DRAFT
ENVIRONMENTAL ASSESSMENT

for

PROPOSED APPLIED FIRE PROJECT

on

WILD HORSE ISLAND STATE PARK

November 6, 2001

Montana Fish, Wildlife & Parks
490 North Meridian Road
Kalispell, MT 59901
(406) 752-5501

Lake County

Executive Summary

Wild Horse Island State Park, located in Big Arm Bay of Flathead Lake, is managed by Montana Fish, Wildlife and Parks (FWP) as a primitive state park. FWP manages the park under the following philosophy: *"Wild Horse Island's natural qualities should be emphasized and conserved. The Palouse prairie and Ponderosa pine forest ecosystems, rare plants, and present wildlife species should be preserved, and primitive, dispersed public recreation should be provided."*

Wild Horse Island is considered to be one of the best remaining examples of a native Palouse prairie and Ponderosa pine forest ecosystem in the western United States. Spalding's Catchfly *Silene spaldingii* and Columbia Crazyweed *Oxytropis campestris* var. *Columbiana,* two native plant species of special concern, are known to exist on Wild Horse Island. Bitterroot flowers, bluebunch wheatgrass, Idaho and rough fescue, and arrow-leafed balsamroot flourish on the island's savanna. Wild Horse Island is home to Rocky Mountain bighorn sheep, mule deer, wild horses, and numerous small mammal and bird species. The island is also home to people with homes located along the island's perimeter. Wild Horse Island has become a premiere destination for visitors seeking wildlife viewing, and natural and cultural historical interpretation. FWP estimates 10,244 visits where made to the park in 1999.

A primary issue surrounding the island's management has been the role that fire plays in shaping the island's Palouse prairie and Ponderosa pine ecosystem. Since the island's designation as a state park in 1978, FWP has explored this issue and has advocated the use of prescribed burning as a way to perpetuate the island's prairie, enhance wildlife habitat, and offer cultural and natural interpretation.

In the summer of 1999, FWP contracted with Stephen Barrett, a research forester and fire ecologist, to conduct a fire history survey on the island and analyze alternatives for the use of prescriptive burning on the island. FWP also contacted wildland fire officials from the Confederated Salish & Kootenai Tribal Forestry Department, and the Montana Department of Natural Resources and Conservation for consultation and assistance in designing an applied fire prescription and safety contingency plan. These departments were also approached with a request for operational assistance should an applied fire proposal be implemented. Finally, FWP consulted with a wide range of biologists, botanists, and range managers in identifying issues and techniques associated with grassland management and applied fire. Several issues were identified through this process:

- Encroachment of Ponderosa pine forest onto Wild Horse Island's grasslands.
- Fire effect on native and nonnative plant communities.
- Fire effects on the island's wildlife.
- Changes to island's ecosystem associated with fire exclusion.
- Safety concerns for private property and visitors.

As a result, FWP has drafted a proposal for a pilot project that would utilize applied fire and/or mechanical thinning on 25 to 60 acres of the island's Palouse prairie and Ponderosa pine. Below is a brief description of the proposal alternatives.

Alternative A - No action: Under this alternative, the current practice of total fire exclusion would continue on Wild Horse Island State Park. FWP would incur no risk of negative impacts associated with prescriptive burning. It is predicted that under this alternative, Ponderosa pines will continue to encroach upon open grasslands, slowly converting open savanna to forestland. Consequently, wildlife and human usage may change as the landscape changes. It is possible that this alternative may have a negative impact on the vitality of the Palouse prairie habitat, which is believed to have evolved with frequent fire.

Alternative B - Experimental controlled burning of four subunits during the late dormant period: This alternative would treat four subunits (A1, A2, A3, and A4) of 5 to 15 acres each, with fire in the late dormant period (early spring). These subunits would be located in areas of severe Ponderosa pine encroachment, and pre- and postburn vegetation monitoring would be conducted by FWP personnel.

Two of the subunits in this alternative (A1 and A4) are comprised predominantly of native grass communities, while A2 and A3 have much higher percentages of nonnative grasses and Canada thistle. All four subunits are experiencing severe Ponderosa pine encroachments, with canopy covers as high as 75%.

