Comparison of Climate Change Adaptation Provisions in S. 1733 and H.R. 2454

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Summary

This report summarizes and compares climate change adaptation-related provisions in the American Clean Energy and Security Act of 2009 (H.R. 2454) and the Clean Energy, Jobs, and Power Act (S. 1733). H.R. 2454 was introduced by Representatives Waxman and Markey and passed the House on June 26, 2009. S. 1733 was introduced to the Senate by Senators Boxer and Kerry and, after subsequent revisions made in the form of a manager's substitution amendment, was reported out of the Senate Environment and Public Works Committee on November 5, 2009.

Adaptation measures aim to improve an individual's or institution's ability to cope with or avoid harmful impacts of climate change, and to take advantage of potential beneficial ones. Both H.R. 2454 and S. 1733 include adaptation provisions that (1) seek to better assess the impacts of climate change and variability that are occurring now and in the future; and (2) support adaptation activities related to climate change, both domestically and internationally.

Overall, while the two bills would authorize similar adaptation programs, they differ somewhat in scope and emphasis, and they also differ in the distribution of emission allowance allocations over time. Both bills contain provisions that address international climate change adaptation; domestic climate change adaptation programs, including the U.S. Global Change Research Program (USGCRP), the National Climate Service, and state and tribal programs; public health; and natural resources adaptation. S. 1733 includes five additional provisions not provided for in the House bill that deal with drinking water utilities; water system mitigation and adaptation partnerships; flood control, protection, prevention, and response; wildfire; and coastal Great Lakes states' adaptation.

Neither the Senate-reported bill (S. 1733) nor the House-passed bill (H.R. 2454) contains a process at the federal level for developing and implementing a national strategic plan to address the full range of sectors expected to be affected by climate change. Neither bill includes provisions that explicitly address adaptation in major sectors such as transportation and energy infrastructure, or agriculture.

Another difference between S. 1733 and H.R. 2454 is the distribution of allowance allocations over time, and the subsequent availability of the amounts credited to certain funds. The relative distribution of allowances to adaptation-related activities is slightly higher in the House bill than in the Senate bill, and the difference increases over time, but the actual amounts of revenue generated would be contingent on the number and price of emission allowances. The Senate bill provides that funds for many adaptation-related provisions, such as for natural resources and public health, are made available "without further appropriations." In contrast, the analogous provisions in the House bill provide that the funds would become available only by subsequent appropriations.

A side-by-side table is included in an appendix to the report that compares adaptation-related provisions in H.R. 2454 and S. 1733.

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Introduction

Congress is currently considering major legislation related to climate change. Climate change responses have typically been categorized into two broad types: mitigation and adaptation. Mitigation measures attempt to slow down the occurrence of climate change by, for example, reducing greenhouse gas emissions. Adaptation measures, on the other hand, aim to improve an individual or institution's ability to cope with or avoid harmful impacts of climate change, and to take advantage of potential beneficial ones. While much attention has been paid to mitigation efforts, a growing focus on current impacts of climate change has led to specific provisions in several bills that would increase research on and programmatic attention to possible options for adaptation.[1] Climate change mitigation and adaptation activities are not mutually exclusive, and in most cases can actually be complementary. Because the extent of climate change impacts upon different ecosystems, regions, and sectors of the economy will depend not only on the sensitivity of those systems to climate change, but also on the systems' ability to adapt to climate change, both types of activities are considered by many to be an essential part of a comprehensive approach to dealing with the impacts of climate change.

The American Clean Energy and Security Act of 2009 (H.R. 2454) passed the House on June 26, 2009. The Senate Environment and Public Works (EPW) Committee approved the Clean Energy, Jobs, and Power Act (S. 1733) on November 5, 2009.[2] Both H.R. 2454 and S. 1733 would establish a cap-and-trade system to regulate greenhouse gas emissions, and address energy topics including energy efficiency and renewable energy. Both bills also include adaptation provisions that (1) seek to better assess the impacts of climate change and variability that are occurring now and in the future; and (2) support adaptation activities related to climate change, both domestically and internationally.

This report summarizes and compares the adaptation-related provisions in H.R. 2454 and S. 1733. A side-by-side table in an **Appendix** to the report compares relevant provisions related to climate change adaptation in both bills. The provisions are grouped into the following headings:

- International Climate Change Adaptation
- Domestic Climate Change Adaptation (including the National Climate Change Adaptation Program and the National Climate Services Program)
- State and Tribal Programs
- Public Health
- Natural Resources Adaptation
- Other Climate Change Adaptation Programs, including Water Resources (in S. 1733 only)

[1] For instance, in October, Senators Bingaman, Whitehouse, and Baucus introduced the Natural Resources Climate Adaptation Act of 2009, which would require federal agencies to prepare a national strategy and agency plans to minimize the adverse impacts of climate change on natural resources and maximize resilience.

[2] The Senate Environment and Public Works Committee reported out of committee on November 5, 2009, a revised version of S. 1733, a manager's amendment in the nature of a substitute. S. 1733 was originally introduced by Senators Boxer and Kerry in September 2009. The analysis herein refers to the Senate EPW Committee-reported version of S. 1733, which is available at the Senate EPW Committee website: http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=1d1bc826-beed-4eb3-933b-d7559bc61d4b.

Climate Change and Adaptation

Importance of Adaptation

Climate-related changes have been observed in the United States and globally. A recent report by the U.S. Global Change Research Program (USGCRP) provided scientific documentation of the impacts of climate change already occurring in the United States.[3] The report analyzed different sectors and regions of the United States and concluded that climate disruption causes a wide range of damaging impacts in the United States currently, and that these impacts will continue to intensify, depending on the region. The report also found that population growth and increased use of resources will limit the ability of society and natural systems to adapt successfully. Specific findings include increased:

- stress on water resources, which will amplify regional droughts and reduce water supply, especially in regions dependent on western mountain snowpack;
- risk for coastal settlements, infrastructure, and ecosystems from sea-level rise and more intense hurricanes and storm surges;
- numbers of wildfires and areas of forest adversely affected or destroyed by pest outbreaks linked to warming;
- threats to human health related to heat waves, poor air quality, and insect-borne diseases;
- challenges to crop and livestock production due to increasing stress on water resources, increasing temperatures, increasing outbreaks of pests and diseases, and the need for new management practices;
- stress of population growth and overuse of resources, which will limit the ability of society and natural systems to adapt successfully.

The Intergovernmental Panel on Climate Change (IPCC) stated in its Fourth Assessment Report that "adaptation will be necessary to address impacts resulting from the warming which is already unavoidable due to past emissions."[4] The panel concluded that many industrial sectors and the natural environment, including agriculture, forestry, water resources, human health, coastal settlements, and natural ecosystems, will need to adapt to a changing climate or possibly face diminished productivity, functioning, and health.

Adaptation can include a wide range of activities. For agriculture, examples of adaptation can include farmers changing management practices—for example, altering their planting dates and irrigation scheduling—or farmers switching to different crop varieties altogether, in response to changing temperature and rainfall regimes. For coastal regions, strategies to prevent damage from climate change and rising sea levels can include improving shoreline protection measures—for example, installing dikes, levies, other structures, and beach vegetation—or can result in

[3] United States Global Change Research Program, *Global Climate Change Impacts in the United States*, 2009, http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts.

[4] M. L. Parry, O. F. Canziani, J. P. Palutikof, P. J. van der Linden, and C. E. Hanson, eds., *Climate Change 2007: Impacts, Adaptation and Vulnerability*, Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge, UK.

companies relocating key business centers away from coastal areas vulnerable to inundation and hurricanes. The costs of implementing adaptation measures are generally considered in relation to the value of the assets protected, in order to assess the net benefit of adaptation investments.

Current Status of Public Action

While adaptation as an approach for dealing with the impacts of climate change is gaining increasing attention, few examples exist of concrete actions or strategies dealing with adaptation across different levels of government. According to a recent report by the National Research Council (NRC), individuals and institutions are unprepared both conceptually and practically for meeting the challenges and opportunities that climate change presents.[5] Similarly, at a recent hearing of the House Select Committee on Energy Independence and Global Warming, experts testified that current U.S. adaptation efforts are largely ad hoc, uncoordinated, underfunded, and lacking the information needed to make critical decisions.[6] Specifically, testimony from the Government Accountability Office (GAO), based on its recently released report on nationwide climate change adaptation efforts, concluded that adaptation efforts are often constrained by a lack of site-specific data, such as local projections of expected changes, and by a lack of clear roles and responsibilities among federal, state, and local agencies.[7] The NRC report included recommendations to bolster the capacity of federal programs in the area of climate science and information; to strengthen research on adaptation, mitigation, and vulnerability; to initiate a periodic national assessment of climate impacts and responses; and to routinely provide policymakers and the public with the relevant scientific information, tools, and forecasts to make better-informed decisions.

Adaptation initiatives are starting to gain traction at the federal and state levels.[8] For instance, the Department of Interior (DOI) recently launched an internal agency initiative to develop a coordinated strategy to address current and future impacts of climate change. [9] The DOI initiative, which was established through secretarial order,[10] establishes a framework through which Interior bureaus will coordinate climate change science and resource management strategies. Also, the National Oceanic and Atmospheric Administration's (NOAA's) Regional Integrated Sciences and Assessments has a program that supports research to meet the adaptation-related information needs of local decision-makers. While federal agencies are beginning to recognize the need to adapt to climate change, there is still a general lack of strategic coordination across agencies, and most efforts to adapt to potential climate change impacts are preliminary.

[5] National Research Council, *Restructuring Federal Climate Research to Meet the Challenges of Climate Change*, 2009, http://www.nap.edu/catalog.php?record_id=12595.

[6] House Select Committee on Energy Independence and Global Warming, "Building U.S. Resilience to Global Warming Impacts," hearing held on October 22, 2009, http://globalwarming.house.gov/pubs?id=0011#main_content.

[7] General Accountability Office (GAO), *Climate Change Adaptation—Strategic Federal Planning Could Help Government Officials Make More Informed Decisions*, GAO-10-113, October 2009, http://www.gao.gov/new.items/d10113.pdf.

[8] For an overview of what 13 federal agencies are doing related to climate change adaptation, see Government Accountability Office (GAO), *Climate Change Adaptation: Information on Selected Federal Efforts to Adapt to a Changing Climate*, GAO-10-114SP, October 7, 2009, an E-supplement to GAO-10-113**,** http://www.gao.gov/new.items/d10114sp.pdf.

[9] See http://www.doi.gov/news/09_News_Releases/091409.html.

[10] Secretarial Order No. 3289, http://www.doi.gov/climatechange/SecOrder3289.pdf.

