TO: Vicki Christiansen – Chief of the U.S. Department of Agriculture's Forest Service
FROM: Benjamin Manning – April 15th, 2020
SUBJECT: Human-Caused Forest Fire Prevention

Wildfires are a part of most natural forest processes, but in recent decades, fires have led to more wildlife death, human casualties, and property damage than any other time in American History. **How then, can the U.S. Forest Service (USFS) mitigate the increasing damage and loss of all kinds of life due to wildfires in the United States?**

Interests

Forest Service
91% of The USFS's budget ($4.79 billion) is allocated to dealing with wildfires — more than the entire National Park's Service (NPS) budget[i].

Victims
Wildfire deaths and injuries are *always* preventable and have been increasing in recent decades.

Property Owners
In 2019, 4.5 million homes were designated as either high/extreme risk to wildfires. Fires cause billions of dollars in property damages annually.

Forests Users, NFS Workers, & NPS Workers
People who visit and work in forests are the most likely to deal with the direct consequences of forest fire prevention policy options.

American Taxpayers
American tax-payers fund FEMA, the USFS, and NPS – all of which are directly affected by devastating wildfires. Resources allocated to wildfires are opportunity cost somewhere else.

Climate Advocates
Recent Australia wildfires emitted over 250 million tons of CO_2 – equivalent to half of the country's annual output. Man-made climate change is creating its own worsening feedback loop with fires that needs to be addressed in the short term[ii].

Voiceless Flora & Fauna
Millions and millions of plants and animals are torched and killed in wildfires. They have no one to help them but us. We must try to protect them.

Analysis

We Start The Fires

- 85% of forest fires are directly caused by the following human activities: *unattended campfires, debris burning, equipment use/malfunctions, negligently discarded cigarettes, and intentional acts of arson*.[iii] We can affect human behavior, but we can't affect nature.

Humans: Climate Changers

- Man-made climate change is contributing to the increased intensity and quantity of wildfires In the United States.
- We cannot mitigate the effects of climate change quickly enough for this policy proposal.

Natural fires

- The Good: Without humans, wildfires are admittedly a natural part of the forest life cycle and are essential to a healthy ecosystem.
- The Bad: With global warming exacerbating the effects of wildfires, there intensity and rate of occurrence is now far larger than pre-industrial revolution times.

Evidence-Based Tactics

- We already have billions of dollars and working to suppress wildfires – we're good at it[iv].
- Countries with far fewer resources than the U.S. such as Colombia and Madagascar have instituted mandatory and highly successful education briefings before entering national parks to protect endemic wildlife and preserve glaciers.
    - Psychology has proven that when humans know other humans act a certain way – they tend to conform. Additionally, psychological priming through exposure to a stimulus affects responses to a subsequent and related stimulus[v].
    - Successful educational briefings in parks have used these concepts effectively.
- Fewer people in forests will lead to fewer fires. Many U.S. parks (and even more abroad) limit the number of daily entrances, which has greatly improved preservation efforts.

Uncertainties and Controls

- Location: On average, more damaging fires tend to occur in larger swaths of unbroken forests in drier/hotter zones, but we can never predict exact locations.
    - Policy must focus on mitigating probability of fires occurring.
- Time: On average, fires occur during the driest parts of the year, but can occur whenever.
- Cause: With 85% of fires caused by people, complete erasure of human activity would likely greatly reduce the occurrence of fires.
- In Sum: The most effective short-term policy will focus on human caused fires in high risk areas during high risk times – all options/criteria will follow this line of thinking.

Objectives & Criteria for Evaluation

Number of Fires Occurring: Reduce the number of human-caused fires (controlling for climate fluctuations) by 10% in the next 3 years.
Proportion of Causation: Decrease the proportion of human-caused fires by 25% in the next 3 years.
Parks & Forest Funding: Maintain current levels of financial support for parks/forests through money recouped by fewer fire damages.
Assess & Collect Data: Assess wildfire prevention knowledge of park users on a continuous basis – many domestic and international parks survey their visitors upon exit.

Policy Options

1. Let Nature Be – As stated before, fires are a natural part of a healthy ecosystem. We spend billions per year suppressing them and have many experienced firefighters keeping forests safe.

- **Pro:** Simplicity – firefighters and forest workers already know their jobs and do great.
- **Con:** Maintaining status quo requires more resources over time due to climate change.
- **Con:** More fires will lead to more deaths and damage, while adding to CO2 emissions.

2. Present: Forest Entry Education – Upon entering select protected public forested areas for any period of time, visitors must participate in a brief educational experience in order to illicit appropriate priming and group following behavior around human-caused wildfires.

- **Pro:** Shown to be effective in foreign national parks for preservation purposes.
- **Pro:** Will decrease future costs of damaging fires prevented in lives and money.
- **Pro:** Will raise general public awareness for preserving nature.
- **Con:** Requires an up-front financial investment to develop and staff education efforts.
- **Con:** Could disincentivize some visitors from coming because of the hassle.

3. Protect: Decrease Forest Exposure to Humans – In forests that see excessive numbers of visitors, cap entry in areas with high risk during risky seasons through a permit similar to that already used in Olympia and Yosemite[vi].

- **Pro:** Will decrease future costs of damaging fires prevented in lives and money.
- **Pro:** Will mitigate other human activities that are damaging to nature.
- **Con:** Requires an up-front financial investment to develop application/approval process.
- **Con:** Will cause a decrease in park revenue from visitors around the country.

