

Calendar No. 122

111TH CONGRESS
1ST SESSION**S. 601****[Report No. 111-57]**

To establish the Weather Mitigation Research Office, and for other purposes.

IN THE SENATE OF THE UNITED STATES

MARCH 16, 2009

Mrs. HUTCHISON introduced the following bill; which was read twice and referred to the Committee on Commerce, Science, and Transportation

JULY 22, 2009

Reported by Mr. ROCKEFELLER, with an amendment

[Strike all after the enacting clause and insert the part printed in italic]

A BILLTo establish the Weather Mitigation Research Office, 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 “Weather Mitigation
 5 Research and Development Policy Authorization Act of
 6 2009”.

1 **SEC. 2. PURPOSE.**

2 It is the purpose of this Act to develop and implement
3 a comprehensive and coordinated national weather mitiga-
4 tion policy and a national cooperative Federal and State
5 program of weather mitigation research and development.

6 **SEC. 3. FINDINGS.**

7 Congress finds the following:

8 (1) According to a 2003 report by the National
9 Research Council, “people in drought- and hail-
10 prone areas willingly spend significant resources on
11 weather mitigation programs, and in 2001 there
12 were at least 66 operational programs being con-
13 ducted in 10 States across the United States. At the
14 same time, less than a handful of weather mitigation
15 research programs are underway worldwide, and re-
16 lated research in the United States has dropped to
17 less than \$500,000 per year from a high of
18 \$20,000,000 in the late 1970s.” The NRC report
19 entitled “Critical Issues in Weather Modification Re-
20 search” also states that “a coordinated national pro-
21 gram of weather modification research is needed”.
22 Such a program is supported by States that need a
23 scientific means of evaluating current programs and
24 increasing their effectiveness through applied re-
25 search.

(2) Droughts in the United States result in an average economic loss between \$6,000,000,000 and \$8,000,000,000 annually, while severe hail producing storms result in up to \$2,300,000,000 damage to crops and over \$2,000,000,000 in property loss annually. Snowpack, rain enhancement, and hail suppression weather mitigation projects help reduce these losses, and additional research in these areas will make existing programs even more effective and permit them to better quantify their impacts. Recent droughts in the Western United States have produced low lake levels at Lake Powell and Lake Mead and have led the Seven Colorado River Basin States to create cooperative agreements. A separate cooperative agreement is in place for wintertime snowfall enhancement programs in the States of Utah, Colorado, and Wyoming to pursue water augmentation to benefit the entire Colorado River System.

(3) Past and recent evaluations of the potential for snowpack augmentation by cloud seeding in the Colorado River Basin indicate a significant yield in runoff can be attained through properly designed projects. A 2006 evaluation by the Bureau of Reclamation of the Department of the Interior indicates

1 the potential for 800,000 additional acre-feet of
2 water.

3 (4) The impacts of possible climate change and
4 the human impact on weather are not well under-
5 stood. Weather mitigation research could provide
6 data on what, if any, impact pollution may have on
7 the precipitation processes in cloud systems. Re-
8 search into inadvertent and planned weather mitiga-
9 tion may increase our understanding and knowledge
10 of any potential impacts.

11 (5) The recent Weather Damage Modification
12 Program conducted by the Bureau of Reclamation
13 employed a successful model for combining local,
14 State, and Federal resources in providing a means
15 for scientific evaluation of operational cloud-seeding
16 projects (rainfall and snowfall enhancement and hail
17 suppression) in North Dakota, Oklahoma, Texas,
18 Colorado, Utah, Nevada, and California.

19 **SEC. 4. DEFINITIONS.**

20 In this Act:

21 (1) **Advisory Board.**—The term “Advisory
22 Board” means the Advisory Board established by
23 section 5(b).

1 (2) DIRECTOR.—The term “Director” means
2 the Director of the Office appointed under section
3 5(a).

4 (3) OFFICE.—The term “Office” means the
5 Weather Mitigation Research Office established
6 under section 5(a).

