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Testimony

Before the Select Committee on Energy  
Independence and Global Warming,  
U.S. House of Representatives

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## CLIMATE CHANGE

# Financial Risks to Federal and Private Insurers in Coming Decades are Potentially Significant

Statement of John B. Stephenson, Director  
Natural Resources and Environment





Highlights of [GAO-07-820T](#), testimony before the Select Committee on Energy Independence and Global Warming, United States House of Representatives

### Why GAO Did This Study

Weather-related events in the United States have caused tens of billions of dollars in damages annually over the past decade. A major portion of these losses is borne by private insurers and by two federal insurance programs—the Federal Emergency Management Agency’s National Flood Insurance Program (NFIP), which insures properties against flooding, and the Department of Agriculture’s Federal Crop Insurance Corporation (FCIC), which insures crops against drought or other weather disasters.

In this testimony, GAO (1) describes how climate change may affect future weather-related losses, (2) provides information on past insured weather-related losses, and (3) determines what major private insurers and federal insurers are doing to prepare for potential increases in such losses. This testimony is based on a report entitled *Climate Change: Financial Risks to Federal and Private Insurers in Coming Decades are Potentially Significant* (GAO-07-285) released on April 19, 2007.

### What GAO Recommends

In its report, GAO recommended that the Secretaries of Agriculture and Homeland Security analyze the potential long-term fiscal implications of climate change for the FCIC and the NFIP, respectively, and report their findings to the Congress. Both agencies expressed agreement with the recommendation.

[www.gao.gov/cgi-bin/getrpt?GAO-07-820T](http://www.gao.gov/cgi-bin/getrpt?GAO-07-820T).

To view the full product, including the scope and methodology, click on the link above. For more information, contact John Stephenson at (202) 512-3841 or [stephensonj@gao.gov](mailto:stephensonj@gao.gov).

## CLIMATE CHANGE

# Financial Risks to Federal and Private Insurers in Coming Decades Are Potentially Significant

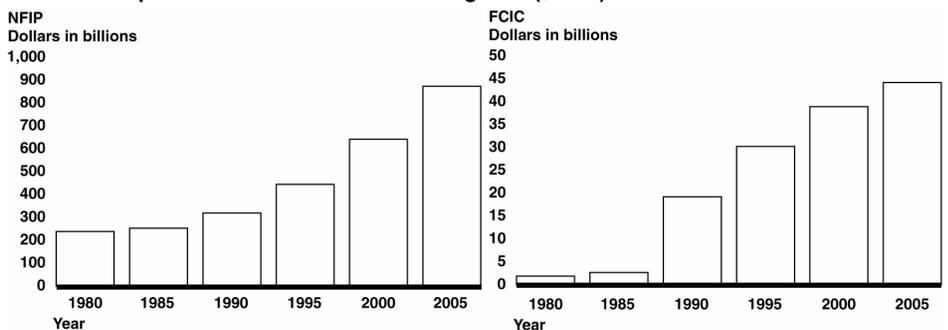
### What GAO Found

Key scientific assessments report that the effects of climate change on weather-related events and, subsequently, insured and uninsured losses, could be significant. The global average surface temperature has increased over the past century and climate models predict even more substantial, perhaps accelerating, increases in temperature in the future. Assessments by key governmental bodies generally found that rising temperatures are expected to increase the frequency and severity of damaging weather-related events, such as flooding or drought, although the timing and magnitude are as yet undetermined. Additional research on the effect of increasing temperatures on weather events is expected in the near future.

Taken together, private and federal insurers paid more than \$320 billion in claims on weather-related losses from 1980 to 2005. Claims varied significantly from year to year—largely due to the effects of catastrophic weather events such as hurricanes and droughts—but have generally increased during this period. The growth in population in hazard-prone areas and resulting real estate development have generally increased liabilities for insurers, and have helped to explain the increase in losses. Due to these and other factors, federal insurers’ exposure has grown substantially. Since 1980, NFIP’s exposure nearly quadrupled to nearly \$1 trillion in 2005, and program expansion increased FCIC’s exposure 26-fold to \$44 billion.

Major private and federal insurers are both exposed to the effects of climate change over coming decades, but are responding differently. Many large private insurers are incorporating climate change into their annual risk management practices, and some are addressing it strategically by analyzing its potential long-term industry-wide impacts. In contrast, federal insurers have not developed and disseminated comparable information on long-term financial impacts. GAO acknowledges that the federal insurance programs are not profit-oriented, like private insurers. Nonetheless, a strategic assessment of the potential implications of climate change for the major federal insurance programs would help the Congress manage an emerging high-risk area with significant implications for the nation’s growing long-term fiscal imbalance.

**Growth in Exposure of Federal Insurance Programs (\$2005)**



Source: GAO.

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Mr. Chairman and Members of the Committee:

I am pleased to be here today to discuss our findings on the potential financial implications of climate change for federal and private insurers. My testimony is based on our report entitled *Climate Change: Financial Risks to Federal and Private Insurers in Coming Decades are Potentially Significant*, released on April 19, 2007.<sup>1</sup> I also presented the findings and recommendations from that report at a hearing before the Senate Homeland Security and Governmental Affairs Committee on the same day. The uncertain and potentially large losses associated with weather-related events are among the biggest risks that property insurers face. Virtually anything that is insured is vulnerable to weather-related events.

The property and casualty segment of the insurance industry, spanning both the private and public sector, bears a large portion of weather-related losses—the dollar value of claims paid on damage attributable to weather-related events.<sup>2</sup> The private sector includes primary insurers that insure individuals and businesses directly, and reinsurers that insure the primary insurers. The public sector includes federal and state programs that were established as an alternative to disaster assistance in markets where private insurance markets did not exist, such as for crop losses, and for losses that private insurers had deemed uninsurable, such as flood damage. The Federal Crop Insurance Corporation (FCIC) was established in 1938 to temper the economic impact of the Great Depression, and was significantly expanded in 1980 to protect farmers from the financial losses brought about by drought, flood, or other natural disasters. The Department of Agriculture’s Risk Management Agency (RMA) administers the program in partnership with private insurance companies, which share a percentage of the risk of loss and the opportunity for gain associated with each insurance policy written. The National Flood Insurance Program (NFIP) was established in 1968 to protect communities vulnerable to flood damage. The Federal Emergency Management Agency (FEMA), within the Department of Homeland Security, is responsible for oversight and management of the NFIP. Private insurers administer the program in

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<sup>1</sup>GAO, *Climate Change: Financial Risks to Federal and Private Insurers in Coming Decades are Potentially Significant*, [GAO-07-285](#) (Washington, D.C.: Mar. 16, 2007).

