

# Quadrennial Fire and Fuel Review Report



June 30, 2005

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*All of the data for the tables were provided by the National Interagency Fire Center in Boise or the National Fire Plan Office in Washington D.C. in the fall of 2004. Because data is constantly being updated and adjusted, the statistics presented in this report should be viewed only as surrogate measures. The most up-to-date and accurate information is obtainable on the NIFC and NFP websites.*

# **Quadrennial Fire and Fuel Review Report**

## **Foreword**

The Quadrennial Fire and Fuel Review (QFFR) represents a first time effort to produce a unified fire management strategic vision for the five federal natural resource management agencies under the Departments of Interior and Agriculture. This inaugural effort emphasizes key mission strategies and core capabilities that must be established to proceed into the future with a common vision and a new collaborative process. This inter- and intra-agency process will ensure continuous programmatic renewal and a focal point for establishing investment priorities. The National Fire and Aviation Executive Board (NFAEB) fully supports the QFFR Report, and endorses its strategies and capabilities for the future of fire management.

The QFFR involved over 200 key personnel from the wildland fire community, including physical and cultural researchers, and non-governmental organizations. A vast array of professionals and experts presented their perspectives and predictions on what will affect wildland fire's future in regards to climate, fuel condition, demographics and public expectations. The QFFR advances strategies for ensuring that fire management's role in ecosystem sustainability is strengthened, that a new concept of fire-adapted human communities is promoted, and that non-wildland fire emergency response does not diminish our commitment to land and resource stewardship.

The transformation to these new integrated mission strategies requires us to establish core capabilities in integrated planning, decision-making, seamless fuels management, monitoring, community education and relationships, training and technical assistance while budget levels remain constant. The shift in mission strategies and capabilities will require building additional skills in the workforce and exploring new methods to accomplish the workload. Together, the federal agencies must reorganize work processes and coordination efforts to meet future demands.

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# **Quadrennial Fire and Fuel Review Report**

## **Executive Summary**

The Quadrennial Fire and Fuel Review (QFFR) is a strategic assessment process that has built on past and ongoing policy and program reviews to evaluate current capabilities and project future needs. This integrated review is a joint effort of the five federal natural resource management agencies and their state, local, and tribal partners that constitute the wildland fire community.

The QFFR takes a long-term perspective in considering future conditions and risks that will affect fire management for the next 10 to 20 years. There is also a near term perspective as the report looks back over the past five years and the reviews of the current state of fire and fuel management programs and capabilities. It notes key natural and social environmental trends that will impact fire management and charts a strategic course for the future.

This first effort is premised on three objectives:

- Establish baseline data on current capabilities and program efforts and review the numerous major studies, reviews, surveys, strategy papers and reports that have recommended changes to existing processes. The QFFR builds on what the federal agencies and their partners have concluded about recent events and lessons learned.
- Serve as an integrated strategic vision document for the interagency federal wildland fire community for fire management and risk reduction.
- Develop a vision for the future that is clearly linked to budget realities. The QFFR describes a strategy-based, balanced, cost-effective program for fire preparedness, prevention, fuel reduction, suppression, and rehabilitation and restoration.

A series of panel sessions with subject matter experts, including social and environmental scientists and natural resource specialists, led to some common conclusions about what the future may hold for fire management programs. Significant findings may be summarized as follows:

- Recent drought and weather conditions that have contributed significantly to increased fuel loadings and severe fire conditions will continue, resulting in more acres being burned and an increased number of large fires.
- The Wildland Urban Interface (WUI) will continue to expand and make fire management's challenge to restore fire's role in the ecosystem and protect communities near public lands more difficult.

- Public expectation for the protection of both communities and surrounding natural values will remain high.
- Hazardous fuel profiles that are categorized as “at risk” will continue to increase.

The QFFR looks at three mission strategies for the future. Allowing fire to play its natural role in ecosystem sustainability within the given social, economic, and political environments is the cornerstone mission strategy. This requires fire management to expand its role in resolving fuel accumulation problems through expanded large-scale landscape treatments and by applying appropriate management responses to all ignitions. Linked to this is a secondary mission strategy of promoting fire adapted human communities rather than escalating protection of communities at risk in the WUI. A component of this strategy will include the reprioritization of current fuel treatment efforts. An equally important component will be reengaging communities and property owners in an effort to increase community awareness of wildland fire risk and to balance responsibilities for public safety and return habitats to ecosystem sustainability.

An increased demand for fire management’s resources and expertise in incident management was identified as the focus of the third core mission strategy. The QFFR critically re-examined the agencies’ non-fire emergency response capability and proposes a strategy to ensure that these demands do not degrade existing public land stewardship responsibilities.

To make the transformation to these new integrated mission strategies requires the agencies to strengthen existing and establish new core capabilities. The integrated mission strategies described above focus on eight capabilities: integrated planning, decision-making, seamless and integrated fuel programs, monitoring, broadening ability to respond, strengthening community relationships, expanding community education and providing training and technical assistance. In the figure below, these core capabilities are aligned with their respective mission strategies:

<b>Mission Strategy</b>	<b>Core Capabilities</b>
Ensuring Fire Management’s Role in Ecosystem Sustainability	<ul style="list-style-type: none"> <li>• Integrating Planning</li> <li>• Enhancing Decision Making</li> <li>• Ensuring Seamless and Integrated Fuel Programs</li> <li>• Establishing Monitoring</li> <li>• Broadening Ability to Respond</li> </ul>
Promoting Fire-Adapted Human Communities	<ul style="list-style-type: none"> <li>• Strengthening Community Relationships</li> <li>• Expanding Community Education</li> </ul>

Balancing Emergency Response	<ul style="list-style-type: none"> <li>• Providing Training and Technical Assistance</li> </ul>
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Expected static budget levels for the foreseeable future will not allow for programmed workforce increases; thus the shift to new mission strategies and the corresponding core capabilities will require building additional skills in the current workforce, not simply adding new positions. The interagency workforce must become more adept at working seamlessly across jurisdictional or agency boundaries and leveraging the existing capabilities of our partners and the public to help accomplish the common goals. All of the federal fire agencies will have to re-position and reorganize portions of their work processes to meet the increasing demands.

A key to implementing the new capabilities is the development of new technology to enhance fire management decision support. Investments in technology utilization and information systems like LANDFIRE, large fire decision support, Resource Ordering and Statusing System (ROSS), Fire Program Analysis (FPA), and Predictive Services will continue to provide sound support and rationale for improved decisions. The federal fire agencies must continue to modernize processes and infrastructure, and reassess structure and organizations at all levels. They must continue to look for more cost-effective means to accomplish common fire and natural resource management goals, providing the opportunity for additional priority accomplishments.

The future success of wildland fire management rests with transforming current organizational structures and processes, assessing management and supporting effectiveness, and making the appropriate investments in new technology to meet future challenges. The QFFR represents a combined effort of the agencies to proceed into the future with a common vision and strengthened collaborative processes.



# I.

## **Introduction**

### **Wildland Fire in the 21<sup>st</sup> Century**

The Quadrennial Fire and Fuel Review (QFFR) is a strategic assessment process that has built on past and ongoing policy and program reviews of the wildland fire community – consisting of the five federal agencies and their state, local, and tribal partners. Using the Department of Defense’s Quadrennial Defense Review as a model, the QFFR is an internal assessment of current capabilities and future needs. The time frame is both long-term and near-term. Projections of future conditions and risks that will affect fire management are set in a 10 to 20 year reference timeframe while strategies for new mission requirements and building new capabilities are defined in a 4 to 5 year period. If institutionalized, mission requirements would be reassessed in the next iteration of the QFFR in 2009.

Essentially the QFFR asks of fire and fuel management – where have we been, where are we now, and where are we going? This report first presents a five-year history of fire and fuel management programs and then reviews the current state of programs and fire and fuel management capabilities. It notes key natural and social environmental trends that will impact fire management and charts a strategic course for the future.

To ensure an integrated perspective, the QFFR has focused on fire and fuel management as a whole enterprise. By design, this is not a review of the separate programs – Preparedness, Prevention, Suppression, Fuel Reduction, and Restoration – or the functions that make up fire and fuel management. Integration also means that the five federal public lands agencies with wildland fire responsibilities – the Bureau of Land Management (BLM), the National Park Service (NPS), the Fish and Wildlife Service (FWS), and the Bureau of Indian Affairs within the Department of Interior and the U. S. Forest Service (USFS) within the Department of Agriculture – undertook this review as a joint effort. State, local, tribal and non-government partners in the greater wildland fire community also participated in different phases of the QFFR effort to ensure that a broad range of interests were considered and melded into the final review.

The QFFR is designed to be a base for setting interagency priorities and guiding investment decisions for the future. This first effort aims to:

- Establish baseline data on current capabilities and program efforts, and review the numerous major studies, reviews, surveys, strategy papers and reports completed by different groups within the wildland fire management community. It also includes external assessments that have evaluated problems, proposed solutions and made recommendations for change. The QFFR is to build on, not replace what the federal agencies and their partners have concluded about recent events and lessons learned.

- Serve as a strategic vision document for the interagency federal wildland fire community for fire management and risk reduction. The QFFR is intended to question current assumptions about environmental dynamics, mission requirements, and resource capabilities, then consider alternative mission strategies and propose means to meet future needs.
- Develop a vision for the future that is clearly linked to budget realities. The QFFR outlines an integrated, strategy-based, balanced, cost-effective program for fire preparedness, prevention and public education, fuel reduction, fire suppression, and rehabilitation and restoration.

### ***QFFR Methodology***

Because this QFFR was a first time effort, it had to be adapted to meet the capacities of the federal wildland fire agencies and their partners. Federal wildland fire agencies do not have large policy staffs in Washington D.C. or elsewhere to oversee a QFFR effort and provide a final report. Instead, the model used fire management’s decentralized structure, its extensive training and research networks, and the accepted practice of “direct engagement” by fire management professionals in various taskforces and project teams to produce the QFFR. Three phases were created.

In Phase I, a series of **New Assumptions Panels** with researchers and subject matter experts were conducted to review current assumptions about the fire and fuel environment and identify significant demographic, environmental, technologic, and social/economic issues and trends. These panel sessions were hosted in different regions of the country according to ecosystem categories, as set by senior federal and state fire management leaders. The New Assumptions Panels included presentations by researchers followed by in depth discussions by panel attendees representing fire, resource, line officers, and state, local and non-governmental organizations. The section in this chapter on emerging threats and risks is largely a product of those expert presentations and comparative assessments of how these emerging trends could impact fire management mission strategies.

In Phase II, five **Working Panels** were assembled to assess the work of the New Assumptions Panels, review the reports of the past five years, and analyze current capabilities and future challenges for the purpose of preparing mission alternative strategies. Panels typically consisted of 12-15 members including federal fire and fuel management representatives, state and tribal representatives, line officer and other participants. While each Working Panel had a separate domain of questions to focus on, each panel based its proposals on the cumulative work of the preceding panels. Working Panels were also given the opportunity to develop shadow strategies and counter proposals to ensure a robust review of alternatives. The domains for each panel were:

- Threats, Strategies, and Risk Mitigation (the why – how will the future mission be shaped by new threats & risks in the changing environment?)
- Force Structure and Infrastructure (the what – what capabilities are needed to accomplish the mission and meet future threats and risks?)

- Workforce Capability and Development (the who - what workforce and management capacities are needed to ensure safety and success?)
- Operations, Logistics, Communications, and Technology (the how – what operational and coordination assets are needed to ensure mission accomplishment?)

In Phase III, an **Integration Panel** organized all the panel results into coherent sets of alternatives and developed the integrated strategic vision for the final report. After producing a synthesis of the overall vision, mission strategies and requisite core capabilities, the panel members prepared chapters summarizing the structure, workforce capacities, and operational and system assets in a final QFFR report for submission to the **Senior Steering Group** for final approval. The senior steering group is the National Fire and Aviation Executive Board (NFAEB) consisting of the fire directors of the five federal agencies and the fire director from the National Association of State Foresters (NASF). NFAEB is ultimately responsible for accepting the final report and leading consultation efforts with the Departments of the Interior and Agriculture, the Wildland Fire Leadership Council (WFLC), the National Wildfire Coordinating Group (NWCG), and others.

### ***Looking Back – Assessments of Where We Have Been***

Fire management historically has been event driven. Behind major changes in wildland fire policy and fire, fuel, and restoration programs are significant occurrences or fire events that have changed perceptions of current program effectiveness and future mission challenges. In the past five years, there have been a significant number of major studies, reviews, surveys, strategy papers and reports both in and outside of wildland fire management, which have proposed new solutions and recommendations for change. Likewise, there are numerous regional evaluations, local after action reviews, safety assessments, and training and lessons learned efforts designed to assess differences between what fire and fuel managers and other professionals in the field expected to happen and what actually occurred.

The QFFR has used these efforts as its foundation. This section in the report serves as a brief history acknowledging the range and depth of this knowledge in several different segments. What makes these reports so important to the QFFR's work is that they make the business case that the wildland fire and fuel environment is significantly different now and that fire management has fundamentally changed since 2000.

