

118TH CONGRESS  
1ST SESSION

# H. R. 5160

To require the Secretary of Agriculture to conduct research relating to measurement, monitoring, reporting, and verification of greenhouse gas emissions and carbon sequestration, and for other purposes.

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## IN THE HOUSE OF REPRESENTATIVES

AUGUST 4, 2023

Mr. SORENSEN (for himself and Mr. LAWLER) introduced the following bill;  
which was referred to the Committee on Agriculture

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## A BILL

To require the Secretary of Agriculture to conduct research relating to measurement, monitoring, reporting, and verification of greenhouse gas emissions and carbon sequestration, and for other purposes.

1 *Be it enacted by the Senate and House of Representa-*  
2 *tives of the United States of America in Congress assembled,*

3 **SECTION 1. SHORT TITLE.**

4 This Act may be cited as the “Advancing Research  
5 on Agricultural Climate Impacts Act of 2023”.

6 **SEC. 2. DEFINITION OF SECRETARY.**

7 In this Act, the term “Secretary” means the Sec-  
8 retary of Agriculture.



1           (E) other stakeholders who reflect the  
2           operational, geographic, and socioeconomic di-  
3           versity of United States agricultural operations.

4           (4) REQUIREMENTS.—The methodology devel-  
5           oped under paragraph (1) shall, to the maximum ex-  
6           tent practicable—

7                   (A) be usable at any location at which soil  
8                   carbon can be directly measured;

9                   (B)(i) require measurement to a standard  
10                  soil depth sufficient for measuring the core set  
11                  of variables described in paragraph (5), deter-  
12                  mined using the best available science; or

13                  (ii) if measurement to the standard soil  
14                  depth described in clause (i) is not practicable  
15                  due to insufficient soil depth or other factors  
16                  relating to the applicable sample site, require  
17                  measurement in accordance with an alternate  
18                  approach developed by the Secretary, using the  
19                  best available science, that—

20                           (I) requires measurement to the max-  
21                           imum allowable depth of a sample site; and

22                           (II) produces data that is interoper-  
23                           able with data collected by measurement to  
24                           the standard soil depth in accordance with  
25                           clause (i);

1 (C) measure the core set of variables de-  
2 scribed in paragraph (5) to produce a standard  
3 set of reporting metrics;

4 (D) produce data that is interoperable with  
5 other data collected by the Department of Agri-  
6 culture;

7 (E) account for calibration differences in  
8 soil analysis between testing facilities;

9 (F) account for differences in uncertainty  
10 between different measurement tools; and

11 (G) be usable for voluntary reporting of  
12 soil carbon data under subsection (b).

13 (5) CORE VARIABLES.—The methodology devel-  
14 oped under paragraph (1) shall measure the fol-  
15 lowing core set of variables for each sample:

16 (A) Bulk density.

17 (B) Organic carbon concentration.

18 (C) Rock fraction volume and weight.

19 (D) Other variables, as determined by the  
20 Secretary.

21 (b) VOLUNTARY SOIL CARBON DATA REPORTING.—

22 (1) TECHNICAL ASSISTANCE.—

23 (A) IN GENERAL.—The Secretary, acting  
24 through the Chief of the Natural Resources  
25 Conservation Service, shall provide to producers

1 described in paragraph (2) technical assistance,  
2 including guidance, for voluntarily measuring,  
3 monitoring, and reporting to the Secretary soil  
4 carbon data using the methodology developed  
5 under subsection (a).

6 (B) GUIDANCE.—Guidance provided under  
7 subparagraph (A) shall be, at a minimum—

8 (i) available in multiple languages;  
9 and

10 (ii) available to producers described in  
11 paragraph (2) in both digital and analog  
12 formats.

