3.2 RISK ASSESSMENT: CLIMATE CHANGE

OVERVIEW

This plan is prepared with the understanding that climate change will impact state mitigation planning and the hazards that it addresses. Depending upon the research sources and methods utilized, a variety of changes, severities, and outcomes have been predicted in regards to climate change. However, for the purposes of this plan, a general understanding is that:

- The climate is changing;
- These changes are and will have an effect on the hazards within Idaho;
- The type and severity of the known hazards are both changing and increasing; and
- A dynamic planning approach will be needed going forward to ensure hazard planning remains resilient.

Environmental, social, and economic health is essential to disaster resilience. Climate change can affect natural hazards, which can result in damages and hardships for a community, region, and the entire state of Idaho for years following the event. Some climate change impacts include sea level rise, extreme storm events, and increased flooding, drought, and wildfire. Hazard mitigation includes both short-term and long-term actions to reduce the severity of the effects of these hazards. Risk analysis helps to identify the steps necessary to reduce climate change impact.
As an indicator of a changing climate, during 2012 Idaho experienced some of the worst wildfires and drought conditions in its history.

BACKGROUND

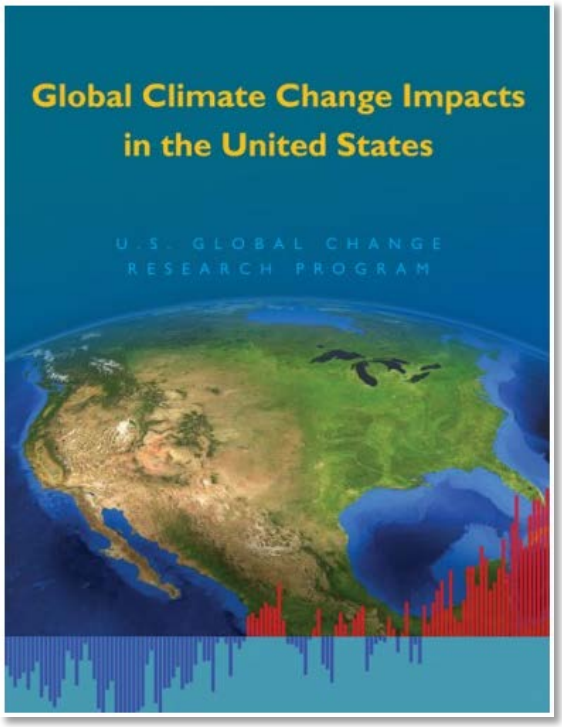
Climate change impacts include threats to our health, safety, infrastructure, and economic vitality within Idaho. Scientific experts are analyzing climate change impacts and our government is noticing such observations.

The United States Global Change Research Act passed in 1990, requiring the United States Global Change Research Program (USGCP) to report effects of global change on the natural environment, agriculture, energy production and use, land and water resources, transportation, human health and welfare, human social systems, and biological diversity, to the President and Congress every four years. This group analyzes current trends in global change (both human induced and natural caused), to project major trends for the subsequent 25 to 100 years.[1]

The National Climate Assessment (NCA) is one important resource for understanding and communicating climate change science and impacts in the United States. It informs the nation about already observed changes, the current status of the climate, and anticipated trends for the future. The

[1] US Global Change Research Program . (1989). *Our Changing Planet (OCP).* Washington D.C.: USGCRP.

NCA report process integrates scientific information from multiple sources and sectors to highlight key findings and significant gaps in our knowledge. The NCA also establishes consistent methods for evaluating climate impacts in the U.S. in the context of broader global change. Findings from the NCA provide input to Federal science priorities and are used by U.S. citizens, communities, and businesses as they create more sustainable and environmentally sound plans for the nation's future.