Some states have begun to make progress on adaptation independently and through partnerships with other entities, such as academic institutions. The state of California recently developed and released a draft California Climate Adaptation Strategy.[11] This is the first example of a strategic, operational plan for collaborative action by state agencies to adapt to impacts of global climate disruption and sea-level rise. Maryland has also begun a strategic planning process to better understand the impacts of climate change on the state's economy and natural resources, especially the Chesapeake Bay region, and to coordinate state efforts.

In devising these strategic plans for adaptation, states are often calling for more resources, leadership, and coordination from the federal government. Specifically, state agencies such as those in California and Maryland are advocating for:

- more federal support for state research programs that generate locally relevant data and information related to potential impacts of climate change;
- an integrated national intergovernmental strategy on adaptation that is coordinated among relevant state and federal agencies, and is multidisciplinary and inclusive of other sectors such as transportation, energy, agriculture, forestry, water resources, and utilities;
- more dedicated federal funding for adaptation, to carry out programs to protect coastal communities, natural resources, and the national interest from the impacts of climate change.

Some are skeptical of implementing wide-scale adaptation measures and argue that adaptation activities should not be comprehensively pursued because attention and resources will detract from mitigation efforts. Others think that adaptation activities are just another way for various interest groups and sectors to seek government subsidies for activities they would already otherwise be doing.

Overview of Adaptation Provisions in S. 1733 (as Reported by the Senate EPW Committee) vs. H.R. 2454 (as Passed by the House)

This report summarizes and compares the adaptation provisions in S. 1733, as reported by the Senate Environment and Public Works (EPW) Committee on November 5, 2009, and H.R. 2454, as passed by the House on June 26, 2009. Overall, while the two bills would authorize similar adaptation programs, they differ somewhat in scope and emphasis, and they also differ in the distribution of emission allowance allocations, which in effect provide monetary resources for specified programs and activities.[12] Both bills contain provisions that address:

[11] See http://www.energy.ca.gov/2009publications/CNRA-1000-2009-027/CNRA-1000-2009-027-D.PDF.

[12] In a cap-and-trade system, companies or other groups are issued a number of emission *allowances* (or *credits*) which represent the right to emit a specific amount of greenhouse gases. The total amount of allowances and credits cannot exceed the cap, limiting total emissions to that level. Policymakers decide how, to whom, and for what purpose to distribute emission allowances. The allowances represent significant value in terms of a wealth transfer in the case of directly allocated allowances or government revenue in the case of auctioned allowances. For more information, see CRS Report RL34502, *Emission Allowance Allocation in a Cap-and-Trade Program: Options and Considerations*, by (continued...)

- international climate change adaptation;
- domestic climate change adaptation programs, including the National Climate Change Program and the National Climate Service;
- state and tribal programs;
- public health; and
- natural resources adaptation.

S. 1733 contains five additional provisions (not contained in the House bill) that deal with:

- drinking water utilities;
- water system mitigation and adaptation partnerships;
- flood control, protection, prevention, and response;
- wildfire; and
- coastal Great Lakes state adaptation.

Neither the Senate-reported bill (S. 1733) nor the House-passed bill (H.R. 2454) contains a process at the federal level for developing and implementing a national strategic plan to address the full range of sectors expected to be affected by climate change. Neither bill includes explicit provisions that address adaptation in major sectors such as transportation and energy infrastructure, or agriculture, although these activities are allowable under state programs for climate adaptation that are provided for in both bills.

It should be noted that while forestry and agriculture are considered extensively in S. 1733 and H.R. 2454 with regard to supplemental emissions reductions, set-asides and allowances, and carbon offsets, these considerations are not specifically related to adaptation. Depending on the nature of the implementation, these programs could potentially assist in forest and agriculture adaptation to climate change. However, they have not been included in this report because emissions mitigation is their primary purpose (not adaptation), and adaptation is not necessarily a consideration in their implementation.

Allowance Allocations for Adaptation-Related Activities

Although there are significant differences in how the overall emission allowances are distributed, both bills would allocate allowances or auction revenues to fund various adaptation activities.[13] **Table 1** provides an overview of the emission allowances allocated to adaptation-related activities for 2016 and 2030, given as a percentage of total allowances for both bills.

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(name redacted).

[13] For a comparison of cap-and-trade provisions, including a discussion of allowance allocation differences between S. 1733 and H.R. 2454, see CRS Report R40896, *Climate Change: Comparison of the Cap-and-Trade Provisions in H.R. 2454 and S. 1733*, by (name redacted), (name redacted), and (name redacted).

Table 1. Adaptation Allowances in S. 1733 vs. H.R. 2454

	S. 1733 (EPW-reported bill) % of total allowances		H.R. 2454 (House-passed bill) % of total allowances	
	2016	**2030**	**2016**	**2030**
International Adaptation[a]	1.10	3.71	1.0	4.0
State and Tribal Adaptation[b]	0.43	1.62	0.90	3.9
Public Health	0.09	0.07	0.10	0.1
Natural Resource Adaptation[c]	0.87	2.97	1.01	4.0

Source: CRS analysis of S. 1733 (as reported by Senate EPW Committee) and H.R. 2454 (as passed by the House).

Notes: Percentages reflect the share of total allowances less those for the Strategic Reserve (H.R. 2454) or the Market Stability Reserve (S. 1733). The amounts of revenue would be contingent on the value of emissions allowances over time.

a. For S. 1733, this includes both off-the-top allowances and direct allowances for activities related to international adaptation.

b. Both bills include the establishment of a State Climate Change Response (SCCR) Fund in each state, which could be used to fund state and local government programs for greenhouse gas reduction and climate adaptation. Specifically concerning adaptation, funds are for state-administered grant programs related to transportation; water systems mitigation and adaptation partnerships; flood control and response; agriculture; and other activities. H.R. 2454 does not include several of the water resource provisions.

c. Natural resource adaptation includes both direct allowances and allowances obtained by auction.

One significant difference between the two pieces of legislation is the distribution of allowances and proceeds from auction allocations and the subsequent availability of the amounts credited to certain funds. In the Senate bill, several of the adaptation-related provisions provide that the amounts in the funds are automatically available to be obligated (i.e., spent), "without further appropriation," for specified purposes, programs, and activities. In contrast, the analogous adaptation provisions in the House bill provide that the amounts in the funds would become available only by subsequent appropriations. That is, the amounts would not be available automatically, but instead would need to be provided in subsequent appropriations acts.

H.R. 2454 both allocates allowances directly and creates several funds for the allocation of proceeds from the sale of allowances. It generally allocates allowances to states and tribes, and proceeds from the auction of allowances to federal government agencies. Authorizations are subject to future appropriations. For the adaptation provisions, the House relies on hortatory language, such as that found in Section 480(b), to support full appropriations for certain natural resources programs: "... such sums as are deposited in the Natural Resources Climate Change Fund, and the amounts appropriated for subsection (c) shall be no less than the total estimated annual deposits in the Natural Resources Climate Change Adaptation Fund."

While the allocations of allowances and of the proceeds from auctions are distributed similarly by S. 1733, in the Senate bill, in all cases related to adaptation, the auction proceeds for programs or funds would be automatically available to be obligated (i.e., spent) "without further appropriation."[14] The provision of funding "without further appropriation" might be

[14] See Sec. 211, Sec. 212, and Sec. 370(a)(2)-(6) in **Appendix**.

controversial. Comparable language in provisions of the House bill (none related to adaptation programs, however) has been scored by the Congressional Budget Office (CBO) as mandatory spending.[15] Even with mandatory funding, the ultimate funding of specific programs and activities will in many cases be determined by agency, state, and/or tribal decision-makers.

International Adaptation

Developing countries, especially those that are least developed, and the poorest communities, are the most vulnerable to the impacts of climate change. In these vulnerable countries and communities, the impacts of climate change can pose a direct threat to people's very survival. Specific impacts highlighted by the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC 2007)[16] include the following.

- By 2020, yields from the 93% of crop production in Africa that is rain-fed could be reduced by up to 50%.
- Worldwide, approximately 20%-30% of plant and animal species are likely to be at increased risk of extinction if increases in global average temperature exceed 1.5°C -2.5°C.
- Widespread melting of glaciers and snow cover will reduce melt water from major mountain ranges (e.g., Hindu Kush, Himalaya, Andes), where more than 1 billion people currently live.
- Displacement of an estimated 200 million people due to sudden climate-related disasters is projected by 2050; it is estimated that in 2008 more than 20 million people were displaced by sudden climate-related disasters.
- Increased adverse health impacts and mortality will result from higher frequency and intensity of climate-related diseases such as heat stroke, malaria, dengue, and diarrhea.

International assistance for adaptation, especially to help the most vulnerable developing countries, is one of the major commitments of industrialized countries under the United Nations Framework Convention on Climate Change (UNFCCC), to which the United States is a party. Adaptation assistance is also one of the major issues under negotiation in an effort to reach agreement in Copenhagen in December 2009 on international cooperation to address climate change beyond the year 2012.

Many have asserted that current overseas development aid (ODA) is insufficient to cover the adaptation needs of developing countries. A variety of international institutions and nongovernmental organizations have tried to estimate the costs of adaptation for developing countries and the associated needs for public funding. Figures range from $4 billion to several hundreds of billions of dollars annually by the year 2030, where definitions and scope of adaptation activities often account for many of the differences in funding requirements.[17] The

[15] See H.Rept. 111-137, Table 4, pp. 379-380 .

[16] See http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg2_report_impacts_adaptation_and_vulnerability.htm.

[17] Martin Parry et al., *Assessing the Costs of Adaptation to Climate Change: A Review of the UNFCCC and Other Recent Estimates* (London: International Institute for Environment and Development (IIED), August 2009), (continued...)

World Bank, in an updated study from September 2009, estimates the average annual adaptation costs from 2010 to 2050 to be between $75 billion to $100 billion annually,[18] while EU leaders agreed in October 2009 that developing nations would need $150 billion annually by 2020 to tackle climate change and to deal with its consequences.[19] Estimates for climate change adaptation by sector made by the UNFCCC are given in **Table 2**.

Table 2. Climate Change Adaptation Cost Estimates by Sector Needed by 2030

(billion dollars per year normalized for 2009)

Sector	Global Cost	Developed Countries	Developing Countries
Agriculture	14	7	7
Coastal Zones	11	7	4
Human Health	5	not estimated	5
Infrastructure	8-130	6-88	2-41
Water	11	2	9
Total	**49-171**	**22-105**	**27-66**

Source: UNFCC (2007).

