Charlie. "Forest Carbon: A Natural Climate Solution and Tool for Advancing the Pace of Conservation." News and Events. Cold Hollow to Canada. July 6, 2020. https://www.coldhollowtocanada.org/what/news/article/forest-carbon-a-natural-climate-solution-and-tool-for-advancing-the-pace-of-conservation Accessed: October 30, 2021.
[174] CHC. 2021-2025 Strategic Plan. 2021 https://www.coldhollowtocanada.org/about/strategic-plan#c302 Accessed: October 30, 2021.
[175] *Id.*
[176] Macleod, Kavita. "Cold Hollow Carbon: A Vermont Forest Carbon Cooperative for Climate Change Mitigation." Case Profile Series on Land Trusts as Climate Change Solution Providers. January 2021. https://www.coldhollowtocanada.org/fileadmin/files/Case_Profile_Cold_Hollow_Carbon_VT_03_24_21_.pdf Accessed: October 31, 2021.
[177] *Id.*
[178] *Id.*
[179] *Id.*
[180] *Id.*

3. **Program Process (cont'd)**
   - **Project implementation (cont'd)**
     owners, to reviewing forest management plans, to supporting project development, to marketing and selling credits."[181]
   - **Monitoring, reporting, payment process**
     For the Carbon Aggregation Project, participants must manage their forests to maintain and increase carbon stock.[182] "The number of credits is calculated by experienced forestry experts who use field-based measurements and other sources to estimate the amount of carbon that can be sequestered by a specific forest landholding in excess of the established baseline. For both the compliance and voluntary markets, carbon credits are generated following established protocols and listed in registries; the Vermont Forest Carbon Company has used the American Carbon Registry (ACR).[183] Currently the project is in its initial implementation stages. "Forestland owner agreements were signed in Spring 2020, and while credits will not be formalized for release until Winter 2021, verification has been completed and the project has commitments for credit purchase from multiple buyers…"[184] For the FCP, SIG Carbon provides framework for cost-sharing and legal aggregation, provides forest yield growth modeling, carbon quantification services, carbon storage potential analysis, and project management (inventory design, quality assurance, contracting, project documentation, and on-site verification process).[185]
   - **Post-project review and evaluation**
     The CHC pilot project was determined a success, "This proof-of-concept project has demonstrated that aggregated carbon arrangements can, in an economic and efficient manner, connect forestland owners to carbon offset markets in areas where smaller, private forestland holdings predominate. It has also demonstrated that land trusts and their special purpose subsidiaries can be appropriate homes for aggregated carbon offset projects."[186]

     Building trust among landowners and organizations involved takes time.[187] Although the 40-year contract is less than the 100 year California Air Resources Board (CARB) contracts, the length of time is a barrier.[188] The contracts are with landowners who are already on the path to conserving.[189] Help entering different landowners is one of the next steps. The Land Trust

[181] Macleod, Kavita. "Cold Hollow Carbon: A Vermont Forest Carbon Cooperative for Climate Change Mitigation." Case Profile Series on Land Trusts as Climate Change Solution Providers. January 2021. https://www.coldhollowtocanada.org/fileadmin/files/Case_Profile_Cold_Hollow_Carbon_VT_03_24_21_.pdf Accessed 31.10.2021
[182] CHC. "Forest Carbon Aggregation." Programs. 2021. https://www.coldhollowtocanada.org/programs/carbon Accessed 30.10.2021.
[183] Macleod, Kavita. "Cold Hollow Carbon: A Vermont Forest Carbon Cooperative for Climate Change Mitigation." Case Profile Series on Land Trusts as Climate Change Solution Providers. January 2021. https://www.coldhollowtocanada.org/fileadmin/files/Case_Profile_Cold_Hollow_Carbon_VT_03_24_21_.pdf Accessed 31.10.2021
[184] Macleod, Kavita. "Cold Hollow Carbon: A Vermont Forest Carbon Cooperative for Climate Change Mitigation." Case Profile Series on Land Trusts as Climate Change Solution Providers. January 2021. https://www.coldhollowtocanada.org/fileadmin/files/Case_Profile_Cold_Hollow_Carbon_VT_03_24_21_.pdf Accessed 31.10.2021
[185] SIG Carbon. "LandTrusts Vermont Land Trust Aggregation Project." Projects. 2021.https://www.sigcarbon.com/case-study/cold-hollow-to-canada-carbon-cooperative-vernmont-land-trustAccessed 30.10.2021.
[186] Macleod, Kavita. "Cold Hollow Carbon: A Vermont Forest Carbon Cooperative for Climate Change Mitigation." Case Profile Series on Land Trusts as Climate Change Solution Providers. January 2021. https://www.coldhollowtocanada.org/fileadmin/files/Case_Profile_Cold_Hollow_Carbon_VT_03_24_21_.pdf Accessed 31.10.2021
[187] *Id.*
[188] *Id.*
[189] *Id.*

3. **Program Process (cont'd)**
   - **Post-project review and evaluation (cont'd)**
     Alliance, Finite Carbon, and The Climate Trust have partnered in a new 5- year pilot project to "pool Land trust resources for the voluntary carbon market. Under this partnership, Finite Carbon will support land trusts with their forestlands and The Climate Trust will support purchasing no-till grassland easements for the carbon market."[190] Lessons learned from the Forest Carbon project will be used for the Wild Carbon Initiative project which will encompass nearly 10,000 acres in the Northeast.[191]

4. **Concerns/Issues**
   Methods of enrollment and verification are not easily publicly accessible. This may be because it is a pilot project. Program goes by multiple names: Carbon Aggregation Project (CHC) and Forest Carbon Project (VLT). It is unclear if program pays only for additionality, i.e. "maintain and increase" language, not maintain or increase. However, in the CHC case study, credits are determined against the baseline of the current inventory.[192] The carbon credits are sold against a baseline (Patch, personal communication). The pilot project was conducted with participants whose existing management plans closely aligned with practices that manage forests for carbon sequestration.[193] New markets are developing which may preclude the necessity of large parcels for a landowner to engage in the carbon market (e.g. the TNC's Family Forest Carbon Program and Finite's Core Carbon).[194] The proposed federal legislation, Rural Market's Act would provide funding for a part of the proposed Growing Climate Solutions Act that would, "USDA certification for carbon experts, developers, and third-party verifiers and an online marketplace for buyers and sellers."[195] See Kosiba (2021) for table of forest carbon developers, programs, minimum acreage, and contract length.[196]

---

[190] *Id.*
[191] *Id.*
[192] Macleod, Kavita. "Cold Hollow Carbon: A Vermont Forest Carbon Cooperative for Climate Change Mitigation." Case Profile Series on Land Trusts as Climate Change Solution Providers. January 2021. https://www.coldhollowtocanada.org/fileadmin/files/Case_Profile_Cold_Hollow_Carbon_VT_03_24_21_.pdf Accessed: October 31, 2021.
[193] *Id.*
[194] Kosiba, AM. "Forest Carbon Markets for Vermont Landowners." Vermont Department of Forests, Parks and Recreation. 2021. https://fpr.vermont.gov/sites/fpr/files/Forest_and_Forestry/Climate_Change/Files/ForestCarbonOffsetsForVermontLandowners_Mar2021.pdf Accessed: January 11, 2021.
[195] *Id.*
[196] I*d.*

Appendix IV: Carbon Forest Project (FCP)

List of partners:

- 2 Countries, 1 Forest
- Audubon Vermont
- The Nature Conservancy
- The Staying Connected Initiative
- The Trust for Public Land
- University of Vermont
- Vermont Department of Forests, Parks, & Recreation
- Vermont Fish & Wildlife Department
- Vermont Land Trust
- Vermont Natural Resource Council
- Wildlands Network[197]
- List of Additional Collaborators:
- Appalachian Corridor Appalachien
- Champlain Adirondack Biosphere Network
- Keeping Track
- Missisquoi River Basin Association
- Northeast Wilderness Trust
- Northern Forest Canoe Trail
- Ruiter Valley Land Trust
- Vermont Wild and Scenic Rivers[198]
- The Carbon Aggregation Project was made possible through collaboration with:
- Vermont Housing and Conservation Board
- Land Trust Alliance
- Cotyledon Fund
- High Meadows Fund[199]
- Woodlots Program is fund in part through a grant awarded by:
  Northeastern Area State and Private Forestry, U.S. Forest Service and by the High Meadows Fund.[200]
- Forest Carbon Project (VLT, offshoot of Carbon Aggregation Project)
- Vermont Land Trust
- University of Vermont
- Spatial Informatics Group (SIG) (carbon quantification and verification)
- Green Timber conducted inventory assessment
- Cold Hollow to Canada Regional Conservation Partnership
- The Nature Conservancy (farmer-market connector and funding provider)
- Through a Natural Climate Solutions Accelerator Grand funded by the Duke Foundation
- High Meadows Fund (funding)
- Vermont Housing and Conservation Board (funding)
- Lyme Timber Company (financial guidance)
- Finite Carbon (financial guidance)[201]

---

[197] CHC. 2021-2025 Strategic Plan. 2021 https://www.coldhollowtocanada.org/about/strategic-plan#c302 Accessed: October 30, 2021.
[198] *Id.*
[199] Hancock, Charlie. "Forest Carbon: A Natural Climate Solution and Tool for Advancing the Pace of Conservation." News and Events. Cold Hollow to Canada. July 6, 2020. https://www.coldhollowtocanada.org/what/news/article/forest-carbon-a-natural-climate-solution-and-tool-for-advancing-the-pace-of-conservation Accessed: October 30, 2021.
[200] CHC. "Woodlots Program." Programs. 2021. https://www.coldhollowtocanada.org/programs/woodlots Accessed: October 30, 2021.
[201] Macleod, Kavita. "Cold Hollow Carbon: A Vermont Forest Carbon Cooperative for Climate Change Mitigation." Case Profile Series on Land Trusts as Climate Change Solution Providers. January 2021.

Appendix IV: Carbon Forest Project (FCP)

For further reading:
Green Timber- conducts forest inventory, creates management plans, offers third party verification services. https://greentimberforestry.com/

UMassAmherst and UVM Forest Carbon: An essential natural solution for climate change. Provides overview of forest carbon cycle as it relates to forest age and provides information on different forest management strategies. https://masswoods.org/sites/masswoods.org/files/Forest-Carbon-web_1.pdf

https://www.coldhollowtocanada.org/fileadmin/files/Case_Profile_Cold_Hollow_Carbon_VT_03_24_21_.pdf Accessed 31.10.2021

Appendix V: Glastir

1. Basic Program Information

- **Program name**: Glastir (Glastir Commons; Glastir Woodland Creation; Glastir Woodland Regeneration). The Welsh Government performed the Glastir Monitoring and Evaluation Programme from 2013 through 2016 to evaluate the environmental effects of the Glastir Programme.[202] Much of the information here dates from that evaluation. Another survey was scheduled for 2021 and remains forthcoming.
- **Program location**: Wales[203]
- **Year founded**: 2009; Glastir replaced all existing agri-environment schemes in 2013.[204]
- **Size of program (# of farms, landowners, etc.):** "There are currently 4,600 participants in the Entry level scheme, including 1,400 in the Advanced level and 500 in the Decoupled Advanced, managing 37% of the total utilised agricultural area in Wales." [2017 information][205]
- **Acreage of program**: Over 1.3 hectares (3,212,369.96 acres)[206]
- **Minimum acreage required**: 3 hectares (7.4 acres)[207]
- **Program administrator**: Welsh Assembly Government (WAG)[208]
- **Targeted participants**: Owners of Agricultural land in Wales.[209]
- **Prerequisites for enrollment**: Farms must fulfil the Whole Farm Code and meet the points threshold (must reach 28 points per hectare of eligible land).[210]

