



Fire Management Board

Wildland Fire Predictive Services Program Review Report



Fire Management Board
National Interagency Fire Center
Boise, ID
June 12, 2017

Table of Contents

Executive Summary	3
Introduction.....	5
Early Program Development.....	6
2017 National Program Review.....	8
Review Objectives:	9
Review Format	9
Review Process	9
Information Collection	9
Information Analysis	13
Predictive Services Program Status.....	13
Survey and Interview Demographics	13
Accomplishment and Achievements	15
Program Importance and Customer Use	15
Program Structure	17
Position Management	20
Program Capabilities	22
Future Focus Areas	22
Summary.....	24
References	24
Appendix	25
Appendix A. Review Team	25
Appendix B. Survey Questions	26

Executive Summary

Wildland fire response decisions have always been based on the best available weather; fuels; fire activity; terrain factors, and resource availability; as well as other site-specific variables. In an attempt to provide new and continual fire weather, fire danger and resource information for strategic wildland fire management decision-making at all levels, the Wildland Fire Predictive Services Program was formally established following the 2000 fire season.

During the time that the Wildland Fire Predictive Services Program has been in place, concerns have arisen about how well it is reflecting the latest guidance, program alternatives, and strategic planning for the future. These concerns prompted the Fire Management Board (FMB) to initiate an interagency review to measure the effectiveness of the current program in meeting the changing wildland fire management business requirements.

The FMB Tasking Memorandum directed that the review would use a two-phased approach. Phase One involves the assessment and documentation of the need and expectations for predictive services products and services at the local, geographic, and national levels. Phase Two, if needed, will use the assessment information from Phase One to develop recommendations for FMB decision-making in regard to future direction and management of the predictive services program. This report fulfills Phase One of the tasking direction from the FMB. It clarifies the state of the program, what are the identified needs and expectations and how well it is working to meet those needs and expectations.

The review was structured to assess important program elements, considerations, and issues that influence and drive the program. All appropriate processes were used to identify, organize, coordinate, and collect information pertaining to the program. Key contacts, stakeholders, and resources were identified and venues to expedite information gathering were utilized, including: web-based questionnaires/surveys, personal interviews, and background information review.

The web-based surveys received a total of 429 total responses from users across the United States and from a wide range of positions and involvement (375 from the federal version and 54 from the non-federal version). Sixty-one individual interviews were completed. When combined with survey responses, 490 individual contacts were conducted through surveys and interviews.

The review specifically looked into the areas of importance and use, program structure, position management, program capabilities, and future focus areas. The report offers detailed information about each of these program areas in regard to efficiency.

Since its inception, Predictive Services (PS) has worked to achieve its original mission and set a standard for providing decision support information. The program has a very important mission, is widely used, and is a driving force in decision-making. It is well accepted, provides some outstanding services and products, and supports a wide variety of individuals. However, gaps exist which limit the effectiveness and usefulness to the wildland fire community, and in some cases, hinder capability and performance.

A detailed summation of the current state of the program including discussions of the situation and issues is provided in this report. Issues associated with the following areas are identified:

Program importance and customer use

Program structure

- Organization
- Funding
- Agency position sponsorship

- Governance
- Supervision
- Unit location
- Organizational affiliation
- Roles and responsibilities

Position management

- Staffing levels
- Staffing protocols
- Agency position sponsorship
- Career ladders
- Vacancy filling processes and timelines
- Assigned collateral duties
- Job sharing opportunities
- Remote location opportunities

Program Capabilities

Future Focus Areas

- Research
- Technology
- International coordination

The Predictive Services Program is critical to the success of wildland fire management. While its value is clear, its functioning and capability show opportunities for improvements. This report identifies those gaps or areas where evaluation can lead to better defined and stable operations and improved efficiency.

Additional groups or teams will be needed to address specific areas and these groups must be configured to include various subject matter experts, agency organizational level representative levels, and stakeholders from partner program areas in fire management.

Introduction

Responses to wildland fire events have always been based on the best available information coming from analyses of the situation. Information invaluable to fire managers and firefighters has expanded over the years and now includes current and predicted weather; fuel type; fuel condition; moisture content; current and predicted burning activity; and terrain situation, as well as other site-specific variables.

Obtaining and interpreting weather information and its affects on fire activity have become increasingly more important and the ability to do so has grown significantly. Through the late 1990's, wildland fire bureaus did not have their own capability to generate weather information and relied nearly exclusively on the National Weather Service (NWS) fire weather services. The NWS became a key partner with land management agencies in developing fire weather information systems, providing meteorologists and other support to wildfire incidents and coordination centers, and issuing weather forecasts, updates, and advisories.

In the mid- to late 1990's, the ability of the NWS to continue to meet wildland fire agencies' needs began to erode. Both budgets and leadership direction led to less capability and direction to support wildland fire management agency weather needs. At this same time, critical fire weather information had become essential for use by both managers and firefighters – this information was vital to development of strategy, tactical operations, and other decisions critical to firefighter safety.

Also by this time, the capability to track fire danger levels and track and provide current and predicted fire behavior information had markedly expanded. Several examples of positioning fire behavior analysts in support of long-term assessments and as “fire behavior service centers” had occurred and proven successful (Bushey and Mutch 1990). However, high demands during active fire seasons, limited capability in fire danger tracking, and limited numbers of qualified fire analysts frequently limited the ability to provide fire analyst support to Geographic Areas (GA) and Incident Management Teams (IMT).

Meteorologists, fire behavior specialists, fuels specialists, and long-term analysts were not located at central coordination sites and in times of extreme fire activity, were obtained on an as-needed basis. They were used in central locations and at times, assembled into fire risk assessment teams to assess current and projected fuel conditions and fire activity over a significantly active sub-geographic area or an entire State or geographic area (Zimmerman and others 2000). Such assessments were intended to help anticipate needs and prepare responses but were most often completed during fire activity or even as it began to subside. The net result was that a formal, full-time system to obtain long-term climate, weather, fuels, fire behavior, and potential fire occurrence information was lacking.

So, at a time when the wildland fire community was in need of better, more frequent fire weather information for planning and operational purposes, the primary source of this information was facing increasing restrictions due to monetary constraints and a changing mission. In addition, while fire behavior assessment and prediction capabilities were increasing, the capacity to routinely produce and apply this information was not expanding commensurately.

Reviews of wildfire situations having serious undesirable outcomes pointed to weather and fire behavior information as important factors contributing to these outcomes. Specifically, a review of the 1994 South Canyon Fire (Final Report of the Interagency Management Review Team, South Canyon Fire, Allen et al. 1995) reported that communicating fire weather and fire behavior information was significantly important to firefighter safety and wildland fire management.

As a result, the Interagency Management Review Team recommended that federal fire leadership examine alternatives to sole reliance on NWS for fire weather services before serious impacts for wildland fire management occurred. An interagency evaluation of how to obtain fire weather services, use them to

optimize firefighter safety, and maximize their application led to the creation of the Wildland Fire Predictive Services Program. It was apparent that weather, fuels, and fire behavior support to wildland fire management was not suffering from a lack of fire environment information and capability to obtain and produce this information, but from a lack of a coordinated program to provide these products and services on a routine basis.

For that reason, the Wildland Fire Predictive Services Program was formally established following the 2000 fire season through the National Fire Plan. Predictive Service Units at the National Interagency Coordination Center (NICC) and Geographic Area Coordination Centers (GACCs) were established. This program was created as a national program to provide a proactive approach of support to wildland fire management decision-making across the country. Interagency meteorologists and intelligence coordinators were initially positioned at geographic area coordination centers to gather and analyze fire, fuels and weather information for the national coordination system. This information was intended to help integrate fire weather, fire danger and resource information into strategic resource allocation and prioritization processes.

After the establishment of the Wildland Fire Decision Support System (WFDSS) in 2008 and the National Fire Decision Support Center (NFDSC) in 2009, capability to provide and obtain fire behavior and analyst skills and support to publish decisions in WFDSS was expanded. The NFDSC could support GA's directly or by aiding in adding capability at GA's. In a few cases, some GACC's implemented the concept of a local Decision Support Center to fill the same objectives of the Fire Behavior Service Centers and publishing WFDSS decisions.

Early Program Development

The initial Predictive Services Program development plan had a goal to have dedicated teams focused on fire weather, fire danger and resources available in each GACC, including NICC. The final National Fire Plan decision was to have twenty fire weather meteorologists hired to form Predictive Service units at NICC and all GACC's. These positions and existing intelligence staff would work under a common mission to integrate fire weather and climatology into forward-looking products and services for wildland fire managers and firefighters. For whatever reasons, fire analyst skills were not well defined originally and it was thought these positions could be detailed as needed. NICC was the only coordination center to initially hire a wildland fire analyst position.

The program was designed to serve the entire wildland fire organization evenly. GACC Predictive Services units were planned to meet local and area needs as well as to provide support for national products and services. The NICC program was planned to oversee the entire program, identify needs and requirements, manage national products, and provide support to GACC units.

Activities that have taken place during the first 17 years of this program include initial establishment, creation of a interagency oversight group, completion of program surveys for assessment of effectiveness, development of a national handbook, and numerous papers and memorandums regarding program status. A summary of development and administrative activities is shown in Table 1.

