

Case Study of the Modified Fire Suppression Option: Three 1997 Alaska Fires¹

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Abstract

Flexibility in the Alaska Interagency Fire Management Plan allowed for varied responses to three Modified fires, all located within 15 miles of Bettles, Alaska. Discussions with land managers about values at risk, potential cost, probability of success, fuels, and fire behavior resulted in the decisions to directly suppress two fires and indirectly suppress the third. The fires B347 and B483 were 45 and 400 acres at time of detection, while fire B349 was 600 acres. Fires B347 and B483 were held to 50 and 600 acres at costs of \$25,568 and \$202,893, respectively. Fire B349 grew to 24,185 acres at a cost of \$115,306. Aggressive attack of Fire B349 would have resulted in a similar or higher cost, while losing the ecosystem benefits of a large patchy fire in a fire-dominated ecosystem.

Introduction

This paper will examine the differing decision processes in the management of three fires that occurred in the Tanana Zone, Alaska, in areas designated for Modified suppression during the summer of 1997. The three fires were within 15 miles of Bettles, Alaska. Two fires, B347 and B349, started on June 21. Fire B483 started on July 3. The fires were responded to and managed in three separate methods available by using the Modified management option, demonstrating the flexibility of the Modified suppression option and the Alaska Interagency Fire Management Plan.

Alaska Fire Management

Wildland fire in Alaska is managed under a state-wide consolidated plan (U.S. Department of Interior 1982,1984). The plan has four management options for fire: Critical, Full, Modified and Limited. Each option has specific operational procedures designated in the plan, ranging from priority over other fires to procedures for when natural fire is desired or the values at risk do not warrant the expenditure of funds. Critical and Full call for immediate initial attack, while Limited calls for only the suppression necessary to protect sites or keep the fire within the management unit. Modified is intermediate between Full and Limited and has more possibilities for initial attack decisions.

Fire suppression duties are split between two Federal and one State agencies and are separate from most other land management responsibilities. Agreements between the State and Federal governments have divided the state by geographic region. The U.S. Department of Interior, Bureau of Land Management-Alaska Fire Service (USDI / BLM-AFS) has responsibility for most of interior and northern Alaska, regardless of the land ownership. The State of Alaska, Department of Natural Resources, has similar responsibilities for much of the rest of the state. The USDA Forest Service manages fire on its lands in southeast and south-central Alaska (*fig. 1*).

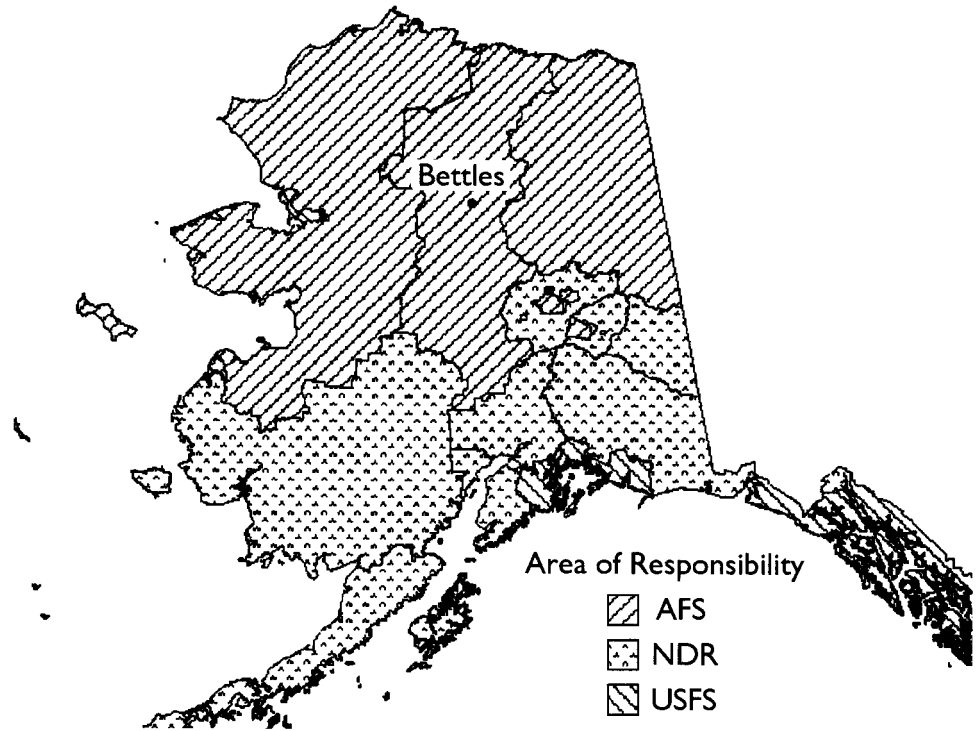
The Alaska Interagency Fire Management Plan (the Plan) was completed and implemented in 1984 (U.S. Department of Interior 1984). Before completion of the Plan, all fires were suppressed under a policy similar to the former USDA Forest Service "10 a.m." policy (Alaska Wildland Fire Coordinating Group 1998). Priority for suppression rested with fire managers and did not necessarily take into account the role of fire in the environment. Fire managers prioritized fires