7 (4) RESEARCH AND DEVELOPMENT.—The term
8 “research and development” means theoretical anal-
9 ysis, exploration, experimentation, and the extension
10 of investigative findings and theories of a scientific
11 or technical nature into practical application for ex-
12 perimental and demonstration purposes, including
13 the experimental production and testing of models,
14 devices, equipment, materials, and processes.

15 **SEC. 5. WEATHER MITIGATION RESEARCH OFFICE ESTAB-**
16 **LISHED.**

17 (a) ESTABLISHMENT.—There is established in the
18 National Science Foundation the Weather Mitigation Re-
19 search Office to establish and coordinate the national re-
20 search and development program on weather mitigation
21 described in section 6. The Office shall be headed by a
22 Director, who shall be appointed by the Director of the
23 National Science Foundation.

24 (b) ADVISORY BOARD.—

1 (1) IN GENERAL.—The Office shall have an Ad-
2 visory Board, the function of which shall be to ad-
3 vise the Office and to make recommendations to the
4 Office concerning legislation, policies, administra-
5 tion, research, and other matters, consisting of 11
6 members, appointed by the Director of the National
7 Science Foundation, as follows:

8 (A) At least 2 members shall be represent-
9 atives of States that are currently supporting
10 operational weather mitigation programs.

11 (B) At least 2 members shall be a rep-
12 resentative of the National Center for Atmos-
13 pheric Research of the National Science Foun-
14 dation.

15 (C) At least 1 member shall be a rep-
16 resentative of National Aeronautics and Space
17 Administration.

18 (D) At least 1 member shall be a rep-
19 resentative of the American Meteorological So-
20 ciety.

21 (E) At least 1 member shall be a rep-
22 resentative of the American Society of Civil En-
23 gineers.

1 (F) At least 1 member shall be a rep-
 2 resentative of the National Academy of
 3 Sciences.

4 (G) At least 1 member shall be a rep-
 5 resentative of the National Oceanic and Atmos-
 6 pheric Administration of the Department of
 7 Commerce.

8 (H) At least 1 member shall be a rep-
 9 resentative of the Department of Agriculture.

10 (I) At least 1 member shall be a represent-
 11 ative of institutions of higher education or re-
 12 search institutes with experience in the field.

13 (2) TENURE.—A member of the Advisory
 14 Board shall serve at the pleasure of the Director of
 15 the National Science Foundation.

16 (3) VACANCIES.—Any vacancy on the Advisory
 17 Board shall be filled in the same manner as the
 18 original appointment.

19 (c) CHAIR AND VICE CHAIR.—The Advisory Board
 20 shall select a Chair and Vice Chair from among its mem-
 21 bers.

22 (d) INITIAL MEETING.—Not later than 30 days after
 23 the date on which all members of the Advisory Board have
 24 been appointed, the Advisory Board shall hold its first
 25 meeting.

1 (e) MEETINGS.—The Advisory Board shall meet at
2 the call of the Chair.

3 (f) QUORUM.—A majority of the members of the Ad-
4 visory Board shall constitute a quorum, but a lesser num-
5 ber of members may hold hearings.

6 (g) DUTIES OF THE OFFICE.—

7 (1) STUDIES, INVESTIGATIONS, AND HEAR-
8 INGS.—The Office may conduct studies, obtain in-
9 formation, and hold hearings necessary to carry out
10 the purposes of this Act.

11 (2) COOPERATION WITH OTHER AGENCIES.—
12 The Office may cooperate with public or private
13 agencies to promote the purposes of this Act.

14 (3) COOPERATIVE AGREEMENTS.—The Office
15 may enter into cooperative agreements with the head
16 of any department or agency of the United States,
17 an appropriate official of any State or political sub-
18 division of a State, or an appropriate official of any
19 private or public agency or organization to conduct
20 research and development pertaining to weather
21 mitigation.

22 (4) CONDUCTING AND CONTRACTING FOR RE-
23 SEARCH AND DEVELOPMENT.—The Director may
24 conduct or contract for research and development
25 activities in accordance with section 6.

