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**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF ALASKA**

SOVEREIGN IÑUPIAT FOR A LIVING ARCTIC,
et al.,

Plaintiffs,

v.

BUREAU OF LAND MANAGEMENT, et al.

Defendants.

and

CONOCOPHILLIPS ALASKA, INC., et al.,

Intervenor-Defendants.

CENTER FOR BIOLOGICAL DIVERSITY, et al.

Plaintiffs,

v.

BUREAU OF LAND MANAGEMENT, et al.

Defendants,

and

CONOCOPHILLIPS ALASKA, INC., et al.,

Intervenor-Defendants.

Case No.: 3:23-cv-00058-SLG

Case No.: 3:23-cv-00061-SLG

**AMICUS CURIAE BRIEF OF OUR CHILDREN'S TRUST IN SUPPORT OF
PLAINTIFFS' MOTIONS FOR SUMMARY JUDGMENT**

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INTRODUCTION

Our Children’s Trust (“OCT”) submits this *amicus curiae* brief in the above-captioned cases in support of Plaintiffs.¹ Plaintiffs challenge the Bureau of Land Management’s (“BLM”) approval of the Willow Master Development Plan (“Willow Project”). Among other claims, Plaintiffs argue BLM did not sufficiently evaluate the Willow Project’s climate effects. OCT seeks to assist the Court in its analysis of the case at hand by illuminating the broader context in which the Willow Project would operate, including: (1) the unique vulnerabilities and disproportionate harms to youth in Alaska and worldwide from the federal government’s continuing contributions to the climate crisis through the approval of fossil fuel projects like the Willow Project, as well as; (2) the best available climate science, which demonstrates that continuing fossil fuel emissions resulting from the approval of such projects critically harm and endanger the lives, health, and safety of youth. The best available science further demonstrates that new fossil fuel projects and infrastructure, like the Willow Project, are unnecessary because clean, renewable energy is readily available to economically fulfill all energy needs without causing destruction to the climate system and the health and safety of children.

IDENTITY AND INTEREST OF *AMICUS CURIAE*

Our Children’s Trust (“OCT”) is a non-profit public interest law firm that provides

¹ OCT files this brief concurrently in each of the above-captioned cases. The use of “Plaintiffs” in this brief generally refers to the plaintiffs in both of the above-captioned cases.

strategic, campaign-based legal services to youth from diverse backgrounds to secure their legal rights to a safe climate. OCT works to protect the Earth’s climate system for present and future generations by representing young people in legal efforts at federal, state, and global levels to secure their binding and enforceable fundamental rights to a healthy atmosphere and stable climate, based on the best available science.

OCT currently represents youth in active constitutional climate litigation pending in the United States District Court for the District of Oregon,² and the state courts of Montana,³ Hawai‘i,⁴ Utah,⁵ and Virginia,⁶ each of which challenges government policies and systemic practices that cause and contribute to the climate crisis, endangering the health and safety of children in violation of their constitutional rights. OCT has also represented Alaska youth, including Alaska Native youth, in the pursuit of climate justice.⁷ All of OCT’s advocacy efforts on behalf of youth and future generations are based on the best available climate science and are supported by Nobel laureate scientists and medical experts, including the world’s top climate scientists. Given OCT’s mission, experience, and advocacy to secure climate justice for youth, OCT has a unique perspective, expertise,

² *Juliana v. United States*, No. 6:15-cv-01517-AA (D. Or.).

³ *Held v. Montana*, No. CDV-2020-307 (Mont. First Jud. Dist. Ct. Lewis & Clark Cnty.).

⁴ *Navahine F. v. Hawai‘i Dep’t of Transp.*, No. 1CCV-22-0000631 (JMT) (Haw. First Cir. Env’t Ct.).

⁵ *Natalie R. v. Utah*, No. 20230022-SC (Utah Sup. Ct.).

⁶ *Layla H. v. Virginia*, No. 1639-22-2 (Va. Ct. App.).

⁷ *Sagoonick v. Alaska*, No. 3AN-17-09910 CI (Alaska Third Jud. Dist. at Anchorage); *Kanuk v. Alaska*, No. 3AN-11-07474 CI (Alaska Third Jud. Dist. at Anchorage).

and a significant interest in informing the court on the best available climate science and the disproportionate harms to youth from the federal government’s ongoing contributions to the climate crisis through fossil fuel infrastructure like the Willow Project.

SUMMARY OF ARGUMENT

This Court’s decision on Plaintiffs’ Motions for Summary Judgment has important implications for the Earth’s climate system and the habitability of the world that children and future generations will inherit. The best available climate science demonstrates that, as a result of the use of fossil fuels, atmospheric concentrations of greenhouse gases (“GHGs”) have already risen well beyond safe levels, resulting in dangerous climate changes that are disproportionately harming the health and safety of our nation’s youth, including children in Alaska. The federal government’s approval of new fossil fuel infrastructure, like the Willow Project, locks in further dangerous GHG pollution for decades, exacerbating the climate crisis and the resulting harms to children. As Our Children’s Trust explained in their public comment on the Willow Project, every additional ton of emissions matters and causes more danger, more temperature rise, and more harm to the youth of Alaska and throughout our nation, making it even harder to return to a safe, stable climate system.⁸ With children already suffering disproportionate harms from climate change with life-long implications for their health and safety, urgent emissions

⁸ Public Comment Letter from Our Children’s Trust to BLM, *Re: Notice of Preparation of a Supplemental Environmental Impact Statement for the Willow Master Development Plan* (Mar. 8, 2022), available at <https://rb.gy/ot9ub>.

reductions are required to prevent further worsening existential harms to our nation's youth. Additional GHG emissions from fossil fuel projects like the Willow Project only cause further harm and endangerment to Youth. Such projects are entirely unnecessary. Clean, renewable energy is readily available to economically fulfill all energy needs without causing destruction to the climate system and the health and safety of children.

ARGUMENT

I. Children are Uniquely Vulnerable to and Disproportionately Harmed by the Air Pollution and Climate Change Resulting from the Development and Combustion of Fossil Fuels

Children are uniquely vulnerable to and disproportionately harmed by the dangerous effects of fossil fuel emissions and ensuing climate change resulting from fossil fuel infrastructure like the Willow Project. Children's still-developing bodies; unique behavioral patterns; higher intake of air, food, and water per unit of body weight; dependence on caregivers; political powerlessness; and inheritance of the worst of the increasing harms of climate change all contribute to making them more susceptible to these harms compared to adults.⁹ As depicted in Figure 1, the harmful effects of climate disruption and dangerous air quality to children resulting from fossil fuel projects like the

⁹ See Samantha Ahdoot, Susan E. Pacheco & Council on Environmental Health, *Global Climate Change and Children's Health*, 136 *Pediatrics* e1468 (2015); Rebecca Pass Philipsborn & Kevin Chan, *Climate Change and Global Child Health*, 141 *Pediatrics* e20173774 (2018); Wim Thiery et al., *Intergenerational Inequities in Exposure to Climate Extremes*, 374 *Science* 158 (2021); U.S. EPA, *Climate Change and Children's Health and Well-Being in the United States* (Apr. 2023).

Willow Project start before they are born and result in lifelong hardships.

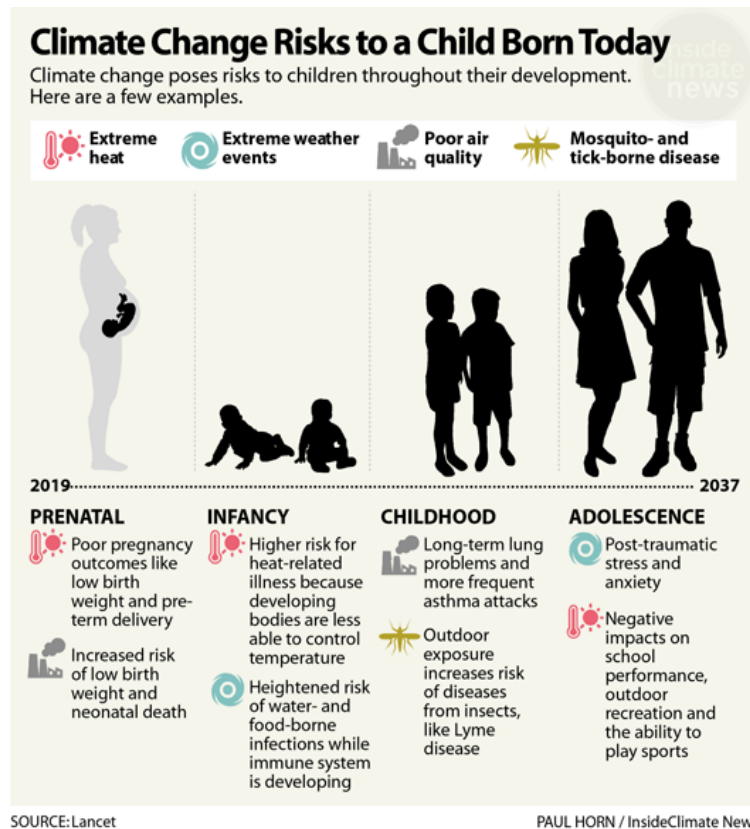


Figure 1: The harmful and disproportionate effects of climate disruption and hazardous air quality on children throughout their development.¹⁰

A. Children are Uniquely Vulnerable to and Disproportionately Harmed by the Dangerous Air Quality Resulting from the Development and

¹⁰ Sabrina Shankman, *The Climate Change Health Risks Facing a Child Born Today: A Tale of Two Futures*, Inside Climate News (Nov. 14, 2019), <https://insideclimatenews.org/news/14112019/health-children-infants-climate-change-impact-pollution-heat-lancet-countdown-study/>; see also Anthony J. McMichael, *Globalization, Climate Change, and Human Health*, 368 *New Eng. J. Med.* 1335, 1339 (2013).