Much of the language in the House and Senate bills is identical, but there are several differences regarding programs to support international adaptation to climate change. Both bills establish an International Climate Change Adaptation Program, but S. 1733 would insert "and Global Security" into the title and makes clear that adaptation assistance should protect and promote U.S. interests. In H.R. 2454, Section 495 provides explicit authority for a variety of activities and aid eligible for support, including research, planning, investments, and capacity-building, among others. S. 1733 does not include a comparable specific list of eligible activities.

Both bills direct the Secretary of State or other designee of the President to distribute funding for international climate adaptation bilaterally or multilaterally. However, H.R. 2454 requires that 40% to 60% of funding go to multilateral funds or international institutions that meet given eligibility requirements. H.R. 2454 also specifies that no more than 10% of bilateral assistance may go to any one country; S. 1733 would not set such limits. The House bill also includes language directing that resources provided to this program must supplement, not supplant, other federal, state, or local resources that would similarly support international adaptation activities (i.e., requiring "additionality" of adaptation assistance). H.R. 2454 also does not explicitly provide for bilateral programs in other agencies that may have capacity-building, technological, financing, or other expertise that could be effective in assisting adapting to climate change.

(...continued)

http://74.125.93.132/search?q=cache:KCCoQ47xQdMJ:www.iied.org/pubs/pdfs/11501IIED.pdf+%22Assessing+the+costs+of+adaptation%22&cd=2&hl=en&ct=clnk&gl=us&client=firefox-a.

[18] World Bank, *Economics of Adaptation to Climate Change: New Methods and Estimates* (consultation draft), September 2009, http://beta.worldbank.org/climatechange/content/economics-adaptation-climate-change-study-homepage.

[19] BBC News, *EU Accelerates Climate Funding*, http://news.bbc.co.uk/2/hi/europe/8334146.stm.

While H.R. 2454 gives responsibilities for oversight of funding distributions to the Secretary of State (or other presidential designee) and the Administrator of the U.S. Agency for International Development (USAID), S. 1733 would give that authority to a Strategic Interagency Board on International Climate Investment.[20]

Domestic Adaptation

Improving adaptation in the United States to climate variability and change could include the following modified or new activities:

- climate observation and forecast services, such as season to interannual predictions of weather, or multi-decadal forecasts of temperature, precipitation, and other climate parameters;
- research and analysis on climate change impacts, including the identification of potential risks, benefits, and options for adaptation;
- development of vulnerability assessments and adaptation strategies within and across sectors, localities, states, agencies, and sectors;
- incorporation of climate variability and change into infrastructure planning and operating procedures;
- development of a comprehensive climate adaptation strategy that includes cross-sectoral and interagency strategies and plans;
- testing and demonstration of adaptation measures; and
- evaluation, training, and information-sharing of successful programs and experiences related to climate adaptation.

In general, S. 1733, as reported by the Senate EPW Committee, and H.R. 2454, as passed by the House, reflect similar but not identical approaches and identified needs regarding climate change adaptation. Both bills would expand federal efforts to address adaptation to climate change, although the federal role is limited in different ways. The differences between the House and Senate bills reflect differences in priorities, and in determining which entities should be responsible for developing and implementing adaptation strategies. Neither of the bills is comprehensive in terms of authorizing an overarching strategy across sectors and levels of government.

Both bills would establish national "climate services" to develop observational data, climate modeling, and access to information for federal, state, local, and private decision-makers, to help them develop and execute adaptation strategies. Both bills apparently place primary responsibility in the states and Indian tribes for developing most strategies and plans for domestic adaptation, financially supported by sales of federal greenhouse gas emission allowances. S. 1733 also would require states to provide a part of their funding to localities for climate change adaptation. Both the House and Senate bills supplement the state responsibilities with requirements to establish sector-specific adaptation plans and activities at the federal level, emphasizing adaptation to protect public health and natural resources.

[20] This Board would also oversee programs to promote "supplemental emission reductions," greenhouse gas sequestration in forests under Sec. 751.

S. 1733 and H.R. 2454 provide authorities for domestic adaptation in three major categories:

- National Climate Change Adaptation Program;
- National Climate Service; and
- state and tribal adaptation programs.

National Climate Change Adaptation Program

At the national level, both H.R. 2454 and S. 1733 authorize expansion of the federal role in adaptation to climate change, although neither of the bills calls for comprehensive assessment and strategy to coordinate across levels of government. S. 1733, however, would establish a new national adaptation program. The Senate approach, as outlined in S. 1733, would establish a broad federal authority by directing the President to establish a National Climate Change Adaptation Program to increase "the overall effectiveness of Federal climate change adaptation efforts." The wording leaves wide discretion to the President, although it is seemingly limited to the interests and activities of federal agencies. For example, S. 1733 does not explicitly authorize that this program work with states, localities, and the private sector on cross-cutting strategies or to coordinate among different entities and stakeholders.

H.R. 2454 does not explicitly provide similar broad authority to the President to establish a national climate change adaptation program (although some might argue that the President already has such authority). While earlier versions of the House bill also would have established a comprehensive federal adaptation program and strategy, these provisions were not included in the version of H.R. 2454 passed by the House. H.R. 2454, as passed by the House, expands the focus of the U.S. Global Change Research Program[21] (USGCRP) to include climate change adaptation, vulnerability assessments, and policy analysis. While the coordinating committee for the USGCRP would expand beyond the current science agencies and research programs to include agencies representing sectors that have a stake in adapting to climate change, the implication of the H.R. 2454 language is that federal adaptation efforts remain primarily a research, and not a programmatic, effort. These and other USGCRP efforts would be led by the White House Office of Science and Technology Policy (OSTP).

Although S. 1733 would establish a National Climate Change Adaptation Program, it does not provide language authorizing funding or allocating emission allowances to the program. (Funding authorizations and allowance allocations are provided for other adaptation provisions in both bills.) H.R. 2454 increases authorization for interagency coordination of the USGCRP (not just for adaptation) to $10 million annually, approximately doubling recent expenditures.

[21] H.R. 2454, Part 1, would repeal and replace parts of the existing Global Change Research Act of 1990. This provides for the continuation and coordination of federal global change research. The U.S. Global Change Research Program (USGCRP) established under the GCRA of 1990 and continued under both bills has been the primary vehicle in the United States for domestic and internationally coordinated research on climate change. It has produced world-leading results in many aspects of climate change science. However, it also has been criticized for not being sufficiently oriented toward the information needs of potential users, especially decision-makers, as well as for insufficient interagency coordination and budget prioritization. For more information, see CRS Report RL33817, *Climate Change: Federal Program Funding and Tax Incentives*, by (name redacted).

National Climate Service

Many scientists and decision-makers agree that in order to adapt effectively to climate change, individuals and institutions need more accurate climate data and information that is specific to their locations and concerns. There is less agreement on the appropriate authorities, the scope of federal programs, and how federal programs should be structured and coordinated to implement plans and activities.

Both S. 1733 and H.R. 2454 would establish national programs to develop and provide access to information to assist decision-makers in plannning for adaptation to climate change. The National Climate Service in H.R. 2454 would be established within the USGCRP. The language in S. 1733 is terse and broadly defined, while H.R. 2454 includes much more detail, authorizes several subsidiary programs, and specifies the organizations to manage them. The bills differ on the design and location of the National Climate Service (NCS) office. S. 1733 places it within the Department of Commerce's National Oceanic and Atmospheric Administration (NOAA), while H.R. 2454 would establish a new interagency entity called the National Climate Service, plus a NOAA Climate Services Office, but leaves the evaluation of options, and design and location of the National Climate Service program, to the President. In H.R. 2454, the ultimate relationship of the NOAA Climate Services Office to the National Climate Service is left to be determined. The implementation plan of the NCS would be coordinated by the Director of OSTP.

Key recipients of climate services in both bills would be states, localities, and tribal governments, as well as the public, to enable the development and implementation of adaptation strategies to reduce vulnerability to climate variability and change. Stakeholders might need training in how to use more extensive climate information, as well as in dealing effectively with the wide uncertainty that is likely to continue to surround projections of climate, especially at more refined temporal and spatial scales.

State Adaptation Programs

Many policies and programs that influence the impacts of climate change on people, businesses, and natural resources are under the primary authority of states, who may in turn delegate authorities to local governments and may to some extent coordinate intergovernmental authorities at the local level. Both H.R. 2454 and S. 1733 appear to leave most authority and responsibility for addressing climate change adaptation to the states. Both bills do provide a role for the Environmental Protection Agency (EPA), which will facilitate the process of reviewing and approving state plans and disseminating "lessons learned" across states and tribes.

Both bills would require and help fund state and tribal adaptation programs. The Senate bill would require states to use the proceeds from the sales of allocated emission allowances exclusively for listed activities and as included in approved state climate change response plans, while the House bill identifies uses but provides a broader range of allowable activities that can be in compliance with approved state and tribal adaptation plans. Both bills use detailed and substantially identical language specifying the roles that states and tribes must play in developing and carrying out climate change adaptation plans.[22] S. 1733 and H.R. 2454 would provide

[22] H.R. 2454 uses "climate adaptation" in these sections, raising the question of whether plans and funded activities are to include climate variability as well as climate change.

financial resources to the states and tribes to support their adaptation planning, strategies, and implementation of certain measures through emission allowance allocations.

Public Health

Potential public health impacts of climate change include a wide range of risks including:

- a decline in air quality and an increase in allergenic pollen;
- more extreme temperatures;
- more frequent wildfires;
- altered conditions that foster the spread of communicable diseases and vector-borne diseases;
- events that threaten basic life support systems, such as droughts and floods which could adversely affect water, sanitation, and food systems.

The public health provisions in S. 1733 are essentially identical to those in H.R. 2454. Both bills mandate measures to assist health professionals in adapting to the health effects of climate change, including "the development, implementation, and support of State, regional, tribal and local preparedness, communication, and response plans to anticipate and reduce the threats of climate change." Both bills would require the Secretary of Health and Human Services (HHS) to develop a national strategy for public health adaptation, based on regular needs assessments and with input from an advisory board, to be updated every four years. Both bills would establish a Climate Change Health Protection and Promotion Fund.

The primary difference between the two bills is related to program funding and the use of the emission allowance allocations. S. 1733 would make funds obtained through revenue generated by emission allocation allowances available to the Secretary of HHS "without further appropriation," while H.R. 2454 makes funds available to the Secretary of HHS subject to further appropriation.