13 (2) APPLICABILITY.—The guidance developed  
14 under paragraph (1) shall be applicable to—

15 (A) producers that are recipients of grants  
16 under programs described in paragraph (3) to  
17 voluntarily measure, monitor, and report to the  
18 Secretary soil carbon outcomes under those pro-  
19 grams; and

20 (B) any other producer that elects to vol-  
21 untarily report to the Secretary direct measure-  
22 ments of soil carbon data.

23 (3) PROGRAMS DESCRIBED.—The programs re-  
24 ferred to in paragraph (2)(A) include—

1 (A) conservation innovation grants under  
2 section 1240H of the Food Security Act of  
3 1985 (16 U.S.C. 3839aa–8);

4 (B) the sustainable agriculture research  
5 and education program under subtitle B of title  
6 XVI of the Food, Agriculture, Conservation,  
7 and Trade Act of 1990 (7 U.S.C. 5801 et seq.);

8 (C) the organic agriculture research and  
9 extension initiative established under section  
10 1672B of that Act (7 U.S.C. 5925b);

11 (D) grants under the Agriculture and Food  
12 Research Initiative under section 2(b) of the  
13 Competitive, Special, and Facilities Research  
14 Grant Act (7 U.S.C. 3157(b)); and

15 (E) such other programs as the Secretary  
16 determines to be appropriate.

17 (4) REQUIREMENT.—The Secretary shall seek  
18 to provide culturally appropriate technical assistance  
19 and guidance under paragraph (1) to socially dis-  
20 advantaged farmers and ranchers (as defined in sec-  
21 tion 355(e) of the Consolidated Farm and Rural De-  
22 velopment Act (7 U.S.C. 2003(e))).

23 (c) UPDATES.—

24 (1) IN GENERAL.—The Secretary shall update  
25 the methodology developed under subsection (a)(1)

1 and the guidance issued under subsection (b)(1)(B)  
2 as needed to reflect the best-available data science.

3 (2) INTEROPERABILITY.—In making any up-  
4 dates under paragraph (1), the Secretary shall en-  
5 sure that data collected with the updated method-  
6 ology remains interoperable with previously collected  
7 measurements.

8 (d) AUTHORIZATION OF APPROPRIATIONS.—There is  
9 authorized to be appropriated to carry out this section  
10 \$2,000,000 for each fiscal year.

11 **SEC. 4. DEVELOPMENT OF NEW MEASUREMENT TOOLS**

12 **UNDER AFRI.**

13 Section 2(b)(2)(D) of the Competitive, Special, and  
14 Facilities Research Grant Act (7 U.S.C. 3157(b)(2)(D))  
15 is amended—

16 (1) in clause (vii), by striking “and” at the end;

17 (2) in clause (viii), by striking the period at the  
18 end and inserting “; and”; and

19 (3) by adding at the end the following:

20 “(ix) measuring, monitoring, report-  
21 ing, and verifying greenhouse gas emis-  
22 sions and carbon sequestration.”.

1 **SEC. 5. SOIL HEALTH AND CARBON DEMONSTRATION**  
2 **TRIALS.**

3 (a) ON-FARM CONSERVATION INNOVATION  
4 TRIALS.—Section 1240H(c) of the Food Security Act of  
5 1985 (16 U.S.C. 3839aa–8(c)) is amended—

6 (1) in paragraph (1)(B)(i), by striking sub-  
7 clause (III) and inserting the following:

8 “(III) soil health management  
9 systems, including—

10 “(aa) systems to maintain or  
11 increase soil carbon levels; and

12 “(bb) cost-effective tools to  
13 measure, monitor, report, and  
14 verify greenhouse gas emissions  
15 and carbon sequestration;” and

16 (2) in paragraph (3)(D), by striking “3 years”  
17 each place it appears and inserting “5 years”.