Table 1. Wildland Fire Predictive Services Program development and administrative activities, 2000 - 2017.

Date	Activity	Objective
2000	Created as a national program under National Fire Plan activities.	To create a program to ensure that climate, weather, fuels, fire danger, situational and resource information was available to fire management decision makers and that this information was integrated into short and long range decision support products and services to provide for safe,

		cost-effective, and efficient fire management.
2002	National Predictive Services Group formed and chartered under GA and NICC Managers to provide Predictive Services (PS) program oversight, leadership, and direction.	To provide oversight and guidance for all components of the predictive services program.
2004	National Predictive Services Group (NPSG) conducted program survey.	Determine key accomplishments, successes, and obstacles within PS program – improve efficiency.
2005	Draft White Paper to document and communicate state of PS program.	Provide updated information on program direction and needs. Identified the issue of predictive services lacking appropriate national oversight and leadership to successfully meet the mission and objectives.
2005	NPSG re-chartered by National Fire and Aviation Executive Board (NFAEB).	Administrative realignment.
2005	Annual Predictive Services Meeting recommendation to develop national guidelines for PS program in the form of a national handbook.	Develop a National Predictive Services Handbook that defines Predictive Services program operating standards.
2006	More in-depth survey conducted.	Continue assessment of accomplishments, successes, and obstacles within PS program – improve efficiency.
2007	Draft Memo from NFAEB to Fire Management.	Clarify agency direction with regard to predictive services. This memo reinforced that the concept behind the formation of predictive services was to blend intelligence, meteorological forecasting, and fire analyst capabilities into a cohesive national program. Listed necessary agency support and basic operating procedures. (Unsigned copy available)
2007	Final assessment report issues on NPSG survey.	Assess user needs.
2009	NPSG re-chartered and renamed as National Predictive Services Subcommittee (NPSS)	Administrative process.
2009	National PS Handbook completed and signed by National Wildfire Coordinating Group (NWCG).	Guidance and direction document for the National and Geographic level predictive services program finalized per the 2005 recommendation.
2009	NPSS moved under the NWCG Fire Environment Committee (FENC)	Administrative process – effort to gain better oversight and interagency coordination.
2011	2011 Predictive Services program meeting – Discussed the “Functional Area Transition” proposal to shift PS from having MET and Intel groups to a program with functional areas of Operations and Training, Outreach and Training, and Research and Development. This proposal was voted down but the group.	Seemingly the last universal effort to seek solid governance for the PS program.
2014	Memo (Chair NMAC) – communicating predictive service requirements to GACG Chairs.	Clarify GA PS roles and national needs.

2014	NPSS diminished in role from functioning committee to one-person involvement.	Reduction in participation. No clear role and function.
2015	Briefing Paper from PS National Program Manager for Fire Management Board.	Transmit organizational issues affecting PS.
2015	Briefing paper from PS National Program Manager for National Coordination System Committee Meeting.	Transmit review of organizational issues affecting PS's meteorological unit.
2016	Memo from PS National Program Manager to NMAC.	Clarify status of PS program.
2017	Interagency program review completed	Review program status and evaluate efficiency.

From the onset of the program, it was intended to serve customers at all levels of wildland fire management – local, area, and national managers and firefighters.

While the mission of the program has been presented in slightly different versions over the years, the commonality is that the principal focus of this program is: to support the wildland fire community with decision support information that integrates climate, weather, fuels, fire danger, situational and resource information into short- and long-term products and services to anticipate critical fire events and provide for safe, cost-effective, and efficient fire management activities.

2017 National Program Review

During the time that the Wildland Fire Predictive Services Program has been in place, a national fire policy review and update and a National Cohesive Wildland Fire Management Strategy have been completed. Current program status has evolved over this 17-year period and there are concerns about how well it is fully reflecting the latest guidance, program alternatives, and strategic planning for the future. Program oversight has been reduced over this time period and no program reviews or evaluations have taken place during the last 10 years.

Program reviews are appropriate to evaluate program structure, mission, capability, status, alternatives, and future needs and capability situation. Reviews can define the current state of the program in terms of status, efficiency, and operational activities. Reviews also provide a basis for making strategic decisions on short- and long-term programmatic options.

Because of the duration since the Wildland Fire Predictive Services Program was established, the completion of a fire policy review and long-term strategy, and evolving capabilities and needs, the Fire Management Board (FMB) decided to conduct a program review of the current Wildland Fire Predictive Services Program.

FMB Tasking Memorandum (FMB Tasking Memorandum No. 16-001) established a multi-level (National, Geographic, Local level) task team to conduct an interagency program review to measure the effectiveness of the current Wildland Fire Predictive Services Program to meet the changing business requirements of wildland fire management.

Review Objectives:

The objectives for the 2017 review are to:

- Measure the effectiveness of the current Wildland Fire Predictive Services Program to meet the changing business requirements of wildland fire management.
 - Review organizational structure, staffing levels, subject matter expertise, consistency throughout the program, predictive products and services and their relationship to needs and expectations of wildland fire management.
- Utilize an interagency review team consisting of members representing the FMB/NMAC/NWCG, 3rd tier dispatch organizations, Geographic Area Coordination Center levels, Geographic Area Coordinating Group levels, predictive services user groups, and line officer/decision makers.
- Provide a written report including all information collected, analysis process, assessment results, and findings and recommendations.

Review Format

The tasking for a program review originated in 2015 through FMB Tasking Memorandum No. 15-002. This memorandum stated that the review will use a phased approach and this format was reinforced in FMB Tasking Memorandum No. 16-001. Phase One would involve having the review team document the need and expectations for predictive service products and services at the local, geographic, and national levels. The full extent and need for Phase Two was believed to be dependent upon Phase One results. If needed, Phase Two would be used to develop recommendations for future staffing levels, program direction, services, and to assist the FMB in development of future governance direction. This report clarifies the background, program status, and state of the predictive services program. It provides explanations on what are the identified needs and expectations and how well the program is working to meet those needs and expectations.

Review Process

This review was conducted in accordance with the format described in the tasking memorandum and structured to address the full scope of the wildland fire predictive services program. It includes assessments of important program elements and those central considerations and issues that influence and drive the program. It has strategic and operational implications across local, regional, and national management scales; across the range of short-, intermediate, and long-term temporal scales; across unit, landscape, regional, and national level spatial scales, and is applicable to interagency activities.

The Wildland Fire Predictive Services Program Review involved multiple parts that include: information collection, information analysis, results of information collection and analysis, development of major issues, and report preparation.

Information Collection

All appropriate processes were used to identify, organize, coordinate, and collect information pertaining to the wildland fire predictive services program. Key contacts, stakeholders, and resources to inform review team needs were identified and venues to expedite information gathering were followed. Activities during this phase included web-based questionnaires, personal interviews, and background information review. Information sources and their relationship to support of the review objectives are shown in Table 2.

Table 2. Wildland Fire Predictive Services - information sources in support of objectives

Type of Information	Information Collection Options		
	Background Information Review	Personal Interviews	Questionnaires
Expectations: Assess expectations for predictive products and services at all levels.	X	X	X
Needs: Identify needs for predictive products and services at all levels.		X	X
Capability: Define capability to meet identified needs for predictive products and services at all levels.	X	X	X
Position Management: Review position management structure and associated administrative issues (staffing levels, staffing protocols, agency position sponsorship and hosting, career ladders, vacancy filling process, job sharing opportunities, remote location opportunities).	X	X	X
Program Management: Define program structure, oversight, and governance.	X	X	X
Future Management Alternatives: Identify possible alternatives for future staffing levels, protocols, locations, etc., for projected future needs.		X	X
Future Capability Alternatives: Identify possible alternatives for services, technology, research, etc., if any, for projected future needs.		X	X

Specific descriptions of information collection activities include:

- **Web-based questionnaires.** A web-based questionnaire was developed as a primary method to obtain feedback and input. The questionnaire was distributed in two versions - a federal employee-only and a non-federal individual adaptation. The questionnaires were developed and managed through the Survey Monkey commercial software program (www.surveymonkey.com). A link to the federal version was distributed electronically to email contact lists and by manual delivery. Distribution and management of the non-federal version was facilitated and supported through the National Association of State Foresters (NASF) and distributed through their email contact lists and by manual delivery.

Questions in the two versions of the survey differed only in federal/non-federal administrative requirements and encompassed five general areas. Information areas requested through the questionnaires are shown in Table 3.

Table 3. Survey questions by information type, use, and benefits.

Information (# questions)	Use	Benefits
Explanatory (Introduction to survey)	Provide respondent with an explanation of why survey is being conducted and what it will be used for.	Help explain purpose and need and generate interest to complete the survey.
User background (5)	Provide demographics on respondents.	Allow sorting capability to delineate range of respondent background and responsibilities. Help determine who predictive services customers are.
Program Importance (9)	Provide background on consistency; importance; products used, and additional products that may be needed.	Provide user input on current and future program importance. Allow sorting of perspectives on current predictive services program.
Needs and Products (2)	Provide information on program needs, expectations and barriers to use.	Gain information on program expectations and needs. Allow sorting of perspectives on ability to meet user needs.
Program management (8)	Provide information on program structure, position management, and program capabilities.	Allow sorting of perspectives on the influence of program structure, position management, and program capabilities on program efficiency and areas to improve.