**Planning and Policy.** Dramatic change began with the severe wildland fire season of 2000, characterized by many as the fire season of the century. The report issued, *Managing the Impacts of Wildfire on Communities and the Environment – A Report to the President in Response to the Wildfires of 2000* led directly to the creation of the National Fire Plan and an FY 2001 appropriation action that provided nearly 2 billion dollars in new fire funding (an effective budget increase of 90%) for the Forest Service and the Department of the Interior. Linked to the National Fire Plan was the Western Governors Association's *Ten Year Comprehensive Strategy* that applauded the allocation of new federal resources and acknowledged the critical role to be played by state and tribal

governments and local communities. It also cautioned the agencies about the increased need to manage public expectations and educate communities on wildland fire.

Efforts to implement the National Fire Plan were matched by the Forest Service and Department of the Interior's proposal for a new cohesive fuel strategy. While this was in part a response to the U.S. General Accounting Office's (GAO), now the Government Accountability Office, 1999 study "*Western National Forests: A Cohesive Strategy is Needed to Address Catastrophic Wildland Fire Threats*", hazardous fuel reduction programs were already being expanded significantly. The 2002 study, *Restoring Fire-Adapted Ecosystems on Federal Lands* was a landmark step as it recognized that separate agency fuel programs had to be refocused as a coordinated interagency effort with shared national goals. It also recommended that future fuel treatments should be managed at a larger landscape level. The cohesive fuel strategy also restated the dual premise of fire and fuel management as both to "reduce wildland fire risk to communities" and "restore and maintain fire-adapted ecosystems."

A third concurrent effort signifying change was the revision of the Federal Fire Policy, spurred primarily by an escaped prescribed fire at Cerro Grande, New Mexico that destroyed more than 200 homes and threatened the national laboratories at Los Alamos. A group of federal and state members re-evaluated the 1995 Federal Fire Policy and took steps to implement the guiding principles. This 2001 Review noted that agency differences, ranging from actual policy interpretations to language and terminology were major factors impeding implementation and potentially raising risk levels for fire fighters and the public. Then the five federal agencies under the guidance of the recently formed Wildland Fire Leadership Council (WFLC) commissioned an interagency working group to address the requirements for an implementation strategy. Their 2003 report, *Interagency Strategy for the Implementation of Federal Wildland Fire Management Policy* addressed how agency operational differences should be molded to produce common objectives, definitions, and policy outcomes.

The direction of these policy changes was further strengthened with the passage of the Healthy Forests Restoration Act of 2003 (P.L. 108-148) or HFRA. While the purpose of HFRA is to accelerate fuel reduction treatments and other restoration efforts in forests and rangelands to reduce wildfire risks in local communities, the legislation also codified other important objectives for fire management. One provision allows streamlined approaches to the National Environmental Protection Act (NEPA) for HFRA projects on some lands. (It should be noted however that the revised NEPA compliance standards can only be used on Forest Service and BLM lands.) Another important requirement cited increased collaboration between federal agencies and local communities, especially when a community wide protection plan had been established. The HFRA also stipulated that 50 percent of the funding for HFRA projects is to be allocated to Wildland Urban Interface (WUI) communities at risk.

**Cost Management.** Increased wildfire activity in the United States over the last decade also produced greater fire suppression costs. There were select years throughout the 1990's where fire acres and costs significantly exceeded normal annual averages. In

1998 wildland fires in Texas and Florida produced some of the highest per acre suppression costs on record, which was followed in 1999 by wildland fires in California that reached over \$175 million and accounted for almost 30 percent of the Forest Service's total suppression budget. These record wildland fire years prompted separate reviews on the new phenomena of high cost large fires. The National Association of State Foresters' Forest Fire Protection Committee produced a 2000 report entitled *Cost Containment on Large Fires: Efficient Utilization of Wildland Fire Suppression Resources*. The Forest Service also produced a study on the 1999 California experience entitled *Policy Implications of Large Fire Management*. When the 2000 fire season resulted in over a billion-dollar Forest Service suppression expenditure (to be matched by billion dollar suppression expenditure costs in FY 2002 and 2003), additional efforts were launched to understand this new dynamic. In 2002, three western states had their largest single wildfires on record: the Hayman fire in Colorado, the Rodeo-Chediski fire in Arizona, and the Biscuit fire in Oregon.

The Department of the Interior commissioned the National Academy of Public Administration (NAPA) to examine spiraling fire suppression costs, among other wildland fire policy and management issues. NAPA's 2002 report, *Wildfire Suppression: Strategies for Containing Costs* was actually one of six extensive studies conducted on different facets of wildland fire management. The Forest Service initiated a Chief's Review which produced a report in 2003 "*Chief's Incident Accountability Report*" followed by a March report entitled "*Large Fire Cost Reduction Action Plan*" which endorsed a range of internally focused recommendations designed to contain costs on large fires. Several national and geographic area reviews were conducted of large fires in 2002 and 2003, including the Hayman, Rodeo-Chediski, Biscuit, Aspen, and B&B fires among others. The number of fire reviews was substantial enough that the National Fire Plan Office assessed the reviews in its 2003 report, *Consolidation of 2003 National and Regional Large Incident Strategic Assessment and Oversight Reviews Key Findings*.

Large fire costs also attracted a number of external evaluations. The Wilderness Society issued reports in 2003, *The Wildland Fire Challenge* and in 2004, *The Federal Wildland Fire Budget*. The latter study examined the impacts of "fire borrowing", a budget practice of the Forest Service, which allows transferring money from other fund categories to cover current suppression costs and then repaying through supplemental funding bills. This issue was studied by the GAO in a June 2004 report, *Wildfire Suppression- Funding Transfers Cause Project Cancellations and Delays, Strained Relationships, and Management Disruptions*. The title aptly summarizes GAO's conclusion and The Wilderness Society's concerns. Other important studies on large fire costs were the Idaho Conservation League's 2003 study, *Fire in Idaho*, Yale University's Forest Health Initiative 2003 research study, *Assessing the Environmental, Social, and Economic Impacts of Wildfire*, the Wildfire Suppression Funding Coalition's review, *Cost Containment Accountability Recommendations*, and finally the *Report of the State of California's Governor's Blue Ribbon Fire Commission* which examined the disastrous fires in Southern California in the Fall of 2003.

The information produced on large fire costs in the last four years is extensive and impressive. WFLC commissioned a federal and state strategic issues panel to examine these reports and assess the various recommendations of the groups noted above and others. This panel of half federal and half state and local representatives found more than 300 specific recommendations and proposed strategies to be considered. In its final report, *Large Fire Suppression Costs: Strategies for Cost Management*, the panel noted that predictions for continued severe drought in the west, fuel accumulation, and population and housing growth in the WUI would cause fire suppression costs “to remain high into the foreseeable future.”

**State and Local Firefighting Capacity.** State and local firefighters have always been a critical part of wildland firefighting. While they bear primary responsibility for the more than 800 million acres of forests and rangelands owned by non-federal interests, they are partners in the wildland fire community. A number of reports over the past five years have examined the role of state and local firefighting forces, especially the rural, volunteer and other local fire departments that are heavily engaged in fire fighting in the wildland-urban interface. A 1999 study by the National Association of State Foresters (NASF), *Fire and Ice: The Roles of State and Federal Forestry Agencies in Disaster Management and Response* discussed the growing state and local presence in emergency response. In 2003, NAPA provided a study, *Containing Wildland Fire Costs: Utilizing Local Firefighting Forces* advocating among other things expanding the use of local forces in extended fire suppression attack as a cost reduction measure.

In an effort to define the current role and activities associated with the state and local fire forces and assess funding levels and training needs, the Federal Emergency Management Agency (FEMA) and the National Fire Protection Association (NFPA) conducted a study, *A Needs Assessment of the U.S. Fire Service* in 2002. Their survey of state and local fire departments and fire forces noted that there were over a million active firefighters in the U.S., of which just over three- fourths are volunteer firefighters and that almost half of the volunteers were in communities with less than a 2,500 population. Regarding training, the survey concluded that a significant number of state and local fire department personnel involved in wildland firefighting lack formal training needed for wildland firefighting.

NASF followed the needs assessment with a comprehensive report in 2003 – *The Changing Roles and Needs of Local, Rural, and Volunteer Fire Departments in the Wildland Urban Interface*. Reemphasizing the critical role played by rural, volunteer, and local fire departments as “the nation’s first line of defense against fire starts”, the report outlined steps for augmenting wildland fire training, strengthening multi-jurisdictional partnerships for more efficient interagency response, improving initial attack and emergency communications capabilities, and accelerating federal and state assistance programs.

**Safety.** Safety has always been the number one concern of the five federal wildland agencies and their partners. In almost every report produced since 2000, from federal fire policy to all of the cost management studies, from human capital concerns to resource

planning; safety as a paramount concern was addressed repeatedly. Essentially, safety as the first core value of the wildland fire community is embedded in every study.

Some events over the past five years have produced separate evaluations. The deaths of four fighters on the Thirty Mile Fire in 2001 during extended attack operations was a major catalyst for the federal fire policy *Implementation Strategy* report discussed above. Two air tanker crashes in the summer of 2002 and the loss of the pilots caused the Forest Service and the Bureau of Land Management to jointly establish an independent, five-member Blue Ribbon Panel to identify essential information for establishing a safe and effective future aviation program. Their report, *Federal Aerial Firefighting: Assessing Safety and Effectiveness* based on extensive interviews and regional hearings had major internal impacts on contracting, management of aviation resources, and ultimately externally on the Federal Aviation Administration. And in 2003, two firefighter deaths at the Cramer Fire prompted a major review, following that accident investigation report that has highlighted the local importance of fire leadership.

**Fire Resource Planning.** In 2001, the federal fire agencies undertook a fundamental reassessment of their fire budget and resource planning process for the purpose of moving towards a landscape model. A report to the National Fire Plan coordinators, *Developing an Interagency Landscape Fire Planning Analysis and Budget Tool* proposed creating a new resource allocation system called Fire Program Analysis (FPA). FPA distributes resources to fire planning units (FPU) that in effect reach “across administrative boundaries to accomplish fire and ecosystems goals at the landscape level”. This QFFR report incorporates the FPA future vision for resource planning into its assumptions using the first phase (preparedness resources) implementation date of 2008.

Another view of resource allocations came in two studies on creating a specific sub-organization to respond to large fires. A 1999 Chief’s Review created an interagency team to look at different organizational structures for fire response. The team’s 2000 report, *Agency Strategy for Fire Management*, recommended the creation of a National Incident Management Organization or NIMO. The purpose would be to effectively create a demarcation between local fire preparedness resources and NIMO who would manage large fire operations or national disasters. This idea has resurfaced in a report released in 2004 entitled *The National Interagency Complex Incident Management Organization Study*, which recommends a pilot project with a limited number of small-cadre national teams to focus primarily, if not exclusively, on large incident management.

**Human Capital.** Concerns about workforce preparedness and development led to several examinations of human capital issues. Building on the internal perspectives assessment study on safety and workforce culture completed in the late 1990’s, *Wildland Firefighter Safety Awareness Study* produced by the Tridata Corporation in 1998; NWCG conducted a major survey on firefighting participation levels. This NWCG survey of over 1500 dedicated and non-dedicated firefighters in all five federal fire agencies produced the study *Where have all the Firefighters Gone?* This report concluded that while a significant percentage of the current workforce is actively engaged in and committed to firefighting, there are significant barriers to participation for the remainder of the non-

dedicated fire workforce (i.e. work overload, staffing shortages, compensation, training issues and currency issues).

Workforce development has also been extensively reviewed over the last five years. A report in 2001, *Report of the Leadership Task Group* provided recommendations on incorporating leadership development into all levels of fire management training. A year later, an interagency task group produced a comprehensive assessment of current training capabilities and delineated a vision of what training should be in a study, *Federal Fire Training Strategy: Training and Development for Federal Fire Management's Next Generation*. Both studies reinforced the importance of the ongoing investment made in fire and fuel management workforce development.

A third study on human capital is the ongoing effort to further establish fire management qualifications to bolster firefighter safety and to increase professionalism. The May 2004 white paper, *"Interagency Fire Program Management Qualifications Standards and Guide"* established minimum qualifications for 14 key fire management positions and charts the path for implementation of the standards over a five-year period.

**External Sources.** This section is only a very brief introduction to the "documents" that were reviewed during the QFFR process (see Appendix A for the complete reference list). However, two other external sources are worth specific mention. The GAO has conducted no less than a dozen studies of wildland fire management issues in the past decade; thus its role has been established as spurring the interagency cohesive fuel strategy effort. While their reports have evaluated a range of policy and management issues, GAO has consistently emphasized the importance of understanding the growing dimensions of wildland fire risk and its severity.