18 (b) SUSTAINABLE AGRICULTURE RESEARCH AND  
19 EDUCATION PROGRAM.—Section 1621(e) of the Food, Ag-  
20 riculture, Conservation, and Trade Act of 1990 (7 U.S.C.  
21 5811(e)) is amended—

22 (1) by striking “The Secretary” and inserting  
23 the following:

24 “(1) IN GENERAL.—The Secretary”; and

25 (2) by adding at the end the following:





1           “(5) RESOURCE CHARACTERISTICS.—The term  
2           ‘resource characteristics’ means—

3                   “(A) geographic, climate, natural resource,  
4                   and soil type characteristics; and

5                   “(B) any other characteristics that the  
6                   Secretary determines to be appropriate for the  
7                   purpose of carrying out the program.

8           “(6) SECRETARY.—The term ‘Secretary’ means  
9           the Secretary, acting jointly through the Chief of the  
10           Natural Resources Conservation Service and the Ad-  
11           ministrators of the Agricultural Research Service.

12           “(b) ESTABLISHMENT.—

13                   “(1) IN GENERAL.—The Secretary shall estab-  
14                   lish a program to inventory, monitor, and analyze  
15                   soil carbon changes on eligible land in the United  
16                   States.

17                   “(2) PURPOSES.—The purposes of the program  
18                   are—

19                           “(A) to analyze soil properties, including  
20                           soil organic carbon, across space, time, and  
21                           depth;

22                           “(B) to analyze the impacts of land man-  
23                           agement strategies, including conservation ac-  
24                           tivities, on soil carbon sequestration; and

1           “(C) to inform any tools of the Secretary  
2           designed to predict the impacts of different land  
3           management practices, including implementing  
4           conservation activities, on greenhouse gas emis-  
5           sions and soil carbon sequestration across the  
6           United States.

7           “(3) CONSULTATION.—In carrying out the pro-  
8           gram, the Secretary shall consult with the Director  
9           of the National Institute of Food and Agriculture,  
10          the Chief of the Forest Service, the Chief Data Offi-  
11          cer, the Administrator of the Environmental Protec-  
12          tion Agency, the Secretary of Energy, and the head  
13          of any other department or agency that the Sec-  
14          retary determines to be appropriate.

15          “(c) SAMPLING.—

16                 “(1) SAMPLE SITES.—The Secretary shall select  
17                 sample sites under the program by taking into con-  
18                 sideration—

19                         “(A) the accessibility of sites;

20                         “(B) the ease of collecting repeated meas-  
21                         urements over time; and

22                         “(C) such other factors as the Secretary  
23                         determines to be appropriate.

24                 “(2) PREFERENCE.—In selecting sample sites  
25                 under paragraph (1), the Secretary shall give pref-

1       erence to sites that have been used for soil testing  
2       previously.

3           “(3) NUMBER OF SAMPLE SITES.—The Sec-  
4       retary shall select sufficient sample sites under para-  
5       graph (1) to analyze changes in soil carbon across  
6       regional resource areas, as determined by the Sec-  
7       retary, over time, taking into account the geo-  
8       graphical size and heterogeneity of each regional re-  
9       source area.

10       “(d) INVENTORY.—

11           “(1) IN GENERAL.—Every 5 years, the Sec-  
12       retary shall prepare an inventory of soil carbon  
13       stocks on eligible land, under which the Secretary  
14       shall collect measurements at each sample site se-  
15       lected under subsection (c).

16           “(2) METHODOLOGY.—The Secretary shall en-  
17       sure that the methodology developed under section  
18       3(a) of the Advancing Research on Agricultural Cli-  
19       mate Impacts Act of 2023 is used for purposes of  
20       conducting measurements at each sample site under  
21       the program.

22           “(3) MINIMUM NUMBER OF SAMPLES.—The  
23       Secretary shall measure a sufficient number of sam-  
24       ples to analyze changes in soil carbon at each sample

1 site selected under subsection (c) for each inventory  
2 under paragraph (1).

3 “(4) CHARACTERISTICS.—In preparing the in-  
4 ventory under paragraph (1), the Secretary shall  
5 document the following characteristics for each sam-  
6 ple site selected under subsection (c):

7 “(A) Soil type and texture.

