Final Performance Report for Cooperative Agreement No. L16AC00129

A National Cluster Evaluation
of the Fire Science Exchange Network:
Processes and Impacts

JFSP Project #AWD-01-0000591

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Abstract: The National Evaluation of the Joint Fire Science Program (JFSP) assesses at the aggregate national level the processes and outcomes of the 15 regional Fire Science Exchanges. The evaluation includes four components: 1) an online survey targeting the fire science information-related experiences and opinions of fire managers/practitioners (Consumers), fire researchers/scientists (Producers), and members of the General Public; 2) a webmetrics component including quantitative and qualitative elements; 3) an evaluation resource guide designed to assist Exchanges in evaluating their regional activities; and 4) a qualitative interview component exploring the perspectives and experiences of key Exchange personnel. The Final 2018 annual report presents results obtained from the eighth year (Wave 8) of data collection from the online survey and webmetrics evaluation components. All 11 annual reports are posted on the FireScience Exchange Network website, which can be accessed via the FireScience.gov website. This Cooperative agreement only covers the years of 2016 to 2018, and comprises the activities associated with the national evaluation for those years, including the 2016, 2017, and 2018 annual reports.
**Objectives:** Objectives of this national evaluation project were to: 1) assist the JFSP Board in determining how to improve and further support Exchanges’ performance and success; 2) provide feedback to Exchanges concerning progress towards their goals to help maximize the impacts of outreach and educational activities; and 3) facilitate Exchanges’ development of JFSP best practices towards reaching shared goals.

**Background:** Over the past few decades, there has been an increasing emphasis on federally funded program accountability. Programs must clearly demonstrate the impacts of their efforts in order to secure future funding and support. This is often best accomplished through theory-driven evaluations examining multiple facets of program activities and outcomes. To this end, this project—the national cluster evaluation of the Joint Fire Science Program (JFSP) Fire Science Exchange Network (Exchanges)—employs a mixed-method approach grounded in the Logic Model to assess the processes and outcomes of the JFSP Exchange activities. As each Exchange is diverse and in varying stages of development, the present evaluation is conducted at the aggregate level to track progress towards Exchanges’ shared goals related to the enhancement of fire science delivery.

**Materials and Methods:** An annual survey was developed in 2010 and administered online over the course of eight years (2011–2018). The survey was designed to evaluate Exchange constituents’ experiences with their regional Exchange. Experiences included the Exchange website, educational events and products, as well as experiences with other fire science professionals. Since Exchanges are required to participate only during their funding year, for each year the survey was administered, participants represented Exchanges established at different points in time. To account for this variation in establishment, data were separated based on the Exchanges’ year of funding as an indicator of developmental maturity. It was assumed that Exchanges would need time to impact their constituents. Webmetric data on each Exchange website also has been collected each year. Annual national reports detail the survey results from participating Exchanges, as well as the webmetric results from all Exchanges.

**Results and Discussion:** Large-scale boundary organization initiatives are complex networks that feature multiple program sites in varied developmental stages, tasked with translating science-based research into applicable information. It is essential to the success of such initiatives to strategically and routinely assess progress toward desired goals and outcomes for the purpose of targeting improvements. In response to findings that increased production of applicable fire science did not result in increased use of fire science among practitioners, JFSP established the Fire Exchange initiative. Exchanges were tasked with improving the dissemination and the application of translated fire science. To meet this goal, Exchange personnel recognized that it was essential to establish Exchanges as reliable sources of relevant fire science as well as to increase positive interactions and improve relationships between practitioners and scientists. As scientists and practitioners increase mutual respect for one another, scientists are more likely to engage in research relevant to practitioners, and practitioners are more likely to adopt and apply these research findings. Therefore, when planning programming to bring these professional groups together, Exchange personnel incorporated the perspectives of both the scientists producing fire science research and the practitioners using that research in real-world contexts.

To evaluate the activities of the initiative, we constructed a national logic model based on our Theory of Change. This logic model mapped how Exchanges’ shared activities would achieve their overarching goal of bridging the gap between fire science research and practice in order to eventually change environmental conditions. According to the logic model, necessary prerequisite steps included: increasing perceptions that Exchanges are valuable and
trusted sources of fire science, increasing mutual respect between scientists and practitioners, and increasing practitioners’ use of fire science in their jobs.