In June of 2013, the President's Climate Action Plan was unveiled. Some highlights note that 'the administration will convene representatives from the insurance industry…to account for climate change risks and incentivize policy holders to take steps to reduce their exposure to these risks'. In addition, the administration plans to 'increase understanding of climate-change impacts…and develop the information and tools nedded by decision-makers to respond to both long-term climate change impacts and near-term effects of extreme weather'.[2]

The University of Idaho published its report titled, Indicators of Climate Change in Idaho, in 2011. The introduction to this report is included below:

> In 2007, the Intergovernmental Panel on Climate Change reported in their fourth assessment that the Earth's climate system is unequivocally warming. Their conclusion was based on a suite of scientific observations consistent with a warming planet including increases in global air and ocean temperatures, rising global sea level, decreases in mountain snowpack and Arctic sea ice.
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> Observations of physical, chemical and biological facets of the environment are referred to as environmental indicators. Given that changes in surface temperatures, sea level, and snow and ice cover have occurred on most continents and oceans over the last several decades, they represent an important indicator of global climate change. At regional to local scales indicators of climate change are varied due not only to whether regional changes in climate have occurred, but also whether the area is sensitive to changes in climate.
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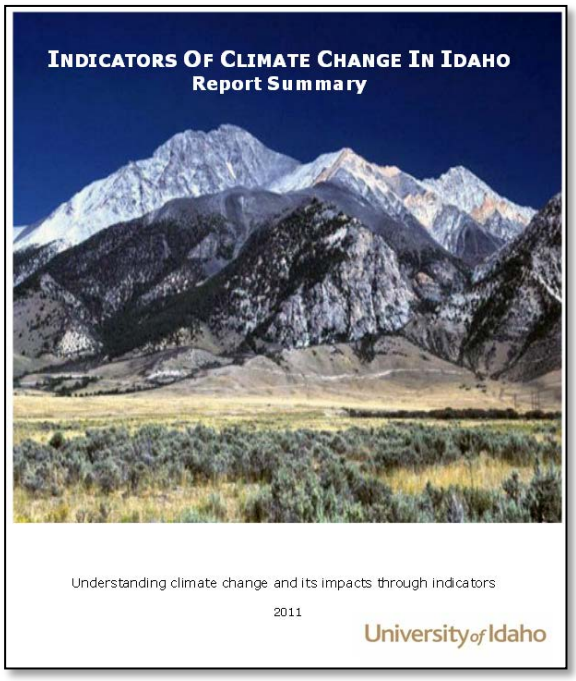
> In partnership with its three public universities, Idaho is currently supporting research efforts at understanding the effects of climate change. This undertaking will allow for a better understanding of observed climate change and projected changes for the state as well as

[2] Executive Office of the President. (2013). *The President's Climate Action Plan.*

implications of climate variability and change on ecological, human, and economic systems. The development of climate indicators for the state can serve as a valuable tool for detecting and understanding the effects of observed changes in climate, as well as understanding the ramifications of projected changes in climate for Idaho.



This summary report provides information on indicators of climate change in Idaho, with a focus on describing trends in physical and biological systems. Indicators were selected on the basis of published scientific literature and publically available data libraries. The following points represent key findings from this analysis and synthesis of climate change indicators in Idaho, and are briefly discussed in the subsequent sections of this summary.

FUTURE CHANGES

Idaho's State Hazard Mitigation Plan (SHMP) is taking critical steps to decrease and potentially avoid these impacts associated with climate change. Should such hazards occur, the protection of lives, property, and economic sustainability are essential to the State's continuity of operations and for its citizens as a whole.

Vulnerabilities include:

- Increased occurrences and magnitudes of hazard events, including: severe storms, flooding, drought, and wildland fires
- Changing climatic and precipitation patterns that may impact the State's agricultural, hydroelectric, recreational, and economic sectors
- Increased exposure to hazard events for all of Idaho's citizens and infrastructure
- Expanding diversity of extreme weather events
- Increased temperatures and altered streamflows impacting the ecosystem and species migration

Climate experts agree that when such potential impacts arise, they will be significant. Recent predictions, as described by the National Service Center for Environmental Publications (NSCEP), include

"more precipitation may come in short, intense bursts (e.g., more than 2 inches of rain in a day), which could lead to more flooding."[3]

A recent report released by the Federal Emergency Management Agency (FEMA) states that climate change will increase the areas of the United States at risk of floods by up to 45% by 2100, with very large regional variations. It also notes that no significant decreases in floodplain depth or area are anticipated for any region of the nation; in fact, median flood flows are may increase even in areas that are expected to become dryer on average.[4]

