

Quadrennial Fire and Fuel Review Report



March 30, 2005

This Report is submitted by the QFFR Integration Panel for final review and approval by the NFAEB. The reports contains the Panel's final analyses and strategy recommendations, but does not purport to represent any official policy or program decision by NFAEB and the federal wildland fire agencies.

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Foreword

The Quadrennial Fire and Fuel Review (QFFR) represents, for the first time a unified fire management strategic vision for the five federal natural resource management agencies under the Departments of Interior and Agriculture. The QFFR has built on past efforts, reviewed current programs and provided data on future trends that will affect the USDA Forest Service, Bureau of Land Management, Bureau of Indian Affairs, National Park Service and the U.S. Fish and Wildlife, as well as their partnering agencies within the wildland and emergency management communities. This inaugural effort provides strategic approaches for the future and emphasizes key mission strategies and core capabilities that must be established to meet the future challenges, and provides a vehicle for periodic review of the Federal Wildland Fire Policy as required by its Implementation Plan.

The QFFR involved over 200 key personnel from the wildland fire community, physical and cultural researchers, and non-governmental organizations, and called upon a vast array of professionals and experts to present their key findings that will affect wildland fire's future in regards to climate, fuel condition, demographics and public expectations. To address these future conditions, we will establish 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.

To make this transformation to these new integrated mission strategies requires us to establish core capabilities in integrated planning, decision making, seamless fuel management programming, monitoring, ability to respond, community relationships, community education, and training and technical assistance. We expect that budget levels will continue to support the current organizational level without increasing. The shift to the mission strategies and capabilities will require building additional skills in the workforce and explore new methods to accomplish the workload. Together, the federal agencies must reorganize work processes and coordination efforts to meet the demands.

The federal wildland fire agencies must continue to modernize processes and infrastructure, reassess structure and organization at both the national and field levels, and continue to look for more cost effective means to accomplish management goals, so that savings can be redirected to other priorities, such as the development of new technology and information systems.

The QFFR represents a combined effort of the agencies 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 in the future. The National Fire and Aviation Executive Board fully supports the Quadrennial Fire and Fuel Review Report, and endorses the strategies and capabilities for the future of fire management.

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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 of fire and fuel management programs, 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, affordable program for fire preparedness, prevention, fuel reduction, fire suppression, and rehabilitation and restoration.

A series of panel sessions with 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, and fires will become larger with increasing frequency.
- The Wildland Urban Interface will continue to expand and make fire management's challenge to restore fire in the ecosystem and protect communities near public lands more difficult.
- Public expectation for both the protection of communities and surrounding natural values will remain.

- 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 biomass accumulation problems through expanded large-scale landscape treatments and applying appropriate management responses to all ignitions. Linked to this is a secondary mission strategy for promoting fire adapted communities rather than escalating protection of communities at risk in the wildland urban interface. Part of this mission strategy entails reprioritizing current fuel treatment efforts. A more important part will be reengaging communities and property owners in an effort to increase community awareness in terms of wildland fire risk but also to balance responsibilities for public safety and returning habitats to ecosystem sustainability.

Increased demands for fire management’s incident management resources and expertise focus the third core mission strategy. The QFFR sees a strategy for the future involving a re-examination of the agencies non-fire emergency response capability and ensuring that emergency response demands do not degrade public lands stewardship responsibilities.

To make the transformation to these new integrated mission strategies requires the agencies to establish different core capabilities. The integrated mission strategies described above focus on eight capabilities that deal with planning, decision-making, priority setting, monitoring, ability to respond, strengthening relationships, augmenting community education and balancing emergency response demands. In the figure below, these core capabilities are aligned with their respective mission strategies:

Mission Strategy	Core Capabilities
Ensuring Fire Management’s Role in Ecosystem Sustainability	Integrating Planning Enhancing Decision Making Ensuring Seamless and Integrated Fuel Programs Establishing Monitoring Broadening Ability to Respond
Promoting Fire-Adapted Human Communities	Strengthening Community Relationships Expanding Community Education
Balancing Emergency Response	Providing Training and Technical Assistance

Expected static budget levels for the foreseeable future do not allow for programmed workforce increases. So, the shift to new mission strategies and the corresponding core capabilities will require building additional skills in the workforce, not simply adding

new positions. The interagency workforce must become more adept at working seamlessly across administrative boundaries and leveraging the existing capabilities of publics and partners to help accomplish the work. 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 information systems like LANDFIRE, large fire decision support, ROSS, FPA, and Predictive Services will continue to improve the quality of decisions that affect outcomes. The federal fire agencies must continue to modernize processes and infrastructure, reassess structure and organizations at both the national and field levels, and continue to look for more cost effective means to accomplish the fire and natural resource management goals, so that resources may be redirected to other priorities.

The future of wildland fire management rests with transforming the organizations and processes to meet these challenges, assessing management and support groups for effectiveness and making the appropriate investments in new technology for the future. The QFFR represents a combined effort of the agencies to proceed into the future with a common vision and a strengthened collaborative process.

I.