Combustion of Fossil Fuels

Dangerous air quality caused directly by the development and combustion of fossil fuels pursuant to projects like the Willow Project¹¹ and by the increased incidence of wildfires from the resulting climate change,¹² causes significant and disproportionate harm to children's health.¹³ The combustion of fossil fuels emits dangerous pollutants, including sulfur dioxide (SO₂), nitrogen oxides (NO_x), particulate matter (PM), carbon dioxide (CO₂), and mercury (Hg).¹⁴ SO₂ and NO_x contribute to the formation of ozone and fine particulate matter.¹⁵ All these pollutants contribute to adverse health impacts, including heart and lung diseases, increased emergency room visits and hospital admissions, and

¹¹ See U.S. BLM, *Willow Master Development Plan – Environmental Impact Statement: Record of Decision* 17-18 (Oct. 2020) (finding that the Willow Project “would increase air and noise emissions” for neighboring communities); Christopher G. Nolte et al., *Ch. 13: Air Quality, in Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II*, U.S. Global Change Research Program 512, 514 (2018), <https://nca2018.globalchange.gov/chapter/air-quality> (energy sector accounts for 84% of U.S. GHG emissions, 80% of emissions of nitrogen oxides, and 96% of sulfur dioxide, the major precursor of sulfate aerosol).

¹² Nolte et al., *supra* note 11, at 519 (finding that climate change is lengthening wildfire season and causing larger wildfires).

¹³ Sahana Mathiarasan & Anke Hüls, *Impact of Environmental Injustice on Children's Health—Interaction between Air Pollution and Socioeconomic Status*, 18 Int'l J. Env't Rsch. & Pub. Health 795, 796 (2021); U.S. EPA, *supra* note 9, at 35-45; Karn Vohra et al., *Global Mortality from Outdoor Fine Particle Pollution Generated by Fossil Fuel Combustion: Results from GEOS-Chem*, 195 Env't Rsch. 110754 (2021) (detailing how air pollution generated by fossil fuel consumption caused 876 child deaths in North America in 2018).

¹⁴ U.S. EPA, *Power Plants and Neighboring Communities* (last updated May 11, 2023), <https://www.epa.gov/power-sector/power-plants-and-neighboring-communities>.

¹⁵ *Id.*

premature deaths.¹⁶ Children are particularly vulnerable to air pollutants because they breathe more air relative to their body weight than adults, increasing the exposure of their narrow airways, that are already vulnerable to constriction because they are small and developing, to toxins.¹⁷

Wildfire smoke contains fine particulate matter (PM_{2.5}) that is linked to respiratory morbidity and premature mortality,¹⁸ as well as neuropsychological impacts in children that are associated with ADHD, autism, and negative impacts on school performance and memory.¹⁹ Over 7 million children are exposed to wildfire in the United States annually, and this number is increasing as climate change worsens with continuing GHG emissions; in Alaska, exposure to particulate matter from wildfire smoke already “presents a substantial public health burden in the present day,” and, under climate change, is projected to double by 2050.²⁰ Wildfire exposure has been linked to asthma exacerbations, wheezing, pneumonia, and bronchitis²¹ and often becomes a medical emergency for children. For

¹⁶ *Id.*

¹⁷ Frederica Perera & Kari Nadeau, *Climate Change, Fossil-Fuel Pollution, and Children’s Health*, 386 *New Eng. J. Med.* 2303, 2304 (2022).

¹⁸ Sydney Leibel et al., *Increase in Pediatric Respiratory Visits Associated with Santa Ana Wind–Driven Wildfire Smoke and PM_{2.5} Levels in San Diego County*, 17 *Annals Am. Thoracic Soc’y* 313, 314 (2020).

¹⁹ Stephanie M. Holm et al., *Health Effects of Wildfire Smoke in Children and Public Health Tools: A Narrative Review*, 31 *J. Exposure Sci. & Env’t Epidemiology* 1, 3 (2021).

²⁰ Perera & Nadeau, *supra* note 17, at 2307; Seung Hyun Lucia Woo et al., *Air Pollution from Wildfires and Human Health Vulnerability in Alaska Communities Under Climate Change*, 15 *Env’t Rsch. Letters* 094019 (2020).

²¹ Perera & Nadeau, *supra* note 17, at 2307.

example, the Lilac Fire in California in 2017 was associated with 16 excess respiratory visits per day by children to the emergency department.²² Additionally, it is estimated that exposure to wildfire accounts for over 2,400 annual visits to the emergency room by children with asthma.²³ Asthma is the leading chronic disease in children,²⁴ affecting 4.7 million U.S. children under age 18.²⁵

The physiological features of youth make them disproportionately vulnerable to the harms of dangerous air quality. Children’s organs, such as the lungs and brain, are still developing, making them particularly vulnerable.²⁶ Children’s bodies take more time to process and excrete toxic materials such as those present in wildfire smoke and fossil fuel pollution,²⁷ exacerbating the resulting harm they face.²⁸ The risk of adverse health effects from dangerous air quality increases with exposure and are greater for individuals exposed

²² Leibel et al., *supra* note 18, at 319.

²³ Jacob R. Pratt et al., *A National Burden Assessment of Estimated Pediatric Asthma Emergency Department Visits that may be Attributed to Elevated Ozone Levels Associated with the Presence of Smoke*, 191 *Env’t Monitoring & Assessment* 269 (2019).

²⁴ Giuliana Ferrante & Stefania La Grutta, *The Burden of Pediatric Asthma*, 6 *Frontiers in Pediatrics* 1 (2018).

²⁵ CDC, *Asthma: Most Recent National Asthma Data* (last reviewed May 10, 2023), https://www.cdc.gov/asthma/most_recent_national_asthma_data.htm.

²⁶ U.S. EPA, *supra* note 9, at 36-37.

²⁷ See U.S. EPA, *Why Wildfire Smoke is a Health Concern* (last updated Oct. 20, 2022), <https://www.epa.gov/wildfire-smoke-course/why-wildfire-smoke-health-concern> (“Wildfire smoke is comprised of a mixture of gaseous pollutants (e.g., carbon monoxide), hazardous air pollutants (HAPs) (e.g., polycyclic aromatic hydrocarbons [PAHs]), water vapor, and particle pollution.”).

²⁸ *Id.*

throughout their lifetimes beginning in their youth, than for individuals exposed during adulthood.²⁹

Further, children have unique behavioral patterns that place them at greater risk of harm from dangerous fossil fuel pollution and climate fire smoke resulting from fossil fuel projects like the Willow Project. Compared to adults, children spend more time outside and closer to the ground, tend to engage in more rigorous activity, and inhale more air (and therefore more pollution) per unit of time and body weight, which exposes them to pollutants in a greater quantity than adults.³⁰ The combination of higher physical vulnerability and behavioral patterns that place children directly in harm's way causes them to suffer significantly greater harms from air pollution, beyond what adults experience.

The medical harms of hazardous air quality to youth and children begin during fetal development. Exposure to dangerous air quality during fetal development triggers miscarriages, stillbirths, and premature births; and significantly increases the incidence of birth defects, low birth weight, infant medical conditions, and infant deaths.³¹ Exposure to air pollution during fetal development is associated with both immediate and lifelong injuries to health. (Figure 2).

²⁹ U.S. EPA, *supra* note 9, at 36-37.

³⁰ Marie J. Carroquino et al., *Environmental Toxicology: Children at Risk*, in *Encyclopedia of Sustainability Science and Technology* 239, 245 (2013).

³¹ U.S. EPA, *supra* note 9, at 45.

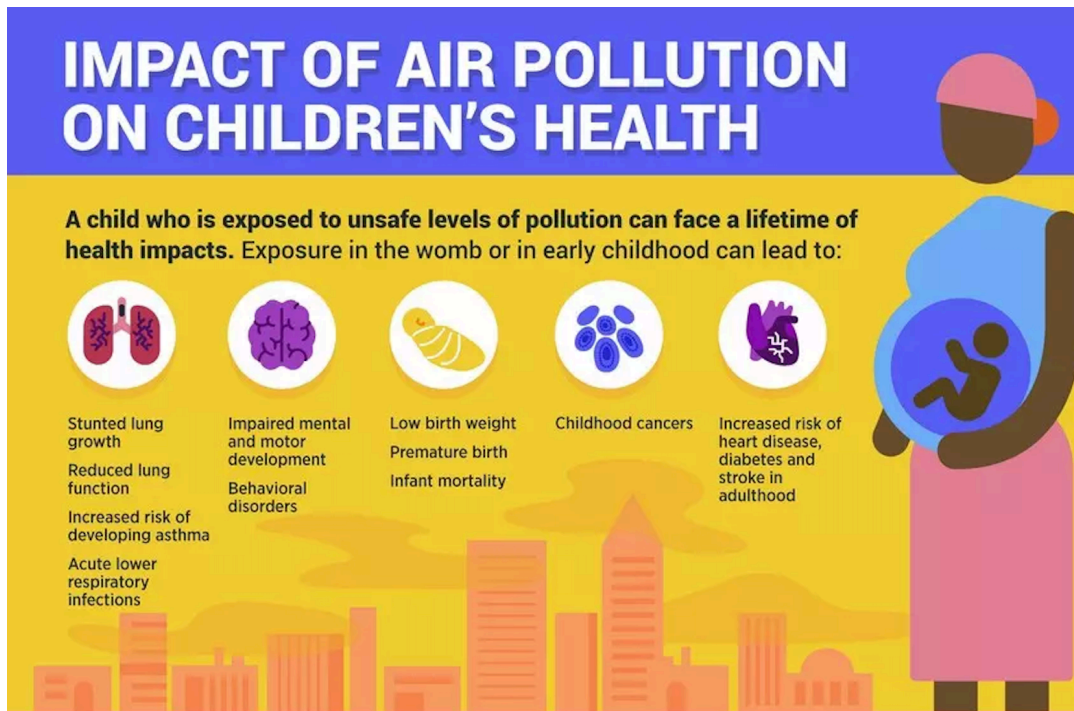


Figure 2: The harms to children’s health from air pollution begin with early exposure and last a lifetime.³²

The link between dangerous air quality and harms to children’s physical health is well established for a wide range of health conditions, including cardiovascular and respiratory diseases, central nervous system disorders, metabolic conditions, reproductive dysfunction, organ damage, cancer, and other serious health effects.³³ Exposure to polluted

³² World Economic Forum, *Children Are Dying from Air Pollution. Here’s How We Can Protect Them* (Nov. 19, 2021), <https://www.weforum.org/agenda/2021/11/how-we-can-protect-children-dying-from-air-pollution/>.

