Joint Fire Science Program

Evaluation Resource Guide

for Joint Fire Science Program Fire Exchanges

Loretta Singletary, William Evans, Lorie Sicafuse and Lisa Maletsky

University of Nevada Cooperative Extension
University of Nevada, Reno

Funded by a grant from the Joint Fire Science Program

University of Nevada Cooperative Extension

2016

University of Nevada
Cooperative Extension

PEER REVIEWED

Curriculum Material 16-01

Evaluation Resource Guide for Joint Science Program Fire Exchanges

**Loretta Singletary, Professor and Interdisciplinary Outreach Liaison,
Department of Economics, Cooperative Extension**

**William Evans, Professor and State Extension Specialist,
College of Education, Cooperative Extension**

Lorie Sicafuse, Research Associate, College of Education

**Lisa Maletsky, Doctoral Student,
Interdisciplinary Doctoral Program in Social Psychology**

Table of Contents

Table of Contents (continued)

Overview and Purpose

The Joint Fire Science Program (JSFP) is an interagency research partnership between the U.S. Department of Interior and the U.S. Department of Agriculture. The JFSP funds a national network of regional Fire Exchanges designed to improve access to and application of fire science research results and tools. These Fire Exchanges comprise collaborative partnerships involving federal, state and local government; public, private, nonprofit and research agencies and organizations.

Common Fire Exchange goals include coordinating current fire science delivery efforts, increasing communication and collaboration between fire managers and fire scientists, and facilitating the dissemination and application of current fire science information among researchers, fire managers, policymaker and the general public. Each Fire Exchange has developed a variety of educational activities designed to improve the linkage between fire science research and application.

Coincident with public demand for greater accountability in the use of public funds, public agencies have increased, and enforced the requirement for funding recipients to measure and document program impacts. The JFSP prioritizes evaluating and communicating the impacts of its educational outreach activities as an important component in improving fire science research delivery and application.

This guide is designed to support these efforts by increasing the knowledge and skills necessary to evaluate Fire Exchange educational activities effectively and consistently. It reviews eight topic areas critical to effective program evaluation, including:

- Program planning,
- Evaluation planning,
- Evaluation questions and design,
- Evaluation methods,
- Collecting and handling data,
- Analyzing and interpreting data,
- Communicating evaluation results, and
- Evaluation ethics.

Each topic area is defined and resources provided to help develop quality evaluation plans for JFSP Fire Exchanges educational activities. A specific emphasis is placed on the logic model. The guide includes appendices that contain additional tools that may be useful in planning and implementing a comprehensive evaluation. Finally, this guide also includes basic templates that may be adapted for use in evaluating JFSP Fire Exchanges' educational activities within the context of a logic model.

The purpose and development of the JFSP online evaluation, a component of the external aggregate evaluation of Fire Exchanges activities, is described and discussed to provide an example of instrumentation (see Appendix A). It is expected that individual Fire Exchange evaluations will vary substantially, which makes the development of a one-size-fits-all evaluation instrument and methodology challenging. However, this example may be useful to illustrate how to develop question items to assess program outcomes in terms of a hypothetical JFSP logic model also provided.

Appendix B includes basic questionnaire templates that Fire Exchanges may adapt in evaluating their educational activities. Also included in Appendix B are brief descriptions of different types of available statistical analysis that may be applied to evaluative data.

Why is Evaluation Important?

As criteria for receiving continued funding and to improve fire science delivery, measuring and reporting program impacts are required of JFSP Fire Exchanges. Thus, it is critical for JFSP Fire Exchange investigators[1] to demonstrate the impact of their educational activities. This is typically accomplished as part of an overall comprehensive program evaluation. Program evaluation should be an integral component of program development. As such, how a program is to be evaluated should be considered in the program planning stage.

Logic models are increasingly used and endorsed by community education professionals to reveal the linkages between program development activities and evaluation outcomes. Development of a program logic model is the first step in program evaluation planning. The logic model approach to program development is intended to clarify the purpose of the educational program and identify potential obstacles to achieving success prior to program implementation. A logic model is useful in planning how to measure and report accomplishments, as well as any program adaptations that may have been necessary.

Program evaluations serve multiple purposes. These include:

- Provide overall program accountability;
- Monitor program effectiveness in order to adapt activities as needed to reach targeted outcomes;
- Increase knowledge to help formulate new theories;
- Acquire knowledge and experience to develop and encourage best practices;
- Maintain oversight of and effectively manage program staff; and
- Comply with the requirements of program funding sources.

Evaluation results can provide powerful information. Such information can be used to justify a program's design, validate the resources spent, determine if educational goals were reached, and assess the extent to which the program adequately addressed the situation for which it was intended.

There is no single best approach or method to evaluate all programming efforts, just as there is no single best approach to delivering programs. These concepts are reflected in the ecological, geographic and cultural diversity of the funded JFSP Fire Exchanges. This diversity of programming purpose results in differing levels of program design, duration and intensity, necessitating unique program evaluation strategies for each Fire Exchange and their proposed educational activities.

JFSP Fire Exchanges investigators need to be knowledgeable and creative in designing, implementing and reporting their program evaluation efforts. When correctly used, quantitative, qualitative, ethnographic, narrative, economic and other evaluation methods are *equally beneficial* to ascertain program impacts.

Sensitivity to differences in learning objectives, target audiences and teaching methods is critical to understanding the appropriateness of the evaluative approach used and the results obtained. Finally, if a goal of a program evaluation is dissemination of the evaluation results through peer-reviewed publication, then Institutional Research Board (IRB) certification should be sought and obtained.

Because of the complexity of community-based educational programs, collaborative approaches, when possible, often result in more effective evaluations. This is often the case in terms of cluster evaluations, where diverse data collection methods within the same evaluation design can contribute unique information on program effectiveness.

Evaluations need to be congruent with program scope and intensity. Abundant program resources, high program dosages (or frequent educational interaction with participants), and ambitious educational goals, require thoughtful approaches and more rigorous evaluation designs.

[1] This guide refers to leaders and planners of JFSP Fire Exchange programming as JFSP Fire Exchange investigators.

For these reasons, evaluation planning ideally should coincide with the inception of program development. While JFSP Fire Exchanges should collaborate on program evaluation design and methods when possible, no single evaluation type, method or approach can be used for all Fire Exchanges, given the scope and diversity of JFSP Fire Exchanges' educational activities.

Also, because the evaluation of a single outreach educational program requires diverse skills, it is difficult for any JFSP Fire Exchange investigator to become an evaluation expert. Therefore, JFSP Fire Exchange investigators are encouraged to work with others who have complementary skills. The JFSP Fire Exchange program development effort will benefit from collaborative teamwork in evaluating its educational activities.

Evaluation Types

For the purposes of the JFSP Fire Exchanges, program evaluation targets educational activities that are developed and implemented. In this context, program evaluation measures what happened as a result of a planned educational activity, based on pre-established program goals and learning objectives.

Although many types of evaluation have been identified in the research base, two are particularly relevant to the educational mission of the JFSP Fire Exchange: formative or process evaluation and summative or outcome-based impact evaluation. Each can significantly contribute to the overall quality of JFSP-funded programming.

Formative (process) evaluation is typically conducted for the purpose of improving or refining a program. It examines a program as it develops by scrutinizing its educational activities. It may involve pre-testing of educational materials in order to assess their efficacy and quality. It may also involve tracking the number of educational materials and activities, number of program contacts, and the types of barriers encountered in reaching target teaching outcomes. The results of formative evaluations often lead to modifications to educational materials and activities in order to strengthen the program. The goal of formative evaluation is to identify ways in which to improve educational activities to make the program more efficient, more relevant and more likely to accomplish a program's learning objectives and goals.

Summative (impact) evaluation assesses program outcomes (changes that occur as a result of the program, without necessarily establishing cause and effect conclusions) and impacts (effectiveness in changing target populations' knowledge/learning, behavior/action, or in conditions). Summative evaluation is typically appropriate for mature programs as it seeks to measure a program's overall success in reaching its target goals. It usually occurs at the conclusion of the program or at planned benchmark points during program implementation. It is often conducted by an external evaluator in order to increase objectivity.

Both formative and summative evaluation involves comprehensive planning. This includes the establishment of measurable collaborative process goals and objectives, the identification of methods and sampling strategies, the description of implementation strategies, and the outline of data analyses and reporting tactics.

JFSP requires that its Fire Exchange investigators become increasingly competent in these types of program evaluation in order to:

- Objectively and consistently measure program outcomes and impacts;
- Modify and strengthen educational activities as needed based on evaluative information;
- Report program outcomes and impacts; and
- Continually strengthen programming in order to sustain Fire Exchanges as effective outreach infrastructure to increase the delivery and use of fire science information.

At the same time, it is acknowledged that the types of desired outcomes and impacts important to JFSP Fire Exchanges may not become evident until sometime after the educational activities or experiences have occurred. In addition, JFSP Fire Exchange target audiences may be highly heterogeneous in terms of age, culture, learning styles, fire science role and geographic place.

For these reasons, JFSP Fire Exchange program impacts may be more complicated and/or time consuming to assess than traditional classroom educational activities. This added complexity accentuates the importance of planning.

References

Alkin, M.C. (2013). *Participatory evaluation up close: An integration of research-based knowledge.* Thousand Oaks, CA: Sage Publications.

Baumberger, M., Rugh, J., & Mabry, L. (2006). *Real world evaluation*. Thousand Oaks, CA: Sage Publications.

Bonbright, D. (2012). Use of impact evaluation results. *Impact Evaluation Notes*. No. 4, November. Washington, DC: InterAction.

Boone, E.J., Safrit, R.D., & Jones, J. (2002). *Developing programs in adult education: A conceptual programming mode (*2nd ed.). Evanston, IL: Waveland Press.

Cohen, C. (2006). Evaluation learning circles: A sole proprietor's evaluation capacity-building strategy. *New Directions in Evaluation*, 111: 85-93.

Davidson, E.J. (2005). *Evaluation methodology basics: The nuts and bolts of sound evaluation.* Thousand Oaks, CA: Sage Publications.

Festen, M., & Philbin, M. (2007). *Level best: How small and grassroots nonprofits can tackle evaluation and talk results*. San Francisco, CA: Jossey-Bass**.**

Fitzpatrick, J.L., Sanders, J.R., & Worthen, B.R. (2011). *Program evaluation: Alternative approaches and practical guidelines* (4th ed.). Boston, MA: Allyn & Bacon.

Hall, J., Freeman, M., & Roulston, K. (2013). Right timing in formative program evaluation. *Evaluation and Program Planning*. 45, August: 151-156.

McDavid, J.C., Huse, I., & Howthorn, L. (2013). *Program evaluation and performance measurement: An introduction to practice* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Perrin, B. (2012). Linking monitoring and evaluation to impact evaluation. *Impact Evaluation Notes*. No. 2, April. Washington, DC: InterAction.

Rogers, P. (2012). Introduction to impact evaluation. *Impact Evaluation Notes*. No. 1, March. Washington, DC: InterAction.

Senge, P.M. (1990). *The fifth discipline: The art and practice of the learning organization*. New York, NY: Doubleday.

Wandersman, A. (2014). Getting to outcomes: An evaluation capacity building example of rationale, science, and practice. *American Journal of Evaluation*. 35(1): 100-106.

Wholey, J.S., Hatry, H.P., & Newcomer, K.E. (2004). Part Three. In *Handbook of practical program evaluation* (2nd ed.). San Francisco: Jossey-Bass.

Yarbrough, D.B., Shulha, L.M., Hopson, R.K., & Caruthers, F.A. (2011). *Evaluation standards: A guide for evaluators and evaluation users* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Topic 1: Program Planning

Program planning involves the selecting and mapping of a theory of action. That is, outreach programs exist for the purpose of responding strategically to a particular situation in order to change the situation, presumably to bring about improvements. Ideally, that situation has been defined and framed objectively through a formal needs assessment. Logic modeling, or graphically mapping a program to implement a theory of action, can help to better clarify and understand program purpose and goals.

Logic modeling is a thought process that evaluators have used since the 1970s. It has regained notoriety in the past decade as a standard tool for planning, implementing and evaluating many federally funded community education programs.

Effective evaluation and program success depends upon a clear understanding about how and why a proposed program will resolve a specific problem, generate new ways of understanding the problem, and optimize assets to address the problem. A logic model approach to program and evaluation planning can help to create a shared understanding of program goals, and methods for reaching goals and projected outcomes.

At its simplest, a logic model requires identifying the *situation* that the program is designed to address or change. It describes the *inputs* or resources necessary to invest in order to bring about the desired change(s). It then describes the next logical step, which are the *activities* (utilizing the inputs provided) in order to achieve the desired changes. It goes on to identify and describe the *outputs* resulting from combining inputs with activities. The outputs are the products, services and events that are intended to lead to the program's outcomes. Finally, it describes the program outcomes as anticipated/desired changes in knowledge levels, attitudes and behaviors necessary to bring about a long-term change in a situation. Long-term change is depicted as a societal improvement (i.e., impacts on societal health and well-being; or impacts on economic, environmental and civic conditions).

A logic model takes into consideration basic *assumptions*. These are certain beliefs and ideas, based on theory, research and knowledge that support the linkages that have been identified and described as inputs, outputs and outcomes. It also considers *external factors*. These factors may affect a given program, but are beyond the control of the program leaders, developers or managers.

Logic models have a number of uses and can be applied to a variety of situations and audiences. Logic models are particularly useful for planning comprehensive outreach programs. Ideally, the exercise of completing a logic model for a particular program forces program leaders to clarify desired short-, medium- and long-term outcomes within the context of the formally identified needs (situation). Working backwards, program leaders must determine how to reach the desired outcomes through educational activities, tools and methods (inputs, activities and outputs).

Logic models serve to create a roadmap for achieving program outcomes, and thus success. As such, logic modeling may be a first step in designing quality program evaluations. The ability to map a program comprehensively can help to more easily identify indicators of change or impact. These identified indicators become evaluative criteria or measures.[2]

Logic modeling may also be used to involve the target audience in program planning. This application includes guiding stakeholder groups to collaboratively develop program goals and identify activities to help learners reach program goals. In many cases, stakeholders are the learners and can provide very useful insight into program planning and development.

---

[2] The University of Wisconsin Extension website provides an interactive model that JFSP Fire Exchange investigators may use in developing logic models tailored to their particular Fire Exchange's activities and targeted impacts.

Logic modeling may also help to explain program activities and desired outcomes to a broad group of program stakeholders and/or funding sources. A simplistic graphic depiction of program inputs, outputs and outcomes can be useful as a teaching tools, as well as a planning tool.

