



NATIONAL CLIMATE ASSESSMENT DETAILS CHALLENGES TO NORTHWEST SALMON RECOVERY; WARMING 'INCREASES EXTINCTION RISK FOR SPECIES ALREADY AT LOW ABUNDANCE'

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The Fifth National Climate Assessment (NCA5) released this week finds that the impacts of weather extremes — exacerbated by climate change — are far-reaching across every region of the United States. And it indicates a warming future threatens Northwest salmon recovery.

“Salmon abundance, age at maturation, and size at maturity are widely correlated with climate trends. Idaho’s Snake River spring and summer Chinook and sockeye salmon are at particularly high risk across multiple future temperature scenarios. Increasing temperatures are expected to increase the duration and spatial extent of enabling conditions for harmful algal blooms, increasing threats to marine mammals, fish, and shellfish. Population instability increases volatility in fisheries and the extinction risk for species that are already at low abundance,” says the [new report](#).

Endangered Snake River sockeye salmon, a key focus of Columbia/Snake river basin salmon recovery efforts, “is highly vulnerable to climate change. Application of conservation genetics and interagency and Tribal cooperation have sustained this culturally and ecologically unique population.”

Over 150 years, a variety of human activities have affected Idaho sockeye, notes the report. “For example, overfishing, construction of dams that blocked migration for periods of time, and stocking of non-native fish populations altered aquatic ecological processes in complex ways. Numerous factors contributed to sockeye declines until almost no fish returned from the ocean in the 1990s. All 16 adults known to have returned during that decade were captured and taken into a breeding program. Subsequently, a collaboration among federal, state, and Tribal biologists increased reproduction of the captive fish, allowing the release of smolts and some adults to the wild to spawn. In 2014, a peak of 1,579 sockeye salmon returned to Idaho’s Sawtooth Mountains.

“In July 2015, a record-breaking heatwave combined with low snowpack from the previous winter led to high water temperatures that killed nearly all naturally migrating adults, highlighting the vulnerability of this life stage in sockeye salmon. To protect genetic diversity in hot years and maximize reproductive capacity, adults have been collected at dams and transported upriver nearly 500 miles.

“By the 2040s, temperatures in the free-flowing Salmon River, which travels 425 miles in central and eastern Idaho, could rise several degrees more than larger rivers downstream”

The Salmon River could lose nearly half its streamflow during the adult migration window, threatening this endangered species, says the report.

“Extensive water withdrawals and habitat modifications in the Salmon River basin exacerbate these conditions. Nevertheless, the quality of juvenile rearing habitat and marine survival are relatively high in this population, and reintroduction programs are widely supported. Additional actions to restore cool, clean water throughout the basin would support the population’s natural adaptation to climate change.”

For the Northwest, in general, the NCA5 says, “Extreme heat, flooding, wildfires, and other climate hazards threaten human health, sense of place, ecosystems, infrastructure, and industries in the Northwest. Impacts across sectors will have cascading effects on livelihoods and well-being, with Tribes and other frontline communities facing disproportionate risks. Adaptation actions that prioritize social equity and utilize local and Indigenous Knowledge can support regional resilience.”

The report notes that recent extreme events have stressed water systems and housing, transportation, and energy infrastructure across the Northwest.

“Extreme precipitation, droughts, and heatwaves will intensify due to climate change and continue to threaten these interrelated systems. Given the complexity of and interdependencies among infrastructure systems, an impact or a response within one sector can cascade to other sectors. Cross-sectoral planning, which can include redesigning aging infrastructure and incorporating climate considerations into land-use decisions, can increase resilience to future climate variability and extremes.

“Long-term changes in climate and the frequency and magnitude of extreme events, such as droughts, floods, and heatwaves, affect species and ecological processes. High temperature records set in the Northwest from 2015 through 2021 were associated with many short-term or long-term ecological transformations, such as mortality or physiological damage to numerous native species of plants and animals, changes in water availability, and wildfire dynamics. Ecological effects and responses to climate change are not uniform, even among closely related species.”

The report stresses that climate change will increase the prevalence of non-native, invasive species in Northwest woods and rivers.

“Climate change can affect the distribution and population dynamics of native and non-native species. When some non-native species become effective competitors with native and other non-native species, they are considered to

be invasive in natural and human-dominated systems, including forests used for timber harvest or recreation. Some of these invasive species are expected to become more prevalent in response to projected increases in temperature, especially minimum winter temperature, and increases in the frequency, duration, and severity of drought across the Northwest.

“Hydrological and thermal changes will prompt shifts in species composition of native and non-native fishes, especially where their habitats have been impaired by land use, including stream modifications and water withdrawals. For example, rising temperatures, disease spread, and competition threaten the native bull trout and cutthroat trout. Non-native invasive species such as smallmouth bass, which thrive in warmer waters, continue to expand in the Columbia River basin, competing with and consuming native salmonids. Increased intensity of precipitation and occurrence of rain-on-snow events will increase flood severity and frequency, endangering salmon eggs and juveniles.”

As for marine heatwaves off the Northwest coast, the report says the “2014–2016 marine heatwave had numerous effects in the highly productive California Current marine ecosystem, including the first documented domoic acid poisoning of sea lions, with detectable levels of domoic acid in dolphins, whales, and seals off the Washington coast. These toxins are now detectable year-round in sea lions, not just during algal blooms. Changes in the ecosystem during the heatwave also caused mass mortality of seabirds, such as Cassin’s auklets and common murrelets and led to extensive closures of crab and shellfish fisheries.