³³ See generally, U.S. EPA, *supra* note 9, at 36-45.

air also causes profound harms to the cognitive development of youth and children, whose brains are still developing.³⁴

B. Children are Uniquely Vulnerable to and Disproportionately Harmed by Increasing Temperatures and Deadly Heatwaves

Youth and children are particularly vulnerable to the rising temperatures and increasingly frequent and deadly heat waves resulting from the government's approval of projects like the Willow Project. Heat is the leading weather-related killer in the United States,³⁵ and children are at elevated risk of heat-related illness and death compared to adults due to their greater surface area to body mass ratio, lower rate of sweating, and slower rate of acclimatization.³⁶ Heat-related illness and injury is increasing as temperatures rise due to fossil fuel induced climate change, and children compose almost half of the population impacted by heat-related illness.³⁷ Even small increases in extreme heat leads to increased illness and deaths³⁸ The very youngest are at a particularly elevated risk of heat-related death: within the first seven days of life, infant mortality increases 25%

³⁴ See Christine T. Loftus et al., *Exposure to Ambient Air Pollution and Early Childhood Behavior: A Longitudinal Cohort Study*, 183 *Env't Rsch.* 10975 (2020) (finding that “prenatal and childhood exposure to higher levels of outdoor air pollution were associated with poorer behavioral outcomes in early childhood.”).

³⁵ National Weather Service, *Weather Related Fatality and Injury Statistics*, <https://www.weather.gov/hazstat/> (last visited July 18, 2023).

³⁶ Bareket Falk & Raffy Dotan, *Children's Thermoregulation During Exercise in the Heat: A Revisit*, 33 *Applied Physiology, Nutrition, & Metabolism* 420, 425 (2008).

³⁷ Courtney W. Magnus & Therese L. Canares, *Heat-Related Illness in Children in an Era of Extreme Temperatures*, 40 *Pediatrics Rev.* 97, 97 (2019).

³⁸ World Health Organization (hereinafter WHO), *Heat and Health* (June 1, 2018), <https://www.who.int/news-room/fact-sheets/detail/climate-change-heat-and-health>.

on extremely hot days.³⁹ Among student athletes, death from heat-related illness is rising,⁴⁰ and over 9,000 high school athletes are treated for heat-related illnesses each year.⁴¹ Between 2000 and 2013, deaths from heat stroke doubled among U.S. high school and college football players.⁴² Extreme heat also places young children at higher risk of kidney and respiratory disease as well as fever and electrolyte imbalance.⁴³ Extreme heat also negatively affects children's school performance and well-being. Heat and increasing temperatures make it more difficult for children to learn, perform well on tests, and even to attend school.⁴⁴

Because of fossil-fuel-induced climate change, the last 8 years have been the hottest, globally, in recorded human history,⁴⁵ and experts predict that 2023 will be the hottest year

³⁹ Xavier Basagaña et al., *Heat Waves and Cause-specific Mortality at all Ages*, 22 *Epidemiology* 765 (2011).

⁴⁰ Perera & Nadeau, *supra* note 17, at 2307.

⁴¹ Janet L. Gamble & John Balbus, *Ch. 9 Populations of Concern*, in *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* 248, 255 (2016), <https://health2016.globalchange.gov/populations-concern>.

⁴² *Id.*

⁴³ Zhiwei Xu et al., *The Impact of Heat Waves on Children's Health: A Systematic Review*, 58 *Int'l J. Biometeorology* 239, 244 (2013); U.S. EPA, *supra* note 9.

⁴⁴ See Joshua Graff Zivin & Jeffrey Shrader, *Temperature Extremes, Health, and Human Capital*, 26 *Future Children* 31, 40 (2016); Jisung Park, *Hot Temperature, High Stakes Exams, and Avoidance Behavior: Evidence from New York City Public Schools*, NBER (2017); Hyunkuk Cho, *The Effects of Summer Heat on Academic Achievement: A Cohort Analysis*, 83 *J. Env't Econ. & Mgmt.* 185, 192 (2017).

⁴⁵ World Meteorological Organization (hereinafter WMO), *State of the Global Climate 2022*, WMO-No. 1316 (2023).

in human history.⁴⁶ June 2023 was the hottest June on record,⁴⁷ and July 2023 is set to become the hottest month on record.⁴⁸ Additional fossil fuel infrastructure like the Willow Project would directly lead to more GHG emissions and increasing temperatures and heatwaves, worsening the harms children are already enduring.

C. Children are Uniquely Vulnerable to and Disproportionately Harmed by Increasing Extreme Weather Events

Children are also uniquely vulnerable to the increasing flooding, storms, and other extreme weather events that are occurring as a result of fossil fuel-induced climate change.⁴⁹ Children's developing immune systems make them particularly vulnerable to water-related and gastrointestinal illness when extreme weather events impact sanitation and sewer systems.⁵⁰ Children suffer disproportionately from such events, with 88% of the global disease burden of climate change falling on children under 5 years old.⁵¹ The childhood impacts from extreme weather events have life-long consequences, harming

⁴⁶ Ian Shine, *Is 2023 Going to be the Hottest Year on Record?*, World Economic Forum (July 20, 2023), <https://www.weforum.org/agenda/2023/07/climate-2023-hottest-year-on-record/>.

⁴⁷ NOAA, *Earth just had its Hottest June on Record* (July 13, 2023), <https://www.noaa.gov/news/earth-just-had-its-hottest-june-on-record>.

⁴⁸ WMO, *July 2023 is Set to be the Hottest Month on Record* (July 31, 2023), <https://public.wmo.int/en/media/press-release/july-2023-set-be-hottest-month-record>.

⁴⁹ Perera & Nadeau, *supra* note 17, at 2305.

⁵⁰ American Public Health Association, *Making the Connection: Climate Changes Children's Health* (May 2016) https://www.apha.org/-/media/Files/PDF/topics/climate/Childrens_Health.ashx.

⁵¹ *Id.*

children's physical and mental development.⁵² These events also injure, kill, and displace children and their families, and damage and destroy their homes and schools. For example, in 2019 alone, almost one million people were displaced due to extreme weather events in the United States⁵³ and 8,000 children remained displaced at the end of the year.⁵⁴ Globally, approximately 12 million children were displaced due to extreme weather events in 2022.⁵⁵ These extreme weather events disproportionately impact children and lead to increased hospitalization and mortality due to cardiovascular, respiratory, mental health, and renal diseases.⁵⁶

Flooding events are increasing due to climate change, putting children at increased risk of drowning and experiencing direct harms from physical and mental trauma.⁵⁷ Drowning is already the leading cause of death for children ages 1-4 and the second leading

⁵² Perera & Nadeau, *supra* note 17, at 2305.

⁵³ Int'l Displacement Monitoring Ctr., *Country Profile: United States*, <https://www.internal-displacement.org/countries/united-states> (last visited Aug. 2, 2023).

⁵⁴ Int'l Displacement Monitoring Ctr., *Number of IDPs by Age at the End of 2019*, at 8 (Apr. 2022), <https://www.internal-displacement.org/sites/default/files/publications/documents/202004-age-disaggregated-IDP-data-paper.pdf>.

⁵⁵ UNICEF, *Number of Displaced Children Reaches New High of 43.3 Million* (June 13, 2023), <https://www.unicef.org/press-releases/number-displaced-children-reaches-new-high-433-million>.

⁵⁶ Coral Salvador et al., *Public Health Implications of Drought in a Climate Change Context: A Critical Review*, 44 *Ann. Rev. Pub. Health* 213, 214, 219 (2023).

⁵⁷ Yoko Akachi et al., *Global Climate Change and Child Health 4*, UNICEF (2009), <https://www.unicef-irc.org/publications/560-global-climate-change-and-child-health-a-review-of-pathways-impacts-and-measures.html>.

cause of unintentional injury for children ages 5-14.⁵⁸ Additionally, as increasingly severe storms and heavy precipitation increase the risk of flooding, childhood mortality and morbidity is increased by increasing the risk of infectious diseases and nutritional deficiencies.⁵⁹ It is estimated that children bear 88% of the burden of disease related to climate change.⁶⁰ The World Health Organization (“WHO”) estimates that there will be 48,000 additional deaths due to diarrheal diseases among children under age 15 in 2030 when compared to a future without climate change.⁶¹ Climate change is expected to contribute to this problem as floods and temperatures increase.⁶²

At the other extreme, climate change and temperature increases have also increased drought severity.⁶³ Droughts have wide-ranging effects on multiple sectors, impacting ecosystems, agriculture, water security, and food security.⁶⁴ Droughts are associated with health issues such as water-borne and vector-borne diseases, cardiovascular and respiratory conditions, injuries, kidney conditions, esophageal cancer, food insecurity and

⁵⁸ Ctrs. for Disease Control & Prevention, *Drowning Facts*,

<https://www.cdc.gov/drowning/facts/index.html> (last reviewed Oct. 7, 2022).