Hypothetical JFSP Fire Exchange Logic Model

A hypothetical logic model outlining potential connections between JFSP Fire Exchange investments and impacts is displayed in **Figure 1**. This hypothetical model is intended to help JFSP investigators understand the potential linkages or relationships between various aspects of program planning, execution and impacts. As resources, activities and goals vary across Fire Exchanges, their individualized logic models will differ from this example and from one another. Despite these differences, logic models tailored to each Fire Exchange should be conceptually similar. Recognition of the **situation**, or current challenges and opportunities, is essential in planning any type of program or intervention. For instance, several Fire Exchanges have identified the opportunity to increase communication and collaboration between fire managers/practitioners and fire researchers/scientists.

Fire Exchanges may invest a variety of resources, or *inputs* (e.g., funding, staff, time) in developing and executing the intervention or activities designed to reach targeted populations in progressing toward program goals (**outputs**). With respect to the present example, outputs may include professional meetings, conferences, or interactive website components designed to facilitate communication and networking among fire science professionals. These outputs in turn should be linked to programming *outcomes*. Such outcomes extend along a continuum. **Short-term outcomes** focus on learning and are evidenced by changes in knowledge, awareness, skills, opinions and behavioral intentions. For instance, as a result of JFSP Fire Exchange programming outputs, fire managers/practitioners may find fire scientists easier to approach and believe that fire science research is more trustworthy. Additionally, fire scientists may be more motivated to consult local fire managers when working on research projects. **Medium-term outcomes** refer to actions, or changes in behaviors, decision-making, policies and/or social outcomes. Fire managers/practitioners and researchers/scientists actually collaborating on a research project is an example of a medium-term outcome of Fire Exchange programming aimed at enhancing relationships between these populations.

Long-term outcomes refer to program effects on societal conditions (i.e., impacts on societal health and well-being; or impact on economic, environmental and civic conditions). Assessment of such outcomes may be beyond the scope of evaluations of individual JFSP Fire Exchanges as such changes may emerge over several years. It is important, however, that Fire Exchanges anticipate and articulate the long-term outcomes of their interventions and activities. Improving the quality of relationships between fire practitioners and scientists is not a finite goal, but rather related to more distal outcomes (i.e., quality relationships should facilitate the dissemination and application of fire science research, which should in turn lead to improved societal conditions). Specific examples of potential short-, medium- and long-term JFSP Fire Exchange programming and activity outcomes are displayed in **Figure 2**. It also should be noted that each Fire Exchange may have different **assumptions** (i.e., beliefs about their programming activities and contextual features) and **external factors** (features of the environment in which the programming activities are executed), which will further impact their conceptualization of the relationships between logic model components.

Figure 3 provides a logic model worksheet that may be helpful to JFSP Fire Exchange investigators in developing individualized program plans. This worksheet can also be used to aid in understanding the linkages among a given JFSP Fire Exchange's fire science delivery strengths and needs, investments outputs and outcomes.

Figure 1. Generic Logic Model for JFSP Fire Exchanges.

Situation	Inputs	Activities	Outputs	Outcomes: Knowledge	Outcomes: Actions	Outcomes: Conditions
Description of challenge or opportunity - Lack of synthesis, clarity, and relevance of fire science information may hinder accessibility and application - Need for more up-to-date and interactive web-based sources of fire science information - Need for more hands-on learning opportunities - Insufficient communication between fire practitioners and scientists - Opportunity to increase sharing of fire science information within and between organizations - Opportunity to educate the Public	**What we invest:** - Staff - Students - Volunteers - Money - Time - Knowledge - Infrastructure - Research base - Materials - Equipment - The collection of stakeholder opinions	**What we do:** - Synthesize and clarify fire science research results - Develop websites - Explore web-based options for outreach (i.e., chat, discussion groups) - Provide more interactive learning opportunities for managers - Help facilitate communication between practitioners/scientists - Work with media to reach community members, stakeholders **Who we reach (Participation):** - Fire managers/practitioners - Land managers - Researchers and scientists - Community members - Decision makers	**Products, services and events that are intended to lead to the program's outcomes:** - Fact sheets, brochures, newsletters - "One-stop shopping" interactive websites - Professional meetings and conferences -Field trainings and demonstration sites - Collaborations between practitioners and scientists on research projects - Practical educational materials for policy and decision-makers - Public service announcements, community meetings - Participants reached	**Occurs when there is a change in knowledge or the participants actually learn:** - New means of accessing the most recent fire science research results and tools - New fundamental or applied fire science knowledge - How fire science technology is applied - Enhanced decision-making skills and knowledge of options to implement in the field - Ways of facilitating information sharing within and between organizations - Policy knowledge - New and improved methods for applying fire	**Occur when there is a change in behavior or the participant's act upon what they've learned:** - Utilize improved fundamental or applied fire science knowledge - Adopt, apply new and improved skills - Directly apply information from fact sheets, brochures & web-based sources - Adopt and use new methods or improved technology - Regularly make work-related decisions based on fire science research results - Increased communication and collaboration b/w fire practitioners and scientists - Actively apply practical policy	**Occur when a societal condition is improved due to a participant's action taking to contribute to:** - Fire ecology - Plant and animal species - Water quality - Recreational areas - Community - Lack of synthesis, clarity, and relevance of fire science information may hinder accessibility and application - Need for more up- to-date and interactive web-based sources of fire science information - Need for more hands-on learning

ASSUMPTIONS - These are the premises based on theory, research, evaluation knowledge etc. that support the relationships of the elements shown above, and upon which the success of the program rests.

EXTERNAL FACTORS - A brief discussion of what variables have an effect on the program or project, but which cannot be changed by managers of the program or project. For example, a wildfire prevention fire success may depend on variability of the weather.

Figure 2. Definitions and Potential Examples of JFSP Fire Exchange Program Outcomes.

Program Outcomes - Planned results or changes for individuals, groups, communities, organizations, or systems. Types of outcomes include:

	DEFINITION	EXAMPLES
1. Change in Knowledge	Occurs when there is a gain in knowledge or the participants actually **learn**.	• New understanding of the application of fire science research • Awareness of new sources of current fire science information and means of accessing those sources • Increased understanding of how to apply technology in the field • Enhanced decision-making skills and knowledge of options to implement in the field • Increased policy knowledge • New, improved methods for applying fire science research results and tools
2. Change in Behavior and/or Action	Occurs when there is a change in behavior or the participants **act** upon what they've learned.	• Use of improved fundamental or applied fire science knowledge • Adopt and implement new and improved skills • Directly apply information from fact sheets, brochures, newsletters • Adopt and use new fire science methods or improved technology • Increase communication and collaboration with fire practitioners/scientists • Actively apply practical policy and decision-making knowledge • Changes in organizational practices (e.g., increased collaboration among and within organizations, or increased sharing of fire science research results and tools)
3. Changes in Condition	Occurs when a **societal condition** is improved due to a participant's change in action. These are usually changes in social, economic, civic and environmental conditions and are synonymous with impacts. Includes changes in conditions as a result of the change in behavior based on knowledge learned.	• Fire ecology improves • Cultural and economic resources are improved • Improved water quality and a healthier environment • Improved wildlife habitat and biodiversity • Increased access to recreational areas • Protection of human health, life and property • Shared responsibility for living with wildfire

Figure 3. Logic Model Worksheet.

This template is designed to help identify program inputs, outputs and outcomes in terms of the logic model. Inputs (what a Fire Exchange invests to produce desired outcomes) can be listed in the first box. The Outputs a Fire Exchange produces can be listed in the next section, designed to capture a variety of activities and the participants reached. Each Fire Exchange likely anticipates multiple short- and medium-term outcomes resulting from such Outputs, which may be articulated in the third section. Ultimately, these short- and medium-term outcomes should produce more substantial changes in conditions, which may be identified in the "Long-term Outcomes" box.

Program:____(name)____Logic Model (uses text boxes: add/change boxes and arrows as needed)

Situation:____

INPUTS	OUTPUTS		OUTCOMES		
	Activities	Participation	Short	Medium	Long

Resources to Assist with Program Planning

Boone, E.J., Safrit, R.D., & Jones, J. (2002). *Developing programs in adult education: A conceptual programming model* (2nd ed.). Evanston, IL: Waveland Press.

Douglah, M. (1998). *Developing a concept of Extension program evaluation*. Retrieved from http://learningstore.uwex.edu/pdf/G3658-7.PDF

Edna McConnell Clark Foundation. (2006*). Evaluating your organizational capacity: A self- assessment tool.* Retrieved from http://www.emcf.org/publications/emcf-reading-room/tools-and-guides/assessing-your-organizational-capacity/

Funnell, S.C., & Rogers, P.J. (2011). *Purposeful program theory: Effective use of theories of change and logic models.* San Francisco, CA: Jossey-Bass.

McLaughlin, J.A., & Jordan, G.B. (2004). Using logic models. In J.S. Wholey, H.P. Hatry, & K.E. Newcomb (Eds.) *Handbook of practical program evaluation* (2nd ed.). San Francisco: Jossey-Bass.

Patton, M.Q. (1997). *Utilization-focused evaluation: The new century text* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Ohio State Extension. (2008). *Successful assessment methods and measurement in evaluation (SAMMIE)*. Retrieved from http://sammie.osu.edu/

Ramlow, M.E. (2007). *Program Evaluation Standards.* Retrieved December 27, 2007 from www.eval.org/EvaluationDocuments/progeval.html

Rockwell, K., & Bennett, C. (2008). *Hierarchy for targeting outcomes and evaluating their achievement (TOP).* Retrieved from http://citnews.unl.edu/TOP/english/

University of Wisconsin Extension - UWEX. (2008). *Logic model evaluation*. Retrieved from www.uwex.edu/ces/pdande/evaluation/evallogicmodel.html

University of Wisconsin Extension - UWEX. (2008). *Program development*. Retrieved from www.uwex.edu/ces/pdande/progdev/index.html

W.K. Kellogg Foundation. (1998). *W.K. Kellogg Foundation evaluation handbook.* Retrieved from http://www.ojp.usdoj.gov/BJA/evaluation/links/WK-Kellogg-Foundation.pdf

Topic 2: Planning an Evaluation

Careful evaluation planning is directly connected to the quality of the evaluation results, and is a critical first step in the evaluation process. This topic area addresses the different purposes and types of program evaluation. A special emphasis is placed on developing evaluation questions that are linked to the educational program's theory or framework.

Developing impact indicators and identifying data sources are also critical at this phase. To clarify and understand the purpose for the program evaluation recommended having either conducted and/or reviewed the results of a comprehensive needs assessment.

The results of the needs assessment influence evaluation and logic model planning by identifying needs to address through educational outreach. The subsequent logic model describes the needs or situation and logically links the educational activities (inputs and outputs) with anticipated outcomes and expectations.

Evaluation of a comprehensive educational outreach program necessitates having clear program goals that include striving to achieve particular knowledge gains, attitude actions and behavioral changes. Evaluation planning questions to ask, for example, may include:

- Is the intention of evaluation to provide an overall measure of the net worth of the JFSP Fire Exchange?
- Is the intention to determine if the JFSP Fire Exchange effectively addressed or resolved the problem/situation?
- Is the intention to determine how to improve specific elements of the JFSP Fire Exchange program with the goal of improving fire science delivery?

Outlining the purpose of the evaluation includes determining who is conducting the evaluation, who will participate in the evaluation, and who will be the recipient of evaluation results, or the audience for the evaluation. Probing questions to ask, for example, could include:

- Will the evaluation of educational activities be conducted by a third party not involved directly with the JFSP Fire Exchange and is neutral about the outcome of the evaluation?
- Will the evaluation be conducted by the Fire Exchange program staff?
- Will evaluation participants include the JFSP Fire Exchange program participants?
- Will evaluation participants include the general public?

In terms of identifying the audience or recipients of the evaluation information, clarifying questions involve merging the intention of the evaluation with potential recipients of the resulting information and include:

- Will the evaluation results be used to clarify the situation, acquire additional information, and/or expand the number of participants and interests?
- Will the results demonstrate cost-effectiveness of the program to funding sources?
- Will the results be used to inform policy makers about the issue(s) or the program effects?
- Will the results be used to inform the general public, who may have a stake in the issue and whose tax dollars may have helped to subsidize the program?
- Will the results be used to help develop theories and models to advance the Fire Exchange program goals and objectives?

It is important to develop as complete as possible an understanding of who will be the recipients of the evaluation results. It is also important to know what these audiences want to know, and why and what they plan to do with the information—how will they use it. Finally, a comprehensive evaluation plan includes securing agreements from the prospective evaluation participants and expressing their willingness to participate. They should also receive assurances of confidentiality and all means possible to protect their anonymity.

Figure 4 provides a worksheet to help begin the planning process. Ideally, JFSP Fire Exchange investigators would involve staff and selected stakeholders to help complete the questions.

Figure 4. Evaluation Planning Questions.

Who are the key program stakeholders?
Who are the key stakeholders of the evaluation results?
How will the evaluation results be used?
Which methods will be used to collect the data?
What is the most effective protocol for collecting evaluation information?
What are the ethical issues to consider?
How will the data be analyzed?
How will the data be validated?
How will the evaluation findings be communicated?

Figure 5 provides a worksheet to assist with planning the evaluation of JFSP Fire Exchange educational activities. The components of a logic model are provided to help generate ideas for developing impact indicators in the program planning process. Impact indicators to measure short-, medium- and long-term outcomes may be used to develop evaluation questions (see **Topic 3**).

Figure 5. Evaluation Planning Worksheet.

Assumptions	Identify indicators of change and data sources
Resources	Identify indicators of change and data sources
Activities	Identify indicators of change and data sources
Outputs	Identify indicators of change and data sources
Short-term Outcomes	Identify indicators of change and data sources
Medium-term Outcomes	Identify indicators of change and data sources
Long-term Outcomes	Identify indicators of change and data sources

To summarize, evaluation planning includes creating an evaluation protocol, timeline and overall management plan. The goal of evaluation planning is to identify indicators of change, identify data sources, develop evaluation questions, and manage and monitor the program evaluation process. In planning program evaluation, it is helpful to review previously published evaluative research. These examples may be used to inform the value and logic of each Fire Exchange's proposed evaluation plan. The following resources may assist with planning evaluation of JFSP Fire Exchange educational activities.

Resources to Assist with Evaluation Planning

Alkin, M.C., Christie, C.A., & Rose, M. (2006). Communicating Evaluation. In I.F. Shaw, J.C. Green, & M.M. Mark (Eds.) *Handbook of evaluation*. San Francisco, CA: Sage Publications.

Baumberger, M., Rugh, J., & Mabry, L. (2006). First clarify the purpose: scoping the evaluation. *Real world evaluation.* Thousand Oaks, CA: Sage Publications.