Natural Resources Adaptation

Adaptation of natural resources to climate change is a difficult concept to define, and determining a strategy to support it is complicated. To some extent, adaptation is occurring already: Trees in Alaska now grow much farther north than they did only 30 years ago. Small rodents in the Rockies are found at higher elevations than in the past. Freshwater marshes are being supplanted by salt-tolerant species. Fires are removing trees that cannot tolerate repeated droughts, and beetles that can now complete two generations in a year are speeding destruction of timber. Ecosystems lose species that are no longer able to find suitable habitat, or are unable to move rapidly enough to find it. Many of these changes are not considered desirable, and some constitute serious threats from an economic, public health, or aesthetic standpoint. Approaches by many parties have focused on lessening the negative effects of climate change, but more recently, planners have begun to plant different trees, map coastal areas to determine changes in tides and resulting vegetation, consider likely future ranges of species, and examine whether current use land patterns will permit species to reach more suitable habitats.

Both the House-passed and Senate-reported bills attempt to encourage federal and state strategies that can be adopted to support the resilience of species and the ecosystems on which they depend in the face of relatively rapid climate change. Within the provisions relating to natural resources, there are only a few major differences between the two bills. Both bills provide for federal, state, tribal, and local programs. Considerable emphasis at both levels is on planning, and within plans, on a tremendous number of factors to be developed, researched, or evaluated. In addition, both bills would create or facilitate the dissemination of new information sources. Both create a new National Climate Service, for example.

The natural resource adaptation activities in both bills would be funded through emission allowances, either through direct allocations or through revenues generated via auctioned allowances. The Senate bill would include a provision for land acquisition under the Land and Water Conservation Fund (LWCF), with funding available "without further appropriations," as has been proposed several times in the past. Such LWCF proposals have had considerable support from the scientific and environmental communities to protect rare ecosystems and/or recreational opportunities. However, opponents of LWCF—especially of LWCF proposals not subjected to annual appropriations oversight—have argued that the supervision of the appropriations process is necessary to protect property rights and landowners.[23] In addition, those that seek to limit federal spending in general may argue against allocation of money to any of the funds in S. 1733 in the absence of annual control by the appropriations and budget committees. H.R. 2454, on the other hand, requires that funds for natural resource adaptation programs be made available subject to annual appropriations.

In addition, both bills mandate the creation of new programs to disseminate data via geospatial information systems (GIS). While some data concerning wildlife already exist in GIS databases around the country, and considerable cooperation already exists among many agencies and academia, federal agencies and other levels of government might find the data useful for a variety of additional purposes, such as finding suitable locations for energy development and transportation infrastructure. Moreover, many see further coordination of geospatial data as essential for interagency and cross-sector coordination and planning.[24]

In both the House and Senate bills, there is little consideration of soils outside of carbon sequestration, biofuels, and alternative energy in relation to adaptation. Agricultural adaptation is also essentially absent from both bills. For example, at least six agencies within DOI are mentioned specifically, as is NOAA within the Department of Commerce, but within USDA, only the Forest Service figures prominently. USDA's Natural Resources Conservation Service (NRCS) is not mentioned in either bill, even though the agency's major responsibilities involve preventing soil erosion, protecting watersheds, and cooperating at multiple levels of government to control runoff and ease the effects of drought.

In addition, S. 1733 would address climate-change-exacerbated wildfire threats in several ways. It would define fire-ready communities, authorize cost-share grants to such communities, and direct cost-share agreements to encourage states and communities to become fire-ready. It also would

[23] For example, property rights were a major issue in certain conservation bills in the 106th Congress; see out-of-print CRS Report RL30444, *Conservation and Reinvestment Act (CARA) (H.R. 701) and a Related Initiative in the 106th Congress*, by (name redacted) and (name redacted) (available from (name redacted)).

[24] For a discussion of the current status of geospatial research and coordination efforts, see CRS Report R40625, *Geospatial Information and Geographic Information Systems (GIS): Current Issues and Future Challenges*, by (name redacted).

direct mapping of fire risk in priority areas for fuel reduction treatments. Wildfires are not covered in the House-passed bill.

Water-Related Adaptation

Climate change is anticipated to affect water availability and use regionally, and may alter the frequency or intensity of water-related hazards, such as droughts and floods.[25] Potential impacts of climate change are of great interest to utility officials, federal agencies, and others concerned with water management and use. According to the Intergovernmental Panel on Climate Change (IPCC), higher water temperatures, increased precipitation intensity, and longer periods of low flows will exacerbate many forms of water pollution, with impacts on water system reliability and operating costs, human health, and ecosystems. Similarly, climate change affects the function and operation of existing water infrastructure, as well as water management practices.[26] Temperature change drives other changes in natural environmental processes that, in turn, affect the quality and quantity of water resources. A range of impacts are anticipated, although they are likely to vary by region, including warmer water, precipitation changes, loss of reservoir storage and snowpack, sea level rise, increases in storm intensity, increased risk of flood damage, water treatment and distribution challenges, increased wastewater treatment needs and costs due to heavier runoff, and increased demand in response to heat waves and dry spells.

Water-related adaptation is likely to incorporate a range of measures: demand management and conservation, difficult land use choices in at-risk areas, investments in infrastructure, and aquatic ecosystem protection and restoration. Adapting to climate's water-related effects presents significant challenges, in part because of the wide variety of entities involved in managing and using water,[27] and the ecosystems and species that depend on its availability, variability, and quality. Responsibilities for, and funding of, different water adaptation measures are at issue as Congress considers climate change legislation.

S. 1733 would include provisions specific to water-related adaptation; no similar provisions are included in H.R. 2454.[28] To assist adaptation by water utilities, S. 1733 (in Division A) would

[25] Not only are extreme events a concern, but also of concern are anticipated changes in average streamflows, groundwater recharge rates, and timing and depth of snowpack. Ocean, coastal, and marine adaptation issues are generally not discussed in this section, except as they relate to § 384 and flooding and shoreline protection.

[26] Intergovernmental Panel on Climate Change, *Climate Change 2007: Impacts, Adaptation and Vulnerability, Chapter 3, Freshwater Resources and Their Management*, Contribution of Working Group II to the Fourth Assessment Report, Cambridge, UK, 2007, http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg2_report_impacts_adaptation_and_vulnerability.htm.

[27] Water-related functions are shared by all levels of government and the private sector. Local governments and other public and private entities (e.g., water utilities) are largely responsible for municipal water infrastructure (e.g., drinking water, wastewater, stormwater) and flood damage reduction measures. The states generally allocate water within their jurisdiction. The federal government generally participates in water projects that are considered to be in the national interest (e.g., navigation to support commerce, dams and related irrigation to promote settlement of western states, participation in the construction of congressionally authorized flood protection projects). Federal water activities are spread over numerous federal agencies.

[28] Both S. 1733 (as reported by the Senate EPW Committee) and H.R. 2454 also include other water-specific provisions, which are not discussed herein because they are addressed in the bill not as part of adaptation, but through greenhouse gas reduction programs. These provisions are focused on the energy efficiency gained by improving water efficiency, and include §§ 141-143 of S. 1733 and §§ 215-217 of H.R. 2454. Also, § 157 of S. 1733, which would require a study of risk-based policies and programs (including flood insurance), is related to water-related adaptation. Other bills, such as S. 1462, also address (primarily through studies) water-related issues that may arise related to the (continued...)

establish a research program to assist drinking water utilities (Section 211) and a program of grants to states and Indian tribes for water system adaptation projects (Section 381). S. 1733 would also include two other water-specific adaptation provisions—Section 382, which would establish a grants program to states and Indian tribes for adapting to climate-related flood impacts, and Section 384, which would provide assistance to coastal (including Great Lakes) states for adapting to climate change. No specific provisions were included for drought or for adaptation of agricultural or energy sector water use to changed water resource availability and quality. Sections 381, 382, and 384 would be funded through the state climate change response account (Section 210 of Division B); Section 211 of Division A includes only an authorization of appropriations. These provisions focus to a greater extent on adapting to water *quantity* challenges of climate change (e.g., ensuring utilities' reliable delivery of water supply) than water *quality* (e.g., changes in dissolved oxygen levels or water chemistry resulting from warmer temperatures).

Water-related adaptation planning and measures also are covered under broader provisions, most notably federal assistance for state adaptation efforts, federal research and assessment, and natural resources adaptation efforts by designated federal agencies. The bills would provide funding for select federal agencies to undertake aquatic ecosystem restoration activities and other water-related natural resource adaptation actions using allocations established for natural resources adaptation;[29] otherwise, they do not specifically allocate funding for federal agencies to undertake climate change adaptation for water infrastructure (e.g., dams, levees, navigation improvements) or other water-related programs under their jurisdiction.[30] The bills would direct federal water resource agencies, including the Bureau of Reclamation and the Army Corps of Engineers, to adapt their plans, programs, and activities. Because most water resource projects typically receive project-specific authorization from Congress, it is unclear how much authority and funding these agencies would have to implement adaptation actions.

S. 1733 and H.R. 2454 largely focus their federal natural resources adaptation provisions on the agencies responsible for managing and protecting water resources, such as the U.S. Army Corps of Engineers, the Bureau of Reclamation, and the U.S. Environmental Protection Agency, not the agencies working with the users that depend on water resources. For example, neither U.S. Department of Agriculture agencies (e.g., Natural Resources Conservation Service) nor Department of Energy entities (e.g., power marketing administrations) are included. Agriculture, particularly in the West, is the largest consumer of water. The energy sector also withdraws significant quantities during extraction, processing, and generation. Water-related independent entities, like the Tennessee Valley Authority, also are not specifically addressed in the natural resources adaptation provisions. One exception is that S. 1733 would include the Federal Emergency Management Agency (FEMA) in the natural resources adaptation panel proposed in the bill (Section 365). FEMA manages flood hazard mitigation programs and the national flood insurance program; FEMA is not included in a similar provision of H.R. 2454 (Section 475).

(...continued)

energy sector, including water use of lower carbon dioxide-emitting electricity technologies.

[29] Natural resources adaptation funding is discussed in the previous section. Whether the funds made available by these bills for aquatic ecosystem restoration would cover the anticipated cost of adapting to climate change is uncertain because reliable estimates of these costs are not available.

[30] Reliable estimates of the federal water resources infrastructure costs associated with adaptation are not available.

In summary, the water-specific provisions of S. 1733, which have no comparable provisions in H.R. 2454, would be focused largely on issues arising from water quantity changes (e.g., reduced municipal water supplies, increased flooding, higher sea levels). While broad natural resource provisions of the bills include water resource agencies and funding for aquatic ecosystem restoration, less attention is given in S. 1733 or H.R. 2454 to the adaptation of federal water resources infrastructure to changes in water resource quantity and quality; similarly, while S. 1733 would address some of the adaptation challenges faced by municipal water providers, little attention is given in either bill to managing adaptation in two of the largest water use sectors—agriculture and energy.