1 **SEC. 6. NATIONAL RESEARCH AND DEVELOPMENT PRO-**
2 **GRAM ON WEATHER MITIGATION.**

3 (a) **IMPLEMENTATION PLAN.**—Not later than 180
4 days after the date of enactment of this Act, the Director,
5 in consultation with the Advisory Board, shall develop and
6 submit to Congress a plan for the establishment and co-
7 ordination of the national research and development pro-
8 gram required by section 5(a). The plan shall—

9 (1) for the 10-year period beginning in the year
10 it is submitted, establish the goals and priorities for
11 Federal research that most effectively advance sci-
12 entific understanding of weather mitigation;

13 (2) describe specific activities required to
14 achieve such goals and priorities, including funding
15 of competitive research grants, training and support
16 for scientists, and participation in international re-
17 search efforts;

18 (3) identify and address, as appropriate, rel-
19 evant programs and activities of the Federal agen-
20 cies and departments that would contribute to the
21 program;

22 (4) consider and use, as appropriate, reports
23 and studies conducted by Federal agencies and de-
24 partments, weather modification organizations, and
25 other expert scientific bodies, including the National

1 Research Council report entitled “Critical Issues in
2 Weather Modification Research”;

3 ~~(5) make recommendations for the coordination~~
4 ~~of program activities with weather mitigation activi-~~
5 ~~ties of other national and international organiza-~~
6 ~~tions; and~~

7 ~~(6) estimate Federal funding for research ac-~~
8 ~~tivities to be conducted under the program.~~

9 ~~(b) PROGRAM ACTIVITIES.—~~The national research
10 and development program required by section 5(a) may
11 include the following activities related to weather mitiga-
12 tion:

13 ~~(1) Interdisciplinary research and development~~
14 ~~and coordination of research and development and~~
15 ~~activities to improve understanding of processes re-~~
16 ~~lating to planned and inadvertent weather mitiga-~~
17 ~~tion; including the following:~~

18 ~~(A) Research related to cloud and precipi-~~
19 ~~tation physics.~~

20 ~~(B) Cloud dynamics and cloud modeling.~~

21 ~~(C) Improving cloud seeding-related tech-~~
22 ~~nologies.~~

23 ~~(D) Severe weather and storm research.~~

24 ~~(E) Research related to potential adverse~~
25 ~~affects of weather mitigation.~~

1 (2) Coordination with relevant organizations
2 that engage in weather mitigation research.

3 (3) Development through partnerships among
4 Federal agencies, State agencies with weather modi-
5 fication experience, and academic institutions of new
6 technologies and approaches for weather mitigation.

7 (4) Establishing scholarships and educational
8 opportunities that encourage an interdisciplinary ap-
9 proach to weather mitigation.

10 (5) Promotional activities in accordance with
11 subsection (c).

12 (6) Administering the grant program described
13 in subsection (d).

14 (c) PROMOTION OF RESEARCH AND DEVELOP-
15 MENT.—In order to assist in expanding the theoretical
16 and practical knowledge of weather mitigation, the Office
17 shall promote and fund research and development, studies,
18 and investigations with respect to—

19 (1) improved forecast and decision-making tech-
20 nologies for weather mitigation operations, including
21 tailored computer workstations and software and
22 new observation systems with remote sensors; and

23 (2) assessments and evaluations of the efficacy
24 of weather mitigation.

1 (d) GRANT PROGRAM FOR RESEARCH AND DEVELOP-
2 MENT.—

3 (1) IN GENERAL.—The Office may establish a
4 grant program for the award of grants to eligible en-
5 tities for research and development projects that
6 pertain to weather mitigation. To the extent prac-
7 ticable, the grant program shall be modeled after
8 both the Atmospheric Modification Program imple-
9 mented by the National Oceanic and Atmospheric
10 Administration in 1980, and the Weather Damage
11 Modification Program implemented by the Bureau of
12 Reclamation of the Department of the Interior in
13 2002.