Davidson, E.J. (2005). What is evaluation, defining the purpose of the evaluation, identifying evaluation criteria, organizing the criteria and identifying potential sources of evidence? In *Evaluation methodology basics: The nuts and bolts of sound evaluation*. Thousand Oaks, CA: Sage Publications.

Douglah, M. (1998). *Developing a concept of Extension program evaluation*. Retrieved from http://learningstore.uwex.edu/pdf/G3658-7.PDF

Flowers, Alice B. (2010). Blazing an evaluation pathway: Lessons learned from applying utilization-focused evaluation to a conservation education program. *Evaluation and Program Planning,* 33 (2), 165-171.

Mark, M.M., Green, J.C., & Shaw, I.F. (2006). The evaluation of policies, programs, and practices. In I.F. Shaw, J.C. Green, & M.M. Mark (Eds.) *Handbook of evaluation*. San Francisco, CA: Sage Publications.

Mertens, D.M. (2005). Evaluation. In *Research and evaluation in education and psychology: Integrating diversity with quantitative, qualitative, and mixed methods* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Patton, M.Q. (1997). Focusing evaluations: Choices, options, and decisions. In *Utilization-focused evaluation: The new century text* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Preskill, H. & Russ-Eft, D. (2005). Focusing the evaluation. In *Building evaluation capacity: 72 activities for teaching and training*. Thousand Oaks, CA: Sage Publications.

Rossi, P.H., Lipsey, M.W., & Freeman, H.E. (2004). Identifying issues and formulating questions, an overview of program evaluation, tailoring evaluations. In *Evaluation: A systematic approach* (7th ed.). Thousand Oaks, CA: Sage Publications.

Stecher, B.M., & Davis, W.A. (1987). Thinking about the focusing process, thinking about client concerns and evaluation approaches, how to formulate an evaluation plan. In *How to focus a program evaluation*. Thousand Oaks, CA: Sage Publications.

Taylor-Powell, E., Steele, S., & Douglah, M. (1996). *Planning a program evaluation*. Madison: University of Wisconsin Cooperative Extension Publication G3658-1.

University of Wisconsin Extension. (2008). *Logic model evaluation*. Retrieved from www.uwex.edu/ces/pdande/evaluation/evallogicmodel.html

Walker, R., & Wiseman, M. (2006). Managing evaluations. In I.F. Shaw, J.C. Greene, & M.M. Mark (Eds.) *The Sage Publications handbook of evaluation* (pp. 360-383). Thousand Oaks, CA: Sage Publications.

Western Michigan University Program Evaluation Center (n.d.). *The Program evaluation standards*. Retrieved from http://www.wmich.edu/evalctr/jc/PGMSTNDS-SUM.htm

Wholey, J.S. (1997). Clarifying goals, reporting results. In D.J. Rog, & D. Fournier (Eds.), Progress and future directions in evaluation: Perspectives on theory, practice, and methods. *New directions for evaluation*, no. 76. San Francisco, CA: Jossey-Bass.

Topic 3: Evaluation Design

Evaluations are only as effective as the questions that drive them. Developing key evaluation questions that accurately measure outcomes and impacts is critical to collecting meaningful evaluative data. It is important to invest time to carefully develop and write questions that accurately measure identified indicators of impacts and outcomes.

Learning about the types of questions that can be used in evaluation is important. JFSP Fire Exchange investigators are encouraged to work with an evaluation mentor or team to develop viable questions in order to effectively measure indicators and assess logical links between outcome goals and questioning strategies.

Evaluation design includes:

- Generating, testing and editing questions based on program learning objectives;
- Adapting evaluation questions to audience and methods;
- Linking appropriate impact indicators to program outputs and outcomes;
- Selecting and applying appropriate evaluation methods (see **Topic 4**); and
- Adjusting or augmenting evaluation design to changes in learners' progress or program goals.

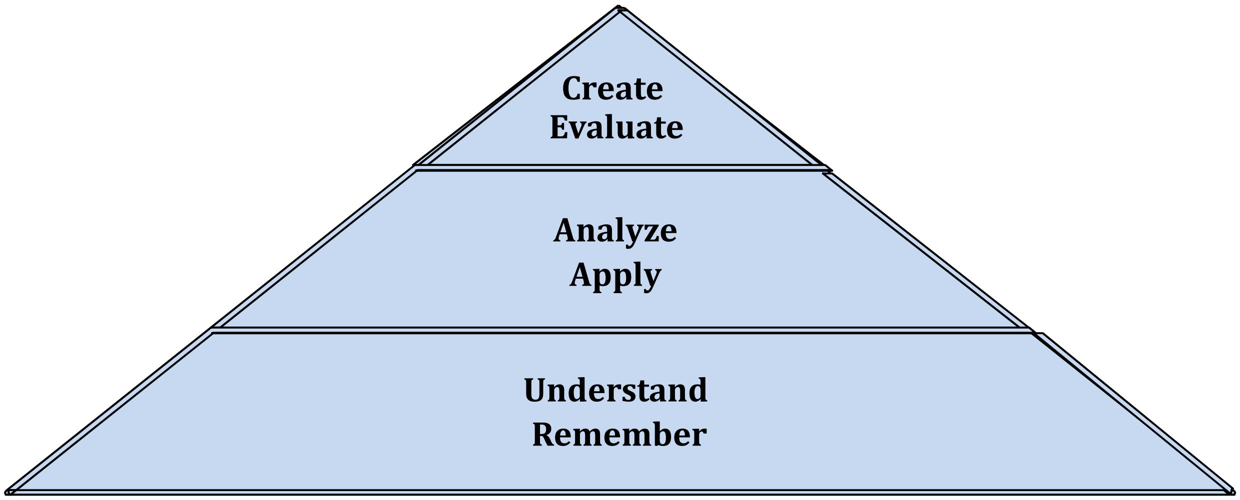
Developing evaluation questions requires having established clear learning objectives for program participants. Evaluation questions can then be linked to learning objectives and, following the logic model, identified program outcomes and impact indicators.

In 1956, Benjamin Bloom and colleagues created a multi-tiered model (Bloom's Taxonomy) of classifying thinking that illustrates the cognitive learning process. The lowest three levels are: remember, understand and apply. The highest three levels are: analyze, evaluate and create. The taxonomy is hierarchical in that it depicts the learning process as progressive, moving from basic cognitive processes to more advanced processes. In other words, learners who are able to apply what they have learned have also mastered the material to the extent that they can recall the material and understand it.

Bloom's Taxonomy has been revised (see **Figure 6**) to help educators better understand and evaluate learning outcomes when instruction is well planned and has clear learning objectives (Anderson & Krathwohl, 2001). As applied to program evaluation design, the model helps to classify and clarify the learning process so as to improve the evaluation design. That is, Bloom's Taxonomy provides a foundation for developing questions specifically to assess learning outcomes. Key words represent each hierarchical level of learning and may help to assess learning outcomes and impacts of educational activities.

1. Remember what is learned: Recall, recognize and identify
2. Understand or comprehend what is learned: Compare, explain, summarize and paraphrase
3. Apply what is learned in a given situation: Use, carry out and implement
4. Analyze what is learned: Organize, deconstruct, differentiate and distinguish
5. Evaluate what is learned based on a set of standards: Check, critique and judge
6. Create or put elements together to form something new: Generate, plan and produce

Figure 6. Revised Version of Bloom's Taxonomy of Learning.



A critical component of evaluation design is developing and writing the evaluation questions. In writing questions to evaluate short-, medium- and long-term impacts, it is helpful to review similar criteria that Dillman (2000) provides for developing survey questions. These include:

- Write each question so as to require an answer from participants. Avoid questions with introductory words such as "if" and "when", which invite nonparticipation or nonresponse.
- Encourage participants to relate their answer in terms of the present time. That is, structure the question in the context of what usually happens rather than what happened in the past. Participants can more readily estimate their current, usual activity rather than try to recall the past.
- Understand the extent to which participants may have ready-made answers. In attempting to measure attitudes and beliefs, for example, carefully consider the wording and sequence of question items. Testing and rewriting question items is the best method for reducing the opportunity for inconsistent responses.
- The range of response categories provided influences responses. The visual appearance and layout of the choice set stimulates response as well. If the question and its response categories are vague, the more likely the risk for measurement error.
- To encourage participation, design a simply, clearly worded questionnaire that is friendly in appearance and invites responses. Avoid lengthy instructions and lists of questions to evaluate educational activities with clear learning objectives.
- Collect comparable evaluative data. That is, if participants are asked to complete evaluation questionnaires and provide feedback through focus groups, the questions featured in both approaches should be designed to produce data that are comparable.

Question structure is as equally important as question content. Three structures that are commonly used for this purpose include open-ended questions, close-ended as ordered response categories, and close-ended as unordered response categories.

Open-ended questions are very useful in soliciting feedback and input from participants or to probe for additional detail. Answers to open-ended questions can help to build future evaluation questions. This type of question structure is also helpful when restricting answers to a range of responses is impractical.

- How can fire scientists improve communication with fire science users?

Close-ended questions with ordered responses provide participants with a categorical response scale where they must select one answer from a fixed range of choices. Examples include:

Example question #1: All citizens have a responsibility to prevent wildfire (please select only one answer):

Strongly disagree
Somewhat disagree
Neither agree nor disagree
Somewhat agree
Strongly agree

Example question #2: How effective are you in applying current fire science in your daily work? (Please select only one answer.):

I need a lot of improvement at this
I need some improvement at this
I am okay at this
I am good at this
I am very good at this

Close-ended questions with unordered responses present possible answers in no particular order. Participants choose the response that best describes their situation. An example includes:

Example question #3: Whose responsibility is it to see that fire scientists conduct research that is useful to fire managers? (Please select only one answer.):

Fire scientists
Fire managers or users of fire science
Agencies that fund fire science research
General public
Elected community
Decision makers

An example of a partially close-ended question with unordered response categories includes the following:

Example question #4: How do you prefer to receive fire science information? (Please select only one answer.):

JFSP Fire Exchange website
JFSP Fire Exchange ongoing demonstration sites
JFSP Fire Exchange one-day trainings
JFSP Fire Exchange printed self-paced materials
Other (please describe) ____

In considering the structures presented, the easiest questions to answer are those that provide limited choices and thus require limited effort to consider and select an answer. However, certain circumstances merit the use of those questions that require more effort to consider and select an answer. For example, question #4 requires more time to consider responses, including the option for the participant to add a response missing from the choice set.

Careful choice of words is a key to success in writing all structures of questions. Dillman (2000) provides principles to serve as guides when writing questions. These include:

- Choose simple rather than specialized words or phrases. For example, instead of using the word *occupation*, use *job*; instead of *respond*, use *answer*.

- Choose as few words as possible and avoid repetitious phrases. Instead of repeating the choices in each question stem, ask the question and provide the choices once.

- Use complete sentences to ask questions. Instead of *number of years worked in fire management*, use *how many years have you worked in fire management*?

- Avoid vague quantifiers such as *occasionally*. Instead provide a range of specific choices such as *once per month* and *two to three times per month*.

- Avoid specificity that exceeds the participant's capacity to answer the question accurately. For example, instead of asking how many fire science fact sheets have your read during the past six months, provide a set of numeric choices including 0, 1-2, 3-5 and so forth.

- Use equal numbers of positive and negative categories for scalar questions. For each level of agreement, for example, provide equal numbers of levels of disagreement.

- Distinguish "don't know" from neutral by positioning at the end of the choice scale. For example, on a choice scale of 1 to 5, "don't know" should be placed as choice 6.

- Eliminate check-all-that-apply question formats to reduce primacy effects. In other words, participants are likely to select those items listed first than those listed last. Revise these questions to include a choice set.

It is a good practice to draft questions for content and then test these drafts on colleagues and staff. After revising questions accordingly, test the readability and clarity of the questionnaire further with a small sample of participants who can provide honest feedback. Typically, numerous drafts, revisions, and rewrites are necessary to produce a set of questions that satisfy the goal of content and readability.

For evaluations that are administered as printed and online questionnaires, format of individual questions and question sets is also an important detail to manage. **Figure 7** illustrates a format that lists both questions and answers horizontally, thus conserving space. The question stem is positioned directly above a list of simple stem endings. This format provides simply worded questions and conserves space, thus shortening the overall questionnaire length.

Figure 7. Main Question Stem Stated Once with Multiple Endings Listed.

As a result of attending trainings at the JFSP Fire Exchange demonstration site:	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I remember what I learned.	1	2	3	4	5
I apply what I learn right away at work.	1	2	3	4	5
I can explain to others about what I learned.	1	2	3	4	5
I have new ideas to share with fire science researchers.	1	2	3	4	5

Appendix A includes a copy of the questionnaire that is currently being used to help evaluate JFSP Fire Exchanges' progress toward their goals at the aggregate level, along with a narrative describing the development of this instrument and the purpose of specific items. Though individual Fire Exchange evaluations likely will be highly variable, this narrative may be useful in illustrating how questionnaires may be designed and question items developed to assess program outcomes.

Appendix B includes evaluation templates that provide helpful starting points in designing questions and strategies specifically for use in evaluating the impacts of educational activities, as well as formative evaluation of the program as it evolves over time. While these templates only provide an example of question items, they may be used to jumpstart the development of the evaluation design and question-writing process.

Resources to Assist with Evaluation Design

Anderson, L.W, & Krathwohl, D.R. (Eds.). (2001). A taxonomy for learning, teaching and assessing: A revision of Bloom's Taxonomy of educational objectives. New York: Longman.

Bamberger, M. (2012). *Introduction to mixed methods in impact evaluation*. Impact Evaluation Notes, No. 3. Washington, DC: InterAction.

Bamberger, M., Rugh, J., & Mabry, L. (2006). *Real world evaluation*. Thousand Oaks, CA: Sage Publications.

Bloom, B.S., & Krathwohl, D.R. (1956). Taxonomy of educational objectives: The classification of educational goals, by a committee of college and university examiners. Handbook 1: Cognitive domain. New York: Longmans.

Bradburn, N., Sudman, S., & Wansink, B. (2004). *Asking questions*. San Francisco, CA: Jossey- Bass.

Creswell, J.W. (2003). *Research design: Qualitative, quantitative, and mixed-method approaches* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Delgado, M. (2006). *Designs and methods for youth-led research.* Thousand Oaks, CA: Sage Publications.

Department of Agricultural and Extension Education. (2008). *AEE 577 Evaluation in agricultural and Extension education, class II: Approaches and models of evaluation*... Retrieved from www.cals.ncsu.edu/agexed/aee577/Class%20II/aee577class2.html

Dillman, D.A., Smyth, J.D., & Christian, L.M. (2009). *Internet, mail, and mixed-mode surveys: The tailored design method* (3nd ed.). New York: John Wiley & Sons, Inc.