Appendix. Comparison of Adaptation-Related Provisions in H.R. 2454 (as Passed by the House) and S. 1733 (as Reported by the Senate EPW Committee)

S. 1733 (as reported by the Senate EPW Committee)	**H.R. 2454** (as passed by the House)	**Comments**
INTERNATIONAL CLIMATE CHANGE ADAPTATION		
Sec. 324. International Climate Change Adaptation and Global Security Program. The Secretary of State, consulting with heads of other agencies, is required to establish an International Climate Change Adaptation and Global Security Program. After consulting with heads of agencies, the Secretary of State or other Presidential designee directs the distribution of funding to assist vulnerable countries and their populations within them, and for programs that promote U.S. interests by supporting adaptation to climate change. Funding may be provided bilaterally, and/or through multilateral or international institutions under the United Nations Framework Convention on Climate Change (UNFCCC).	**Sec. 493. International Climate Change Adaptation Program.** The Secretary of State, consulting with heads of other agencies, is required to establish an International Climate Change Adaptation Program. Assistance must supplement, not supplant, other resources for similar activities. After consulting with heads of agencies, the Secretary of State or other Presidential designee directs the distribution of allowances to assist vulnerable countries and populations within them, by supporting adaptation to climate change. Funding may be provided bilaterally, and/or through multilateral or international institutions under the United Nations Framework Convention on Climate Change (UNFCCC). **Sec. 494**. Multilateral or international recipients must receive 40% to 60% of distributions, and must meet eligibility and reporting requirements, overseen by the Secretary of State. **Sec. 495. Bilateral Assistance**. USAID may carry out programs and give allowances to any private or public group to assist with the development of adaptation plans and projects to assist the most vulnerable developing countries, support investments, research programs and activities, and encourage engagement of local communities. No more than 10% of the allowances distributed for bilateral assistance in a year may support activities in any one country. The USAID Administrator must provide for consultation and disclosure of information to stakeholders regarding any programs or activities carried out under this section.	Language in the two bills is nearly identical on establishment of the program and distribution of allowances/assistance. S. 1733 provides for "additionality" of resources as demanded by international guidance for accounting for financial commitments under the Climate Convention. On uses of assistance, the two bills are similar, but S. 1733 omits much of the detail and prescriptive language contained in H.R. 2454. Specific differences include: • S. 1733 distributes funds while H.R. 2454 distributes allowances; • S. 1733 sets no limits on the portion of assistance to distribute multilaterally, while H.R. 2454 requires 40-60% go to multilateral funds or mechanisms. • H.R. 2454 sets eligibility criteria for multilateral funds or institutions to receive allowances • H.R. 2454 authorizes USAID to provide assistance with specified purposes, limited to no more than 10% to any single country in a year. • H.R. 2454 prescribes priorities and conditions for USAID's use of assistance. Content of the reports and reviews also differs. S. 1733 allows discretion in bilateral programs to involve any agency. H.R. 2454 does not explicitly provide for bilateral programs in agencies other than USAID, though other agencies may have existing or potential expertise and programs that could support international capacity-building, technological, financing or other needs related to adapting to climate change.

S. 1733 (as reported by the Senate EPW Committee)	**H.R. 2454** (as passed by the House)	**Comments**
Sec. 325. Evaluation and Reports. Directs the Board to establish a system to monitor and evaluate the international climate change assistance. Reports to Congress required within one year of enactment, within three years of enactment, and then triennially, to review needs and opportunities for further investment in developing countries.	**Sec. 495(d). Annual Reports**. The USAID Administrator must report to the President and to Congress within 180 days after enactment and annually thereafter on the following: the extent of adverse climate change impacts in the most vulnerable developing countries; the potentially destabilizing effects of climate change affecting U.S. national security; how emission allowances were distributed and recommendations for future years; and the status of international cooperation. **Sec. 495(e). Monitoring and Evaluation**. The Administrator of USAID must establish performance goals, indicators, and other means to evaluate, *inter alia*, the degree to which local communities were informed of and engaged in, activities; the impacts of adaptation activities; and recommendations for adjustments.	Both bills require reviews and evaluations of international assistance for adaptation, as well as reports to Congress. H.R. 2454 is more detailed and prescriptive regarding how to monitor and evaluate the programs, and content of the reports.
Sec. 207. International Climate Change Adaptation and Global Security. Directs allocation of allowances to climate change adaptation. The quantity of allocation is specified in Sec. 771(a)(14): 2012-2021: 1.0% of annual allowances; 2022-2026: 2.0% of annual allowances; 2027-2050: 5.0% of allowances.	**Sec. 782(n) International Adaptation**. Directs the EPA Administrator to allocate emission allowances for international adaptation for: 2012-2021: 1.0% of annual allowances; 2022-2026: 2.0% of annual allowances; 2027–2050: 4.0% of allowances.	Almost identical allocations of allowances, except for the latest period of 2027-2050, with a 5% distribution under S. 1733 versus the 4% under H.R. 2454. The rising percentages of allowances may correspond with predicted increases in climate change, and associated accelerating adaptation needs.
DOMESTIC CLIMATE CHANGE ADAPTATION		
Sec. 341. National Climate Change Adaptation Program. The President must establish a National Climate Change Adaptation Program within the United States Global Research Program (USGCRP) to increase effectiveness of federal adaptation efforts.	No similar provision.	H.R. 2454 and S. 1733 take different approaches to adaptation to climate change at the national scale. S 1733 directs the President to establish a National Climate Change Adaptation Program, leaving broad discretion as to the new program's organization, strategy, contents, etc. In contrast, H.R. 2454 primarily expands the existing U.S. Global Change Research Program more explicitly to emphasize the *effects* of climate change, and to add impact and adaptation-related research, new observational, research, and to improve information based decision-making efforts (See Sec. 451 below).

S. 1733 (as reported by the Senate EPW Committee)	**H.R. 2454** (as passed by the House)	**Comments**
No similar provision	**Sec. 451.Global Change Research and Data Management**. Repeals and replaces Titles I and III of the existing Global Change Research Act (GCRA) of 1990 (P.L. 101-606; 15 U.S.C.2921 et seq.). Directs the President to establish an interagency coordinating committee, a U.S. Global Change Research Program (USGCRP), a National Global Change Research and Development Plan, budget coordination, Vulnerability Assessments, Policy Assessments, and annual reports to Congress. It also establishes a Global Change Research Information Exchange and interagency data management, and requires reports on ice sheet melt and sea level rise, and on implications of hurricane frequency and intensity patterns. Establishes the Office of Science and Technology Policy as the "lead agency" and authorizes $10 million annually for FY2009-FY2014 for "interagency program activities." In Sec. 451(5), the National Global Change Research and Assessment Plan must, inter alia, catalog types of information needed by decision makers to develop policies to reduce vulnerabilities to global change, and provide for economic, demographic, technological, and other information to meet the needs of decision-makers. Sec. 451(8) requires a Policy Assessment within one year of enactment and every four years thereafter by the National Academy of Public Administration and the National Academy of Sciences, to cover both climate change mitigation and adaptation options.	The GCRA of 1990 established an interagency coordinating committee and the U.S. Global Change Research Program (USGCRP). H.R. 2454 provisions are in many aspects similar or identical to those in the GCRA, but more expansive. It leaves in place Title II of the GCRA, which covers international global change research cooperation. Compared to the existing management of the USGCRP, H.R. 2454 would make the White House Office of Science and Technology the lead agency. To the 1990 purpose is added "observation" and "outreach" activities, with an emphasis on "effects" of global change. The Global Change Research Program is (re)established in para. (4) "to respond to the information needs of communities and decision-makers and to provide periodic assessment of the vulnerability of the United States and other regions...." Other provisions, however, do not maintain this more expansive language, confining the provisions to "research" (e.g., for interagency coordination). In congruity, the bill would expand participation in the interagency coordinating committee to include representation not just of science programs but also resource management and climate mitigation agencies and programs. Unlike the existing program, the Office of Science and Technology Policy is made the "lead agency." OSTP does not have existing authority to "allocate funds" to agencies. In H.R. 2454, the relationship of the Global Change Research Information Exchange to the new National Climate Services (Sec. 452) and the new Climate Service Office in NOAA (Sec. 452(e)) is not defined, and is to be established or designated by the President.
Sec. 157. Study of Risk-Based Programs Addressing Vulnerable Areas. The Administrator of the EPA, or other presidentially-designated heads of federal agencies, must conduct a study that reviews and assesses federal pre-disaster mitigation, emergency response, and flood insurance policies and programs affecting areas vulnerable to climate change; describe better strategies to address	**Sec. 451(7)**. Requires a Vulnerability Assessment within one year of enactment and every five years thereafter, with a time frame of the subsequent 25 to 100 years. Assessment is to cover the United States and other world regions, and multiple sectors and categories of impacts.	While H.R. 2454 requires comprehensive and periodic assessments of vulnerability to climate change, S. 1733 authorizes one report, confined to specific types of disaster (not necessarily due to climate change). The S. 1733 study is a one-time requirement aimed at evaluating expected cost savings from improving inter-agency and inter-governmental coordination rather than a broad vulnerability assessment as authorized in H.R. 2454.

S. 1733 (as reported by the Senate EPW Committee)	**H.R. 2454** (as passed by the House)	**Comments**
vulnerabilities, and whether existing federal policies support state response and adaptation goals in Sec. 211. The studies also must identify and recommend how to resolve contradicting programs that address areas vulnerable to climate change, and identify annual cost savings that could be achieved with recommended strategies. Report is due to Congress within two years of enactment		
Sec. 342. Climate Services. The Secretary of Commerce acting through the Administrator of the National Oceanic and Atmospheric Administration (NOAA) must establish a National Climate Service within NOAA. The National Climate Service is to: • develop climate information, data, forecasts and warnings at national and regional scales; and • distribute information related to climate impacts to state, local, and tribal governments and the public to help develop and implement strategies to reduce vulnerabilities to climate variability and change.	**Sec. 452. National Climate Service.** Establishes a National Climate Service (NCS), and defines the activities to be undertaken within the National Oceanic and Atmospheric Administration (NOAA), to: • advance understanding of climate variability and change at different scales; • provide forecasts, warnings, and other information on weather and climate. Its goal is to meet the needs of decisionmakers in federal agencies; state, local, and tribal governments; regional entities; and other stakeholders and users, for information related to climate variability and change. Requires a report to Congress within two years of enactment to describe institutions and propose how to establish a National Climate Service. Requires the Undersecretary of NOAA to establish a Climate Services Office within NOAA, and to establish a Clearinghouse of Federal Climate Service Products and Links to Federal Agencies Providing Climate Services. Requires a number of additional programs and services to support climate change information and adaptation planning. Sec. 452(m) specifies that nothing in Sec. 452 authorizes requirements for states, tribes or local governments to develop adaptation or response plans or to take any other actions in response to variations in climate that may impose a financial burden to such governments.	Both bills would establish a new Climate Service program. S. 1733 places the National Climate Service within NOAA. H.R. 2454 leaves evaluation of options, and design and location of the national program to the President while also establishing an office within NOAA. In H.R. 2454, the relationship of the National Climate Service, or the new Climate Service Office in NOAA, to the Global Change Research Program and the Global Change Research Information Exchange is not made explicit. "Climate" and "climate variability," as distinct from "weather," are not defined, and have been inconsistently used in some proposals for national climate services. Sec. 452(b)(2) explicitly calls for "weather" forecasts, warnings and other information.