  Requirements for the Whole Farm Code

  Farms must meet several parameters, including 1) complying with Good Agricultural Environmental Conditions, 2) not extracting natural mineral resources or burn vegetation on rocky areas, 3) maintaining field records of amendment application, 4) not cultivating within 2 meters of watercourse or wetland, 5) not amending on waterlogged or frozen soil, 6) not storing manure and farm wastes on a flood risk area or high-risk slope, 7) complying with certain restrictions for cultivating maize, and 8) maintaining appropriate buffer strips (minimum 2 meters) along high risk slopes and water courses.[211] *For a full list of requirements please refer to source.*[212]

---

[202] Centre for Ecology and Hydrology, "Glastir Monitoring & Evaluation Programme: Final Report," (July 2017). [*hereafter* GMEP Final Report]
[203] Llywodraeth Cynulliad Cymru, "Glastir: New Sustainable Land Management Scheme for Wales," *The European Agricultural Fund for Rural Development: Europe Investing in Rural Areas*, (2010). [*hereafter* SLM Scheme]
[204] *see* GMEP Final Report at 4.
[205] *Id.*
[206] Strut & Parker, "Future of Farm Support in Wales," (9/30/21; accessed 10/21/21), https://rural.struttandparker.com/article/future-of-farm-support-in-wales/.
[207] *see* SLM Scheme at 6.
[208] Sophie Wyne-Jones, "Connecting payments for ecosystem services and agri-environment regulations: An analysis of the Welsh Glastir Scheme," *Journal of Rural Studies*, 77 (2013), http://dx.doi.org/10.1016/j.jrurstud.2013.01.004. [*hereafter* Wyne-Jones]
[209] Welsh Government, "Glastir Entry Book 1: General Guidance 2015,"5 (2015), https://gov.wales/sites/default/files/publications/2018-01/glastir-entry-2015-rules-booklet-1.pdf. [*hereafter* Entry Book 1]
[210] *see* SLM Scheme at 4.
[211] *Id.* at 7-9.
[212] *Id.*

1. **Basic Program Information (cont'd)**
   - **Prerequisites for enrollment (cont'd)**:
     Farmers who hold Common Land Rights and have joined together to establish a Grazing Association are eligible for the Common Land element.[213] Other farms will apply under the All-Wales element.[214] This summary will focus on the All-Wales Element.

     Registering for the All-Wales Element
     Participants must 1) register an interest in joining the scheme, 2) register all of their land with the Welsh Assembly Government's Land Parcel Identification System, 3) mush have full management responsibility and control over the land, either as owner or as the holder of a 5 year tenancy lease, 4) be the only claimant for the land, 5) must have a minimum 3 hectares of eligible land, 5) meet the minimum points threshold, and 6) avoid causing environmental damage of a kind that would contravene the Glastir contract conditions before entering in a contract.[215]

     Participants can enter a Targeted element, which addresses the WG's six areas of concern: soil carbon management, water quality, water quantity management, biodiversity, historic environment, and improving access.

     Registering for the Targeted Element
     1) Land must already be under contract for the All-Wales Element, and 2) all land proposed must be assessed against target maps to assess relevance to the objectives above.[216]

   - **Required data sharing**: All participants must register all of their land with the Welsh Assembly Government's Land Parcel Identification System.[217] Land for participants of the Targeted Element must be assessed against target maps to assess relevance to the objectives above.[218] Participants must also allow for regular inspections throughout the year.[219]
   - **Budget (overall, annual, etc.):** "total direct payments made to farms through Glastir were £37 million in 2015 (and provisional sum of £40 million in 2016)" [2017 information].[220]

---

[213] *Id*. at 3.
[214] *Id.*
[215] *Id.* at 5.
[216] *Id.*; *See also*: Mark Reed, Andrew Moxey, Katrin Prager, Nick Hanley, James Skates, Chris Evans, Klaus Glenk, Ken Thomson, "Improving the link between payments and the provision of ecosystem services in agri-environment schemes in UK peatlands," Centre for Ecology & Hydrology, 1 (2014), http://nora.nerc.ac.uk/id/eprint/508943/1/N508943PP.pdf. [*hereafter* Reed et al.]
"*Spatial targeting of intervention measures is one of the more innovative aspects of Glastir. The scheme's Targeted Element utilises environmental data to build a simple process based model, which allows an applicant's land holding to be assed and scored against a range of priority objectives. Priority layers (maps) for a wide range of environmental objectives have been developed in conjunction with stakeholders. Layers include species, habitats, designations, soil (including peatlands), water quality and quantity access and historic environment. In addition to scoring an applicant's land holding, the simple process based model also identifies the range of options and measures most appropriate in order to attain the specific environmental benefits which the land holding offers. Contract managers further interrogate environmental data and enter into a negotiation phase with the landowner so as to agree the most equitable options. Entry into the targeted element is determined by passing a score threshold. Options include capital works and management measures, payments are in line with the regulatory framework based on cost of capital works and also opportunity cost of management measures, income forgone*."
[217] *Id.*
[218] *Id.*
[219] *see* Entry Book 1 at 25.
[220] *see* GMEP Final Report at 11.

Appendix V: Glastir

1. **Basic Program Information (cont'd)**
   - **Funding source/who pays**: Glastir is funded by Axis 2 (Improving the Environment and the Countryside) of the Welsh Government's Rural Development Programme 2014-20.[221]
   - **Duration of program**: Ongoing, but will end in 2024/2025 when Glastir will be replaced by a more comprehensive Wales Sustainable Farming Scheme.[222]
   - **Goal/expected outcome(s)**: While "[the] management specifications do relate to particular 'ecosystem' outputs, they are not intended to provide quantifiable outputs of goods and services, in terms of specific amounts of carbon or water for example. Instead, scheme agreements are based upon the management of on-farm features and habitats, in a specified manner, to maintain or promote conditions associated with particular ecosystem outputs."[223]
   - **Specific conservation practices mentioned/measured**:
     Example Management options: 1) Hedgerow management, 2) creating streamside corridors to exclude stock 3.5 meters from edge, 3) restore or create an orchard, 4) commit to slurry injections, 5) graze permanent pasture with minimal inputs, 6) manage existing habitats.[224]
   - **Ecosystem services measured**: Biodiversity, Soil, Water, Greenhouse gases, Woodlands, Access and Recreation.[225]
   - **Method of ecosystem services measurement**: Practices are verified through on-farm inspections.[226]
   - **Practice or performance**: Practice[227]
   - **What is paid for**: Implementing practices determined through application/conservation planning.[228]
   - **Payment (cost) per unit of service**: Flat rate based on land area—£35 per hectare (US$19.49 per acre) [data from 2012].[229] Farmers also receive per hectare payments under the Whole Farm Code, and those managing up to 20.00 hectares receive £15.00 per hectare, between 20.01 and 50.00 hectares receive £8.00 per hectare, between 50.01 and 100.00 hectares receive £2.75, and above 100.00 hectares there is no additional payment.[230]
   - **Payment mechanism**: The program used to operate within—and was somewhat limited by—the European Union's framework of Common Agriculture Policy (CAP) payments.[231] Conditions for transferring payments to farmers were defined by the General Agreement on Tariffs and Trade (1994) and EC Regulation 1783/03 and restricted Glastir participants from

---

[221] Natural Resources Wales, "Glastir Woodland Scheme," (last updated 10/25/21; accessed 10/25/21), https://naturalresources.wales/guidance-and-advice/business-sectors/forestry/woodland-creation/glastir-woodland-scheme/?lang=en.
[222] Llywodraeth Cymru, " Co-design for a Sustainable Farming Scheme for Wales," 33-39 (2021), https://gov.wales/sites/default/files/publications/2021-09/sustainable-farming-scheme-co-design-future-farming_0.pdf. [*hereafter* Co-design for SLM Scheme]
[223] *see* Wyne-Jones at 80.
[224] *see* SLM Scheme at 10.
[225] *see* GMEP Final Report at 6.
[226] *see* Entry Book 1 at 25.
[227] *see* Reed et al. at 1.
[228] *see* Entry Book 1 at 4.
[229] *see* Wyne-Jones at 80.
[230] *see* Entry Book 1 at 40.
[231] *see* Wyne Jones at 77.

1. **Basic Program Information (cont'd)**
   - **Payment mechanism (cont'd)**:
     receiving payments for quantified outcomes.[232] These circumstances are changing following Brexit.[233]

     CAP is designed around two "pillars": Pillar 1 provides direct payments to farmers and other forms of market support, with the goal of building a strong agricultural sector. The smaller Pillar 2 is designed to support rural development.[234] Pillar two contains three "axes," and Glastir is subject to "axis 2" which is aimed at improving land management and the environment.[235]
   - **Average payment:** Farms generally receive £1,000 and £10,000 annually [2017 information].[236]
   - **Total payments/percentage of budget towards payments**: "Overall, 63% of Pillar 2 funding was spent on AES (2.2% in admin support) and 23% in support of production with the remainder split on administration (3.2%), forestry creation and restoration (8.4%) and support for social enterprises (2.4%)."[237] "Biodiversity...(including woodland habitats) accounts for 47% of the total GMEP budget, 36% is allocated across soils, waters, climate change mitigation, landscape and historic features, trade-offs and co-benefits, and the remaining 17% allocated to underpinning activities such as informatics, the GMEP data portal and project management."[238]

2. **History/Brief Overview**

   Glastir built off four pre-existing schemes.[239] WAG introduced Glastir in 2009 to strike a new path in Wales' environmental agenda that would tackle climate change, carbon capture, and water management.[240] As an important note for the Vermont PES Working Group as it considers funding, relationships to other programs, etc., all of Wales' agri-environment schemes in practice until that time were replaced by Glastir.[241]

   Glastir's design holds "a broad 'All-Wales Element' open to all farmers [working] alongside more specified 'Targeted', 'Regional', and 'Common-Land' elements to address areas of particular concern and tackle the issues of grazing commons."[242] Originally, farmers participating in Glastir operated in a point system where they chose different management options to reach a total number of points.[243] The program has since changed and "points are now attached to new management specifications explicitly designed to deliver benefits framed as 'environmental/ecosystem goods and services'."[244]

---

[232] *Id.* at 81. "*So, whilst it has not yet been possible to change the basis of the payments, due to the requirements of EC Regulation 1783/03 which sets out income-foregone as the basis of agri-environment rates, it is evident that the Glastir payments are not being presented as a means of compensating farmers, but as a means of paying for a desirable product.*"
[233] David Arnott, David Chadwick, Ian Harris, Aleksandra Koj, & David L. Jones, "What can management option uptake tell us about ecosystem services delivery through agri-environment schemes?," *Land Use Policy,* 195 (2019). [*hereafter* Arnott et al.]
[234] *see* Reed et al. at 2.
[235] S.H. Gay, B. Osterburg, D. Baldock, A. Zdanowicz, "Recent evolution of the EU Common Agricultural Policy (CAP): state of play and environmental potential," *Impact of Environmental Agreements on the CAP*, 7 (2005), https://ieep.eu/uploads/articles/attachments/a9e24479-e35a-40ad-8c71-82f4401d4c68/WP6D4B_CAP.pdf?v=63664509697.
[236] *see* GMEP Final Report at 11. "*Environmental payments to farms in Wales average between <1 and 10% of total farm output, and are highest for hill cattle and sheep farms*."
[237] *see* Arnott et al. at 196.
[238] *see* GMEP Final Report at 7.
[239] *Id.* at 10.
[240] *see* Wyne-Jones at 80.
[241] *Id.*
[242] *Id.*
[243] *Id.*
[244] *Id.*

2. History/Brief Overview (cont'd)

As of 2012, participants are required to enter all eligible land that they have full management control over.[245]

3. Program Process

Details of application, prerequisites, baseline assessments, objectives, payment calculation, etc.

i. Pre-implementation of project/funding[246]

Farm participants need to adhere to a Whole Farm Cost that "concerns record keeping and habitat protection, and prohibits some practices such as application of livestock manures when soils are waterlogged."[247] Participants begin in a General Entry (scheme), with later options of progressing to and Advanced (GA) scheme that spatially targets specified conservation issues. The program also includes a Commons element (GC), an Efficiency capital grant element (GF) and Organic Farming element (GO), and a Woodland Creation and Management element (GW) that stands alone as a separate program.

ii. Project implementation

Details of actions by participants/funder.