Vegetation monitoring would be conducted for a minimum of three years following controlled burning to assess fire effects on the different plant communities contained in subunits A1 through A4.

The potential for fire escapement would increase with this alternative due to the fact that multiple burn units would require more ignitions and cover a greater quantity of acreage. Negative impacts associated with applied fire, as identified through postburn monitoring, would also be more difficult to mitigate for the same reasons.

Alternative C (preferred alternative) - Experimental controlled burning of a single unit during the late dormant period: Alternative C creates one subunit (A1) of approximately 10 acres in size. This subunit is located in an area of heavy Ponderosa pine encroachment. The prairie component of unit A1 is primarily native grasses and forbs, with a smaller component of nonnative invaders. Fire would be applied to A1 during the late dormant period (early spring). Alternative C offers a "go-slow approach," allowing FWP to monitor a single, applied fire unit for net fire effect on treated plant communities. If positive results are documented through postburn monitoring, this pilot project can be used to guide similar efforts elsewhere on Wild Horse Island's grasslands. If negative results, such as propagation of nonnative plant species were documented, mitigation would be limited to one subunit. Alternative C does not offer the ability to measure fire effects on predominantly nonnative plant communities

Unit A1 is located in a relatively remote area of the park and in an area that geographically is conducive to controlled burning, thus lessening concerns for private property damage resulting from fire escapement. FWP feels that Alternative C offers the potential for habitat enhancement and interpretive opportunities while keeping risks of negative impacts to a minimum. For these reasons, Alternative C is the preferred alternative.

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I. Introduction

A. Background

Wild Horse Island State Park, one of 15 designated primitive state parks managed by Montana Fish, Wildlife and Parks (FWP) is located within the boundaries of the Flathead Indian Reservation on the west side of Flathead Lake. Wild Horse Island is 2,118 acres in size, with approximately 2,066 of that being park land. The remaining acreage consists of 54 private lots located along the perimeter of the island (see figure 1).