<sup>2</sup>Insurers use the term “loss” to refer to the dollar value of approved or settled claims arising from damages incurred by a policyholder. “Loss” does not account for premium or other income, deductibles, co-payments, or damages in excess of coverage.

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partnership with the federal government, but the federal government assumes the full liability for losses.

To remain financially solvent, the insurance industry must estimate and prepare for the potential impact of future weather-related events. Any unanticipated changes in the frequency or severity of weather-related events can have financial consequences at the company level and industry-wide. Some infrequent weather-related events—drought or hurricanes, for example—are so severe that they pose unique challenges for insurers and reinsurers. Commonly referred to as extreme or catastrophic events, the unpredictability and sheer size of these events—both in terms of geography and number of insured parties affected—have the potential to overwhelm insurers' and reinsurers' capacity to pay claims.

The earth's climate and weather patterns are dynamic, varying on seasonal, decadal, and longer time scales. Of particular concern, the global average surface temperature has increased by 1.3 degrees Fahrenheit (0.74 degrees Celsius) over the past 100 years, and the National Academy of Sciences (NAS) and other scientific organizations have concluded that available evidence points to continued, perhaps accelerating, increases over the next century. Much research and policy debate of late has centered on the extent to which human activities have contributed to this warming and accompanying changes in climate, and how much is due to natural variability. But in any case, climate change, defined by the Intergovernmental Panel on Climate Change (IPCC) as any change in the climate over time due to either natural variability or as a result of human activity,<sup>3</sup> may affect social and economic activities in potentially profound ways—by raising sea levels, changing precipitation patterns, and altering the frequency or severity of weather-related events.

My testimony summarizes our report, focusing on (1) what is known about how climate change might affect the frequency and severity of damaging weather-related events, (2) the extent of the insured losses incurred by private and federal insurers and reinsurers resulting from weather-related

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<sup>3</sup>More specifically, the IPCC definition refers to climate change as a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer). Climate change may be due to natural factors (e.g., internal processes or external forcings such as solar variations or heavy volcanic activity), or to persistent human-induced changes in the composition of the atmosphere or land use patterns.

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events, and (3) what major federal agencies and private insurers and reinsurers are doing to prepare for the potential risk of increased losses.

To describe how climate change might affect insured and uninsured losses, we reviewed and summarized key scientific assessments by reputable international and national research organizations, including the IPCC, NAS, and the multi-federal agency Climate Change Science Program (CCSP). To determine the extent of insured losses, we analyzed key data from 1980 through 2005 from the insurance industry and federal agencies. Comparable data on 2006 losses were not available at the time we completed work on our report. To determine what federal and private insurers are doing to prepare for potential increases in losses, we interviewed agency officials and a subset of the largest insurers and reinsurers operating within the United States. We also interviewed officials from catastrophe modeling firms, insurance industry associations, the National Association of Insurance Commissioners,<sup>4</sup> and universities to provide additional context for respondents' statements. In addition, we reviewed key reports and publications from federal agencies, insurance experts, and selected insurance companies. We performed our work in accordance with generally accepted government auditing standards.

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## Summary

Assessments by key governmental scientific bodies have found that the effects of climate change on weather-related events could be substantial. IPCC projections, endorsed by NAS and CCSP, expect warmer surface temperatures to increase the frequency and severity of damaging weather-related events (such as flooding or drought), although the timing, magnitude, and duration of these changes are as yet undetermined. Further research on the relationship between increasing temperatures and weather events is ongoing. Of particular note, the IPCC is in the process of releasing its *Fourth Assessment Report* of the state of climate science throughout 2007, and CCSP has undertaken an assessment of the potential changes specific to North America in a report scheduled for release in 2008.

Taken together, private and federal insurers paid more than \$320 billion in claims on weather-related losses from 1980 through 2005. In constant 2005 dollars, private insurers paid the largest part of this total, \$243.5 billion

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<sup>4</sup>The National Association of Insurance Commissioners is an organization of insurance regulators from the 50 states, the District of Columbia, and the five U.S. territories.

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(about 76 percent); followed by federal crop insurance, \$43.6 billion (about 14 percent); and federal flood insurance, \$34.1 billion (about 11 percent). Claims varied significantly from year to year—largely due to the incidence and effects of extreme weather events such as hurricanes and droughts—but generally increased during this period. The growth in population in hazard-prone areas, and resulting real estate development and increasing real estate values, have increased federal and private insurers' total coverage and have helped to explain the increase in losses.

While both major private and federal insurers are exposed to increases in the frequency or severity of weather-related events associated with climate change, the two sectors are responding in different ways. Many major private insurers are incorporating elements of climate change into their annual and strategic risk management practices to reduce their exposure to catastrophic risk—that is, their vulnerability to extreme weather-related events and the associated financial losses. One consequence is that they are transferring some of their exposure to policyholders and to the public sector. Federal insurance programs, on the other hand, have seen their exposure grow significantly—NFIP's total coverage has quadrupled from 1980 to 2005, nearing \$1 trillion, and program expansion has increased FCIC's total coverage nearly 26-fold to \$44 billion. These escalating exposures to catastrophic weather events are putting the federal government at increased financial risk, but federal insurers have done little to develop and disseminate the kind of information they, and other key decision-makers such as the Congress, need to understand their programs' long-term exposure to the increased financial risks associated with climate change.

While we acknowledge that the mandate and operating environment of the major federal insurance programs is different from that of the private sector, we believe that better information about the federal government's exposure to potential changes in weather-related risk would help the Congress identify and manage this emerging high-risk area—one that potentially has significant implications for the nation's growing fiscal imbalance. Accordingly, our recently released report recommends that the Departments of Agriculture (USDA) and Homeland Security (DHS) assess the potential long-term fiscal implications of climate change for the FCIC and NFIP, respectively, and report their findings to the Congress. During the April 19 hearing, Senators Lieberman and Collins both requested that USDA and DHS notify the Committee of how they plan to implement this recommendation, and offered some guidance on the agencies' approaches in conducting such an assessment.