8 “(B) Land use history, including conserva-  
9 tion activities.

10 “(C) Environmental characteristics, such  
11 as temperature and precipitation.

12 “(D) Other characteristics, as determined  
13 by the Secretary.

14 “(e) INDIVIDUAL PROTECTIONS.—

15 “(1) PROTECTION OF PRIVATE PROPERTY  
16 RIGHTS.—Before selecting a sample site under sub-  
17 section (c) or conducting any measurement under  
18 subsection (d)(1), the Secretary shall obtain author-  
19 ization from the owner of the eligible land.

20 “(2) VOLUNTARINESS REQUIREMENT.—The  
21 Secretary may not require authorization under para-  
22 graph (1) or any other participation in any activity  
23 under this section as a condition on receipt of any  
24 benefit under a program administered by the Sec-  
25 retary.

1           “(3) DATA PRIVACY PROTECTION.—In carrying  
2 out the program, the Secretary shall ensure that  
3 data is collected and analyzed while respecting rel-  
4 evant privacy safeguards and does not include any  
5 identifiable, proprietary, or personal information of  
6 individual land owners or operators.

7           “(f) DATA CENTER.—

8           “(1) IN GENERAL.—Data collected under the  
9 program shall be maintained in a data center oper-  
10 ated by the Secretary.

11           “(2) PARTNERSHIPS.—The data center de-  
12 scribed in paragraph (1) may be operated in part-  
13 nership with 1 or more of the following entities, if  
14 the entity complies with paragraph (4):

15           “(A) An 1862 Institution (as defined in  
16 section 2 of the Agricultural Research, Exten-  
17 sion, and Education Reform Act of 1998 (7  
18 U.S.C. 7601)).

19           “(B) An 1890 Institution (as defined in  
20 that section).

21           “(C) A 1994 Institution (as defined in sec-  
22 tion 532 of the Equity in Educational Land-  
23 Grant Status Act of 1994 (7 U.S.C. 301 note;  
24 Public Law 103–382)).

1           “(D) Institutions of higher education with  
2           expertise in predictive modeling, large-scale  
3           data collection, soil carbon research, or agricul-  
4           tural land management to mitigate climate  
5           change.

6           “(E) Federal research centers.

7           “(3) APPLICATIONS.—An entity described in  
8           any of subparagraphs (A) through (E) of paragraph  
9           (2) seeking to enter into a partnership to manage  
10          the data center described in paragraph (1) shall sub-  
11          mit to the Secretary an application at such time, in  
12          such manner, and containing such information as  
13          the Secretary may require.

14          “(4) REQUIREMENTS.—The data center de-  
15          scribed in paragraph (1) shall—

16                 “(A) use the industry standard protocols  
17                 to protect identifiable, proprietary, or personal  
18                 information of individual land owners or opera-  
19                 tors;

20                 “(B) ensure that individual producer data  
21                 is not sold through the center; and

22                 “(C) comply with all applicable privacy re-  
23                 quirements, including—

24                         “(i) section 1770 of the Food Security  
25                         Act of 1985 (7 U.S.C. 2276);

1                   “(ii) section 1619 of the Food, Con-  
2                   servation, and Energy Act of 2008 (7  
3                   U.S.C. 8791);

4                   “(iii) section 502(c) of the Federal  
5                   Crop Insurance Act (7 U.S.C. 1502(c));  
6                   and

7                   “(iv) section 552 of title 5, United  
8                   States Code.

9                   “(5) LIMITED RELEASE OF INFORMATION.—

10                  The Secretary may release or disclose information  
11                  maintained in the data center described in para-  
12                  graph (1) pursuant to section 1619(b)(3)(A)(i) of  
13                  the Food, Conservation, and Energy Act of 2008 (7  
14                  U.S.C. 8791(b)(3)(A)(i)) to researchers for the pur-  
15                  poses of statistically analyzing the information.