The results of the cumulative years of evaluative research of Exchanges’ outcomes and processes indicate that Exchanges are making progress toward reaching short- and medium-term goals necessary to achieve long-lasting environmental change. For practitioners in particular, these impacts are demonstrated by improvements at all levels of Exchange efforts, including improvements in attitudes concerning the value of Exchanges, Exchange websites (Exchanges’ primary mechanism for reaching practitioners), practitioner reports of increased relevance of fire science and its use on the job, and practitioner reports that scientists respect their input on research agendas. Improvements in perceptions of Exchanges and Exchange websites indicate that these organizations increasingly meet constituents’ needs and are viewed as valuable and trusted sources of fire science information. Furthermore, these findings are supported by coincident research that reveals Exchanges are viewed as credible sources of translated fire science and that practitioners are using Exchange products to make decisions on the job (Hunter 2016). That practitioners increasingly endorse the use and application of Exchange fire science in their professional work is an important finding. This indicator of behavioral change, as a result of Exchange resources and activities, often is difficult to achieve and yet essential to achieving long-term changes in conditions. The current findings, reflected as modest but statistically significant increases in mean scores for reported fire science use among practitioners, reveal that Exchanges are taking the necessary steps to achieve their long-term goals.

Improvements in practitioners’ attitudes toward scientists are particularly important in demonstrating increases in mutual respect between practitioners and scientists, which is integral for fire science adoption. During the first and second years of the evaluation, scientists rated themselves as highly approachable whereas practitioners rated scientists as less approachable. Qualitative data collected in interviews with Exchange personnel in 2012 revealed that professional communication and trust could be improved between fire practitioners and scientists (Sicafuse et al. 2013, Maletsky et al. 2017). Based on these findings, Exchange personnel sought to pay special attention to improving practitioner and scientist interactions. The longitudinal results reported here suggest that their efforts have been successful in improving practitioners’ perceptions that scientists value their expertise. Additionally, supplemental qualitative data from the annually administered surveys serve to further verify these successes. As one practitioner stated, “The fire science [Exchange] has been a fantastic resource. It’s great to see the communication between [practitioners] and scientists that was almost non-existent when I began my career two decades ago.” According to another practitioner, “The Exchanges play critical roles in developing and maintaining two-way communication between fire scientists and practitioners and deserve continued funding and support through the JFSP.” Finally, as one practitioner reflected, “The highest value of the Fire Science Exchange is the Exchange itself—[that is,] when the scientist, managers and practitioners come together to solve fire challenges where the ‘answers’ are not clear. The more the Exchanges focus on springing forward using the best from traditional western science, traditional ecological knowledge, and evidence based practice and learning, the more likely we are able to advance.”
Similarly, for scientists, ratings have increased over time concerning Exchanges’ impacts in their regions and value of Exchange websites. Scientists’ perceptions of practitioners were very positive initially (at the upper end of the scale) and have remained positive over time. This result is not surprising, as many scientists likely became involved with Exchanges to disseminate their research findings and improve the application of fire science research in the field. Exchanges also may attract scientists who are more interested in collaborating with practitioners and pursuing applied science research. Increases in ratings of the Exchanges overall and Exchange websites in particular indicate that scientists also benefit from Exchanges as a forum for sharing their research, identifying new research topics, and connecting with other fire science professionals. The finding that scientists rate Exchanges as valuable in the fire science community is necessary to ensure that scientists remain engaged and willing to receive constructive input and feedback from practitioners.

**Conclusions (Key Findings) and Implications for Management/Policy and Future Research:** The Joint Fire Science Program Fire Science Exchange Network is composed of 15 Exchanges across the United States that act as boundary organizations to increase the dissemination and use of fire science. Three key implications for management and policy are highlighted from our evaluative findings: the logic model framework for program planning and evaluation, the importance of relationship-building between practitioners and scientists, and the use of a variety of educational outreach methods and materials. First, a comprehensive logic model of the Exchange initiative as well as individual Exchange logic models were developed. These models provided structure for prioritizing activities by directly linking them to short-, medium-, and long-term objectives that needed to occur in succession. Thus, logic models helped identify strategies to reach desired changes. Second, Exchanges recognized that rather than being passive recipients of research findings, practitioners needed to communicate to scientists their current and future management needs. Providing opportunities for these professionals to interact improved relationships, practitioners’ perceptions that their experiences were valued, and increased fire science adoption. Finally, the use of a variety of outreach products allowed Exchanges to reach wider audiences with differing learning styles, professional roles, and time constraints. Exchanges were able to provide in-person activities as well as harness emerging social media technologies, maintaining a coherent message across educational outreach platforms. Future outreach initiatives should continue to use a variety of educational strategies to foster interpersonal connections, ensuring that a cohesive strategy (outlined in a logic model) guides implementation of translational science. A review of our longitudinal results was published in 2018 (Maletsky, Evans, Singletary, & Sicafuse, 2018). Each of the annual National Evaluation reports can be found on the JFSP Exchange website. Finally, all of our de-identified annual national survey evaluation data, as well as the metadata associated with this project has been archived with the Forest Service Research Data Archive (under the trackid: JFSP-2019-001).
Literature Cited:


Appendix A: Contact Information for Key Project Personnel

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Appendix B: List of Completed/Planned Scientific/Technical Publications/Science Delivery Products (over course of this grant cycle—2016-18):

1. Articles in peer-reviewed journals:


2. Technical reports (all posted on the JFSP Exchange website):