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In commenting on a draft of this report, both USDA and DHS agreed with our recommendation, although USDA took issue with several points made in the report. The Department of Commerce neither agreed nor disagreed with the report's findings, but instead commented on the presentation of several issues in the draft and offered technical comments which we incorporated into this report as appropriate. The Department of Energy elected not to provide comments on the draft.

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## Background

Insurance is a mechanism for spreading risk over time, across large geographical areas, and among industries and individuals. While private insurers assume some financial risk when they write policies, they employ various strategies to manage risk so that they earn profits, limit potential financial exposure, and build capital needed to pay claims. For example, insurers charge premiums for coverage and establish underwriting standards, such as refusing to insure customers who pose unacceptable levels of risk or limiting coverage in particular geographic areas. Insurance companies may also purchase reinsurance to cover specific portions of their financial risk. Reinsurers use strategies similar to primary insurers to limit their risks.

Under certain circumstances, the private sector may determine that a risk is uninsurable. For example, homeowner policies typically do not cover flood damage because private insurers are unwilling to accept the risk of potentially catastrophic losses associated with flooding. In other instances, the private sector may be willing to insure a risk, but at rates that are not affordable to many property owners. Without insurance, affected property owners must rely on their own resources or seek out disaster assistance from local, state, and federal sources.

In situations where the private sector will not insure a particular type of risk, the public sector may create markets to ensure the availability of insurance. The federal government operates two such programs—the NFIP and the FCIC. NFIP provides insurance for flood damage to homeowners and commercial property owners in more than 20,000 communities. Homeowners with mortgages from federally regulated lenders on property in communities identified as being in high flood risk areas are required to purchase flood insurance on their dwellings. Optional, lower cost flood insurance is also available under the NFIP for properties in areas of lower flood risk. NFIP offers coverage for both the property and its contents, which may be purchased separately. FCIC insures agricultural commodities on a crop-by-crop and county-by-county basis based on farmer demand and the level of risk associated with the

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crop in a given region. Major crops, such as grains, are covered in almost every county where they are grown, while specialty crops such as fruit are covered only in some areas. Participating farmers can purchase different types of crop insurance and at different levels.

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## Climate Change Is Expected to Alter the Frequency or Severity of Damaging Weather-Related Events

Assessments by leading scientific bodies suggest that climate change could significantly alter the frequency or severity of weather-related events, such as drought and hurricanes. Leading scientific bodies report that the Earth warmed during the twentieth century— 1.3 degrees Fahrenheit (0.74 degrees Celsius) from 1906 to 2005 according to a recent IPCC report—and is projected to continue to warm for the foreseeable future.<sup>5</sup> While temperatures have varied throughout history, triggered by natural factors such as volcanic eruptions or changes in the earth’s orbit, the key scientific assessments we reviewed have generally concluded that the observed increase in temperature in the past 100 years cannot be explained by natural variability alone. In recent years, major scientific bodies such as the IPCC, NAS, and the United Kingdom’s Royal Academy have concluded that human activities are significantly increasing the concentrations of greenhouse gases and, in turn, global temperatures. Assuming continued growth in atmospheric concentration of greenhouse gases, the latest assessment of computer climate models projects that average global temperatures will warm by an additional 3.2 to 7.2 degrees Fahrenheit (1.8 to 4.0 degrees Celsius) during the next century.<sup>6</sup>

Based on model projections and expert judgment, the IPCC reported that future increases in the earth’s temperature are likely to increase the frequency and severity of many damaging extreme weather-related events (summarized in table 1). The IPCC recently published summaries of two of

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<sup>5</sup>This estimate comes from a recently released summary of a key component of IPCC’s *Fourth Assessment Report* of the state of climate science, which reported an updated 100-year linear trend (1906 through 2005) of 1.3 degrees Fahrenheit—larger than the corresponding 1.0 degrees Fahrenheit (0.6 degrees Celsius) reported in the 2001 *Third Assessment Report*.

<sup>6</sup>IPCC narrowed its range of projected warming in its recently released summary from the corresponding range of 2.5 to 10.4 degrees Fahrenheit (1.4 to 5.8 degrees Celsius) reported in the 2001 *Third Assessment Report*. Although these two sets of projections are broadly consistent, they are not directly comparable. IPCC notes in the summary that the new range is more advanced in that it provides best estimates and an assessed likelihood range. It also relies on a larger number of climate models of increasing complexity and realism, as well as new information regarding the nature of feedbacks from the carbon cycle and constraints on climate response from observations.

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the three components of its *Fourth Assessment Report*. The first, in which IPCC summarized the state of the physical science, reports higher confidence in projected patterns of warming and other regional-scale features, including changes in wind patterns, precipitation, and some aspects of extreme events such as drought, heavy precipitation events, and hurricanes. The second, in which IPCC addresses climate impacts and vulnerabilities, reported that the potential societal impacts from changes in temperature and extreme events vary widely across sector and region. For example, although the IPCC projects moderate climate change may increase yields for some rain-fed crops, crops that are near their warm temperature limit or depend on highly-used water resources face many challenges. Additionally, local crop production in any affected area may be negatively impacted by projected increases in the frequency of droughts or floods. Furthermore, the IPCC stated that the economic and social costs of extreme weather events will increase as these events become more intense and/or more frequent. Rapidly-growing coastal areas are particularly vulnerable, and the IPCC notes that readiness for increased exposure in these areas is low. These reports have not been publicly released in their entirety, but are expected sometime after May 2007.