14 (2) FEDERAL SHARE.—The Office may not
15 award a grant under this subsection for a project if
16 the Federal share of such project would be greater
17 than 65 percent of the project cost, which may in-
18 clude in-kind services furnished by the participating
19 entity.

20 (3) ELIGIBLE ENTITIES.—For purposes of this
21 subsection, an eligible entity is a State agency, insti-
22 tution of higher education, or nonprofit organization
23 that has—

24 (A) an established background and exper-
25 tise in the field of weather mitigation; and

1 ~~(B)~~ experience with working with and co-
 2 ordinating with State agencies.

3 ~~(4)~~ USE OF FUNDS.—A recipient of a grant
 4 under this subsection may only use the grant for a
 5 research and development project that—

6 ~~(A)~~ pertains to weather mitigation; and

7 ~~(B)~~ was in operation on the day before the
 8 date the grant was awarded.

9 **SEC. 7. ANNUAL REPORT ON ACTIVITIES.**

10 ~~(a)~~ IN GENERAL.—Not later than January 31, and
 11 annually thereafter, the Director shall prepare and submit
 12 an annual report to the President, the Senate Committee
 13 on Commerce, Science, and Transportation, and the
 14 House of Representatives Committee on Science and
 15 Technology on the activities conducted pursuant to this
 16 Act during the preceding calendar year, including the fol-
 17 lowing:

18 ~~(1)~~ A summary of the achievements of Federal
 19 weather mitigation research, including federally sup-
 20 ported external research, during the preceding fiscal
 21 year.

22 ~~(2)~~ An analysis of the progress made toward
 23 achieving the goals and objectives of the plan devel-
 24 oped under section 6(a), including the identification
 25 of trends.

1 ~~(3) A copy or summary of the plan required by~~
 2 ~~section 6(a) and any changes made to the plan.~~

3 ~~(4) A summary of agency budgets for weather~~
 4 ~~mitigation activities for the preceding fiscal year.~~

5 ~~(5) Recommendations, if any, regarding addi-~~
 6 ~~tional action or legislation that may be required to~~
 7 ~~assist in achieving the purposes of this Act.~~

8 ~~(6) A description of the relationship between re-~~
 9 ~~search conducted on weather mitigation and re-~~
 10 ~~search conducted pursuant to the Global Change Re-~~
 11 ~~search Act of 1990 (15 U.S.C. 2921 et seq.), as well~~
 12 ~~as research on weather forecasting and prediction.~~

13 ~~(7) A description of any potential adverse con-~~
 14 ~~sequences on life, property, or water resource avail-~~
 15 ~~ability from weather mitigation efforts, and any sug-~~
 16 ~~gested means of mitigating or reducing such con-~~
 17 ~~sequences if such efforts are undertaken.~~

18 ~~(b) FIRST REPORT.—The first report required by~~
 19 ~~subsection (a) shall be submitted on January 31 in the~~
 20 ~~second calendar year following the date of the enactment~~
 21 ~~of this Act.~~

22 **SEC. 8. COOPERATION WITH WEATHER MITIGATION RE-**
 23 **SEARCH OFFICE.**

24 The head of any department or agency of the United
 25 States and the head of any other public or private agency

1 or institution that receives research funds from the United
 2 States shall, to the extent practicable, cooperate with the
 3 Office for purposes of carrying out this Act.

4 **SEC. 9. FUNDING.**

5 (a) AUTHORIZATION OF APPROPRIATIONS.—There
 6 are authorized to be appropriated to the Office for the
 7 purposes of carrying out this Act \$25,000,000 for each
 8 of the fiscal years 2010 through 2014. Amounts appro-
 9 priated pursuant to this subsection shall remain available
 10 until expended.