Participants must register an expression of interest, following which they will be asked to provide documentary evidence concerning management control of the land.[248] Participants will receive a package listing all parcels indicated in the expression of interest, which will include certain land characteristics and information to help choose options.[249] (Farms entering a Regional package will receive 10% more points per option (regional packages offer a reduced list of options that are considered of the greatest environmental value to a given region).[250] Participants then choose among management options and select at least enough to meet the points threshold.[251] A contract binding the agreement is signed following a discussion with a Divisional Office representative of the location and options selected.[252]

iii. Details of monitoring, reporting, payment process.

Glastir participants are required to allow government representatives to conduct on farm inspections to "check the land details and accuracy of any relevant documentation and record keeping."[253] Inspections are spread throughout the year and will cover all commitments that can be checked at the time of the visit.[254] In some cases, the inspections will conduct unannounced inspections.[255]

Payments are "calculated based on the eligible payable area under contract upon successful validation of the SAF and Glastir Contract each year."[256]

---

[245] *see* SLM Scheme at 3.
[246] *see* GMEP Final Report at 10.
[247] *Id.*
[248] *see* SLM Scheme at 3-5.
[249] *Id.* at 5.
[250] *Id.* at 3
[251] *Id.* at 5. *See also*: Entry Book 1 at 3.
[252] *see* SLM Scheme at 5.
[253] *see* Entry Book 1 at 25.
[254] *Id.*
[255] *Id.*
[256] *Id.* at 4.

4. **Concerns/Issues**

The program initially showed low participation rate, which farmers attributed to poor support and access to technical advice.[257] Although the project is not yet completed, it will phase out in 2024-25 when the Welsh Government plans to overhaul the country's environmental farm support schemes to replace with a comprehensive "Sustainable Farming Scheme for Wales."[258] Glastir was evaluated through surveys with participants and areas identified for improvement are listed below.

The prevailing issues reported in farmer surveys concern communications between administrators and participants.[259] In an assessment of Welsh farmers' experiences Glastir, many reported that they found the program too prescriptive and did not offer opportunities for farmers to offer their input.[260] Furthermore, the schemes were too inflexible to accommodate variability from weather, markets, etc.[261] The program's payment of £35 per hectare is contingent on reaching that point total.[262] Farmers stated that future schemes should include informed discussions with participants to clearly explain the objectives and reasons for implementing particular measures.[263]

Survey participants also reported a desire for better access to information and support, and that the program could be adapted to better accommodated peer-to-peer knowledge exchange and collaboration on common land.[264] Many also indicated that access to grant funding was necessary to overcome up-front costs for implementing best-practice measures and installing infrastructure.[265]

---

[257] Debbie James, "Glastir uptake hampered by lack of advice," *Farmers Weekly,* (October 16, 2012), https://www.fwi.co.uk/news/environment/glastir-uptake-hampered-by-lack-of-advice.
[258] *see* Co-design for SLM Scheme at 33-39.
[259] *Id.*
[260] *Id.*
[261] *Id.*
[262] *Id.*
[263] *Id.*
[264] *Id.*
[265] *Id.*

Appendix VI: Lake Taupo Nitrogen Trading Program

1. Basic Program Information

- **Program name:** The Lake Taupo Nitrogen Market in New Zealand
- **Program location**: Lake Taupo catchment area, NZ[266]
- **Year founded**: 2011[267]
- **Size of program (# of nitrogen trades.)**[268]:
  - 180 farmers enrolled as of 2015
  - 24 trades to Lake Taupo Protection Trust (LTPT) amounting to 170,300 kg N
  - 12 trades to other farmers amounting to 17,634 kg N
  - Total: 36 trades amounting to 187,934 kg N
- **Acreage of program**: N/A
- **Minimum acreage required**: N/A
- **Program administrator:** Lake Taupo Protection Trust
- **Targeted participants:** Farmers
- **Prerequisites for enrollment:** Compliance-based not voluntary
- **Required data sharing**: Based around livestock numbers and cropping practices, with all farms providing their annual accounting records to the Regional Council[269].
- **Budget (overall, annual, etc.)**: 79.2 million NZD
- **Funding source/who pays**[270]:
  - Taupo District Council (22%)
  - Waikato Regional Council (33%)
  - Central Government (45%)
- **Duration of program:** 2011-present
- **Goal/expected outcome(s):** 20% nitrogen reduction through the buy-back of allocated nitrogen discharge allowances and to reduce the local economic and social impacts of the nitrogen cap. The initial target of 153 tons of nitrogen reduction was raised to 170 tons. This goal was achieved in 2015[271].
- **Specific conservation practices mentioned/measured:** N/A
- **Ecosystem services measured:** Nitrogen load reduction
- **Method of ecosystem services measurement:** OVERSEER model estimates nitrogen emissions based on livestock numbers, fertilizer applied and management practices[272].
- **Practice or performance:** Performance
- **What is paid for:** Land, NDAs (nitrogen discharge allowances)
- **Payment (cost) per unit of service:** $300 per kg of N[273]
- **Payment mechanism:** Landowners were able to buy, sell, or lease nitrogen discharge allowances within the catchment.
- **Average payment:** N/A

---

[266] Organisation for Economic Co-operation and Development. (2015). The Lake Taupo Nitrogen Market in New Zealand. *OECD Environment Paper*, *4*.
[267] Organisation for Economic Co-operation and Development. (2015). The Lake Taupo Nitrogen Market in New Zealand. *OECD Environment Paper*, *4*.
[268] *Id.*
[269] *Id.*
[270] *Id.*
[271] Organisation for Economic Co-operation and Development. (2015). The Lake Taupo Nitrogen Market in New Zealand. *OECD Environment Paper*, *4.*
[272] *Id.*
[273] *Id.*

Appendix VI: Lake Taupo Nitrogen Trading Program

1. <u>Basic Program Information (cont'd)</u>

- **Selling point/tagline:** It is the only trading program or market where non-point sources operate under a cap[274].

2. <u>History/Brief Overview</u>

New Zealand's Lake Taupo Nitrogen Trading program was established as part of a policy package that addressed an emerging water quality problem, not an existing crisis, namely, to protect against deteriorating water quality of Lake Taupo. To achieve reduced nitrogen losses to 20% below current discharge levels, a catchment cap to constrain agricultural N load to Lake Taupo was established. To achieve this, a nitrogen discharge allowance (NDA) trading system and Lake Taupo Protection Trust (LTPT) 20% buy-back program were established.[275]

3. <u>Program Process</u>

- **Pre-program implementation**
  i. Regulation of non-point agricultural sources: LTPT introduced land use and discharge controls whereby nitrogen leaching farming activities were now controlled through a resource consent and agricultural land now required a nitrogen discharge allowance (NDA) to farm.[276] NDAs for each farm were based on their highest nitrogen leaching year between 2001 and 2005. Nutrient leaching is determined using the OVERSEER nutrient budgeting model. This meant the activities on each consented farm could only leach as much nitrogen as the NDAs they were allocated. This is enforced through a requirement for approved management plans, a regular monitoring program, and penalties for non-compliance under the Resource Management Act.[277]
  ii. Based on NDAs, a nitrogen market was created which allows landowners to buy, sell, or lease other landowners' NDAs. Landowners could also sell their NDAs back to the LTPT, as described below.
  iii. LTPT buy-back: A public fund, managed by the LTPT, was established to permanently reduce nitrogen leaching in the catchment by at least 20% of current levels by 2020. This was through a mix of land purchase (and converting land use to low leaching activities) and directly purchasing NDAs (where farmers retain ownership of the land but change land use or management and receive a payment from the Trust)[278].

---

[274] Organisation for Economic Co-operation and Development. (2015). The Lake Taupo Nitrogen Market in New Zealand. *OECD Environment Paper*, *4*.
[275] *Id*
[276] *Id*
[277] Organisation for Economic Co-operation and Development. (2015). The Lake Taupo Nitrogen Market in New Zealand. *OECD Environment Paper*, *4*.
[278] *Id*

3. Program Process (cont.)

Table 2 | **History of nitrogen discharge allowance trades in the Lake Taupo**

Year	Number of trades to LTPT	Amount traded to LTPT (kg N)	Number of trades to farmers	Amount traded to farmers	Total trade	Total amount of N traded (kg N)
2009	3	17,242	3	12,184	6	29,426
2010	5	56,100	2	3,500	7	59,600
2011	4	43,614	2	1,311	6	44,925
2012	9	24,311	3	362	12	24,673
2013	2	9,799	1	113	3	9,912
2014*		0	1	164	1	164
2015	1	19,234	0	0	1	19,234
Total	**24**	**170,300**	**12**	**17,634**	**36**	**187,934**

Notes: * This represents the period to June 2014. LTPT = Lake Taupo Protection Trust.

Figure 1. History of nitrogen discharge allowance trades in the Lake Taupo, NZ catchment area as of 2015.

- **Post-project review and evaluation**
  - Highly successful in terms of reducing the amount of nitrogen leaving agricultural lands.[279]
  - The cap has reduced farmers' ability to intensify production, has
  - decreased land values and has significantly increased administration and compliance costs.[280]
  - A number of farmers left the area as a result of the project[281].
  - Overseer software will constantly need to be updated[282]
  - Attempt to minimize the administrative and time costs borne by farmers.[283]

4. Concerns/Issues

- No concrete or measured assessments of environmental impacts or cost/benefit to farmers.[284]
- High set-up and administration costs[285]
- High benchmarking costs for each farm[286]
- High consent application cost to farmers[287]
- Project's self-identified room for improvement.
- Externalities are difficult to identify[288]

---

[279] Duhon, M., McDonald, H., & Kerr, S. (2015). Nitrogen Trading in Lake Taupo An Analysis and Evaluation of an Innovative Water Management Policy. *Motu Economic and Public Policy Research*, *15*(7)
[280] *Id.*
[281] *Id.*
[282] *Id.*
[283] *Id.*
[284] *Id.*
[285] *Id.*
[286] Duhon, M., McDonald, H., & Kerr, S. (2015). Nitrogen Trading in Lake Taupo An Analysis and Evaluation of an Innovative Water Management Policy. *Motu Economic and Public Policy Research*, *15*(7)
[287] *Id.*
[288] *Id*

Appendix VII: Soil and Water Outcomes Fund (SWOF)