Introduction

Wildland Fire in the 21st 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 - the five federal agencies and their state, local, and tribal partners. Using the Defense Department's Quadrennial Defense Review as a model, this 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 frame 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 a review of 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.

For full integration, 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. This 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 had three aims:

- 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, including 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 is to produce a report that outlines an integrated, strategy-based, balanced, affordable program for fire preparedness, prevention, 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 agencies and their partners. Federal fire agencies do not have large policy staffs in Washington or elsewhere to oversee a QFFR effort and provide a final report. Instead, the model created 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 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 defined by different senior federal and state fire management leaders. The New Assumptions Panels included presentations by researchers followed by in depth discussions of 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, analyze current capabilities and future challenges for the purpose of preparing mission alternative strategies. Panels typically consisted of 12-15 members including federal agencies 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 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 its blend of the overall vision, they produced the panel chapters in the final QFFR report for submission to the **Senior Steering Group** for final recommendations and 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 representative from National Association of State Foresters (NASF). NFAEB is ultimately responsible to accept the final report and to lead consultation efforts with the Departments of Interior and Agriculture, the Wildland Fire Leadership Counsel (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 both 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 proposing new solutions and recommendations to manage change. Matching these efforts are the 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 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 provide the foundation of the business case that the wildland fire and fuel environment is significantly different now - that fire management has fundamentally changed since 2000.

Planning and Policy. Dramatic change begins 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 funding (an effective budget increase of 90%) for the Forest Service and the Department of Interior. Linked to the National Fire Plan was the Western Governors Association’s *Ten Year Comprehensive Strategy* that, while approving the allocation of new federal resources and acknowledging the critical role to be played by state and tribal

governments and local communities cautioned the agencies about managing public expectations on wildland fire.

Efforts to implement the National Fire Plan were matched by the Forest Service and Department of Interior (DOI) proposal of a new cohesive fuel strategy. While this was in part a response to the GAO's 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 in that it recognized that separate agency fuel programs had to be refocused as a coordinated interagency effort with shared national goals and that future fuel treatments should be at the larger landscape level. The cohesive fuel strategy also restated the dual premise of fire and fuel management as both "reducing wildland fire risk to communities" and to "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 agency and state and local members re-evaluated the 1995 Federal Fire Policy and made significant changes in the guiding principles. The 2001 Review noted that agency differences, ranging from actual policy interpretations to language and terminology were major factors impeding implementation and potentially raising risks levels for fire fighters and the public. Then the five federal agencies under the aegis of the Wildland Fire Leadership Council commissioned a 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 three important objectives for fire management. One provision allows streamlined approaches to National Environmental Protection Act (NEPA) for HFRA projects on some lands (estimated to be as many as 20 million acres). Two other important requirements cited increased collaboration between federal agencies and local communities, especially when a community wildfire protection plan had been established, and a stipulation 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 always select years throughout the 1990's where fire costs 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 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 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), more efforts were launched to understand this new dynamic. In 2002, three western states had their largest single wildfire season on record: the Hayman fire in Colorado, the Rodeo-Chediski in Arizona, and the Biscuit in Oregon.

The Department of 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 supplemental report entitled "*Large Fire Cost Reduction Action Plan*". 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. When 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, the panel found more 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 wildland urban interface would cause fire suppression costs “to remain high into the foreseeable future”.

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.

But 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 studied and was a major catalyst for the 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 (FAA). 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. In a report to the National Fire Plan Coordinators, *Developing an Interagency Landscape Fire Planning Analysis and Budget Tool*, agreement was reached on creating a new system within the decade to be called Fire Program Analysis (FPA). FPA moves towards distributing resources for 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 2007.

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 *An Agency Strategy for Fire Management* recommended the creation of a national incident management organization or NIMO that would 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 90's (*Wildland Firefighter Safety Awareness Study* – Tridata Corporation 1998) NWCG conducted a major survey on firefighting participation levels. The 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, resource shortage, compensation, and training issues).

Workforce development was also extensively reviewed over the last five years. The *Report of the Leadership Task Group* in 2001 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 *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 in human capital is the ongoing effort to further establish fire management qualifications to bolster firefighter safety and to increase professionalism. A 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 can only be 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 General Accounting Office (now the General Accountability Office) has conducted no less than a dozen studies of wildland fire management issues in the past decade. Reference to GAO's role in helping spur the interagency Cohesive Fuel Strategy effort has already been made. 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, assessing the "technical, strategic, social, and policy aspects of management in fire-adapted ecosystems." The 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, include: (paraphrased below)

- Whether the current regime of large fires is 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?
- Whether the goal of fire management is prevention by decreasing fuel or 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. The first is the likelihood that wildland fires will happen with increasing frequency. The second is the level of potential damage that a wildland fire will produce in terms of firefighter and public fatalities, and destruction of homes and communities.

Statistics accumulated in the many reports and wildfire databases reviewed by the QFFR indicate that in the last five years, wildland fire is increasing in both frequency and severity. 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 wildfire activity in the United States. On the one hand, the actual number of fires has decreased. But the more telling statistic is the increase in numbers of acres burned. Three of the five years reported more than 7 million acres consumed by wildland fires among the four Department of Interior agencies, the Forest Service and state and tribal lands.