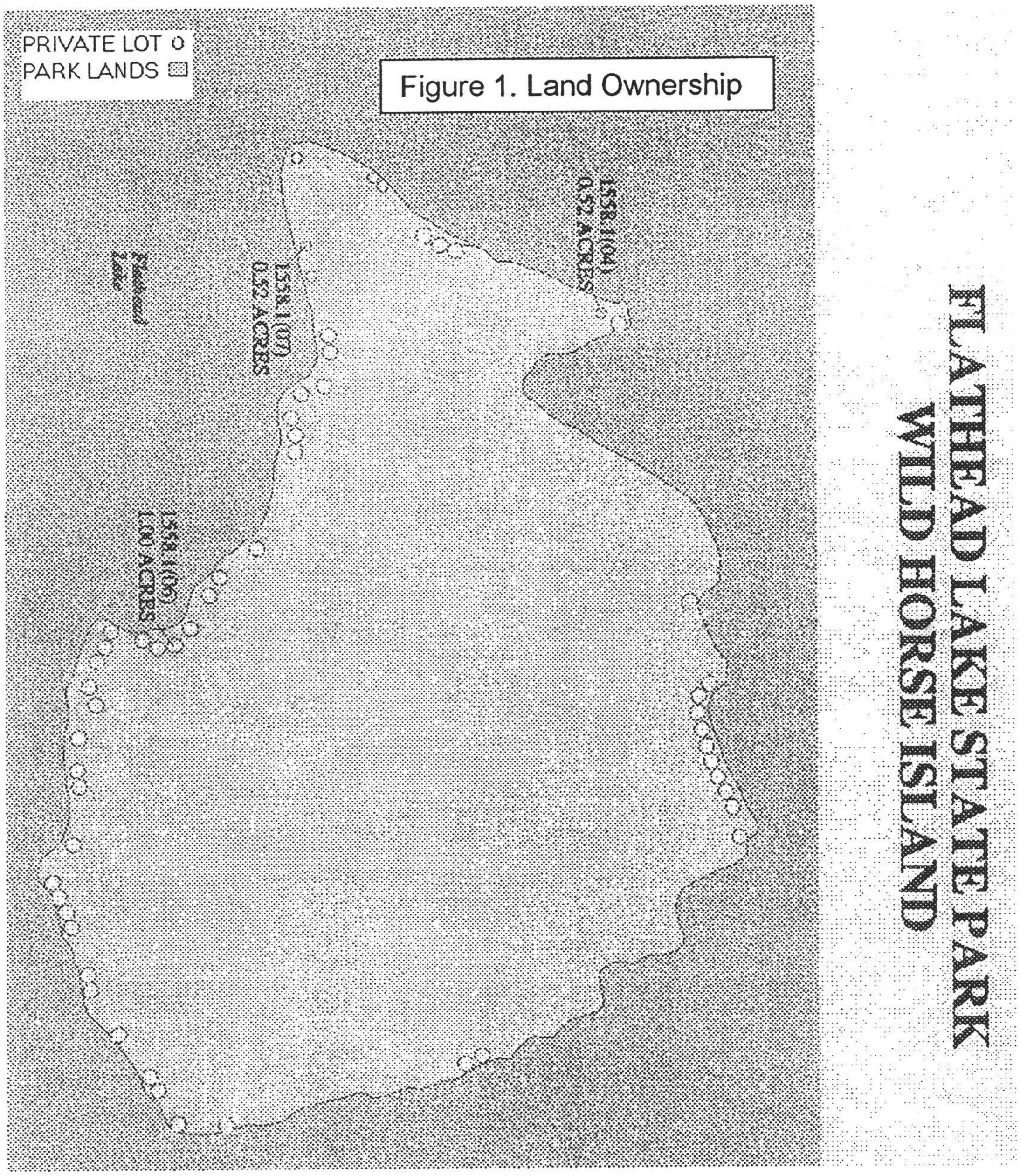


Figure 1. Land Ownership

Wild Horse Island contains one of the few remaining examples of an intact Palouse prairie and Ponderosa pine ecosystem in western Montana. Wild Horse

Island is home to Rocky Mountain bighorn sheep, mule deer, wild horses, and a wide variety of birds and small mammals.

Wild Horse Island was visited by an estimated 10,244 people in 1999, continuing a trend of increased visitation that has been documented since FWP began gathering visitation data in 1980. Visitation for 2000 was significantly reduced due to fire danger closures. (Montana State Park and Fishing Access Sites Visitation Report 1999 and 2000 – available through Region One FWP headquarters in Kalispell).

The original management plan for Wild Horse Island was written in 1978 and was most recently updated by the Parks Division of FWP in 1994. Consistent with earlier planning documents, the 1994 management plan update states the management philosophy for Wild Horse Island as follows:

"Wild Horse Island's natural qualities should be emphasized and conserved. The Palouse prairie and Douglas-fir/Ponderosa pine forest ecosystems, rare plants, and present wildlife species should be preserved, and primitive, dispersed public recreation should be provided."

Fire Ecology

A primary issue regarding the above-mentioned management philosophy is the use (and current exclusion) of fire in managing for the propagation of the Palouse prairie and Ponderosa pine forest ecosystem.

From Wild Horse Island's inception as a state park, fire management has been a controversial topic - specifically, the use of fire as a tool through prescriptive burning. As early as 1982, the island's management documents have suggested that the use of controlled burning on the island might be desirable. The 1982_Wild Horse Island Management Plan Update suggested that FWP should consider using controlled burning for range rehabilitation. The 1987 Management Plan Update for the park identifies the following preferred department action:

"The department will allow natural forest succession to occur on the island, including allowing diseases to complete their cycles. The forest will be contained from invading certain open areas identified for prairie preservation or wildlife range. This will be done through designed fires or mechanical control."

A draft fire management plan was written for the island in 1989, and it included a proposal for an experimental controlled burn to address fuel loading and encroachment of Ponderosa seedlings onto the Palouse prairie. Due to public sentiment at the time, this project was not implemented. Instead, mechanical thinning of Ponderosa pine trees was utilized in the Little Skeeko Bay region of the island.

Finally, in the interim management action section of the 1994 Management Plan Update, the following preferred action is identified:

"Implement controlled burning of a selected grassland area as outlined in the 1989 Draft Fire Management Plan."