⁵⁹ Daniel Helldén et al., *Climate Change and Child Health: A Scoping Review and an Expanded Conceptual Framework*, 5 *Lancet Planetary Health* e164, e166-67 (2021).

⁶⁰ Sophie Cousins, *Extreme Weather Events and Child Health*, 3 *Lancet Child & Adolescent Health* 70, 70 (2019).

⁶¹ WHO, *Quantitative Risk Assessment of the Effects of Climate Change on Selected Causes of Death, 2030s and 2050s* 7 (Simon Hales et al. eds., 2014).

⁶² Emily Baumgaertner, *Drowning Is No. 1 Killer of Young Children. U.S. Efforts to Fix It Are Lagging*, *N.Y. Times* (July 8, 2023), <https://www.nytimes.com/2023/07/08/health/children-drowning-deaths.html>.

⁶³ Salvador et al., *supra* note 56, at 216.

⁶⁴ *Id.* at 214.

malnutrition, mental health disorders, and mortality.⁶⁵ In general, children are most vulnerable to the health impacts of droughts, experiencing respiratory illness, diarrheal illnesses, and malnutrition.⁶⁶ Droughts lead to water insecurity for families in impacted areas, and contribute to worsened respiratory health, mental health, undernutrition, and infectious diseases among children.⁶⁷ The WHO predicts an additional 131,000 additional deaths in children under 5 due to climate-related undernutrition in 2030.⁶⁸ Drought and climate change also contribute to increased wildfire in the United States.⁶⁹ Drought-related stressors often lead to severe mental health issues, including depression and anxiety, and children experience higher levels of stress during drought than adults.⁷⁰

Acute stress reactions are common in children following extreme climate events, and these reactions can develop into post-traumatic stress disorder (“PTSD”).⁷¹ Indeed, PTSD symptoms have been documented following nearly every type of climate disaster and across all continents and cultures.⁷² Exposure to natural disasters is associated with sleep disturbance, sadness, and other mental health issues among children, and leads to

⁶⁵ *Id.* at 218.

⁶⁶ Margaret Sugg et al., *A Scoping Review of Drought Impacts on Health and Society in North America*, 162 *Climatic Change* 1177, 1187 (2020).

⁶⁷ Helldén et al., *supra* note 59, at e167.

⁶⁸ WHO, *supra* note 61, at 89.

⁶⁹ NOAA, *Wildfire Climate Connection*, <https://www.noaa.gov/noaa-wildfire/wildfire-climate-connection> (last updated July 24, 2023).

⁷⁰ Sugg et al., *supra* note 66, at 1183.

⁷¹ U.S. EPA, *supra* note 9, at 58.

⁷² Marianne Hrabok et al., *Threats to Mental Health and Well-Being Associated with Climate Change*, 76 *J. Anxiety Disorders* 102295, 2 (2020).

increased depression, anxiety, and stress.⁷³ Children are also uniquely vulnerable to attachment difficulties that can develop during and after climate disasters.⁷⁴ Such difficulties can predict adult attachment insecurity and hamper the quality of relationships youth can form during the remainder of their life.⁷⁵

D. Children Are Uniquely Vulnerable to and Disproportionately Harmed by the Mental Health Harms from Climate Change

Climate change additionally has severe and lasting effects on children's mental health. The psychological health effects to children related to climate change include elevated levels of anxiety, depression, post-traumatic stress disorder, increased incidences of suicide, substance abuse, social disruptions like increased violence, and a distressing sense of loss.⁷⁶ Studies have found links between higher temperatures and rates of mental health concerns,⁷⁷ and between fluctuations in climate and the onset and severity of depression.⁷⁸ For youth with pre-existing mental health conditions, a warming climate

⁷³ Zhiwei Xu et al., *Climate Change and Children's Health—A Call for Research on What Works to Protect Children*, 9 Int'l J. Env't Rsch. & Pub. Health 3298, 3302 (2012).

⁷⁴ Adrienne van Nieuwenhuizen et al., *The Effects of Climate Change on Child and Adolescent Mental Health: Clinical Considerations*, 23 Current Psychiatry Rep. 88 (2021).

⁷⁵ See R.A. Bryant et al., *Separation from Parents During Childhood Trauma Predicts Adult Attachment Security and Post-Traumatic Stress Disorder*, 47 Psych. Med. 2028 (2017).

⁷⁶ *Id.*

⁷⁷ Stephen Vida et al., *Relationship Between Ambient Temperature and Humidity and Visits to Mental Health Emergency Departments in Québec*, 63 Psychiatric Servs. 1150, 1152 (2012).

⁷⁸ Haris Majeed & Jonathan Lee, *The Impact of Climate Change on Youth Depression and Mental Health*, 1 Lancet Planetary Health e94, e95 (2017).

poses additional risks: Numerous psychiatric medications interfere with the body's thermoregulation abilities, which are already less responsive in youth as compared to adults.⁷⁹

The EPA and mental health experts have identified “climate anxiety” among children as a chronic stressor with adverse effects on children’s lives.⁸⁰ Children that understand the likelihood of experiencing climate change effects throughout their lives are more predisposed to experiencing climate anxiety and feelings of hopelessness and trauma.⁸¹ Government betrayal, by continuing to contribute to the climate crisis through approval of projects like the Willow Project is also highly linked to the climate anxiety children are uniquely experiencing.⁸² Children’s inability to participate in the political process leaves them politically powerless to change government policy regarding the systemic approval of damaging fossil fuel infrastructure like the Willow Project and the resulting harms to their health and safety. This causes significant feelings of disempowerment and hopelessness in youth.⁸³

⁷⁹ see Kaja Perina, *Heat Intolerance and Psychiatric Medications*, *Psychology Today* (July 27, 2021); Kazuyo Tsuzuki, *Effects of Heat Exposure on the Thermoregulatory Responses of Young Children*, 113 *J. Thermal Biology* 103507, 7 (2023).

⁸⁰ U.S. EPA, *supra* note 9, at Appendix A, 2.

⁸¹ *Id.*

⁸² Expert Report of Lise Van Susteren at 15-18, *Juliana v. United States*, No. 6:15-cv-01517-AA (D. Or. June 28, 2018), ECF No. 271-1.

⁸³ Ann V. Sanson et al., *Responding to the Impacts of the Climate Crisis on Children and Youth*, 13 *Child Dev. Persps.* 201, 203 (2019).

E. Children Will Inherit and Experience the Worst Harms of the Climate Crisis

Children are also disproportionately vulnerable to the physical and psychological harms of the climate crisis because, as they grow older, they will experience increasingly numerous, frequent, and severe injuries in comparison with present generations of adults.⁸⁴ Under current GHG emission rates, children born in 2020 are expected to face more than a seven-fold increase in overall extreme climate events, such as heat waves, wildfires, crop failures, droughts, and floods, compared to an adult born in 1960.⁸⁵ For example, an adult born in 1960 will likely experience between two and six extreme heatwaves in their lifetime regardless of future GHG emissions, whereas a child born in 2020 will likely experience 21 to 39 extreme heatwaves, if global warming is allowed to reach 2.4°C (Figure 3), and will experience far more under current emission trajectories, with the federal government continuing to systemically contribute to the climate crisis through approval of infrastructure like the Willow Project. If global warming reaches 3.5°C, which is within the range of projected warming under current policies,⁸⁶ a child born in 2020 will likely experience 44 times more extreme heatwaves in their lifetime than an adult born in 1960.⁸⁷

⁸⁴ Thiery et al., *supra* note 9, at 158; IPCC, *Summary for Policymakers, in Climate Change 2023: Synthesis Report 7* (2023).

⁸⁵ Thiery et al., *supra* note 9, at 158.

⁸⁶ Hoesung Lee et al., *Synthesis Report of the IPCC Sixth Assessment Report (AR6): Longer Report*, Intergovernmental Panel on Climate Change 24, 33 (2023).

⁸⁷ Thiery et al., *supra* note 9, at 159.

The lifetime exposure disparities between children and present generations of adults are similar across other harms of the climate crisis. (Figure 4).

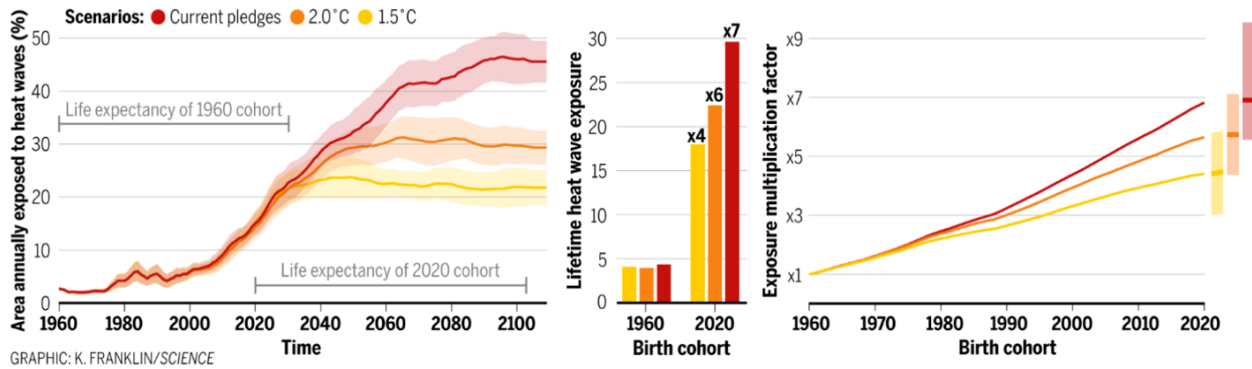


Figure 3: Analysis under three GHG emissions scenarios of: (Left) Annual global land area exposed to heat waves; (Middle) Lifetime heatwave exposure for persons born in 1960 and 2020; and (Right) Exposure multiplication factors for lifetime heat wave exposure by birth year relative to persons born in 1960.⁸⁸