“Many salmon populations also contracted sharply after the heatwave. Preliminary evidence indicates that, following extreme heat in June 2021, numerous shellfish species became thermally stressed or died. The frequency and intensity of marine heatwaves are expected to increase. These marine heatwaves are expected to have broad-ranging impacts on marine ecosystems and increase the incidence of human–wildlife conflict, such as entanglement of whales in fishing gear. While the impacts of future marine heatwaves on species will vary—some species will decline, others will increase, and others will shift their distributions—current regulations and practices may not adequately respond to these impacts, potentially leading to disruptions in fisheries.”

For the full Northwest chapter of the report go [here](#).

However, the report also finds that rapidly reducing greenhouse gas emissions and accelerating adaptation can limit further warming and protect lives and

property from many climate risks. In coordination with the release of the report, President Biden announced more than \$6 billion through his Investing in America agenda to make communities across the country more resilient to climate change.

Some of the key findings from the report are:

–Actions taken now to accelerate net emissions reductions and adaptation to ongoing changes can reduce risks for current and future generations.

–Climate change exacerbates long-standing social inequities experienced by underserved and overburdened communities, contributing to persistent disparities in the resources needed to prepare for, respond to, and recover from climate impacts. Low-income and communities of color face higher risks of illness and death from extreme heat, climate-drive floods and air pollution compared with White people, and often lack access to adequate flood infrastructure, green spaces, safe housing and often lack protective resources.

–Climate change is harming physical, mental, spiritual and community health and well-being.

–The impacts of extreme climate events are costing the nation an estimated \$150 billion each year. With every increment of global warming, costly damages are expected to accelerate. For example, 2 degrees Fahrenheit of warming is projected to cause more than twice the economic harm induced by 1 degree F of warming. High annual temperatures and tropical cyclones are associated with lower growth in GDP.

–Climate action can result in near-term benefits that outweigh the costs, with the potential to improve well-being, strengthen resilience, benefit the economy and redress legacies of racism and injustice.

–Acre for acre, Blue Carbon Ecosystems, such as sea grasses, mangroves and saltmarshes, are estimated to store about twice as much carbon below ground than terrestrial vegetation. With conservation and restoration, these ecosystems could sequester enough carbon each year to offset about 3 percent of global emissions (based on 2019 and 2020 emissions).

–By 2050 and by 2100, sea level rise under the Intermediate Sea Level Scenario, is projected to be higher along the Atlantic (about 1.25 and 4 feet, respectively)

versus Pacific coast (0.75 and 3 feet), and greatest along the western Gulf coast (2 and 5 feet).

-Hurricanes have been intensifying more rapidly since the 1980s and causing heavier rainfall and higher storm surges due to climate change. There is no long-term trend in the frequency of landfalling hurricanes in the U.S. since the late 19th century, but there has been an increase in hurricane activity in the North Atlantic since the early 1970s.

-Climate change has impacted commercial marine fisheries in every region of the U.S. by altering the availability and quality of harvested species, destabilizing fisheries-related revenue and employment, and causing new management challenges.

-While climate change is not the sole driver affecting fish populations, it is an added stressor that exacerbates other negative impacts.

-Over the next century, climate change is expected to reduce fish and shellfish catch in all U.S. regions, including some of the highest-valued fisheries.

The NCA5 released by the Biden Administration and the U.S. Global Change Research Program, also notes that across the country, efforts to adapt to climate change and reduce greenhouse gas emissions have expanded since the last National Climate Assessment in 2018, and U.S. emissions have fallen since peaking in 2007. But without deeper cuts in global and U.S. net greenhouse gas emissions and accelerated adaptation efforts, climate risks to the U.S. will continue to grow.

"The Fifth National Climate Assessment can help every community, every business and every American prepare for and respond to climate change," said U.S. Secretary of Commerce Gina Raimondo. "While the report clearly shows the immense challenges of climate change, it also outlines the opportunity to create a more resilient nation and a stronger, more sustainable economy."

"The key findings of this Fifth National Climate Assessment showcase the science-based information NOAA provides for the nation by observing and predicting climate change and working with communities to build resilience to its effects," said NOAA Administrator Rick Spinrad, Ph.D. "The report details the far-reaching effects of human-caused climate change on the U.S. and concludes

that every additional increment of warming that we avoid — every action to reduce warming — matters for reducing harmful impacts.”

NOAA’s contributions to the report are significant, including 35 authors and 13 chapter leaders along with critical editorial, graphical and technical support. The report’s chapters include two physical science chapters, 18 national-level topic chapters, 10 regional chapters and chapters that focus on societal responses to climate change through adaptation and mitigation. NOAA’s work on regionally-based climate resiliency, community engagement and environmental justice are also reflected in the report. New this year are chapters on Earth system processes, economics and social systems and justice. The report provides examples of community projects to mitigate and adapt to climate change.

The report gives greater emphasis to the importance of Indigenous knowledge in understanding long-range change in our environment and its impacts, as well as environmental justice to understand the unequal impacts of climate change and to creating equitable solutions.

Also new for this report is an [interactive online NCA5 Atlas](#) , which allows users to explore the latest localized temperature and precipitation projections. The atlas is designed to be used by national, state, tribal and community leaders, adaptation planners, researchers, educators and the general public. For the first time, this report includes over 90 pieces of art drawn from more than 800 pieces submitted by the public and a poem written by Poet Laureate Ada Limón, embracing different interpretations of the report and its findings.

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