11 (b) ALLOCATION.—Of the amounts appropriated to
 12 the National Science Foundation under subsection (a) for
 13 each fiscal year—

14 (1) 66 percent shall be available to, and re-
 15 tained by, the National Science Foundation for use
 16 in carrying out its responsibilities under this Act;

17 (2) 34 percent shall be transferred by the Na-
 18 tional Science Foundation to—

19 (A) the National Oceanic and Atmospheric
 20 Administration; and

21 (B) the National Aeronautics and Space
 22 Administration.

23 (c) COMPETITIVE GRANTS.—The Director of the Na-
 24 tional Science Foundation and the Administrators of the
 25 National Oceanic and Atmospheric Administration and

1 the Aeronautics and Space Administration shall each allo-
 2 cate at least 50 percent of the amounts retained by or
 3 transferred to their respective entities under subsection
 4 (b) for each fiscal year to competitive grants.

5 (d) GIFTS.—The Office may accept, use, and dispose
 6 of gifts or donations of services or property.

7 **SECTION 1. SHORT TITLE.**

8 *This Act may be cited as the “Weather Mitigation Re-*
 9 *search and Development Policy Authorization Act of 2009”.*

10 **SEC. 2. PURPOSE.**

11 *It is the purpose of this Act to develop a national coop-*
 12 *erative Federal and State program of weather mitigation*
 13 *research and development.*

14 **SEC. 3. FINDINGS.**

15 *Congress finds the following:*

16 (1) *According to a 2003 report by the National*
 17 *Research Council, “people in drought- and hail-prone*
 18 *areas willingly spend significant resources on weather*
 19 *mitigation programs, and in 2001 there were at least*
 20 *66 operational programs being conducted in 10 States*
 21 *across the United States. At the same time, less than*
 22 *a handful of weather mitigation research programs*
 23 *are underway worldwide, and related research in the*
 24 *United States has dropped to less than \$500,000 per*
 25 *year from a high of \$20,000,000 in the late 1970s.”*

1 *The NRC report entitled “Critical Issues in Weather*
2 *Modification Research” also states that “a coordi-*
3 *nated national program of weather modification re-*
4 *search is needed”. Such a program is supported by*
5 *States that need a scientific means of evaluating cur-*
6 *rent programs and increasing their effectiveness*
7 *through applied research.*

8 *(2) Droughts in the United States result in an*
9 *average economic loss between \$6,000,000,000 and*
10 *\$8,000,000,000 annually, while severe hail producing*
11 *storms result in up to \$2,300,000,000 damage to*
12 *crops and over \$2,000,000,000 in property loss annu-*
13 *ally. Snowpack, rain enhancement, and hail suppres-*
14 *sion weather mitigation projects could help reduce*
15 *these losses, and additional research in these areas*
16 *could make existing programs even more effective and*
17 *permit them to better quantify the impacts of those*
18 *projects. Recent droughts in the Western United*
19 *States have produced low lake levels at Lake Powell*
20 *and Lake Mead and have led the Seven Colorado*
21 *River Basin States to create cooperative agreements.*
22 *A separate cooperative agreement is in place for win-*
23 *tertime snowfall enhancement programs in the States*
24 *of Utah, Colorado, and Wyoming to pursue water*

1 *augmentation to benefit the entire Colorado River*
 2 *System.*

3 *(3) Past and recent evaluations of the potential*
 4 *for snowpack augmentation by cloud seeding in the*
 5 *Colorado River Basin indicate the potential for a sig-*
 6 *nificant yield in runoff through properly designed*
 7 *projects. A 2006 evaluation by the Bureau of Rec-*
 8 *lamation of the Department of the Interior indicates*
 9 *the potential for 800,000 additional acre-feet of water.*

10 *(4) Weather mitigation research could provide*
 11 *insights on the interaction of pollution with the pre-*
 12 *cipitation processes in cloud systems. Research into*
 13 *inadvertent and planned weather mitigation may in-*
 14 *crease our understanding and knowledge of any po-*
 15 *tential impacts.*

16 *(5) The recent Weather Damage Modification*
 17 *Program conducted by the Bureau of Reclamation*
 18 *employed a successful model for combining local,*
 19 *State, and Federal resources in providing a means for*
 20 *scientific evaluation of operational cloud-seeding*
 21 *projects (rainfall and snowfall enhancement and hail*
 22 *suppression) in North Dakota, Oklahoma, Texas, Col-*
 23 *orado, Utah, Nevada, and California.*

24 **SEC. 4. DEFINITIONS.**

25 *In this Act:*

1 (1) *DIRECTOR*.—The term “Director” means the
2 Director of the Program appointed under section 5(a).