S. 1733 (as reported by the Senate EPW Committee)	**H.R. 2454** (as passed by the House)	**Comments**
STATE AND TRIBAL PROGRAMS		
Sec. 210. State Programs for Greenhouse Gas Reduction and Climate Adaptation. Within 2 years of enactment, the EPA Administrator or other presidential designee(s) must promulgate regulations to implement this section. Of each vintage year's allowances specified in Sec. 771(a) for state adaptation, the EPA Administrator must reserve: • 10% for coastal and Great Lake States, for purposes in Sec. 384 (see below); • 10% for states for wildfire programs for purposes in Sec. 383 (see below) ; • at least 1% for Indian tribes, of which at least 18% must go to Alaska Native Villages; and distribute the remainder of allowances for State government programs for GHG reduction and climate adaptation. Allowances or proceeds from auction of allowances are deposited into State Climate Change Response (SCCR) accounts. From 2011-2049, the EPA Administrator or other federal agency head(s) designated by the President must distribute allowances for the subsequent calendar year to states and tribes annually. States receive allowances generally on the basis of (1) population and (2) the ratio of each State's per capita income relative to that of the United States as a whole. States must distribute at least 12.5% of the proceeds deposited to SCCR accounts to local governments to address specific adverse impacts of climate change (listed below). States and tribes shall use the allowance proceeds exclusively to develop and implement policies, programs or measures that reduce GHG emissions	**Sec. 453. State Programs to Build Resilience to Climate Change Impacts.** Sec. 453(b) Within two years of enactment, the EPA Administrator or other presidential designee(s) must promulgate regulations to implement this section. From 2011-2049, the EPA Administrator or other federal agency head(s) designated by the President must distribute allowances to states and tribes annually. States receive allowances on the basis of (1) population and (2) the ratio of each state's per capita income relative to that of the United States as a whole. Tribes receive 1% of allowances, distributed competitively based on their adaptation plan or project proposals. Tribes with adaptation plans have priority in distribution. Uses of allowances are listed, with priority being given to reduce flood risks. Allowances must be sold within one year, with proceeds deposited into the State Energy and Environment Development (SEED) accounts. States the intention of Congress that funds provided should supplement, not replace, existing sources of funding.	Requirement to promulgate implementing regulations is identical. S. 1733 directs the EPA Administrator to reserve percentages of allowances allocated to state adaptation programs for specific states and uses, as well as tribes. The remainder is distributed to states and tribes by formulae. H.R. 2454 does not include these "reserve" paragraphs, beginning directly with distributions of allowances. The formulae and methods for determining each State's allowances are identical in H.R. 2454 and S. 1733, although the language varies slightly. In S. 1733, the initial combined State Climate Change Response and Transportation Fund in Treasury has been eliminated and replaced with separate funds for transportation and state climate change responses.

S. 1733 (as reported by the Senate EPW Committee)	**H.R. 2454** (as passed by the House)	**Comments**
or build resilience to climate change via activities listed under Sec. 221(g)(2). Funds must be used in accordance with approved state or tribe climate change response plans, and only for specific activities, to address: • water system partnerships (Sec. 381); • flood control, protection, prevention and response programs (Sec. 382); • impacts on water quality, supply or reliability of state-owned or operated water systems (Sec. 381(d)); • recycling (Sec. 154); • adverse climate change impacts on agricultural or ranching activities; • projects to restore abandoned mine lands that increase carbon sequestration or reduce GHG emissions while providing other benefits; • adverse impacts on air pollution or air quality; • measures to reduce GHG emission that decrease other air pollutant emissions as well. At least 12.5% of allowance proceeds in SCCR accounts must be distributed to local governments for activities listed under (2) above. States and localities shall ensure that funds are used to assist categories of "socially and economically vulnerable populations." States the intention of Congress that funds provided should supplement, not replace, existing sources of funding.		
Sec. 210(h). State and Tribal Response Plans. In order to receive funds, states and tribes must have approved adaptation plans. Beginning with vintage year 2012, states must have approved State climate change response plans to meet regulations to be promulgated under Sec. 221(b), with elaboration of content under Sec. 221(g). The state	**Sec. 453. State Programs to Build Resilience to Climate Change Impacts**. In order to receive funds, states and tribes must have approved adaptation plans. Beginning with vintage year 2015, states and tribes must have approved State climate change response plans to meet regulations to be promulgated under Sec. 453(b), with elaboration of content under Sec. 453(f). State and	Language in the two bills is similar, except: Allocation of allowances under this section are contingent on approved state adaptation plans by 2012 under S. 1733 and by 2015 under H.R. 2454. S. 1733 additionally specifies that states must consider and undertake a longer list of requirements, where

S. 1733 (as reported by the Senate EPW Committee)	**H.R. 2454** (as passed by the House)	**Comments**
climate change response plans must, at a minimum, assess and prioritize vulnerabilities; identify and prioritize cost-effective projects, programs, and measures to mitigate and build resilience to current and predicted climate; assess potential carbon reductions by changing land management policies; ensure that the state consider and undertakes a variety of listed types of initiatives; consider impacts on socially and economically vulnerable populations; use pre-disaster mitigation, emergency response, and public insurance programs; and be consistent with federal conservation and environmental laws and try to avoid environmental degradation. Plans must be revised and resubmitted every five years. Tribal climate change response plans have same requirements as the states, but may vary if necessary to account for special circumstances of Indian tribes.	Tribal climate change response plans must, at a minimum, assess and prioritize vulnerabilities; identify and prioritize cost-effective projects, programs, and measures to mitigate and build resilience to current and predicted climate; assess potential carbon reductions by changing land management policies; ensure that the state considers and undertakes a variety of listed types of initiatives; and be consistent with federal conservation and environmental laws and try to avoid environmental degradation. Plans must be revised and resubmitted every five years.	appropriate, protect forested land using science-based ecological restoration practices, and consider impacts on socially and economically vulnerable populations. S. 1733 allows adaptation funds to be used for carbon sequestration on abandoned mine lands. Reporting and enforcement language is identical in both bills. In addition, S. 1733 has an auditing provision that gives authority to the EPA Administrator or other presidential designee, to audit or review implementation and compliance of state plans. No auditing provision exists in H.R. 2454. In both bills, the EPA Administrator must take into account lessons learned, avoid duplication, and coordinate with state natural resources adaptation plans.
PUBLIC HEALTH		
Sec. 353. National Strategic Action Plan. Requires the Secretary of Health and Human Services (HHS) to prepare a national strategic action plan to prepare for and respond to public health impacts of climate change in the United States and other nations, in consultation with relevant agencies and stakeholders. The plan must be revised by 2014 and every four years thereafter. Requires a public health needs assessment from the National Research Council and the Institute of Medicine within one year of enactment.	**Sec. 463. National Strategic Action Plan**. Similar to Senate bill except gives authority to conduct and fund research to the Secretary of HHS, directed by the Director of the Centers for Disease Control and Prevention, and the head of any other appropriate federal agency.	
Sec. 354. Advisory board. Establishes an advisory board to provide scientific and technical advice to the Secretary of Health and Human Services on domestic and international impacts of climate change on human health.	**Sec. 464. Advisory Board**. Essentially identical to Senate bill.	
Sec. 355. Reports. Describes the requirement for reports on a needs assessment, due within one year of enactment, and on climate change health	**Sec. 465**. **Reports**. Essentially identical to Senate bill.	

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protection and promotion, due by July 1, 2013 and every 4 years thereafter.		
Sec. 356. Definitions. Provided definitions for health impact assessment, national strategic action plan, and secretary.	**Sec. 466. Definitions**. Essentially identical to Senate bill.	
Sec. 211. Climate Change Health Protection and Promotion Fund. Establishes in the Treasury a Climate Change Health and Protection Fund which will receive revenue from the auctioning of 0.1% of each year's emission allowances. The funds are available "without further appropriation" and should supplement existing sources of funding. The Secretary of HHS may distribute funds from the Fund to federal agencies, other governments, or other entities, to carry out any of the provisions of the health and climate change provisions in this subtitle.	**Sec. 782(l)(2). Domestic Adaptation**. Directs the EPA Administrator to allocate 0.1% of emission allowances for the Climate Change Health Protection and Promotion Fund (Sec. 467) in 2012 and thereafter. Availability of funds would be subject to further appropriation.	Language in the two bills is similar except: Funds are available to Secretary of HHS subject to further appropriation in H.R. 2454, while S. 1733 makes funds available "without further appropriation" or fiscal year limitation,
NATURAL RESOURCES ADAPTATION		
Sec. 361. Purposes. Purposes of this subpart are to establish an integrated program that responds to climate change, including ocean acidification, drought, flooding, and wildfire, and to provide financial support and incentives for these activities.	**Sec. 471**. **Purposes.** Similar to Senate bill.	Senate bill makes specific mention of drought, flooding, and wildfire; House bill does not.
Sec. 362. **Natural Resources Climate Change Adaptation Policy**. States that federal policy is "to use all practicable means to protect, restore, and conserve natural resources so that natural resources become more resilient, adapt to, and withstand the ongoing and expected impacts of climate change, including, where applicable, ocean acidification, drought, flooding, and wildfire."	**Sec. 472**. **Natural Resources Climate Change Adaptation Policy.** States that federal policy is "to use all practicable means and measures to protect, restore, and conserve natural resources to enable them to become more resilient, adapt to, and withstand the impacts of climate change and ocean acidification."	Essentially the same except the Senate bill specifically mentions drought, flooding, and wildfire, while the House bill does not.
Sec. 363. Definitions. Defines 15 terms used in the subpart: account, administrators, board, center, coastal state, corridors, ecological processes, habitat, Indian tribe, natural resources, natural resources adaptation, panel resilience/resilient, state, and strategy.	**Sec. 473. Definitions**. Defines nine terms used in the subpart,: coastal state, corridors, ecological processes, habitat, Indian tribe, natural resources, natural resources adaptation, resilience/resilient, and state.	Neither bill includes the consideration of air and soil resources in the definition of natural resources. In addition, House bill definition of "natural resources" mentions land and water while the Senate bill omits these terms. In the definition of "ecological processes, both bills contain

