What about Wildfire? The State of Fire Science

1. Forest fires require three elements: **ignition**, **oxygen (air)**, **and fuel (wood).**

2. Current operational fire models (created to predict wildfire behavior and guide land-management decisions) focus on fuels, and use overly simplistic approximations for wind/airflow effects. This is a problem, because airflow and the supply of fresh oxygen to a fire is more significant than fuels (6 times more important by mass, and 2600 times more by volume).

3. When you remove fuels, you increase airflow, which can actually intensify fires and increase fire spread (e.g., Atchley et al. 2021, Banerjee et al. 2020). And since current operational fire models neglect this effect, they may unintentionally mislead decision makers to make forests less fire safe (via logging and removing fuels) when attempting to achieve the opposite.

4. To address this, currently missing air-flow effects must be incorporated into existing models, which is a complex task that requires detailed knowledge of physics.

5. **Logged landscapes and Wildfire**: This provides a partial explanation as to why landscapes that are logged and "managed" tend to burn more frequently and intensely than landscapes that are protected like parks and wilderness (Bradley, et al. 2016).

6. **Ignitions also play a significant role in wildfires** – 84 percent of fires on public land are human-caused (Balch 2017). With more than 2500 miles of roads, the current landscape is nearly impossible to manage to control ignitions.

7. **What to do about this?** With only 12 percent of old growth left to support the forest ecosystem (Erman, D.C. et al. 1996) and with the existing landscape fire-prone due to its conditions – what's next? Here is a partial answer, while more study is completed.

    - Reintroduce cultural burning – this effectively reduces the most combustible fuels on the landscape and brings Native Americans back to the land.
    - Protect old growth, and support the forest ecosystem fostering its rebirth (this can imply many different activities including some thinning).
    - Monitor and patrol the landscape to control human-caused ignitions.