Both surveys were web-accessible and available for response from their initiation until January 10, 2017.

- **Personal interviews.** Personal interviews with researchers; predictive services subject matter experts, planning and operational practitioners; local, area, and national decision-makers; university staff; and other stakeholders were completed. Individuals from the following groups, organizations, agencies, committees, etc. were interviewed:
 - All Federal wildland fire management agencies
 - State fire management agencies as appropriate
 - Tribal wildland fire management organizations as appropriate
 - NWCG Fire Environment Committee
 - National Interagency Coordination Center
 - Geographic Area Coordination Centers
 - Joint Fire Science Program
 - University forestry and natural management programs
 - Federal research labs
 - Non-governmental organizations
- **Past Reviews and Reports.** The following memorandums, handbooks, references guides, published articles, and reports were used to obtain information relevant to this review:
 - Zimmerman, G.T., M. Hilbruner, P. Werth, T. Sexton, and R. Bartlette. 2000. Long-range fire assessments: procedures, products, and applications. In: Proceedings: Third Symposium of Fire

- and Forest Meteorology, 80th American Meteorological Society Meeting, American Meteorological Society, Boston, MA.
 - 2005. **Draft White Paper – Predictive services: direction and management.** National Predictive Services Group.
 - 2005. **NPSG White Paper and Staffing/Funding Issues.** National Predictive Services Group.
 - 2007. Memorandum – Agency direction with regards to predictive services. From National Fire and Aviation Executive Board to Fire Management.
 - 2009. Patricia L. Winter and Thomas A. Wordell. **An Evaluation of the Predictive Services Program.** Fire Management Today. 69:(4) 27-31.
 - 2009. **National Predictive Services Handbook.** NWCG.
 - 2012. Owen, Gigi, J.D. McLeod, C. Kolden, D. B. Ferguson, and T.J. Brown. **Wildfire management and forecasting potential: the roles of climate information and social networks in the Southwest United States.** Weather, climate, and Society. 4:90-102. American Meteorological Society.
 - 2014. **Memorandum – Predictive services requirements.** From NMAC to Geographic Area Coordination Group Chairs.
 - 2014. **PowerPoint presentation – Predictive Services: Background, National Expectations, and Current Projects.** National Coordination System Committee Meeting.
 - 2014. **Memorandum – Information Technology business requirement for predictive services.** From National Predictive Services Program Manager to USFS AD for Fire Operations.
 - 2015. **Briefing Paper for Fire Management Board – Organizational issues affecting predictive services.**
 - 2015. **Briefing Paper for National Coordination System Committee Meeting – Review of organizational issues affecting predictive services’ meteorological unit.**
 - 2016. **Memorandum – Status of predictive services program.** From National Predictive Services Program Manager to National Multi-Agency Coordinating Group (NMAC).
 - National Predictive Services Strategic Plan.
 - 2016. Rolinski, T., S. Capps, R. Fovell, Y. Cao, B. D'Agostino, and S. Vanderburg, 2016: **The Santa Ana Wildfire Threat Index: Methodology and Operational Implementation. Weather Forecasting.** doi:10.1175/WAF-D-15-0141.1, in press.
 - 2016. Garfin, Gregg, Timothy J. Brown, Tom Wordell, and Ed Delgado. **The making of national seasonal wildfire outlooks.** Chapter 7, p 143 – 171. (in): Climate in context: Science and Society Partnering for Adaptation, First Edition. (Ed): Parris, Adam, Gregg Garfin, Kristin Dow, Ryan Meyer, and Sarah Close. John Wiley & Sons, Ltd.
 - 2016. Tithcott, Al. **Canadian wildland fire preparedness and response plan.** Canadian Council of Forest Ministries, Wildland Fire Management Working Group. PowerPoint Presentation at Wildfire Canada Conference.
- **Attendance at meetings and conferences.** Relevant regional, national, and international conferences and other meetings were attended as an additional means for gathering information. The following conferences and meetings were used for this purpose:
 - Fire Environment Committee Meeting 2016
 - 2nd International Smoke Symposium 2016
 - Wildfire Canada 2016
 - National Predictive Services Meeting 2016
 - NMAC/GMAC Meeting 2017
 - International Congress on Prescribed Fire 2017
 - National Cohesive Wildland Fire Management Strategy Workshop 2017

Information Analysis

Analysis of the collected information helped define the state of the current wildland fire predictive service program, the use of program services and products by managers, and future importance and needs. Questionnaires contained both closed and open-ended questions. All questions were viewed in terms of answer summaries, response trends in both data and chart formats, and were filtered and compared as needed. Questionnaire information was used to define program importance, program management efficiency, needs and products, and future focus areas.

Personal interview information was used to validate survey trends and to obtain specific additional input. Background information was reviewed to determine how the program was established, what its original mission and responsibilities were, and initial program management and structure situations. Meeting and conference attendance served as an opportunity to gather additional specific information, personal experience, and singular perspectives from individuals, and solicit feedback on the review process.

All acquired information was compiled into a master dataset and then segregated into specific information sets pertaining to program elements and drivers (see the next section for more information). Quantifiable data were built into graphic presentations and are included as appropriate throughout this report.

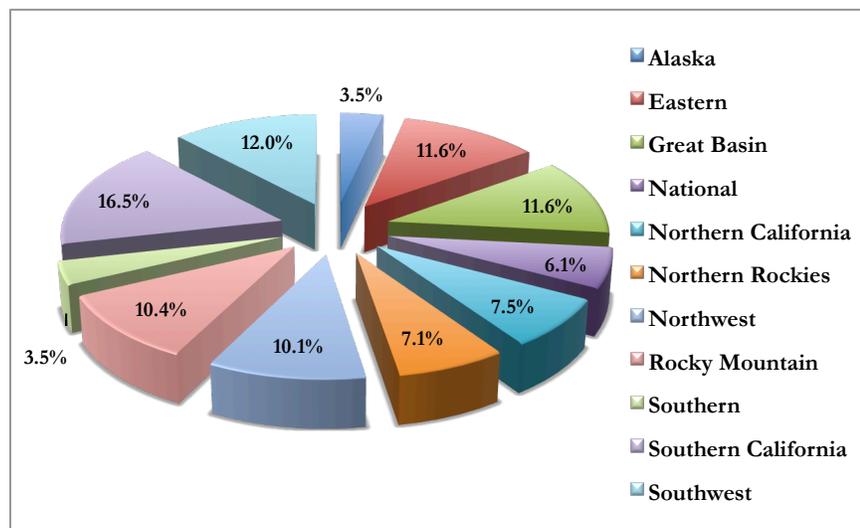
Predictive Services Program Status

Survey and Interview Demographics

The two questionnaires produced 429 total responses from users across the United States and from a wide range of positions and involvement with the Predictive Services Program (375 from the federal version and 54 from the non-federal version). Sixty-one individual interviews were completed. When combined with survey responses, 490 individual contacts were conducted through surveys and interviews.

All Geographic Areas (GA) were represented with fairly uniform responses across all areas. A breakdown of responses by GA is shown in Figure 1.

Figure 1. Total survey response by Geographic Area – legend values start with Alaska at 3.5% at the top of the chart, then GA's progress down the legend and their corresponding values progress around the pie chart in a clockwise direction.



Individuals from a wide range of agencies and organizations responded to the surveys. Response levels for all agencies that had at least one response are shown in Figure 2.

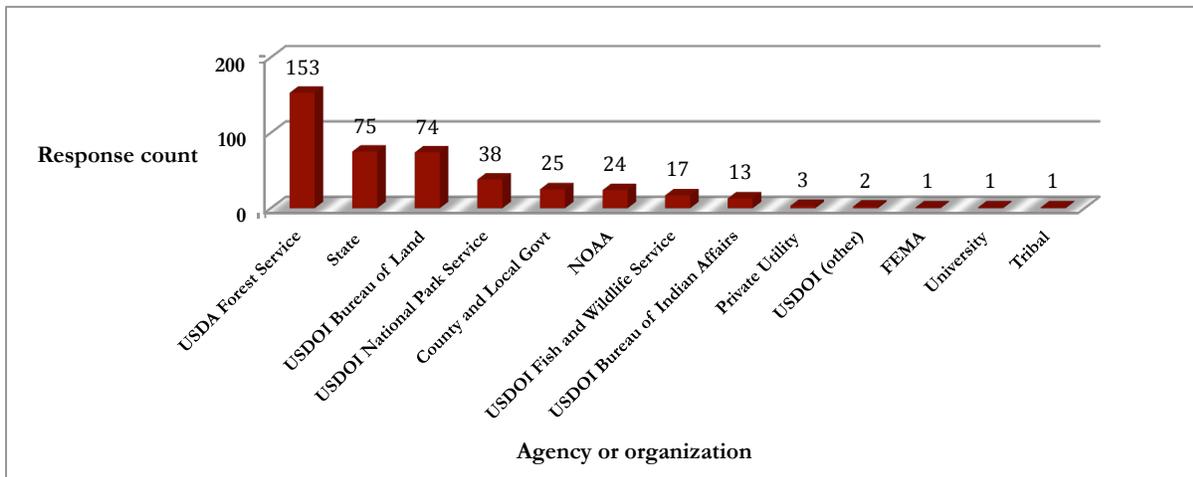


Figure 2. Agencies and organizations represented by survey response and proportion of each group.