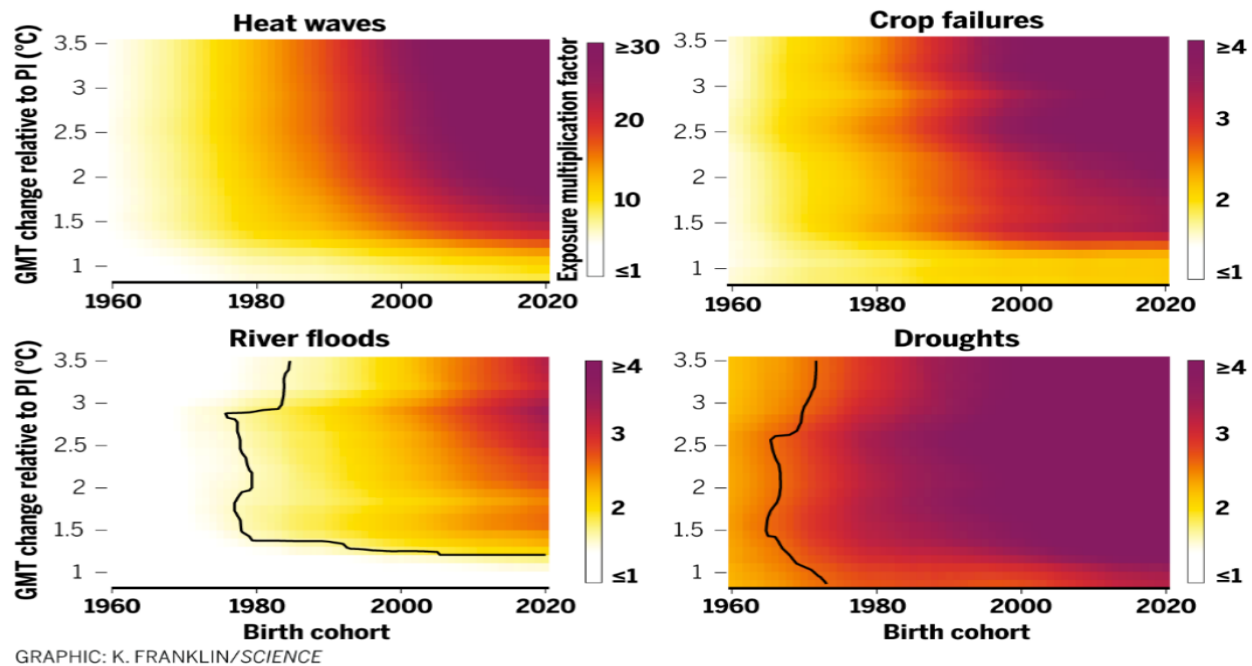


Figure 4: Extreme event exposure multiplication factors by birth year under a range of

⁸⁸ *Id.*

global warming trajectories relative to someone living in the preindustrial period. Source: Thiery, et al. *supra* note 9 at 159.

II. Alaska's Youth are Particularly at Risk from the Harms of Climate Change

A. Increasing Temperatures and Heatwaves Threaten Alaska's Youth

Children in Alaska are on the frontlines of climate change. Alaska has warmed *twice* as fast as the global average since the mid-20th century, nearly four times the global average since 1979, and this trend is expected to accelerate.⁸⁹ Average annual temperatures have increased by 3°F compared to 1.8 °F for the contiguous United States.⁹⁰ Fossil-fuel induced climate change has already resulted in a significant increase in extremely hot days in Alaska over the past sixty years,⁹¹ and devastating heat waves have grown both more frequent and more severe.⁹² As explained in Section I.B, children and youth are uniquely vulnerable to extreme heat. However, Alaska's youth are particularly at risk, because the prevalence of air conditioning is lower in Alaska than in any other state. Just 7% of Alaskan homes have air conditioning, as compared to more than 90% in the majority of contiguous

⁸⁹ Carl J. Markon et al., *Ch. 26: Alaska, in Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II*, U.S. Global Change Research Program 1185, 1190, 1192 (2018), <https://nca2018.globalchange.gov/chapter/alaska>; see also Mika Rantanen et al., *The Arctic has Warmed Nearly Four Times Faster than the Globe Since 1979*, 3 *Comm'ns Earth & Env't* 168.

⁹⁰ NOAA National Centers for Environmental Information, *State Climate Summaries: Alaska* 1 (2022), <https://statesummaries.ncics.org/downloads/Alaska-StateClimateSummary2022.pdf>.

⁹¹ Brooke C. Stewart et al., *Regional Climate Trends and Scenarios for the U.S. National Climate Assessment: Part 7. Climate of Alaska*. NOAA Technical Report NEDIS 142-7, 17 (2013).

⁹² Srdjan Dobricic et al., *Increasing Occurrence of Heat Waves in the Terrestrial Arctic*, 15 *Env't Rsch. Letters* 024022, 3-4 (2020).

states.⁹³ This makes it much harder for youth to mitigate the impact of extreme heat, and increases their likelihood of suffering adverse health outcomes. Indeed, increasingly temperatures in Alaska are directly associated with higher emergency department visits for a variety of health issues,⁹⁴ and the harms to youth are projected to increase with additional emissions from the approval of projects like the Willow Project. With continuing development and combustion of fossil fuels, the state's annual average surface air temperature is projected to increase by a devastating 14.4°F by the end of the century.⁹⁵

B. Increasing Wildfires and Wildfire Smoke Harm the Health and Safety of Alaska's Youth

Climate change has increased the incidence of large fires and the weather conditions that cause such fires in the western United States since the early 1980s, including in Alaska.⁹⁶ The length of Alaska's fire weather season has increased by ~69% from 1979 to

⁹³ Lucas Davis, *How Many U.S. Households Don't Have Air Conditioning?*, Haas Energy Institute (Aug. 15, 2022), <https://energyathaas.wordpress.com/2022/08/15/how-many-u-s-households-dont-have-air-conditioning/>.

⁹⁴ See Micah B. Hahn et al., *Association of Temperature Thresholds with Heat Illness—and Cardiorespiratory-Related Emergency Visits during Summer Months in Alaska*, 131 *Env't Health Persp.* 057009 (2023) (describing adverse health outcomes associated with days above the average summer heat index in Anchorage, Fairbanks, and the Matanuska-Susitna Valley).

⁹⁵ USDA, *Alaska and a Changing Climate*, <https://www.climatehubs.usda.gov/hubs/northwest/topic/alaska-and-changing-climate> (last visited Aug. 8, 2023).

⁹⁶ Matthew W. Jones et al., *Global and Regional Trends and Drivers of Fire Under Climate Change*, 60 *Revs. Geophysics* e2020RG000726 (2022); M. Roxana Sierra-Hernández et al., *Increased Fire Activity in Alaska Since the 1980s: Evidence from an Ice Core-Derived Black Carbon Record*, 127 *J. Geophysical Rsch.* e2021JC035668 (2022).

2019 and could increase by 174% in length by 2100 if GHG emissions continue unabated.⁹⁷

As a result of rising temperatures, Alaska’s permafrost—which covers more than 80% of the state’s land⁹⁸—is thawing, with some models projecting that permafrost will be lost entirely from large parts of Alaska by the end of the century.⁹⁹ This has caused land that used to be too cold or wet to burn to turn into fuel for ever-worsening wildfires.¹⁰⁰ In turn, the wildfires create a feedback loop of more melting permafrost, fueling more fires. Modeling indicates a four-fold increase in the 30-year probability of fire occurrence and an increase in fire-season length of more than 20 days by 2100 due to climate change.¹⁰¹ Alaska already experiences high levels of wildfire-specific air pollution, and these are only set to get worse as GHG emissions increase.¹⁰²

This leaves children in Alaska at an elevated risk of respiratory and cardiovascular disease now and into the future, as well as an increased risk of mental health issues related

⁹⁷ Jones, *supra* note 96, at 14, 44.

⁹⁸ Torre Jorgenson et al., *Permafrost Characteristics of Alaska*, Institute of Northern Engineering, University of Alaska Fairbanks (2008), https://www.epa.gov/sites/default/files/2017-09/documents/ak-state_attachment_2017-06-19.pdf.

⁹⁹ See E. E. Jafarov et al., *Numerical Modeling of Permafrost Dynamics in Alaska Using a High Spatial Resolution Dataset*, 6 *Cryosphere* 613, 622 (2012).

¹⁰⁰ See Adrià Descals et al., *Unprecedented Fire Activity Above the Arctic Circle Linked to Rising Temperatures*, 378 *Science* 532, 536 (2022) (finding that “[a]s permafrost retreats, high temperatures and drying conditions may favor higher combustion rates”).

¹⁰¹ Matthew W. Jones et al., *Climate Change Increases the Risk of Wildfires 2* (2020), https://www.preventionweb.net/files/73797_wildfiresbriefingnote.pdf.

¹⁰² Woo et al., *supra* note 20, at 10-11.

to natural disasters and displacement.¹⁰³

C. Extreme Weather Events Threaten the Health and Safety of Alaska's Youth

Storms, flooding, extreme wind, droughts, and abnormal precipitation have battered Alaska over the past decade. Climate models project that these extreme weather events will only become more frequent with continuing GHG emissions from the approval of fossil fuel infrastructure like the Willow Project.¹⁰⁴ Together, they have already caused significant environmental degradation, substantial economic losses, and enormous human suffering. In 2022, for example, Typhoon Merbok devastated Western Alaska with unprecedented force, impacting well over 1,000 miles of coastline.¹⁰⁵

Climate disasters are not only particularly severe in Alaska, they are also far more difficult to respond to. The remote nature of the state makes repairs far more costly, especially when—as was the case in 2022—the few roads that run to affected communities

¹⁰³ See Sections I.A, I.C.