**Table 1: Selected IPCC Estimates of Confidence in Projected Changes in Weather-Related Events**

Weather-related event	Confidence in projected future changes, 2007	Examples of major projected impacts relevant to property insurers
Warmer and fewer cold days and nights; warmer/more frequent hot days and nights over most land areas	Virtually certain <sup>a</sup>	<ul style="list-style-type: none"> <li>• Increased crop yields in colder environments</li> <li>• Decreased crop yields in warmer environments</li> <li>• Increased insect outbreaks in agriculture and forestry</li> </ul>
Warm spells/heat waves: frequency increases over most land areas	Very likely	<ul style="list-style-type: none"> <li>• Reduced crop yields in warmer regions due to heat stress</li> <li>• Wildfire danger increases</li> </ul>
Heavy precipitation events: frequency increases over most areas	Very likely	<ul style="list-style-type: none"> <li>• Damage to crops</li> <li>• Soil erosion</li> <li>• Inability to cultivate land due to excessive moisture content of soils</li> <li>• Damage and disruption due to flooding</li> </ul>
Area affected by drought increases	Likely	<ul style="list-style-type: none"> <li>• Land degradation, lower yields and damage or failure of crops</li> <li>• Increased livestock deaths</li> <li>• Increased risk of wildfire</li> <li>• Disruptions due to water shortages</li> </ul>
Intense tropical cyclone activity increases	Likely	<ul style="list-style-type: none"> <li>• Damage to crops and trees</li> <li>• Disruption and damage due to flooding and high winds</li> <li>• Withdrawal of private insurance from vulnerable areas</li> </ul>

Source: IPCC, Climate Change 2007: Impacts, Adaptation, and Vulnerability, Summary for Policymakers, 2007.

Note: IPCC uses the following terms to indicate the assessed likelihood of an outcome—"virtually certain" indicates a 99% probability of occurrence; "very likely" indicates a greater than 90% probability of occurrence; and "likely" indicates a greater than 66% probability of occurrence.

<sup>a</sup>Warming of the most extreme days and nights each year.

In addition to the IPCC's work, CCSP is assessing potential changes in the frequency or intensity of weather-related events specific to North America in a report scheduled for release in 2008. According to a National Oceanic and Atmospheric Administration official and agency documents, the report will focus on weather extremes that have a significant societal impact, such as extreme cold or heat spells, tropical and extra-tropical storms, and droughts. Importantly, officials have said the report will provide an assessment of the observed changes in weather and climate extremes, as well as future projections.

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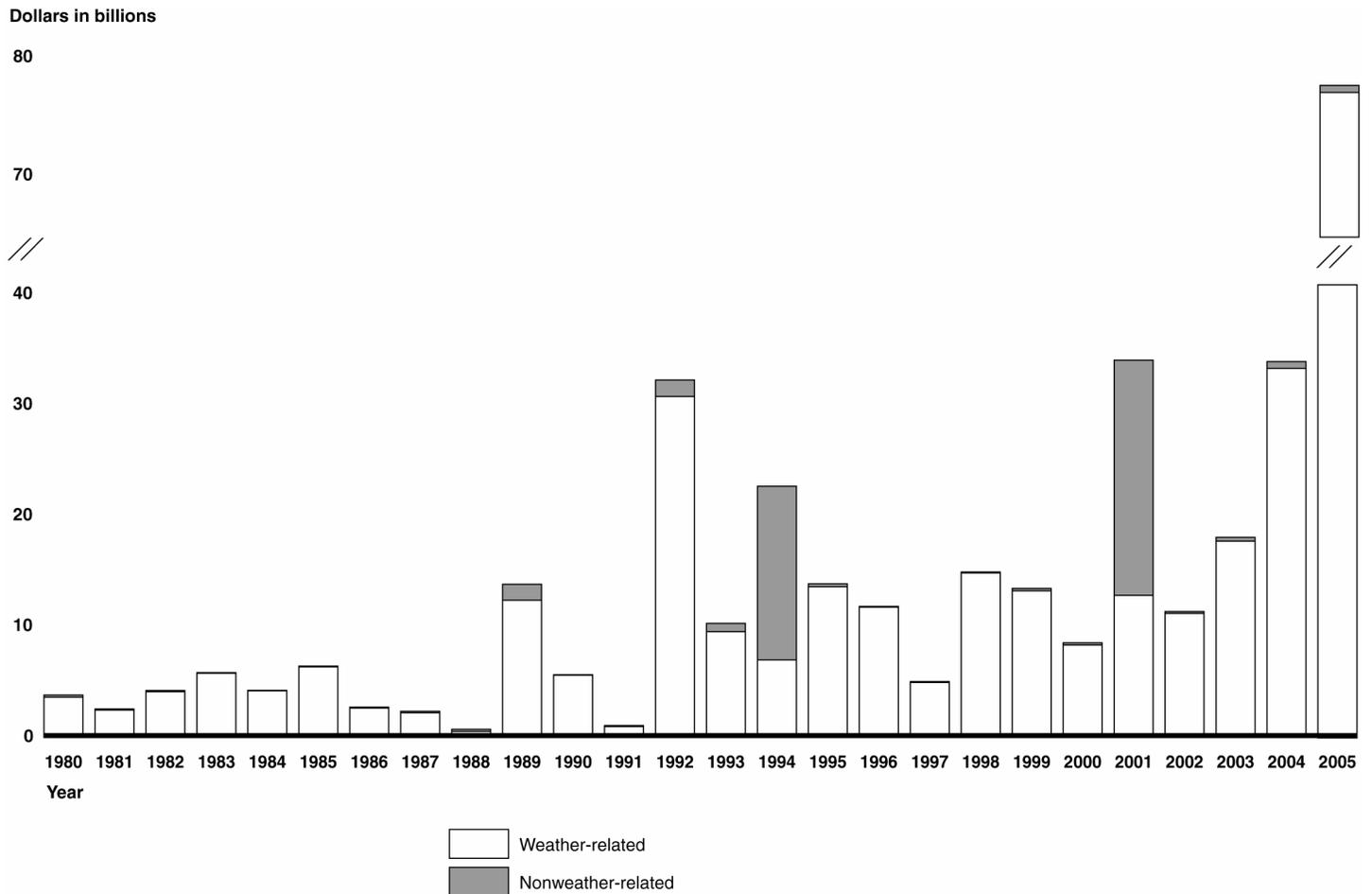
## Weather-Related Insured Losses Totaled More Than \$320 Billion between 1980 and 2005 and Appear to Be Increasing

Based on an examination of loss data from several different sources, we found that insurers incurred about \$321.2 billion in weather-related losses from 1980 through 2005. In particular, as illustrated in Figure 1, our analysis found that weather-related losses accounted for 88 percent of *all* property losses paid by insurers during this period.<sup>7</sup> All other property losses, including those associated with earthquakes and terrorist events, accounted for the remainder. Weather-related losses varied significantly from year to year, ranging from just over \$2 billion in 1987 to more than \$75 billion in 2005.