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Figure 1

Location of Bettles, Alaska, and Fire Management Zones within Alaska. The three zones in the north are managed by the Alaska Fire Service (AFS), the zones in the southwest and south-central are managed by the State of Alaska (DNR), and the southeast is managed by the USDA Forest Service (USFS).



for resources. Some fires did not receive any suppression due to location and a lack of resources, but these decisions were not systematic.

If a Modified fire escaped initial attack, the Plan called for the preparation of an Escaped Fire Situation Analysis (EFSA). The EFSA involves analysis of costs and effects of various suppression or monitoring strategies. A strategy is picked by the land and fire managers that will meet their goals.

The Plan was drawn up with land managers fully involved. It took into account the role of fire in the environment (Viereck and Schandelmeier 1980), while putting more emphasis on involvement of the land managers in fire management decisions. Land managers are contacted about all fires on their lands and their wishes for suppression are taken into account during the operational phases of fire fighting.

The Plan was designed to evolve over time, with changes being made to the suppression levels for different areas as more information became available and land managers grew more comfortable with the Plan. Statewide between 1982 and 1997 about 5 million acres have been changed from Full to Limited, 10 million acres have been changed from Modified to Limited, and 7,700,000 acres have been changed from Full to Modified (Strong and Burrows 1998). Modified and Limited are the more flexible options, with Modified offering the most operational adaptability.

A 1998 revision of the Plan, the Alaska Wildland Fire Management Plan (AWFMP), consolidated and updated earlier versions of the Plan (Alaska Wildland Fire Coordinating Group 1998). The definition of Modified in this plan includes language specifying that it is the most flexible option and is intended to balance suppression costs with acres burned.

Narrative

The three fires in this study were lightning-caused and were reported by pilots. At the time of initial reports they varied from 1 to 10 acres, but by the time initial attack forces arrived they were from 50 to 500 acres in size. Initial locations reported by pilots and plotted by dispatchers were somewhat inaccurate, leading

to delays and possible changes in the management strategies for two of the fires. Information from the USDI BLM-AFS fire folders shows that one fire was managed as an initial attack smokejumper fire, one as an extended attack fire with smokejumpers and crews, and one as a limited action fire.

The initial attack fire, B347, was contained and extinguished by eight smokejumpers, with a final size of 50 acres. The limited action fire, B349, grew to 25,000 acres. The extended attack fire, B483, was held to 600 acres by 60 firefighters (fig. 2).

Fires B347 and B349

Both fires were reported in mid-afternoon on June 21, 1997, with approximate locations given by pilots. Initial plotting on protection maps showed them to be in Limited areas. Land managers were notified of the fires and the decisions to not staff them. BLM transport aircraft were used to update dispatchers on locations and burning conditions. As updated information arrived it became apparent that the early locations were incorrect.