3 (2) *PROGRAM*.—The term “Program” means the
4 Weather Mitigation Research Program established
5 under section 5(a).

6 (3) *RESEARCH AND DEVELOPMENT*.—The term
7 “research and development” means theoretical anal-
8 ysis, exploration, experimentation, and the extension
9 of investigative findings and theories of a scientific or
10 technical nature into practical application for experi-
11 mental and demonstration purposes, including the de-
12 velopment of experimental models, instrumentation,
13 materials, and processes.

14 (4) *WEATHER MITIGATION*.—The term “weather
15 mitigation” means the purposeful or inadvertent
16 changing or controlling, or attempting to change or
17 control, by artificial methods the natural development
18 of atmospheric cloud forms or precipitation forms in
19 the troposphere.

20 (5) *WORKING GROUP*.—The term “Working
21 Group” means the Working Group established by sec-
22 tion 5(c).

1 **SEC. 5. WEATHER MITIGATION RESEARCH PROGRAM ES-**
 2 **TABLISHED.**

3 (a) *ESTABLISHMENT.*—*There is established in the Na-*
 4 *tional Science Foundation's Geosciences Directorate the*
 5 *Weather Mitigation Research Program to establish and co-*
 6 *ordinate the national research and development program on*
 7 *weather mitigation described in section 6. The Program*
 8 *shall be headed by a Director, who shall be appointed by*
 9 *the Director of the Geosciences Directorate. The Director of*
 10 *the National Science Foundation shall coordinate the Pro-*
 11 *gram's work with the Office of Science and Technology Pol-*
 12 *icy.*

13 (b) *DUTIES OF THE PROGRAM DIRECTOR.*—

14 (1) *STUDIES, INVESTIGATIONS, AND WORK-*
 15 *SHOPS.*—*The Director may fund studies, obtain infor-*
 16 *mation, and hold workshops necessary to carry out*
 17 *the purposes of this Act.*

18 (2) *COOPERATION WITH OTHER AGENCIES.*—*The*
 19 *Director may cooperate with public or private agen-*
 20 *cies to promote the purposes of this Act.*

21 (3) *COOPERATIVE AGREEMENTS.*—*The Director*
 22 *may enter into cooperative agreements with the head*
 23 *of any department or agency of the United States, an*
 24 *appropriate official of any State or political subdivi-*
 25 *sion of a State, or an appropriate official of any pri-*
 26 *vate or public agency or organization to conduct re-*

1 *search and development pertaining to weather mitiga-*
 2 *tion.*

3 *(c) WORKING GROUP.—*

4 *(1) IN GENERAL.—The Program shall have a*
 5 *Working Group, the function of which shall be to ad-*
 6 *vice the Program and to make recommendations to*
 7 *the Program concerning administration, research,*
 8 *and other matters, consisting of the Program Director*
 9 *and 11 members, appointed by the Director of the Na-*
 10 *tional Science Foundation, as follows:*

11 *(A) At least 2 members shall be representa-*
 12 *tives of States that are currently supporting*
 13 *weather mitigation programs.*

14 *(B) At least 1 member shall be a representa-*
 15 *tive of institutions of higher education or re-*
 16 *search institutes with experience in the field.*

17 *(C) Other members shall have expertise in*
 18 *one or more of the following areas:*