(The above- mentioned planning documents can be viewed at Region One FWP headquarters in Kalispell.)

Consequently, FWP has drafted an applied fire proposal for the Palouse prairie and Ponderosa pine habitat on Wild Horse Island. The project alternatives address the habitat enhancement, fuels reduction, and public recreation aspects of the 1989 Wild Horse Island Draft Fire Management Plan and the 1994 Management Plan Update. Specific objectives and treatment priorities differ from the 1989 Draft Fire Management Plan, as the body of knowledge regarding applied fire has grown significantly.

The 1989 Draft Fire Management Plan designated two grassland management zones on Wild Horse Island and recommends that each of these two areas receive prescriptive fire. This proposal creates three grassland management units based on topographic features. Within these management units, the plant communities vary widely, depending on aspect, moisture levels, and past and present use. The alternatives associated with this proposal take into consideration possible fire effects on both native and nonnative plant communities. In addition, pre- and postburn vegetation monitoring are elements of all project alternatives in this proposal.

The proposed project is designed to be a pilot project, which, if successful, would be expanded in the future to include other portions of the island's grassland and Ponderosa pine habitat. A primary goal of a long-term, applied fire program on Wild Horse would be to simulate a fire regime on portions of the island similar to that, which occurred prior to modern fire suppression. Future applied fire projects would be dependent on quantified positive results from the pilot project. In creating a pilot burn proposal, FWP has approached fire management officials at the Confederated Salish & Kootenai Tribal Forestry Department and the State Department of Natural Resources and Conservation (DNRC) for technical and operational assistance.