¹⁰⁴ John E. Walsh et al., *Extreme Weather and Climate Events in Northern Areas: A Review*, 209 *Earth-Science Revs.* 103324, 4-10 (2020); Rick Thoman, *In Changing Climate, Alaska Faces Risk of Extreme Precipitation*, Alaska Beacon (Dec. 15, 2022), <https://alaskabeacon.com/2022/12/15/in-changing-climate-alaska-risks-extreme-precipitation/>; Aaron Morrison, *A Severe Drought has Returned to Alaska for the First Time Since 2019*, Alaska's News Source (Jun. 16, 2022), <https://www.alaskasnewssource.com/2022/06/16/severe-drought-has-returned-alaska-first-time-since-2019/>.

¹⁰⁵ Taylor Telford, *Western Alaska Confronts Damage After Historic Storm*, Wash. Post (Sept. 18, 2022), <https://www.washingtonpost.com/business/2022/09/18/alaska-storm-typhoon-merbok/>.

get washed away entirely.¹⁰⁶ Extreme weather events affect youth in remote communities in particular, as they wipe out power grids, disrupting power to the freezers the youth and their families use to store food for the entire winter.¹⁰⁷ In Alaska’s remote areas, damage to roads or runways can interfere with food and medicine deliveries, which affects still-developing children severely. Additionally, damage to heating infrastructure from extreme weather events disproportionately affects young children, who are more susceptible to hypothermia.¹⁰⁸

D. The Continuing Existence and Cultures of Many Alaska Native Youth’s Villages are Threatened by Climate Change

Continuing fossil fuel emissions resulting from the government’s approval of projects like the Willow Project are causing loss of sea ice, flooding, thawing permafrost, and coastal erosion in Alaska that threatens to wipe the very existence of many Alaska Native youth’s villages off the map.¹⁰⁹ The United States Government Accountability Office’s assessment of threatened Alaska Native villages increased from 31 (“facing

¹⁰⁶ *Id.*

¹⁰⁷ Ayurella Horn-Muller, *Alaskan Tribal Communities Confront Food Insecurity After Storm*, Axios (Sep. 23, 2022), <https://www.axios.com/2022/09/23/alaskan-tribal-communities-storm>.

¹⁰⁸ Dominique Singer, *Pediatric Hypothermia: An Ambiguous Issue*, 18 Int’l J. Env’t Rsch. & Pub. Health 11484, 6 (2021).

¹⁰⁹ GAO, *Alaska Native Issues: Federal Agencies Could Enhance Support for Native Village Efforts to Address Environmental Threats* (May 2022), <https://www.gao.gov/products/gao-22-104241>; Markon et al., *supra* note 89, at 1190, 1192.

imminent threats”) in 2009¹¹⁰ to 70 villages (“facing significant environmental threats”) in 2022.¹¹¹ Consequently, many of these villages will need to relocate or disband.¹¹² The costs of relocation are enormous,¹¹³ increasing the risk villages must disband and lose their community and culture that has endured for millennia.¹¹⁴

The long-term psychological, cultural, and spiritual damage children can suffer as a result of displacement¹¹⁵ is particularly severe for Alaska Native children, whose families and communities have often lived in their native homelands since time immemorial, and who have deeply rooted cultural or spiritual traditions tied to the land they inhabit.¹¹⁶ Research suggests that Alaska Native children living along the coastline feel most attached

¹¹⁰ GAO, *Alaska Native Villages: Limited Progress Has Been Made on Relocating Villages Threatened by Flooding and Erosion* 14 (June 2009), <https://www.gao.gov/products/gao-09-551>.

¹¹¹ GAO, *supra* note 109, at 18.

¹¹² GAO, *supra* note 110, at 17-18 (as of 2009, 12 villages were exploring relocation options).

¹¹³ See, e.g., Denali Commission, *Final Environmental Impact Statement: Mertarvik Infrastructure Development Nelson Island, Alaska* 28 (Mar. 2018) (cost of relocation of village of Newtok estimated at over \$120 million).

¹¹⁴ See GAO, *supra* note 110, at 20-27 (with no comprehensive relocation program, villages must make piecemeal attempts to get support, resources, and funding to relocation on their own, resulting in limited progress).

¹¹⁵ See *supra* Section I.C.

¹¹⁶ See Julie Depenbrock, *This is What’s at Risk from Climate Change in Alaska*, NPR (Dec. 22, 2022), <https://www.npr.org/2022/12/22/1144942195/climate-change-is-transforming-the-arctic-and-alaska-natives-are-on-the-frontlin>; Oliver Milman, *Alaska Indigenous People See Culture Slipping Away as Sea Ice Vanishes*, *The Guardian* (Dec. 19, 2016), <https://www.theguardian.com/environment/2016/dec/19/alaska-sea-ice-vanishing-climate-change-indigenous-people>.

to beaches as culturally and socially important places—the exact area that is most at risk of due to climate change.¹¹⁷

E. Climate Change Threatens the Species Youth in Alaska Rely on for Subsistence and Food Security

Climate change is also harming species Alaska’s youth fish and hunt for subsistence, threatening their food security, economy, cultures, and community.¹¹⁸ Most rural households in Alaska rely on subsistence food sources for nutrition,¹¹⁹ and declining harvests from the impacts of climate change threaten the health and well-being of Alaskan children. According to the Alaska Department of Health and Social Services, “[m]any Alaska communities have already reported various changes to subsistence harvest, such as salmon die-offs related to warmer ocean waters, shifting caribou migration, decline and range change in sea mammals, and increased variability in berry harvest.”¹²⁰ With heavy reliance on these subsistence resources, changes to these food sources resulting from continuing GHG emissions threatens the food security and health of Alaska’s children.¹²¹

¹¹⁷ Richard D.G. Irvine et al., *Learning to See Climate Change: Children’s Perceptions of Environmental Transformation in Mongolia, Mexico, Arctic Alaska, and the United Kingdom*, 60 *Current Anthropology* 723, 725 (2019) (detailing how “[t]he beach was the most frequently highlighted special place” for Iñupiaq children).

¹¹⁸ *Subsistence in Alaska*, Alaska Dep’t of Fish and Game, <http://www.adfg.alaska.gov/index.cfm?ADFG=subsistence.main> (last visited Aug. 2, 2023).

¹¹⁹ *Id.*

¹²⁰ Sarah Yoder, *Assessment of the Potential Health Impacts of Climate Change in Alaska*, *State of Alaska Epidemiology* 24 (Jan. 8, 2018), <http://www.epi.alaska.gov/bulletins/docs/rr201801.pdf>.

¹²¹ *Id.* at 24-25.

Salmon are a prime example of how climate change is dramatically diminishing the populations of fish species Alaska's children rely on for subsistence, with increasing mortality rates from warming streams, increased high-flow events, and variability in stream flow.¹²² The federal government has declared fishery disasters for the 2021 Alaska Kuskokwim River Salmon, 2021 Norton Sound Chum and Coho Salmon, 2021 Chignik Salmon, and 2020 Copper River/Prince William Sound Coho and Pink Salmon.¹²³ Climate change is projected to continue harming salmon populations,¹²⁴ increasingly threatening the food security of Alaska's children and future generations. By 2100, summer habitats for salmon are projected to decrease by up to 86% for Chinook, 45% for sockeye, 36% for steelhead, 30% for coho, 30% for pink, and 29% for chum.¹²⁵

Climate change has also impacted halibut harvest, on which many Alaskan families rely.¹²⁶ In 2020, 49% of holders of Subsistence Halibut Registration Certificates indicated

¹²² Leslie A. Jones et al., *Watershed-scale Climate Influences Productivity of Chinook Salmon Populations Across Southcentral Alaska*, 26 *Glob. Change Biology* 4919, 4920, 4926-28, 4931 (2020).

¹²³ NOAA, *Secretary of Commerce Approves Disaster Declarations in AK and WA* (Dec. 16, 2022), <https://www.noaa.gov/news-release/secretary-of-commerce-approves-disaster-declarations-in-ak-and-wa>.

¹²⁴ Tero Mustonen & Brie Van Dam, *Climate Change and Unalakleet: A Deep Analysis*, 13 *Sustainability* 9971, 19 (2021), <https://www.mdpi.com/2071-1050/13/17/9971>.

¹²⁵ Omar I. Abdul-Aziz et al., *Potential Climate Change Impacts on Thermal Habitats of Pacific Salmon (*Oncorhynchus spp.*) in the North Pacific Ocean and Adjacent Seas*, 68 *Canadian J. Fisheries & Aquatic Scis.* 1660, 1668 (2011).

¹²⁶ Lauren A. Sill & David Koster, *Subsistence Harvests of Pacific Halibut in Alaska, 2020*, Alaska Dep't of Fish and Game vii (Jan. 2022), <https://www.adfg.alaska.gov/techpap/TP485.pdf>.

that they were not able to meet their needs for halibut.¹²⁷ Pacific halibut habitat is projected to decrease by about 50% by 2100 as a result of climate change.¹²⁸

Climate change also threatens many of the species of mammals on which Alaska Native youth rely for subsistence. The communities of Gambel, Savoonga, Diomedes, and Wales have had to declare harvest disasters and request aid due to food shortages relating to failed walrus hunts;¹²⁹ and the State of Alaska also declared a disaster on St. Lawrence Island,¹³⁰ which was home to over 500 children at that time.¹³¹ Similarly, seal populations on which Alaska Native youth rely are declining as a result of loss of sea ice and other effects of climate change.¹³² Continuing GHG emissions pursuant to the federal government's perpetuation of the climate crisis through the approval of projects like the Willow Project will only increase the already serious threats to the species youth in Alaska rely on for their sustenance and food security, and other harms to the health and safety of Alaska's youth.

