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Attorneys for Plaintiffs

MONTANA FIRST JUDICIAL DISTRICT COURT
LEWIS AND CLARK COUNTY

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| RIKKI HELD, et al., Plaintiffs, v. STATE OF MONTANA, et al., Defendants. | Cause No. CDV-2020-307 Hon. Kathy Seeley DECLARATION OF DANIEL B. FAGRE IN SUPPORT OF PLAINTIFFS' RESPONSE BRIEF IN OPPOSITION TO DEFENDANTS' MOTION TO PARTIALLY DISMISS FOR MOOTNESS |
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FILED

APR 14 2023

ANGIE SPARKS, Clerk of District Court
By  Deputy Clerk

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Pursuant to MCA §1-6-105, Daniel B. Fagre hereby declares as follows:

1. I am an expert and rebuttal witness in the above-entitled action. I am making this declaration in support of Plaintiffs' Response Brief in Opposition to Defendants' Motion to Partially Dismiss for Mootness. I have personal knowledge of the facts I state herein, except as to those stated on information and belief, and if called to testify, I would and could testify competently thereto.

QUALIFICATIONS & SUMMARY OF EXPERT TESTIMONY

2. I submitted an expert report in this case that discusses how the retreat of glaciers in the last few decades provides incontrovertible evidence of anthropogenic warming. I opined that unless human greenhouse gas emissions decline rapidly, glaciers from Glacier National Park will disappear in the coming decades, destroying both aesthetic and ecological values of the Park for Montana's youth, these Plaintiffs, and future generations for the foreseeable future. Doc. 222, Expert Report at 3. In forming my opinions, I relied upon my education, background, training, four decades of experience as a research scientist, my decades of experience studying the impacts of climate change on Montana's glaciers, and my collaboration with other scientists studying climate change and glacier loss. *Id.* I also reviewed a number of documents, data, and studies, including Plaintiffs' Complaint, all of which are identified in Attachment 2 to my expert report. Expert Report at 3, Attachment 2.
3. I also submitted a rebuttal report to respond to Dr. Judith Curry's opinions on glacier loss, that are inconsistent with the scientific literature, "which shows unequivocally that glaciers are receding, and many have already been lost entirely, due to anthropogenic climate change, not natural variability." Doc. 240, Rebuttal Report at 1. In both my expert and rebuttal reports, I reserved the right to supplement my report should additional relevant or pertinent information

become available. Expert Report at 3; Rebuttal Report at 1. One of the purposes of this declaration is to supplement my expert report based on a new Intergovernmental Panel on Climate Change (IPCC) report.

4. I earned a Bachelor's degree (1975) from Prescott College, Prescott, Arizona and Masters (1978) and Ph.D. (1981) degrees from the University of California, Davis. I completed Post-doctoral training (1983) at the University of California before joining the faculty of Texas A&M University (1983-1989) where I also held an appointment in the Texas Agricultural Experiment Station. I joined the National Park Service as a research scientist at Indiana Dunes National Park (1989-1991) before being offered the Climate Change Research Coordinator position (1991) at Glacier National Park, Montana, as part of the nationwide United States Global Change Research Program. This position in the Department of Interior was moved briefly to the National Biological Service (1993-1996) before being transferred to the United States Geological Survey (USGS).
5. In 2018 I received the Shoemaker Lifetime Achievement Award for Science Communication from the USGS. I served in the USGS until my retirement in 2020, continuing as Scientist Emeritus post-retirement.
6. At Glacier National Park, I helped develop a national climate change research program within the National Park Service, coordinating with other Biogeographical Area Coordinators across the breadth of national parks from Florida to Alaska. I built a research program centered on Glacier Park as a representative mountain ecosystem, engaging faculty and scientists from Montana universities and across the U.S. To address climate change impacts on mountain systems, this research program involved diverse disciplines, including ecosystem modelling, hydrology, glaciology, paleoecology, UV-B effects on amphibians, alpine vegetation

dynamics and the physics of snow avalanches. The alpine glaciers of Glacier Park became an early focus of climate change research because they were expected to be sensitive indicators of changing temperatures and precipitation (e.g., Oerlemans, 1994). I and others established aerial photography surveys of glaciers in 1993, began a repeat photography program in 1997, used GIS and emerging satellite platform remote sensing technologies to map glaciers in late 1990s (Key et al., 2002), and constructed a geospatial glacial melt model (Hall and Fagre, 2003). Global Positioning System (GPS) technologies were used to map glacier ice margins and on-ice studies began in 2003. In conjunction with geology faculty at University of Montana, a mass balance monitoring program of Sperry Glacier was established in 2005 and was eventually joined in 2013 to the USGS Benchmark Glacier program, begun in 1957, and the World Glacier Monitoring Service based in Switzerland. In recent years, automated climate stations and ice-penetrating radar have been deployed on the glaciers, and airborne LiDAR and classified satellite data have improved glacier mapping.