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<sup>7</sup>The insured loss totals used in our analysis understate total economic damage associated with weather-related events. Due to data limitations, we did not account for uninsured, underinsured, and self-insured losses. According to data obtained from Munich Re, the type of insured losses we reviewed account for no more than about 40 percent of the total economic losses attributable to weather-related events. Various public and private disaster relief organizations provide assistance to communities and individuals who suffer economic losses that are not insured. Additionally, weather-related events are also responsible for many indirect and non-market impacts that are not wholly accounted for in economic terms, such as environmental damage. This issue is discussed on pages 23-25 of *Climate Change: Financial Risks to Federal and Private Insurers in Coming Decades Are Potentially Significant* (GAO-07-285).

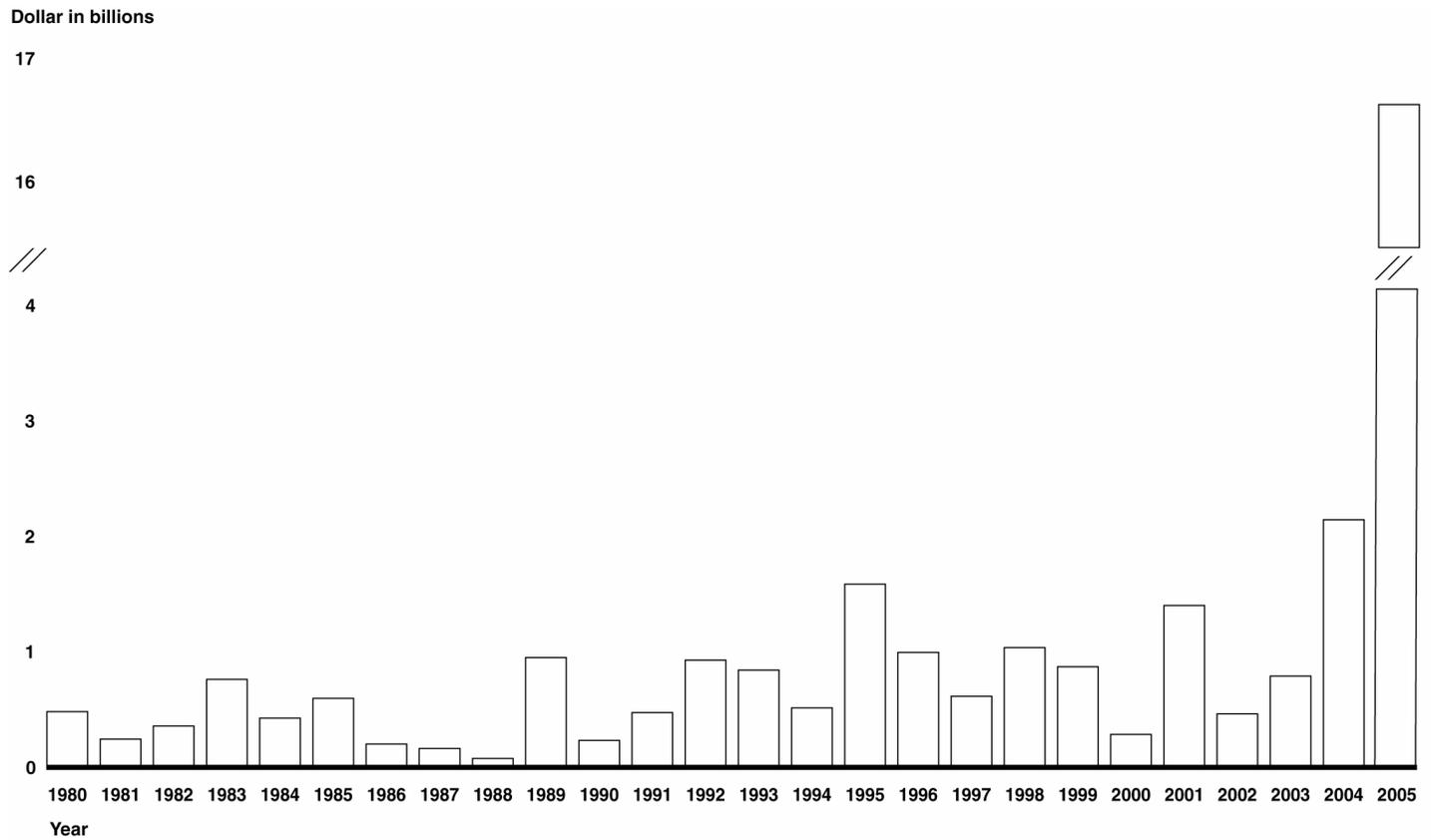
**Figure 1: Annual Weather- and Nonweather-Related Insured Losses**



Sources: GAO analysis of PCS, NFIP, and FCIC data.

Private insurers paid \$243.5 billion—over 75 percent of the total weather-related losses we reviewed. The two major federal insurance programs—NFIP and FCIC—paid the remaining \$77.7 billion of the \$321.2 billion in weather-related loss payments we reviewed. NFIP paid about \$34.1 billion, or about 11 percent of the total weather-related loss payments we reviewed during this period. As illustrated in Figure 2, claims averaged about \$1.3 billion per year, but ranged from \$75.7 million in 1988 to \$16.7 billion in 2005.