Douglah, M. (1998). *Developing a concept of Extension program evaluation*. Retrieved from ttp://learningstore.uwex.edu/pdf/G3658-7.PDF

Earthman, E., Richmond, L.S., Peterson, D.J., Marczek, M.S., & Betts, S.C. (1999). *Adapting evaluation measures too hard to reach audiences*. Retrieved from http://ag.arizona.edu/sfcs/cyfernet/evaluation/adapeval.pdf

Fowler, F.J. (1995). *Improving survey questions: Design and evaluation*. Thousand Oaks, CA: Sage Publications.

Goodyear, L., Barela, E., Jewiss, J., & Usinger, J. (2014). *Qualitative inquiry in evaluation: From theory to practice*. San Francisco, CA: Jossey-Bass.

James Bell Associates (2007). *Evaluation brief: What's the difference? Understanding process and outcome evaluation*. Retrieved from http://www.jbassoc.com/reports/documents/understanding%20process%20and%20outcome%20evaluation.pdf

North Carolina State University Department of Agricultural and Extension Education. (2008). *AEE 577 Evaluation in agricultural and Extension education, class II: Approaches and models of evaluation*. Retrieved from www.cals.ncsu.edu/agexed/aee577/Class%20II/aee577class2.html

Ohio State Extension. (2008). *Successful assessment methods and measurement in evaluation (SAMMIE)*. Retrieved from http://sammie.osu.edu

Patton, M.Q. (2011). *Developmental evaluation: Applying complexity concepts to enhance innovation and use.* New York, NY: Guilford Press.

Patton, M.Q. (2012). *Essentials of utilization-focused evaluation*. Thousand Oaks, CA: Sage Publications.

Patton, M.Q. (2004). Utilization-focused evaluation methods*: Theoretical underpinnings and origins.* In M.A Ikin & C. Christie (Eds.) *Roots of evaluation theory (pp. 276-292)*. Thousand Oaks, CA: Sage Publications.

Rockwell, K., & Bennett, C. (1995). *Targeting outcomes of programs*. Retrieved from http://citnews.unl.edu/TOP/index.html

Rockwell, K., & Bennett, C. (2008). *Hierarchy for targeting outcomes and evaluating their achievement.* Retrieved from http://citnews.unl.edu/TOP/english/

Rossi, P.H. Freeman, H.E., & Lipsey, M.W. (2004). *Evaluation: A systematic approach* (7th ed.). Thousand Oaks, CA: Sage Publications.

Sabo, K.F. (2007). *Youth participatory evaluation: Strategies for engaging young people*. San Francisco, CA: Jossey Bass.

Silliman, B. (2007). *Critical indicators of youth development outcomes*. Retrieved from www.national4-hheadquarters.gov/library/Indicators_4H_MM.pdf

Stufflebeam, D.L. (2002). *The CIPP model checklist*. Retrieved from http: //www.wmich.edu/evalctr/archive_checklists/cippchecklist.htm

United Way. (2008) *Outcome measurement resource network*. Retrieved from http://national.unitedway.org/outcomes/resources/mpo/examples.cfm

University of Wisconsin Extension. (2008). *Logic model evaluation*. Retrieved from www.uwex.edu/ces/pdande/evaluation/evallogicmodel.html

University of Wisconsin Extension. (2008). *Program development*. Retrieved from www.uwex.edu/ces/pdande/progdev/index.html

W.K. Kellogg Foundation. (2008). *Evaluation questions*. Retrieved from http://www.wkkf.org/Default.aspx?tabid=90&CID=281&ItemID=2810011&NID=2820011&LanguageID=0

Topic 4: Evaluation Methods

This topic area involves understanding and selecting methods for collecting and analyzing evaluative data. Evaluative methodology is most commonly categorized as quantitative and qualitative.

Qualitative methods generally are implemented in the natural setting where program instruction takes place. The researcher or evaluator becomes the instrument for collecting data and generally uses multiple methods. These include interviews and observation of participants in addition to participants' observations. The data collected emphasizes descriptions of the participants' experiences and seek to derive meaning from the perception of the participants.

Qualitative methods focus on the social interaction that occurs among program instructors and participants throughout the duration of the program and program activities, rather than strictly focusing on the extent to which targeted program outcomes are achieved. The researcher or evaluator applies an inductive approach to analyzing evaluative data. In other words, the meaning of the data collected is extracted from a larger body of information that comprises the data set.

Examples of qualitative methods pertaining to the JFSP program include focus groups conducted by various Fire Exchanges to identify fire science delivery needs. Another example includes the planned interviews of JFSP Fire Exchange investigators, one component of the aggregate external evaluation of the JFSP Fire Exchange program. The interviews were conducted during the second year of JFSP Fire Exchange program implementation. The purpose of the interviews was to learn about investigator challenges and opportunities concerning the development, implementation and evaluation of JFSP Fire Exchanges. These qualitative data helped to determine *best practices* for the JFSP Fire Exchange investigators and yield information to support ongoing program improvements.

Quantitative methods generally are aligned with the natural science research model, which traditionally emphasizes experimental designs to test specific hypotheses. These methods emphasize collecting numerical data that can be analyzed using statistical tests. Quantitative methods focus on objectivity and instrument reliability in the collection of evaluative data. They also seek to replicate measurement and generalize findings to a broader population.

Surveys are the most common quantitative method used in program evaluation. Such surveys are often comprised of Likert-type questions that produce numerical data. For the aggregate external evaluation of JFSP Fire Exchanges, for example, an e-survey is used that features primarily Likert-type questions producing scalar data or ordinal variables (See **Appendix A**). Similarly, the aggregate external evaluation of JFSP Fire Exchange websites produces numerical or quantitative data.

Quantitative and qualitative methods each feature unique benefits and shortcomings. Unfortunately, the history of program evaluation includes a controversial period where evaluators struggled to determine the relevance and utility of each method, often promoting one method over another. This conflict resulted in evaluators becoming polarized in their selection of methods and resulted in a rift that persisted for decades. However, contemporary evaluations seek to be comprehensive and often employ a variety of quantitative and qualitative methods to provide a more holistic understanding of the linkages among program inputs, outputs, outcomes and impacts.

A comprehensive evaluation seeks to select and combine quantitative and qualitative methods consistent with evaluation goals, and illustrates linkages between methods, specific evaluation questions, and analyses. The resources provided in this section are designed to help JFSP Fire Exchange investigators to:

- Select and implement evaluation methods appropriate for the evaluation goals,
- Apply appropriate methods to specific evaluation questions, and
- Anticipate the inferential statistics to be used to analyze evaluative data collected.

Resources to Assist with Selecting Evaluation Methods

American Psychological Association. (2010). *Publication manual of the American psychological association* (6th ed.). Washington, DC: Author.

Baugh, E. & Guion, L.A. (2006). Using culturally sensitive methodologies when researching diverse cultures. *Journal of Multi-disciplinary Evaluation, 4*. Retrieved from http://evaluation.wmich.edu/jmde/JMDE_Num004.html

Baumberger, M., Rugh, J., & Mabry, L. (2006). Real world evaluation. Thousand Oaks, CA: Sage Publications.

Bouffard, S., & Little, P. (2004). *Detangling data collection: Methods for gathering data*. Cambridge, MA: Harvard Family Research Project, Harvard University.

Cohen, C. (2006). Evaluation learning circles: A sole proprietor's evaluation capacity-building strategy. *New Directions in Evaluation*, *111*, 85-93.

Cooksy, L. (2005). The complexity of the IRB process: Some of the things you wanted to know about IRBs but were afraid to ask. *American Journal of Evaluation,* 26(3), 352-361.

Creswell, J.W. (2003). *Research design: Qualitative, quantitative, and mixed-method approaches* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Davidson, E.J. (2005). *Evaluation methodology basics: The nuts and bolts of sound evaluation.* Thousand Oaks, CA: Sage Publications.

Diem, K. (2002). Using research methods to evaluate your extension program. *Journal of Extension, 40*(6). Retrieved from http://www.joe.org/joe/2002december/a1.shtml

Fitzpatrick, J.L., Sanders, J.R., & Worthen, B.R. (2011). *Program evaluation: Alternative approaches and practical guidelines* (4th ed.). Boston, MA: Allyn & Bacon.

Greene, J., & Caracelli, V.J. (1997). Advances in mixed-method evaluation: The challenges and benefits of integrating diverse paradigms*. New Directions for Evaluation, 74.*

Henderson, K.A. (2006). *Dimensions of choice: Qualitative approaches to parks, recreation, sport, and leisure research*. State College, PA: Venture Publishing.

Henderson, K.A., & Bialeschki, M.D. (2002). *Evaluating leisure services: Making enlightened decisions.* State College, PA: Venture Publishing.

Kane, M., & Trochim, W.M.K. (2006). *Concept Mapping for Planning and Evaluation.* Thousand Oaks, CA: Sage Publications.

Mertens, D.M. (2005)*. Research and evaluation in education and psychology: Integrating diversity with quantitative, qualitative, and mixed* methods (2nd ed.). Thousand Oaks, CA: Sage Publications.

Ohio State Extension. (2008). *Successful assessment methods and measurement in evaluation (SAMMIE)*. Retrieved from http://sammie.osu.edu/

Patton, M.Q. (1987). An introduction to qualitative methods, when to use qualitative methods. In *How to use qualitative methods in evaluation*. Newbury Park, CA: Sage Publications.

Patton, M.Q. (2001). *Qualitative research and evaluation methods, (3rd ed.)*. Thousand Oaks, CA: Sage Publications.

Patton, M.Q. (2004). Utilization-focused evaluation methods: Theoretical underpinnings and origins. In M.A Ikin & C. Christie (Eds.) *Roots of evaluation theory (pp. 276-292)*. Thousand Oaks, CA: Sage Publications.

Preskill, H., & Russ-Eft, D. (2005). *Building evaluation capacity: seventy two activities for teaching and training*. Thousand Oaks, CA: Sage Publications.

Purdue University Writing Lab. (n.d.). *Sample research report*. Retrieved from: http://owl.english.purdue.edu/media/pdf/20070515024844_669.pdf

Stecher, B.M., & Davis, W.A. (1987). *How to focus an evaluation.* Newbury Park, CA: Sage Publications.

W.K. Kellogg Foundation. (1998). *W.K. Kellogg Foundation evaluation handbook.* Retrieved from http://www.ojp.usdoj.gov/BJA/evaluation/links/WK-Kellogg-Foundation.pdf

Topic 5: Collecting and Handling Data

Before implementing an evaluation, JFSP Fire Exchange investigators should consider and plan for the collection and management of quantitative and qualitative data. This topic area focuses on procedures for the proper collection, storage, processing and handling of data.

In order to foster a research environment that advocates for the rights and welfare of individuals participating in research, Institutional Review Boards (IRBs) have been created to review research protocols involving human subjects.[3] Each institution engaged in research that is covered by Code of Federal Regulations, Title 45 (Public Welfare Department of Health and Human Services), Part 46 (Protection of Human Subjects) and, that is conducted or supported by a federal department or agency must provide written assurance of compliance with this policy.

The purpose of an IRB review is to evaluate the risk and the researchers' protection against risks for human subjects. IRBs exist to: 1) determine and certify that research protocols involving human subjects conform to the regulations and policies set forth by the U.S. Department of Health and Human Services and the Food and Drug Administration concerning the safety, rights, welfare, health and privileges of human subjects and 2) assist and support investigators in their compliance with existing federal and state regulations.

It is recommended that JFSP Fire Exchange investigators become familiar with their respective IRB protocols and procedures in order to independently design and implement a data collection plan consistent with their evaluation objectives.[4] This typically requires appropriately described data collection methods and procedures within the context of an evaluation report.

Developing an application for IRB approval to conduct evaluative research requires the researcher to:

- Prepare IRB application forms according to required specifications;
- Apply knowledge of data collection methods to the creation of a simple data collection tool;
- Use technology to assist in data collection and management;
- Critique existing data collection tools on the basis of their reliability and validity;
- Apply the proper procedures for handling and managing data using a real data set; and
- Report methods sections for evaluation reports and/or articles.

Files of evaluation data are created prior to data analysis. Therefore, it is important to consider, plan for and provide assurances of data anonymity and confidentiality. Security concerns must be addressed with or without IRB approval. A plan should include where data will be maintained and filed. Data resulting from evaluation of educational activities ideally should be kept in locked cabinets or secure locations. An approved IRB protocol includes a commitment to timelines associated with how long investigators maintain secure data as well as how data are to be destroyed.

If the resulting data are not intended for use in making generalizations about a population and/or provide little to no risk or harm to the human subjects involved, it may be possible that IRB approval is either exempt or unnecessary. This may be the case for the evaluation of Fire Exchange educational activities. However, it is recommended that investigators pursue IRB approval for exemption and/or formal determination of whether or not IRB approval is needed.

[3] IRBs are regulated by each institution's Office for Human Research Protections (OHRP) and were developed in direct response to human subject research abuses earlier in the 20th century.

[4] In working with federally recognized American Indian tribes on sovereign reservation lands, individual IRBs often exist unique to a particular tribal government. It is necessary to seek tribal IRB exemption/approval prior to conducting survey research involving tribal members and reservation residents. This approval is in addition to and separate from university IRB approval.

The national aggregate evaluation of JFSP Fire Exchanges qualifies as a cooperative research project, according to the Code of Federal Regulations, Title 45, Part 46.114 (Cooperative Research). Cooperative research involves investigators representing multiple institutions. While each institution is responsible for safeguarding the rights and welfare of human subjects and for complying with the federal policy, an institution participating in a cooperative project may enter into a joint IRB arrangement. In this case, cooperating investigators rely upon the review of another qualified IRB to avoid duplication of effort. Therefore, for example, while the aggregate evaluative e-survey is implemented by JFSP Fire Exchange investigators, one IRB approval from the external evaluators' lead institution is sufficient.

The following resources can help JFSP Fire Exchange investigators to plan for the collection and management of evaluative data. These resources may also help investigators to plan evaluation activities based on the amount of time needed for the IRB application and approval processes.

Resources to Assist with Data Collection and Management

Bamberger, M., Rugh, J., & Mabry, L. (2006). *Real world evaluation: Working under budget, time, data, and political constraints.* Thousand Oaks, CA: Sage Publications.

Betts, S.C., Peterson, D.J., & McDonald, D.A. (2005). More tips: What if a Cooperative Extension professional must work with two or more Institutional Review Boards? *Journal of Extension, 43*(4). Retrieved from http://www.joe.org/joe/2005august/tt1.shtml

Bouffard, S., & Little, P. (2004). *Detangling data collection: Methods for gathering data.* Cambridge, MA: Harvard Family Research Project. Retrieved from http://www.hfrp.org/publications-resources/browse-our-publications/detangling-data-collection-methods-for-gathering-data

Bradburn, N., Sudman, S., & Wansink, B. (2004). *Asking questions*. San Francisco, CA: Jossey-Bass.