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

In terms of five-year averages, total wildfire acres have increased by the following:

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

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 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.

Secondly, the potential for catastrophic fire has also increased. Risk levels are due primarily to 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 WUI 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.

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 – and greatly increased the levels of complexity and difficulty for wildland fire and fuel management.

Driving Factors 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 assess how they would affect mission assumptions. Four such forces were assessed- fuel, drought and climate variation, demographic and the wildland urban

interface, and public expectations. Each will be summarized in terms of trend and future impact.

Fuel Conditions. Today, after a half-century 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, 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 and insect kill further complicate the 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 trend of 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 Western Governors Association made large scale fuel treatment programs a key priority in an attempt to reduce the hazardous fuel conditions which 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 10-12 million “affected” acres annually.

Drought and Climate Variation. Severe drought has also increasingly predisposed fuel laden forests and rangelands to larger fires 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 reporting to the New Assumptions Panels indicated that they have a 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.

One of the premises of current climate studies is that variability of climate has gone up. Recent drought patterns predicting abrupt climate change will also generate uncertainty in the coming years, and given the state of fuel accumulation and expansion of the wildland urban interface, may impact the fire and fuel problems even more. Most climate change use models predict a future much warmer than the past, and warmer than now.

The impact of weather on fire season severity 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 these fires (defined as greater than 300 acres) indicate that large fires account for the majority of acres burned. While only 1.1 percent of all fires, they accounted for 97.5 percent of area burned. Furthermore, both the number of large fires and the average size of these fires have been increasing over time.

Demographics and the Wildland Urban Interface. Population and housing growth in the wildland urban interface is occurring at an increasing rate. Social science research presented to the New Assumption Panels indicates that 8.4 million new homes were added to the WUI in the 1990's and this rate of growth is being sustained. This represents 60% of the new homes constructed in the United States during that period and is triple the rate of home construction outside the wildland urban interface. Likewise, population growth in the interface also exceeds national population growth rates. Not only did the wildland urban interface expand, but the intermix area also grew by 24%. Research shows that 9% of the land area of the United States and 31% of the homes in the United States are located in the wildland urban interface.

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 or 15% of the US population. In 2000, western states population was 61 million or 22% and projected to reach nearly 80 million people by 2020 or 24% of the total US population. Nationally, the movement into the WUI will be pushed by an expected 8% decrease in the population in rural communities, a 57% increase in urban communities, and 77% increase in low-density suburban areas over the next 20 years. In terms of land use, 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. In short- the growth of 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 constrains 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 public being evacuated safely in the event of a fire. Residents expect protection of the values that brought them to the wildland in the first place, things such as view shed, watersheds, wildlife and its habitat, and others. Ecosystem characteristics can be as important to the wildland urban interface population as their own personal property. Even populations not located in the wildland/urban interface value wildland resources and wildland fire protection. An important example is the Southern California national forests, which manage wildland fire protection primarily for 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 wildland/urban interface has eroded public tolerance for some treatments. Public intolerance for smoke has constrained the use of prescribed fire. 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 considered afterwards. Another manifestation of expectations in this arena is the increased use of more expensive fire fighting assets like aviation resources, which the public increasingly equates with “normal” successful fire fighting operations.

Other Factors. Wildland fire protection resources also have a history of being very effective at managing any emergency incident. This reputation has created a demand for services from the wildland fire protection community, which are not explicitly related to wildland fire but to the broader category of emergency management. Several examples exist, from dealing with outbreaks of Newcastle disease in the domestic chicken population, to assisting in the recovery efforts following 9-11, and the Discovery 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.

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 and new strategies 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 biomass accumulation, drought severity and climate change, increasing demographics 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 biomass 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 wildland urban interface will vastly improve the ways communities and individual property owners are dealt with, and balance responsibilities for public safety and 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 issues. This mission strategy stresses a sense of living with fire within communities. Rather than merely addressing acres treated within the wildland urban interface where biomass 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. While the federal wildland fire agencies have significant levels of expertise and capabilities in incident management, they must begin to instill this knowledge within dependent agencies so that they can redeem their own primary responsibilities. At this time it would not be acceptable to withdraw as a significant response provider, but the 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 actions versus recovery needs to be established to put sideboards 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. Based on public expectations and political ramifications, the agencies need to apply the best-known science to date in addressing future conditions that will have a negative or positive affect to the agencies.