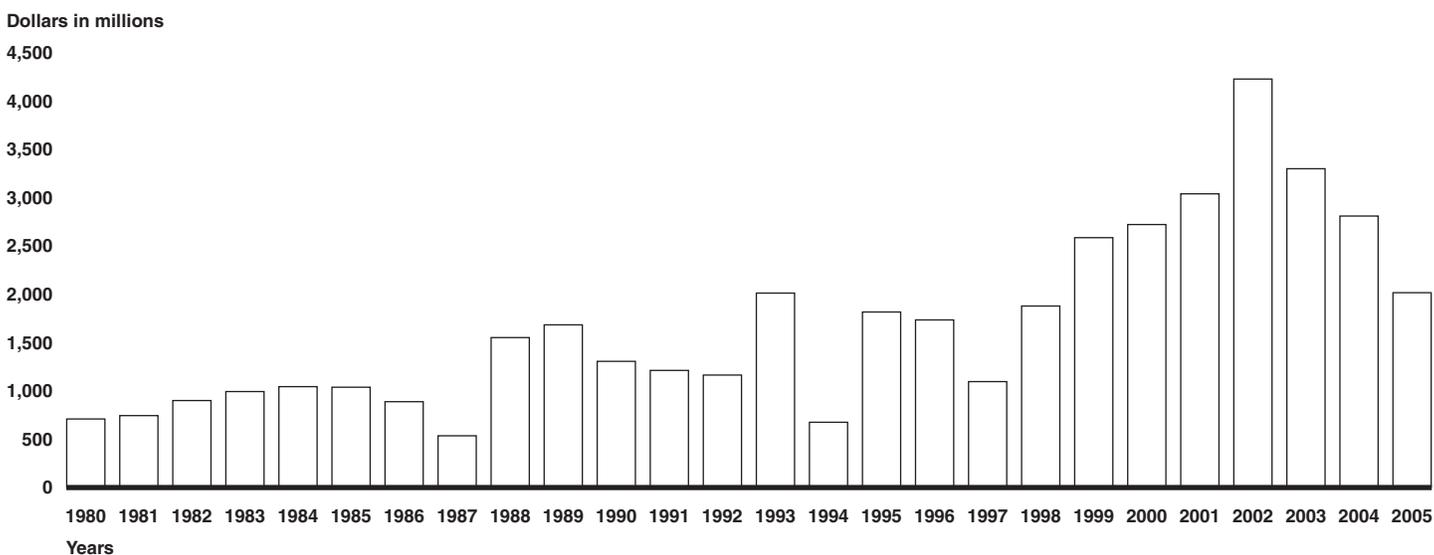
**Figure 2: Weather-Related Losses Paid by NFIP**



Source: GAO analysis of NFIP data.

Since 1980, FCIC claims totaled \$43.6 billion, or about 14 percent of all weather-related claims during this period. As illustrated in Figure 3, FCIC losses averaged about \$1.7 billion per year, ranging from \$531.8 million in 1987 to \$4.2 billion in 2002.

**Figure 3: Weather-Related Losses Paid by FCIC**



Source: GAO analysis of FCIC data.

The largest insured losses in the data we reviewed were associated with catastrophic weather events. Notably, crop insurers and other property insurers both face catastrophic weather-related risks, although the nature of the events for each is very different. In the case of crop insurance, drought accounted for more than 40 percent of weather-related loss payments from 1980 to 2005, and the years with the largest losses were associated with drought. Taken together, though, hurricanes were the most costly event in the data we reviewed. Although the United States experienced an average of only two hurricanes per year from 1980 through 2005, weather-related claims attributable to hurricanes totaled more than 45 percent of all weather-related losses—more than \$146 billion. Moreover, as illustrated in Table 2, these losses appear to have increased during the past three decades.

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**Table 2: Insured Losses Associated with Hurricanes**

	Category 1 & 2	Category 3, 4, & 5	Total
1980s	\$807 (11)	\$9,905 (6)	<b>\$10,712 (17)</b>
1990s	\$9,039 (11)	\$29,099 (8)	<b>\$38,138 (19)</b>
2000s	\$8,072 (7)	\$89,210 (7)	<b>\$97,282 (14)</b>
<b>Total</b>	<b>\$17,918 (29)</b>	<b>\$128,214 (21)</b>	<b>\$146,132 (50)</b>

Source: GAO analysis of PCS and NFIP data; National Oceanic and Atmospheric Administration (hurricane severity classification).

Note: Totals in millions of 2005 dollars. Totals do not include crop losses associated with hurricanes. Number of hurricanes associated with losses is included in parentheses. Hurricane classification was based on peak intensity at landfall.

Several recent studies have commented on the apparent increases in hurricane losses during this time period, and weather-related disaster losses generally, with markedly different interpretations. Some argue that loss trends are largely explained by changes in societal and economic factors, such as population density, cost of building materials, and the structure of insurance policies. Others argue that increases in losses have been driven by changes in climate. To address the issue, Munich Re—one of the world’s largest reinsurance companies—and the University of Colorado’s Center for Science and Technology Policy Research jointly convened a workshop in Germany in May 2006 to assess factors leading to increasing weather-related losses.<sup>8</sup> The workshop brought together a diverse group of international experts in the fields of climatology and disaster research. Workshop participants agreed that long-term records of disaster losses indicate that societal change and economic development are the principal factors explaining weather-related losses.<sup>9</sup> However, participants also agreed that changing patterns of extreme events are drivers for recent increases in losses, and that additional increases in losses are likely, given IPCC’s projections.

The close relationship between the value of the resource exposed to weather-related losses and the amount of damage incurred may have ominous implications for a nation experiencing rapid growth in some of its most disaster-prone areas. AIR Worldwide, a leading catastrophe modeling

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<sup>8</sup>Peter H ppe and Roger Pielke, Jr., eds., *Report of the Workshop on Climate Change and Disaster Losses: Understanding and Attributing Trends and Projections*, Hohenkammer, Germany, May 25-26, 2006 (Munich, Germany: October 2006).

<sup>9</sup>Consensus statements agreed to at the workshop are listed in their entirety in appendix IV of [GAO-07-285](#).

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firm, recently reported that insured losses should be expected to double roughly every 10 years because of increases in construction costs, increases in the number of structures, and changes in their characteristics. AIR's research estimates that, because of exposure growth, probable maximum catastrophe loss—an estimate of the largest possible loss that may occur, given the worst combination of circumstances—grew in constant 2005 dollars from \$60 billion in 1995 to \$110 billion in 2005, and it will likely grow to over \$200 billion during the next 10 years.

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## Major Private and Public Insurers Differ in How They Manage Catastrophic Risks Associated with Climate Change

Major private and federal insurers are responding differently to the prospect of increasing weather-related losses associated with climate change. Many large private insurers are incorporating both near and longer-term elements of climatic change into their risk management practices. On the other hand, for a variety of reasons, the federal insurance programs have done little to develop the kind of information needed to understand the programs' long-term exposure to climate change.