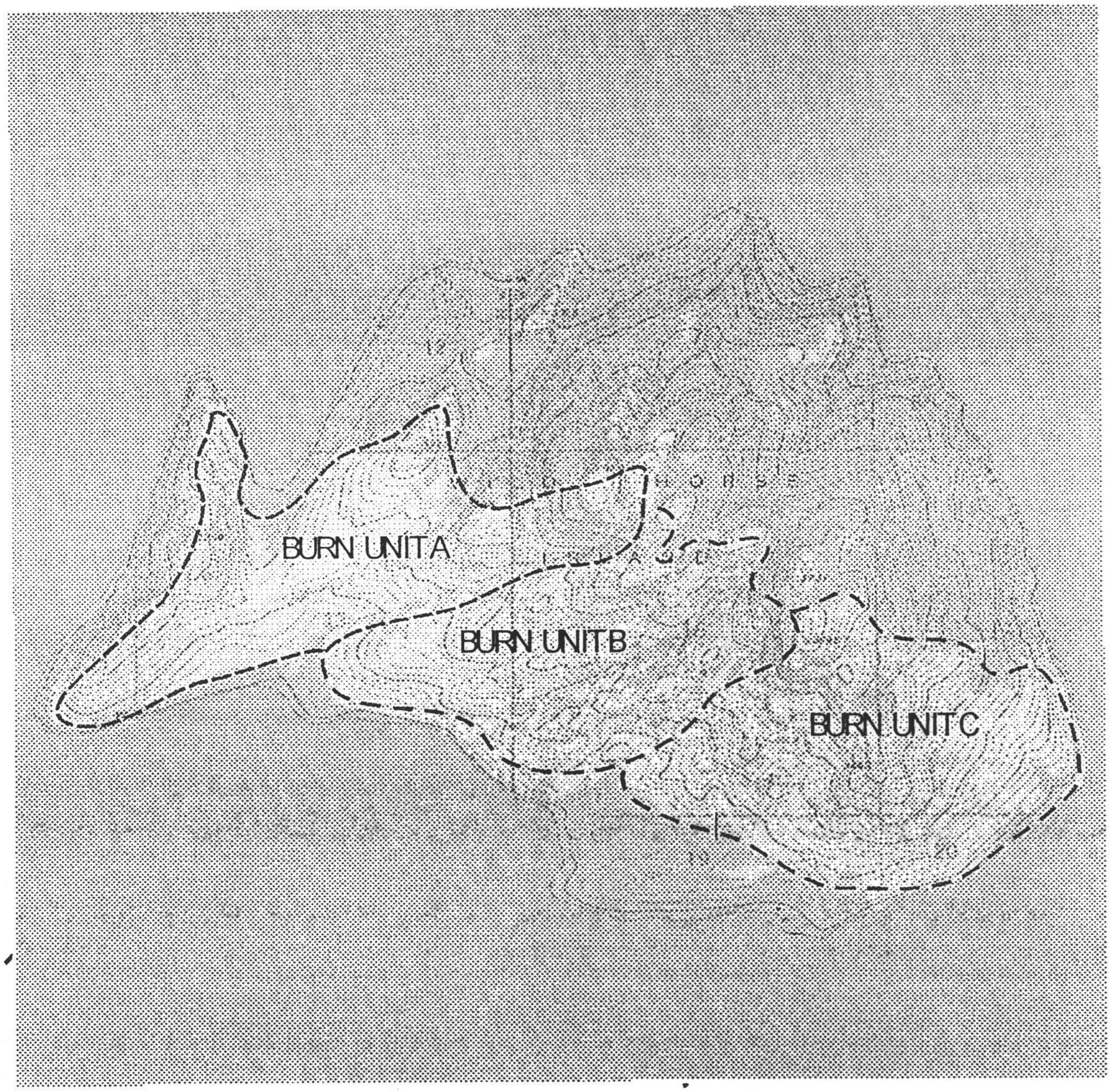
Proposal Description

The Parks Division proposes to implement an applied fire demonstration project within Wild Horse Island's approximate 1,100 acres of Palouse prairie and Ponderosa pine habitat. This would be a pilot project to determine the feasibility and success of using applied fire as a management tool on the island. The project goals and objectives are oriented to habitat enhancement (i.e., reduce Ponderosa pine encroachment and stimulate native vegetation), fuel reduction, and interpretation. Quantifiable objectives would be measured against baseline range data through postburn monitoring.

For the purpose of rangeland management, Wild Horse Island's Palouse prairie and Ponderosa pine habitat has been divided into three polygons of similar acreage (Figure 2). These management units diverge from early fire management zones as identified in the 1989 Draft Fire Management Plan. The

current boundary lines are based on topographic features, which can be used as unit boundaries for management activities strictly pertaining to rangeland management. A subunit or multiple subunits of management unit A would be treated in the pilot project. Management unit A contains several locations that are typified predominantly by native plant communities that are in the early stages of pioneering by Ponderosa pine stands. Unit A is also further from residential dwellings than units B and C. If the pilot project meets project objectives, portions of management units B and C may also be treated with prescriptive burning in subsequent years. An applied fire burn regime would be based on a 9- to 12-year mean fire interval (MFI). A 9- to12-year MFI translates to portions of each of the three management areas being treated with applied fire once every 9 to12 years.

Figure 2. Wild Horse Island Range Management Units



B. PURPOSE AND NEED OF THE PROPOSED ACTION

It is a common belief that traditionally wildfire played a significant roll in the maintenance of Palouse prairie and Ponderosa pine ecosystems (Antos et al. 1983, Barret et.al. 1997, Devlin 2000, Lecica 1999). Fire response records from the Confederated Salish & Kootenai Tribal Forestry Department indicate that since 1963 tribal fire crews have responded to 14 wildfires on Wild Horse Island, 8 of which were confirmed lightning-caused fires. In the summer of 1999 FWP contracted with Stephen W. Barrett, a consulting research forester from Kalispell, Montana. Barrett has studied fire history and ecology throughout the inland west for over 20 years. Mr. Barrett was asked to conduct a literature review and field study of Wild Horse Island's fire history as it pertains to grasslands and determine if there was evidence that wildfire had indeed played a roll in the island's pre-settlement past. Barrett was also asked to formulate recommendations for controlled burn alternatives should this management action be deemed as potentially beneficial. Barrett's work culminated in a final report, which was delivered to FWP in December of 1999 (Appendix A).