But the probability of both more frequent (more acres burned) and larger-scale (more acres burned by large or extreme fires) forces the federal fire agencies to plan carefully how they will respond on this new plateau level of wildland fire behavior. In short, wildland fire management is in a new era, and potentially in a new kind of era. The QFFR confirms the four threats examined in Chapter 1 as core characteristics of this new era. To reiterate:

Fuel accumulations with the lack of fire (past policy of fire exclusion) stands as the primary causal factor for catastrophic fire. It is also fairly well accepted that biomass accumulations are being created faster than they can be treated and that even the significant increase in fuel treatments at all levels may 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 climatologic 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 fuel regimes across the country. Areas, which have not traditionally witnessed large catastrophic fire, will begin to experience these fires as the fuel beds begin 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 housing 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 rather than defensive ones, both in terms of saving property and preserving the surrounding area. 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 does exist that the traditional fire season will be extended in various portions of the country. This may be further impacted by an increased demand for the agencies’ expertise in incident management on other emergency incidents and the possibility exists where those other emergencies may take precedence over wildland fire emergencies and project implementation. Balancing this potential is critical if the agencies are to fulfill their land stewardship and fire management responsibilities in the future.

Redeveloping Core Capabilities

To make the transformation to these new integrated mission strategies to better address future threats and risks, the agencies will need to enhance or establish different core capabilities for the future. The integrated mission strategies described above focus on eight capabilities: planning, decision-making, priority setting, monitoring, ability to respond, strengthening relationships and expanding community education and balancing emergency response demands with training and technical assistance. In the figure below these core capabilities are aligned with their respective mission strategies:

Mission Strategy	Core Capabilities
Ensuring Fire Management’s Role in Ecosystem Sustainability	Integrating Planning Enhancing Decision Making Ensuring Seamless and Integrated Fuel Programs. Establishing Monitoring Broadening Ability to Respond
Promoting Fire-Adapted Human Communities	Strengthening Community Relationships Expanding Community Education
Balancing Emergency Response	Providing Training and Technical Assistance

Each of these capabilities will be assessed in depth in subsequent chapters, but a brief overview of what they entail 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 in ecosystem sustainability is to be established, a truly integrated planning process is essential. Land/Resource management planning and fire management planning will be linked in a process that promotes collaboration among all stakeholders. As the agencies move towards the full implementation of fire program analysis, the fire management plans that are developed for each fire planning unit would use appropriate management response. Fire management plans in the future would increase fire prevention planning efforts on a landscape basis and consider point protection as an equally acceptable approach as perimeter control to wildfire management.

Enhancing Decision Making with AMR. Two concurrent objectives are entailed in the goal of improving decision-making involving wildfire. The range of the decision process is to be expanded and the decision-making environment should be improved. Expanding the process means initial response will allow for the full range of appropriate management response regardless of ignition source. This would combine the fire use and fire suppression decision into a single decision process, allowing for multiple strategies for any given ignition. Decision criteria would be provided to allow for consideration of investments in reducing or maintaining fuel profiles rather than simply the cost of suppression. Improving the decision making environment would ensure agency support for decision makers who select AMRs that may entail higher risk as long as the decision is well-reasoned and supported by best available science. Vulnerability of decision makers should also be lowered by advance collaboration with stakeholders and increasing public education on wildland fire.

Ensuring Seamless and Integrated Fuel Programs. Fuel treatments need to be prioritized on a national scale for seamless, integrated and interagency landscape scale programs and projects. Agencies are already moving from simply “treating acres” to “affecting acres with higher risk”. The next emphasis will be on large, landscape scale interagency projects and increasing financial and reporting incentives for interagency treatments. 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 and 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. This capability should also be extended outside the organizational boundaries of the federal agencies to involve Non-

Government Organizations (NGO's) and other stakeholders in monitoring to improve collaboration and effectiveness.

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 new national Type I resource teams (the proposed NIMO initiative) to developing Type III resource teams at the local level capable of accomplishing the full range of AMR. It will also be crucial to incorporate long-term assessment skills into incident management teams and fire resource organizational structures.

Strengthening Community Relationships. The goal of helping communities at risk in the Wildland Urban Interface has been a priority since the National Fire Plan. Future action should be based on building relationships before program remedies and capital investments are made. Strengthening community relationships means first promoting community self-sufficiency and collaborating with local leaders on community wildfire protection plans. 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.

Balancing Emergency Response. 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 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 according to the National Response Plan as negotiated with the various annexes. The overall strategy would be to allow for dependent agencies to redeem their own responsibilities in emergency response and for fire management to provide technical assistance as needed and create new partnerships for learning and information transfer.

Roles and Responsibilities

Each of the capabilities noted above accepts 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 land/resource management planning. While considerable efforts have been undertaken to improve both land/resource 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. Finally, in terms of fire and ecosystems sustainability, Appropriate Management Response must be strengthened so that decision makers can quantify values and benefits and assess short term and long-term effects. Improving the process for strategy decisions must also incorporate both 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 new strategy envisions no dramatic change in terms of current fuel activities and efforts. Current efforts under the National Fire Plan with supporting research and development, scientific applications, public education, and community capacity building through grants and technical assistance that support rural fire departments, community fire prevention planning and FIREWISE Communities programs will continue. In areas where land ownership/ settlement patterns are such that federal land is adjacent to WUI, there will be a continuing federal responsibility to implement fuel reduction in accordance with community wildfire protection plans. As before, local governments will be responsible for ordinances and land use policies in the WUI that promote fire safe environments. Rural and volunteer fire departments have the primary responsibility to protect structures.