According to the United States Environmental Protection Agency (EPA) [5]:

> 'The climate of the Northwest is changing. Over the last century, the average annual temperature rose by 1.5°F, with increases in some areas up to 4°F. Changes in snowpack, streamflows, and forest cover are already occurring. Future climate change will likely continue to influence these changes. Average annual temperature in the region is projected to increase by 3-10°F by the end of the century. Winter precipitation is projected to increase while summer precipitation is projected to decrease, though precipitation projections are less certain than those related to temperature. Future climate change impacts would be compounded by pressures related to the region's rapidly growing population.'

The EPA also mentions the following[6]:

A reliable water supply is crucial for energy production, agriculture, and ecosystems in the Northwest. Much of the region's water is stored naturally in winter snowpack in the mountains. The snowpack melts and runs off into streams and rivers in the late spring and summer, a time when there is very little rainfall. Climate change will likely threaten this natural storage, with important consequences for the timing of runoff and amount of water available in streams and rivers (streamflow) throughout the year.

- Higher winter temperatures are projected to cause more precipitation to fall as rain instead of snow. This would decrease snow accumulation. The April 1st snowpack, an indicator of natural water storage available for the warm season, is projected to decline by as much as 40% in the Cascades by the 2040s. This reduction in available snowpack (and thus water) could increase the risk of drought during normally dry summers.

- Higher temperatures will likely contribute to earlier snowmelt and major changes in the timing of runoff. As a result, the peak of spring runoff is projected to shift 20 to 40 days earlier by the end of the century.

[3] EPA, U. S. (1998). *Climate Change and Idaho.* Washington D.C.
[4] FEMA, U.S. (2013). The Impact of Climate Change and Population Growth on the NFIP through 2100.
[5] http://www.epa.gov/climatechange/impacts-adaptation/northwest.html
[6] http://www.epa.gov/climatechange/impacts-adaptation/northwest.html

- Warmer temperatures are projected to cause more precipitation to fall as rain. Overall winter precipitation is projected to increase. These changes would increase winter flood risks.

MITIGATION RATIONALE

This section has shown how climate change is affecting the many factors that impact the hazards that Idaho faces. This only increases the need to incorporate a dynamic approach to planning as climate change continues to evolve and change the hazards as we know them. A long term, forward thinking approach to planning and mitigating these hazards will need to incorporate a component for climate change.

Hazard mitigation includes both short-term and long-term actions to reduce the severity of the effects of these hazards. Risk analysis can help to identify the steps necessary to reduce climate change impact. Figure 3.2.A below provides a general structure of the environmental security construct, presented in the Ramsay and O'Sullivan article, 'There's a Pattern Here: The Case to Integrate Environmental Security into Homeland Security' [7]. The authors, and a growing collective of others, now believe that environmental security is a vital component of homeland security, and overall national security for all nations.