19 *(i) Cloud dynamics.*

20 *(ii) Precipitation physics.*

21 *(iii) Nucleation theory.*

22 *(iv) Hydrology.*

23 *(v) Water management engineering.*

24 *(vi) Numerical modeling of cloud sys-*
 25 *tems.*

1 (vii) *Hail and fog.*

2 (viii) *Social sciences.*

3 (ix) *Lightning.*

4 (x) *Any other area of expertise deemed*
5 *necessary by the Director.*

6 (2) *TENURE.*—*A member of the Working Group*
7 *shall serve at the pleasure of the Director of the Na-*
8 *tional Science Foundation.*

9 (3) *VACANCIES.*—*Any vacancy on the Working*
10 *Group shall be filled in the same manner as the origi-*
11 *nal appointment.*

12 (d) *CHAIR AND VICE CHAIR.*—*The Working Group*
13 *shall select a Chair and Vice Chair from among its mem-*
14 *bers.*

15 (e) *INITIAL MEETING.*—*Not later than 30 days after*
16 *the date on which all members of the Working Group have*
17 *been appointed, the Working Group shall hold its first meet-*
18 *ing.*

19 (f) *MEETINGS.*—*The Working Group shall meet at the*
20 *call of the Chair.*

21 (g) *QUORUM.*—*A majority of the members of the Work-*
22 *ing Group shall constitute a quorum, but a lesser number*
23 *of members may hold hearings.*

1 **SEC. 6. NATIONAL RESEARCH AND DEVELOPMENT PRO-**
 2 **GRAM ON WEATHER MITIGATION.**

3 (a) *IMPLEMENTATION PLAN.*—Not later than 1 year
 4 after the date of enactment of this Act, the Director, in con-
 5 sultation with the Working Group, shall develop and submit
 6 to Congress a plan for the establishment and coordination
 7 of the national research and development program required
 8 by section 5(a). The plan shall—

9 (1) for the 10-year period beginning in the year
 10 it is submitted, establish the goals and priorities for
 11 Federal research that most effectively advance sci-
 12 entific understanding of weather mitigation;

13 (2) describe specific activities required to achieve
 14 such goals and priorities, including funding of com-
 15 petitive research grants, training and support for sci-
 16 entists, and participation in international research
 17 efforts; and

18 (3) estimate Federal funding for research activi-
 19 ties to be conducted under the program.

20 (b) *PROGRAM ACTIVITIES.*—The national research and
 21 development program required by section 5(a) may include
 22 the following activities related to weather mitigation:

23 (1) *Interdisciplinary research and development*
 24 *and coordination of research and development and ac-*
 25 *tivities to improve understanding of processes relating*

1 to planned and inadvertent weather mitigation, in-
 2 cluding the following:

3 (A) Research related to cloud and precipita-
 4 tion physics.

5 (B) Cloud dynamics and cloud modeling.

6 (C) Research on advance technologies re-
 7 lated to cloud seeding.

8 (D) Severe weather and storm research.

9 (E) Research related to potential adverse af-
 10 fects of weather mitigation.

11 (2) Coordination with relevant organizations
 12 that engage in weather mitigation research.

13 (3) Development through partnerships among
 14 Federal agencies, State agencies with weather modi-
 15 fication experience, and academic institutions of new
 16 technologies and approaches for weather mitigation.

17 (4) Establishing scholarships and educational
 18 opportunities that encourage an interdisciplinary ap-
 19 proach to weather mitigation.

20 (5) Dissemination activities in accordance with
 21 subsection (c).

22 (6) Administering the grant program described
 23 in subsection (d).

24 (c) PROMOTION OF RESEARCH AND DEVELOPMENT.—

25 In order to assist in expanding the theoretical and practical

1 *knowledge of weather mitigation, the Program shall pro-*
 2 *mote and fund research and development, studies, and in-*
 3 *vestigations with respect to—*

4 (1) *improved forecast and decisionmaking tech-*
 5 *nologies for weather mitigation operations, including*
 6 *innovations in human-centered observations systems*
 7 *and remote sensor systems; and*

8 (2) *adaptation and scaling experiments in the ef-*
 9 *ficacy of weather mitigation.*