1.1 Basic Program Information

- **Location**: Particular counties in Delaware, Maryland, New York, Pennsylvania, Virginia, West Virginia (Chesapeake Watershed), Illinois, Iowa, Ohio
- **Year founded**: In 2019, SWOF launched a pilot project and in 2020 enrolled 9,500 acres in Iowa. In 2021, SWOF and partners expanded to 120,000 acres, primarily in Iowa, Illinois, and Ohio. In 2020, SWOF received $7.3 million from a USDA-NRCS grant (Regional Conservation Partnership Program Alternative Funding Arrangement) and received the same grant worth $8.5 million in 2021.[289, 290]
- **Program administrators**: AgOutcomes (subsidiary of Iowa Soybean Association) for "agronomic and farmer relations elements" and ReHarvest Partners (subsidiary of Quantified Ventures) for "financial and contracting aspects."[291] Additional support is provided by partners including the Agriculture Technology & Environmental Stewardship Foundation, American Farmland Trust, the Illinois Soybean Association, Ohio Corn & Wheat, and the Ohio Soybean Association. [292]
- **Size of program**: In SWOF's first year of implementation (2020) 9,500 acres were enrolled, 6,407 metric tons of CO2e were sequestered, 172,794 lbs of nitrogen were reduced, and 11,651 lbs of phosphorus were reduced.[293]

1.2 General Program Details

- **Program target participants:** Farmers in particular counties in Delaware, Maryland, New York, Pennsylvania, Virginia, West Virginia (Chesapeake Watershed), Illinois, Iowa, and Ohio.
- **Prerequisites for enrollment**: Must farm in a priority location and fields must be compliant with the USDA-FSA Highly Erodible Land and Wetland Conservation provisions. Participants may not enroll in other programs while participating in the SWOF. This includes cost-share.[294]
- **Required data**: Past two years of field management operations (records) .[295] Data is also collected on management operations during enrollment year(s).[296]
- **Length of contract**: 1 year, renewable[297]
- **Annual budget**: Depends on market and buyer. Although there is not a cap on acres per se, enrollment closes once SWOF reaches their acreage goal for the year.[298] There is no minimum or maximum number of acres required for enrollment.[299]

---

[289] Iowa Soybean Association. "USDA partnership will scale up Soil and Water Outcomes Fund's work with Midwest farmers." September 17, 2020. https://www.iasoybeans.com/newsroom/press-release/usda-partnership-will-scale-up-soil-and-water-outcomes-funds-work-with-midwest-farmers Accessed: October 18, 2021.
[290] Peabody, Rachel and Claire Weinzierl. Soil and Water Outcomes Fund Project Plans to Scale Up in Illinois, Indiana, And Missouri. Illinois Soybean Association. Press Release. October 8, 2021. https://www.ilsoy.org/press-release/soil-and-water-outcomes-fund-project-plans-scale-illinois-indiana-and-missouri Accessed: October 18, 2021.
[291] SWOF, "Our Partnership." Our Team. 2020. https://www.theoutcomesfund.com/team Accessed: October 18, 2021.
[292] *Id.*
[293] SWOF, "Our Impact." News + Impact. 2020. https://www.theoutcomesfund.com/impact Accessed: October 17, 2021.
[294] SWOF. "FAQ" Farmer Resources. 2020. https://www.theoutcomesfund.com/farmer-resources Accessed: October 17, 2021.
[295] Illinois Soybean Association. Soil and Water Outcomes Fund Virtual Q&A. Illinois Soybean Association. July 14, 2021. Soil and Water Outcomes Fund Virtual Q&A Accessed: November 16, 2021.
[296] *Id.*
[297] SWOF. "FAQ" Farmer Resources. 2020. https://www.theoutcomesfund.com/farmer-resources Accessed: October 17, 2021.
[298] SWOF. "FAQ" Farmer Resources. 2020. https://www.theoutcomesfund.com/farmer-resources Accessed: October 17, 2021.
[299] Illinois Soybean Association. Soil and Water Outcomes Fund Virtual Q&A. Illinois Soybean Association. July 14, 2021. Soil and Water Outcomes Fund Virtual Q&A Accessed: November 16, 2021.

1.2 General Program Details (cont'd)

- **Funding source**: Beneficiaries i.e. outcome customers[300] pay for services provided. Beneficiaries include corporations, municipalities, state departments of agriculture, and the federal government.[301] "…corporations seeking to offset greenhouse gas emissions in their supply chain, and public entities such as municipal water utilities or state departments of agriculture seeking to improve and safeguard water quality."[302] Customers include Cargill (April 2020), USDA, City of Ames™, Cedar Rapids "City of Five Seasons®", Iowa Department of Agriculture and Land Stewardship (February 2021), PepsiCo (April 2021), Nutrien Ag Solutions™ (February 2021), The County of Dubuque, Ingredion® (April 2021), and BASF.[303;304;305,306]
- **Payment mechanism**: SWOF "manages a pool of capital on behalf of impact investors to pay farmers for implementation of agriculture best management practices."[307]
- **Goals/expected outcome(s)**: SWOF seeks to have enrolled one million acres of US cropland by the end of 2023.
- **Accepted conservation practices**: SWOF is "not prescriptive about the conservation practices you can implement, participating farmers typically implement practices including no-till, cover crops, land retirement, conversion to pasture, extended rotations." [308] Compensation is affected by baselines practices and soil type. At a minimum, producers will need to use cover crops and reduce tillage or switch to no-till.[309]
- **Ecosystem services measured**: GHG outcomes (soil carbon sequestration and nitrous oxide reductions) and water quality improvements (nitrogen and phosphorus retention).

---

[300] SWOF, About the Soil and Water Outcomes Fund. Factsheet. N.d. https://static1.squarespace.com/static/5db70c3d3a013f252a36f1da/t/5fa47860d690ab64102d406f/1604614304236/SWOF+One+Sheet+for+Beneficiaries Accessed: October 17, 2021.

[301] Kiel, Adam and Mark Lambert. Soil and Water Outcomes Fund Partners with Nutrien Ag Solutions to Launch Carbon and Water Quality Outcome Program. Press Release. February 9, 2021. https://www.theoutcomesfund.com/partnership-nutrien-ag-solutions-carbon-and-water-quality-outcome-program Accessed: October 17, 2021.

[302] SWOF, Cost-effective solutions for soil and water stewardship. Factsheet. April 2021. https://static1.squarespace.com/static/5db70c3d3a013f252a36f1da/t/608008e5a43e163b411979c9/1619003622559/SWOF+Farmer+One+Sheet+April+2021.pdf Accessed: October 17, 2021.

[303] SWOF, "Our Partnership." Our Team. 2020. https://www.theoutcomesfund.com/team Accessed: October 17, 2021.

[304] James, Katie, Keely Coppess, Adam Kiel, and Matt Lindsay. Iowa Department of Agriculture and Land Stewardship Announces Groundbreaking Water Quality Outcomes Incentives. Press Release. January 5, 2021. https://www.theoutcomesfund.com/idals-announces-groundbreaking-water-quality-outcomes-incentives Accessed: October 17, 2021.

[305] Kiel, Adam and Mark Lambert. Soil and Water Outcomes Fund Partners with Nutrien Ag Solutions to Launch Carbon and Water Quality Outcome Program. Press Release. February 9, 2021. https://www.theoutcomesfund.com/partnership-nutrien-ag-solutions-carbon-and-water-quality-outcome-program Accessed: October 17, 2021.

[306] Kiel, Adam and Mark Lambert. PepsiCo and Ingredion Partner with Soil and Water Outcomes Fund to Drive Carbon Sequestration and Water Quality Improvement Through Farmer-Centric Approach to Sustainable Agriculture. Press Release. April 21, 2021. https://www.theoutcomesfund.com/partnership-with-pepsico-ingredion-drives-carbon-sequestration-water-quality-improvement Accessed: October 17, 2021.

[307] SWOF. About the Soil and Water Outcomes Fund. Factsheet. N.d. https://static1.squarespace.com/static/5db70c3d3a013f252a36f1da/t/5fa47860d690ab64102d406f/1604614304236/SWOF+One+Sheet+for+Beneficiaries Accessed: October 17, 2021.

[308] SWOF, Cost-effective solutions for soil and water stewardship. Factsheet. April 2021. https://static1.squarespace.com/static/5db70c3d3a013f252a36f1da/t/608008e5a43e163b411979c9/1619003622559/SWOF+Farmer+One+Sheet+April+2021.pdf Accessed: October 17, 2021.

[309] SWOF. "FAQ" Farmer Resources. 2020. https://www.theoutcomesfund.com/farmer-resources Accessed: October 17, 2021.

1.2 General Program Details (cont'd)

- **Method of ecosystem services measurement**: Sustainable Environmental Consultants (SEC) provides third-party quantification and verification of environmental outcomes via the EcoPractices platform."[310] Soil and Water Outcomes Fund representatives also perform evaluations. Soil sample on 10% of farms, water sample on 10% of farms, remote sensing on 100% of fields, and staff conduct field inspections post-harvest.[311]

1.3 Payment Details

- **Practice or performance:** Performance[312]
- **Ecosystem services paid**: GHG outcomes (soil carbon sequestration and nitrous oxide reductions) and water quality improvements (nitrogen and phosphorus retention).
- **Payment (cost) per unit of service**: Payments are only offered if there is a guaranteed outcomes purchaser. [313] SWOF provides "payments to farmers and landowners that go well beyond the scale of existing public or private incentive programs."[314]
- **Average payment**: The average payment in 2020 was $35/acre.[315] The highest payment was $50 in 2020.[316] Payments vary by location/program. 2021 payment cap in Illinois was $20.[317] See Figure 2 for SWOF's side-by-side comparison of with other PES programs.[318]

[310] SWOF, "Our Partnership." Our Team. 2020. https://www.theoutcomesfund.com/team Accessed: October 17, 2021.
[311] Illinois Soybean Association. Soil and Water Outcomes Fund Virtual Q&A. Illinois Soybean Association. July 14, 2021. Soil and Water Outcomes Fund Virtual Q&A Accessed: November 16, 2021.
[312] SWOF, "SWOF Original: Why Should Food and Agricultural Business-Related Companies Pay for Outcomes? (vs. Pay for Practices)." News + Impact. September 14, 2021. https://www.theoutcomesfund.com/in-the-news/swof-original-why-should-food-and-agricultural-business-related-companies-pay-for-outcomes-vs-pay-for-practices Accessed: October 17, 2021.
[313] SWOF. "FAQ" Farmer Resources. 2020. https://www.theoutcomesfund.com/farmer-resources Accessed 10.17.2021.
[314] SWOF, "Why Work with Us?" Homepage. 2020. https://www.theoutcomesfund.com/ Accessed: October 17, 2021.
[315] SWOF, "SWOF Original: Why Should Food and Agricultural Business-Related Companies Pay for Outcomes? (vs. Pay for Practices)." News + Impact. September 14, 2021. https://www.theoutcomesfund.com/in-the-news/swof-original-why-should-food-and-agricultural-business-related-companies-pay-for-outcomes-vs-pay-for-practices Accessed: October 17, 2021.
[316] Iowa Soybean Association. "Soil and Water Outcomes Fund." State of Soy. November 4, 2020. https://www.youtube.com/watch?v=4WJv_MTlYZs Accessed Accessed: October 17, 2021.
[317] Illinois Soybean Association. Soil and Water Outcomes Fund Virtual Q&A. Illinois Soybean Association. July 14, 2021. Soil and Water Outcomes Fund Virtual Q&A Accessed: November 16, 2021.
[318] SWOF. "SWOF Original: Side-by-Side Comparison of Carbon and Water Quality Outcome Programs." News + Impact. August 16, 2021. https://www.theoutcomesfund.com/in-the-news/swof-original-side-by-side-comparison-of-carbon-and-water-quality-outcome-programs Accessed: October 17, 2021.