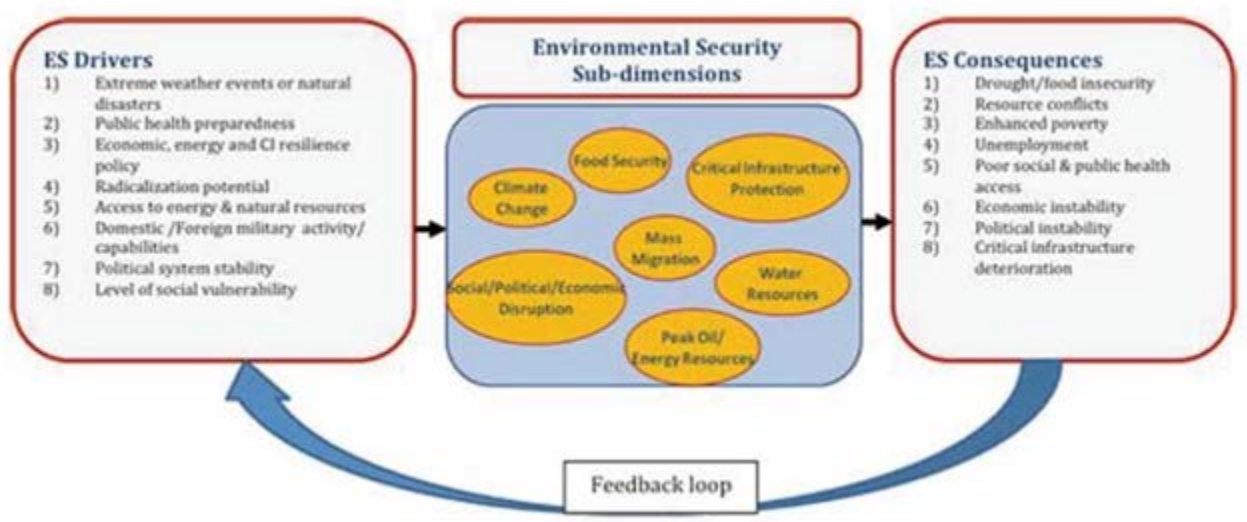


Figure 3.2.A: Environmental Security Construct / Source: Ramsay and O'Sullivan article, 'There's a Pattern Here: The Case to Integrate Environmental Security into Homeland Security'

[7] Ramsay and O'Sullivan (2013). *There's a Pattern Here: The Case to Integrate Environmental Security into Homeland Security Stragegy.* Homeland Security Affairs.

GENERAL MITIGATION APPROACHES

There are three approaches to addressing climate change: adaptation, mitigation, and engagement. Others have used the words "retreat, resist, or ignore."[8] Each approach has an associated cost. Identifying climate change hazard and risk impacts within Idaho builds a more resilient and sustainable framework, preserving quality of Idaho's resources, diverse community, and way of life.

To be effective, mitigation approaches should be based upon the most accurate information and data available. Looking forward, the State needs to ensure that it continues to incorporate and leverage the most up-to-date reports and findings that are available.

The Global Change Research Act of 1990 requires an assessment report at least every four years. The Federal government is responsible for producing these reports through the U.S. Global Change Research Program (USGCRP), a collaboration of 13 Federal science agencies. A 60 member Federal advisory committee, the National Climate Assessment Development Advisory Committee (NCADAC), has been charged with developing the 2013 report and recommendations about the ongoing assessment process. A draft version of this report was recently posted for public review. The report itself is being written by 240 authors drawn from academia; local, state, and Federal government; the private sector; and the nonprofit sector.[9]

The National Oceanic Atmospheric Administration (NOAA) National Climatic Data Center (NCDC) tracks many different types of meteorological and climatological information that can be used to get a general understanding of the trends, or lack thereof, within a geological region and time frame. This information was also used to inform this plan on the potential impacts of Climate Change to the hazards that Idaho addresses.
Potential climate change impacts and their timing are uncertain. A combination of history and science gives us an advantage – however, they do not work as a crystal ball. Maintaining awareness and dialogue with community stakeholders and climate experts enhance our pursuit to risk reduction, including those hazards affected by climate change. According to Idaho Experimental Program to Stimulate Competitive Research (EPSCoR), connections between surface water and ground water with timing and magnitude, affected by projected climate change, could influence mountain snow packs and snowmelt.[10]

Preparedness by means of securing food and fuel is critical. Aftermath of Super-storm Sandy, otherwise known, as the "perfect storm" is an example of such circumstances - A major storm surge, flooding mass urban populations, halting all infrastructures within the disaster zone during the winter season. Necessary heat, fuel, and food were a difficult commodity to access as transportation became limited, and infrastructure failed. Sensitivity to vulnerable, economically disadvantaged elderly and non-English speaking populations during climate change weather-affected hazards should be taken into

[8] Cruz, C. o. (2012). *City of Santa Cruz Climate Adaptation Plan.* Santa Cruz: City of Santa Cruz.
[9] USGCRP. http://globalchange.gov/what-we-do/assessment/nca-overview
[10] Idaho Experimental Program to Stimulate Competitive Research (EPSCoR). (2012).

consideration. As climate scientists predict more frequent storm events, it is key to identify significant structural and financial vulnerabilities.

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