10 (d) *GRANT PROGRAM FOR RESEARCH AND DEVELOP-*
 11 *MENT.—*

12 (1) *IN GENERAL.—The Director of the National*
 13 *Science Foundation may establish a grant program*
 14 *for the award of grants to eligible entities for research*
 15 *and development projects that pertain to weather*
 16 *mitigation. For purposes of this subsection, an eligible*
 17 *entity is a State agency, institution of higher edu-*
 18 *cation, or nonprofit organization that has—*

19 (A) *an established background and expertise*
 20 *in the field of weather mitigation; and*

21 (B) *experience with working with and co-*
 22 *ordinating with State agencies.*

23 (2) *USE OF FUNDS.—A recipient of a grant*
 24 *under this subsection may only use the grant for a re-*

1 search and development project that pertains to
2 weather mitigation.

3 **SEC. 7. BIENNIAL REPORT ON ACTIVITIES.**

4 (a) *IN GENERAL.*—Not later than January 31, and
5 every 2 years thereafter, the Director shall prepare and sub-
6 mit a report to the President, the Senate Committee on
7 Commerce, Science, and Transportation, and the House of
8 Representatives Committee on Science and Technology on
9 the activities conducted pursuant to this Act during the pre-
10 ceding 2 calendar years, including the following:

11 (1) *A summary of the achievements of Federal*
12 *weather mitigation research, including federally sup-*
13 *ported external research, during the preceding 2 fiscal*
14 *years.*

15 (2) *An analysis of the progress made toward*
16 *achieving the goals and objectives of the plan devel-*
17 *oped under section 6(a), including the identification*
18 *of trends.*

19 (3) *A copy or summary of the plan required by*
20 *section 6(a) and any changes made to the plan.*

21 (4) *Recommendations, if any, regarding addi-*
22 *tional action that may be required to assist in achiev-*
23 *ing the purposes of this Act.*

24 (5) *A description of any potential adverse con-*
25 *sequences on life, property, or water resource avail-*

8 *SEC. 8. COOPERATION WITH WEATHER MITIGATION RE-*
9 *SEARCH PROGRAM.*

15 **SEC. 9. COORDINATION.**

(1) identify and address, as appropriate, relevant programs and activities of the Federal agencies and departments that would contribute to the program;

(2) consider and use, as appropriate, reports and studies conducted by Federal agencies and departments, weather modification organizations, and other

1 *expert scientific bodies, including the National Re-*
 2 *search Council report entitled “Critical Issues in*
 3 *Weather Modification Research”; and*

4 *(3) make recommendations for the coordination*
 5 *of program activities with weather mitigation activi-*
 6 *ties of other national and international organizations,*
 7 *in consideration of relevant international agreements.*

8 *(b) ANNUAL REPORT.—In support of the annual re-*
 9 *port required by section 7(a), the Office of Science and*
 10 *Technology Policy shall provide—*

11 *(1) a summary of agency budgets for weather*
 12 *mitigation research for the preceding fiscal year; and*

13 *(2) a description of the relationship between re-*
 14 *search conducted on weather mitigation and research*
 15 *conducted pursuant to the Global Change Research*
 16 *Act of 1990 (15 U.S.C. 2921 et seq.), as well as re-*
 17 *search on weather forecasting and prediction.*

18 **SEC. 10. FUNDING.**

19 *(a) AUTHORIZATION OF APPROPRIATIONS.—There are*
 20 *authorized to be appropriated to the Director of the Na-*
 21 *tional Science Foundation for the purposes of carrying out*
 22 *this Act \$25,000,000 for each of the fiscal years 2010*
 23 *through 2014. Amounts appropriated pursuant to this sub-*
 24 *section shall remain available until expended.*

- 1 (b) *GIFTS.*—*The Program may accept, use, and dis-*
2 *pose of gifts or donations of services or property.*

Calendar No. 122

11TH CONGRESS
1ST Session

S. 601

[Report No. 111-57]

A BILL

To establish the Weather Mitigation Research
Office, and for other purposes

JULY 22, 2009

Reported with an amendment