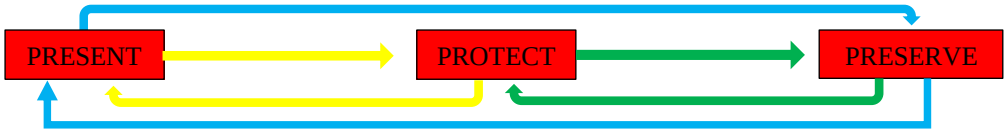
4. The Combo of Education & Titration: Institute both policy options 2 and 3.

- **Pro:** Will maximize the pros of each option in preventing fires and recouping fire cost
- **Con:** Requires the largest initial investment in terms of complexity and money.

Recommendation

I recommend that we institute the final policy option: the combination. By reducing human exposure to forests and educating visitors, we will maximally prevent human-caused fires in the short term. Despite the initially financial costs to instituting these plans, the money saved by preventing the most devastating fires (tens of billions of dollars annually) will cover the initial costs and so much more in the long run. The educational systems have already been implemented successfully in less developed countries than the U.S., and several American protected forests already have a cap system on park entry. This policy will save the most lives, prevent the most damage, and uses previously tested and successful methods to accomplish these goals[1].

Implementation – for full outline see appendix[2]



PRESENT: Provide information to forest visitors to preempt fire-starting actions.
PROTECT: Decrease human interaction with high risk forests in high risk periods of time.
PRESERVE: Continue to uphold and assess measures to protect forests from fires. Gather data to measure the success of protecting and preserving, and then update strategies accordingly to mitigate man-made wildfires. These programs will pay for themselves through saved money not used for disaster/damage relief due to wildfires.

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[1] Please note that my implementation guidelines in the appendix allow for you Mrs. Christensen to implement only policy option 2 or 3 if you deem only one of them appropriate independent of my analysis.
[2] Blue lines represent feedback looks that occur in policy option 2. Green for option 3. All three colors for option 4.

APPENDIX - Blue - Presentation (policy 2), Green - Protection (policy 3), and Yellow - Both

First 120 Days: A Few High Risk Sites Up & Running (Fire seasons are roughly 120 days)	
Parties	**Necessary Actions**
USFS, NPS, Yosemite, Olympia, & Grand Teton	• Identify parks/forests that already use a permit system for limiting entry. • Research which parks have the most efficient systems in order to scale-up to other parks/forests.
USFS, NPS, Yosemite, Olympia, & Grand Teton	• Create instructional video describing risky fire-starting behavior stressing appropriate priming and group behaviors. Necessary footage likely already exists from Smokey the Bear advertising campaigns. • Have park visitors stop at entrance when paying fees and participate in brief education session including a video and a survey testing comprehension.
USFS, NPS, Yosemite, Olympia, & Grand Teton, Analytics Team	• Create an exit survey that assesses visitor knowledge and behavior pertaining to wildfires (data on fires is already collected). • Create analytics team through outsourcing or existing employees. Using differences in difference quasi experimental methods, compare man-made wildfires incidence to controls.
Following 120 Days	
USFS, NPS, & Analytics Team	• Evaluate results from preliminary trials on previous forests/parks. • Determine which parts of plan were effective, continually improve education content and work to expedite permit entry process. • Start advertising for fire prevention to gather public/political support.
Analytics Team	• Assess a second group of forests/parks with in high-fire risk areas using existing fire data and predictive algorithms.
Analytics Team	• Calculate maximum possible number of entry permits in order to preserve revenue while minimizing fire exposure for all forests in programs.
Pre-Fire Season Prep	
USFS, NPS, Initial Parts, & New Parks	• Institute updated permit systems in both newly selected parks and initial parks with according number of permits.
USFS, NPS, Initial Parts, & New Parks	• Institute updated education systems for both new and initial parks. • Customize education according to local risks and environmental factors.
Analytics Team	• Set up analytics team to effectively assess data from new parks and easily scale up to add more effectively.
Long Term	
USFS & NPS	• Assuming success of program, advertise results in decreased man-made fires through commercial program on likely stations using saved money from fire budgets. Increases popularity of program even more than before.
Analytics Team	• Continually analyze successful metrics for protection/presentation optimizing for future fire prevention.
USFS & NPS	• Re-evaluate programs accounting for changes in climate in order to improve them. If after 3 years there is no effect, terminate the programs.

I attest that I did not give or receive unauthorized assistance while working on this paper.

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[i] Christiansen, Victoria. "Concerning President's Fiscal Year 2020 Proposed Budget For the USDA Forest Service." *U.S. House Documents Repository*, 28 Mar. 2019, docs.house.gov/meetings/AP/AP06/20190328/109158/HHRG-116-AP06-Wstate-ChristiansenV-20190328.pdf.

[ii] Chow, Denise. "Australia Wildfires Unleash Millions of Tons of Carbon Dioxide." *NBCNews.com*, NBCUniversal News Group, 23 Jan. 2020, www.nbcnews.com/science/environment/australia-wildfires-unleash-millions-tons-carbon-dioxide-n1120186.

[iii] "Wildfire Causes and Evaluations (U.S. National Park Service)." *National Parks Service*, U.S. Department of the Interior, 2020, www.nps.gov/articles/wildfire-causes-and-evaluation.htm.

[iv] Berry, Alison. "Forest Policy Up in Smoke: Fire Suppression in the United States." *Property and Environment Research Center*, 2007, www.perc.org/wp-content/uploads/2007/09/Forest_Policy_Up_in_Smoke.pdf.

[v] Kahneman, Daniel. *Thinking, Fast and Slow*. New York: Farrar, Straus And Giroux, 2011.

[vi] "Request a Permit (U.S. National Park Service)." *National Parks Service*, U.S. Department of the Interior, 2020, www.nps.gov/nature/request-a-permit.html