Brown, R., Martin, S., & Weigel, D. (2004). What Cooperative Extension professionals need to know about Institutional Review Boards: Recruiting participants? *Journal of Extension, 42*(6). Available at: http://www.joe.org/joe/2004december/tt1.shtml

Conrad, F., & Schober, M. (2007). *Envisioning the survey interview of the future.* New York, NY: John Wiley & Sons, Inc.

Cooksey, L. (2005). The complexity of the IRB process: Some of the things you wanted to know about IRBs but were afraid to ask. *American Journal of Evaluation, 26*(3), 352-361.

Dillman, D.A., Smyth, J.D., & Christian, L.M. (2009). *Internet, mail, and mixed-mode surveys: The tailored design method* (3rd ed.). New York: John Wiley & Sons, Inc.

Fink, A. (2002). *How to manage, analyze, and interpret survey data* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Lopez, M. (2002). *Youth vote national youth survey June 2002 data codebook*. Retrieved from: http://www.civicyouth.org/PopUps/youthvote_national_survey_june_2002_codebook.pdf

Martin, S., Weigel, D., & Brown, R. (2005). What Cooperative Extension professionals need to know about Institutional Review Boards: Obtaining consent. *Journal of Extension*, *43*(2), Article 2TOT1. Retrieved from http://www.joe.org/joe/2005april/tt1.shtml

McDonald, D.A., Peterson, D.J., & Betts, S.C. (2005). More tips: What if a Cooperative Extension professional must work with Native American Institutional Review Boards? *Journal of Extension*, *43*(5). Retrieved from http://www.joe.org/joe/2005october/tt1.shtml

Morgan, D.L., & Krueger, R.A. *The Focus Group kit*. (1998). Thousand Oaks, CA: Sage Publications.

National Cancer Institute. *Human participant's protection training*. Retrieved from http://cme.cancer.gov/clinicaltrials/learning/humanparticipant-protections.asp

National Institute of Health. *Office of Human Subjects Research*. Retrieved from http://ohsr.od.nih.gov/

National Network of Libraries of Medicine. (2006). *Outreach activity data collection form*. Bethesda, MD: Author. Retrieved from: http://nnlm.gov/evaluation/tools/ActivityInfo.pdf

Newman, D.L., & Brown, R.D. (1996). *Applied ethics for program evaluation*. Thousand Oaks: Sage Publications.

Ohio State Extension. (2008). *Successful assessment methods and measurement in evaluation (SAMMIE)*. Retrieved from http://sammie.osu.edu/

O'Reilly, J., Hubbard, M., Lessler, J., Biemer, P., & Turner, C. (1994). Audio and video computer assisted self-interviewing: Preliminary tests of new technologies for data collection. *Journal of Official Statistics, 10*(2), 197-214.

Patton, M. (2002). *Qualitative research and evaluation methods,* (3rd ed.). Thousand Oaks: Sage Publications.

Peterson, D.J., McDonald, D.A., & Betts, S.C. (2005). More tips: Communicating with Institutional Review Boards over the course of your project. *Journal of Extension*, *43*(6). Retrieved from http://www.joe.org/joe/2005december/tt1.shtml

Preskill, H., & Russ-Eft, D. (2005). *Building evaluation capacity: 72 activities for* teaching and training. Thousand Oaks, CA: Sage Publications.

Rubin, H., & Rubin, I. (2005). *Qualitative interviewing: The art of hearing data*. Thousand Oaks, CA: Sage Publications.

Trochim, W.K. (2006). *Research methods knowledge base: Data preparation*. Retrieved from http://www.socialresearchmethods.net/kb/statprep.php

Weigel, D., Brown, R., & Martin, S. (2004). What Cooperative Extension professionals need to know about institutional review boards? *Journal of Extension, 42*(5). Retrieved from http://www.joe.org/joe/2004october/tt1.shtml

Weigel, D., Martin, S., & Brown, R. (2005). What Cooperative Extension professionals need to know about institutional review boards: Risks and benefits. *Journal of Extension*, *43*(1) Article 1TOT1. Retrieved from http://www.joe.org/joe/2005february/tt1.shtml

Wholey, J.S., Hatry, H.P., & Newcomer, K.E. (2010). *Handbook of practical program evaluation* (3rd ed.). San Francisco, CA: Jossey-Bass.

Topic 6: Analyzing and Interpreting Data

JFSP Fire Exchange investigators may vary in their experience with evaluative data analysis and interpretation. Although presumably many understand and frequently use advanced statistics, others have had limited opportunities to practice statistical and analytical procedures in *applied* data analysis. Thus, this topic area covers basic analysis procedures available for both quantitative and qualitative evaluative data.

Descriptive statistics commonly are used to *describe* the features of the data collected for evaluation purposes, the goal being to describe the impact of the educational activity or outreach program. Descriptive statistics summarize and provide basic information about the individuals evaluated and the evaluation measures. Combined with a simple graphical analysis, they comprise the foundation of quantitative analysis of evaluative or applied data. Certainly, other statistical tests may be used in order to more rigorously study evaluative data to discern if causal effects are present or to generalize to a larger population. However, for the purpose of understanding evaluative data, descriptive statistics are sufficient.

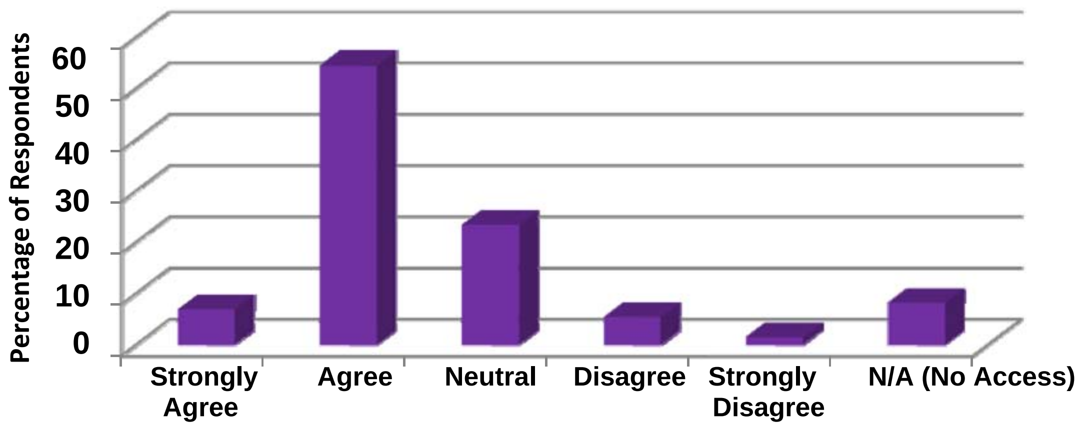
The procedures for analyzing and interpreting evaluation survey data depends on the type of data, qualitative or quantitative. It also depends on the number of questions in the evaluation instrument. Many evaluations of educational activities use primarily closed-ended questions with a fixed choice set of scalar or categorical response options (see **Topic 3**). These types of questions produce quantitative data.

The analysis of quantitative data such as these would begin with a description of the distribution of responses among the scalar categories. Using a statistical software package, such as Statistical Analysis System (SAS) or Statistical Package for Social Sciences (SPSS), a frequency table of counts and percentages is calculated. The information from frequency tables may be illustrated graphically for the purpose of sharing the results with program participants, program team members, funding sources and others (see **Table 8** and **Figure 8**).

Table 1. JFSP Fire Exchange Consumers' Perceptions of the Currency of Web-based Communication: Frequency and Number of Responses.

Question: The Fire Science information I have received from web-based sources is current and up-to date						
	Disagree	**Strongly Disagree**	**Neutral**	**Agree**	**Strongly Agree**	**N/A**
%	1.5	5.4	23.4	54.5	6.9	8.2
N	11	40	72	400	51	60

Figure 8. Consumers' Perceptions of the Currency of Web-based Communication Sources: Percentage of Respondents.



Analysis and interpretation of evaluation data becomes increasingly complex with a large number of question items. While frequency tables might be informative, the challenge with a large number of question items is to organize the results in order to be meaningful and useful. In order to interpret large sets of data, it is necessary to establish priorities. This is very applicable when the questions use the same response format. For example, with a set of evaluation questions that ask participants to indicate their agreement with statements about what they have learned or which types of trainings are most effective, the question items may be rank-ordered by mean scores. Standard deviations and numbers of participants answering each question are useful information to interpret mean scores. Alternatively, the items may be rank-ordered by percentage of participants who indicate they agree or strongly agree (see **Table 9**).

Table 2. Consumers' Perceptions and Experiences Regarding Fire Science Information Accessibility and Applicability: Ranked Mean Responses.

Question Item	Mean (SD)
Fire science information should be shared more frequently within my agency/organization.*	4.05 (.74)
Using fire science information enhances my effectiveness on the job.	4.03 (.68)
I trust fire science research findings.	3.77 (.67)
I often draw on fire science research when making work-related decisions.	3.63 (.83)
During the past year, I have changed at least one thing in my work based on what I've learned about fire science.	3.39 (.93)
Fire science information is easy to find.	3.37 (.83)
Fire science information is easy to understand.	3.30 (.81)
Fire science information is easy to apply to my specific problems.	3.13 (.87)

* Source: JFSP Fire Exchange Aggregate Evaluation Report, 2011.

Analyzing and organizing the data in this way provides a way to summarize and interpret the findings. For example, a rank ordering of skills featured in a given training (or series of trainings) can reveal those skills that participants learned most and learned least. This organization also allows similar types of items (in this example, skills) to be compared. To reduce data for the purpose of further analysis and interpretation, indexes and/or scales are useful tools. Both are composites produced by combining two or more question items. An index score is the sum of the scores of the choice categories for a group of question items.

In building an index, the items included should be shown to have face validity. That is, the items should be shown to more or less measure what they were intended to measure. For example, several items that measure (post-program) behaviors of fire managers as part of an evaluation of programs that increase fire managers' skills should share a logical consistency. That is, each item should in concept be relevant to skills essential to effective fire management practices.

Valid indexes are uni-dimensional. This means that the items in the index measure a single concept (dimension). In other words, these items should be related to each other. Whether a concept is narrowly defined or broadly defined influences the extent to which a group of items featured in an index represents a single dimension. Bivariate and multivariate analysis are used to examine relationships among items of an index. Bivariate relationships can be determined through tabular analysis. Two-way tables may be constructed and tested for relationships using chi-square, phi and related statistics or correlations.

To assess the internal consistency of items included in an index, the *Cronbach's alpha* statistic is often used (Carmines and Zeller, 1979). An alpha score of .80 indicates acceptable internal consistency for an index.

Identifying these relationships for evaluation data can help identify program participants with unique needs. Similarly, identifying relationships between specific topics and the socio-demographic characteristics of respondents for an evaluation can help identify which segments of program participants achieved the greatest knowledge gains, attitude and behavioral changes, for example. This information can help program managers brainstorm new ideas for targeting specific populations, thus increasing impacts.

The procedures for examining relationships between specific sets of question items (topics) and participant characteristics involve calculating two-way tables (cross-tabulations). The accompanying statistics (chi-square and associated probability level) for each pair of items is the statistical test to determine if the relationship is statistically significant. By reviewing the chi-square statistic and associated probability level for variables, it is simple to assess if relationships between variables meet the criteria for statistical significance (typically .01 or a more rigorous .001).

Once these procedures are conducted, patterns among the items showing significant relationships can be identified. For example, if application of learned fire science is associated with years of experience as a fire manager but not gender or age, then efforts may need to be made to better understand the relationship between experience and knowledge application. Examining how job experience relates to the remaining question items that measure learning is warranted.

Qualitative data analysis includes comparing and contrasting statements to determine and interpret meaningful patterns or themes. Meaningfulness is determined by the particular goals and objectives of the evaluation. Qualitative data analysis focuses on words, phrases and statements. While analysis of these data lacks a set of universal standards, rules and/or procedures, it can still be systematic and disciplined.

Qualitative analysis is distinguished by a reiterative pattern of examining the data to make connections, identify themes, and make new connections. This process results in a deeper understanding of the data as themes emerge.

The goals for qualitative data analysis are to:

- Identify patterns and common themes in the context of specific question items;
- Consider how identified patterns inform larger questions;
- Determine if there are deviations from identified patterns and how to explain such deviations;
- Explain any interesting observations and how these inform the larger evaluation picture;
- Determine if the patterns identified suggest the collection of additional data or revision of the evaluation questions; and
- Assess the extent to which the identified patterns support or do not support additional qualitative or quantitative analyses.

Evaluators who collect and analyze qualitative data are advised to involve at least two individuals. This helps to code data as objectively and freshly as possible. It is also advisable to begin data analysis as soon as possible following data collection.

For qualitative data collected from interviews of JFSP Fire Exchange investigators, for example, transcriptions were performed by one evaluation team member while a second team member verified accuracy of the transcriptions. Once the transcripts were completed, two individuals coded data using Glaser and Strauss' (1967) constant comparative method with an emphasis on the respondents' natural language. This *grounded theory* approach to data analysis allows the evaluators to focus data collection while simultaneously induce emerging patterns. Multiple data coders working together to analyze and interpret the data also helps to reduce individual bias. Together, the evaluators constantly modified initial coding and added to categories as necessary to sort the data and begin to arrange emerging themes.

The following resources can help JFSP Fire Exchange investigators to select and conduct appropriate analytical procedures appropriate for program evaluation data. These resources may also help investigators to appropriately interpret findings and develop conclusions from an analysis of evaluative data to inform program improvement and change.

Resources to Assist with Evaluative Data Analysis and Interpretation

Berkowitz, S. (1996). Using qualitative and mixed method approaches. Chapter 4 in N*eeds assessment: A creative and practical guide for social scientists,* R. Reviere, S. Berkowitz, C.C. Carter, & C. Graves-Ferguson (Eds.) Washington, DC: Taylor & Francis.

Betts, S., & Temper, K. (Eds). (2001). *Beyond basics: Evaluating community-based programs training curriculum.* Retrieved from http://ag.arizona.edu/sfcs/cyfernet/cyfar/Curriculum.pdf

Callor, S., Betts, S., Carter, R., Marczack, M., Peterson, D., & Richmond, L. (2000). *Community-based project evaluation guide.* Tucson, AZ: University of Arizona, Institute of Children, Youth, and Family. Retrieved from http://ag.arizona.edu/sfcs/cyfernet/cyfar/evalgde.htm

Fink, A. (2002). *How to manage, analyze, and interpret survey data* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Fitzpatrick, J.L., Sanders, J.R., & Worthen, B.R. (2011). *Program evaluation: Alternative approaches and practical guidelines* (4th ed.). Boston, MA: Allyn & Bacon.