16                  “(g) PUBLIC AVAILABILITY.—On completion of each  
17                  inventory under subsection (d)(1), the Secretary shall  
18                  make publicly available—

19                         “(1) the statistical or aggregated form of data  
20                         collected from measurements under that subsection;

21                         “(2) information regarding the methodology  
22                         used to collect that data; and

23                         “(3) any analysis made of the measurements  
24                         described in paragraph (1).



1       “(h) REPORTS.—On completion of each inventory  
2 under subsection (d)(1), the Secretary shall prepare, pub-  
3 lish, and make available to the public a report that—

4           “(1) contains a description of soil carbon  
5 trends, including by incorporating measurements  
6 conducted under subsection (d) during the 5 years  
7 covered by the report;

8           “(2) contains an analysis of the impact of dif-  
9 ferent land management practices, including imple-  
10 menting 1 or more conservation activities, on soil  
11 carbon levels;

12           “(3) contains an analysis of the effect of weath-  
13 er and climate variability on the observed trends;

14           “(4) contains an analysis of how land manage-  
15 ment practices, including conservation activities,  
16 that influence soil carbon sequestration may affect  
17 the rate of emissions of other greenhouse gases in  
18 the agricultural sector, including methane and ni-  
19 trous oxide; and

20           “(5) establishes a benchmark for the baseline  
21 soil carbon absent additional conservation activities.

22       “(i) STRATEGIC PLAN.—Not later than 1 year after  
23 the date of enactment of the Advancing Research on Agri-  
24 cultural Climate Impacts Act of 2023, the Secretary shall  
25 prepare and submit to Congress a strategic plan to imple-

1 ment and carry out this section, which shall describe in  
2 detail—

3           “(1) the organization and procedures necessary  
4           to implement and carry out this section;

5           “(2) the plan for measurements in each re-  
6           gional resource area under subsection (d)(1) for the  
7           first 5-year interval, including the schedule and the  
8           number of samples collected from each sample site  
9           selected under subsection (c).

10          “(j) AUTHORIZATION OF APPROPRIATIONS.—There  
11 is authorized to be appropriated to carry out this section  
12 \$17,500,000 for each fiscal year.”.

13 **SEC. 7. PREDICTIVE MODELS.**

14          (a) IN GENERAL.—The Secretary shall develop and  
15 maintain a modeling tool (or combination of tools) that  
16 shall predict the impacts of different land management  
17 practices, including implementing conservation activities,  
18 on greenhouse gas emissions and soil carbon sequestration  
19 across the United States.

20          (b) CONSULTATION.—In developing the modeling tool  
21 or tools under subsection (a), the Secretary shall consult  
22 with—

23           (1) the Secretary of Energy;

24           (2) the Administrator of the Environmental  
25           Protection Agency;

1           (3) agricultural producers, including socially  
2           disadvantaged farmers and ranchers (as defined in  
3           section 355(e) of the Consolidated Farm and Rural  
4           Development Act (7 U.S.C. 2003(e)));

5           (4) soil carbon experts;

6           (5) nonprofit organizations;

7           (6) academic researchers;

8           (7) private companies with expertise in soil car-  
9           bon sequestration or greenhouse gas monitoring for  
10          agricultural operations; and

11          (8) other stakeholders, including the heads of  
12          other appropriate Federal agencies or non-Federal  
13          entities, who reflect the operational, geographic, and  
14          socioeconomic diversity of United States agricultural  
15          operations.