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		the phrase "biological, chemical, or physical interaction," but it should be noted that these processes, are not mutually exclusive.
Sec. 364. Council on Environmental Quality. Directs Chair of the Council on Environmental Quality (CEQ) to advise the President on developing and implementing a Natural Resources Climate Change Adaptation Strategy and federal natural resource agency adaptation plans, and to coordinate such activities.	**Sec. 474. Council on Environmental Quality**. Essentially identical to Senate bill.	
Sec. 365. Natural Resources Climate Change Adaptation Panel. Establishes a Natural Resources Climate Change Adaptation Panel as a forum for coordinating development and implementation of the federal adaptation strategy. The Chairperson of CEQ is to chair the Panel. The Panel must be established within 90 days of enactment of the law, and include NOAA, USFS, NPS, FWS, BLM, USGS, Reclamation, BIA, EPA, Army COE, CEQ, FEMA, and other federal agencies with jurisdiction over natural resources, as determined by the President.	**Sec. 475. Natural Resources Climate Change Adaptation Panel.** Similar to Senate bill.	The only difference is that the Senate bill includes the Federal Emergency Management Agency (FEMA) on the Adaptation Panel, while the House bill does not. Neither bill includes the USDA's Natural Resources Conservation Service specifically on the Adaptation Panel, although President has discretion to add other agencies.
Sec. 366. Natural Resources Climate Change Adaptation Strategy. Describes the climate change adaptation strategy to be developed by the panel established in Sec. 365. The strategy must be developed within one year of enactment of the subpart, and must be reviewed and revised every five years. The strategy must be based on the best available science; must be developed in cooperation with states, Indian tribes, other federal agencies, local governments, conservation organizations, scientists, and other stakeholders; and must be open for public comment. The purpose of the strategy is to protect, restore, and conserve natural resources to enable them to become more resilient, adapt to, and withstand the impacts of climate change, and to identify opportunities to mitigate ongoing and expected impacts.	**Sec. 476. Natural Resources Climate Change Adaptation Strategy**. Similar to Senate bill.	Differences are minor and include multiple references to "ongoing" and "expected" or "expanding" impacts in the Senate bill, while the House bill regularly refers to "ocean acidification" in concert with climate change.

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Sec. 367. Natural Resources Adaptation Science and Information. Directs the Administrators to establish a Natural Resource Climate Change Adaptation Science and Information Program, to be led by the USGS National Climate Change and Wildlife Center (established by this section) and the National Climate Service in NOAA. Program is to provide technical assistance, conduct and sponsor research, and provide research, monitoring tools, and information. Secretaries of Commerce and the Interior must conduct initial and then five-year surveys of natural resources impacts of climate change; monitoring of baselines and trends; and stakeholder needs for monitoring, research, and decision tools. Establishes a Science Advisory Board to advise Secretaries on impacts and scientific strategies and mechanisms, and to identify and recommend research priorities.	**Sec. 477. Natural Resource Adaptation Science and Information.** Similar to the Senate bill.	Minor differences include multiple references to "ongoing" and "expected" or "expanding" impacts in the Senate bill, while the House bill regularly refers to "ocean acidification" in concert with climate change, where the Senate bill specifically also mentions drought, flooding, and wildfire.
Sec. 368. Federal Natural Resource Agency Adaptation Plans. Requires each federal agency represented on the Natural Resources Climate Change Adaptation Panel to complete a Natural Resources Climate Change Adaptation Plan, consistent with the policy under Sec. 472, within one year of enactment. After approval by the President, adaptation plans must be submitted to specified congressional committees (e.g., House Natural Resources; Senate Energy and Natural Resources; Environment and Public Works; and any others with agency jurisdiction) within 30 days of approval.	**Sec. 478**. **Federal natural resource agency adaptation plans**. Similar to the Senate bill, though Senate Environment and Public Works is not mentioned specifically.	Senate bill requires the agency action plans to include "any changes in decisionmaking processes necessary to increase the ability of resources under the jurisdiction of the department or agency and, to the maximum extent practicable, resources under the jurisdiction of other departments and agencies that may be significantly affected by decision of the department or agency, to become more resilient, adapt to, and withstand the ongoing and expects impacts of climate change…." House bill lacks similar provision.
Sec. 369. State natural resources adaptation plans. Requires states to prepare a state natural resources climate change adaptation plan to be eligible to receive funds under Sec. 370. The plan must include priorities, programs, and measures of effectiveness, and must be reviewed and updated every five years.	**Sec. 479. State natural resources adaptation plans.** Similar to the Senate bill.	House and Senate bills are essentially identical, except Senate bill adds a few additional items to include in plans. Note that there is a typographical error in Sec. 369(e)(5): where "regional fishery management plants" should read "regional fishery management plans."
Sec. 370. **Natural Resources Climate Change Adaptation Account.** Overall, section distributes	**Sec. 480. Natural Resources Climate Change Adaptation Fund**. Overall, section distributes	In these two sections, the bills are very similar in their details and structure, and their allocations to various

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allowances to states for adaptation activities, and distributes, "without further appropriation," proceeds from auction of allowances to specified federal agencies and programs. States must pay at least 10% of costs of any federal grant provided in this section. (See specific subsections, below.)	allowances from Sec. 721(a) to support state adaptation activities, and funds from auction of allowances to support specified federal agencies and programs. Specifies that appropriation levels for both federal programs should be no less than the proceeds from specified allowances and auction of allowances. States must pay at least 10% of costs of any federal grant provided in this section. (See specific subsections, below.)	programs generally differ by less than a percentage point. However, the major difference is that the Senate bill provides funds "without further appropriation," while the House bill subjects them to annual appropriations. The House provisions rely on the creation of special funds and provide the strongest possible encouragement to the appropriations committees to approve appropriations at the full authorized levels for the new funds.
Sec. 370(a)(1). Distributes allowances from Sec. 771(a)(16) and Sec. 216 (which allocates allowances from Sec. 771(a)(16) to a new Natural Resources Climate Change Adaptation Account, NRCCAA) for Wildlife Restoration Program (84%; see 16 U.S.C.669c) and Coastal Zone Management Act (CZMA) (16%; see 16 U.S.C. 1455(c)).	**Sec. 480(a).** Directs a percentage of the emission allowances in Sec. 721(a) to state adaptation activities under Sec. 479 for wildlife restoration grants (84.4%), and coastal zone conservation (15.6%).	The House and Senate bills both allocate allowances to state programs, rather than proceeds from auction of allowances.
Sec. 370(a)(2). Distributes proceeds from auction of allowances under Sec. 771(b)(7) and Sec.212. Allocates proceeds to the Department of Interior (DOI) as follows: • 28%—specified natural resources adaptation activities by DOI agencies and Sec. 371 Corridors Information Program. • 8%—specified programs for endangered species, wetlands, migratory birds, coastal program, and private lands. • 5%—specified tribal programs under Bureau of Indian Affairs (BIA) and the Fish and Wildlife Service (FWS).	**Sec. 480. Natural Resources Climate Change Adaptation Fund**. Establishes a new Natural Resources Climate Change Fund (NRCCF) in Treasury, with appropriations authorized at not less than estimated total annual deposits to Natural Resources Climate Change Adaptation Fund (NRCCAF). Sec. 480(c)(1) allocates funds from NRCCF to DOI in a manner similar to S. 1733, except amounts are 27.6% , 8.1%, and 4.9%, respectively.	In S. 1733, Sec. 370(a)(2)-(6) all receive funding from Sec. 771(b)(7) and Sec. 212. However, both Sec. 771(b)(7) and Sec. 212 direct that their proceeds go only to Sec. 370(a)(2). If these latter sections are correct, then the source of funding for Sec. 370(a)(3)-(6) is not clear. It seems likely that the intent in Sec. 771(b)(7) and Sec. 212 was to include all five of these paragraphs as eligible for funding.
Sec. 370(a)(3). Directs 20% of funds available from Sec. 771(b)(7) and Sec. 212 under this subpart, for Land and Water Conservation Fund (LWCF)-type purposes—1/6 for Interior's stateside assistance; 1/3 for Interior land acquisition; 1/6 for Forest Service grants for land or easement acquisition; and 1/3 for Forest Service land purchases—with considerations for funding allocation.	**Sec. 480(c)(2).** Essentially identical to Senate bill,, except 19.5%, rather than 20% for LWCF-type purposes. Amounts allocated to LWCF are subject to annual appropriations.	In the Senate bill, the availability of funds under the LWCF is available "without further appropriation." While a comparable proposal has had considerable support from the scientific and environmental communities to protect rare ecosystems and/or recreational opportunities, opponents have argued that the supervision of the appropriations process is necessary, in order to protect property rights and landowners. In addition, persons wishing to limit federal spending in general may argue

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Amounts allocated to LWCF to be available "without further appropriation."		against allocation of money to either fund in the absence of annual control by appropriations and budget committees. In S. 1733, also see comments under Sec. 370(a)(2) concerning funding from Sec. 771(b)(7) and Sec. 212.
Sec. 370(a)(4). Directs 8% of funds available from Sec. 771(b)(7) and Sec. 212 under this subpart for natural resource adaptation by the Forest Service on the national forests and national grasslands and through financial and technical assistance.	**Sec. 480(c)(3).** Essentially identical to Senate bill, except 8.1%, rather than 8%, for the same purposes.	In S. 1733, also see comments under Sec. 370(a)(2) concerning funding from Sec. 771(b)(7) and Sec. 212.
Sec. 370(a)(5). Directs 11% of funds available from Sec. 771(b)(7) and Sec. 212 to Secretary of Commerce for specified coastal, estuarine, fishery, marine mammal, endangered species, and coastal programs.	**Sec. 480(c)((4).** Essentially identical to Senate bill, except 11.5%, rather than 11%, for the same purposes.	In S. 1733, also see comments under Sec. 370(a)(2) concerning funding from Sec. 771(b)(7) and Sec. 212.
Sec. 370(a)(6). Directs 12% of funds available from Sec. 771(b)(7) and Sec. 212 to EPA and 8% to Corps of Engineers for specified estuarine and freshwater ecosystem protection programs, including programs in a list of 20 named ecosystems, as well as water resources programs.	**Sec. 480(c)(5).** Essentially identical to Senate bill, except 12.2% for EPA and 8.1% for the Corps of Engineers, rather than 12% and 8% respectively, for the same purposes. Slightly different list of named ecosystems.	In S. 1733, also see comments under Sec. 370(a)(2) concerning funding from Sec. 771(b)(7) and Sec. 212.
Sec. 371. National Fish and Wildlife Habitat and Corridors Information Program. Establishes a National Wildlife Habitat and Corridors Information Program within DOI to support states and tribes to develop coordinated geographic information system (GIS) of fish and wildlife habitat and corridors for information and modeling of climate change impacts and adaptation, and to enhance state and tribal wildlife action plans. Use of GIS intended to aid policy makers at all levels. Secretary authorized to support states and tribes financially and technically to develop and implement system.	**Sec. 481. National Wildlife Habitat and Corridors Information Program**. Essentially identical to Senate bill.	Neither bill specifies a funding level, but funding available from Sec. 370(a)(2) in S. 1733, and from Sec.480(c) in H.R. 2454. GIS data bases for many areas of wildlife management already exist, though coverage is often spotty and comparisons may be difficult. Major benefit of programs could be increased utility from better coordination and compatibility.