However, 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 a 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 our response. And while there will also be interest in training and skills transference, Fire management must be cognizant that additional workloads on organizational staffs, coordination centers, and training centers to provide technical assistance 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 the USDA and DOI. The President's FY 06 budget actually calls for cuts in the 5% to 10% of current budget levels. Hence, 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 Land and Fire Management Plans (FMP, WFSAs, and WFIP) 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 affect. Improving planning decisions will also enable the appropriate management response to become a better decision by setting objectives that guide the AMR decision through the FMP. The collaborative Fire Management Plan is used to determine how human cause ignitions are managed and how anticipated post fire emergency stabilization and rehabilitation will be addressed.

To support Appropriate Management Response, decision-making processes and tools should include better predictive services and the use of risk analysis and decision theory applied to fire management. Prior to the AMR decision, a system is needed that allows for pre-positioning of resources that is based on best available predictive tools. This should also involve training Incident Management Teams (IMT's) to deal with the full range of management responses with the objective of reducing costs and improving efficiency. Better decision-making training and tools for all decision makers, including fire duty officers and Multi-Agency Coordination Groups, are needed.

The investment approach for fire adapted communities is really building relationships with communities and property owners before investing capital. Current investments should emphasize zoning and building requirements, especially for any new communities or building sites in the WUI and fuel manipulation for defensible space would still be supported for existing homes and communities in the WUI. Overall, Community Wildfire Protection Plans and commitment to long-term maintenance would be essential.

Investment in emergency response should be refocused to establishing partnerships with other agencies to provide training through the use of contract instructors who 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 and at the same time provide mentoring and training assignments. 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 benefits 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 land/resource management planning will not be easy, but the movement towards fire planning units as part of FPA should help with the transition. Expanding the use of appropriate

management response to take full advantage of all ignitions for ecosystem improvement will require a longer implementation process. AMR will need better tools and training for decision-making and a re-examination of who should be making decisions with incentives for accepting inherent 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. Strategy should support communities organizing to take action, become self-sufficient, and above all becoming comfortable (and knowledgeable) with prescribed and natural fires in their environs

Finally, the emergency response strategy will split short term and longer goals. In the short term, efforts will be directed at support and real work assets – as requested within “resource reserves” and consistent with NRP. The implementation of the current NIMO proposal would be covered along with undertaking an intensive training and development program for other agencies and partners. But over the longer term, the mission strategy would seek to further reduce dependencies and further limit all-risk 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; but moving out of the direct support role to a “training and technical adviser” role for the longer term (5-10 years) to build agency (other federal, state & local) capabilities.

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 will be similarly pressed. Regions can expect some variation in their preparedness force structure numbers as they deal with larger program costs pressures, financial adjustments, and other budget issues.

While funding levels for the current force structure numbers in preparedness are projected to remain constant, 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- driven by current levels of over 50 dollars a barrel for oil- stay in this upper range, more dramatic cost increases in agency operations and contract operations could be expected.

Current Force Structure

The core fire management force structure is to be maintained – especially at the local (initial response) level. 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.

Preparedness Resources	Department of the Interior					USFS	
	BIA	BLM	FWS	NPS	Total	FS	Total
Personnel							
Firefighters	1,140	2,260	295	495	4,190	11,300	15,490
Smokejumpers		152		1	153	311	464
Overhead + Prevention						457	
Total	1,140	2,412	295	496	4,343	12,068	15,954
Teams (all agencies)	Type						
	I	II	II State	FUMA			
	17	35	22	7			

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

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 table insert denoting appropriate shifts and changes in workforce and infrastructure requirements.

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 (analysis and modeling) to

identify what the new potential vegetative communities are, compared to what the current or historic communities were, are needed. 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, which would not default to full perimeter containment/control but rather consider point protection as an equally acceptable approach to wildfire management. This approach should mitigate the rapid increase in suppression costs and provide additional fuel treatments, reducing 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 should develop Interagency Fire Management Plans. Where this is not possible, (e.g. single agency FPU) 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 FPUs to ensure political boundaries do not hinder full implementation of appropriate management response concepts. Agencies should work to develop joint planning to allow fire to be used on the landscape basis across agency lines. NGOs 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
Integrating Planning	Migrate planning for Fire & LRMP to FPU level (landscape)	5 positions per FPU = 750 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. Five per FPU is a rough number -- some FPUs 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 FPU level activities. Building interagency land management and fire management plans; including written documents, will be a large workload that must precede the FPA modeling efforts.

Enhancing Decision Making with AMR. Federal policy should support full AMR at local levels or within specific bureaus. Individual units or bureaus may elect to implement more restrictive approaches. For example: campfire escapes could be managed within the full range of AMR. A change in policy will be needed to allow full AMR on all ignitions (2001 update to federal fire policy disallows Wildland Fire Use (WFU) for human-caused ignitions).

The Wildland Fire Situation Analysis (WFSA) process should not be a perfunctory exercise used to justify a decision already made rather than to evaluate alternatives for determining the “optimum” 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, which provide incentives for accepting risk.