Secondly there is a growing body of literature by academics and institutional researchers on wildland fire management issues. One of the prime sources used by the QFFR was the recent Special Section in the August 2004 issue of *Conservation Biology: Wildfire and Conservation in the Western United States*. The articles in this symposium are actually an extended discussion of the complexities and interdependences of the current and future wildfire problem in the United States. They assess the "technical, strategic, social, and policy aspects of management in fire-adapted ecosystems." Different research views presented in this symposium reflect the debate in the academic circles and among land managers about what is happening, why, and what can or should be done about wildfire severity. Questions, such as those posed in the introduction to the symposium, are paraphrased below:

- Is the current regime of large fires a natural by-product of fire adapted ecosystems or the consequence of past policies of fire exclusion?
- What do the major changes embodied in new legislation (HFRA) or proposed planning changes mean for resource and property values in the context of public expectations and understanding?
- Is the goal of fire management prevention by decreasing fuel, increasing fire resistance by putting more fire into the landscape or some combination of both?



***Looking Forward: Emerging Threats and Risks.***

In relating risk to wildland fire, it is useful to distinguish between two factors. First is the likelihood that more severe large wildland fires will occur. Second is the level of potential damage that a wildland fire will produce in terms of firefighter and public fatalities, and destruction of homes, communities and resources.

Statistics accumulated in the many reports and wildfire databases reviewed by the QFFR indicate that since 2000 wildland fire is increasing in both amount and severity. While the actual number of fires has decreased, the real statistic is the increase in numbers of acres burned and the increase in the number of large fires. In three of the five past years reports indicate that more than 7 million acres were burned by wildland fires among the four Department of the Interior agencies, the Forest Service and state and tribal lands. The data provided below, taken from end-of- year reports compiled by National Interagency Fire Center (NIFC), is a good surrogate measure of the increase in wildland fire impact in the United States.

Table 1 Annual Wildfires & Acres Burned Totals

	<b>Fires</b>						
	<b>USFS</b>	<b>BIA</b>	<b>BLM</b>	<b>FWS</b>	<b>NPS</b>	<b>ST/OT</b>	<b>Totals</b>
<b>2000</b>	11,699	4,549	3,485	309	522	71,716	92,280
<b>2001</b>	10,713	3,717	3,550	252	1,554	64,191	83,977
<b>2002</b>	9,246	4,584	2,579	472	465	56,077	73,423
<b>2003</b>	10,251	4,094	2,931	352	485	45,156	63,269
<b>2004</b>	8,606	3,661	2,906	381	490	49,834	65,878
	<b>Acres</b>						
	<b>USFS</b>	<b>BIA</b>	<b>BLM</b>	<b>FWS</b>	<b>NPS</b>	<b>ST/OT</b>	<b>Totals</b>
<b>2000</b>	2,333,672	321,907	1,694,407	396,760	136,145	2,510,602	7,393,493
<b>2001</b>	595,263	149,894	1,029,893	43,909	59,517	1,691,715	3,570,191
<b>2002</b>	2,402,501	465,390	1,139,465	505,246	176,965	2,493,412	7,182,979
<b>2003</b>	1,428,267	269,767	352,466	325,408	196,895	1,386,420	3,959,223
<b>2004</b>	551,966	71,292	1,305,707	2,096,403	42,352	4,026,811	8,094,531

Source: National Interagency Fire Center – December 2004

In comparing five-year averages, total wildfire acres have increased by the following over the past three periods: <sup>1</sup>

1990 – 1994	3,436,537
1995 – 1999	4,136,284
2000 - 2004	6,040,083

Risk levels are also increasing because of the growth of population and housing in the Wildland Urban Interface and intermix. (While definitions vary, Interface is defined here as a place with more than 6 housing units per square kilometer or more than 1 house for 40 acres, that has less than 50% vegetation and is within 2.4 kilometers from an area that is 75% vegetated. Intermix has fewer houses and more than 50% vegetation).

The conversion of unpopulated forest and rangeland to housing in the WUI was already increasing faster than population growth in the 1990's at a rate of 1.2 acres of undeveloped land for every additional person added to the population rolls. Assessments of census data provided to the QFFR New Assumptions Panels concluded that housing growth rates in the WUI are nearly triple the rates of increase outside the WUI. These growth rates for the 1990's will equate to more than 8 million new houses in the coming decade.

Compounding this problem is the fact that the intermix, where housing is likely to be outside of fire districts, has the fastest rate of growth within the over expansion of the WUI. The intermix has less than 10% of the land area but more than 40% of all new houses. In terms of risk, this means an increased probability for more houses and people to be not just on the edge of potential wildland fires, but increasingly in the midst of fires. More structures in the midst of wildland fire also limit the effectiveness of traditional wildland fire suppression tactics and strategies such as backfire and burnout.

These two highly significant changes (increased wildland fire and increased population exposed to wildland fire) have altered the nature of wildland fire risk, both now and for the future, as well as greatly increased the levels of complexity and difficulty for wildland fire and fuel management.

### ***Driving Forces for Future Change***

The purpose of the New Assumptions Panels process of the QFFR was to examine the driving forces behind these new risk levels (such as environmental and socioeconomic challenges) and to assess how those forces would affect mission assumptions. Four driving forces were assessed: fuel, drought and climate variation, population change in the wildland urban interface, and public expectations. Each will be summarized in terms of trend and future impact.

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<sup>1</sup> Outliers can significantly influence averages -- as the 2004 Alaskan fire season does for the 2000-2004 period. More than 6 million acres of the 2004 totals were in Alaska or nearly 75% of total acres burned. But even if the five-year average for acres burned in Alaska were substituted for the 2004 figure (926,028 acres), the adjusted five-year average would still be 4,896,093 acres.

**Fuel Conditions.** Today, after a half-century of a policy of attempted fire exclusion, extensive areas of the nation's public lands are at risk from intense, severe wildfires that could potentially burn well beyond the adaptive limits of the forest or rangelands. They can cause significant damage to key ecological values and threaten nearby communities.

Historically, there was more fire on the landscape. As the 2002 Cohesive Fuel Treatment Strategy (*Restoring Fire Adapted Ecosystems on Federal Lands*) notes, more than 25 million acres burned annually on federal lands in the past compared to less than 5 million acres annually during the current period. Now, the most damaging and costly wildfires in recent history are often in fire-dependent forests and rangelands where conditions have been altered because of the absence of several fire return intervals. The accumulation of fuel has dramatically increased to the point where research estimates indicate that more than 40% of federal lands (not including Alaska) or 190 million acres of federal forests and rangelands face high risks of catastrophic fire due to deteriorating ecosystem health and drought. Drought conditions, the presence of invasive species, and insect kill further complicate and stress fuel conditions, which make the public lands and adjacent communities more vulnerable to wildfires.

Simulation research on fire potential presented to the New Assumptions Panels projected the effects of the inter-decadal variability of climate change, in terms of fuel buildup, drying and ignition. The trend in all of the future scenarios is a massive expansion of woody vegetation throughout the interior West. Even though projected increases in fire will mean some of the fuel will be consumed, it will not be sufficient to hold back the fuel expansion, nor the increase in carbon sequestration. The future will see an increase in carbon in the West, an increase in fire, and both happening at the same time.

The federal wildland agencies have been acutely aware of the problems associated with fuel accumulation. Indeed, the Ten Year Comprehensive Strategy that was approved by the Secretaries of Agriculture and Interior with the Western Governors Association made large scale fuel treatment programs a key priority in an attempt to reduce the hazardous fuel conditions that impact rural communities. And fuel treatments have risen dramatically as a result of the National Fire Plan. In 2004 more than three million acres were treated. However, the level of scale to be reached for fuel reduction programs to have a significant impact on reducing fire risk is estimated to be between 10 and 12 million acres annually. Thus the 2002 Cohesive Strategy calls for the most effective placement of fuel treatments to maximize hazard reduction on the landscape.

**Drought and Climate Variation.** Severe drought has also increasingly predisposed fuel-laden forests and rangelands to larger fires or mega or extreme wildfires. The nation's public lands, particularly in the western United States, are being impacted by what appears to be a long-term (25-35 years) drought cycle, which began in the mid to late 1990s. Climatologists presenting to the New Assumptions Panels indicated that they have high confidence that the recent shift represents a return to the dry climate patterns of the 1930's through 1950's, particularly in the West.

Increasingly, the premise of current climate studies is that the variability of climate has risen. Recent patterns in abrupt climate change indicate uncertainty for the coming years; given the state of fuel accumulation and expansion of the wildland urban interface, there is a risk that climate may impact fire and fuel problems even more. Most climate change models predict a future much warmer than now or in the past.

The impact of weather on fire is now well established and shows a clear relationship between drought and fire season severity. While fuel has been building up for years, it is drought and warmer temperatures that will cause fires to increase in size and severity. Compiled data on large fires (defined as greater than 300 acres for grass fires, 100 acres for forest fires) indicate that these fires account for the majority of acres burned. While less than 2 percent of all fires, large fires accounted for over 95 percent of total acres burned. And as noted, both the number of large fires and the average size of large fires have been increasing over the last decade.

**Demographics and the Wildland Urban Interface.** Population and housing growth in the WUI is occurring at an increasing rate. Social science research presented to the New Assumption Panels indicates that 8.4 million new homes, or 60% of the new homes constructed in the United States were added to the WUI in the 1990's and this rate of growth is being sustained. The rate of growth is triple the rate of home construction outside the WUI. In the southeast, the WUI and intermix are so widespread and growing so rapidly that many states estimate that 90% of the wildfires suppressed in that region threaten structures.

Social science research presented to the New Assumptions Panels indicates that 9% of the land area of the United States and 31% of the homes in the United States are located in the WUI. In terms of land use change, this reflects a 26 percent increase in “urban/suburbanized” land area over the last quarter century from a corresponding loss of 18% of agricultural lands and 8% of wetlands.

The growth of the interface and intermix over the past decade has also been driven by larger regional population shifts. In 1960, the population of the Western States was just over 27 million people but grew to 61 million in 2000 and is now projected to reach nearly 80 million people by 2020 or 24% of the total US population. In short, the growth in the WUI shows no signs of diminishing in the next 20 years.

Private property, particularly developed property, complicates wildland fire suppression efforts by increasing the values at risk and the social and political pressures to extinguish fires. In addition, the growth in WUI complicates hazardous fuel reduction projects and has the potential to constrain the use of fire as a management tool in these areas.

**Public Expectations.** Public expectations are also a critical factor and extend to more than just the protection of homes and the safe evacuation of people in the event of a fire. Residents expect protection of the values that brought them to the wildland in the first place. These include view shed, watersheds, wildlife and its habitat, among others. Ecosystem characteristics can be as important to the WUI population as their own

personal property. Even populations not located in the WUI value wildland resources and wildland fire protection. An important example is the Southern California National Forests, where the wildland fire management program focuses on the downstream effects on water quality, flood and mudslide prevention, and recreation.

Fire exclusion policies over the past century have helped to create vast acreage where ecosystem sustainability is threatened. Simply re-introducing fire is often no longer an option in the areas that need restoration treatments the most. The overcrowded condition of millions of acres of fire-prone wildlands often precludes using fire at ecologically appropriate intensities, without some form of pre-fire mechanical treatment. However, the mechanical treatments that are required to reduce fuel loads are often viewed by key public interest groups as a back door means for logging and thus resisted.

The increasing number of people living in the WUI has eroded public tolerance for some treatments. Public intolerance for smoke has constrained the use of prescribed fires in some areas; this may or may not be reflected in state or county air quality regulations. In fact, any move to reduce vegetation or remove trees is frequently met with great resistance from homeowners in the interface, as they place great value on the trees themselves, the overall environment and wildlife habitat, and the privacy and seclusion that wildland surroundings afford. Yet avoiding the risks of fire use and mechanical treatments has only worsened the fuel accumulation problem and increased the severity of subsequent wildfires that pose a much greater threat to homeowners and their environs.

Cost of wildland fire suppression and particularly large fires remains high and is likely to stay that way given the levels of fuel and long term drought scenarios forecasted for the future. The public, when facing an emergency situation, expects firefighting to be performed immediately, safely, and successfully. Cost is only considered afterwards. Another manifestation of expectations in this arena is the increased use of more expensive firefighting assets such as aviation resources, which the public increasingly equates with “normal” successful firefighting operations.

**Other Factors.** There is a long history of using wildland fire protection resources very effectively to manage other emergency response incidents. This reputation has created a demand for services from the wildland fire protection community not explicitly related to wildland fire but to a broader category of non-fire incident management. Examples range from hurricane response and recovery to dealing with outbreaks of Newcastle disease in the domestic poultry population or assisting in the recovery efforts following the terrorist attacks on the World Trade Center and Pentagon, and the Columbia Shuttle Disaster Recovery.

The demands come from within the agency, within the Departments, and within the Executive Branch. These demands are increasing and, given the unknowns associated with Homeland Security and terrorism, will remain uncertain. What is certain is that any increase in demand comes at a time when the fire agencies are already having difficulty maintaining staffing levels for firefighting incident management teams.