16          (c) REQUIREMENTS.—The modeling tool or tools de-  
17          scribed in subsection (a) shall—

18               (1) be anchored in direct measurements of land,  
19               including soil sampling, such as under the program  
20               established under section 1240N of the Food Secu-  
21               rity Act of 1985 and the programs described in sec-  
22               tion 3(b)(3);

23               (2) account for differences that could impact  
24               land management outcomes, including—

25                       (A) soil type;

- 1 (B) type of land use;
- 2 (C) type of crop;
- 3 (D) geography and local climate;
- 4 (E) geographic size of the land-use oper-
- 5 ation;
- 6 (F) ongoing or existing conservation activi-
- 7 ties; and
- 8 (G) such other items as the Secretary de-
- 9 termines to be appropriate;
- 10 (3) allow a user of the tool to estimate the
- 11 changes in greenhouse gas emissions or soil carbon
- 12 sequestration, and the uncertainty of those esti-
- 13 mated changes, that occur as a result of imple-
- 14 menting 1 or more conservation activities; and
- 15 (4) be user-friendly and accessible—
- 16 (A) to producers and researchers; and
- 17 (B) in multiple languages.

18 (d) **REVIEWS AND UPDATES.**—

19 (1) **REVIEWS.**—Not less frequently than annu-

20 ally, the modeling tool or tools described in sub-

21 section (a) shall be reviewed to determine if an up-

22 date is required to reflect the best available data and

23 science.

24 (2) **UPDATES.**—If it is determined that an up-

25 date is required under paragraph (1), the update

1 shall be made not later than 1 year after the date  
2 of that determination.

3 (e) PARTNERS.—

4 (1) IN GENERAL.—In analyzing data, con-  
5 ducting research, and developing and maintaining  
6 the modeling tool or tools under subsection (a), the  
7 Secretary may partner with—

8 (A) an Institution described in paragraph  
9 (2);

10 (B) an institution of higher education with  
11 expertise in predictive modeling, large-scale  
12 data collection, soil carbon research, or agricul-  
13 tural land management to mitigate climate  
14 change; or

15 (C) a Federal research center.

16 (2) INSTITUTIONS DESCRIBED.—An Institution  
17 referred to in paragraph (1)(A) is any of the fol-  
18 lowing:

19 (A) An 1862 Institution (as defined in sec-  
20 tion 2 of the Agricultural Research, Extension,  
21 and Education Reform Act of 1998 (7 U.S.C.  
22 7601)).

23 (B) An 1890 Institution (as defined in  
24 that section).

1           (C) A 1994 Institution (as defined in sec-  
2           tion 532 of the Equity in Educational Land-  
3           Grant Status Act of 1994 (7 U.S.C. 301 note;  
4           Public Law 103–382)).

5           (f) ANNUAL REPORT.—Not later than 2 years after  
6           the date of enactment of this Act, and annually thereafter,  
7           the Secretary shall submit to Congress a report that—

8           (1) describes the progress of the Secretary in  
9           developing the modeling tool or tools under sub-  
10          section (a);

11          (2) contains an assessment of the accuracy with  
12          which a user will be able to use the tool to determine  
13          the permanence and additionality of greenhouse gas  
14          emissions reduced or carbon sequestered;

15          (3) describes the models and data that the Sec-  
16          retary has developed or collected, or intends to de-  
17          velop or collect, as applicable, for purposes of devel-  
18          oping or maintaining the tool;

19          (4) describes—

20                  (A) whether it was determined that an up-  
21                  date was required under subsection (d)(1); and

22                  (B) if an update was required, the specifics  
23                  of the update;

24          (5) includes any other information that, as de-  
25          termined by the Secretary, is relevant to—

1 (A) the efficacy of the tool;

2 (B) the intended applications of the tool;

3 or

4 (C) the determination of—

5 (i) changes in greenhouse gas emis-  
6 sions or soil carbon sequestration associ-  
7 ated with producer land-use practices; or

8 (ii)(I) estimates of the impacts of land  
9 use practices, including conservation activi-  
10 ties, on greenhouse gas emissions and soil  
11 carbon sequestration; and

12 (II) the measurement error of the  
13 tool.

14 (g) AUTHORIZATION OF APPROPRIATIONS.—There is  
15 authorized to be appropriated to carry out this section  
16 \$500,000 for each fiscal year.

○