Glaser, B.G. (1965). The constant comparative method of qualitative analysis. *Social Problems,* 12(4), 436-445. Retrieved from http://www.jstor.org/stable/798843

Glaser, B.G., & Strauss, A. (1967). *The discovery of grounded theory: Strategies for qualitative research.* Chicago: Aldine.

Israel, Glenn D. 1992. *Elaborating Program Impacts Through Data Analysis*. Program Evaluation and Organizational Development, IFAS, University of Florida. PEOD-3, September.

Israel, Glenn D. 1992. *Phases of Data Analysis*. Program Evaluation and Organizational Development, IFAS, University of Florida. PEOD-1. October.

Kvale, S. (1995). The social construction of validity. *Qualitative Inquiry,* (1):19-40.

Miles, M.B., & Huberman, M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Northcutt, N., & McCoy, D. (2004). *Interactive qualitative data analysis.* Thousand Oaks, CA: Sage Publications.

Ohio State Extension. (2008). *Successful assessment methods and measurement in evaluation (SAMMIE)*. Retrieved from http://sammie.osu.edu/

Patton, M.Q. (1990). *Qualitative evaluation and research methods* (2nd ed.) Newbury Park: CA, Sage Publications.

Preskill, H., & Russ-Eft, D. (2005). *Building evaluation capacity: 72 activities for teaching and raining*. Thousand Oaks, CA: Sage Publications.

Salkind, N. (2007). *Statistics for people who think they hate statistics* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Silverman, D. (2001). *Interpreting qualitative data* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Strauss, A.L. (1987). *Qualitative analysis for social scientists*. New York: Cambridge University Press.

Taylor Fitz-Gibbon, C., & Lyons Morris, L. (1987). *How to analyze data.* Newbury Park, CA: Sage Publications.

Taylor-Powell, E., & Renner, M. (2003). *Analyzing qualitative data*. Madison, WI: University of Wisconsin-Extension. Retrieved from http://learningstore.uwex.edu/pdf/G3658-12.PDF

Trochim, M.K. (2006). *Research methods knowledge base: Descriptive statistics.* Retrieved from http://www.socialresearchmethods.net/kb/statdesc.htm

University of Kentucky College of Agriculture. (n.d.). *Program development and evaluation resources.* Retrieved from http://www.ca.uky.edu/agpsd/soregion.htm

University of Wisconsin Extension Publication G3658-12 (n.d.). *Analyzing qualitative data.* Retrieved from: http://learningstore.uwex.edu/pdf/G3658-12.PDF

University of Wisconsin Extension Publication G3658-06 (n.d.). Analyzing qualitative data. Retrieved from: http://learningstore.uwex.edu/pdf/G3658-6.pdf

University of Wisconsin Extension. Publication G3658-14 (n.d.). Using Excel for analyzing survey questionnaires. Retrieved from http://learningstore.uwex.edu/pdf/G3658-14.pdf

Wholey, J.S., Hatry, H.P., & Newcomer, K.E. (2004). Handbook of practical program evaluation (2nd ed.). San Francisco: Jossey-Bass.

Wolcott, H.F. (2001) Writing up qualitative data (2nd ed.). Thousand Oaks, CA: Sage Publications.

Topic 7: Communicating Evaluation Results

Evaluation results should be effectively shared in order to help ensure future program support and success. This requires that evaluation results be translated into forms of communication that are useful to various stakeholders. This includes evaluation reports that are easy to read and understand. Elements of communicating evaluation results include understanding the purposes of reporting, the content of a standard evaluation report, how to identify stakeholders, and how to present the results that matter most to stakeholder groups.

An evaluation report should include the following basic elements:

- **Introduction**: The introduction section identifies and frames the issue. This is the outline for the evaluation activity and states the goals for the evaluation with relevance to the program plan and model. Previous evaluation findings may be briefly referenced to help focus the relevance of the evaluation conducted and reported.
- **Purpose Statement**: The purpose statement outlines the selection of evaluative methods. It explains why quantitative, qualitative and/or mixed methods are appropriate for the evaluation activity.
- **Methods**: This section explains the question(s) the evaluation activities seek to answer. In the case of evaluation activities associated with a logic model approach, for example, a methods section explains and provides specific examples of short- and medium-term outcomes. These include knowledge gains as well as attitude and behavioral changes the educational activities are designed to produce. Projections of anticipated long-term outcomes should also be described, tying logically into the intended short- and medium-term outcomes. The methods section explains why and how the evaluation questions were developed, review processes and additional efforts to refine the instrumentation to collect evaluative data. The protocol for data collection is also described in this section.
- **Results**: This results section reports the findings of the evaluation activities. This section describes the data analyses and rationale for the analyses. This section highlights the types of descriptive statistics, for example, used to analyze the data, such as ranked mean scores, standard deviation and analysis of variance. Analysis of the data to assess reliability of the instrumentation and validity of the results are also reported here.
- **Summary and Implications**: This section of the report succinctly reviews the evaluation activities, summarizing the purpose, methods and results. Implications are discussed for program improvement, given the findings of the evaluation activities. This section highlights what worked and what did not work in terms of the educational activities designed to produce the targeted program impacts. In both formative and summative evaluation scenarios, this information can be very useful to JFSP Fire Exchange investigators, program participants, and the primary and secondary sources of program funding. When used constructively the summary and implications section can aid in targeting specific program improvements as well as refine future programming initiatives.

Tables 3 and **4** provide examples of how findings of the data analyses may be reported and highlighted in the results section of the report. In these particular examples, Likert-type questions were used to assess the extent to which hypothetical JFSP Fire Exchange trainings may be effective in achieving intended impacts. These questions were designed to collect quantitative measures of participants' perceptions of their learning experiences.

Mean scores for each of the indicators are reported. In **Table 2**, pre- and post-test scores are illustrated as well as the results of paired t-tests. This information demonstrates the extent to which changes in knowledge and attitudes occurs using data collected from participants before and after the training. Statistically significant changes are noted.

Table 3. *Hypothetical* JFSP Fire Exchange Training: Teaching Impacts Summaries.

JFSP Fire Exchange Trainings	Quality of Training	Usefulness of Training	Knowledge Gains as a Result of Training	Number of Participants
Fall Training	4.12	3.94	4.03	90
Winter Training	4.73	3.75	3.85	55
Spring Training	4.10	4.67	4.05	15
Summer Training	4.31	4.15	3.98	42

Rating Code: 5 = highest; 1 = lowest

Table 4. *Hypothetical* JFSP Fire Exchange Training: Sample Indicators of Short and Intermediate Impacts.

Short-term/Intermediate-term Impacts	Pre-test	Post-test	Number of Participants
I understand the fire science available to me.	2.76	3.55[a]	101
I use the fire science available to me to do my job better.	2.76	3.15[a]	101
I get my best fire science from fire scientists in my Consortium.	2.77	3.04[a]	102
I will use my Consortium website to find the most current fire science information.	2.30	3.55[a]	103

Rating Code: 1 = never; 2 = rarely; 3 = sometimes; 4 = often; 5 = consistently

[a] Differences between pre-test and post-test scores statistically significant at $p > .01$.

Resources to Assist with Communicating Evaluation Results

American Psychological Association (2010). *Publication manual of the American psychological association* (6th ed.). Washington, DC: Author.

Evergreen, S.D.H. (2013). *Presenting data effectively: Communicating your findings for maximum impact.* Newbury Park, CA Sage Publications.

Fitzpatrick, J.L., Sanders, J.R., & Worthen, B.R. (2011). *Program evaluation: Alternative approaches and practical guidelines* (4th ed.). Boston, MA: Allyn & Bacon.

Reynolds, G. (2010). *Presentation Zen design: Simple design principles and techniques to enhance your presentations.* Berkeley, CA: New Riders.

Torres, R.T., Preskill, H., & Piontek, M.E. (2005). *Evaluation strategies for communicating and reporting* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Topic 8: Evaluation Ethics

Many evaluations involve sociopolitical elements. Regardless of the approach, design, methodology or depth and scope of any evaluation, it necessarily addresses issues relating to the allocation of resources and power. Because the results of evaluations often influence policy making and funding decisions, this inherent political nature of evaluation has spawned the evolution of ethics and standards.

Joint Committee on Standards for Educational Evaluation

Evaluation ethics refers to the principles of right and wrong action relating to rules of conduct to guide individuals in evaluation activities. The Joint Committee on Standards for Educational Evaluation (2011) provides 30 standards categorized into four groups that correspond to the four attributes presented below. The four attributes were determined in earlier work by the Joint Committee (1981) as the necessary aspects of ethical and sound evaluations. These attributes have been endorsed by the American National Standards Institute and as such provide national standards for ethical evaluation behaviors. These attributes and associated standards exist to ensure that evaluations of educational programs:

- Are u*seful* in that the evaluation is timely, informative and influential;
- Are f*easible* in that the evaluation is practical, realistic, diplomatic and cost-effective;
- *Ensure propriety* in that the evaluation is properly and legally conducted with due regard for the welfare of those involved in and affected by the evaluation; and
- *Ensure accuracy* in that they are comprehensive, measure what they are designed to measure, produce sound information, and are technically adequate, and that judgments rendered can be linked logically to evaluative data collected.

American Evaluation Association Principles to Guide Evaluators

Similarly, the American Evaluation Association promotes ethical evaluations and has developed a set of principles to guide evaluators. These include:

- *Systematic inquiry that is of the highest quality* in terms of technical standards, appropriate methods, strengths, and weaknesses of evaluation approaches and questions;
- *Competent* evaluators and evaluation teams that possess skills and experience necessary and also practice within the boundaries of their competence levels;
- *Integrity and honesty* of evaluators in their efforts to ensure integrity of the evaluation as demonstrated through honest admissions of conflict of interest, accurately presented data, and findings and resolve concerns related to evaluation procedures and findings;
- *Respect for people* as demonstrated through the effort to develop a comprehensive understanding of the evaluation context, follow professional ethics and standards, optimize benefits and minimize risks or harm to participants involved, and perform the evaluation so as to demonstrate respect for participants' self-worth; and
- *Responsibilities for the diversity* of the general and public welfare, allowing stakeholders to access evaluative information and present findings in an understandable way, honoring promises of the individual's confidentiality, and considering the good of society (American Evaluation Association, 2011).

Evaluation is Never Context-free

Simons (2006) maintains that any set of principles guiding the ethics of evaluation cannot be context-free. That is, evaluation occurs in the field rather than a laboratory. And, the sociopolitical nature of evaluation ensures that dilemmas will arise.

When it comes to evaluating outreach educational programs, community stakeholders decide if a program is a success. Evaluation data help with this assessment but ultimately the program stakeholders decide what *success* is and if the program should continue, and interpret what the evaluation means to the broader community. Thus, the reality of fieldwork provides ample opportunities that challenge evaluators to resolve ethical dilemmas. An ethical evaluator strives to investigate and report program quality and value for the purpose of informing relevant program stakeholders in order to improve programs or increase evaluation capacity.

As approaches to evaluating JFSP Fire Exchange program and educational activities may increasingly engage the program participants, ethical issues will arise pertaining to utilizing only those evaluators who have participated in the Fire Exchange program. In other words, program participants may not fully trust an “outsider” and not completely answer evaluation questions for fear of a breach in confidentiality.

Ethics, as they apply to evaluation principles and actions, are about how we should behave as members of society with a personal morality. It has to do with right and wrong actions on a daily basis. For example, in planning an evaluation, the evaluator must determine how the resulting information will be distributed and to whom it will be distributed. This is to help encourage that the code of “respect for persons” prevents the evaluator from misusing evaluation information, withholding from participants the purpose of the evaluation research, or asking individuals to participate without their knowledge.

Resources Concerning Evaluation Ethics

Aluwihare-Samaranayake, D. (2012). Ethics in qualitative research: A view of the participants’ and researchers’ world from a critical standpoint. *International Journal of Qualitative Methods*. 11(2): 64-81.

American Evaluation Association. (2011). American Evaluation Association guiding principles for evaluators. *American Journal of Evaluation*. 32(2): 165-167.

Joint Committee on Standards for Educational Evaluation. (1981). *Standards for evaluations of educational programs, projects, and materials.* New York: McGraw-Hill.

Joint Committee on Standards for Educational Evaluation. (2011). *The program evaluation standards: How to assess evaluations of educational programs* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Julnes, G., & Bustelo, M. (2014). Professional values and ethics in evaluation. *American Journal of Evaluation*. 35(4): 525-526.

Newman, D.L., & Brown, R.D. (1996). *Applied ethics for program evaluation*. Thousand Oaks, CA: Sage Publications.

Simons, H. (2006). Ethics in evaluation. In I.F. Shaw, J.C. Greene, & M.M. Mark (Eds.), *Handbook of evaluation: Policies, programs and practices*. Thousand Oaks, CA: Sage Publications.

Smith, M., & Robinson, G. (2001). *Researching violently divided societies: Ethical and methodological issues*. New York: United Nations University Press.

Yarbrough, D.B., Shulha, L.M., Hopson, R.K., & Caruthers, F.A. (2010). *The Program Evaluation Standards: A guide for evaluators and evaluation users* (3rd ed.). Thousand Oaks, California.

Web-based General Program Evaluation Resources Relevant to all Topic Areas

The following links provide useful guidelines for evaluating community-based programs.