## II

### **Mission Strategies: Threats and Risks Mitigation**

The basic assumptions of future threats and risks to the natural and socio-political environments will require further transformation of the federal wildland fire agencies' strategies and capabilities. Much of the course to the future has been plotted through the National Fire Plan, WGA's Ten Year Comprehensive Strategy, the Cohesive Fuel Strategy, HFRA, and refinements to the Federal Fire Policy. However, new approaches will have to be undertaken to cope with escalating risks and threats. New strategies will have to be adopted to position the agencies with their state, tribal, and local partners to address the challenge of more severe and more complex wildland fires in the foreseeable future. Also, new forms of organization and reinvestments of capital, both human and monetary, will be required on a short and long-term basis.

The higher level of threats and risks confronting fire and fuel management result from the interdependent effects of environmental change brought on by fuels accumulation, drought severity and climate change, population growth in the interface, and rising public expectations. There are also other influences to be addressed such as internal and external oversight, political realities, budgets, policies, and law.

#### ***Refining Mission Strategies***

The cornerstone mission strategy for the future is to allow fire to play its natural role in ecosystem sustainability within the given social, economic, and political environments. This entails creating or expanding the conditions and opportunities for fire to play its role safely, achieving defined resource objectives while protecting and enhancing values. The federal wildland fire agencies need to become more opportunistic in resolving the problem of fuel accumulation through aggressive landscape scale treatments and applying appropriate management responses to all ignitions regardless of cause. Decision science needs to be fully incorporated into all management responses both in pre-positioning and resource allocations whether it is for project implementation or emergency response. This will provide the critical elements for cost containment, safety, and resource benefit.

Promoting a secondary mission strategy for fire adapted human communities rather than escalating protection of communities at risk in the WUI will vastly improve relationships with communities and individual property owners, as well as balance responsibilities for public safety with returning habitats to ecosystem sustainability. Community awareness will be increased and inhabitants in the interface would be able to improve their capacity to deal with the wildland fire issues. This mission strategy stresses a sense of living with fire within communities. Rather than merely addressing acres treated within the WUI where fuel is accumulating faster than it can be treated, the agencies would be better served by measuring the influences of various treatments for defensible space and establishing responsible partnerships with communities.

A third core mission strategy for the future involves a re-examination of the agencies' emergency response capability. There is an overwhelming need to ensure that agency emergency response is limited to the commitments under the National Response Plan. The federal wildland fire agencies have significant levels of expertise and capabilities in incident management. Instilling this knowledge within dependent agencies will enable them to redeem their own primary responsibilities. At this time it would not be acceptable to withdraw as a significant response provider, but agencies must begin to position themselves for the future by establishing pre-incident partnerships and assistance programs with the dependent agencies. A clear delineation between response and recovery actions needs to be established within the annexes of the National Response Plan. Limiting response in the future will enable the fire and fuel organizations to meet their land stewardship roles and responsibilities, and continue integrated involvement in all land management planning efforts.

### ***Relating Threats and Risks***

Traditionally the federal wildland fire agencies have analyzed their capabilities based on past conditions or risks. This has placed the agencies at a severe disadvantage in anticipating the future and adjusting strategies to meet future threats. Given public expectations and political ramifications, agencies need to apply the best-known science to date in addressing future conditions that will have a negative or positive affect on the public lands and the communities nearby.

The probability of more frequent, larger-scale and severe fires forces the federal fire agencies to plan carefully how they will respond on this new plateau level of wildland fire behavior. The QFFR confirms the four threats examined in Chapter 1 as core characteristics of this new era. To reiterate:

***Fuel accumulations stands as a significant causal factor for catastrophic fire.*** It is also fairly well accepted that biomass is accumulating faster than it can be treated. The situation is further complicated by the increasing problem of exotic invasive plant species. Even if the significant increase in fuel treatments at all levels of the past five years is sustained, it may only have limited effect in controlling the rise in wildland fire and reducing the impacts of extreme fire.

***Directly linked to fuel is the predicted longer term, thirty year drought cycle that climatological data indicates the nation entered in the mid 1990's.*** This drought coupled with the possible effects of abrupt climate change and temperature warming will significantly impact various vegetative regimes across the country. Areas, which have not traditionally witnessed large catastrophic fire, will begin to experience these fires as the vegetation begins to adapt to drought and climate change.

***Demographic shifts from metropolitan areas to rural areas also complicate the problem by putting more people into fire prone areas in the wildland urban interface or intermix.*** While some of the newer communities and structures have been created with wildfire defense in mind, far too many have not. They, along with many older

communities and homes, have been established with inadequate regard to fire adaptability and survival.

***Public focus is on protective measures, such as saving property and preserving the surrounding area, rather than defensive and preventive measures.*** This has and will continue to divert firefighting resources from their primary suppression management mission and into more hazardous suppression containment situations. The lack of human community fire resilience also limits the agencies’ range of management responses to fires near communities.

It can be further anticipated that large fire incident frequencies will increase largely due to the fuel accumulations, weather patterns, and public pressures. The possibility exists that the traditional fire season will be extended in various portions of the country. This trend may be further affected by an increased demand for the agencies’ expertise in incident management on other emergency incidents. The possibility also exists that these other emergencies may take precedence over wildland fire emergencies and project implementation. Balancing this potential is critical if agencies are to fulfill their land stewardship and fire management responsibilities in the future.

***Redeveloping Core Capabilities***

To ensure these new integrated mission strategies are able to address the threats and risks noted above, agencies will need to enhance or establish different core capabilities for the future. The integrated mission strategies require strengthened or new core capabilities in planning, decision-making, priority setting, monitoring, ability to respond, community relationships, community education and training and technical assistance in incident management. In the figure below (**and not listed in any priority order**), these core capabilities are aligned with their respective mission strategies:

<b>Mission Strategy</b>	<b>Core Capabilities</b>
Ensuring Fire Management’s Role in Ecosystem Sustainability	<ul style="list-style-type: none"> <li>• Integrating Planning</li> <li>• Enhancing Decision Making</li> <li>• Ensuring Seamless and Integrated Fuel Programs</li> <li>• Establishing Monitoring</li> <li>• Broadening Ability to Respond</li> </ul>
Promoting Fire-Adapted Human Communities	<ul style="list-style-type: none"> <li>• Strengthening Community Relationships</li> <li>• Expanding Community Education</li> </ul>
Balancing Emergency Response	<ul style="list-style-type: none"> <li>• Providing Training and Technical Assistance</li> </ul>



Each of these capabilities will be assessed in depth later, but a brief overview of what each entails is an important preface to describing how agency roles, responsibilities, and resources need to be aligned for the future.

**Integrating Planning.** If the role of fire management in ecosystem sustainability is to be established, a truly integrated planning process is essential. Agency land management planning and fire management planning will be linked in a process that better aligns resource objectives with fire regime dynamics and promotes collaboration among all stakeholders. As agencies move towards the full implementation of Fire Program Analysis (FPA), the fire management plans developed for each fire planning unit could consider a full range of appropriate management responses (AMR). Fire management plans in the future should consider point protection as an equally acceptable approach as perimeter control to wildfire management.

**Enhancing Decision Making.** Two concurrent objectives are entailed in the goal of improving decision-making involving wildland fire. The range of the decision process is to be improved and the decision-making environment should be expanded. Expanding the process means initial response will allow for the full range of appropriate management response (AMR). This would combine the fire use and fire suppression decision into a single decision process. Decision criteria should be provided to allow for consideration of investments in reducing or maintaining fuel profiles rather than simply the cost of suppression. Enhancing the decision making environment would provide support for decision makers who select AMR's that may entail higher risk as long as the decision is well-reasoned and supported by the best available science. Decision makers should also collaborate in advance with stakeholders to increase public understanding of wildland fire and the risks involved.

**Ensuring Seamless and Integrated Fuel Programs.** Seamless and interagency landscape scale programs and projects that are integrated with resource management should be given priority. Agencies are already moving from simply "treating acres" to strategically treating acres. Fuel management must also ensure continued maintenance to protect investments in areas where desirable conditions have been obtained through projects or wildfire.

**Establishing Monitoring for Adaptive Management.** Better evaluation is essential to ascertain whether land conditions are improving, values are being protected, and better strategies and tactics are being used in the full range of wildfire decision-making. Effectiveness monitoring protocols should be developed to assist line officers, agency administrators and incident commanders and their teams based on best available science. Monitoring for adaptive management should assess land condition outcomes, impacts of tactical operations and strategic decisions in AMR, and costs. Monitoring capabilities should also be extended outside the organizational boundaries of the federal agencies to involve Non-Government Organizations (NGO's) and other stakeholders.

**Broadening Ability to Respond.** The future will require that all wildland fire management resources are capable of handling the full range of appropriate management

response. Broadening the ability to respond will require expanding the range of fire management forces from the adoption of the proposed National Incident Management Organization (NIMO) initiative to developing Type III incident management teams at the local level. These teams should be capable of accomplishing the full range of AMR. It will also be crucial to incorporate long-term assessment skills in wildland fire incident management as well as fire and fuel organizational structures.

**Strengthening Community Relationships.** The goal of helping communities at risk in the WUI has been a priority since the establishment of the National Fire Plan. Strengthening community relationships means first promoting community self-sufficiency and collaborating with local leaders on Community Wildfire Protection Plans (CWPP). Then more traditional programmatic efforts can occur to provide assistance to WUI communities from enhancing local fire protection capability to establishing building codes, zoning ordinances, and landscape defense tactics.

**Expanding Community Education.** Goals for community education programs go beyond simply improving the fire prevention message, as effective as that message has been in the past. Fire management's capability must include helping develop fire leadership at the community level and understanding community expectations and concern for resource values (air, water, view shed) beyond simply protecting homes. The Firewise program and its extension Firewise Communities USA is part of this wider effort. Expanding community education should help shape more realistic public expectations of the federal fire agencies and promote the concept of creating fire adapted communities that complement the fire adapted ecosystems that they adjoin.

**Providing Training and Technical Assistance.** The capability of the federal fire agencies to provide effective initial and extended emergency response to any number of incidents has already been established. Balancing the demands on this capability with the National Response Plan and the agencies core missions is the issue. First response would be limited to existing roles and agreements, which support local and state emergency incidents. Extended responses would be limited to the National Response Plan as negotiated with the various annexes. The overall capability would then allow for dependent agencies to redeem their own responsibilities in emergency response. Fire management would focus on providing training and technical assistance as needed and creating new partnerships for learning exchange and information transfer.

### ***Roles and Responsibilities***

Each of the capabilities noted above is based on the assumption that federal fire agencies will assume key roles and responsibilities for successful performance.

For fire management's role in ecosystem sustainability there must be effective integration of fire and fuel into agency land management planning. While considerable efforts have been undertaken to improve both agency land management planning and fire management planning, recent studies and fire reviews have questioned whether there is a clear line of sight between the two processes. This linkage is critical if there is to be an

effective analysis of tradeoffs both for fire suppression decisions and fuel treatment prioritization. Decision support for AMR must be strengthened so that decision makers can quantify values, costs, and benefits and assess short and long-term effects. Strategy decisions will be improved if they are based on building better tools for decision-making and better training for fire management decision makers.

Roles and responsibilities must shift somewhat for successful accomplishment of the fire adapted human communities mission strategy. The ultimate objective is to enable communities to create their own fire-safe environment, lessening the need for federal protection and treatment and freeing up federal dollars for ecological restoration on the rest of the land. In terms of responsibility, this mission strategy aims to move from a rescuer-protector relationship to one of responsible partner with responsible and capable partners.

There will be continued demand for wildland fire community involvement in emergency response; however this dependency needs to be reduced. Negotiations within each annex of the National Response Plan can limit or at least balance the federal wildland fire agencies' response. Although there will be an anticipated need for training and skills transference, fire management must be also cognizant of the additional workloads on organizational staffs, coordination centers, and training centers to provide technical assistance. This will go well beyond current capabilities using existing methods. Partnering and extensive use of contract instruction methods would potentially reduce impacts.

### ***Resources and Investments***

In terms of investment strategy, the QFFR recognizes current budget realities that dictate a budget neutral posture for the future. Fire and fuel management can expect to be in the same no-growth position as with both the US Forest Service and the Department of Interior agencies. Investments needed to make the transformation to new strategies must come from realignment or repositioning of existing programs.

Fire management's role in ecosystem sustainability begins with seeking more integration of Agency Land Management Plans (LMP) and Fire Management Plans (FMP) including prescriptive criteria and critical decision thresholds. Land and resource management planning must include considerations for fire and its effect on the fire management program, as well as the ecosystems the planning process is designed to protect.

To support Appropriate Management Response (AMR), decision-making processes and tools should include better use of predictive services, risk analysis and decision theory applied to fire management. A system is needed that allows for pre-positioning of resources that is based on best available predictive tools. All Incident Management Teams (IMT's) need to be able to cope with the full range of management responses and the objective of reducing costs and improving efficiency. Decision makers will need better decision-making training and tools.

The investment approach for fire adapted human communities is essentially building relationships with communities and property owners before investing capital. Current investments should emphasize zoning and building requirements, especially for any new communities or new building sites in the WUI. Fuel manipulation for defensible space would still be supported for existing homes and communities in the WUI. Overall, community wide protection plans and commitment to long-term maintenance would be essential.