Capability	Strategy	Force Structure & Infrastructure Requirements
Decision Making with AMR	Expand the range of decisions under AMR and improve decision making ability	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 a higher level of intensity. Individual agency targets must be replaced with an interagency landscape perspective. Barriers to pooling money, cross billing problems, issues involving credits and accomplishment must be addressed. Current policies and internal processes sometimes impose barriers on interagency operations, establish competition for funds, assign targets

to individual units rather than set collaborative targets for accomplishments at the landscape level across agency boundaries.

A new way to measure accomplishments is needed (beyond burned acres by agency) – to allow the transfer of money over boundaries. Finally, maintenance must be addressed as a priority for both prescribed fire and wildfire acres.

Capability	Strategy	Force Structure & Infrastructure Requirements
Ensuring Seamless and Integrated Fuel Programs	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 AARs, as well as environmental effects monitoring of the actions undertaken. A feedback loop for improving decisions given the findings of AARs is necessary. Using experienced NGOs in the monitoring process should be fully considered.

Capability	Strategy	Force Structure & Infrastructure Requirements
Monitoring for Adaptive Management	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 IMTs 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. If fire is to be considered an ecological process, an increase in the amount of fire use and application of prescribed fire is needed.

Capability	Strategy	Force Structure & Infrastructure Requirements
Ability to Respond	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"> 1. Adopt NIMO 7 by 7 - 49 national positions, plus one national manager = 50 2. Increase National Teams to 20 Type Is, 40- Type IIs, Sustain 20 plus state and local teams 3. Absorb –Convert 6 FUMT to Type II all purpose IMTs 4. Ensure at least 1 Type III for every FPU (154 FPUs)

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.

Strengthening Community Relationships. Current program efforts will continue in fuel and prevention to reduce risks to communities in the interface and property owners in the WUI intermix. Continuing priorities will be for treatments of WUI lands where communities have a community wildfire protection plan, zoning and building requirements, and fuel manipulation for defensible space.

But the rationale here demands a shift over time to building relationships before investing capital.

Capability	Strategy	Force Structure & Infrastructure Requirements
Community Relationships	Reemphasis on 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. The key to the strategy is making community education a process as opposed to another program to support the expansion of the FIREWISE and community fire leadership efforts, 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
Community Education	Reorientation of existing workforce (Prevention Teams, WUI Specialists, and Public Affairs) to support public education	No new positions required.

Balancing Emergency Response. The Emergency Response capability will be limited to requirements defined in the National Response Plan. Implementation of the NIMO model with its seven “small teams” with all risk capability will add capacity without significantly diverting from primary responsibilities. Training expertise must be sustained while working with other agency partners outside the wildland fire community.

Capability	Strategy	Force Structure & Infrastructure Requirements
Emergency Response	Possible Realignment of team formation and use of contracted functional services Enhanced training Capacity in IM	Seven NIMO Teams for All Risk Sustain academy level high-level expertise in managing IM Training

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 Planning Analysis (FPA). By fiscal year 2007, FPA will lead the transformation of the former agency specific planning units into a new national network of 147 fire planning units. 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 management 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 organizational elements of the industrial organizational model with its emphases on large economies of scale and interchangeable parts have been displaced by 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 being implemented through FPA.

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.

In suppression, the federal agencies still rely on their fire preparedness funded resources and other resources from other non-fire programs, which make up what is known as the “militia” for fire. In 2004, there were more than 32,000 personnel qualified to fight fire and approximately 15,000 of those were also qualified for 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. red carded) by agency and region.

Qualified Firefighting						Geographic	
Positions						Totals	
	BIA	BLM	FWS	NPS	USFS	Totals	Pct
AK	3	418	38	26	199	684	2.1%
CA	152	358	55	593	3,583	4,741	14.8%
EA	191	2	256	495	1,366	2,310	7.2%
GB	359	1,441	24	260	2,258	4,342	13.5%
NR	1,453	275	121	260	2,405	4,514	14.1%
NW	604	898	113	253	3,237	5,105	15.9%
RM	525	478	137	368	1,356	2,864	8.9%
SA	216	31	370	595	2,199	3,411	10.6%
SW	1,891	370	52	298	1,514	4,125	12.9%
2004							
Totals	5,394	4,271	1,166	3,148	18,117	32,096	
Pct	16.8%	13.3%	3.6%	9.8%	56.4%		
1999							
Totals	3,167	4,137	2,137	5,657	18,051	33,149	Estimated
Pct	9.6%	12.5%	6.4%	17.1%	54.5%	29,005	Adjusted

In terms of overall change over the past five years, the number of certified red-carded 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. But the red card data base system has been completely revised because of the old system's inaccuracies that inflated 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 red card number (over 32,000 qualified 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.

Building the workforce capacities to accommodate the new mission requirements outlined in the QFFR will require realignment and redirection of the existing workforce. 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. Rather - 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 that are consistent with the cost management goals pursued by fire management at all levels.