The initial report on fire B347 was 1-2 acres, 90 percent active, mostly tundra fuels with rain showers in the area. Maps showed a creek and a cabin approximately 1 mile south. Based on this initial information, the AFS and State duty officers made the decision to not staff the fire. At approximately the same time another fire was reported in the same vicinity. The initial reports placed it in a Limited area, but updated reports gave different locations.

Corrected mapping placed both fires in Modified areas. The fire management officer flew both fires late in the evening. When he arrived at B347, it was actively burning on all flanks and did not appear catchable; but after sizing up B349 he returned to B347 and found that the fire had received considerable rain and that it could be caught. There were no apparent values at risk from B349 while B347 threatened a cabin. The decision to staff only one of the two fires was based on the fire sizes, probability of successful initial attack, limited availability of smokejumpers, and values at risk. He ordered initial attack resources for the second fire to be available early the next day in case resource protection was required and began the preparation of an EFSA.

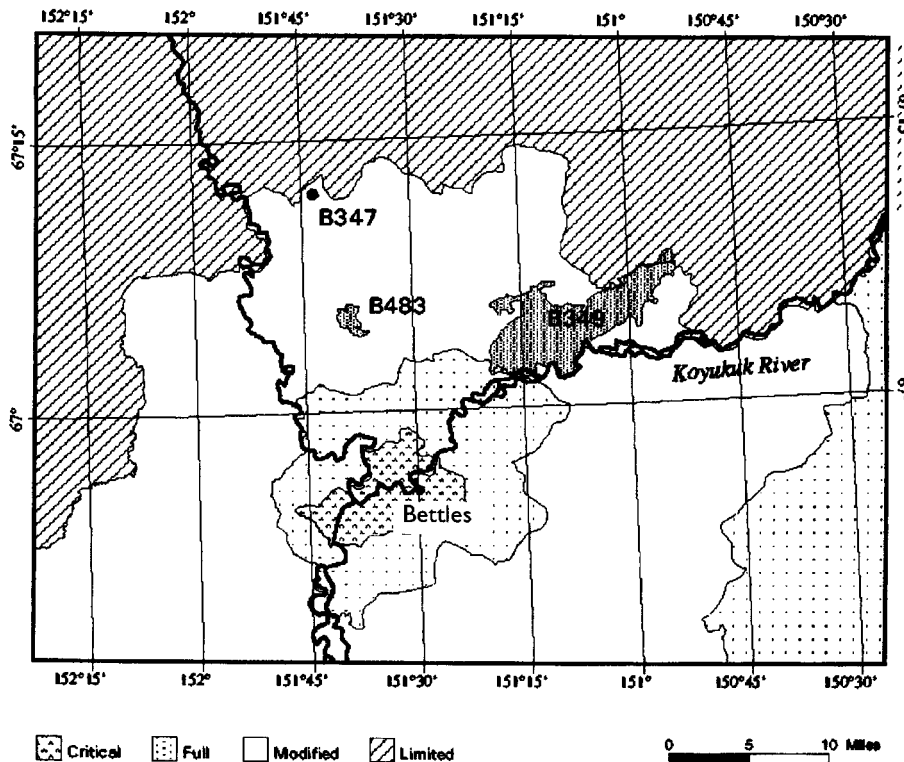


Figure 2

Fire management options (Critical, Full, Modified, and Limited) and locations of three 1997 fires (B347, B349, and B483) near Bettles, Alaska.

Fire B347 was caught by the eight smokejumpers who were dropped on the fire. Located near the boundary between Limited and Modified, it threatened a cabin about three-fourths of a mile away. It was declared out 3 days after it was found. There was no appreciable size growth from the time the smokejumpers landed until it was declared out.

On the morning of June 22, B349 was sized-up by smokejumpers. Based on their observations and initial conversations with land managers, it was decided to continue with monitoring. There were no resources directly threatened by the fire, it was only catchable with a sizeable commitment of resources, and the cost of trying to catch it was estimated to be high. An EFSA was started that day and completed on June 23. The fire was on State land, but was surrounded by lands owned by two native corporations, the BLM, and the National Park Service. Representatives from all the land owner/ manager agencies were involved in the EFSA process and concurred with the final management decision.