A fairly comprehensive range of customer involvement with predictive services was obtained through the surveys and interviews. The majority of individuals responding to the surveys stated that their primary involvement with predictive services was in operational response planning and implementation. Local level decision-makers were the next highest represented group. The full breakdown of respondent function and involvement with predictive services is shown in Figure 3.

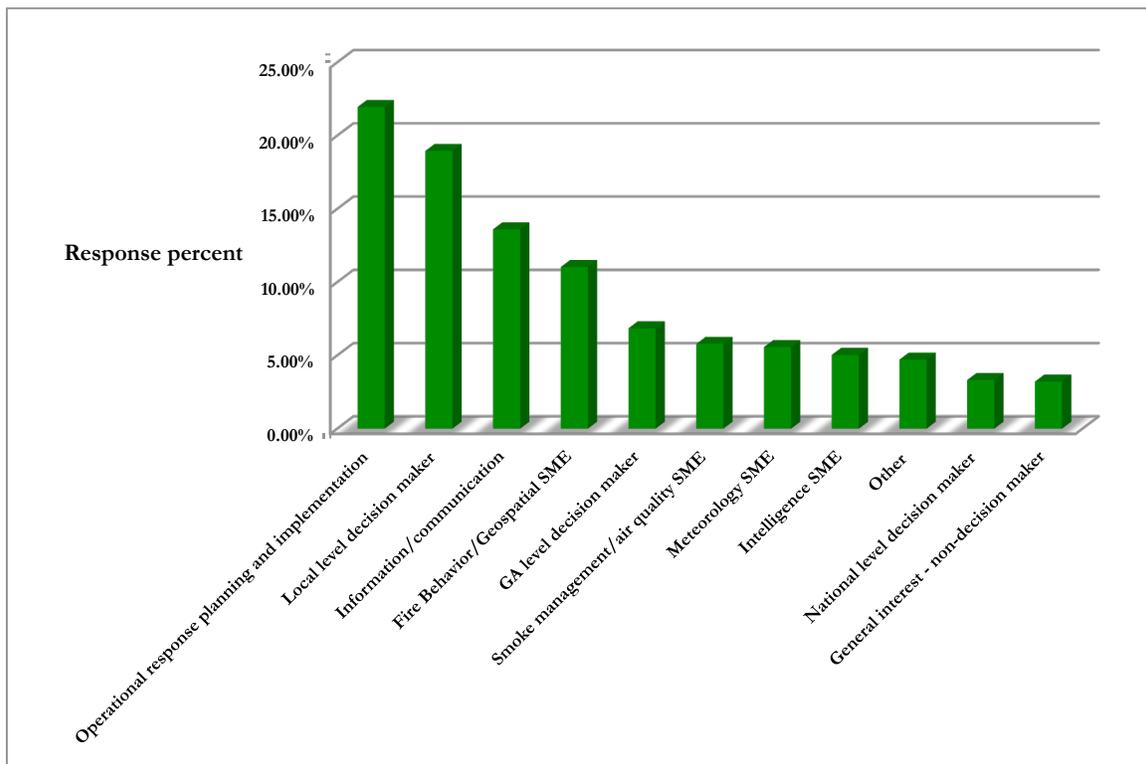


Figure 3. Survey respondent involvement with predictive services.

Familiarity and involvement with predictive service products and services were assessed. Respondents were asked if they have been involved with or used predictive services in more than one geographic area. Nearly 80% of all respondents replied they have used or been involved with predictive services in more than one geographic area. This provided reference for assessing consistency among geographic area products and services.

Accomplishment and Achievements

In the nearly 17 years since its inception, Predictive Services has worked hard to achieve its original mission and set a standard for providing decision support information for the wildland fire management community. Interviewees described this program as having a very important mission, being widely used, and being a driving force in decision-making. The program is well accepted, provides some outstanding services and products, and supports a wide variety of individuals, as indicated in Figure 3. Gaps do exist which are limiting the effectiveness of the program to be of maximum usefulness to the wildland fire community.

Strengths include a next level knowledge of fire weather and other environmental factors that help paint a big picture for fire managers. Innovation and creativity are clearly evident and have aided in development of two national products: the 7-day Significant Fire Potential Outlook and the National Significant Wildland Fire Potential Outlook. However, the development of the 7-day product is one example of a gap. In developing this product without collaborating with program managers and other NWCG groups, inconsistency in its implementation across the country is occurring.

The overall achievements have been characterized as good, especially in light of being established as a national program but having to tailor activities to Geographic Areas. A large number of comments reflected that the program has evolved with changing situations over the years, that it does not need to change, but needs to continue to evolve. One comment specifically stated that the loss of Predictive Services would be very serious and irreplaceable to the fire community.

Another common thread to comments received was a general feeling that a program review is timely and will help to promote improved efficiency.

Program Importance and Customer Use

The importance of the Predictive Services program mission is very clear. This program provides high value to the wildland fire management decision process. It generates objective information from a sound basis and gives up to date information on fire situations, including weather, fuels, fuel moisture content, fire behavior, resource availability, and facilitates the most efficient use of resources in light of current and expected conditions. Program staff provide training, outreach, education, support to research, and consolidate weather information to support development of standards and procedures, although in some cases consistency of products is not standardized across GA's. Figure 4 shows a comprehensive description of areas of potential involvement and influence by Predictive Services program activities. It is a complete representation of all areas encompassed by the program mission statement, reference materials, and personal information. However, this does not indicate that Predictive Services program has the skills, ability, or capacity to implement. It merely represents a comprehensive illustration of all areas that are described in mission statements and being addressed to varying degrees by Predictive Services units around the country

Wildland Fire Predictive Services Program Functional Linkages

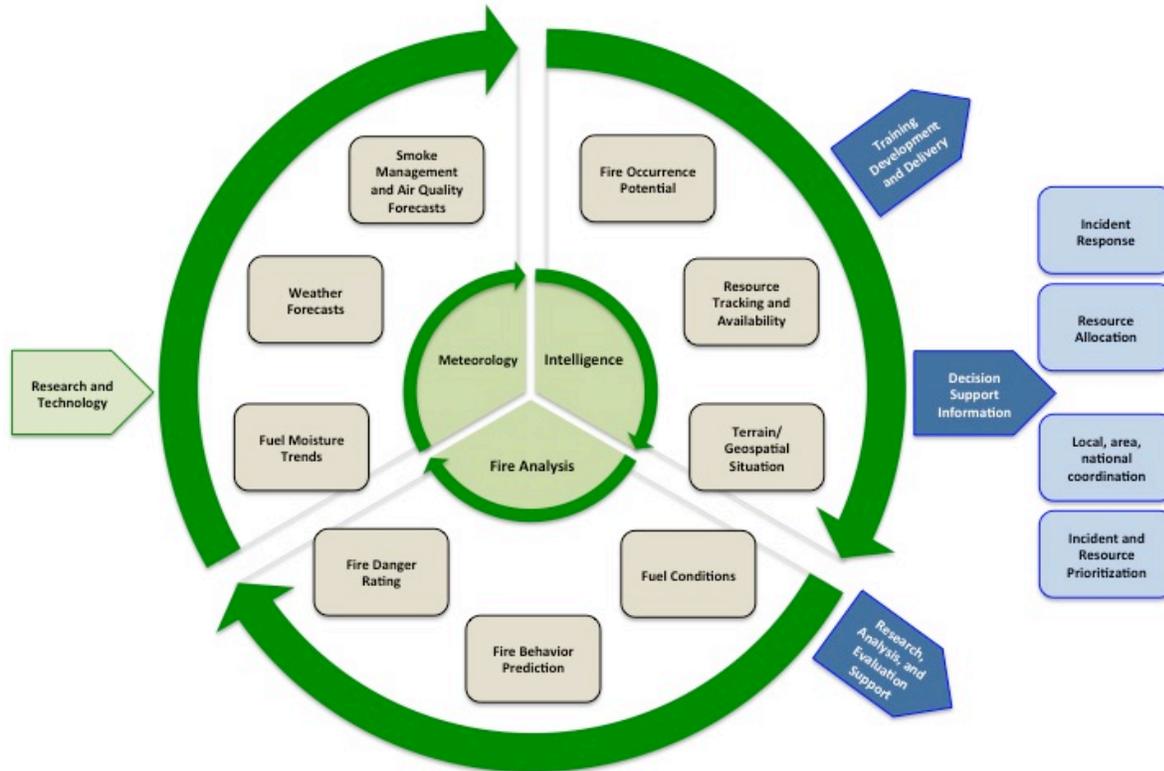
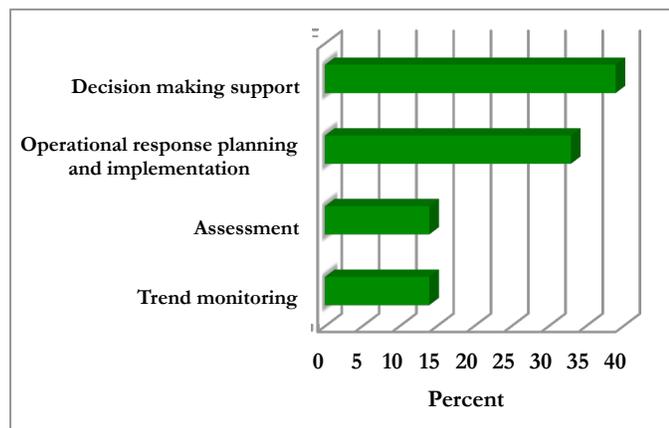


Figure 4. Wildland fire predictive services program functional linkages.