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Sec. 372. Additional Provisions Regarding Indian Tribes. Specifies that nothing in this subpart amends federal trust responsibilities to Indian tribes. Exempts from Freedom of Information Act (FOIA) disclosure any information relating to sacred sites or cultural activities that tribes consider confidential. Clarifies that DOI Secretary may apply provisions of the Indian Self-Determination and Education Assistance Act in implementing this subpart regarding safeguards for natural resources conservation. Protects rights reserved under treaties for tribes to take certain plant foods.	**Sec. 482. Additional Provisions Regarding Indian Tribes**. Contains similar provisions. FOIA exemption is more detailed and provides that information received by a federal agency concerning human remains, resources, cultural items, activities identified by an Indian tribe as traditional or cultural, is protected from FOIA disclosure if head of agency, in consultation with DOI Secretary and tribe, determines that disclosures may cause significant invasion of privacy, risk harm to remains or items, or impede site use.	Both sections specify that the DOI Secretary may authorize an Indian tribe to implement DOI climate change activities related to natural resources conservation in this subpart.
Sec. 383. Wildfire. Defines fire-ready communities and authorizes cost-share grants to such communities. Directs federal fire agreements to encourage communities to become fire-ready. Directs fire risk mapping of priority areas needing fuel reduction efforts.	No similar provision	S. 1733 authorizes a program to reduce the risk of wildfires in fire-ready communities and establishes criteria therein. The program creates regional maps of communities most at risk of wildfire and identifies priority areas and identifies several examples for priority areas needing "hazardous fuel treatment and maintenance." Grants would be provided for fire protection education programs, training programs for local firefighters, equipment to increase fire preparedness, implementation of community wildfire protection plans, and forest restoration that accomplishes fuel reduction.
Sec. 212. Climate Change Safeguards for Natural Resources Conservation. Establishes an account in Treasury to be called Natural Resources Climate Change Adaptation Account (NRCCAA) to receive proceeds from auction conducted under (new) Sec. 771(b)(7) of Clean Air Act. Funds to be available "without further appropriation" or fiscal year limitation for the purposes of Sec. 370(a)(2), above.	**Sec. 480. Natural Resources Climate Change Adaptation Fund**. See Sec. 480 discussion above.	Senate bill creates one fund; House bill creates two funds, dividing federal and non-federal programs. Both Sec. 212 and Sec. 771(b)(7) in S. 1733, allocate auction proceeds only to Sec. 370(a)(2), and not to Sec. 370(a)(3)-(6). If that is intentional, then the source of funding for Sec. 370(a)(3)-(6) is not clear.
Sec. 216. State Programs for Natural Resource Adaptive Activities. Directs Administrator to distribute allowances to states from Sec. 771(a)(15) in accordance with sec. 370(a)(1) (which provides for natural resources adaptation activities; see above).	**Sec. 480.** See Sec. 480 discussion above.	If Sec. 216 is to be interpreted consistently with Sec. 370(a) and Sec. 771(15)-(16), it appears likely that the reference in this section should be to Sec. 771(a)(16), rather than Sec. 771(a)(15).

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OTHER CLIMATE CHANGE ADAPTATION PROGRAMS, INCLUDING WATER RESOURCES		
Sec. 211. **Effects of Climate Change on Drinking Water Utilities**. Requires EPA, in cooperation with the Secretaries of Commerce, Energy and the Interior, to establish and provide funding for a research program to assist drinking water utilities in adapting to climate change. Research program is to be conducted through a nonprofit research foundation and should address issues related to: water quality and quantity impacts and solutions, impacts on groundwater supplies from carbon sequestration, infrastructure impacts, desalination and water reuse, alternative supply technologies, energy efficiency and greenhouse gas minimization, regional cooperative water management solutions, utility management and water management models, improving energy efficiency in water provision and treatment, water conservation and demand management, and customer communication and education. Funding for this program is authorized at $25 million for each of FY2010-2020	No similar provision	Sec. 211 (of Division A) would establish and fund a broad-ranging research program that encompasses research in these key issue areas and others. Language similar to Sec. 211 exists in free-standing bills, H.R. 3727 and S.1035. Related bills in this Congress include House-passed H.R. 631, the Water Use Efficiency and Conservation Research Act, which would establish in EPA's Office of Research and Development (R&D) a broad R&D program promoting water use efficiency and conservation to address increasing water scarcity resulting from increased demand and climate change-related effects.
Sec. 381. **Water System Mitigation and Adaptation Partnerships.** Requires EPA to establish a water system mitigation and adaptation partnership program and to provide grants to states and Indian tribes for water system adaptation projects. Identifies entities eligible to receive project assistance as owners or operators of a community water system, wastewater treatment works, decentralized wastewater treatment system for domestic sewage, groundwater storage and replenishment system, or system for transport and delivery of water for irrigation or conservation. Identifies eligible uses, such as enhancing water use efficiency, modifying or relocating water infrastructure significantly impaired by climate change, or studying how climate change may impact future operations and sustainability of water systems. Provides for a competitive process,	No similar provision	Sec. 381 authorizes appropriations for water system mitigation and adaptation partnerships. Actual funds would be provided through distribution of emission allowances under Sec. 210 of Division B. Under Sec. 210 of Division B, EPA would distribute the proceeds of emission allowances to states to support the partnership programs under Sec. 381 and a number of other programs. The program proposed by Sec. 381 would consider both adaptation — understanding and planning for impacts on water supplies and watersheds — and mitigation — modifying water infrastructure facilities. Water and wastewater utilities currently are eligible to receive financial assistance for water infrastructure capital projects through Safe Drinking Water Act and Clean Water Act and other federal programs, but these others do not exclusively address climate change-related project needs. S. 1733 does not address coordination between

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prioritizing applications for water systems at the greatest and most immediate risk of facing significant climate-related negative impacts. Federal share of projects shall not exceed 50%.		existing infrastructure assistance programs and the proposed Sec. 381 program. Other legislation in the 111th Congress also addresses water system mitigation and adaptation partnerships. S. 1712 and H.R. 3747 include such a provision (section 6). H.R. 2969 is similar. These bills would direct EPA (not states) to make grants to water systems generally for the same purposes as Sec. 381 of S. 1733.
Sec. 382. Flood Control, Protection, Prevention, and Response. Requires EPA, in consultation with the Army Corps of Engineers and FEMA, to establish a program to provide funds to states and Indian tribes for flood control, protection, prevention, and response projects that address the climate change impacts, with priority to be given to projects that directly assist flood activities by communities, are part of a larger state or watershed plan for flood reduction, advance multiple objectives, protect or enhance natural ecosystem functions, use nonstructural approaches, and reduce the frequency and consequences of flooding in densely populated areas.	No similar provision.	Sec. 382 of S. 1733 authorizes appropriations for a program to grant states and Indian Tribes funds for flood-related adaptation. Actual funds would be provided through distribution of emission allowances under Division B, Sec. 210. S. 1733 contains language directing EPA to consult with the Corps and FEMA to implement the provision. EPA typically does not undertake flood control activities; however, it does manage grant and loan programs that distribute monies to states and other entities for water quality and other environmental improvement projects. Instead, federal flood damage reduction actions are generally undertaken through the Corps and FEMA.[a] The relationship of the proposed program to existing federal flood damage reduction activities is not defined. S. 1733 promotes a flood risk management approach (e.g., supporting measures that permanently reduce flood risks, such as relocation out of flood-prone areas) and prioritizes opportunities with multiple benefits (e.g., unified flood hazard, built-environment, and ecosystem adaptation measures). A question raised by Sec. 382 is whether eligibility for using these funds would require consistency with state and local hazard mitigation plans and state climate change adaptation plans?
Sec. 384. Coastal and Great Lakes State Adaptation Program. Requires the EPA Administrator to distribute grants for coastal states' (including the Great Lakes states) adaptation. The states may use the funds for planning and addressing the impacts of climate change in coastal watersheds,	No similar provision	Sec. 384 of S. 1733 authorizes appropriations to distribute funds to states for coastal impact adaptation. Actual funds would be provided through distribution of emission allowances under Division B, Sec. 210.

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including (1) addressing sea level and lake level changes, shoreline erosion, and storm frequency or intensity; (2) developing plans for protecting or relocating public facilities and infrastructure; (3) conducting related research and data collection; (4) responding to impacts such as ocean acidification, thermal stratification, saltwater intrusion into freshwater aquifers; algae blooms and species migration. Priority to plan and carry out projects and activities shall be given to state coastal agencies.		This provision would create a mechanism for coastal and Great Lakes states to receive federal grants for climate change adaptation measures. No similarly broad adaptation provision is provided for inland areas; Sec. 382 of S. 1733 (described above) is focused solely on flood-related adaptation. The contents of State Natural Resource Adaptation Plans (SNRAP) outlined in Sec. 369 of Division A are closely related to data and activities identified in Sec. 384. Similarly, there is potential overlap of activities funded in Sec. 384 via state grants and Sec. 370(a)(5) and (6) of Division A for federal activities. Although coordination with other statewide climate change efforts is required in Sec. 384, S. 1733 is neither explicit in the relationship between Sec. 384 and SNRAPs, nor the distinction between the adaptation focus of Sec. 384 and the SNRAPs natural resource management focus. Coordinating SNRAPs with existing activities such as State Coastal Zone Management Plans is required by Sec. 369, but coastal activities in Sec. 384 are not subject to the same requirement. One implementation question is whether, and if so how, use of funds and planning under Sec. 384 would be linked to existing state coastal zone management programs and SNRAPs. The relationship between existing National Oceanic and Atmospheric Administration (NOAA) grants under state coastal zone management plans, and EPA's administration of grants under Sec.384 is not defined.

Source: CRS analysis.

a. Other federal agencies are also involved with flood damage reduction projects, such as the United States Department of Agriculture's Natural Resource Conservation Service, the Department of Interior's Bureau of Reclamation and the Tennessee Valley Authority.

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