Four alternative action plans were identified in the EFSA for B349.³ The alternatives were: no action, place crews on the fire, and two different limited actions with aerial firing. A limited action to use aerial firing and the natural barriers of the Koyukuk River and a creek was chosen as the preferred alternative by land managers. The plan would protect resources to the south and west at a reasonable cost. The estimated cost was \$75,000 with led to a cost of \$115,306 and a size of 24,185 acres.

The fire was monitored daily and its growth mapped by AFS staff. Based on the growth, projected weather, fuels the fire was burning in, and the preferred perimeter identified in the EFSA, the decision was made on June 26 to send a light helicopter with a burn boss and aerial ignition device operator to burn out on the southern and western flanks. The plan was to keep the fire out of Full areas by burning along a creek and the Koyukuk River. This was accomplished over the next two days, except for one spot fire on the western flank. The decision was made to let the spot fire grow for the time being based on fuels, access, and weather.

At this time the fire was just over 20,000 acres and had cost an estimated \$20,000. The fire had been monitored and limited action taken to keep it from burning out of designated control lines. The Plan was followed and the multiple goals of keeping fire out of high value areas while allowing it to play its natural role in the environment were met.

Eighteen days after the fire started 3 crews were placed on the spot fire on the west flank for 3 days. The crews mopped up the edge of the spot fire, with the goal of keeping the fire from moving any more to the southwest and into areas designated as Full. These crews were from an adjacent fire, B483, and were moved to B349 because they were available and seen as a low cost method of meeting the land managers' goals. The fire was monitored for 12 more days before it was declared out.

Fire B483

Fire B483 was an extended attack fire that started on July 3, 1997. Crews and smokejumpers were ordered simultaneously, with smokejumpers arriving first. The fire was in an area designated for Modified protection. It was 50 acres when detected, 100 acres when the smokejumpers arrived and 600 acres when it was declared out. At the time of detection and the decision to staff the fire, the land manager was not available but later concurred with the decision. The decision was made due to the proximity to areas designated for Full protection, a lack of natural barriers between the fire and Full areas, and the Plan, which calls for initial attack in Modified areas early in the season.

Resources available for the initial attack were limited. One load of smokejumpers were available in the state. Before their departure to the fire, the smokejumpers were briefed over the phone by the fire management officer about objectives, resources available, and the plan to send hand crews. Several hand

³Unpublished data on file, Alaska Fire Service, Bureau of Land Management, U.S. Department of Interior, Ft. Wainwright, Alaska.

crews, two helicopters, and retardant were ordered. Another start close to Fairbanks that same day diverted some of the ordered resources.

The extended attack suppression efforts were successful. Managers of adjacent lands were informed of the fire and the suppression decisions in case it escaped initial attack. There was close communication between the Tanana Zone fire management staff and the incident commander on tactics, resources and goals. The fire was contained, mopped up, and declared out in 6 days.

Different Approaches to the Fires

There were seven primary factors that went into the decision processes that resulted in different fire management strategies for these fire: size upon discovery, plotted location, resources available for suppressing the fire (both initial attack and extended attack), threats to development or high value resources, fire behavior, the projected cost of suppression, and the flexibility of the Modified option.

Size Upon Discovery

B347 and B349 were both reported as small, 1 acre fires, while B483 was reported as a larger fire. B347 was over 40 acres and B349 was over 400 acres when viewed by the AFS fire management officer. Size was a factor in the decision to suppress B347 and not to suppress B349, but it did not play a role in the decision on B483.

Plotted Location

The misplots of B347 and B349 were very important to the initial decisions to not suppress them when initially reported. Being misplotted led to a significant delay in the decision process and resulted in the delayed initial attack on B347 and the decision not to use initial attack on B349. If they had been correctly plotted both might have been initial attacked at an earlier stage.

B483 was correctly plotted. The timely response to this fire and decisions on resource ordering were based upon correct plotting, indicating no natural barriers between the fire and Full suppression lands to the south.