When queried about the importance of this program, 98 per cent of survey respondents and 100 per cent of interviewed individuals replied that the program is important to the fire management program and their needs. When asked if they thought that predictive services are adequately meeting their needs, 68 per cent responded positively while 32 per cent stated that they did not believe their needs were being met.

Primary areas where predictive services provide value include: decision-making support, operational response planning and implementation, assessment, and trend monitoring. Customers clearly feel that decision-making support is where predictive services program services and products have the highest value, followed by operational response planning and implementation, assessment, and trend monitoring (Figure 5).

Figure 5. Primary reasons predictive services program products and capabilities are important – – higher percentages of responses signify higher importance.



In terms of how supportive and important the program is at various spatial scales, the Geographic Area level received the highest rating, followed by the local level (Figure 6).

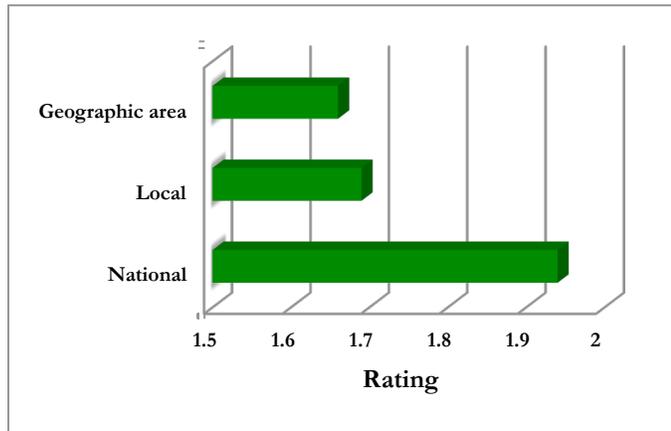


Figure 6. Relative importance of predictive services products and capabilities to fire program needs at national, area, and local spatial scales (lower ratings indicate higher importance).

Customer satisfaction is affected very little by barriers to use of services and products. Over 50 per cent of respondents stated that there are no barriers to their use of services and products. Of nine categories listed as potential barriers, only two had more than 10 per cent responses and six were less than 5 per cent.

Program Structure

Program structure was assessed to gain information on how efficiently predictive services is structured. The following areas were used to characterize program structure:

- Organization - type of program such as national, area, local, centralized, decentralized;
- Agency position sponsorship - predictive services FTE's are hosted by all wildland fire management agencies;
- Governance - no central oversight and governance from a single agency or a national entity;
- Supervision - supervisory controls, supervision by unit manager, position hosting individual, or other;
- Unit location - are PS staff located in appropriate locations;
- Organizational affiliation - are PS units assigned to dispatch, logistics, operations, or other organizational areas;
- Roles and responsibilities - do PS staff share, duplicate, or transfer roles and responsibilities to regular agency staff)

When asked if the current program structure of the predictive services program is clearly defined and supporting the most efficient program, quite different responses were received from the federal and non-federal responses. First, in both surveys a large number of responses indicated that they were not able to answer this question (39% - non-federal; 42% - federal). This is valid because a number of the customers do not have full awareness of the components of program structure and should not have to be directed into a yes or no answer. So, these responses were filtered out of the dataset. The resulting data show that the federal responses indicated 49 per cent of individuals think that the program structure is clearly defined and supporting the most efficient program while 51 per cent think it is not. The non-federal survey data show that 71 per cent of responses think that the program is structured adequately and efficiently while only 29 per cent stated that it is not. Certainly the majority of responses were captured through the federal survey but respondents to both surveys use the same services and products so the disparity between them is difficult to explain. But basically this indicates that only slightly more federal responders feel program structure is not aiding efficiency while the majority of non-federal responders feel program structure is contributing to the most efficient program. **An important point here is that while the survey percentages may indicate that the program structure is supporting current needs, the hundreds of**

comments received through interviews do not agree with this. The bulk of interview comments raised issues of inefficiency in program management.

In terms of what individual program structure components are most important to supporting program objectives, organization and predictive services roles and responsibilities were the most important while supervision and agency position sponsorship were indicated to be the least important (Figure 7).

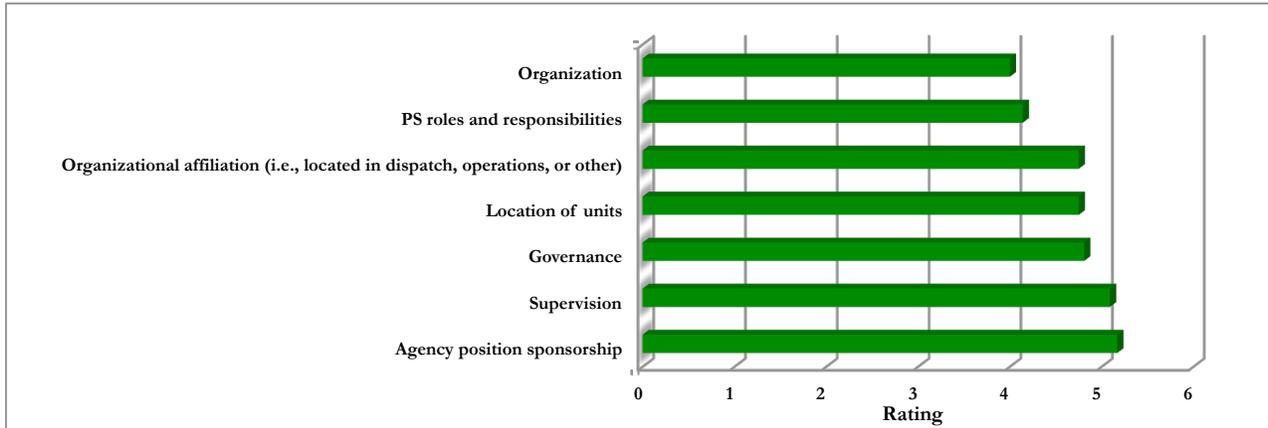


Figure 7. Most important program structure elements in support of program objectives – lowest rating values indicate higher importance.

Specific comments received from interviews that relate to efficiency for each of these areas are summarized below. These comments are not meant as negative summaries but feedback received that signifies current situations.

- **Organization:** The Predictive Services program has, during its 17-year existence, changed little from its original organization. There is not clear understanding of exactly who the primary customers, are although we received considerable feedback on who those customers should be.

No formal charter exists and there is no collective vision or mission. One comment stated that Predictive Services has lost sight of its programmatic purpose. There is no oversight group and common direction is lacking. Oversight from a national entity is lacking and units are left to gain oversight at local levels. This has led to levels of independent development and a lack of consistency across Geographic Areas. Also, subject matter expertise and oversight is lacking at some GACC’s adding confusion and allowing too much leeway to freelance priorities and products.

- **Funding:** Lack of a national oversight group prevents formal national funding. As a result, program funding is not represented as a national line item and is not derived from national decisions. It is not clear who is responsible for funding at national and regional levels. Positions are split among federal agencies, which can cause an imbalance in support from different agencies. This is a large program; potentially a multi-million dollar program that is limited by funding and is supported by an improvised funding mechanism lacking consistency, developed and implemented in Geographic Areas, conducted on a year-by-year basis. Thus, it lacks strategic planning capability, and directly affects staffing, technology and equipment support, travel and training capability, product development and delivery, consistency in services and products across GA’s, as well as others.
- **Agency position sponsorship:** Predictive Services positions were agreed upon in 2000 as part of the program establishment. Different individual agencies host FTE’s within each GA. Issues with agency

FTE management have been identified. There are no standard position descriptions for positions across agencies. Each agency manages their positions differently in terms of filling positions, vacancy procedures, position descriptions, position numbers, grade levels, and oversight. Each controls their positions and varies in commitment to local use and national support. Successional planning is not consistent which is problematic for long-term operation. Filling of vacant positions is managed by individual agencies independently and decisions are made to not fill or delay filling positions for cost savings purposes; ramifications of this to program capability and efficiency are obvious and negative.

- **Governance:** Oversight by a central entity establishes consistency, provides leadership, and maintains common direction. The Predictive Services program does not have defined central governance. It functions as a national program only in name and has no accepted and supported national leadership. During the last 17 years, it had a central oversight group that provided a basis for standards and consistency but not well accepted and lacked the ability to directly oversee the full program. Eventually this oversight group dissolved or became inactive.