General Guides to Program Evaluation

A Guide to Family Intervention and Prevention Program Evaluation
This step-by-step guide provides a basic overview to planning and implementing a youth program evaluation, with a slight focus on family violence prevention and intervention programs.
http://www.thesummerinstitute.ca/wp-content/uploads/A-Guide-To-Family-Intervention-and-Prevention-Program-Evaluation.pdf

2002 National Science Foundation User-Friendly Handbook to Program Evaluation
This handbook provides a lengthy, but user-friendly guide to evaluating programs, from early design to qualitative and quantitative analysis with a special focus on creating culturally responsive evaluations.
https://www.nsf.gov/pubs/2002/nsf02057/nsf02057.pdf

Administration on Children and Families. Program Manager's Guide to Evaluation
This nine-chapter handbook is an easy-to-use guide through all steps in evaluation research, with a special focus on youth program evaluation. The guide provides step-by-step instructions through design, implementation, analysis, and data reports.
https://www.acf.hhs.gov/sites/default/files/opre/program_managers_guide_to_eval2010.pdf

Ways to Improve the Quality of Your Program Evaluations
This guide provides simple tips for improving program evaluation.
https://fyi.uwex.edu/programdevelopment/files/2016/04/Tipsheet9.pdf

Collaborative Evaluation Led by Local Educators: A Practical, Print- and Web-Based Guide.
This guide provides a simple outline for conducting a collaborative evaluation process.
https://www.wested.org/wp-content/files_mf/1374814340li0401.pdf

Design and Implementation

Cost Analysis in Evaluation Research
This website provides an overview of how to conduct an adequate cost analysis prior to conducting evaluation research.
http://cals.arizona.edu/sfcs/cyfernet/cyfar/Costben2.htm

Alternative Methods for Collecting Evaluation Data
This website provides some useful guidelines for implementing alternative evaluation data strategies. Topics include: focus groups, cost analysis, portfolio assessment, qualitative interviews and existing records.
http://cals.arizona.edu/sfcs/cyfernet/cyfar/evaldata.htm

Using Logic Models
This University of Wisconsin-Extension website provides helpful information for creating and implementing logic models in evaluation research.
http://fyi.uwex.edu/programdevelopment/logic-models/

The Logic Model for Program Planning and Evaluation
This short paper by Paul McCawley (University of Idaho) provides an excellent and simple introduction to logic modeling.
http://www.cals.uidaho.edu/edcomm/pdf/CIS/CIS1097.pdf

Introducing Program Teams to Logic Models: Facilitating the Learning Process
This resource provides the outline and content for a half-day logic model workshop for managers, staff and volunteers.
http://evaluationcanada.ca/secure/17-3-113.pdf

Enhancing Program Performance With Logic Models
This is University of Wisconsin Extension comprehensive interactive Web resource to learn about and improve use of logic models.
http://www.uwex.edu/ces/lmcourse/interface/coop_M1_Overview.htm

Using Surveys in a Community
Utah State University Extension provides a general overview for designing, distributing, and using questionnaire data.
https://extension.usu.edu/files/uploads/surveyguide.pdf

Communicating With Your IRB
This Journal of Extension guide provides some useful tips on how to communicate program goals to IRB panels through all stages of program evaluation.
https://www.joe.org/joe/2005december/tt1.php

The Penn State Cooperative Extension Program Evaluation
This website provides information on how to design and implement a useful program evaluation in order to improve a program, compare delivery methods and respond to stakeholders.
http://extension.psu.edu/evaluation

Communicating Your Findings

Beyond the Data
This source provides a basic guide for how best to communicate evaluation research findings in a meaningful way. https://www.cdc.gov/dhdsp/docs/evaluation_reporting_guide.pdf

More Resources on Program Evaluation

The American Evaluation Association is an international professional association of evaluators devoted to the application and exploration of program evaluation, personnel evaluation, technology, and many other forms of evaluation. http://www.eval.org/

The Evaluators' Institute offers short-term professional development courses for practicing evaluators. https://tei.cgu.edu/

International Organization for Cooperation in Evaluation helps legitimate evaluation and supports the evaluation societies, associations, and networks so that they can better contribute to good governance and effective decision making, and strengthen the role of civil society. http://www.ioce.net/

The National Legislative Program Evaluation Society offers a wealth of learning and professional development opportunities for program evaluators, whether new or experienced. Includes links to state offices of program evaluation and/or performance auditing in the USA.
http://www.ncsl.org/legislators-staff/legislative-staff/program-evaluation.aspx

Online Handbooks and Textbooks for Evaluation Research
Publisher: American Evaluation Association
Description: This website includes a host of general and program-specific online textbooks and evaluation research handbooks. http://www.eval.org/p/cm/ld/fid=79

.

Appendix A

JSFP Fire Exchange National Evaluation: Development and Purpose

The following narrative outlines the rationale behind the JFSP Fire Exchange national evaluation instrument, highlighting the purpose and measurement of specific items as they relate to one overarching goal-improving fire science delivery. As JFSP Fire Exchanges are diverse, their individual evaluation protocols will differ from one another and from this example design. By using one example relevant to all Fire Exchanges, however, we hope that this narrative illustrates how an evaluation tool is developed to measure identified programming outcomes.

Evaluation Instrument Development

All JFSP Fire Exchanges are working toward the overarching goal of improving fire science delivery by increasing the accessibility and applicability of fire science information. This may be accomplished through several means, such as improving relationships between fire practitioners and scientists; increasing collaboration among fire science professionals (both practitioners and scientists) and organizations; providing more interactive learning opportunities for fire practitioners; synthesizing and clarifying current fire science research results; and using social media and developing Exchange websites offering a variety of fire science information and resources relevant to local problems and conditions.

The JFSP national evaluation instrument targets fire science delivery, as well as the effectiveness of common strategies Fire Exchanges have proposed to facilitate progress toward this goal. The JFSP national evaluation instrument was designed to yield an aggregate evaluation of Fire Exchange activities, rather than a comparative assessment of individual Exchange performance. Aggregated data allow evaluators to examine the progress of the entire initiative, while respecting differences in geography, ecology and demography between Fire Exchanges.

The perspectives of those involved in program development and management are critical to effective evaluation design. Thus, the national evaluation instrument (online questionnaire) was developed through a collaborative process involving the JFSP evaluation team, Fire Exchange principal investigators and other key JFSP personnel.

Multiple versions of the questionnaire were drafted and circulated for review. Revisions were made based upon ongoing Fire Exchange feedback and recommendations. The final version of the questionnaire represents an integration of input from each Fire Exchange.

Purpose of National Evaluation Question Items

All evaluation question items were developed to target JFSP Fire Exchange program objectives within the context of the logic model. The national evaluation primarily focused on short- and medium-term outcomes, as many long-term outcomes of JFSP Fire Exchange outputs may not emerge for several years.

A draft of the questionnaire was developed using a collaborative approach involving the first eight JFSP Fire Exchanges to receive funding in 2010. Evaluators developed question items based upon Fire Exchange objectives and outreach activities as described in proposals to the JFSP Board. Drafts of the questionnaire were circulated among Fire Exchange investigators and JFSP Board members for review. Revisions to question items and design were made accordingly. The resulting questionnaire was pre-tested by subsets of the targeted survey population. That is, the questionnaire was pre-tested by a panel of four Fire Exchange investigators and two JFSP Board members. These individuals were later omitted from the study sample. The purpose of the pre-test was to identify missing items, evaluate content validity, and check for clarity and comprehension of question items. The questionnaire underwent final revisions based upon the pre-test results.

The national evaluation questionnaire features three “frames.” These frames or versions of the questionnaire specifically target:

- Fire managers and/or fire science practitioners;
- Fire researchers and/or scientists; and
- Land owners and/or community members.

As the fire manager/practitioner questionnaire is the most extensive and widely distributed, this discussion focuses on the purpose of items included in this frame or version. Please refer to the copy of the manager/practitioner questionnaire (provided on pp. 42-46 in this document) as needed throughout the remainder of this section.

In addition, Fire Exchange investigators are encouraged to submit Exchange-specific items to the e-survey that are presented to respondents indicating membership in a specific Fire Exchange. Collected responses are then provided to those Fire Exchange investigators. The opportunity for Fire Exchanges to submit region-specific items helps them with the tracking of their individual activities and regional evaluations.

Section 1: Experiences with Fire Science Information (p. 42-43, Items 1-15)

This section was designed to assess participants’ current perceptions of the accessibility and applicability of fire science information. In addition, it explains changes or improvements in these perceptions occurring between the last four waves of survey distribution. Further, it explores whether improvements in the accessibility and applicability of fire science information translate into behaviors (e.g., whether current tools and research results are being used on the job). As previously mentioned, fire science delivery may be enhanced through several means, some of which are the focus of items in this section (e.g., enhancing relationships between practitioners and scientists).

Items 1-3 (*Fire science information is easy to find, Fire science information is easy to understand,* and *Fire science information is easy to apply to my specific problems*) measures *attitudes* and *beliefs* about the general accessibility and applicability of fire science information. Within the logic model framework, these items target short-term programming outcomes.

Items 4-5 (*Fire science researchers/scientists value my knowledge and experience as a field professional* and *Fire science researchers/scientists rarely provide information that helps me address the management problems I face)* and items 9-11 (*Fire science researchers are reluctant to study problems by local managers/practitioners, Fire science researchers/scientists are easy to approach,* and *Fire science researchers/scientists are willing to directly work with me.)* assess beliefs and opinions about fire scientists and their behaviors (short-term outcomes that may potentially be linked to medium-term outcomes such as behaviors).

Item 6 (*I trust fire science research findings*) also targets beliefs and opinions and thus assesses a short-term outcome related both to fire science research itself and those who produce it.

Item 7 (*Using fire science information enhances my effectiveness on the job*) targets perceptions of job performance, a medium-term outcome of JFSP Fire Exchange programming.

Item 8 (*Fire science information should be shared more frequently within my agency/organization*) also measures beliefs about the accessibility of fire science information while tapping organizational behaviors/practices.

Fostering positive relationships between fire managers/practitioners and fire researchers/scientists may be critical for improving the applicability and accessibility of fire science research results and tools. Not only are such relationships conducive to information sharing, but research conducted by fire scientists must be relevant to practitioners’ needs in order to be applied. In turn, the use of such research results depends on fire practitioners’ trust in such research findings and their willingness to apply them to local problems. Several items aim to assess the quality of relationships between fire managers/practitioners and fire researchers/scientists.

Items 12-13 (*I often draw upon fire science research when making work-related decisions; and during the past year, I have changed at least one thing in my work based on what I have learned about fire science*) specifically target behavioral (medium-term) outcomes. That is, these items go beyond an assessment of whether participants believe that fire science information *is applicable*, and aim to determine whether such information is *actually being applied* in the field.

Items 14 and 15 (*Have you worked jointly with fire science researchers/scientists on a research or management project?* and *Would you like to work/continue working with jointly with fire science researchers/scientists on a research project or management project?*) measure medium-term outcomes evidenced by behaviors and behavioral intentions.

Section 2: Experiences with Fire Exchange (p. 43, Items 1-7)

Section 2 items are designed to measure participants' perceptions and experiences regarding their regional Fire Exchange, specifically focusing on perceptions of Exchanges' impacts on fire science information accessibility and applicability. Participants who indicate that they are **not** aware of a JFSP Fire Exchange active in their region are "screened out" of this item set and are not asked to respond to items pertaining to their Exchange's efforts. However, the majority of participants (over 80 percent across recent years) indicated that they were familiar with the Fire Exchange operating in their region and thus responded to the items in Section 2.

In Section 2, Item 1 targets the perceived value of Fire Exchanges in helping to coordinate and share fire science information. Item 7 (*I would recommend Fire Exchange involvement to my co-workers*) also targets perceptions of the value of Fire Exchanges (a short-term outcome), while also measuring behavioral intentions (a medium-term outcome) to refer others to their regional Fire Exchange. The remaining items continue to reflect common goals across Fire Exchanges, such as improving the accessibility and application of fire science information (Items 2-3), local fire management policy (Item 4), and communication among fire managers/practitioners and fire researchers/scientists (Item 5). Item 6 assesses medium-term outcomes of Fire Exchanges' programming at the organizational level (*The Fire Exchange has made it easier for my agency/organization to accomplish its goals*). It should be noted that the items included in this section target perceptions of Exchange contributions to mainly medium-term outcomes.

Section 3: Website (p. 44, Items 1-8)

Each Fire Exchange has invested significant resources into developing and maintaining individual websites aimed at enhancing fire science delivery. Thus, it is important to determine whether these outputs cohere with Fire Exchange objectives and if they are meeting users' needs. Many Fire Exchange investigators shared similar visions in proposing their websites, including developing a website that was easy to navigate and well-organized, providing "one-stop shopping" sites, including interactive website components to facilitate communication between practitioners and scientists. Items 1-5 in this section probe participants' opinions about common indicators of website quality and utility (i.e., whether participants believe that their Fire Exchange's website is user-friendly, provides a wide variety of fire science information, provides practical information that they can use on the job, provides up-to-date information, and organizes information in one convenient place). Item 6 (*During the last year, how often did you use information obtained from your Exchanges' website in your job?*) targets Fire Exchanges' overarching goal of increasing the application of fire science information, which is a medium-term outcome.

Many Fire Exchange websites offer an interactive feature (e.g., discussion forum or "Ask an Expert" help desk) intended to address practitioners' fire science information needs while fostering dialogue between practitioners and scientists. Though these interactive features were expected to be popular, analysis of quantitative webmetrics data indicated that website users seldom accessed and engaged in the forums. Some Fire Exchange personnel suspected that these unexpected outcomes may be due to website users' lack of awareness or understanding about these interactive features. Thus, Item 7 directly asks participants whether their Fire Exchange provides a forum for communicating with other practitioners or scientists.

Finally, participants are asked to share any comments about their Fire Exchange's website (e.g., suggestions, thoughts about features and organization) in Item 8. Responses to this item are analyzed thematically to determine what the Fire Exchange websites are doing well and to identify areas for improvement. In 2015, a website template project was implemented. Standardizing websites across Fire Exchanges should facilitate navigation ease as well as help evaluators identify best practices.

Section 4: Communication Sources (p. 45, Items 1-11)

Preferences for varying sources of fire science information (e.g., written products, electronic sources, interactive sources such as field trips and workshops) were explored in several of the JFSP Fire Exchange baseline assessments. This section gathers additional data about such preferences, specifically targeting frequency of use (actions/behaviors, a medium-term outcome) and the perceived usefulness of fire science information obtained from each communication source (beliefs/opinions, a short-term outcome). Responses are used to help track improvements in the accessibility, quality and relevance of fire science information as a result of Fire Exchanges' outputs. In addition, responses may help Fire Exchange investigators focus their efforts on developing and providing communication sources or learning opportunities that participants find most useful.

Section 5: Obstacles (p. 46, Items 1-6)

Most of the items throughout the online survey are positively framed and target strengths of JFSP Fire Exchanges' outputs. This section, however, focuses on identifying potential gaps in Fire Exchanges' programming that may inhibit goal progress. Items reflect some of the common obstacles to accessing fire science information as mentioned in Fire Exchange proposals to the JFSP Board: limited opportunities to communicate with researchers/scientists (Item 1); poor synthesis and organization of existing fire science information (Items 2-3); difficulty applying fire science information in the field (Item 4); and lack of communication within and between organizations (Items 5-6). Responses may help Exchanges focus their efforts and resources on minimizing perceived obstacles, and/or on implementing alternative means of narrowing programming gaps. Despite their focus on obstacles, items in this section also can be used to assess improvements as increased levels of disagreement with each item signify that these gaps no longer exist and/or are being effectively addressed.