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## Major Private Insurers Prospectively Manage Potential Increases in Catastrophic Risk Associated with Climate Change

Catastrophic weather events pose a unique financial threat to private insurers' financial success because a single event can cause insolvency or a precipitous drop in earnings, liquidation of assets to meet cash needs, or a downgrade in the market ratings used to evaluate the soundness of companies in the industry. To prevent these disruptions, the American Academy of Actuaries (AAA)—the professional society that establishes, maintains, and enforces standards of qualification, practice, and conduct for actuaries in the United States—recommends, among other steps, that insurers measure their exposure to catastrophic weather-related risk. In particular, AAA emphasizes the shortcomings of estimating future catastrophic risk by extrapolating solely from historical losses, and endorses a more rigorous approach that incorporates underlying trends and factors in weather phenomena and current demographic, financial, and scientific data to estimate losses associated with various weather-related events.

In our interviews with eleven of the largest private insurers operating in the U.S. property casualty insurance market, we sought to determine what key private insurers are doing to estimate and prepare for risks associated with potential climatic changes arising from natural or human factors. Representatives from each of the 11 major insurers we interviewed told us they incorporate near-term increases in the frequency and intensity of

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hurricanes into their risk estimates. Six specifically attributed the higher frequency and intensity of hurricanes to a 20- to 40-year climatic cycle of fluctuating temperatures in the north Atlantic Ocean, while the remaining five insurers did not elaborate on the elements of climatic change driving the differences in hurricane characteristics.

In addition to managing their aggregate exposure on a near-term basis, some of the world's largest insurers have also taken a longer-term strategic approach to changes in catastrophic risk.<sup>10</sup> Six of the eleven private insurers we interviewed reported taking one or more additional actions when asked if their company addresses climatic change in their weather-related risk management processes. These activities include monitoring scientific research (4 insurers), simulating the impact of a large loss event on their portfolios (3 insurers), and educating others in the industry about the risks of climatic change (3 insurers), among others. Moreover, major insurance and reinsurance companies, such as Allianz, Swiss Re, Munich Re, and Lloyds of London, have published reports that advocate increased industry awareness of the potential risks of climate change, and outline strategies to address the issue proactively.

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### Major Federal Insurers Have Taken Little Action to Prospectively Assess and Disseminate Information on Potential Increases in Catastrophic Risk Associated with Climate Change

NFIP and FCIC have not developed information on the programs' longer-term exposure to the potential risk of increased extreme weather events associated with climate change as part of their risk management practices. The goals of the key federal insurance programs are fundamentally different from those of private insurers. Whereas private insurers stress the financial success of their business operations, the statutes governing the NFIP and FCIC promote affordable coverage and broad participation by individuals at risk over the programs' financial self-sufficiency by offering discounted or subsidized premiums. Also unlike the private sector, the NFIP and the FCIC have access to additional federal funds during high-loss years.<sup>11</sup> Thus, neither program is required to assess and limit its catastrophic risk strictly within its ability to pay claims on an annual basis. Instead, to the extent possible, each program manages its

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<sup>10</sup>Additionally, concern over the potential impacts of climate change on the availability and affordability of private insurance has led the National Association of Insurance Commissioners to establish a task force to formally address the issue in a report expected this summer.

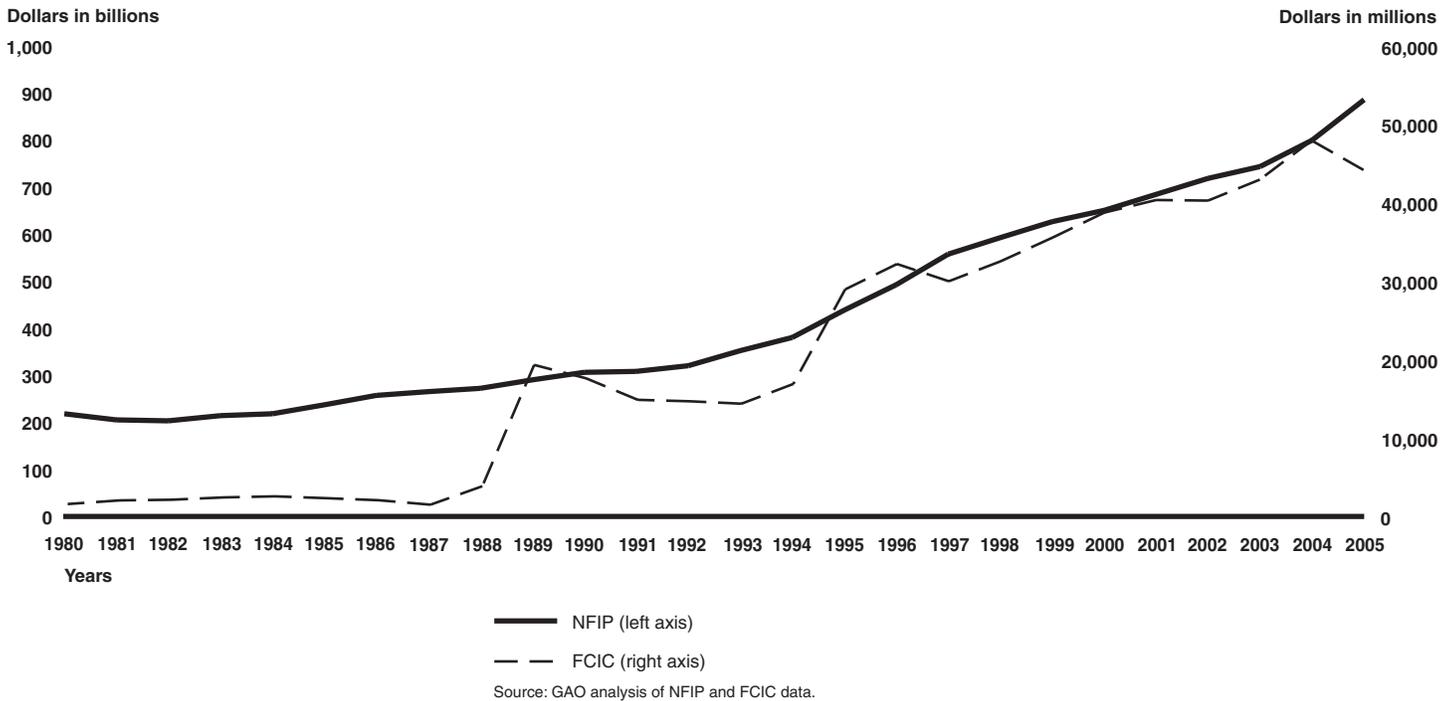
<sup>11</sup>FCIC receives additional funds for excess losses through USDA's annual appropriations process. The NFIP is authorized to borrow additional funds from the Treasury on an as-needed basis, and repay the borrowed funds with interest.