This has strongly contributed to a lack of standardization and consistency, lack of central governance, no central lead for a national and interagency program, inability to effect coordinated change or growth, and has forced development of oversight at local levels.

- **Supervision:** Supervision of Predictive Services personal varies across GA's. Generally, all personnel are positioned in a Geographic Area Coordination Center (GACC) and supervised by a Center Manager. Within GA's, there are no consistent lines of supervision within the Predictive Services units. This complicates who supervises individuals, communication across GA's, response to national needs, and national issue resolution. Some supervisors indicated that they do not directly oversee operations but merely take what is provided and assume that information is sufficient – there is little understanding of the scope and capability of the program and no impetus to develop.
- **Unit location:** Unit location refers to where Predictive Services units are geographically located. While this area received moderate importance in the surveys, there were few comments received from interviews. This seems to indicate that since this is a program providing support to local level operations, that location of units in GA's as well as in NICC is appropriate and current locations are meeting needs.
- **Organizational affiliation:** Currently, Predictive Services is assigned to GACC's. Across the GACC's, how they are situated is not necessarily identical. They can include all or parts of Intelligence, Weather, and Fire Analysis capabilities (Figure 4). There are disconnected links among these areas and a lack of understanding of how they should interact and collectively support customer needs. Mixed thoughts regarding how Predictive Services should be situated were received with no clear answers. The program description ranged from being a functional bridge between the fire and weather community to being a "bastard child." Visibly, where and what Predictive Services should be is not clear and well understood. It needs to be defined in context of how it operates and supports the wildland fire management program. Clear definitions of intelligence, weather services, decision support, coordination, and fire analysis are needed.
- **Program Naming or Labeling:** Numerous comments were received regarding the labeling of the program. Many indicated that since support to decision-making is of primary importance, perhaps a name change to reflect decision support and more than just predictive information would be appropriate. Greater inclusion of identification and support to risk management was suggested as having value. Suggestions for re-labeling included names such as: Decision Support Group, Fire Environment Decision Support Program, Risk Management Service Center, and Fire Environment Service Centers.

It is important to note that, while numerous comments suggested re-labeling, some suggested the

opposite. It was stated that while decision support is what they do, predictive services is a synonym for that and rebranding will not bridge the chasm that currently exists in the program, it may make it worse.

- **Roles and Responsibilities:** Over the time of its existence, Predictive Services has worked in the functional areas of products and services, research and development, and education and outreach. Initially, Predictive Services filled gaps that the NWS could or would not fill. The program focused primarily in the products and services area with attention to weather and intelligence. Over time, more attention has been given to the fire analysis area, but a significant gap in subject matter expertise still exists in this area. This area has been referenced as a crucial cog in interpreting and communicating fire and situational information. Many GACC's are making do with current staff, some others make use of agency central office (Regional, State, Area offices) fuels specialists, fire planners, and operations specialists, as subject matter experts in fuels, fire danger, and fire behavior subject areas. When this is done, support is needed from PS staff but no clear connection exists and activities appear improvised and reactive.

Specific roles have evolved over this time and different roles and responsibilities have grown out of GA program management. There have been independent developments in GACC programs, which have more or less evolved into separate programs. There is agreement that the fire analysis continues to need more attention and definition. Predictive Services needs to have a clearly defined role within wildland fire management, clarity on services and products needed for support to decision-making, and how it can continue to better support this need in the future.

Outreach and education have always been limited and seemingly, a lower priority. Programmatic outreach is minimal. There appears to be no organized effort to promote Predictive Services products and services to the field. This can constrain work with primary customers that could be valuable to help define needs. Conversely, there are few opportunities and funding for Predictive Services staff to continue their own education through training and conference and workshop attendance.

Position Management

Position Management was evaluated in terms of the following elements:

- Staffing levels;
- Staffing protocols;
- Agency position sponsorship - different agencies hosting FTE's;
- Career ladders - do career ladder opportunities exist for PS staff;
- Vacancy filling processes and timelines - are PS vacancies given priority, are they filled in timely manners, do hosting agencies communicate vacancies to fire director levels;
- Assigned collateral duties;
- Job sharing opportunities - can these types of opportunities exist;
- Remote location opportunities - can these types of opportunities exist?

When asked if the current predictive services program position management protocols help frame and support an efficient program, a slight majority (52%) responded that they feel the protocols help frame a viable program. In terms of ranking the level of importance of the elements, staffing levels and staffing protocols were the most important with job sharing and virtual location opportunities receiving the lowest importance (Figure 8).

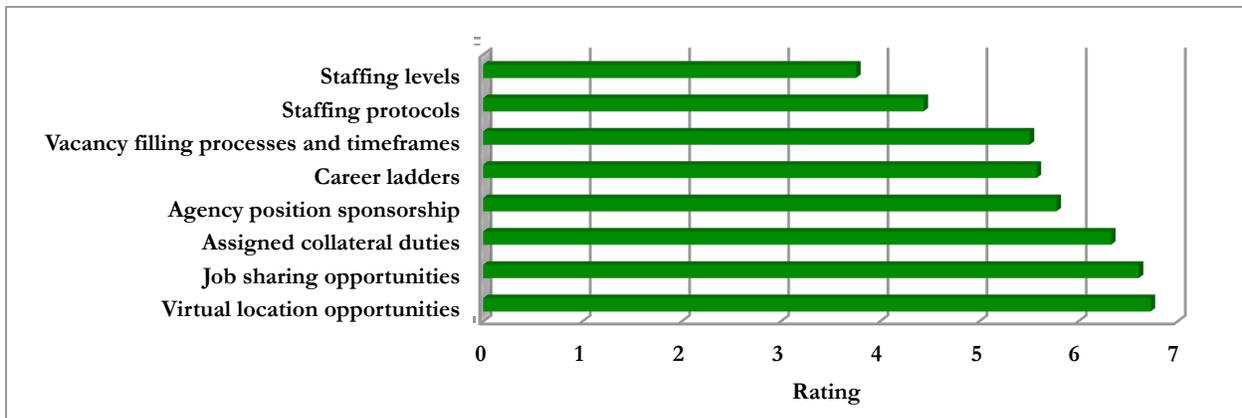


Figure 8. Importance of position management protocols in supporting an efficient program – lower ratings indicate greater importance.

In general, interview responses indicate the belief that the current agency position sponsorship situation is clearly not in support of a highly efficient program. Predictive Service units vary in levels of staffing with some GACC’s struggling to support field operations and national demands. Originally 24 meteorologist positions were identified to be divided among 11 GACC’s (at that time, now 10) and NIFC. Currently, three of those positions no longer exist, several others are vacant, and some have been converted to other duties. In some GACC’s, FTE hosting agencies and local management decided not to fill or to delay filling vacant positions. Current staffing levels can be considered to range from minimally adequate to inadequate. What this means is that in terms of fire weather and intelligence needs, staffing is probably adequate or close to what is needed. When viewing PS in terms of weather, fire danger, fuels, and fire behavior, where current staffing includes central office staff to complement PS staff, the needs are being met but in terms of PS staff only, staffing levels are obviously inadequate due to the lack of dedicated staff positions with this expertise.

Position management varies across hosting agencies and uniform staffing protocols do not exist. Each agency manages their positions differently. Each controls its own positions, writes and maintains position descriptions and grade levels, makes individual decisions on filing vacancies, determines levels of support, and what collateral duties might be assigned. Position descriptions are not consistent for all positions and may not reflect current roles and responsibilities. Assigned collateral duties by hosting agencies affects support for predictive services and program capability.

Many comments do not support multiple agencies hosting Predictive Services positions and multiple comments were received stating that all Predictive Services positions should be hosted by a single agency nationwide in the future.

Career ladders for Meteorologists and the ability to bring in entry-level staff in this area do not exist. Job sharing opportunities do not appear to have been examined in detail. Several examples of this do exist and appear to function efficiently although this was an area not responded to be have a very high level of importance. Virtual location opportunities examples exist in several GACC’s. Reports indicate that some work smoothly and effectively while others feel that this does not support the most effective operation. This was also an area of low importance.

Comments were received stating that the importance of fire analyst positions is growing rapidly. This is not an area that received attention in the initial program planning. However, the need to focus on fire behavior, fuels, fuel moisture, and fire danger at the GACC’s is very evident. Work going on in this area is disparate among the GACC’s and the ability to analyze fuels, fire danger indices and fire behavior consistency affects quality and accuracy. In some areas, these duties have been assigned to meteorologists or intelligence officers, but they often

suffer from a lack of prerequisite experience, knowledge, and training. In some areas, detail positions are assigned to complete this work but fire analysis information is most needed during active fire periods when fire analysts are in short supply.

Comments received in regard to whether the most appropriate configuration of meteorologists, intelligence specialists, and fire analysts indicate that this configuration should be re-evaluated in light of changing needs.

Program Capabilities

Program capabilities were viewed in terms of staff skills and knowledge, technology, and information analysis and management. These three areas are very interrelated and interdependent. Responses indicate that staff skills and knowledge are viewed as the most important category and technology as the least important. However, it was widely reported that data quality, IT support, product integration, and accessibility requirements must be recognized and elevated in support. Information technology was stated as a big impediment to efficiency. Little or no support for technological needs of the program exists which constrains the ability to develop consistent operations and improve customer support.