Investment in emergency response should be redirected to establishing partnerships with other agencies to provide training. The use of contract instructors would significantly lower the reliance of other agencies on the wildland fire agencies. When deployed in accordance with the National Response Plan, fire agency incident management teams would still be expected to support non-fire incidents by providing mentoring and training to other agencies, but resource emphasis should be on short-term response, not longer-term recovery efforts

### ***Making the Transition***

Each of the three mission strategy threads requires a different level of change for successful performance. Fire management's role in ecosystem sustainability would benefit from its reinforcement of current mission goals and its broad scale support of all five federal agency missions and values. Of course, improving the linkage to agency land management planning will not be easy, but the movement towards Fire Planning Units (FPU) as part of FPA should help with the transition. AMR will need better tools and training for decision-making and a re-examination of who should be making decisions with incentives for accepting risk.

The transition approach for fire adapted human communities is to think solely in terms of the long view and avoid short-term programs that address symptoms, but are counterproductive in terms of long-term community sustainability. Strategies should support communities organizing to take action, striving to be self-sufficient, and above all becoming more comfortable (and knowledgeable) with prescribed and natural fires in their environs.

Finally, the emergency response strategy will split short and longer goals. In the short term, efforts will be directed at providing support and real work assets – as requested within “resource reserves” and consistent with the National Response Plan (NRP). Over the longer term, the mission strategy would seek to further increase capabilities of other agencies, which will reduce the dependency on fire resources, expand other agency resource availability to fire and limit non-wildland fire responses as outlined in the NRP Annexes. The path forward can be summarized as providing direct support and resources for the near term in accordance with the NRP.

### III

## Force Structure and Infrastructure

The QFFR recognizes the commitment and investment made in the National Fire Plan and reaffirmed in the Healthy Forests Restoration Act to ensure adequate protection from the threats of wildland fire. However, over the next few years, as agencies seek to cope with mounting federal budget deficit pressures to reduce expenditure levels in all programs, fire management's force structure and ability will be similarly pressed. Regions can expect some variation in their preparedness force structure numbers as they deal with larger program cost pressures, financial adjustments, and other budget issues.

While funding levels for the current force structure numbers in preparedness are projected to be maintained, operational and equipment costs will continue to increase. Inflation has been relatively benign over the course of the past five years, but some projections for the next half-decade indicate that firefighting operations could be subject to much greater cost escalation. If energy prices stay high, as reflected by significant increases in crude oil prices over the last few years, more dramatic cost increases in agency operations and contract operations could be expected.

### *Current Force Structure*

The primary objective is to maintain the core fire management force structure, especially at the local (initial response) level, and maintain the initial attack success rate. This may be challenging as the federal budget remains static and operating costs increase. While the preparedness resources summarized in the table below are not absolutes; as the federal fire agencies move towards the implementation of Phase I of FPA, they represent basic thresholds for support of local fire and fuel management.

Table 2 Preparedness Resources

Preparedness Resources	Department of the Interior					USFS	Federal
	BIA	BLM	FWS	NPS	Total	FS	Total
Personnel							
Firefighters (inc IHC)	1,140	2,265	295	495	4,195	10,010*	14,200
Smokeyjumpers		150			150	300	450
Overhead + Prevention						475	475
<b>Total</b>	1,140	2,415	295	495	4,345	10,785	15,125
<b>Teams (all agencies)</b>	<b>Type</b>						
	<b>I</b>	<b>II</b>	<b>II State</b>	<b>FUMA</b>			
	17	35	22	7			

Source: National Fire Plan Office December 2004

\* Some Estimates Revised in Spring 2005\*

Table 2 does not reflect the presence of state, local, and volunteer department firefighters involved in preparedness. Currently, state and local government forces are providing over 10% of the total, national response capability. At the local initial attack level it is considerably higher. There are several initiatives currently in progress among the NWCG, NASF, and the US Fire Administration to integrate local government forces into the overall, interagency response capability to reflect true national resource levels.

Fuel management efforts are also projected to be on track for the next decade. It is expected that the actual program measurement will change to a more outcome results metric, but the simple output measures below show the imprint of federal efforts. Overall acres treated have increased by half and acres treated in the WUI have more than doubled. Hazardous fuel work is accomplished by a variety of forces, such as agency and contract fuel management crews, fire crews, contractors, and resource crews.

**Table 3 Hazardous Fuel Treatment Acres**

<b>Hazardous Fuel Areas – WUI &amp; Total</b>					
<b>Acres include all Treatments Affecting Fuel</b>					
<b>WUI Acres</b>		<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>
<b>Totals</b>	<b>BIA</b>	8,415	24,501	43,979	69,796
	<b>BLM</b>	98,590	118,274	259,182	215,269
	<b>FWS</b>	54,489	51,514	154,426	169,051
	<b>NPS</b>	2,843	15,030	22,523	35,770
	<b>FS</b>	611,551	764,367	1,114,106	1,311,272
<b>Grand Total</b>		775,888	973,686	1,594,216	1,801,158
<b>All Acres</b>		<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>
<b>Totals</b>	<b>BIA</b>	74,010	120,761	156,911	191,921
	<b>BLM</b>	313,978	321,086	576,831	491,687
	<b>FWS</b>	242,433	453,605	387,468	445,012
	<b>NPS</b>	97,691	163,511	137,627	131,365
	<b>FS</b>	1,361,697	1,198,518	1,453,345	1,803,526
<b>Grand Total</b>		2,089,809	2,257,481	2,712,182	3,064,209
<b>Percent WUI</b>		<b>37.1%</b>	<b>43.1%</b>	<b>58.8%</b>	<b>58.8%</b>
<b>Acres Rx Fire</b>		1,652,409	1,789,022	2,036,561	2,345,166
<b>Percent Rx Fire</b>		<b>79.1%</b>	<b>79.2%</b>	<b>75.1%</b>	<b>76.5%</b>

Source: National Fire Plan Office December 2004

While there have been substantial gains in fuel treatment efforts, fuel accumulations are growing at a pace faster than the current force structure can treat. To address the

situation, the federal fire agencies will need to realign current strategies and take full advantage of all assets that can be used for increasing treatments.

### ***Force Strategy and Requirements***

As outlined before, the integrated mission strategies focus on establishing and strengthening eight core capabilities: planning, decision-making, priority setting, monitoring, building ability to respond, community relationships, community education, and emergency response. Looking to the future, fire and fuel management must address different strategies and priorities within each of the core capabilities as well as repositioning the force structure. Each of the core capabilities is discussed below with a tab figure insert denoting appropriate shifts and changes in workforce and infrastructure requirements. The increased workload may require additional positions, redirecting current work, and/or curtailing lesser priority work within the agencies.

**Integrating Planning.** In land and resource management decision making, planning consideration of the overall needs of the ecosystem must include the ecological role of fire and the consequences of the no action alternative. Satisfying NEPA at the highest level reduces the amount of NEPA work done on a project-by-project basis, saving time and more fully addressing important ecosystem issues. Ways are needed (analysis and modeling) to identify what the new potential vegetative communities are, compared to what the current or historic communities were. In the future, fully integrated planning processes must establish the desired future condition in the realization that it may not be the same as what existed in the past.

The goal is a paradigm shift, where the public would expect that fire would be allowed to play its natural role and question why we would propose to put fires out. Similarly, there would be a paradigm shift in wildfire suppression culture to implement Appropriate Management Response. AMR would not default to full perimeter containment/control, but rather consider point protection as an equally acceptable approach to wildfire management. This approach would mitigate the rapid increase in suppression costs and provide for additional fuel treatments. It would reduce the potential for future large fires by eliminating wasteful suppression decisions and treating more area through the use of fire.

To the extent possible, Fire Planning Units (FPU) should develop Interagency Fire Management Plans. Where this is not possible, (e.g. where there are single agency FPU's) effort should be made to ensure that the planning and implementation of AMR in one FPU (or one agency within an FPU) does not hinder implementation in the adjacent FPU (or adjacent agency within an FPU). Collaboration will be vital between adjacent FPU's to ensure political boundaries do not hinder full implementation of AMR concepts. Agencies should work to develop joint planning to allow fire to be used on a landscape basis across agency lines. Non Government Organizations (NGO's) and private landowners should be included in fire management planning efforts. Increased capability to collaborate in prescribed fire would facilitate the process.

Capability	Strategy	Force Structure & Infrastructure Requirements
<b>Integrating Planning</b>	Migrate planning for Fire & LMP to FPU level (landscape)	2-5 positions per FPU(s) = approx. 300-500 Positions (Current system subsidizes resource planning - this redirection could assume 50%-60% investment). Some economies of scale on landscape

Positions to be added at an FPU level might include fire planners, fire ecologists, GIS specialists, fuel/fire behavior specialists, monitoring specialists, archaeologists, etc. Three per FPU is a rough estimate - some FPU's might need more, some will need less. These positions will assist with interagency resource and fire management planning at the FPU level, but some of these positions will also be needed at the geographic area and national levels to direct and coordinate higher FPU level activities.

**Enhancing Decision Making:** Federal policy should support full AMR at local levels or within specific bureaus. Individual units or bureaus may elect to implement more restrictive approaches. The Wildland Fire Situation Analysis (WFSA) process should not be a perfunctory exercise used to justify a decision already made. Instead it should evaluate alternatives for determining the best overall strategy for managing a large wildfire. The WFSA process needs to be redesigned to make it fit the decision being made. There is a need to combine the WFSA process with the Wildland Fire Implementation Process (WFIP) for a single process of determining strategies for managing a wildland fire ignition.

More consideration must be given to the longer-term benefits of fuel reduction (in reducing potential for large fire in the future) when evaluating alternatives in the WFSA process. Decision-making must also be improved at the agency administrator level. Local line officers currently have few incentives and experience many disincentives for making an appropriate management response decision which entails even a modest increase in risk of eventual escape onto private lands or damage to public property. Well-reasoned decisions can be achieved if risk trade offs are analyzed. This analysis will provide a basis for a more informed and balanced decision. It will also create a culture that allows Incident Commanders and Incident Management Teams (IMT) members to recognize errors in judgment, highlight good decisions, and consider better strategies and tactics in the After Action Review (AAR) setting. Monitoring should involve primary Command and General Staff positions of the IMT in AAR.



Capability	Strategy	Force Structure & Infrastructure Requirements
<b>Decision Making</b>	Expand the range of decisions under AMR and improve decision making ability and leadership skills for fire managers and line officers/agency administrators	No additional force is necessary, only a change in direction for existing work  Build strengths in Predictive Services – GIS etc (25-75 Positions) Public Affairs Officers – 50-70 positions (Some overlap with existing positions)

**Ensuring Seamless and Integrated Fuel Programs.** The substantial increase in fuel treatment efforts among the agencies must be moved to an increased level of effectiveness. Individual agency targets must be replaced with an interagency landscape perspective. Barriers to pooling money, cross billing, and accountability for accomplishments must also be addressed. Current policies and internal processes sometimes impose disincentives for interagency operations, establish competition for funds, and assign targets to individual units rather than set collaborative targets for accomplishments at the landscape level across agency boundaries.

A new method to measure accomplishments is needed (not burned acres by agency). This new method should also allow the transfer of money across boundaries and still enable agencies to get credit for fuel reduction accomplishments. Finally, the maintenance of treated areas must be addressed as a priority for both prescribed fire and wildfire acres.

Capability	Strategy	Force Structure & Infrastructure Requirements
<b>Ensuring Seamless and Integrated Fuel Programs</b>	Pursue seamless integration of fuel treatment efforts in the landscape-setting priorities that reflect interagency and community priorities	Priority setting may not require additional staffing- but probably will demand additional skills in the current workforce.

**Establishing Monitoring for Adaptive Management.** Create a culture which allows Incident Commanders and Incident Management Teams (IMT) members to recognize errors in judgment, highlight good decisions, and consider better strategies and tactics in an after action review setting. Monitoring should involve primary Command and General Staff positions of the IMT in After Action Reviews (AAR).

Land condition outcomes would be addressed via strategy/tactics in AAR's, as well as environmental effects monitoring of the actions undertaken. A feedback loop for

improving decisions given the findings of AAR's is necessary. Using experienced NGO's in the monitoring process should be fully considered.

Capability	Strategy	Force Structure & Infrastructure Requirements
<b>Monitoring for Adaptive Management</b>	Refocus existing evaluation systems to ensure ongoing monitoring of decision making under AMR, fuel priorities, etc	Wildland Vegetation Management monitoring required. Assigned to Geographic Areas

**Broadening Ability to Respond.** Enable all levels of IMT's to accomplish the full range of AMR and enable all current wildland fire management forces to accomplish mission objectives associated with the full range of AMR. One response should mean no differentiation between Wildland Fire Use and wildfire, just the appropriate response to an ignition. Role definition, capabilities, and configuration are decided at the local level and will vary from place to place.

Centralizing and pooling the management of resources (although resources may be distributed in the field) would improve the ability to look at the big picture when setting priorities and perhaps create economies of scale.