The Fire Program Analysis system to be completed in 2007 will reinforce the need for realignment as resource allocation lines are drawn around fire planning units as opposed to the parochial units. This will also help shift preparedness resources to where they need to be rather than where they have always been. Integrated and 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. The agencies must accept 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, and to staff additional resources and incident management teams.

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 real gains in treated acres will come from the appropriate management response to all ignitions, returning periodic fire to dynamic ecosystems and achieving restoration objectives. Interagency, interdisciplinary planning teams will need to focus on landscape, fire planning unit 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 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 collaboration.

Fuel 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 non-incentives to promote the pooling of resources and melding different funding options to accomplish the type of projects needed for seamless fuel 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 Appropriate Management Response for all ignitions. 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. Shifting resource specialists into multi-purpose roles and viewing AMR as an opportunity to improve ecosystem function and reduce overall single resource conflicts is an inherent concept. AMR also requires that fire science be a major component of the Land and Resource Planning Process as opposed to just a reaction to an ignition in the wildland.

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 through grants from the Community Wildfire Protection Planning (CWPP) process, especially when supported by all partners at the local, state and federal level. FIREWISE can be integrated into the CWPP process, which will increase local community self-sufficiency in addressing 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 change the agencies’ mode of response to all-risk incidents and limit that response. At the same time, the agencies need to increase the non-fire agencies’ 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 amount of

available subject matter experts to assist in this endeavor, so partnering and outsourcing 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 all-risk 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 agencies, allowing them to take a lead role. Liaisoning with other all-risk agencies on a national and international scale would reduce their dependency.

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. This means accomplishing mission capacities 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 Land and Resource 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 the decision maker and create new learning experiences for the decision maker.

Skills in fuel management need to be further developed to provide better modeling capabilities, adaptive management, risk assessment, biomass accumulation and disturbance regimes. These skills need to be seamlessly integrated into all fuel planning efforts, which will further support decision makers. 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.

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. Skill in mentoring external personnel during incidents will need to be enhanced and broadened to further expedite the dependency reduction. Outsourcing and contract management skills can also offer options for accelerating the dependency reduction.

Future Challenges in Workforce Transformation.

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 every employee in fire and fuel management. The strength of all the fire management's programs rests, and always will, in its employees.

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 needs to be focused on the increasing employee skills in the use of non-fire vegetation treatment skills, and ensure that training and experience is accomplished in several different fire regimes. Grant development and contract administration training needs to be expanded upon and be required at various levels in the agencies to further the opportunities for outsourcing. Federal and non-federal technical advisors need extensive education in NEPA, and in 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. Maintaining realistic workload expectations will also improve retention and provide better quality assurances on programs.

Safety will always remain the top priority for all of the agencies. The current behavioral focus needs to now be expanded to a self-responsibility and accountability program. Making safety work for the agencies will always remain a challenge and cannot be taken for granted at any time.

Transforming the Workforce

In order to transform the workforce to meld these capabilities into successful mission accomplishments, the agencies must agree to a streamlined organization and on a strategic process for reshaping the organization.

- First and foremost the agencies priorities must be on their land stewardship role and not focus on reorganizing for all-risk responses. They should provide technical assistance to these all-risk responses and withdraw from complete incident management by setting realistic limits on the support to be rendered.
- Fire Management needs to rebuild relationships with Line Officers/Agency Administrators, and become an integral part of forest leadership and planning. Fire Management should transform fire expertise into a role of public land environmental leadership.

- Suppression thinking must be towards fire's role in the ecosystem and the appropriate management response to any ignition. Preparedness resources need to be staffed and funded for this mission alone, and not consider other peripheral activities. Prevention efforts need to be directed towards creating fire adaptivity in communities.
- Enhance educational programs to support the professional development of current and future employees in planning, decision-making, leadership and public education. In addition, the agencies should provide cadres to support and train dependent agencies who are entering the field of incident management through the National Response Plan.
- Establish third party monitoring systems to ensure that fuel treatments are being accomplished and objectives met in accordance with the established priorities for treatment.
- Create partnerships within communities to promote fire adaptability and support those communities that embrace the concepts.

The future course is for more landscape, interagency, integrated efforts that can only be accomplished by a culture that is outwardly sensitive and not just problem solving driven, a culture that is interdependent and not independent.

V Operations, Resources and Technologies

The significant increase in program funding, fuel reduction treatments, and expanding the size of the fire workforce coming 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, 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 2005 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.

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		95
Dozers	30	11	26		67		67
Tractor Plows			32		32		32
Boats	1	1	13		15		15
Aviation							
Helicopters (All exclusive use)	14	27	3	9	53	89	142
Air tankers	5	24			29	7	36
Other AC		29			29	41	70

The aviation assets listed above are just those used by the federal wildland fire agencies and include significant numbers of planes and helicopters under various contract arrangements. 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 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. Thus far, that strategy calls for the following fleet configuration:

- A forty heavy air tanker fleet composed of 15-20 fixed-wing, turbine powered air tankers and 15-20 large helicopters as recommended by the National Airtanker 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.
- Twenty (20) aircraft capable of multi-mission tasking, including all-risk (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 flowing technology.