Appendix VII: Soil and Water Outcomes Fund (SWOF)

Carbon Credit & Water Outcomes Program Comparison

Choosing the Right Ecosystems Services Program for Your Farm

	Soil and Water Outcomes Fund	Bayer	FarmersEdge	CIBO	Corteva	Nori	indigo	Gradable	TruTerra
Payments for both carbon AND water quality.	✓								
Average payments above $35/acre.	✓								
Payments not contingent on carbon market. Farmer does not need to market their credits.	✓	✓			✓		✓		✓
First payment made at time contract is signed.	✓								
Contracts renewed/signed annually; no long-term contract.	✓			✓					
On-staff agronomist to assist with enrollment/practices.	✓	✓					✓		✓
Tenant/legal decision-maker able to enroll.	✓	✓	✓	✓	✓	✓	✓	✓	✓
Monitoring and verification at no cost.	✓	✓			✓		✓		✓
No additional purchases, nor use of company's data tool, required to participate.	✓			✓		✓			

Figure 2. SWOF Side-by-Side Comparison of Carbon and Water Quality Outcome Programs.[319]

2. Program History

In 2013, Iowa implemented the Nutrient Reduction Strategy which resulted in the Iowa Water Quality Initiative (WQI) action plan. The Iowa Department of Agriculture and Land Stewardship (IDALS) supports SWOF through the WQI. [320] Initially piloted in Illinois, Ohio, and the Chesapeake region and first outcomes customers are Cargill (April 2020), followed by Nutrien Ag Solutions (February 2021). SWOF strives to offer "Cost effective solutions for soil and water stewardship." [321] SWOF "provides financial incentives directly to farmers who transition to on-farm conservation practices that yield positive environmental outcomes like carbon sequestration and water quality improvement. We provide significant per acre payments to farmers and landowners by selling these environmental outcomes to public and private beneficiaries."[322]

3. Program Process

- **Project funding:** Based on buyers and market.
- **Project application process:**
  1) create and map fields in SWOF portal and enter baseline and future cropping information, 2) review proposed payment (typically received within 1-2 weeks of signing up), 3) sign contract and receive 50% of payment to off-set investment costs, 4) receive TA from SWOF staff,

[319] SWOF. "SWOF Original: Side-by-Side Comparison of Carbon and Water Quality Outcome Programs." News + Impact. August 16, 2021. https://www.theoutcomesfund.com/in-the-news/swof-original-side-by-side-comparison-of-carbon-and-water-quality-outcome-programs Accessed: October 17, 2021.

[320] James, Katie, Keely Coppess, Adam Kiel, and Matt Lindsay. Iowa Department of Agriculture and Land Stewardship Announces Groundbreaking Water Quality Outcomes Incentives. Press Release. January 5, 2021. https://www.theoutcomesfund.com/idals-announces-groundbreaking-water-quality-outcomes-incentives Accessed: October 17, 2021.

[321] SWOF. "Why Work with Us?" Homepage. 2020. https://www.theoutcomesfund.com/ Accessed: October 17, 2021.

[322] *Id.*

3. Program Process (cont'd)

- **Project application process (cont'd):**
  5) receive 50% of payment at end of crop year after practice has been verified. Farmers may receive assistance from County coordinators.[323]
- **Monitoring, reporting, payment process**
  Sustainable Environmental Consultants (SEC) provides third-party quantification and verification of environmental outcomes via the EcoPractices platform."[324] Soil and Water Outcomes Fund representatives also perform evaluations. Soil sample on 10% of farms, water sample on 10% of farms, remote sensing on 100% of fields, and staff conduct field inspections post-harvest. [325] Quantified Ventures is able to show that their model can produce the same outcome as a municipality "with 30% less cost because they measure and sell the outcomes, rather than paying for the adoption of practices with less reliable tracking of outcomes."[326]
- **Post-project review and evaluation**
  SWOF was initiated in 2021 and it is too early to conduct an evaluation of the program.

4.1 Concerns/Issues

SWOF pays for transition to practices, but does not compensate for farmers who are already implementing conservation strategies. Measurement methods are not easily accessible. Publicization efforts are not clear i.e. strategy to let farmers know about the program is not explicit. Yearlong contracts means that there may not be consistency from year to year. (On the other hand, year-long contracts give farmers flexibility to enroll in PES with a different organization or take advantage of a more lucrative market. Shorter contracts may limit opportunity-cost.) The market is new, and prices guaranteed in the pilot program may not continue as the market fluctuates with supply and demand. SWOF does not detail it's long-term funding strategy. It is unknown how program will continue with just private investors (no government grants). Furthermore, it is not clear if farms can 'age out' by reaching plateau i.e. implementing practices no longer increase water quality or carbon storage. Details of payment structure are unknown and long-term expectations of carbon regulation companies (like Cargill) are unknown e.g. if regulations is not pressing, companies may reduce quantity of credits bought or offer lower payments.[327]

[323] Hopper, Joseph. "Dubuque County farmers explain why they chose The Soil and Water Outcomes Fund." Iowa Soybean Association. August 19, 2021. https://www.iasoybeans.com/newsroom/article/dubuque-county-farmers-explain-why-they-chose-the-soil-and-water-outcomes-fund Accessed 10.17.2021.
[324] SWOF, "Our Partnership." Our Team. 2020. https://www.theoutcomesfund.com/team Accessed 10.17.2021.
[325] Illinois Soybean Association. Soil and Water Outcomes Fund Virtual Q&A. Illinois Soybean Association. July 14, 2021. Soil and Water Outcomes Fund Virtual Q&A Accessed: 16.11.2021
[326] Sworder, Chris. "Regenerative Agriculture – A New Asset Class for Agriculture and Nature-based Solutions Investors – Part 3." CleanTech Group. September 16, 2020. https://www.cleantech.com/regenerative-agriculture-a-new-asset-class-for-agriculture-and-nature-based-solutions-investors-part-3/ Accessed 10.18.2021.
[327] Janiec, Chris. "Cargill-backed pilot fund eyes private capital and 2021 launch." Agri Investor. April 23, 2020. https://www.agriinvestor.com/cargill-backed-pilot-fund-eyes-private-capital-and-2021-launch/ Accessed 10.18.2021.

Appendix VIII: Sustainable Farming Incentive

1. <u>Basic Program Information</u>

- **Program name**: Sustainable Farming Incentive
- **Program location**: England[328]
- **Year founded**: 2021[329]
- **Size of program** (# of farms, landowners, etc.): 938 farmers for the pilot[330]
- **Acreage of program**: N/A
- **Minimum acreage required**: N/A
- **Program administrator**: Department for Environment, Food & Rural Affairs
- **Targeted participants**: Farmers
- **Prerequisites for enrollment**[331]:
  - Eligible Basic Payment Scheme (BPS) applicant in 2020 or 2021
  - Be registered on the Rural Payments service
  - Is not common land or used for shared grazing
  - Does not have an existing agri-environment agreement on it[332]
  - Must have management control of the land included in agreement[333]
- **Required data sharing:** Required documentation to show farmers are meeting the mandatory actions.
- **Budget:**
  - $2.4 billion from 2021-2025[334]
  - $1.6 billion on direct payments[334]
- **Funding source/who pays:** Department for Environment, Food & Rural Affairs
- **Duration of program**: Pilot (2021-2024) Project (2024-2027)[335]
- Additional payments: Learning activities are expected to take up to 15 hours a month. Each pilot participant will be paid $5,000 for the first year of the pilot. Payments making up this total will be made quarterly[336].
- **Goal/expected outcome(s)**[337]:
  - clean and plentiful water
  - clean air
  - thriving plants and wildlife
  - protection from environmental hazards
  - reduction of and adaptation to climate change
  - beauty, heritage and engagement with the environment
- **Specific conservation practices mentioned/measured:** Too many to list, including reduced tillage, riparian buffer installation, etc.[337]
- **Ecosystem services measured**: Too many to list, including pollinator habitat, flood mitigation, etc.[337]

---

[328] Department for Environment, Food & Rural Affairs. (2021). *Guidance Sustainable Farming Incentive pilot*.
[329] *Id.*
[330] *Id.*
[331] *Id.*
[332] *Id.*
[333] *Id.*
[334] *Id.*
[335] *Id/*
[336] *Id/*
[337] *Id.*

Appendix VIII: Sustainable Farming Incentive

1. Basic Program Information (cont'd)

- **Practice or performance**: Practice bundles and monitoring/recordkeeping
- **What is paid for**: Proper implementation of conservation strategies
- **Payment (cost) per unit of service**: Depends on "levels" achieved for eight "standards"[338]
- **Payment mechanism:** Payments will be made for all the eligible land in the agreement and all actions have to be completed on all that land.[339]
- **Average payment**: N/A
- **Total payments/percentage of budget towards payments**: 67%[340]

2. History/Brief Overview

The Sustainable Farming Incentive scheme is one of 3 schemes being developed to encourage environmental land management.[341] The other schemes are Local Nature Recovery and Landscape Recovery. The Sustainable Farming Incentive scheme will reward farmers for managing their land in an environmentally sustainable way.[342] These schemes will operate together and pay for sustainable farming practices, improve animal health and welfare, improve environmental outcomes, and reduce carbon emissions.[343] They will create habitats for nature recovery and make landscape-scale changes such as establishing new woodland and other ecosystem services, providing key means to deliver against the country's 25 Year Environment Plan goals and carbon net zero targets.[344] The full scheme will launch in 2022, initially for farmers in England who currently get payments under the Basic Payment Scheme (BPS).[345]

3. Program Process

- Farmer selects land registered on your Rural Payments service account.[346]
- Farmer then selects Sustainable Farming Incentive 'standards' to apply to eligible land and to other features, like hedgerows.[347]
- Farmer also chooses an ambition level for each standard. If you select a higher level, you'll be paid more.[348]

  Ex. Arable and horticultural soils standard
  - Farmer selects the Arable and horticultural soils standard
  - Farmer decides to strive for the Introductory level which has an associated payment of $26 per hectare (2.45 acres)[349]
  - Farmer will be paid for all the eligible land that's in the agreement and will have to complete the actions on all that land.[350]
  - For this standard at the Introductory level, there are four mandatory actions[351]

---

[338] Department for Environment, Food & Rural Affairs. (2021). *Guidance Sustainable Farming Incentive pilot*.
[339] *Id.*
[340] *Id.*
[341] *Id.*
[342] *Id.*
[343] Applin, L., & Lewis, T. (2021). *Update on the Sustainable Farming Incentive pilot*. https://defrafarming.blog.gov.uk/2021/10/15/update-on-the-sustainable-farming-incentive-pilot/
[344] *Id.*
[345] *Id.*
[346] Department for Environment, Food & Rural Affairs. (2021). *Guidance Sustainable Farming Incentive pilot*.
[347] *Id.*
[348] *Id*
[349] *Id*
[350] *Id*
[351] *Id.*

3. <u>Program Process (cont.)</u>

Ex. Arable and horticultural soils standard (cont'd)

- Carry out a soil assessment
- Alleviate soil compaction
- Establish green cover
- Add soil organic matter

- Farmer will keep documents to show they are meeting the mandatory actions[352]
- Farmers will submit an annual declaration which confirms progress under your agreement up to that point.[353]
- Department for Environment, Food & Rural Affairs will be reviewing delivery of agreement through a combination of:[354]
  - physical and virtual site visits
  - remote monitoring
  - desk-based administrative checks

4. <u>Concerns/Issues (from reported feedback thus far)</u>

Application guidance
Some farmers struggled to use guidance online and would have preferred printable versions.[355]

Application process
Those who attended a Defra pre-recorded webinar better understood how to apply.[356]

Support
Over 700 farmers reached out for assistance to the Rural Payments Agency.[357]

Data
Several farmers spotted out-of-date information online and they found the process to update data complex and difficult to navigate.[358]

Usability of the pilot application service
There were challenges with the online application portal.[359]

Standard fit
Some farmers struggled to fit the standards to their farms. The description of the standards felt too inflexible.[360]

Payments
Some people were put off from doing more because the payment rates were considered an insufficient incentive.[361]

---

[352] Department for Environment, Food & Rural Affairs. (2021). *Guidance Sustainable Farming Incentive pilot*.
[353] *Id.*
[354] *Id.*
[355] Applin, L., & Lewis, T. (2021). *Update on the Sustainable Farming Incentive pilot*. https://defrafarming.blog.gov.uk/2021/10/15/update-on-the-sustainable-farming-incentive-pilot/
[356] *Id.*
[357] *Id.*
[358] *Id.*
[359] *Id.*
[360] *Id.*
[361] *Id.*

Appendix IX: Truterra

1.1 Basic Program Information

- **Location**: Varies.
- **Year founded**: 2016[362]
- **Program administrator**: Truterra LLC is the sustainability business of Land O'Lakes.
- **Size of program**: 1,840,000 acres are enrolled on 1,900 farms[363]
- **Affiliates**: For a full list of partners, see list at the end of Appendix IX.