Capability	Strategy	Force Structure & Infrastructure Requirements
<b>Ability to Respond</b>	Transformation of existing team structures -- away from overspecialization to national and local structures that emphasize agility and ability to respond to larger range of fire incidents	<ol style="list-style-type: none"> <li>1. Adopt NIMO* 7 by 7 - 49 national positions, plus one national manager = 50</li> <li>2. Ensure 50 IMT's are available (T1&amp;T2, including NIMO), Sustain 20 plus state and local teams</li> <li>3. Ensure teams are standardized, able &amp; agile.</li> <li>4. Absorb --Convert 6 FUMT to Type II all purpose IMT's</li> </ol>

\*Note: NIMO membership needs to maintain an interagency composition. As currently designed, NIMO is a 5 year test program with full review at the end of the period. , Actual numbers of teams and size should follow the recommendations of the NIMO implementation team

**Strengthening Community Relationships.** Current fire program efforts will continue in the fuel management and fire prevention arenas to reduce risks to communities and property owners in the interface and intermix. Treatments of WUI lands will continue to be a priority where communities have a CWPP, zoning and building requirements, and fuel manipulation for defensible space. The rationale here demands a shift over time to building relationships before investing capital.

Capability	Strategy	Force Structure & Infrastructure Requirements
<b>Community Relationships</b>	Reemphasize local and geographic skills to strengthen working relationships at local levels especially within planning, decision-making, and fuel integration.	No new positions required.

**Expanding Community Education.** Public education must be integrated into ongoing collaboration and consultation efforts with communities, especially those in the WUI. This capability cannot be resolved by simply adding Public Affairs or Education Specialist positions. It also must be recognized that this capability entails more than simply adding new skills. Communication education will require an organization cultural shift and may not be easy to accomplish.

To this end, it is important to make community education a process as opposed to another program. It must strongly support the expansion of the FIREWISE and community fire leadership efforts/Likewise, it should promote and generate joint risk assessment, fuel treatment, and restoration collaborative planning and project proposals such as the emerging FIRESHED initiative. (FIRESHED is an example of a collaborative fire planning process established and tested in California. It brings stakeholders together and illustrates the effects of alternative treatment actions (and no actions) proposed for a landscape). Partnerships with existing community groups and NGO’s should be emphasized.

Capability	Strategy	Force Structure & Infrastructure Requirements
<b>Community Education</b>	Reorient existing workforce (Prevention Teams, WUI Specialists, and Public Affairs) to support public education	No new positions required.

**Provide Training and Technical Assistance.** The federal wildland fire agencies emergency response capability will be limited to requirements as defined in the National Response Plan (NRP) and the Departments (USDA and DOI). Training expertise must be sustained while working with other dependant agency partners outside the wildland fire community.

Capability	Strategy	Force Structure & Infrastructure Requirements
<b>Provide Training and Technical Assistance</b>	Enhanced training capacity in Incident Management (IM)	Sustain academy level high-level expertise in managing IM Training  Provide technical assistance to responders

## ***Management and Organizational Structure***

The federal fire agencies are currently on track to reorganize the fire management structure at local levels with the implementation of Fire Program Analysis (FPA). By fiscal year 2008, FPA will provide Agency Administrators and Fire Managers with the tools to transform the former agency specific program units into a new national network of approximately 150 Fire Planning Units (FPU). A key part of that restructuring will be potential resource realignment as the budget element of FPA determines financial and personnel needs to accomplish the range of fire management responsibilities to be met in each FPU.

Future attention must also be given to refocusing the national wildland fire management organization and structure. The current organizational design is best described as an intricate, interagency and multidivisional form. It was designed to provide reasonably fast and responsive solutions to the problems of coordinating and dispatching large numbers of personnel and equipment to perform interrelated activities in multiple locations regionally and nationally. The National Interagency Fire Center (NIFC) and the National Wildfire Coordinating Group (NWCG) personify this organizational ideal. But NIFC was created in the 1970's and much has changed in terms of size, scale, and systems in the last 30 years.

The QFFR did not examine the current organizational structure or the management requirements of the five federal agencies in terms of either national or regional/geographic basis. Rather, the purpose of the QFFR was to develop future mission strategies and chart how the roles and responsibilities need to change to keep pace in a dynamic environment. However, what is important to recognize is that the tenets of organizational design have changed over the past quarter century. Structure now follows strategy, not vice versa. The classic industrial organizational model with its emphases on large economies of scale and interchangeable parts has been displaced by new organizational designs emphasizing agility, speed, process efficiency, and highly competent personnel and interconnected technologies.

The QFFR defines new mission strategies and objectives for repositioning the workforce within fire management in eight core capabilities to meet future risks and threats. The federal wildland fire agencies should at a future juncture begin an examination of how the larger structure (national and regional) of the agencies could be adapted to accomplish fire management's mission and how it should support the interagency-landscape organizational changes.

## IV

### Workforce Preparedness and Development

The federal wildland fire agencies have long used a variety of workforce resources, both internally and externally, to accomplish the full range of the fire and fuel management missions. With the increase in funding and hiring from the National Fire Plan in 2000, fire management took a major step towards transforming a mostly bi-professional-volunteer workforce to a more dedicated professional fire management force. Likewise, efforts to raise firefighting and emergency response capabilities increased among tribal, state, and local partners and volunteer fire departments and contractors. The challenge to the agencies now is to identify the effects of a flat budget with increased overhead costs and buying power which will require re-assessing organizational structures and alternative forms of hiring and service acquisitions.

In suppression, the federal agencies still rely on their fire preparedness funded resources and other resources from non-fire programs, which make up the “militia” for fire. The militia provides valuable resources to both fire suppression and prescribed fire, and their involvement in the future will be essential. In 2004, there were more than 32,000 personnel qualified to support and/or fight fire and approximately 15,000 of those have participated on “all-risk” incidents. These “responders” are located throughout nine geographic areas across the United States and are classified as national, regional, or local resources for wildland fire. The table below shows the current numbers of employees who are currently qualified (i.e. Incident Qualifications Card) by agency and region.

**Table 4 - Incident Qualifications Carded (IQC) Personnel**

	IQC Firefighting and Support Personnel					Geographic Area	
	BIA	BLM	FWS	NPS	USFS	Totals	Pct
<b>AK</b>	3	418	38	26	199	684	2.1%
<b>CA</b>	152	358	55	593	3,583	4,741	14.8%
<b>EA</b>	191	2	256	495	1,366	2,310	7.2%
<b>GB</b>	359	1,441	24	260	2,258	4,342	13.5%
<b>NR</b>	1,453	275	121	260	2,405	4,514	14.1%
<b>NW</b>	604	898	113	253	3,237	5,105	15.9%
<b>RM</b>	525	478	137	368	1,356	2,864	8.9%
<b>SA</b>	216	31	370	595	2,199	3,411	10.6%
<b>SW</b>	1,891	370	52	298	1,514	4,125	12.9%
<b>2004</b>	<b>BIA</b>	<b>BLM</b>	<b>FWS</b>	<b>NPS</b>	<b>USFS</b>	<b>Totals</b>	
<b>Totals</b>	5,394	4,271	1,166	3,148	18,117	32,096	
<b>Pct</b>	16.8%	13.3%	3.6%	9.8%	56.4%		
<b>1999</b>							
<b>Totals</b>	3,167	4,137	2,137	5,657	18,051	33,149	Estimated
<b>Pct</b>	9.6%	12.5%	6.4%	17.1%	54.5%		

*Source: National Interagency Fire Center, December 2004*

In terms of overall change over the past five years, the number of certified incident qualified personnel has remained about the same. The table's comparison of the pre-National Fire plan numbers (estimated at just over 33,000) indicates a slight decrease to the current 32,000 number. The incident qualifications data base system has been completely revised because of the old system's inaccuracies that overstated totals by 10-15% percent.

This QFFR is premised on the near term assumptions that the total preparedness workforce strength (nearly 16,000 fire fighter equivalents) will be sustained while the total incident qualified numbers (over 32,000 individuals) may slip due to a number of factors. One dominant issue that must be considered is the impacts of workforce reductions, increases in workload, and re-organizations in non-fire program areas that could affect the future availability of the fire militia. Other challenges will include maintaining certification levels and meeting training requirements in the growing complexity of fire management work.

The federal wildland fire agencies devote a significant amount of time and resources to training and employee development. This begins with the basic and advanced training required so that all fire management personnel meet interagency standards and are certified as qualified to perform their duties. Agencies also provide advanced technical and specialized training for the full range of fire management activities at the regional and national levels. For FY 2005 the agencies reported to Congress an estimated total cost of \$58.7 million for all levels of fire management related training, with the Interior agencies at \$29.2 million and the Forest Service at \$29.5 million.

Building the workforce capacities to accommodate the new mission requirements outlined in the QFFR will require realignment and redirection of the existing workforce. Succession planning will be needed to assist in career planning and development. The workforce cannot simply be stretched to accomplish increasing workloads to essentially "do more with less." The nature of fire and fuel management work will still require high levels of reliability, and concerns for safety are always paramount. The reality of current and future budget levels entails improving existing workforce skills, shifting to multi-purpose roles, and ensuring that better decisions are made and are consistent with the cost management goals pursued by fire management at all levels. Investments in training will be needed to improve workforce capability. Alternative forms of hiring and acquisition of services will have to be explored.

The Fire Program Analysis (FPA) system will reinforce the need for realignment as resource allocation lines are drawn around FPU's as opposed to the parochial units. FPA will also assist in identifying the shifting of preparedness resources to where they are needed. Interagency planning with adjoining FPU's will further improve resource placements across all of the agencies.

## ***Building Workforce Capacity***

**For Ensuring Fire Management's Role in Ecosystem Sustainability.** Workforce capacity must be built through the redistribution of the existing workforce. Agencies must accept and cope with the fact that future budget increases will not occur and the most effective workforce must be planned for under current budget limitations. Agencies will also need to include external partners to increase the capacity for monitoring.

Broad-scale landscape management planning with ecosystem emphasis will set the stage for informed decisions on the prioritization and location of fuel treatments. There is an expectation that gains in improving condition class will come from less aggressive suppression responses, returning periodic fire to dynamic ecosystems and achieving restoration objectives. Increased point protection and less full perimeter control will result in more acres having the hazards reduced under the appropriate conditions.

Interagency, interdisciplinary planning teams will need to focus on landscape, fire planning units or other large scale endeavors, to plan and establish objectives for ecosystem management and fire's role. This may require a temporary shift of staffing in the planning function from one area to another to support the restoration of fire-adapted ecosystems. Strong steps must be taken to create consistency among the levels of planning, connecting the national interagency policies to Land Resource Management Plans to Fire Management Plans and down to project level plans. It needs to be understood that this will take time because of the divergent policies, regulations and planning approaches that have created barriers to interagency and interdisciplinary collaboration.

Fuel program priority settings will need to be established whereby agencies would not have to compete for funding and would actually be rewarded for creating new approaches to interagency planning and target accomplishment. Currently there are simply too many interagency barriers and disincentives to promote the pooling of resources and melding different funding options to accomplish the type of projects needed for seamless fuel program integration. But this can only happen if a culture shift occurs in the way accomplishments are measured and if policy changes can be made to foster working across agency boundaries.

As previously discussed, operational decision-making needs to consider the full range of Appropriate Management Response (AMR). Consideration of the limitations of jurisdictional capacity and size of a unit needs to be included in developing the preplanned responses. Considerable effort should go into the planning process prior to the implementation of AMR. Long Term Analyst (LTAN) skills are essential to successful implementation of AMR and are currently a critical shortage category. Collaboration with resource specialists to view natural ignitions on a landscape scale as an opportunity to improve ecosystem function and reduce overall single species conflicts. Fire science needs to be a major component in land and resource planning process to support decisions for long term fire events.

**For Promoting Fire-Adapted Human Communities.** To fully promote fire adapted human communities and reduce dependencies on the federal government, local fire workforce capacity needs to be built to assist these communities. This would require refocusing fire prevention efforts to provide more special assistance to communities and extra assistance to low capacity communities. The refocused effort would also provide sources for technical assistance to community fire leadership in the development of local policies, ordinances, and laws that would create fire safe communities. Fuel expertise would be needed at the local level to provide planning for “long-term” maintenance goals.

The fire adapted human community can be further promoted using federal and state grants to complete and utilize the CWPP process. FIREWISE can be integrated into the CWPP process to increase local community self-sufficiency and address wildland fire protection needs. Skill sets for Community Educational Specialists will need to be developed to assist with these programs.

**For Balancing Emergency Response.** The broader concept for emergency response is to ensure the agencies respond to non-wildland fire incidents in accordance with the National Response Plan. Agencies should provide leadership and assistance to non-fire agencies to increase capacity and decrease the reliance of these same agencies on the wildland fire resources through partnered training and mentoring programs. The wildland fire agencies have a limited number of available subject matter experts to assist in this endeavor; thus partnering and competitive sourcing would be key elements to building this capacity. With the limitation and shortage of experts to provide wildland fire courses of instruction, it would probably not be possible to stretch these resources further into the non-wildland fire emergency response and other agencies training programs.