Resources Available

At the time B347 and B349 were correctly located, there were limited resources available for immediate initial attack. The decision was made to use those resources for the fire that more directly threatened an identified resource (a cabin) and where the chances for success were higher.

B483 was suppressed by using the available resources. At the time smokejumpers were ordered for B483 they were the last load available in the state, and their use on a Modified fire had to be negotiated. Some of the resources ordered for B483 were diverted to a higher priority fire that started after B483.

Threats to High Value Resources

B349 threatened no high value resources at the time it was initially mapped, while B347 and B483 posed threats to high value resources. B347 was less than a mile from a cabin and potentially threatened the cabin. B483 threatened Full areas and a reported cabin. The threat to higher value areas to the south and west drove the EFSA decision on B349 to use the Koyukuk River and a creek as boundaries.

Fire Behavior

Differences in fire behavior contributed to the decision to suppress B347 and not B349. When first observed by the fire management officer, B347 was burning actively on all flanks. B349 was also very active and in heavier fuels. A short time later B347 was less active due to scattered rain storms that missed B349. This led

Table 1—Estimated costs and sizes for four management alternatives, Fire B349.¹

Management alternative	Estimated size, acres		Estimated cost (Dollars)
	72 hours	5	
Monitor from air	1,200	n/a	5,000
Direct attack with crews	1,000	1,000	125,000
Aerial fire between Wild River and Koyukuk River	n/a	70,000	20,000
Aerial fire between Mud Creek and Koyukuk River	n/a	0	75,000

¹Unpublished data on file, Alaska Fire Service, Bureau of Land Management, U.S Department of Interior, Ft. Wainwright, Alaska.

the FMO to use smokejumpers for B347 because he felt initial attack would be successful on it, but would not be successful on B349.

Fire behavior did not play a role in the decision to suppress B483 but did have an effect on the manner in which it was suppressed. During the first burning period, crews were held in the staging area rather than sent directly to the fire while a safe area was secured. After this period additional crew orders were canceled because of decreased fire activity.

Projected Costs

The projected cost of suppression was a formal part of the decision process for B349 during the writing of the EFSA. The projected cost of each alternative was determined based on known costs and assumptions about the duration of each alternative (*table 1*). Because the least cost alternative did not meet integrated management objectives, a higher cost alternative was chosen. The decision to transfer crews from fire B483 to fire B349 took into account that the government was already committed to the cost of transporting the crews home and refurbishing their equipment. These costs were transferred from B483 to B349, but were already incurred. The only additional costs were wages, food, and helicopter flight time.

Flexibility of Modified

The objectives of Modified within the Plan were: reduced suppression costs through minimum force and indirect tactics; and use of fire to achieve land management objectives. This allowed fire managers to choose direct suppression, as on B347 and B483, or a combination of monitoring, indirect and direct suppression, as on B349.

Results of the Decision Process

There were three primary results from the decision process used on these fires: the suppression strategy followed on B349 resulted in a cost savings over other possible strategies; the fires were managed in accordance with the Plan and the Federal Fire Policy; and discussion on changes in the land status near B349 were initiated and no changes resulted.

Savings on B349

The actions taken on B349 after it was correctly plotted resulted in a significant cost savings, while maintaining fire in the landscape. By the time resources were available on June 22 the fire was over 600 acres and in heavy fuels. A reasonable cost for direct suppression of a 100 to 1,000 acre fire in interior Alaska is between \$125 and \$400 per acre (Strong and Burrows 1998). Final size under a direct suppression strategy was estimated at 1,000 acres. This would have resulted in a cost of over \$125,000 and could easily have cost over \$250,000. No high value resources were directly threatened. The final fire burned 24,185 acres at a cost of

Table 2-Costs associated with three 1997 Alaska fires.¹

	B347	B349	B483
	1997 U.S. dollars		
Wages and benefits	15,706	55,232	97,482
Aircraft and vehicles	7,830	58,595	56,172
Materials and supplies	1,976	633	47,744
Other	56	846	1,495
Total	25,568	115,306	202,893

¹Unpublished data on file, Alaska Fire Service, Bureau of Land Management, U.S. Department of Interior, Ft. Wainwright, Alaska.