This new aviation strategy has not been developed completely and many ramifications exist. Even if the asset cost issue (i.e. the price of new aircraft fleet being underwritten by a new appropriation) were resolved, this is not a budget neutral strategy. A larger 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. Furthermore, large helicopters mean more helibases, and that will require additional facilities. Future investment strategy about aviation assets will also have to incorporate plans for increasing remote sensing capacity through new technologies and appropriate platforms.

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 were assessed that the panels thought would provide the highest potential to increase efficiency of the existing workforce:

- Resource Coordination (Ordering, Utilization, CRM, Mobilization)
- Decision Support and Prioritization
- Logistical Support (Equipment 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 the 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 -- all located in Boise. NMAC composed of representatives from USDA Forest Service, DOI Bureaus: BLM, NPS, BIA, and FWS, DHS-USFA, and NASF, 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 US. 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.

The coordination centers move people and their equipment across the country. They also access major resources maintained in a network of geographic area incident caches

throughout the eleven GACC's. The caches have 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, and is funded, staffed, and managed by that agency and is responsible to provide incident support to all customers within the GACC. All cache's 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 a 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.

One further key development in resource coordination should be mentioned. Over the past several years, the NWCG has lead the implementation of R.O.S.S.- the resource ordering status system which has automated the supply and demand sides of requests for people and equipment for fire management. The full implementation of ROSS means that coordination centers have a linked, fully functional critical resources management system in place.

Decision Support and Prioritization

This key area includes several aspects that need modernization and new knowledge developed. The Predictive Services element 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. Predictive Services should continue to provide NMAC with the information necessary to reinforce portions of the country that are approaching critical fire indices. Predictive Services 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). WFSA does not allow for an analysis of the full range of Appropriate Management Responses (AMR) because it does

not include managing fire for resource benefit (fire use). In addition, the WFSA does not adequately consider many of the factors that in reality drive our current decision process.

The sophistication and refinement of the elements that determine the National Preparedness Level will increase as three core systems are integrated. The integrated systems will be:

- **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 Status System (ROSS, already mentioned)** will provide real time availability for firefighting resources across the country.

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

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 will further integrate planning efforts by introducing the concept of fire planning units (FPU), which are based on fire regime and vegetative cover, and pay little attention to administrative boundaries. There are currently 154 delineated FPU's in the United States, which will eventually replace old agency specific planning units. FPA will fund organizations to protect FPU's, with little respect for which agency provides the firefighters. This would also provide opportunities to combine facilities as well as positions and organizations. The goal is to eliminate the "cost plus net value change" paradigm, which has driven fire response planning since the 1970's. Instead, FPA will attempt to optimize "weighted acres protected". As budgets become more constrained, protecting the higher weighted WUI acres will take priority and may cause a realignment of funding from fire to restoring fire adapted ecosystems outside of WUI. The initial Preparedness Model was completed in October 2004, and is being tested in 6 beta-tests around the country. FPA will be used to allocate portions of the FY 2007 budget, and used to formulate the FY 2008. Several other modules for FPA have been initiated, including: fuel treatment analysis, a prevention analysis, and a large fire analysis.

The other change area is the decision tool for support of fuel treatments. Despite a significant expansion of the fuel effort, agencies will not have sufficient capacity to treat enough hazardous fuel to substantially reduce threats to communities and other valuable resources. 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 that will provide project level geospatial information that will identify hazardous fuel conditions across all acres in the United States using information provided by the EROS Data Center. The outputs from LANDFIRE will be able to measure change in Forest and Range conditions over time, and will be beneficial in measuring the improvement in the wildlands. This is a critical investment that must be maintained.

Another promising tool combines spatial assessments with local collaboration efforts. Agencies in California having 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. The system, called FIRESHED, is in its preliminary development stages and needs to be modified to be usable throughout other jurisdictions.

Logistical Support (Equipment and Facilities)

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, 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.

Another area for future development is the Interagency Cache System. 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. The recent study of large fire operations by the National Academy of Public Administration recommended that the wildland agencies implement a "Supply Chain Management System" citing the cache system as a primary cost savings tool.

Fire management's cache system is already in a review process and assessing options from reengineering the system to strategic sourcing. The supply chain system being dealt with here involves reusable durable goods, which is different. 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. But most of the priorities mentioned in this section have already been launched as projects under development or even in the final stages of implementation- R.O.S.S., F.P.A., 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:

- Development of 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. Developing 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.

USDA-FS and DOI have a combined fire management budget of \$2.4 billion dollars. The agencies currently spend a combined total of less than \$30 million or about 1.2% of their budget to develop new knowledge and technology platforms. Moving to a higher level of investment should become a corporate objective as well as finding ways to expedite the development and application of new technology.

For the programs in Fire and Fuel Management to be where they need to be in the next decade, deeper thinking will have to occur. The future of the wildland fire agencies depends upon having technology and knowledge to anticipate natural resource issues and respond to them with a sound scientific basis.

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Appendix B - Panel Memberships, Speakers and Acknowledgements

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