Training capacity in incident management systems needs to be managed to meet the current and future demands. While the National Response Plan will define the demands, fire management’s resource supply must be regarded as limited. Training opportunities need to be leveraged with other dependant agencies, allowing them to take a lead role. Becoming a liaison to other non-wildland fire agencies on a national and international scale would enhance their capabilities and increase resources available to wildland fire agencies.

### ***Creating New Workforce Skill Set Requirements***

The general assumption of no net gain in positions within fire and fuel management due to funding limitations is a given, and the reality that some positions may have to be reduced given the existing budget scenario is also a strong possibility. This means accomplishing mission capacities must come through redirecting existing workforce skills and developing new workforce strengths. Planning skills need to include modeling for future ecosystem changes and emphasizing landscape ecology. Planners for both agency land management plans and fire management plans need better collaboration, conflict resolution and understanding of social demands skills. Decision making skills



need to include more predictive skills for long term risk assessments and monitoring to allow for adaptive management. Leadership and science needs to better support and create new learning experiences for the decision maker.

Community relations and education skills need to include knowledge of grants and agreements processes, assessing fire protection capability, technical knowledge of building codes and ordinances, FIREWISE use and promotion, and long-term fuel maintenance planning near fire adaptive communities.

Skills in fuel management need to be further developed to provide better modeling capabilities, adaptive management, risk assessment, fuel accumulation, and disturbance regimes. These skills need to be seamlessly integrated into all fuel planning efforts, which will further support decision makers. Most past successes in fuel management by the agencies can be attributed to strong local leadership. Future fuel management training efforts need to be focused on developing leadership in both fire managers and agency administrators.

The skill set for emergency response requires increased training skills to increase knowledge and experience levels of non-fire and NRP response agencies outside of the incident environment. Skills in mentoring external personnel during incidents will need to be enhanced and broadened. Competitive sourcing and contract management skills can also offer options for accelerating the dependency reduction.

### ***Transforming the Workforce***

A dual agenda must be pursued to transform the workforce to meld core capabilities and workforce capacities into successful mission accomplishments. In terms of core capabilities, workforce capacities must address the following:

- First and foremost the agencies' priorities must focus on meeting their land stewardship role, and fire management should continue to build its expertise in environmental leadership.
- Relationships need to be enhanced among fire management, line officers/agency administrators and resource management personnel to provide more cohesive leadership and integrated planning.
- Suppression strategies must be focused on fire's role in the ecosystem to maximize resource benefits and reduce costs.
- Prevention efforts need to be directed towards creating fire adaptability in communities.
- Educational programs must be enhanced to support the professional development of current and future employees in planning, decision-making, leadership and public education.

- Cadres must be provided to support and train non-fire agencies entering the field of incident management through the National Response Plan, which would reduce overall response involvement and provide additional resources for fire incidents.
- Monitoring systems need to be established, including third party monitoring, to ensure that fuel treatments are being accomplished and objectives met in accordance with established priorities for treatments.
- Partnerships must be created within communities to promote fire adaptability and support those communities that embrace the concepts.

A second part of the agenda must address human capital issues. There will be numerous challenges facing the federal agencies during this workforce transformation and development of skill sets for the future. Recruitment, training and development, retention, and safety will all pose new challenges to the agencies and affect all employees. The strength of all the fire management's programs rests, and always will, in its employees. Safety will always remain the top priority for all of the agencies. The current safety behavioral focus needs to now be expanded to a self-responsibility and accountability program. Ensuring safety as a core value will always remain and cannot be taken for granted at any time.

As a priority, the agencies must devote time and energy into recruitment in order to bring in new people and develop existing employees in planning, priority setting, and operations. New employees should be directed or counseled towards skill set areas where shortages are anticipated in both planning and operations. More emphasis needs to be placed on strategic sourcing in order to accomplish fuel treatments, enhance landscape defense management, and consider new approaches in the use of contract resources.

Training and development must be focused on increasing employee skills in the use of non-fire vegetation treatments, and ensuring that training and experience is accomplished in several different fire regimes. Grant development and contract administration training needs to be expanded upon and required at various levels in the agencies to further the opportunities for competitive sourcing. Federal and non-federal technical advisors need extensive education in NEPA, air quality and environmental regulations to ensure compliance.

Continuing the support of professional development within the fire and fuel programs will greatly increase retention and promote the agencies as the employer of choice. Attention must be given to the significant problem of looming retirements in fire management and succession planning for the next generation of fire leaders. Maintaining realistic workload expectations will also improve retention and provide better quality assurances on programs.

## V

### Operations, Resources and Technologies

The significant increase in program funding, fuel reduction treatments, and expanding the size of the fire workforce that came out of the National Fire Plan in 2001 moved operational levels in fire management and fuel treatment efforts to a new plateau. However, since 2001, the funding available to the field has remained essentially at the same levels and the number of field locations is unchanged. Meanwhile, rising employee costs, and the availability costs for aircraft and other contract fire support operations (caterers, transportation, showers, etc) have increased. Thus, the level of staffing for Initial Attack operations has decreased slightly since 2001.

#### *Current Assessment of Capital Assets*

The 2004 fire equipment roster listed in the National Fire Plan Report depicts the capital side of the current force structure’s capability of the federal agencies.

**Table 5 - Fire Equipment Resources**

Preparedness Resources	Department of the Interior					USDA	Total
	BIA	BLM	FWS	NPS	Total	FS	
Equipment and Apparatus							
Engines	227	319	75	160	781	1,220	2,001
Tenders	20	36	25	14	95	52	147
Dozers/ Tractor Plows	30	11	58		99	152	261
Boats	1	1	13		15	8	23
Aviation							
Helicopters (All exclusive use)	14	27	3	9	53	89	142
Air tankers	5	24			29	8	37
Other AC		29			29	21	50

*Source: National Fire Plan Office, December 2004*

The table above does not include the capital assets of state, local, tribal, and volunteer fire departments that are a critical part of fire preparedness. As future roles for these forces in all aspects of fire and fuel management are augmented, these assets need to be included in current state assessments and future planning. Likewise, capital assets of contractors and other suppliers need to be included.

The aviation assets listed above illustrate the significance of the latter. The table lists both those assets owned by the federal wildland fire agencies and the significant numbers of planes and helicopters under various national contract arrangements. Local contract aircraft services are extensive (the Forest Service alone has over 500 contractors and over

1000 aircraft under contract) and are present in all phases of current aviation support strategies in fire management from aerial delivered prescribed fire treatments to initial attack and large fire suppression operations.

The tragic aircraft crashes that occurred within the contract air tanker fleet and several warning signals that the Forest Service lead plane fleet encountered raised serious questions about the service life limits of these assets. As the agencies have grappled with these critical safety issues, efforts are underway to develop a new strategy to clarify the role of aviation in future fire suppression efforts. In early 2004 that strategy called for the following fleet configuration:

- A heavy aviation resource fleet composed of 15-20 fixed-wing, turbine powered airtankers and 15-20 large helicopters as recommended by the National Air Tanker Study (NATS). This represents “fewer, newer” fixed wing aircraft and provides dedicated and cost effective large helicopter support for large fires.
- Appropriate number of C-130 Military Airborne Firefighting System (MAFFS) units equipped with MAFFS II tank system.
- Aircraft capable of multi-mission tasking, approximately 20, including non-wildland fire missions (ASM/lead plane, remote sensing, forest health, administrative)
- Safely maintaining the smokejumper aircraft fleet while planning for modernization of the aircraft for smokejumper use and other missions
- Maintaining current levels (2004 baseline) of the helicopter program
- Significant enhancement of technological capabilities to include 100% TCAS equipped agency, smokejumper, and heavy airtanker fleet, 100% flight data recorder equipped aircraft, and 100% of the agency and contracted mission aircraft with automated flight following technology.

The above capability has already been revised significantly with the National Aviation Strategic Plan for 2004-2009, currently under review. As this new aviation strategy fully develops, a number of critical issues will have to be considered. Even if the asset cost issue (i.e. the price of new aircraft fleet being underwritten by a new appropriation) were resolved, it should be recognized that this is not a budget neutral strategy. Another large issue will be facilities. While many of the large air tanker retardant bases have undergone upgrades and modernization, almost all of the bases will require extensive work in order to meet hazardous material compliance regulations. Further, more large helicopters mean more helibases, which will require additional and upgraded facilities. The future investment strategy about aviation assets must incorporate plans for increasing remote sensing capacity through new technologies and appropriate platforms. For example, the military and NASA have made great advances in the Unstaffed Aerial Vehicle (UAV) as a platform for remote sensing technology. Processes need to be

improved to introduce, evaluate, and adopt new technology from the military, research, and other sources.

### *Strategic Sourcing*

In the 2005 QFFR, contracting and other forms of competitive sourcing were not considered to be an activity that would change or influence strategy. Rather, in this report, contracting was viewed as a tool that would be used to implement any of the strategy options considered by the various panels.

As mentioned, contracting is very important to federal wildland fire management. Contracts for activities in prevention, initial attack, large fire suppression, fuel treatment, and other fire management programs account for a significant portion of the expenditures. Without the use of contractors and other partners, the agencies would not be able to meet public expectations for protection, treatment, and restoration.

Contracting in the Fire and Aviation Management Program takes several forms. First is the traditional contract where the agency enters into a contract with another party to provide a service. The government also enters into agreements with organizations or other agencies to assist each other with fire management activities. There are suppression agreements between federal agencies, states, or other local governments that generally focus on mutual assistance along a common boundary. Federal agencies also grant money to states and other entities for fire management activities.

The types and volume of contracting needed to implement the strategy outlined in the QFFR may be a different emphasis or mix of contracts, perhaps using different procurement procedures, or an increase in the volume of contracts.

Over the course of the next five years, this view of contracting as simply a tool used to implement a strategy may change. Agencies are just beginning to implement a Competitive Sourcing Program that is changing the view of the types of activities and functions that can or should be considered for contracting. As that view changes and as more activities become eligible for outsourcing, the contracting and outsourcing program has the potential to impact the strategy and program philosophy in the future. Contracts will still be a tool for implementing a strategy, but a major shift away from relying on government employees will also begin to influence the various strategy options in the future. There are viable contracting options that would require a major internal reorganization or reengineering of the programs and the management of resources.

The future for the fire organization outlined in this QFFR assumes that contracts, agreements, grants, and emergency procurements will be a part, and probably a significant part, of the program. The federal government's view of competitive sourcing will continue to evolve. Agencies are beginning to study the feasibility of using contracted resources in more and more activities. This effort needs to be monitored and the changes will become a major factor in the future force structure.

## ***Preparing Fire Management for Future Operations***

The QFFR addresses several core areas worthy of significant investments to enhance the program capabilities needed for the DOI and USDA to meet future workload demands. Three areas can be assessed that provide the most potential to increase efficiency of the existing workforce:

- Resource Coordination (Ordering, Utilization, Mobilization)
- Decision Support and Prioritization (Predictive Services and New Technology)
- Logistical Support (Equipment, Supplies and Facilities)

However, just as future budget realities should dispel expectations for a large workforce increase, a flat budget in the foreseeable horizon means that modernization of operations and acquisition of new technologies must also meet cost containment or even cost-reduction goals. Essentially, the federal agencies must further develop their capability to more efficiently use the resources that are currently available.

### ***Resource Coordination***

Fire management is more than just firefighters, engines, and aircraft. The backbone of the federal wildland fire agencies' success in large fire response is their unique ability to coordinate the movement of vast numbers of firefighters and resources across the country. A network of interagency coordination centers throughout the U.S. maintains status information of all available firefighting personnel and equipment. These centers have the capability to order personnel and equipment, track asset movements, and arrange transportation to and from incidents throughout the country. The centers all utilize common ordering, tracking, and operating procedures to facilitate smooth operations. Coordination centers also provide current vital fire information such as weather forecasts and fuel conditions to fire managers. In addition, they make predictions for expected fire activity and intensity.

The coordination system is a three-layered organization linking national, geographic or regional, and local hubs. The National Interagency Coordination Center (NICC), located in Boise, Idaho has the responsibility to manage the movement of firefighting resources between the 11 geographic areas. The National Predictive Service Unit is co-located with the NICC along with the National Multi-Agency Coordination (NMAC) group. NMAC is composed of representatives from USDA FS, DOI Bureaus: BLM, NPS, BIA, and FWS, DHS-USFA, and NASF. NMAC is responsible for establishing national priorities for the allocation of firefighting resources and determining the National Preparedness Level.

The second layer of the coordination system is the Geographic Area Coordination Center (GACC). The eleven GACC's include: Alaska, Pacific Northwest, North Zone California, South Zone California, Southwest, Western Great Basin, Eastern Great Basin, Northern Rockies, Rocky Mountain, Southern, and the Northeast. They are composed of

the five federal wildland agencies, and usually, state representatives. Each of the GACC's is responsible to manage the movement of resources to incidents within their area, and to coordinate the ordering of resources from outside of the GACC through the NICC. Each GACC maintains a predictive services unit. During periods of high fire danger, geographic areas usually form a Geographic Area Multi-agency Coordination group to establish incident priorities for the area.