1.2 General Program Details

- **Program target participants:** Farmers, Agricultural Retailers, Food & CPG Companies 2016.[364]
- **Prerequisites for enrollment**: No prerequisites or minimum acres specified.
- **Required data**: Historical data is not required for general use, but three years of baseline data is required for those enrolled in carbon transaction programs.[365] Truterra uses a combination of publicly available data and propriety algorithms.[366]
- **Length of contract**: Varies by program with potential to renew.
- **Annual budget**: Not specified.
- **Funding sources**: Licensees (ag retailers and other users) and businesses who wish to meet Social Responsibility Practitioner (SRP) or environmental goals. Typically, corporations either make payment based on insetting (when companies reduce emissions within own supply chain) or offsetting (when companies purchase carbon credits).[367]

  Funding my also come from government agencies. For example, in the Dubuque County's Pay-For-Performance Program, funding is secured through the Stewardship Incentive Program in partnership with Truterra, Dubuque Soil and Water Conservation District, and local Truterra ag retailer Innovative Ag Services.[368,369] Truterra also collaborates with the National Fish and Wildlife Foundation, National Association of Conservation Districts, and its retailer network to enable conservation agronomist positions at select retailers to provide conservation technical assistance.[370, 371]
- **Payment mechanism**: Payment may depend on buyer or program. For example, in the Dubuque County Pay-For-Performance Program, farmers received an average of $33/acre for climate and water benefits achieved.[372]

---

[362] Truterra. Homepage. 2021. https://www.truterraag.com/ Accessed: November 3, 2021.
[363] *Id.*
[364] Id.
[365] Truterra. "TRUCARBON™ OFFER FAQ." 2021. https://www.rivervalleycoop.com/getattachment/c368016d-294f-4cea-99e8-3a6b6b19e8c3/TruCarbon-Program-FAQ.pdf?lang=en-US Accessed: November 30, 2021.
[366] Truterra. Homepage. 2021. https://www.truterraag.com/ Accessed: November 3, 2021.
[367] Truterra. "The Rapidly Evolving Carbon Market in Agriculture an Overview in Questions & Answers." Carbon Market Q&A. October 2020. https://www.truterraag.com/getattachment/1a0ed799-881e-422e-9c43-7fa7abf8281b/Carbon-Market-QA_October-2020.pdf?lang=en-US&ext=.pdf Accessed: November 7, 2021.
[368] Truterra. "Dubuque County Pay-For-Performance Program, Powered by Truterra, Improves Water Quality, Shifts Participating Acres to Carbon Negative." Articles. October 6, 2021. https://www.truterraag.com/articles/dubuque-county-pay-for-performance-program,-powere Accessed: November 6, 2021.
[369] Truterra. "Truterra Partners with Dubuque County, IA to Offer Local Growers Financial Incentives for Sustainability Improvements." Articles. February 23, 2021. https://www.truterraag.com/Articles/Truterra-Partners-with-Dubuque-County,-IA-to-Offer Accessed: November 6, 2021.
[370] Truterra. "National Fish and Wildlife Foundation, Truterra, LLC Invest to Bolster on-the-ground Conservation Expertise Available to Farmers." Articles. 2021. https://www.truterraag.com/Articles/National-Fish-and-Wildlife-Foundation,-Truterr-(1) Accessed: November 7, 2021.
[371] Truterra. "Building Bridges Between Communities." Articles. 2021. https://www.truterraag.com/Articles/Building-Bridges-Between-Communities Accessed: November 7, 2021.
[372] Truterra. "Dubuque County Pay-For-Performance Program, Powered by Truterra, Improves Water Quality, Shifts Participating Acres to Carbon Negative." Articles. October 6, 2021. https://www.truterraag.com/articles/dubuque-county-pay-for-performance-program,-powere Accessed: November 6, 2021.

1.2 General Program Details (cont'd)

- **Goals/expected outcome(s)**: Truterra is a data collecting and modeling software platform that can be utilized by different entities. Hence the goals and payments depend on the entities relying on Truterra for data management and impact of agronomic practices. In the Dubuque County Pay-For-Performance Program "Participating acres were net carbon negative, sequestering nearly 2x as much GHG in 2021 as emitted in 2020."[373] See Program History for more information on specific success stories.
- **Accepted conservation practices**: Conservation practices that improve sustainability include cover cropping, reducing tillage, and extended crop rotations (from the typical two to three), improved nitrogen management, utilizing variable rate technology.[374]
- **Ecosystem services measured**: Soil carbon accumulation is measured by soil testing, farmer interviews, and other data sources.[375] Truterra's modeling platform offers insights on erosion prevention, sequestering carbon, improving soil health, reducing nutrient loss which effects, risk of leaching, nitrogen use efficiency performance, greenhouse gas performance, and greenhouse gas sequestration which impact water supply and air quality.[376,377]
- **Method of ecosystem services measurement**: Truterra uses a hybrid approach to measure carbon, utilizing stratification soil sampling and modeling.[378] Soil modeling uses algorithms and data (soil type, weather data, tillage patterns, and cover crops) to estimate soil carbon.[379] Computer-based models estimate a national average 0.2-0.5 tons/acre/year carbon removal when no-till and/or cover crops are implemented.[380] For buyers, the Truterra platform offers a "soil to certification approach," but Truterra's definition of soil health is unspecified.[381] The Truterra sustainability tool is positioned to offer other types of ecosystem credits (e.g. water quality and quantity) in the future as well.[382]

---

[373] *Id.*
[374] Truterra. "The Rapidly Evolving Carbon Market in Agriculture an Overview in Questions & Answers." Carbon Market Q&A. October 2020. https://www.truterraag.com/getattachment/1a0ed799-881e-422e-9c43-7fa7abf8281b/Carbon-Market-QA_October-2020.pdf?lang=en-US&ext=.pdf Accessed: November 7, 2021.
[375] Truterra. "The Process of Transforming On-Farm Stewardship into Farm-Generated Carbon Credits." Truterra Carbon Credit V1. n.d. https://www.truterraag.com/getmedia/2f784735-b827-4a65-8e41-8bfdbd5c3924/Truterra-carbon-credit-v1.pdf Accessed: Accessed: November 6, 2021.
[376] Truterra. "How can Truterra help our food system become more transparent?." Truterra YouTube Channel. 2021. https://www.youtube.com/watch?v=xFplNH4GkCM Accessed: November 6, 2021.
[377] Truterra. "The Truterra™ Insights Engine." Truterra YouTube Channel. January 18, 2021. https://www.youtube.com/watch?v=3f_TaEdWQ4s Accessed: November 6, 2021.
[378] Wells, Jennifer. "How is soil carbon measured? And how much is it worth?" In Touch & In Tune. Truterra. February 2021. https://www.truterraag.com/getmedia/99c331a5-fcfe-4095-9298-cec54c05efed/February-Issue_2021.pdf Accessed: November 6, 2021.
[379] *Id.*
[380] *Id.*
[381] Truterra. "Streamlining the path to agricultural carbon and ecosystem services markets." Carbon Program. 2021. https://www.truterraag.com/Carbon Accessed: November 6, 2021.
[382] *Id.*

Appendix IX: Truterra

1.3 Payment Details

- **Practice or performance:** Payments are based on modeling, testing, and/or performance.
- **Ecosystem services paid**: Carbon sequestration as far back as five years.[383]
- **Payment (cost) per unit of service**: In February 2021, Truterra launched its carbon credit program, offering participating farmers $20/ton of carbon and extending that payment back as far as five years to qualifying farmers.[384]
- **Average payment**: Payment depends on market and buyer. The majority of carbon credits sold are between $10-15, but can be as little as $3 or as much as $47.[385] The current Truterra payment of $20 is considered generous for today's market.[386;387]

2. Program History

Truterra is the product of a farmer-owned cooperative seeking ot increase conservation on the ground and private companies wanting to increase their social and/or social responsibility reputation i.e. meet their sustainable development goals (SDG). Jason Weller, then Truterra Vice-President, now President stated, "As private sector demand for on-farm stewardship continues to grow, we're proud to partner with world-class companies like Corbion to bring new resources and new opportunities directly to farmers and their local ag retailers."[388]

The Truterra program was launched by Land O'Lakes in 2016 and since its inception, more than 40 agriculture retailers have joined the network which reflects the current 1,900 farms and 29,000 fields enrolled in the Truterra sustainability tool. Combined, Truterra and Land O'Lakes "touch 25% of all row crop farmers and 50% of the harvested acres."[389] Truterra "is the leading farmer-driven ag and food sustainability program in the U.S."[390] 1,840,000 acres have been put through the Truterra platform.[391] Nineteen states have participating farms.[392] For example, in the Dubuque County Pay for Performance program, payments were made for adopting advanced nutrient management systems (1,591 new acres), adopting cover crops (1,175 new acres), and adopting no-till (183 new acres) which reduced nitrogen loss by an average of 21.9 lbs/acre, phosphorus loss by 2.67 lbs/acre, and reduction of sheet and rill erosion by 14%.[393] In 2021, Truterra announced a partnership with Verdesian Life Sciences to trial their Trident™ nitrogen stabilizer and Verdesian's SEED+™ Liquid and Take Off ST® seed treatments to accelerate cover crop establishment.[394]

---

[383] Truterra. "Streamlining the path to agricultural carbon and ecosystem services markets." Carbon Program. 2021. https://www.truterraag.com/Carbon Accessed: November 6, 2021.
[384] Truterra. "Northern Country Coop Joins Farmer-Owned Truterra Network to Bring New Sustainability and Profitability Opportunities to Local Growers." Articles. 2021. https://www.truterraag.com/articles/northern-country-coop-joins-farmer-owned-truterra Accessed: November 6, 2021.
[385] Wells, Jennifer. "How is soil carbon measured? And how much is it worth?" In Touch & In Tune. Truterra. February 2021. https://www.truterraag.com/getmedia/99c331a5-fcfe-4095-9298-cec54c05efed/February-Issue_2021.pdf Accessed: November 6, 2021.
[386] *Id.*
[387] Truterra. "Northern Country Coop Joins Farmer-Owned Truterra Network to Bring New Sustainability and Profitability Opportunities to Local Growers." Articles. 2021. https://www.truterraag.com/articles/northern-country-coop-joins-farmer-owned-truterra Accessed: November 6, 2021.
[388] Truterra. "Corbion teams with Truterra, farmers to advance sustainable agriculture." Articles. 2021. https://www.truterraag.com/articles/corbion-teams-with-truterra-farmers-to-advance-su Accessed: November 7, 2021.
[389] Truterra. Homepage. 2021. https://www.truterraag.com/ Accessed: November 3, 2021.
[390] *Id.*
[391] Truterra. Farming and Production Organizations. 2021. https://www.truterraag.com/Farming-Production-Organizations Accessed: November 4, 2021.
[392] Truterra. "The future of conservation and sustainability is PRECISION." Truterra YouTube Channel. January 12, 2021. https://www.youtube.com/watch?v=gXM4JsoGVj0 Accessed: November 6, 2021.
[393] Truterra. "Dubuque County Pay-For-Performance Program, Powered by Truterra, Improves Water Quality, Shifts Participating Acres to Carbon Negative." Articles. October 6, 2021. https://www.truterraag.com/articles/dubuque-county-pay-for-performance-program,-powere Accessed: November 6, 2021.
[394] Truterra. "Verdesian Life Sciences and Truterra Team Up to Advance On-Farm Sustainability Across U.S." News. 2021. https://www.truterraag.com/Articles/Verdesian-Life-Sciences-and-Truterra-Team-Up-to-Ad Accessed: November 4, 2021.

