Firefighter Health and Safety
June 2019

Directive
The Forest Service is directed to provide a report regarding its current and planned research on issues and risks related to firefighter health and safety in wildlands and wildland urban interface. The report should include detailed budget information and identify knowledge gaps and potential remedies to address them. (Explanatory Statement)

Summary
Current policies and recommendations for wildland firefighter health and safety are based on research studies focusing on smoke exposure, physical demands, heat stress, nutrition, and hydration status of this population of occupational athletes. The U.S. Department of Agriculture’s (USDA) Forest Service, through its National Technology and Development Program (NTDP), has been studying these areas since the 1960s. This research was accomplished at NTDP, as well as through agreements with various institutions. References regarding a selection of studies relevant to wildland firefighter health and safety can be found at the end of this document.

Current Research
Current research includes analysis of heat stress during wildfire management activities and training, seasonal changes in fitness experienced by hand crews, and the risk of lung cancer and cardiovascular disease mortality due to smoke exposure. Several of these studies have manuscripts that are under peer review at this time—we expect them to be published at the end of 2019. Additionally, a website called “The Black” has been developed to serve as a centralized location for health and safety information for wildland firefighters (WLFFs) (http://theblackperformance.net/).

Budget
Under the direction of the U.S. Department of Agriculture’s Forest Service, Fire and Aviation Management, NTDP allocated $960,000 for wildland firefighter health and safety projects in fiscal year 2019. A large portion of this funding went to partnerships with various universities through agreements to conduct the research. The field evaluations scheduled to occur during the summer of 2019 include, as follows:

- **Wildland Firefighter Exposure and Health Effects Evaluation** (3-Year Duration). This is a cooperative effort with the National Institute of Occupational Safety and Health (NIOSH).
- **Critical Training Physiological Stress Evaluation** (2-Year Duration). This project documents the demands of training for an interagency hotshot crew.
- Evaluation of the current revision to the nutritional components of the Large Fire Food Contract. This project focuses on the nutritional needs of wildland firefighters assigned to long-duration incidents.
- Evaluation of the electrolyte needs of wildland firefighters during wildfire management activities.
Planned Research and Budget

<table>
<thead>
<tr>
<th>Project Area</th>
<th>Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continued development of content and user access to the website, “The Black.”</td>
<td>$375,000</td>
</tr>
<tr>
<td>This consists of dynamic updates to this central location of resources and content</td>
<td></td>
</tr>
<tr>
<td>catered to wildland firefighters to reduce injury rates during training and</td>
<td></td>
</tr>
<tr>
<td>support physical and nutritional needs.</td>
<td></td>
</tr>
<tr>
<td>Continued evaluation of electrolyte needs of wildland firefighters.</td>
<td>$106,000</td>
</tr>
<tr>
<td>Continued evaluation of hydration strategies during exercise in the heat.</td>
<td>$61,000</td>
</tr>
<tr>
<td>Development of educational tools for employee health and WLFF feeding</td>
<td>$37,000</td>
</tr>
<tr>
<td>strategies.</td>
<td></td>
</tr>
<tr>
<td>Physiological adaptations to smoke exposure.</td>
<td>$65,000</td>
</tr>
</tbody>
</table>

Research Opportunities and Knowledge Gaps

Current knowledge gaps and research needs consist of long-term health studies to document the cumulative effects of wildland firefighter activities such as fatigue, stress, smoke exposure, and level of fitness. A multitude of baseline studies have provided significant clarification on the demands of the occupation; however, the long-term effects on the employee are relatively unknown. Sound science will shape policies to improve and maintain wildland firefighters’ health and safety.

Published Literature

Smoke Exposure


Physical Demands


Gaskill SE, Ruby BC, Lankford DE, Heil DP, Sharkey BJ. Effect of Submaximal VO2 at the Ventilatory Threshold on Self-Selected Work Rate during Wildland-Firefighting in Missoula, MT: USDA, USFS, National Technology and Development Program; 2003.


**Heat Stress**

**Nutrition**

**Hydration**