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risk within the context of its broader purposes in accordance with authorizing statutes and implementing regulations.

Nonetheless, an improved understanding of the programs' financial exposure is becoming increasingly important. Notably, the federal insurance programs' liabilities have grown significantly, which leaves the federal government increasingly vulnerable to the financial impacts of catastrophic events. Data obtained from both the NFIP and FCIC programs indicate the federal government has grown markedly more exposed to weather-related losses. Figure 4 illustrates the growth of both program's exposure from 1980 to 2005. For NFIP, the program's total coverage increased fourfold in constant dollars during this time from about \$207 billion to \$875 billion in 2005 due to increasing property values and a doubling of the number of policies from 1.9 million to more than 4.6 million. The FCIC has effectively increased its exposure base 26-fold during this period. In particular, the program has significantly expanded the scope of crops covered and increased participation. The main implication of the exposure growth for both the programs is that the magnitude of potential claims, in absolute terms, is much greater today than in the past.

**Figure 4: Total Coverage of NFIP and FCIC, 1980-2005**



Neither program has assessed the implications of a potential increase in the frequency or severity of weather-related events on program operations, although both programs have occasionally attempted to estimate their aggregate losses from potential catastrophic events. For example, FCIC officials stated that they had modeled past events, such as the 1993 Midwest Floods, using current participation levels to inform negotiations with private crop insurers over reinsurance terms. However, NFIP and FCIC officials explained that these efforts were informal exercises, and were not performed on a regular basis. Furthermore, according to NFIP and FCIC officials, both programs’ estimates of weather-related risk rely heavily on historical weather patterns. As one NFIP official explained, the flood insurance program is designed to assess and insure against current—not future—risks. Over time, agency officials stated, this process has allowed their programs to operate as intended. However, unlike private sector insurers, neither program has conducted an analysis of the potential impacts of an increase in the frequency or severity of weather-related events on continued program operations in the long-term.

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## Information on Federal Agencies' Long-Term Exposure to Catastrophic Risk Could Better Inform Congressional Decision-Making

While comprehensive information on federal insurers' long-term exposure to catastrophic risk associated with climate change may not inform the NFIP's or FCIC's day-to-day operations, it could nonetheless provide valuable information for the Congress and other policy-makers who need to understand and prepare for fiscal challenges that extend well beyond the two programs' near-term operational horizons. We have highlighted the need for this kind of strategic information in recent reports that have expressed concern about the looming fiscal imbalances facing the nation. In particular, we observed that, "Our policy process will be challenged to act with more foresight to take early action on problems that may not constitute an urgent crisis but pose important long-term threats to the nation's fiscal, economic, security, and societal future."<sup>12</sup> The prospect of increasing program liabilities, coupled with expected increases in frequency and severity of weather events associated with climate change, would appear to fit into this category.

Agency officials identified several challenges that could complicate their efforts to assess these impacts at the program level. Both NFIP and FCIC officials stated there was insufficient scientific information on projected impacts at the regional and local level to accurately assess their impact on the flood and crop insurance programs. However, members of the insurance industry have analyzed and identified the potential risks climatic change poses to their business, despite similar challenges. Moreover, as previously discussed, both the IPCC and CCSP are expected to release significant assessments of the likely effect of increasing temperatures on weather events in coming months.

The experience of many private insurers, who must proactively respond to longer-term changes in weather-related risk to remain solvent, suggests the kind of information that needs to be developed to make sound strategic decisions. Specifically, to help ensure their future viability, a growing number of private insurers are actively incorporating the potential for climate change into their strategic level analyses. In particular, some private insurers have run a variety of simulation exercises to determine the potential business impact of an increase in the frequency and severity of weather events. For example, one insurer simulated the impact of multiple large weather events occurring simultaneously. We believe a similar analysis could provide Congress with valuable information about

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<sup>12</sup>GAO, *21st Century Challenges: Reexamining the Base of the Federal Government*, GAO-05-325SP (Washington, D.C.: February 2005), 77.

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the potential scale of losses facing the NFIP and FCIC in coming decades, particularly in light of the programs' expansion over the past 25 years.

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## Concluding Observations

We believe that the FCIC and NFIP are uniquely positioned to provide strategic information on the potential impacts of climate change on their programs—information that would be of value to key decision makers charged with a long-term focus on the nation's fiscal health. Most notably, in exercising its oversight responsibilities, the Congress could use such information to examine whether the current structure and incentives of the federal insurance programs adequately address the challenges posed by potential increases in the frequency and severity of catastrophic weather events. While the precise content of these analyses can be debated, the activities of many private insurers already suggest a number of strong possibilities that may be applicable to assessing the potential implications of climate change on the federal insurance programs.

Accordingly, our report recommended that the Secretary of Agriculture and the Secretary of Homeland Security direct the Administrator of the Risk Management Agency and the Under Secretary of Homeland Security for Emergency Preparedness assess the potential long-term implications of climate change for the FCIC and the NFIP, respectively, and report their findings to the Congress. This analysis should use forthcoming assessments from the Climate Change Science Program and the Intergovernmental Panel on Climate Change to establish sound estimates of expected future conditions. Both agencies expressed agreement with this recommendation. In addition, at an April 19, 2007, hearing on our report convened by the Senate Homeland Security and Governmental Affairs Committee, Chairman Joseph Lieberman and Ranking Member Susan Collins directed the agencies to provide the Committee a deadline by which they plan to transmit this assessment to the Congress in fulfillment of this recommendation. Chairman Lieberman also asked the agencies to prepare and disseminate this assessment independent of any annual reports to the Congress.

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Mr. Chairman, this concludes my prepared statement. I would be happy to respond to any questions that you or other Members of the Committee may have.

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## Key Contact and Staff Acknowledgments

For further information about this testimony, please contact me, John Stephenson, at 202-512-3841 or [stephensonj@gao.gov](mailto:stephensonj@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. Contributors to this testimony include Steve Elstein, Assistant Director; Chase Huntley; Micah McMillan; Alison O'Neill; Kate Robertson; and Lisa Van Arsdale.

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