Budgets are highly influential in obtaining and maintaining technological support. The lack of a national dedicated budget has been addressed earlier and has wide-ranging meaningful impacts. In some areas, the agencies hosting the positions do not provide funding support for computer hardware and software outside of the minimum as the positions are viewed as not contributing significantly to that agency's needs in that area.

Capability to provide backup to other GACC staff appears to be nonexistent or very intermittent and infrequent at best. Establishing an internal backup plan for specific use of meteorologists to assist neighboring offices has not been supported or endorsed.

Continuing education opportunities for staff has already discussed and limits professional growth potential.

Future Focus Areas

When asked if additional products and services are needed, 84 per cent of the respondents said yes, additional products and services are needed. When asked to indicate what products and services are needed, respondents designated the greater integration of all fire environment attributes into a decision support system as the highest ranked category (Figure 9). Decision support information can include elements of each additional topic included in this graph so it is actually an aggregate of all of the listed additional topics. Better clarification of what exactly decision support means and what decisions need support should be developed and used consistently by predictive services.

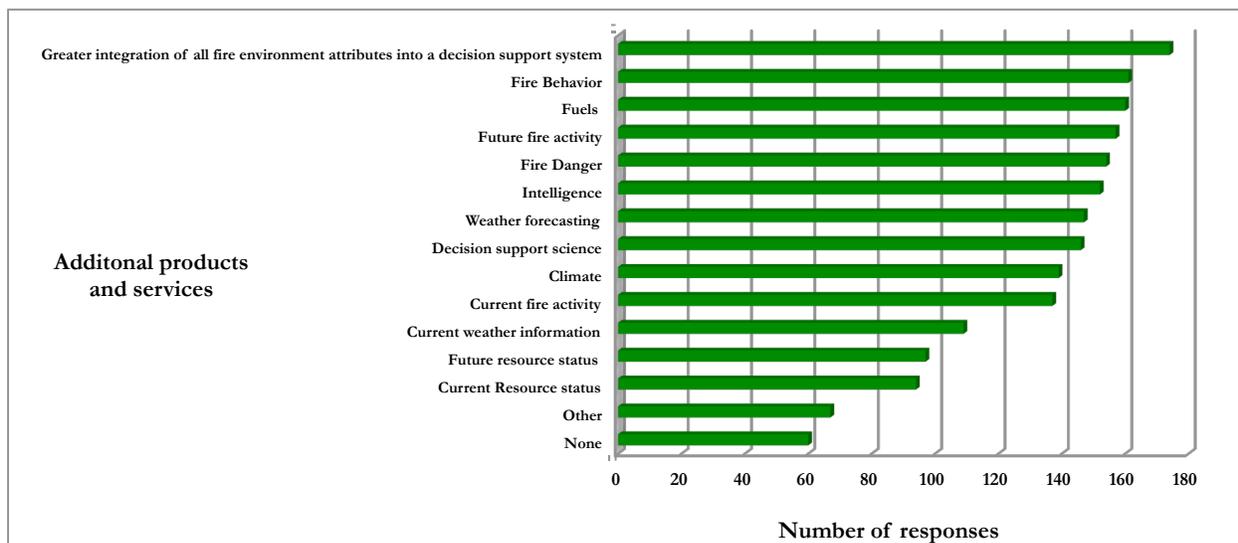


Figure 9. Additional products and service needs identified by survey respondents – higher levels of responses were used to signify higher importance.

Specific comments received include:

- Research:** More research is needed and the role for more research should be endorsed and promoted. Research should be viewed as an objective outsider that provides unbiased program support and facilitates capability expansion. Predictive Services staff are not researchers and should not actively be engaged in research. However, they have the best ability to identify program area research needs, to work closely with researchers, and to interpret and apply research results. Their specific role and value in research should be clarified, realized, and embraced.

Science is a common data source that can facilitate consistency in data, processes, and outputs. Considerable support exists for continued research and the use of science – the Federal fire policy and National Cohesive Strategy support the use of best available information, promote the incorporation of science, and advocate leveraging science to expand fire management capabilities. Both Predictive Services and research units should evaluate specific areas for future research on a continual basis. Innovation, creativity, and expansion of capabilities must be encouraged. Some locally important products have been developed that would not have been possible without creativity and flexibility. A notable example is the Santa Ana Wildfire Threat Index developed in southern California (Rolinski and others 2016).

- Technology:** As science expands, Predictive Services will need to discover the utility in new technology and apply the most appropriate, guide science application, compete technology transfer, and provide interpretation for new information and processes. Predictive Services staff need to support science and technology development by serving as a data source, providing support for the focus of efforts, and being the bridge between research and technology development and spatially operational services and products.
- International Coordination:** Comments were received in regard to the need for international contacts, research, and coordination of services and products with Canada and Mexico. Coordination of weather, fuel moisture, and short- and long-term trend information could be helpful in development of predictive services products.

Summary

The Wildland Fire Predictive Services Program is critical to the success of wildland fire management. While it has developed a firm customer base, useful products and services, and demonstrated a clear value, its functioning and capability show opportunities for improvements.

This review was conducted in accordance with the FMB tasking memorandum and structured to address the full scope of the wildland fire predictive services program. It utilized an interagency review team and involved multiple parts including information collection, information analysis, discussion of information collection and analysis, development of major issues, and report preparation. It includes assessments of important program elements and those central considerations and issues that influence and drive the program. It evaluated the effectiveness of the current program in meeting the changing business requirements of wildland fire management.

This report represents written documentation of the review and includes all information collected, analysis process, assessment results, offers detailed information about each of these program areas, and identifies those gaps or areas where improvements can lead to better defined and stable operations and improved efficiency.

References

- Allen, T., T. Zimmerman, J. Douglas, M.A. Benscoter, R.C. Joslin, M. Edrington, J. Cruz, E. Petrick, M. Barry, and R. Ochoa. 1994. Report of the Interagency Management Review Team - South Canyon Fire. On file at USDI, Washington, D.C., USDA Forest Service, Washington, D.C., and National Interagency Fire Center, Boise, Idaho. 84 p.
- C. L. Bushey and R. W. Mutch. 1990. Fire Behavior Service Center for extreme wildfire activity. *Fire Management Notes* 51(4): 34-42.
- Zimmerman, G.T., M. Hilbruner, P. Werth, T. Sexton, and R. Bartlette. 2000. Long-range fire assessments: procedures, products, and applications. In: *Proceedings: Third Symposium of Fire and Forest Meteorology*, 80th American Meteorological Society Meeting. American Meteorological Society, Boston, MA.
2016. Rolinski, T., S. Capps, R. Fovell, Y. Cao, B. D'Agostino, and S. Vanderburg, 2016: The Santa Ana Wildfire Threat Index: Methodology and Operational Implementation. *Weather and Forecasting* (31):1881-1897. DOI:10.1175/WAF-D-15-0141.1.

Appendix

Appendix A. Review Team

Table A-1. Review team members, position, and representation levels.

Name	Position/agency	Representation
Tom Zimmerman	Contractor, USFS, NIFC	Team Leader
Aitor Bidaburu	Fire Program Specialist, US Fire Administration, NIFC	FMB, NMAC, NWCG
Kent Slaughter	Alaska Fire Service Manager, Alaska Fire Service, BLM	Geographic Area Coordinating Group
Dan O'Brien	Center Manager, Northwest Interagency Coordination Center, BLM	Geographic Area Coordination Center
Gary Murphy	Center Manager, Payette National Forest, USFS	3 rd Tier Dispatch level
Clint Cross	Regional Fuels Specialist, Southern Region, USFS (Now Fire Application Specialist, Fire and Aviation Management, Headquarters Office, USFS)	Predictive Services User Groups
Kevin Larkin	Deputy Forest Supervisor, Deschutes NF, USFS	Line Officer

Appendix B. Survey Questions

The Wildland Fire Predictive Services Program was formally established under the National Fire Plan following the 2000 fire season. The program has been in place for 16 years and during this time, a national fire policy review and update and the National Cohesive Wildland Fire Management Strategy have been completed. Current program status may not fully reflect the latest guidance, program alternatives, and strategic planning for the future. A program review is appropriate that assesses the original program structure, mission, and capability and the current program status, program alternatives, and future needs and capability projections. From this information, decisions can be made on short and long term program direction options. As a result, national fire management leadership (National Wildfire Coordinating Group (NWCG) and the Fire Management Board (FMB)) has decided to conduct an interagency program review of the current Wildland Fire Predictive Services Program.

Your input is needed to help address the future of the predictive services program. This questionnaire is designed to help obtain your input regarding the current status of the predictive services program and future needs. For the purposes of this questionnaire, the Predictive Services Program is viewed as inclusive of predictive service personnel and organizations at the National, Geographic Area, and local levels.

The questionnaire involves multiple parts and 25 questions: background user information (5 questions), products and services importance (9 questions), user needs (2 questions), program management (8 questions), and one optional question. It should take about 25 minutes to complete. If you pause before completing the questionnaire, you can log back in (with the same computer) and pick up where you left off. Your responses will be confidential and no identifying information such as your name, email address, or IP address will be collected. Please feel free to distribute it to other federal employees that have a role, interest, and involvement with fuel treatment activities.

