

FROM: NWCG Fire Weather Subcommittee

TO: NWCG Fire Environment Committee

DATE: October 30, 2023

SUBJECT: Recommendation to Cease Using “Haines Index” in Wildland Fire Forecasts

Overview

The Lower Atmosphere Severity Index, now commonly referred to as the “Haines Index” (HI) was originally developed to tell fire managers when lower-atmospheric weather variables can affect fire behavior. When the HI was developed, weather data was limited, weather model quality was far lower than it is today, and in-situ observations were often all that were available. Given the lack of available data about both weather and fires, the best way to develop an index to provide fire managers with useful information was by performing a statistical study. One such statistical study initiated by Haines in the 1980s became the basis of the HI.

There are, however, many known and persistent issues with the HI which are outlined below. Many of these could individually justify the elimination of the HI from fire weather forecasts and related training/reference materials. Cumulatively, these issues overwhelmingly support the removal of the HI.

Justification for Elimination

1. HI was clearly acknowledged in the publication as needing further development before use, but that development was never done. The HI was operationalized anyway.
2. The HI was developed using subjective data on fires. Atmospheric data was limited to two locations and one season, among other fundamental scientific flaws (Potter 2018a).
3. The operational application of the HI is inconsistent with the intended and tested design of a single value on the start day of a fire.
4. The general use of the HI as a stability index is inappropriate. Values of 1 and 2 for the stability component indicate absolute atmospheric stability. A value of 3 may indicate stability or instability. Which one is the case is lost in the conversion to index value.
5. The general belief that the HI indicates the potential for a plume-dominated wildfire is unsupported by the original publication, or any research since.
6. The HI in no way reflects the effects of wind, despite efforts by Haines and others to do so, yet is evaluated on both windy and calm days.
7. The research to date has shown that in terms of skill in predicting fire development, the HI is only marginally better than a random guess (Potter 2018b).

8. The continued use and teaching perpetuates a focus on irrelevant or misleading information, and is contrary to the use of scientifically founded tools and knowledge in fire management and training.
9. Don Haines has said repeatedly in both public and private conversations that what was published was meant as a draft index; that he was pressured to publish it in a refereed reviewed outlet; that use of the Index should cease; and that he is incredulous that it is still in use after he and others have recommended otherwise for two decades.

Recommendation

It is the finding of the Fire Weather Subcommittee that the continued use of the HI is detrimental to decision making and risk management and its use should be discontinued. We recommend removal of the Haines Index from all fire weather related forecasts and NWCG reference and training materials. We understand that there will be some consternation from various personnel about its removal, but the overwhelming evidence supports its discontinuation.

Our recommendations on how to proceed are as follows:

1. We recommend continuing to use HI through the 2024 fire season. However, we will inform meteorologists that they should instead refer directly to humidity and stability observations and forecasts. The Haines Index should only be provided if specifically requested.
2. In the off-season 2023/2024, work with WFSTAR to make a video on the shortcomings of HI and the recommendation on what to use instead. Namely, directly addressing humidity and stability based on the observations and forecasts. Request that this video be made mandatory for all participants in the 2024 RT-130 courses.
3. In the off-season 2023/2024, request that the National Weather Service cease issuing HI forecasts starting 1/1/2025, replacing it with directly mentioning humidity and/or stability concerns in the forecast discussion part of the forecast. For those seeking forecast map data on stability, work with the National Weather Service to identify a replacement.
4. In the next IRPG update, the FWSC recommends that mention of HI be removed. This recommendation has already been submitted through the IRPG change portal.
5. In the off-season 2023/2024, work with the NWCG training to remove mention of HI in all NWCG training courses and replace it with discussion of stability and the evolution of the boundary layer.
6. In instances where HI is used to inform staffing or operational decisions, work with the Fire Weather Subcommittee to identify a replacement.

To close, the following is correspondence to Dr. Brian Potter, US Forest Service, directly from Don Haines himself:

February 24, 2001

Brian Potter
USDA Forest Service

Good Morning Brian....

On the Index...I feel a bit like a father who sent his child off to boarding school while still a toddler. When I next see him, he is grown and almost unrecognizable. Forecasting the Index days ahead? Forecasting the Index by-the-hour, overnight? Fascinating.

12/22/17 2:30 PM

To: Brian Potter

12/22/17

From: Don Haines

Subject: Comments on THE HAINES INDEX--revise it or replace it

One of the mistakes I made 30 years ago was publishing the HI in a refereed journal. I had planned to keep the study low key and publish as a station paper. At the time, however, the station was pushing "prestige publication" and I went along. If I had published in a station paper I could have better kept the study within the fire community and gained feed-back comments along with a much better fire data base improvement and revision. Too late now.

Supporting Material:

- Videos on Haines Index:
 - Part 1: <https://youtu.be/zpwxgMMziO4>
 - Part 2: <https://youtu.be/BuiQm9hP7s>
 - Part 3: <https://youtu.be/NTEYuopz51g>
- Video on Mixing Height: <https://youtu.be/-KZvCc-cz8c>
- A LOWER ATMOSPHERE SEVERITY INDEX FOR WILDLIFE FIRES (Haines original paper):
National Weather Digest 13(2):23-27:
<http://nwafiles.nwas.org/digest/papers/1988/Vol13-Issue2-May1988/Pg23-Haines.pdf>
- International Journal of Wildland Fire 2018, 27, 437–440: The Haines Index – it's time to revise it or replace it:
https://www.fs.usda.gov/pnw/pubs/journals/pnw_2018_potter001.pdf

- Atmosphere 2018, 9, 177; doi:10.3390/atmos9050177: Quantitative Evaluation of the Haines Index's Ability to Predict Fire Growth Events:
https://www.fs.usda.gov/pnw/pubs/journals/pnw_2018_potter002.pdf