2. **Program History (cont'd)**

Truterra is a sustainability tool that provides an online, interactive, live digital platform that allows farmers and their agronomic advisor to virtually trial different management practices (or suites of practices) and compare results for nitrogen efficiency, soil health insights, and sustainability scores or stewardship ranking, or otherwise maximize return on investment on a field-by-field basis.[395,396] Truterra can manage farmer data required to enter markets, helps farmers identify cost share opportunities by working with local, state, and federal agencies, prepare for new markets (e.g. carbon and water quality credits), and share their positive land stewardship story with the community.[397,398] Truterra's modeling software provides data-backed insights to make better informed management decisions.[399]

In 2018, a pilot program in the Chesapeake Bay was launched with partnerships among Truterra, Campbell Soup Company, and the The Mill (Land O'Lakes agricultural retailer). Over the course of a year, participating farmers saw their Truterra sustainability score jump six points due to improved adoption of conservation practices like planting cover crops, implementing no-till, and utilizing nitrogen efficiency strategies.[400] This is part of Campbell's SDG goal of sustainably sourcing 50% of their wheat by 2025.[401] This program began on 10,000 acres in the Chesapeake region in 2017 and in 2019 expanded to an additional 60,000 acres in Ohio with Heritage Cooperative, thus meeting Campbell's 70,000 acre goal in 2020, one year ahead of schedule.[402] Also in 2018, Tate and Lyle in partnership with Truterra launched a demonstration project that initially enrolled 310,000 acres in corn production in the US Midwest, but since then has expanded to 1.5 million acres in corn production which has helped achieve a 10% reduction in greenhouse gas emissions, 38% increase in nitrogen use efficiency, 6% reduction in sheet and rill erosion, and 4% improvement in soil conditioning index.[403]

As part of the INfield Advantage program, Truterra has partnered with Indiana Soybean Alliance (ISA), Indiana Department of Agriculture in a cover crop demonstration trial that tracks the benefits on fields that have never been cover cropped.[404] Farmers receive a $200 sign-up incentive, free cover crop seed, free soil testing and access to the Truterra sustainability tool.[405] The program is funded through USDA Natural Resources Conservation Service, ISA, and Indiana Corn Marketing Council checkoff dollars.[406] Truterra has also partnered with INfield for cover crop trials, split nitrogen application trial, and tillage methods on 40-80 acre fields, offering $200 signing bonus after data is entered, free soil health tests,

---

[395] Truterra. Farming and Production Organizations. 2021. https://www.truterraag.com/Farming-Production-Organizations Accessed: November 4, 2021.
[396] Truterra. "The Truterra™ Insights Engine." Truterra YouTube Channel. January 18, 2021. https://www.youtube.com/watch?v=3f_TaEdWQ4s Accessed: November 6, 2021.
[397] Truterra. Farming and Production Organizations. 2021. https://www.truterraag.com/Farming-Production-Organizations: Accessed: November 4, 2021.
[398] Truterra. "We're delivering sustainability that's truly sustainable." Food and CPG Companies. 2021. https://www.truterraag.com/Food-CPG-Companies Accessed: November 6, 2021.
[399] Truterra. Farming and Production Organizations. 2021. https://www.truterraag.com/Farming-Production-Organizations Accessed: Accessed: November 4, 2021.
[400] Truterra. "Data and Ag Tech Tools Drive Strong Stewardship, Resilient Farm Businesses and Credible Sustainability Claims in the Chesapeake Bay Region." Chesapeake Project Executive Summary. 2021. https://admin.truterraag.com/getmedia/ec516f16-3079-4c04-a344-3ab7b9ed7de8/Chesapeake-Project-Executive-Summary-General.pdf?ext=.pdf Accessed: Accessed: November 6, 2021.
[401] Campbell. "Rooted in Real Food." 2021 Corporate Responsibility Report Update. 2021. https://www.campbellcsr.com/_pdfs/2021_Campbells_CRR.pdf Accessed: November 7, 2021.
[402] *Id.*
[403] Truterra. "Responsible production starts with responsible sourcing." Tate & Lyle Sustainable Agriculture Programme. n.d. https://admin.truterraag.com/getmedia/82e6e55e-d976-4a1d-aa18-b32fdbbae3d1/Tate-Lyle-sustainable-agriculture-programme.pdf?ext=.pdf Accessed: November 6 2021.
[404] Truterra. "INfield Advantage enrollment open for Indiana farmers to test drive cover crops." Articles. 2021. https://www.truterraag.com/articles/infield-advantage-enrollment-open-for-indiana-farm Accessed: November 7, 2021.
[405] *Id.*
[406] *Id.*

2. **Program History (cont'd)**

routine soil tests, and tissue sampling (not for tillage method trial).[407] The INfield Advantage program, as a result of partnering with Truterra, has also partnered with two of Truterra's agricultural retailers, Ceres Solutions and Premier Ag.[408] Truterra is one of Field to Market® Qualified Data Management Partners, has integrated the Field to Market® suite of sustainability metrics into Truterra software, is integrated into Field to Market® Fieldprint calculator, supports multiple Field to Market® projects, over 1,600 farmers, and over 1.5 million acres.[409,410] Truterra's partnership with Tate and Lyle is through Field to Market®.[411]

3. **Carbon Program Process**

- **Project application process:**
  Truterra offers a short (5-6 question) survey for carbon farmers to see if Truterra's offerings are a suitable fit.[412] [413]
- **Project implementation**
  Truterra retailers assist farmers in data collection and ongoing conservation planning with an eye toward carbon sequestration.[414, 415,416] For example, in September 2020, "the U.S. Business Roundtable publicly released 11 policy principles aimed at achieving the goals of the Paris Agreement" and the GHG Protocol, a global GHG accounting standard, "Sustainability commitments related to GHG emissions are categorized as Scope 1, Scope 2 or Scope 3."[417]

  Truterra's process is as follows: 1) "Farmer implements practices to increase soil carbon levels." 2) "Aggregator collects field-level data to quantify soil carbon." 3) "Soil carbon amounts confirmed via soil testing, farmer interviews, other data sources." 4) "Verified data is evaluated against carbon market certification standards plus any buyer requests." 5) "Certified carbon credits owned by farmer or aggregator are made available to buyer(s) and purchase is transacted." 6) "Farmer maintains stewardship records."[418]

---

[407] INfield Advantage. "Get an INfield Advantage." Trials. 2021. https://infieldadvantage.org/trials/#nutrient-inputs-trial Accessed: November 7, 2021.
[408] Truterra. "INfield Advantage enrollment open for Indiana farmers to test drive cover crops." Articles. 2021. https://www.truterraag.com/articles/infield-advantage-enrollment-open-for-indiana-farm Accessed: November 7, 2021.
[409] Field to Market. Member Spotlight: Truterra. 2021. https://fieldtomarket.org/featured-member-spotlight-series/truterra/ Accessed: November 7, 2021.
[410] Garver, Krista. "Land O'Lakes SUSTAIN's On-Farm Digital Platform Connects Farmers, Food Companies in End-to-End Approach to Sustainability." Sustainability Summary. Food Industry Executive. November 20, 2018. https://foodindustryexecutive.com/2018/11/land-olakes-sustains-on-farm-digital-platform-connects-farmers-food-companies-in-end-to-end-approach-to-sustainability/ Accessed: November 7, 2021.
[411] Field to Market. Member Spotlight: Truterra. 2021. https://fieldtomarket.org/featured-member-spotlight-series/truterra/ Accessed: November 7, 2021.
[412] Truterra. "Streamlining the path to agricultural carbon and ecosystem services markets." Carbon Program. 2021. https://www.truterraag.com/Carbon Accessed: November 6, 2021.
[413] Truterra. "We're delivering sustainability that's truly sustainable." Food and CPG Companies. 2021. https://www.truterraag.com/Food-CPG-Companies Accessed: November 6, 2021.
[414] Truterra. "How can Truterra help our food system become more transparent?." Truterra YouTube Channel. 2021. https://www.youtube.com/watch?v=xFplNH4GkCM Accessed: November 6, 2021.
[415] Truterra. "Truterra Partners with Dubuque County, IA to Offer Local Growers Financial Incentives for Sustainability Improvements." Articles. February 23, 2021. https://www.truterraag.com/Articles/Truterra-Partners-with-Dubuque-County,-IA-to-Offer Accessed: November 6, 2021.
[416] Truterra. "The Truterra™ Insights Engine." Truterra YouTube Channel. January 18, 2021. https://www.youtube.com/watch?v=3f_TaEdWQ4s Accessed: November 6, 2021.
[417] Truterra. "The Rapidly Evolving Carbon Market in Agriculture an Overview in Questions & Answers." Carbon Market Q&A. October 2020. https://www.truterraag.com/getattachment/1a0ed799-881e-422e-9c43-7fa7abf8281b/Carbon-Market-QA_October-2020.pdf?lang=en-US&ext=.pdf Accessed: November 7, 2021.
[418] Truterra. "The Process of Transforming On-Farm Stewardship into Farm-Generated Carbon Credits." Truterra Carbon Credit V1. n.d. https://www.truterraag.com/getmedia/2f784735-b827-4a65-8e41-8bfdbd5c3924/Truterra-carbon-credit-v1.pdf Accessed: November 6, 2021.

3. **Program Process (cont'd)**
   - **Project implementation (cont'd)**
     Truterra offers a quick sustainability score option that allows farmers not working Truterra retailers to see how their fields rank, but does not provide any of the modeling or conservation scenario options.[419] Currently, two companies have purchased licenses to the quick stewardship score software.[420] EFC has incorporated Truterra's quick stewardship score into its FieldAlytics software and AGI has incorporated it into its SureTrak management system.[421]
   - **Monitoring, reporting, payment process**
     Monitoring, reporting, and payment process depend on the buyer. The verification method is not explicitly stated. The Truterra sustainability tool helps farmers manage data, generate data, and aggregates farmers data the positive impacts of which can be shared with buyers.[422] Farmers own data "at all times."[423]
   - **Post-project review and evaluation**
     Post-project review and evaluation was not publicly available at the time of writing this report. Anecdotally, Truterra reports that farmers appreciate having field data to make decisions with and receive new data.[424]

4. **Concerns/Issues**
   Depending on the program, only additionality is paid for. Corporate software could promote corporate solutions that prioritize corporate profit over real conservation changes as could be the case with Land O'Lakes Truttera partnership with Verdesian.