¹²⁷ *Id.*

¹²⁸ Ana C. Franco et al., *Impact of Warming and Deoxygenation on the Habitat Distribution of Pacific Halibut in the Northeast Pacific*, 31 *Fisheries Oceanography* 601, 608, 610 (2022), <https://onlinelibrary.wiley.com/doi/epdf/10.1111/fog.12610>.

¹²⁹ Katya Wassillie, *On Thin Ice: Subsistence Walrus Hunting and the Adaptation to a Changing Climate in Alaska*, *Cultural Survival* (Sept. 8, 2015), <https://www.culturalsurvival.org/publications/cultural-survival-quarterly/thin-ice-subsistence-walrus-hunting-and-adaptation>.

¹³⁰ *Id.*

¹³¹ U.S. Census Bureau, *Sex by Age: Block Group 6, Census Tract 1, Nome Census Area, Alaska*, <https://data.census.gov/table?g=1500000US021800001006> (last visited Aug. 2, 2023).

¹³² Wassillie, *supra* note 129.

III. The Best Available Climate Science Demonstrates that Every Additional Ton of CO₂ Emissions from Fossil Fuel Infrastructure Like the Willow Project Causes Further, Escalating Climate Harms to Children

There is an overwhelming scientific consensus that human-caused climate change has been and is occurring throughout Alaska, our nation, and the entire world today.¹³³ The present rate of warming is the direct result of anthropogenic GHG emissions, primarily CO₂, from the combustion of fossil fuels.¹³⁴ The release and accumulation of GHGs into the atmosphere is causing more solar energy to be retained in Earth’s atmosphere than radiates out into space, disrupting Earth’s energy balance, and resulting in dangerous climate changes to youth and future generations.¹³⁵ The energy imbalance concept is what climate scientists describe as the “*most critical*” metric for determining “the prospects for continued global warming and climate change.”¹³⁶ Earth’s energy imbalance is driven by elevated atmospheric concentrations of greenhouse gases—mainly CO₂ measured in

¹³³ See generally Mark Lynas et al., *Greater than 99% Consensus on Human Caused Climate Change in the Peer-Reviewed Scientific Literature*, 16 *Env’t Rsch. Letters* 114005 (2021).

¹³⁴ IPCC, *supra* note 84, at 7.

¹³⁵ See generally *id.*; Karina von Schuckmann et al., *Heat Stored in the Earth System: Where Does the Energy Go?* 12 *Earth Sys. Science Data* 2013 (2020); Karina von Schuckmann et al., *Heat Stored in the Earth System 1960-2020: Where Does the Energy Go?* 15 *Earth Sys. Science Data* 1675 (2023).

¹³⁶ von Schuckmann et al. (2020), *supra* note 135, at 2014 (emphasis added).

ppm¹³⁷—that are produced by human activities, particularly fossil fuel combustion. CO₂ released into the atmosphere can remain there for up to 1,000 years continuing to affect Earth’s energy imbalance and cause additional warming long after it is emitted.¹³⁸ Emissions generated today will affect the climate for generations to come, and thereby cause particular harm to today’s youth, whose lives will be irreversibly altered by fossil fuel emissions.

Atmospheric concentrations of CO₂ have been increasing, and continue to increase, as a direct result of development and combustion of fossil fuels, causing Earth’s energy imbalance and resulting climate change.¹³⁹ Current atmospheric CO₂ concentrations are higher than levels have been in millions of years.¹⁴⁰ Atmospheric CO₂ concentration reached 419 ppm in 2022 and will be greater than 420 ppm in 2023 according to the U.S. National Oceanic and Atmospheric Administration, crossing the halfway point towards

¹³⁷ In this context, the term “parts per million” (“ppm”) signifies “the number of carbon dioxide molecules per million molecules of dry air[]” based on “measurements [] from the mid-troposphere, [i.e.,] the layer of Earth's atmosphere that is 8 to 12 kilometers [] above the ground.” NASA Global Climate Change, *Vital Signs: Carbon Dioxide* (last updated July 26, 2023), <https://climate.nasa.gov/vital-signs/carbon-dioxide/>.

¹³⁸ Mason Inman, *Carbon is Forever*, 1 *Nature Climate Change* 156, 157 (2008).

¹³⁹ IPCC, *supra* note 84, at 4.

¹⁴⁰ IPCC, *Summary for Policymakers, in Climate Change 2021: The Physical Science Basis* 8 (2021).

doubling atmospheric CO₂ from its pre-industrial concentration.¹⁴¹ The status quo is already untenably dangerous to youth, and additional emissions from new fossil fuel infrastructure will only worsen the concentration of CO₂ in the atmosphere, bringing further harm to children.

The scientific consensus is that to reduce Earth's energy imbalance and restore the stability of Earth's climate system at an equilibrium that will preserve the ability of natural systems to sustain human life and health, atmospheric CO₂ must be reduced to a maximum concentration of 350 ppm.¹⁴² Importantly, the concept of Earth's energy imbalance, and the corresponding standard of 350 ppm, reflects the gravity and urgency of the current climate crisis more accurately than do the temperature targets of the Paris Climate Accord of limiting warming to 1.5°C to 2.0°C, which are not based on best available science and are not safe for humanity or children. The Paris temperature targets were reached through

¹⁴¹ Dr. Pieter Tans & Dr. Ralph Keeling, *Trends in Atmospheric Carbon Dioxide: Data*, NOAA Global Monitoring Lab., <https://gml.noaa.gov/ccgg/trends/data.html>; see the NOAA data available at the following website: https://gml.noaa.gov/webdata/ccgg/trends/co2/co2_annmean_mlo.txt; see also, NOAA, *Broken Record: Atmospheric Carbon Dioxide Levels Jump Again* (June 5, 2023), <https://www.noaa.gov/news-release/broken-record-atmospheric-carbon-dioxide-levels-jump-again>.

¹⁴² James Hansen et al., *Assessing “Dangerous Climate Change”: Required Reduction of Carbon Emissions to Protect Young People, Future Generations and Nature*, 8 PLOS ONE e81648, 5 (2013) [hereinafter *Assessing “Dangerous Climate Change”*]; James Hansen et al., *Young People’s Burden: Requirement of Negative CO₂ Emissions*, 8 Earth Sys. Dynamics 577, 578 (2017) [hereinafter *Young People’s Burden*]; von Schuckmann et al. (2020), *supra* note 135, at 2029; Johan Rockström et al., *Safe and Just Earth System Boundaries*, 619 Nature 102, 104 (2023).

negotiations and by political consensus rather than through scientific analysis.¹⁴³ Current increased average temperatures of 1°C and greater (now at ~1.2°C) are already dangerous according to the IPCC.¹⁴⁴ A temperature target of 1.5°C is catastrophic for our children and posterity,¹⁴⁵ and should not be used to guide decisions that must be based on best available science. The IPCC special report on *Global Warming of 1.5°C* (2018) stated that allowing a temperature rise of 1.5°C “is not considered ‘safe’ for most nations, communities, ecosystems and sectors and poses significant risks to natural and human systems as compared to the current warming of 1°C (*high confidence*).”¹⁴⁶

¹⁴³ Andrea Rodgers et al., *The Injustice of 1.5°C–2°C: The Need for a Scientifically Based Standard of Fundamental Rights Protection in Constitutional Climate Change Cases*, 40 Va. Env’t L. J. 102 (2022); see also Piero Morseletto et al., *Governing by Targets: Reductio Ad Unum and Evolution of the Two-Degree Climate Target*, 17 Int’l Env’t Agreements: Pol., L. & Econ. 655, 660 (2017).

¹⁴⁴ IPCC, *Summary for Policymakers*, in *Climate Change 2022: Impacts, Adaptation and Vulnerability* 11, 17 (2022) (finding that the current level of global warming is already driving heat waves that cause human morbidity, heavy rains, flooding, extreme fires and drought, coral bleaching and demise, massive shifts in species habitats, loss of glaciers, snow and permafrost, as well as more destructive hurricanes.).

¹⁴⁵ See *Assessing “Dangerous Climate Change”*, supra note 142, at 2, James Hansen et al., *Ice Melt, Sea Level Rise and Superstorms: Evidence from Paleoclimate Data, Climate Modeling, and Modern Observations that 2°C Global Warming Could be Dangerous*, 16 Atmos. Chem. & Phys. 3761, 3800 (2016) [hereinafter *Ice Melt, Sea Level Rise and Superstorms*]; U.S. Global Change Research Program, *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* 82-83 (2018); see generally David I. Armstrong McKay et al., *Exceeding 1.5°C Global Warming Could Trigger Multiple Climate Tipping Points*, 377 Science eabn7950 (2022). Note that many researchers use the temperature targets set during the Paris Accord as a point of reference, not as an endorsement of those levels of average planetary heating.

¹⁴⁶ IPCC, *Ch. 5: Sustainable Development, Poverty Eradication and Reducing Inequalities*, in *Special Report: Global Warming of 1.5°C*, at 447 (2018), <https://www.ipcc.ch/sr15/chapter/chapter-5/>.

In order to restore Earth’s energy imbalance as necessary to avert catastrophic climate change, preserve conditions that are safe for human life, and avoid triggering tipping points after which runaway climate change becomes irreversible, atmospheric CO₂ concentrations must be reduced to no more than 350 ppm as rapidly as possible.¹⁴⁷ To achieve this limit, at minimum, fossil fuel emissions must be eliminated as quickly as possible and existing excess atmospheric CO₂ must be removed to prevent the worsening of the unprecedented climate disasters the world has experienced in the last few decades.¹⁴⁸ Scientific evidence emphatically establishes that the necessary way to achieve the 350 ppm limit, thereby “restor[ing] planetary energy balance[,]” is by rapidly phasing out fossil fuel pollution and drawing down atmospheric CO₂.¹⁴⁹ It is economically and technically feasible to achieve these objectives without compromising energy reliability,¹⁵⁰ and no new fossil

¹⁴⁷ *Young People’s Burden*, *supra* note 142, at 591.