The final layer is the local coordination centers and dispatch offices, located throughout the U.S. They are usually interagency in structure and frequently include State fire representatives. Their primary mission is to dispatch resources to incidents within their given area, order additional resources through the GACC, determine local fire danger, and serve as a communication center for field operations. Coordination centers move federal, state, local and private resources and equipment across the country. They also access major resources maintained in a network of geographic area incident caches throughout the eleven GACC's.

One further key development in resource coordination should be mentioned. Over the past several years, NWCG has led the implementation of the Resource Ordering and Statusing System (ROSS), which has automated the supply and demand sides of requests for people and equipment for fire management. The future full implementation of ROSS means that coordination centers have a linked, fully functional critical resources management system in place.

The future of resource coordination, whether solely for wildland fire activities and/or non-wildland fire response involvement over the next 5 to 10 years is a broad horizon. With rapidly expanding Information Technology (IT) advances, electronic status, location, tracking, and ordering, are a must for timely resource coordination.

Implementing new technology in a timely manner, providing funding and training at all levels/locations, and supporting changes is paramount for successful coordination. Recruiting and maintaining a high quality, enthusiastic workforce is increasingly important as the coordination system plays a large part in meeting expectations and goals within wildland fire and other natural resource disciplines, agencies, and departments.

Resource coordination/response can be enhanced, in part, by additional support of the fire management National Predictive Service Unit. Decisions should be made based on current and future intelligence. Providing and supporting National Predictive Service Unit with current technology and funding improves support for managerial decisions. At present, the National Predictive Service Unit provides current weather and fire danger forecasts; but another component the fire community needs to advance and implement is resource allocation (quantities and type) and prioritization to the matrix. (Given the location of, current and future weather, predicted fire behavior, and fuel types, for 1 or more simultaneous ignitions, X number of assets will be needed to meet objectives).

Interagency cooperation, information exchange, and improving efficiency within the current dispatch system are, and will be a priority to meet increased the demands

wildland fire agencies are facing. Tactical resources available to meet current and future demands need to be maintained as a minimum at current levels and should be increased. The coordination system is the hub of many agencies and disciplines, and is relied upon for accurate knowledge of multiple agency protocols and policies.

The 11 Geographic Areas supporting six wildland fire agencies currently have a variable number of dispatch/coordination levels/centers (some states have 1-2, some agencies have 3, other GACC's have 4 levels). Coordination centers should be located, adequately staffed, and supported based on operational needs. The coordination /dispatch structure has been in the current configuration for approximately 12 years. With the future implementation for FPA, it will also be appropriate to review current GACC boundaries or portions of these, to increase efficiency, regardless of political or agency boundaries.

### ***Decision Support and Prioritization***

This key area includes several aspects that need modernization and new knowledge developed. The Predictive Services staff at the national and geographic locations should play a much bigger future role in large fire strategy selection and resource allocation. Inputs from these meteorological and fire behavior experts, coupled with topographical and vegetative information, would enable local, geographic, and national managers to make better informed decisions to allocate precious fire resources. These experts will provide information on which fires have the potential to most severely impact communities and critical infrastructure. The availability of centralized real time evaluations would free local fire managers from the time-consuming predictive assessment and allow them to focus on incident management and public safety. The National Predictive Service Unit should continue to provide NMAC with the information necessary to reinforce portions of the country that are approaching critical fire indices. The National Predictive Service Unit should also play a vital role in helping increase the hazardous fuel treatment program by providing information on localized conditions that are approaching treatment parameters.

Large fire decision support tools need to be developed to replace the outdated and limited capacity of the Wildland Fire Situation Analysis (WFSA). Work is currently ongoing in this arena.

In the future, four core integrated systems and services should provide additional tools to help determine National Preparedness Levels.

- **Predictive Services** will provide current and expected levels of incident activity, intensities, and growth potential.
- **Fire Program Analysis (FPA)** will determine the staffing capabilities of all agencies to respond to incidents and multiple incidents at the initial/extended attack and large fire support.



- **Resource Ordering and Statusing System (ROSS)** will provide real time availability for firefighting resources across the country.
- **Incident Qualifications and Certification System (IQCS)** is linked closely to ROSS and provides critical incident position management information and incident management succession planning capability.

The potential impact on core capabilities in promoting fire management's role in ecosystems management and balancing emergency response demands is obvious. However there are also key future developments in terms of two other capabilities-integrated planning and interagency fuel programs.

Interagency planning for fire management has historically been a complex undertaking because of the varied missions of the five federal agencies. The introduction of the interagency Fire Management Plan (FMP) template has been a positive step to increase planning compatibility. A similar effort needs to take place over the next five years to better link land resource planning to fire management planning and assimilate the changes produced by Fire Program Analysis (FPA).

FPA further integrates planning efforts through the use of FPU's, which are based on fire regime and vegetative cover, and pay little attention to agency boundaries. There are currently approximately 150 delineated FPU's in the U.S., which will eventually replace old agency specific planning units. FPA is an analysis process, which will determine staffing needs and generate an appropriate budget request with little respect for which agency provides the firefighters. This would also provide opportunities to combine facilities as well as positions and organizations. Several additional modules for FPA have been initiated, including: fuel treatment analysis, a prevention analysis, and a large fire analysis. In the long run, FPA may provide more than staffing and budget information such as also providing Agency Administrators and Fire Managers a framework to improve coordination and cooperation with other agencies.

The other change area is the decision tool for support of fuel treatments. Despite a significant expansion of the fuel reduction efforts, agencies will not have sufficient capacity nationally to treat enough hazardous fuel to substantially reduce threats to communities and other valuable resources (with the possible exception of the southeast). The hazardous fuel program requires new decision support tools to identify where to place the treated acres within our current capability to treat fuel so that they will make the greatest protection contribution.

USDA and DOI currently have a project underway called LANDFIRE, which will provide project level geospatial information that will identify hazardous fuel conditions across all acres in the U.S. using information provided by the EROS Data Center. LANDFIRE will be able to measure change in forest and range conditions over time, and will be beneficial in measuring the changes in the wildland condition. This is a critical investment that must be maintained.

Another promising tool combines spatial assessments with local collaboration efforts. Agencies in California have been experimenting with a new tool to prioritize fuel treatments locations to insure that the right acres are being treated to protect the largest and/or most valuable acres. This system, FIRESHED, is in its preliminary development stages and can be adapted to be usable nationwide.

### ***Logistical Support***

Facilities to support firefighting operations include fire stations and engine bays, living facilities, administrative offices, retardant bases, and coordination and dispatch centers. The mechanisms to construct and provide maintenance are different between the two departments. The DOI bureaus receive facilities funding through the fire appropriation, and the Forest Service receives its funding in the engineering budget line. That small difference makes it difficult to plan joint facilities or upgrades to existing facilities.

The implementation of FPA may present all agencies with interesting decisions. If the protection resources from adjacent jurisdictions are found to be the best alternative to provide protection, the prudent agency administrator must ask if it is a wise investment to maintain existing facilities in an area protected by some other agency. FPA may provide an opportunity to declare some facilities excess to our needs, and redirect scarce facility funds. Protection planning by FPU may also discover advantages to newly located facilities or, perhaps, jointly funded facilities to leverage both departments' funds.

The National Interagency Fire Cache System provides direct support to incidents by furnishing equipment and supplies. The cache system has a combined inventory value of over \$70 million. Each of the caches serves an interagency community. Each cache is hosted by an agency within a GACC is funded, staffed, and managed by that agency and is responsible to provide incident support to all customers within the GACC. All caches conform to a national plan, utilize a common ordering system, have common item designation codes, conform to national standards for equipment/supply kits and have refurbishing standards.

By prearranged plan, all of the caches support national incident efforts and can move equipment and supplies around the country. They have mobile capability to preposition cache vans around the country in areas of high fire danger or risk. Caches have a process to provide accountability for all items dispatched to incidents. The caches annually produce the Fire Use/Loss Tolerance report to assess the accountability exercised by cache users to return borrowed cache items. Nationally, all of the agencies have agreed to acceptable limits for the damage or loss of durable cache property. The caches are the primary distributors of the National Radio cache.

While the interagency fire cache system has served the fire community well, there are major new technologies that many organizations have used to replace their legacy large scale depot and warehouse storage systems. The Military has made the modernization of its supply chain a major goal in trying to reduce the cycle time for resource delivery and

cost reduction. Interagency cooperation and coordination in the use of new technology throughout the cache system will be essential.

A review process of fire management's cache system is currently underway which is assessing options from reengineering the system to strategic sourcing. The supply chain system being dealt with here involves reusable durable goods and expendable goods, which is different from other systems. Still, the future direction poses an opportunity to modernize fire cache management and save money while preserving cycle time standards currently being achieved.

### ***Future Directions in Resources and Technology***

A QFFR should conclude its assessment of the future course of resources and technology with a list of promising investments and leading edge projects. Most of the priorities mentioned in this section have already been launched as projects under development or even in the final stages of implementation (ROSS, FPA, LANDFIRE, etc).

The QFFR panels addressing systems needs for the future noted several priorities, but even these were hybrids or offshoots of current technology investments. The QFFR panel's short list was:

- Develop geospatial capabilities in conjunction with ROSS
- Modernization of Coordination Centers & Predictive Services
- New technologies to support mobilization (use of radio, satellite (GPS), cell technology to track all core resources)
- More robust evaluation methodologies. Develop a prototype for statistical based – GIS outcomes landscape assessment (i.e. Firestat)
- Forest Service Research Unit has proposed to establish “Early Warning Centers for the Western and Eastern United States”. These centers should provide useful information about forest and rangeland health and should be part of the equation to determine treatment priorities.

The USDA-FS and DOI have a combined fire management budget of approximately \$2.4 billion dollars. Forest Service research funding to focus on new fire and natural resource knowledge, determine ecological fire effects, improve biomass utilization, and integrate new technology is approximately \$22 million per year. In addition, the DOI and FS fund the Joint Fire Sciences Program with \$8 million of appropriated fire program funds. The FS and DOI have significant fire program dollars invested in developing new systems to support program needs in analysis, geospatial analysis, resource allocation, and predictive services. Advancements in new systems technology present significant issues to the fire agencies. Rising development and life-cycle costs, employee training, and system deployment costs further erode the funds available for firefighting and fuel management resources. In an era of flat budget levels, agencies must find innovative methods to increase opportunities for science and technology. Agencies must expand partnerships with other science and technology organizations like NASA, NIST, and military to

leverage research and technology dollars, and become more efficient in incorporating new science and technology into the programs.

For the programs in fire and fuel management to be where they need to be in the next decade, new and innovative thinking will have to occur. The future of the wildland fire agencies depends upon having the technology and the predictive tools to anticipate natural resource issues in order respond to them with a sound scientific basis.

## **Appendix A**

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## **Appendix B**

### **Quadrennial Defense Review Overview**

Sometime this year, the Secretary of Defense's Office will release its sixth comprehensive review of the nation's defense capabilities and projection of future military security strategies. This quadrennial defense review (QDR) report- so named because it is conducted every four years – is a foundation piece of the military's strategic thinking efforts. While it serves many purposes in helping the Defense Department keep pace with the dynamic rate of change in the world, two of the most critical goals are institutional. Institutionally, it provides an integrated strategic perspective out of the various planning and strategy efforts of the defense establishment- from the Office of the Secretary of Defense and the Joint chiefs to the branches of the military services, the various commands and support communities. The QDR plays another institutional role in linking up the various other review processes, studies, and evaluations that have taken place over the course of four years between QDRs and summarize their impact and significance.

As a review process, the QDR proceeds on different levels. Each QDR, of course, has its unique elements and emphases, but the general format is to begin with "Panel Assessments" of core capabilities- "strategy, force structure, readiness, modernization, infrastructure, human resources, and information operations and intelligence" (Report of the QDR- May 1997). These panel reports and recommendations are then reviewed by an "Integration Group" that produces "integrated options" for the future. The "integrated options" are then reviewed and approved by a "Senior Steering Group".

In terms of working schedule, the Defense Department conducts the QDR in a tight, fast track process that has all three phases – panel assessments, integration, and review and approval – working concurrently but with each phase feeding into the next. There are also some pre-process steps (generally called a start-up and guidance phase) in which initial assumptions and operational and fiscal guidance is generated before the real analysis (panel assessments begin). All together, the defense department produces its report for the Secretary of defense in less than six months. With the final acceptance of the QDR, the Secretary of Defense adds a forwarding message that can be especially significant if new directions in defense strategy are being announced.

The QDR was institutionalized in defense planning in 1997 when it was made a statutory requirement. (Section 118 of Title 10, US Code requires a quadrennial review to be conducted "during a year following a year even divisible by four"). It, of course, should be noted that this timing strategically places the QDR to follow the presidential election and new administration cycle.

## **Appendix C**

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