7. I served as Director of the Climate Change in Mountain Ecosystems Project and Co-Director of USGS's Glaciers and Climate project which is built around the USGS Benchmark program with glacier sites in Alaska, Montana, and Washington. I was one of the founders of the Western Mountain Initiative in the USGS and CIRMOUNT (The Consortium for Integrated Climate Research in Western Mountains), a collaborative, interdisciplinary consortium dedicated to understanding climates and ecosystems of western North American mountains. I have also participated in several international mountain networks and initiatives through the European Union, the United Nations, and the Swiss government. I was an active consultant to the National Park Service, serving on committees to establish ecosystem monitoring, support transboundary management with scientific information, contribute to World Heritage

designation, facilitate information transfer and learning centers, and advocate for global mountain protected areas through international agencies, e.g., the United Nations' Man and Biosphere Programme. These efforts have entailed considerable interaction with mountain scientists from all continents at a number of international mountain-oriented meetings, such as the World Parks Conference in Australia. Several of these were glacier specific such as the First International Conference on Impacts of Climate Change on High-Mountain Systems, sponsored by the University of Zurich and Instituto de Hidrologia of Colombia. I have advised Montana's Governor Schweitzer and Lieutenant Governor Bohlinger Jr., as well as several other state governors, U.S. Senators and members of the House of Representatives, a Vice-President, and the Secretary of the Interior regarding glacier loss in Glacier Park. I was also a member of the Scientific Advisory Panel that produced the 2007 Montana Climate Change Action Plan.

8. A full description of my background and qualifications is contained in my resume, attached to my expert report. Expert Report at 2, Attachment 1.

THE REPEAL OF THE ENERGY POLICY ACT

9. I have been told that the State of Montana repealed its Energy Policy Act, several provisions of which the Plaintiffs challenged as unconstitutional in this case. Expert Report at 15. I write to confirm that all of my opinions contained in both my expert and rebuttal reports remain valid, even though the Energy Policy Act has been repealed. The conclusions in my report were based on Montana's "increasing utilization and development of fossil fuels in Montana," not on any specific legal instrument. Expert Report at 15. I have been provided no information that Montana has changed its activities that utilize and develop fossil fuels, as described in the Complaint. Complaint ¶¶ 118-20.

10. As I explained in my expert report, to save glaciers in Glacier Park, it is vital to reduce greenhouse gas (GHG) emissions and stabilize global temperatures, which requires decreasing reliance on fossil fuels. Expert Report at 15 (“In order to have a chance to save the glaciers, the state of Montana should be doing its part to reduce fossil fuel reliance and the corresponding GHG emissions.”).

THE IPCC’S NEW SYNTHESIS REPORT

11. I have reviewed the new IPCC *Summary for Policymakers* about the Synthesis Report of the IPCC Sixth Assessment Report.¹ This report bolsters many of the conclusions I made in my expert report. For example:

- “Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred. Human-caused climate change is already affecting many weather and climate extremes in every region across the globe. This has led to widespread adverse impacts and related losses and damages to nature and people (*high confidence*).” IPCC Summary for Policymakers at A.2.
- “Climate change has caused substantial damages, and increasingly irreversible losses, in terrestrial, freshwater, cryospheric, and coastal and open ocean ecosystems (*high confidence*). . . . Impacts on some ecosystems are approaching irreversibility such as the impacts of hydrological changes resulting from the retreat of glaciers, or the changes in some mountain (*medium confidence*) and Arctic ecosystems driven by permafrost thaw (*high confidence*).” IPCC Summary for Policymakers at A.2.3.

¹ Intergovernmental Panel on Climate Change, *Summary for Policymakers, in* Synthesis Report of the IPCC Sixth Assessment Report (AR6) (2023), available at <https://www.ipcc.ch/report/ar6/syr/>.

- “In the near term, every region in the world is projected to face further increases in climate hazards. . . . Cryosphere-related changes in floods, landslides, and water availability have the potential to lead to severe consequences for people, infrastructure and the economy in most mountain regions (*high confidence*).” IPCC Summary for Policymakers at B.2.1.
- “With additional global warming, limits to adaptation and losses and damages, strongly concentrated among vulnerable populations, will become increasingly difficult to avoid (*high confidence*). Above 1.5°C of global warming, limited freshwater resources pose potential hard adaptation limits for small islands and for regions dependent on glacier and snow melt (*medium confidence*).” IPCC Summary for Policymakers at B.4.2.
- “Overshooting 1.5°C will result in irreversible adverse impacts on certain ecosystems with low resilience, such as polar, mountain, and coastal ecosystems, impacted by ice-sheet, glacier melt (*high confidence*).” IPCC Summary for Policymakers at B.7.2.

Pursuant to MCA §1-6-105, I declare under penalty of perjury that the foregoing is true and correct.

Executed this 11th day of April, 2023 in West Glacier, Montana.



Daniel B. Fagre