¹⁴⁸ *See, e.g., id.* at 595 (“We conclude that the world has already overshoot appropriate targets for GHG amount and global temperature, and we thus infer an urgent need for (1) rapid phasedown of fossil fuel emissions, (2) actions that draw down atmospheric CO₂, and (3) actions that, at minimum, eliminate net growth of non-CO₂ climate forcings.”).

¹⁴⁹ *See e.g., Ice Melt, Sea Level Rise and Superstorms*, *supra* note 145, at 3801.

¹⁵⁰ *See, e.g.,* Mark Z. Jacobson et al., *100% Clean and Renewable Wind, Water, and Sunlight (WWS) All-Sector Energy Roadmaps for the 50 United States*, 8 *Energy Env’t Sci.* 2093, 2104 (2015); Mark Z. Jacobson et al., *Zero Air Pollution and Zero Carbon from all Energy at Low Cost and Without Blackouts in Variable Weather Throughout the U.S. with 100% Wind-Water-Solar and Storage*, 184 *Renewable Energy* 430, 440 (2022).

fuel infrastructure is needed to meet energy demands.¹⁵¹

With atmospheric levels of GHGs already well past safe levels, every ton of CO₂ emissions worsens Earth's energy imbalance, the ensuing climate crisis, and the resulting harms to youth.¹⁵² The urgency of this situation cannot be overstated. As the most recent IPCC report confirms: “[c]limate change is a threat to human well-being and planetary health (*very high confidence*). There is a rapidly closing window of opportunity to secure a livable and sustainable future for all (*very high confidence*). . . . The choices and actions implemented in this decade will have impacts now and for thousands of years (*high confidence*).”¹⁵³ It is beyond a doubt that these impacts will fall most severely on today's youth, who will have to live with the consequences of the government's continuing contributions to the climate crisis through approval of projects like the Willow Project the longest.¹⁵⁴

Despite the dire urgency of the climate crisis, U.S. GHG emissions and fossil fuel production are moving in the wrong direction. U.S. economy-wide GHG emissions

¹⁵¹ Jacobson, *Zero Air Pollution and Zero Carbon*, *supra* note 150, at 440; Price-Waterhouse-Coopers LLP et al., *100% Renewable Electricity: A Roadmap to 2050 for Europe and North Africa* (2010), <https://www.pwc.co.uk/assets/pdf/100-percent-renewable-electricity.pdf>; Mark Jacobson, *Low-cost Solutions to Global Warming, Air Pollution, and Energy Insecurity for 145 Countries*, 15 *Energy & Env't Sci.* 3343 (2022).

¹⁵² Lee et al., *supra* note 86, at 48; IPCC, *supra* note 84, at 7.

¹⁵³ IPCC, *supra* note 84, at 24.

¹⁵⁴ *See supra* Section I.E (discussing the disparate impact of climate change on children due to their greater expected longevity).

increased an estimated 6.2% in 2021,¹⁵⁵ while U.S. fossil fuel production is expected to reach a new record high in 2023.¹⁵⁶ The Willow Project represents another significant step towards irreversible climate disaster. The Bureau of Land Management's own analysis estimates that the Project could yield more than 600 million barrels of oil over the next 30 years.¹⁵⁷ The fossil fuels extracted pursuant to the federal government's approval of the Willow Project would lead to an estimated 260 million metric tons of CO₂ emitted, or around 9 million metric tons of CO₂ per year. That is equivalent to the emissions of adding two million gasoline-powered cars to the roads for 30 years.¹⁵⁸ It is impossible to square the approval of this project with the federal government's statements that climate change

¹⁵⁵ Alfredo Rivera et al., *Preliminary US Greenhouse Gas Emissions Estimates for 2021*, Rhodium Group (Jan. 10, 2022), <https://rhg.com/research/preliminary-us-emissions-2021/>.

¹⁵⁶ U.S. Energy Info. Admin., *EIA Expects U.S. Fossil Fuel Production to Reach New Highs in 2023* (Jan. 21, 2022), <https://www.eia.gov/todayinenergy/detail.php?id=50978>.

¹⁵⁷ BLM, *Willow Master Development Project: Supplemental Environmental Impact Statement: Record of Decision* 12 (Mar. 2023) (describing various alternative oil extraction plans for the Willow Project, all of which yield over 600 million barrels' worth of oil); *see also id.* (modified Alternative E, as approved in the Record of Decision, would yield approximately 576.0 million barrels, the equivalent of adding 1.8 million gas-powered cars to the road for 30 years).

¹⁵⁸ *See* Lisa Friedman, *Biden Administration Approves Huge Alaska Oil Project*, N.Y. Times (Mar. 12, 2023), <https://www.nytimes.com/2023/03/12/climate/biden-willow-arctic-drilling-restrictions.html>; Timothy Puko, *What is Willow? How an Alaska Oil Project Could Affect the Environment*, Wash. Post (Apr. 22, 2023), <https://www.washingtonpost.com/climate-environment/2023/03/17/willow-project-alaska-oil-drilling-explained/>; Ella Nilsen, *The Willow Project has been Approved. Here's What to Know About the Controversial Oil-Drilling Venture*, CNN (Mar. 14, 2023), <https://www.cnn.com/2023/03/14/politics/willow-project-oil-alaska-explained-climate/index.html>.

represents “*the* existential threat to humanity.”¹⁵⁹ The Biden administration announced its desire to “empower youth across the world to be leaders on resilience and clean energy” during the recent COP27 climate conference,¹⁶⁰ yet the government’s approval of the Willow Project serves only to disempower and harm the health and safety of children, who do not have recourse through the traditional political process.

Approving additional fossil fuel infrastructure, like the Willow Project, locks in continuing GHG emissions for decades, which will result in further harm to youth.¹⁶¹ Large investments in long-lasting fossil fuel infrastructure create barriers to the utilization of new and cleaner renewable energy technologies even when they are more cost-effective, because of the resistance to “strand” fossil fuel assets.¹⁶² The Willow Project is estimated to have a 30-year lifetime,¹⁶³ locking in continuing emissions well beyond the time when the United States must eliminate its fossil fuel emissions in order to avoid catastrophic runaway climate change and resulting existential harms to youth and future generations. With

¹⁵⁹ The White House, *Remarks by President Biden on Climate* (June 19, 2023), <https://www.whitehouse.gov/briefing-room/speeches-remarks/2023/06/19/remarks-by-president-biden-on-climate-resilience-palo-alto-ca/> (emphasis in original).

¹⁶⁰ The White House, *FACT SHEET: President Biden Announces New Initiatives at COP27 to Strengthen U.S. Leadership in Tackling Climate Change* (Nov. 11, 2022), <https://www.whitehouse.gov/briefing-room/statements-releases/2022/11/11/fact-sheet-president-biden-announces-new-initiatives-at-cop27-to-strengthen-u-s-leadership-in-tackling-climate-change/>.

¹⁶¹ Karen C. Seto et al., *Carbon Lock-In: Types, Causes, and Policy Implications*, 41 *Annu. Rev. Env’t & Res.* 425, 427 (2016).

¹⁶² *Id.* at 428.

¹⁶³ *See* BLM, *supra* note 157, at 58.

atmospheric levels of GHGs already well past safe levels, and the resulting impacts of climate change already substantially harming the health and safety of children in Alaska and throughout our nation, adding any new fossil fuel infrastructure further condemns children to a future of escalating climate disaster.

Further, new fossil fuel projects and infrastructure, like the Willow Project, are entirely unnecessary. Economically and technologically feasible clean, renewable energy is readily available to fulfill all energy needs without compromising energy reliability and without causing destruction to the climate system and the health and safety of children.¹⁶⁴

CONCLUSION

Any new fossil fuel infrastructure propels the youth of Alaska and our nation into further into climate chaos. More than any generation of adults alive today, children will disproportionately bear the consequences of the federal governments' continuing systemic contributions to the climate crisis through the approval of projects like the Willow Project. Children throughout our nation, and in Alaska, are already suffering grievous injuries from the climate crisis. Best available science requires urgent emissions reductions to restore the earth's energy balance. Approving the Willow Project continues our nation on a path in the

¹⁶⁴ See, e.g., Jacobson et al., *100% Clean and Renewable Wind, Water, and Sunlight*, *supra* note 150; Jacobson et al., *Zero Air Pollution and Zero Carbon*, *supra* note 150, at 440; Jacobson, *Low-cost Solutions for 145 Countries*, *supra* note 151, at 3347; see also Mark Jacobson, *More Hopeful Calculations for the Energy Transition*, *Issues Sci. & Tech.* (Feb. 18, 2022), <https://issues.org/renewables-minerals-energy-transition-jacobson-forum/>.

opposite direction, harming children, and our ability to bequeath a habitable world to our posterity.

Respectfully submitted this 9th day of August, 2023.

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CERTIFICATE OF COMPLIANCE

The undersigned hereby certifies that this brief complies with the applicable page limitation under LR 7.4(a)(1) because it contains less than 10,000 words, excluding the caption, table of contents, table of cases and authorities, signature block, exhibits, and certificates of counsel.

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CERTIFICATE OF SERVICE

I hereby certify that on August, 9, 2023, I filed a true and correct copy of the foregoing document with the Clerk of the Court for the United States District Court of Alaska by using the CM/ECF system. Participants in case No. 3:23-cv-00058-SLG and Case No. 3:23-cv-00061-SLG who are registered CM/ECF users will be served by the CM/ECF system.

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