\$4 per acre (*table 2*). The use of natural barriers and low cost aerial ignition to burn out along those barriers allowed fire managers to keep costs low.

The placement of crews on B349 increased the cost of the fire from \$20,000 to \$115,306. The Zone fire management considered not placing any crews on the spot fire, but decided that the availability of the crews from the adjacent fire would allow a limited action within the EFSA guidelines at a relatively low cost (Strong and Burrows 1997, 1998).

Compliance with Plan

The three fires were managed within the guidelines of the Plan and the 1996 Federal Wildland Fire Management Policy and Implementation Action Plan (U.S. Department of Interior/U.S. Department of Agriculture 1996). Both the Plan and the Federal Policy, written a decade after the Plan, reflect recognition of the appropriateness of different levels of suppression and the role fire and suppression play in maintaining healthy ecosystems.

The different suppression efforts were within the range identified in the Plan. The Plan calls for immediate, aggressive suppression on all fires in Critical and Full and in Modified early in the season. This was followed for fires B347 and B483. Fire B349 was managed as an escaped fire due to the initial lack of resources and the low threat it posed to high value resources.

Ecological management goals were addressed with the Modified management strategy adopted for B349. The fire was managed in such a manner that high value areas to the south and west were protected, while low value areas to the north and east were allowed to burn.

Land Status

As part of the EFSA process, the National Park Service requested that the appropriateness of Modified for the area of B349 be reviewed at the end of the season.⁴ An informal process was started by the Zone staff, but no changes were suggested by land managers (Strong and Burrows 1998).

Applicability to Other Areas

The Plan and the management of these fires under the Plan offer ideas applicable to other areas: guidelines for joint fire management of fragmented ownership can work well; flexibility in a fire management plan allows resource management goals to be accomplished; and monitoring and indirect attack can be effective management tools that realize cost savings.

Guidelines for Joint Management

The Plan provides guidelines for land and fire managers to work together. The separation of fire management from land management and fragmented ownership have necessitated that these methods be developed. The EFSA provides a simple, coherent method for land and fire managers to jointly consider their options for fires that escape initial attack. The land managers may also call

⁴Unpublished data on file, Alaska Fire Service Bureau of Land Management, U.S. Department of Interior, Ft. Wainwright, Alaska.

for reconsideration of suppression actions taken by fire managers. The Plan calls for annual review of the suppression status by land and fire managers. In practice this has often meant that fire managers have taken the lead and suggested areas for review each winter.

Flexibility

The Modified option is intended to reduce suppression costs and increase resource benefits during the entire fire season and ensure that suppression costs are commensurate with values at risk. This is accomplished by three primary methods: initial attack is used early in the season, indirect attack and site specific attack are used throughout the season, and late season fires are monitored. Land managers may request that initial attack be an indirect effort or that there be no initial attack.

The sparse settlement pattern and scattered resources of interior Alaska allow managers a great degree of flexibility in their fire management decisions. Priorities for suppression are designated in the Plan, and large areas may be designated for Modified and Limited suppression. This could be applied to some higher density areas, although it is doubtful that managers could be as flexible in allowing fires that escape initial attack to grow as large as B349.

Monitoring and Indirect Attack

The monitoring and indirect attack methods used on B349 resulted in significant savings when compared to the projected cost of direct attack. Taking only the actions needed to protect high value areas allowed ecological processes to continue relatively unimpeded. Managers in other areas may not be able to monitor and use indirect attack as much because of high densities of resources, but it can be considered as a method for lowering costs.

Conclusion

The Modified suppression option worked to allow flexible management of three closely located fires in interior Alaska during the summer of 1997. The goal of the Modified suppression option is to balance suppression costs against values at risk and ecological benefits of fire. Fire managers were able to do this through consideration of values at risk, resources available, fire behavior, and projected costs of suppression. Based on these factors they chose to direct attack two of the fires and use indirect and limited direct attack methods on the third. The combination of methods allowed resource management goals to be met while protecting high value resources.

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