The survey will be open for responses until November 30, 2016.

NOTES:

- Only Question 1 differed between the federal and non-federal surveys.
- Questions marked with * required an answer (not optional).

Federal Survey Question	Federal Survey Question
<p>*1. I currently work for (select one):</p> <ul style="list-style-type: none"> <input type="radio"/> NASA <input type="radio"/> NOAA <input type="radio"/> USDA Forest Service <input type="radio"/> USDOJ Bureau of Land Management <input type="radio"/> USDOJ National Park Service <input type="radio"/> USDOJ United States Geological Survey <input type="radio"/> USDOJ Bureau of Indian Affairs <input type="radio"/> USDOJ Fish and Wildlife Service <input type="radio"/> USDOJ (other) <input type="radio"/> USDOE <input type="radio"/> USDOD <input type="radio"/> EPA <input type="radio"/> Other 	<p>* 1. I currently work for (select one):</p> <ul style="list-style-type: none"> <input type="radio"/> State <input type="radio"/> University <input type="radio"/> Contractor <input type="radio"/> Other

*** 2. The Geographic Area I work in is (select one - see map below)"**

- Alaska
- Eastern
- Great Basin
- National
- Northern California
- Northern Rockies
- Northwest
- Rocky Mountain
- Southern
- Southern California
- Southwest

***3. The State I work in is (please type in * your state name)?**

--

***4. My primary function and involvement with predictive services is (select all that apply):**

- National level decision maker
- GA level decision maker
- Local level decision maker
- Meteorology SME
- Intelligence SME
- Fire Behavior/Geospatial SME
- Smoke management/air quality SME
- Operational response planning and implementation
- Information/communication
- General interest - non-decision maker
- Other (please specify)

If Yes, go to question 6

If No, go to question 7

*** 5. Have you been involved with or used predictive services products in more than one geographic area?**

- Yes
- No

6. Have you found predictive services products across geographic areas consistent and easy to use or inconsistent with operational differences?

- Consistent
- Inconsistent

***7. Do you think predictive services program products and capabilities are important to the fire management program and your needs?**

- Yes
- No

***8. Please rank the reasons why predictive service products are important to your needs (please rank from 1 - 4, with 1 being the most important and 4 being the least important, use each rank only once).**

	Decision making support
	Assessment
	Operational response planning and implementation
	Trend monitoring

***9. Do you think predictive services products are more or less important to your needs at the following spatial scales (please select one level of importance for each spatial category)?**

	Extremely more important	Somewhat more important	Neither more important or less important	Somewhat less important	Extremely less important	Don't know
Local						
Geographic area						
National						

***10. Do you think predictive services products will be more or less important to fire management activities and your needs in the future (please select one level of importance for each spatial category)?**

	Extremely more important	Somewhat more important	Neither more important or less important	Somewhat less important	Extremely less important	Don't know
Local						
Geographic area						
National						

***11. Do you think the current predictive services program is adequately meeting your needs (Yes will mean the current program is adequately meeting needs while No will indicate change and improvement is needed)?**

- Yes
- No

***12. Are there barriers that keep you from using predictive services and products (check all that apply)?**

- I don't need this kind of information
- I don't know how to use this information
- I don't trust the products and services
- I don't have time to use these products
- I don't have the technology I need to use these products
- I have never thought about using these products
- I use other information that may conflict or give a different perspective
- Agency direction/guidelines instruct me to use other information
- None
- Other (please specify)

*** 13. What predictive services products and services do you use (please check all that apply)?**

- | | | | |
|--------------------------|---|--------------------------|--|
| <input type="checkbox"/> | 7 - day significant fire potential | <input type="checkbox"/> | Fire behavior advisories |
| <input type="checkbox"/> | National significant wildland fire potential outlook | <input type="checkbox"/> | Fire danger trends and advisories |
| <input type="checkbox"/> | GACC monthly/seasonal significant fire potential outlook | <input type="checkbox"/> | Fuel and fire behavior national map |
| <input type="checkbox"/> | GACC weather/fire potential video briefings | <input type="checkbox"/> | RAWS.NFDERS support and management |
| <input type="checkbox"/> | GACC daily fire weather summary maps | <input type="checkbox"/> | ROMAN |
| <input type="checkbox"/> | GACC smoke management support | <input type="checkbox"/> | National Fuel Moisture Database (NFMD) |
| <input type="checkbox"/> | Specialized GACC products not listed (i.e., SAWTI, Santa Ana Wildfire Threat Index) | <input type="checkbox"/> | Training development and support |
| <input type="checkbox"/> | Briefings | <input type="checkbox"/> | None |
| <input type="checkbox"/> | Other | | |

***14. Which predictive services products and services do you think are more or less important to fire management activities and your needs (please select one level of importance for each item)?**

	Extremely more important	Somewhat more important	Neither more important or less important	Somewhat less important	Extremely less important	Don't know
7-day significant fire potential						
National significant wildland fire potential outlook						
GACC monthly/seasonal significant fire potential outlook						
GACC weather/fire potential video briefings						
GACC daily fire weather summary maps						
GACC smoke management support						
Specialized GACC products not listed (i.e., SAWTI: Santa Ana Wildfire Threat Index)						
Briefings						
Fire behavior advisories						
Fire danger trends and advisories						
Fuels and fire behavior national map						
RAWS/NFDRS support and management						
ROMAN						
National Fuel Moisture database (NFMD)						
Training development and support						

***15. Factors that define the structure of the predictive services program include:**

- Organization - type of program such as national, area, local, centralized, decentralized;
- Agency position sponsorship - predictive services FTE's hosted by all wildland fire management agencies;
- Governance - no central oversight and governance from a single agency or a national entity;
- Supervision - supervisory controls, supervision by unit manager, position hosting individual, or other;
- Unit location - are PS staff located in appropriate locations;
- Organizational affiliation - are PS units assigned to dispatch, logistics, operations, or other organizational areas; and
- Roles and responsibilities - do PS staff share, duplicate, or transfer roles and responsibilities to regular agency staff)?

Do you think the current program structure of predictive services is clearly defined and supporting the most efficient program?

- Yes
- No
- Don't know

***16. In regard to the importance of program structure elements in supporting objectives please rank the following in order of importance (rank from 1 - 7, with 1 being the most important and 7 being the least important, use each rank only once, NA indicates non-importance of that category).**

	Organization		N/A
	Agency position sponsorship		N/A
	Governance		N/A
	Supervision		N/A
	Location of units		N/A
	Organizational affiliation (i.e., located in dispatch, operations, or other)		N/A
	PS roles and responsibilities		N/A

***17. Position management protocols include the following elements:**

- Staffing levels for predictive services;
- Agency position sponsorship - different agencies hosting FTE's;
- Career ladders - do career ladder opportunities exist for PS staff?
- Vacancy filling processes and timelines - are PS vacancies given priority, are they filled in timely manners, do hosting agencies communicate vacancies to fire director levels?
- Job sharing opportunities - can these types of opportunities exist?
- Remote location opportunities - can these types of opportunities exist)?

Do you feel that current position management protocols help to frame and support an efficient program?

- Yes
- No
- Don't know

***18. In regard to position management, please rank the following elements in order of importance (rank from 1 - 8, with 1 being the most important and 8 being the least important, use each rank only once, NA indicates non-importance of that category).**

	Staffing levels		N/A
	Staffing protocols		N/A
	Agency position sponsorship		N/A
	Career ladders		N/A
	Vacancy filling processes and timeframes		N/A
	Assigned collateral duties		N/A
	Job sharing opportunities		N/A
	Virtual location opportunities		N/A

***19. Do you think the current predictive services program capabilities in terms of staff skills and knowledge, technology, and budget levels are supporting the most efficient program?**

- Yes
- No
- Don't know

***20. In regard to predictive services program capabilities, please rank the following elements in order of importance (rank from 1 - 3, with 1 being the most important and 3 being the least important, use each rank only once, NA indicates non-importance of that category).**

	Staff skills and knowledge		N/A
	Technology		N/A
	Budget		N/A

***21. If you were assigning priority areas that you feel could make the predictive services program more effective, how would you rank the following areas (please rank from 1 - 6, with 1 being the most important and 6 being the least important, use each rank only once, NA indicates non-importance of that category)?**

	Program structure		N/A
	Position management		N/A
	Program governance		N/A
	Program capability		N/A
	Additional products and services		N/A
	Additional research		N/A

***22. What do you consider to be the three most significant impediments to improving predictive services program capability, efficiency, and service (100 characters are available for your response, None is an appropriate response)?**

***23. Are additional predictive services products and * services needed?**

- Yes
- No
- Don't know

***24. Please check all areas where you feel that additional products and services * are needed?**

	Climate		Fuels
	Current weather information		Fire Danger
	Weather forecasting		Fire Behavior
	Current Resource status		Intelligence
	Current fire activity		Decision support science
	Future resource status		Greater integration of all fire environment attributes into a decision support system
	Future fire activity		None
Other			

25. Thank you for your input. Would you like to be contacted in the future to provide additional input about the predictive services program?

- Yes
- No

If yes, please enter email address