[419] Truterra. "How quick sustainability scores are generating renewed interest in conservation." Articles. 2021. https://www.truterraag.com/articles/how-quick-sustainability-scores Accessed: November 7, 2021.
[420] *Id.*
[421] *Id.*
[422] Truterra. "How can Truterra help our food system become more transparent?" Truterra YouTube Channel. 2021. https://www.youtube.com/watch?v=xFplNH4GkCM Accessed: November6, 2021.
[423] Truterra. "Star of the West Milling Co Joins Farmer-Owned Truterra Network to Bring New Sustainability and Profitability Opportunities to Local Growers." Articles. 2021. https://www.truterraag.com/articles/star-of-the-west-milling-co-joins-farmer-owned-tru Accessed: November 7, 2021.
[424] Truterra. "Dubuque County Pay-For-Performance Program, Powered by Truterra, Improves Water Quality, Shifts Participating Acres to Carbon Negative." Articles. October 6, 2021. https://www.truterraag.com/articles/dubuque-county-pay-for-performance-program,-powere Accessed: November 6, 2021.

Appendix IX: Truterra

List of partners:[425]

- Ag Growth International (AGI)
- Colorado State University
- Corbion
- Cotton®
- Cotton Incorporated®
- U.S. Cotton Trust Protocol®
- EFC Systems™
- Microsoft
- National Association of Conservation Districts
- NRCS
- Campbells
- Minnesota Department of Agriculture
- Tate & Lyle
- Tavant
- Walmart
- Northland Capital Equipment Finance
- Soil Health Institute
- Agriculture's Clean Water Alliance
- Ducks Unlimited
- Iowa Agriculture Water Alliance
- INfield Advantage
- Soil and Water Conservation Society
- National Fish and Wildlife Foundation
- AGCO
- California Bioenergy
- Nestle PURINA
- Environmental Initiative
- Environmental Tillage Systems
- Field to Market
- Iowa Soybean Association
- La Crosse SEED
- Pheasants forever The Habitat Organization
- Minnesota University
- USDA
- Cannon River Agriculture Collaborative (public, private, and non-profit) for water quality improvements[426]
    - Central Farm Service
    - Cannon River Watershed Partnership
    - Rice SWCD
    - Steele SWCD
    - Cannon River 1 Watershed 1 Plan
    - Minnesota Agricultural Water Quality Certification Program
    - Great River Greening
    - Environmental Initiative
    - Jennie-O
- National Association of Conservation Districts[427]

---

[425] Truterra. Homepage. 2021. https://www.truterraag.com/ Accessed: November 3, 2021.
[426] Truterra. "Working Together to Protect Water in Minnesota." Articles. 2021. https://www.truterraag.com/Articles/Working-Together-to-Protect-Water-in-Minnesota Accessed: November 6, 2021.
[427] Truterra. "Building Bridges Between Communities." Articles. 2021. https://www.truterraag.com/Articles/Building-Bridges-Between-Communities Accessed: November 7, 2021.

Appendix IX: Truterra

List of partnering retailers[428]

- Ag Valley Co-op
- Alliance Ag & Grain
- Battle Creek Farmers Pride
- Belgrade Coop
- Central Farm Service
- Central Valley Ag
- Centra Sota Cooperative
- Ceres Solutions
- Chandler Coop
- Cooperative Farmers Elevator
- Country Partners Inc
- Equity Exchange
- Farmers Cooperative Society
- Farmward
- Five Star Cooperative
- Frontier Cooperative
- Great Bend Co-op
- GreenPoint Ag
- Heartland Co-op
- Heritage Cooperative
- Innovative Ag Services
- Innovative Ag Services - CA
- Kaup Seed and Fertlizer
- Key Cooperative
- Landus Cooperative
- Linn Co-op Oil Company
- Mercer Landmark
- Midland Marketing Coop Inc
- MKC
- New Vision Cooperative
- Northern Country Co-op
- North Star Cooperative
- NuWay-K&H Cooperative
- Ottawa Cooperative Association
- Pathway Ag
- Premier Ag
- Pride Ag
- Reddy Ag Service, Inc & Ross Soil Service, LLC
- River Valley Cooperative
- Scott Cooperative Association
- Smith Fertilizer and Grain
- Star of the West
- The Mill
- Twin State Inc.
- Vision Ag LLC
- WESTCO
- Windy Ridge Ag

[428] Personal communication with Jill Wheeler, Truterra Senior Manager Public Affairs. January 21, 2022..

Appendix X. Vermont Pay for Phosphorus Program

1. Basic Program Information

- **Program name**: Vermont Pay-For-Phosphorus (VT PfP) Program
- **Program location**: Vermont, USA[429]
- **Year founded**: 2021[429]
- **Size of program (# of farms, landowners, etc.)**: Farms will apply for enrollment in the late Fall of 2021. Target of 100 farms over the course of four years. [429]
- **Acreage of program**: N/A
- **Minimum acreage required**: No[429]
- **Program administrator:** Vermont Agency of Agriculture, Food and Markets Water Quality Division[429]
- **Targeted participants**: Eligible farms statewide that meet the RAP Threshold Criteria with crop or hay acres under management.
- **Prerequisites for enrollment**[429]:
  - Actively farming in Vermont
  - All fields managed by the farm
  - Annual cropland and/or hayland
  - Up-to-date Nutrient Management Plan that meets the standards for their farm size in the RAPs.
  - Good Standing with the VAAFM for state environmental regulations, including VT's Required Agricultural Practices (RAPs) and federal Highly Erodible Land (HEL) and Wetland Conservation Compliance.
- **Acceptance guaranteed after enrollment:** No.
  - Ranking pools will support the greatest percentage of funding for Lake Champlain Basin and the Lake Memphremagog Basin, with some funding set aside for watersheds outside of these Basins. [429]
  - Prioritize applicants with higher % of P-reductions and historically underserved farmers. [429]
  - If farms do not rank out, or do not demonstrate reductions above the regulatory threshold, referred to the Farm Agronomic Practices (FAP) Program or other payment programs. [429]
- **Required data sharing:**
  - Initially enter the whole farm's planned nutrient management for the coming year into the FarmPREP program. [429]
  - By the end of the calendar year the farms will (with the help of TA providers as needed) update FarmPREP to reflect their implemented stewardship and Qualified third parties will verify this implementation. [429]
- **Funding source/who pays:** Farmers will enter into contracts with and receive funding from VAAFM. These payments will be financially supported by the USDA Natural Resources Conservation Service (NRCS) Regional Conservation Program (RCPP) Alternative Funding Arrangement (RCPP-AFA) [429]
- **Budget:**
  - $7 million grant from NRCS[429]
  - $4.9 in payments to VT farmers over five years. [429]

[429] Agency of Agriculture, Food and Markets. (2021). *The Vermont Pay-For-Phosphorus (VPFP) Program Overview*. https://agriculture.vermont.gov/sites/agriculture/files/documents/VPFP_Overview_FAQs.pdf

Appendix X. Vermont Pay for Phosphorus Program

1. <u>Basic Program Information (cont'd)</u>

- **Duration of program:** Five years[430]
- **Goal/expected outcome(s):**[431]
  - Reduce phosphorus loading by an estimated 40,000 lbs.
  - 100 farms enrolled
  - Farmer autonomy in decision-making
  - $4.9 million in payments to farmers
- **Specific conservation practices mentioned/measured**: Practices that are able to be modeled in FarmPREP include nutrient management, crop rotations, conversion to hay, cover crop, reduced tillage, no till, manure incorporation or injection, buffers, and grassed waterways.
- **Ecosystem services measured**: Phosphorus load reduction
- **Method of ecosystem services measurement**: P runoff will be modeled from historic TMDL management scenarios and compared with current management. Resulting net P runoff reductions across the farm that exceed the established threshold will receive a payment per pound of P.[432]
- **Practice or performance:** Performance
- **Enrollment payment:** Yes. Initial Data Entry Payment will be $15 per acre with a cap of $4000 per farm. Data Entry Payment compensates the farmer for their time entering or working with TA providers.[433]
- **Other additional incentive payments:** No
- **What is paid for**: Net pounds of P reduced across the farm beyond the threshold reductions.[434]
- **Payment (cost) per unit of service**: TBD
- **Payment mechanism:** Payment will be made after the growing season is finished.[435]
- **Average payment:** TBD
- **Total payments/percentage of budget towards payments**: $4.9 million, or 70% of the budget is expected to be spent on payments to farmers.[436]
- **Selling point/tagline**: Innovative pay-for-performance approach.

2. <u>History/Brief Overview</u>

The Vermont Pay-For-Phosphorus (VPFP) Program, funded by the USDA NRCS RCPP AFA program, will build a novel Pay-for-Performance program in the State of Vermont that will pay for phosphorus reductions above the Lake Champlain Basin Phosphorus TMDL reduction requirements[437]. This strategy comes in response to the state's need to address issues of non-point source pollution and excess nutrient runoff into Lake Champlain and other bodies of water.[438]

---

[430] Agency of Agriculture, Food and Markets. (2021). *The Vermont Pay-For-Phosphorus (VPFP) Program Overview*. https://agriculture.vermont.gov/sites/agriculture/files/documents/VPFP_Overview_FAQs.pdf
[431] *Id.*
[432] *Id.*
[433] *Id.*
[434] *Id.*
[435] *Id.*
[436] *Id.*
[437] *Id.*
[438] *Id.*

3. <u>Program Process</u>

- **Pre-implementation of project/funding**
  - i. Eligible land is "Annual Cropland" and "Hay Land". Farms statewide that are in good standing with AAFM, meet NRCS requirements, and have an up-to-date NMP are eligible.[439]
  - ii. To encourage farmers to apply to the program and enter their data in FarmPREP, AAFM will offer a one-time Initial Data Entry Payment to all new applicants. In the first year this will be $15 per acre with a cap of $4000 per farm. Farms enter the whole farm's planned nutrient management for the coming year into FarmPREP in winter.[440]
  - iii. Priority given to the Lake Champlain Basin and to the Lake Memphremagog Basin. Ranking will prioritize applicants with a higher net percentage of P-reductions across the farm and historically underserved farmers. If farms do not rank out, or do not demonstrate reductions above an additionality threshold set by VAAFM, they will be referred to other existing payment programs that may be able to support practice implementation.[441]
  - iv. Successful applicants will be notified and invited to enroll in early spring.[442]
- **Project implementation**
  - i. Annually, farms will apply in January. VAAFM and NRCS will screen applicants for eligibility. Eligible first-time applicants will receive a contract for Data Entry Payment, and work with a TA provider to enter their farm maps and planned land management into the FarmPREP tool. Once that is complete, those farms will receive a Data Entry Payment and all farms/entries will be ranked. A subset of farms will be offered a contract for the rest of the year for implementation of the plan as described in FarmPREP.[443]
  - ii. Detail of monitoring, reporting, payment process
    1. Enrolled farms will implement conservation practices in the growing season and will work with TA providers to update FarmPREP accordingly.[444]
    2. Qualified third parties will verify the implementation and FarmPREP records.[445]
    3. Farms will be paid for the pounds of P they reduce above min. Program thresholds at the growing season's end.[446]

4. <u>Concerns/Issues</u>

- Almost at time of implementation for the first round of applications and there has yet to be a determination for the payment per lb. of P.[447]
- Preference to Lake Champlain Basin and Lake Memphremagog watershed may be seen as unfair.[463]
- May push farmers into addressing a state resource concern (phosphorus loading) that they are not directly connected to or see as an issue affecting their area.[463]

---

[439] Agency of Agriculture, Food and Markets. (2021). *The Vermont Pay-For-Phosphorus (VPFP) Program Overview*. https://agriculture.vermont.gov/sites/agriculture/files/documents/VPFP_Overview_FAQs.pdf
[440] *Id.*
[441] *Id.*
[442] *Id.*
[443] *Id.*
[444] *Id.*
[445] *Id.*
[446] *Id.*
[447] *Id.*