JFSP National Evaluation Survey Consumer Version

Section 1: Experiences with Fire Science Information

Please select the response that indicates your agreement with the following statements concerning experiences with fire science information and fire science information producers.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Fire science information is easy to find.	1	2	3	4	5
2. Fire science information is easy to understand.	1	2	3	4	5
3. Fire science information is easy to apply to my specific problems.	1	2	3	4	5
4. Fire researchers/scientists value my knowledge and experience as a field professional.	1	2	3	4	5
5. Fire researchers/scientists rarely provide information that helps me address the management problems I face.	1	2	3	4	5
6. I trust fire science research findings.	1	2	3	4	5
7. Using fire science information enhances my effectiveness on the job.	1	2	3	4	5
8. Fire science information should be shared more frequently within my agency/organization.	1	2	3	4	5
9. Fire researchers/scientists are reluctant to study problems and issues suggested by local managers/practitioners.	1	2	3	4	5
10. Fire researchers/scientists are easy to approach.	1	2	3	4	5
11. Fire researchers/scientists are willing to directly work with me if I have questions about fire science research or how to apply fire science at my job.	1	2	3	4	5
12. I often draw upon fire science research when making work-related decisions.	1	2	3	4	5
13. During the past year, I have changed at least one thing in my work based on what I have learned about fire science.	1	2	3	4	5

14. Have you worked jointly with fire researchers/scientists on a research or management project?

❑ Yes ❑ No

15. Would you like to work/continue working with fire researchers/scientists on a research or management project?

❑ Yes ❑ No ❑ Not sure

Section 2: Experiences with Fire Exchange

Prior to participating in this survey, were you aware of a fire science and delivery Exchange or Consortium supported by the Joint Fire Science Program?

❑ Yes ❑ No

Please select the response that indicates your agreement with the following statements concerning your experiences with your regional Fire Exchange's efforts, programming and activities.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. The Fire Exchange is needed to help coordinate sharing of fire science information in my region.	1	2	3	4	5
2. The Fire Exchange has helped improve the accessibility of fire science information.	1	2	3	4	5
3. The Fire Exchange has helped improve the use and application of fire science information in my region.	1	2	3	4	5
4. The Fire Exchange has helped improve policy regarding fire management in my region.	1	2	3	4	5
5. The Fire Exchange has helped improve communication among fire managers/practitioners and fire researchers/scientists in my region.	1	2	3	4	5
6. The Fire Exchange has made it easier for my agency/organization to accomplish its goals.	1	2	3	4	5
7. I would recommend Fire Exchange involvement to my co-workers.	1	2	3	4	5

Section 3: Website

Have you visited your Fire Exchange's website?

❑ Yes ❑ No

Please indicate your agreement with the following statements concerning your experiences and opinions regarding your Fire Exchange's website.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. My Fire Exchange's website is user-friendly.	1	2	3	4	5
2. My Fire Exchange's website provides a wide variety of information.	1	2	3	4	5
3. My Fire Exchange's website provides practical information I can use in my job.	1	2	3	4	5
4. My Fire Exchange's website provides information that is current and up-to-date.	1	2	3	4	5
5. My Fire Exchange's website organizes the information I need in one convenient place.	1	2	3	4	5

6. During the last year, how often did you use information obtained from your Fire Exchange's website in your job?

   ❑ Never ❑ Rarely ❑ Occasionally ❑ Often ❑ Very often

7. Does your Fire Exchange's website provide a forum where you can share information and ask questions?

   ❑ Yes ❑ No ❑ Not sure

8. Please provide any comments you'd like to share about your Fire Exchange's website (e.g., suggestions, thoughts about features or organization, or other experiences with the site):

Section 4: Communication Sources

We are interested in your experiences and opinions regarding different ways in which fire science information is communicated. Using the scales provided, please indicate how often you accessed information from each communication method listed below and rate the usefulness of this information.

	How often did you access fire science information from this communication source during the past year?					**How useful was the fire science information you received from this communication method?**				
	Never				**Often**	**Not Useful**				**Very Useful**
1. Research briefs, fact sheets or brochures	1	2	3	4	5	1	2	3	4	5
2. Newsletters	1	2	3	4	5	1	2	3	4	5
3. Field tours/demonstration sites	1	2	3	4	5	1	2	3	4	5
4. Videos	1	2	3	4	5	1	2	3	4	5
5. Workshops or trainings	1	2	3	4	5	1	2	3	4	5
6. Web-based sources	1	2	3	4	5	1	2	3	4	5
7. Professional meetings/ conferences	1	2	3	4	5	1	2	3	4	5
8. Webinars/teleconferences	1	2	3	4	5	1	2	3	4	5
9. Journal articles, papers or professional reports	1	2	3	4	5	1	2	3	4	5
10. Communicating with researchers/scientists	1	2	3	4	5	1	2	3	4	5
11. Communicating with co-workers	1	2	3	4	5	1	2	3	4	5

Section 5: Obstacles

Please indicate your level of agreement with the following statements concerning obstacles you may face in accessing fire science information.

I face the following obstacles in accessing and/or applying relevant fire science information…

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I have few opportunities to communicate with fire scientists/researchers.	1	2	3	4	5
2. Fire science information is not available in one convenient place.	1	2	3	4	5
3. Available fire science information and/or research results are not presented in a way that managers/ practitioners can easily digest and understand.	1	2	3	4	5
4. Available fire science information and/or research results are difficult to apply in the field.	1	2	3	4	5
5. Lack of communication *between* agencies and organizations in my region decreases the accessibility of fire science information.	1	2	3	4	5
6. Lack of communication *within* agencies and organizations in my region decreases the accessibility of fire science information.	1	2	3	4	5

Appendix B

Program Evaluation Resources: Evaluation Templates

The following templates provide examples of questions and formats that may be useful to JFSP Fire Exchange investigators in evaluating educational activities. These templates include examples of instruments and questions to collect quantitative data and include post-tests and post-reflective tests. Examples of open-ended questions also are provided to collect qualitative evaluation data.

Post-tests are administered to participants after they complete an educational activity. They often gauge participants' evaluation of the activity instructor (e.g., whether they were helpful, informative, engaging) and of the activity itself (e.g., participants' ratings of the quality of various aspects of the learning activity). The most useful post-tests typically target a range of participants' perceptions related to knowledge, attitudes, and beliefs, or behavioral intentions or actual behaviors. Ultimately, post-test items should reflect the desired outcomes of the educational activity (output) within the context of the logic model.

Post-reflective tests also are administered upon completion of an educational activity; however, they assess participants' knowledge and/or attitudes and behaviors both prior to and following their participation in the activity. Data from post-reflective tests can be particularly useful in assessing both comprehensive and specific impacts of an educational activity. Additional information regarding post-reflective tests, their rationale, and their drawbacks and benefits can be accessed through the following websites:

http://www.uwex.edu/ces/pdande/resources/pdf/Tipsheet27.pdf

http://www.uwex.edu/ces/pdande/resources/pdf/Tipsheet29.pdf

http://extension.psu.edu/evaluation/pdf/TS30.pdf

Examples of different types of post-reflective items and their purpose can be accessed at:

http://www.uwex.edu/ces/pdande/resources/pdf/Tipsheet28.pdf

TEMPLATE #1: Simple post-test evaluation of educational activity

Template #1 illustrates *potential examples* of Likert-type scale questions for collecting quantitative data to measure changes in knowledge, attitude and possibly behavior, as a result of JFSP Fire Exchange educational activities. Fire Exchange investigators may develop additional questions or replace the example questions provided. The data collected may be used to calculate either percentages or mean scores reporting the participants' perceived general effects of the educational activity. It should be noted that the following items are merely placeholders, and should be replaced with statements representing the learning objectives of each Fire Exchange's particular educational activity.

Evaluation Instructions: Please take a few moments to complete the following evaluation of the [insert NAME OF FIRE EXCHANGE educational activity]. Please indicate, on a 1-5 scale, with 1 being "strongly disagree" and 5 being "strongly agree", your agreement with the following statements.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I learned something that I can use in my job immediately.	1	2	3	4	5
2. I met new Fire Exchange participants with whom I plan to stay in touch.	1	2	3	4	5
3. I plan to contact a fire scientist and research ideas I have that could help me in my work.	1	2	3	4	5
4. I think differently about fire science as a result of this educational activity.	1	2	3	4	5
5. I learn something interesting to me that will help me in my professional development.	1	2	3	4	5
6. The educational materials I received today are easy to understand.	1	2	3	4	5
7. My Fire exchange is having a long-term impact on how science is used and applied in fire management decisions.	1	2	3	4	5

TEMPLATE #2: Post-reflective evaluation of educational activity

Template #2 illustrates potential examples of Likert-type scale questions for collecting quantitative data to assess overall evaluations of JSFP Fire Exchange educational activities as well as participants' changes in knowledge as a result of these activities. This template may be best-suited for a relatively brief activity (e.g. a workshop or training spanning several hours to one day), as it primarily targets changes in knowledge/understanding (short-term outcomes within the logic model framework), while including a brief assessment of anticipated behavioral change. Means or frequencies may be calculated for Items 1 (A-E), 6, and 8 to measure general evaluations of trainings/workshops. Data regarding changes in knowledge are collected through the use of a post-reflective test format to provide baseline and impact scores for each measure (Item 2). Training topics listed are only examples and should be replaced with the primary objectives of your specific training/workshop; additional items may be added depending on the goals and scope of the educational activity. These data may then be used to conduct paired t-tests to determine if participants' perceived knowledge changed as a result of the educational activity.

Frequencies may be calculated for Item 7 to yield a general assessment of participants' intentions to apply the knowledge they have gained from this specific educational activity. Open-ended questions provide participants with the opportunity to explain why the educational activity was or was not applicable to their work. Additional information regarding analysis of post-reflective data may be accessed via the following websites:

http://www.uwex.edu/ces/pdande/resources/pdf/Tipsheet29.pdf

http://extension.psu.edu/evaluation/pdf/TS52.pdf

Insert Name of Training Here

Evaluation

Please take a few moments to think about today's training and give us your answers to the following questions. Please do not place your name on this evaluation. The information you provide will help us to plan and improve future trainings.

1. **Please provide the following overall evaluation on the effectiveness of this training on a 1-5 5 scale (1 = not effective; 5 = very effective).**

	Not Effective				**Very Effective**
A. Organization and preparation	**1**	**2**	**3**	**4**	**5**
B. Style and delivery	**1**	**2**	**3**	**4**	**5**
C. Responsiveness to participants	**1**	**2**	**3**	**4**	**5**
D. Creating a learning environment	**1**	**2**	**3**	**4**	**5**
E. Content of the training	**1**	**2**	**3**	**4**	**5**

2. **Please rate your knowledge of the following topics *before* attending today's training and *after* attending today's training using on a 1-5 scale (1 = poor; 5 = excellent).**

	Knowledge *before* attending today's training					**Knowledge *after* attending today's training**				
	Poor				**Excellent**	**Poor**				**Excellent**
A. Fuels treatment practices	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
B. Prescribed fire planning/implementation	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
C. Ecosystem management strategies	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
D. Climate impacts on fire regimes	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
E. Monitoring burn severity	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
F. Fire mapping methods	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**

3. **What did you like least about today's training?**

4. What did you like best about today's training?

5. How much did this training provide you with resources to meet your fire science information needs (1=very little; 5=very much)?

1--------------------2--------------------3--------------------4--------------------5
Very Little Very Much

6. With approximately how many co-workers or staff do you plan to share the information you received in this training? ______

7. Do you plan to *make changes or take actions* in your work based on this training (Please mark one.)? Yes__ No___ Not sure_______

If "Yes" could you briefly explain?
____

____

If "No" or "Not sure," which best describes why?

______________Information not applicable or relevant to my work.

______________ Need more information or training.

______________ Other: Please explain briefly.

______________ The information is interesting but cannot be directly applied in my work.

8. Overall, how *valuable* to you or your organization is the information provided by today's training (1=not very valuable; 5=very valuable)?

1--------------------2--------------------3--------------------4--------------------5
Not Very Valuable Very Valuable

TEMPLATE #3: Post-reflective evaluation of educational activity

This template may be adapted to evaluate more extensive/lengthier educational activities, as it includes post-reflective items assessing changes in attitudes, opinions and behavioral intentions, in addition to those targeting basic learning objectives of the activity. The first section assesses changes in understanding (knowledge) of the primary objectives of the educational activity, a short-term outcome within the context of the logic model. The first three items in the second section assess changes in attitudes and beliefs as a result of the learning activity, whereas the last three items target changes in behavioral intentions. Though these also represent short-term outcomes within the logic model framework, behavioral intentions are highly predictive of actual behaviors and changes in decision-making, which are both medium-term outcomes. Again, changes in participants' perceptions as a result of the learning activity can be assessed by calculating mean scores and conducting paired t-tests for each before and after item.

It should also be noted that this template can be adapted for the purposes of administering an actual pre-post test. In this case, participants would complete two identical questionnaires, one administered prior to participation in the educational activity and one administered following participation in the educational activity. With respect to the following template, the "before" and "after" columns would be eliminated; they would simply be asked to report their understanding and opinions regarding training topics once before the activity and once again after they have completed the activity. Again, in deciding whether to utilize a simple post-test, post-reflective test or actual pre-post test to evaluate their activities, Fire Exchange investigators are encouraged to review their respective benefits and shortcomings (resources are highlighted at the beginning of this Appendix).

INSTRUCTIONS: Please take a few moments to complete the following evaluation of the NAME OF CONSORTIUM [educational activity]. On a 1-5 scale, with 1 being "very little" and 5 being "very much," please indicate your level of understanding of the following topics both *before* you participated in this educational activity and *after* you participated in this educational activity.

	Understanding *before* participating in activity					**Understanding *after* participating in activity**				
	Very Little				**Very Much**	**Very Little**				**Very Much**
1. New and improved sources of fire science information.	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
2. New and improved methods for applying fire science research results and tools.	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
3. Ways to connect with fire researchers/scientists in my region.	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
4. Options/strategies to help address local problems/issues.	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
5. Implications of fire science policy in my region.	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**

NEXT, please select the response that best indicates your viewpoint **1)** Back *before* you participated in this educational activity and **2)** Now *after* you have participated in this educational activity on a 1-5 scale with 1 being “strongly disagree” and 5 being “strongly agree”.

	Back *before* the activity					**Now *after* the activity**				
	Strongly Disagree				**Strongly Agree**	**Strongly Disagree**				**Strongly Agree**
1. Fire science research findings are trustworthy.	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
2. Current fire science research results and tools are relevant to my needs.	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
3. It is important to establish relationships with fire researchers/scientists.	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
4. I anticipate collaborating on projects with local researchers/scientists.	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
5. I plan to utilize current research results and tools to enhance my job performance.	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
6. I Recognize and act upon opportunities to share fire science information within my organization.	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**

Please answer the following questions:

1. What did you **like most** about this [educational activity]?

2. What did you **like least** about this [educational activity]?

3. What would you have **changed** about this [educational activity]?

Please provide any additional **comments** about this [educational activity]:

Thank you for your time and cooperation in completing this evaluation.