Through analysis of fire scars on Ponderosa pine trees located in stands adjacent to the island's grasslands, Barrett suggested that fire may have indeed been common on Wild Horse Island prior to the early part of the 20th century (i.e., prior to modern fire suppression). He estimated an MFI of 9 to10 years with a 5- to20-year fire interval range and speculated that fires could potentially have burned an average of 216 acres of the island's total acreage annually. Barrett was careful to mention that this was not an exhaustive analysis, but that these fire frequencies were consistent with similar habitat types elsewhere in the region. Barrett further determined that the two Ponderosa pine stands that were analyzed on the island had not been exposed to fire in 107 years and 113 years respectively, exceeding pre-settlement (i.e., pre-fire suppression) MFIs by 10 to 13 times. This caused Barrett to remark in his final report that "*this is some of the most striking evidence of effective fire exclusion that I have found in two decades of sampling the Northern Rockies.*"

Through analysis of aerial photographs of Wild Horse Island, ranging from 1937 to 1998, and through analysis of still photographs from the Morton Elrod collection housed at University of Montana, Barrett estimated that Wild Horse Island may have already lost up to 20% of its contiguous grassland and savanna habitat to Ponderosa pine encroachment (Appendix A). Presumably, this is a result of fire suppression on the island.

Mechanical thinning to reduce Ponderosa pine encroachment is a tool currently being used by FWP to address small areas of Ponderosa pine encroachment on Wild Horse Island. Mechanical thinning alone does not replace the role of fire as it relates to litter accumulation in grass communities.

C. AUTHORITIES AND DIRECTION

Wild Horse Island was added to the state park system in 1978 and was designated a primitive park under House Bill 314 in 1993. As a state park, the island is managed under RCM 23-1-102, 23-1-110, 23-1-107, and Administrative

Rules of Montana (ARM). ARM 12.8.102 (3) states that *"management will be directed toward retention of state parks in as near a natural condition as possible without* *impairment of ecological features and values."* The park's designation as a primitive park limits improvements to those necessary to meet minimum public health requirements in the matter of sanitation, the establishment of hiking trails, the improvement of existing trails, and minimal signage.

D. DESCRIPTION OF THE PROPOSED PROJECT AREA

1. General

The proposed project area is located within a polygon, approximately 370 acres in size, lying within Sections 12, 13, and 14 of T24N, R21W, and Section 18 of T24N, R20W on Wild Horse Island.

This polygon is a subunit of the approximate 1100-acre Palouse prairie grasslands of Wild Horse Island. In consists primarily of native short grass prairie (Blue Bunch Wheatgrass, Prairie Junegrass, fescues, and native forbs), nonnative grasses, and Ponderosa pine forest. The project area also contains an historic homestead, consisting of two wooden buildings (circa 1911) that are maintained by the Parks Division for interpretive purposes. The department maintains a self-guided interpretive trail in this unit, and a segment of this trail marks the south-central border of the proposed project area. The nearest private structures are located approximately 1/3 of a mile to the south of the project area.

2. Water Resources.

The proposed project area encompasses one intermittent streambed. This bed has no recent indications of a stream channel or erosion. There is no standing water within the proposed project area. Flathead Lake shoreline is located approximately 1/4 to 1/3 of a mile from the southwest through northwest perimeter of the proposed project area. There is heavy vegetative cover throughout this perimeter.

3. Vegetation.

The proposed project area consists of Palouse prairie and Ponderosa pine forest habitat.

Grasses

Dominant native grass species include bluebunch wheatgrass *Pseudorogneria spicata*, Idaho fescue *Festuca idahoensis*, rough fescue *Festuca scabrella,* and prairie junegrass *Koeleria macrantha*. Nonnative grasses include crested wheatgrass *Agropyron cristatum*, cheatgrass *Bromus tectorum*, and quackgrass *Agropyron repens* .

Forbs

Dominant forbs include arrowleaf balsam root *Lewisia rediviva*, silky lupine *Lupinus sericeus*, western yarrow *Achillea millefolium*, and bitterroot *Lewisia rediviva*.

Cactus

A small population of prickly pear cactus *Opuntia humifusa* occurs on southern aspects of the northwest quadrant of the proposed project area.

Shrubs

Small populations of choke cherry bushes *prunus vifginana* occur at higher elevations throughout the proposed project area.

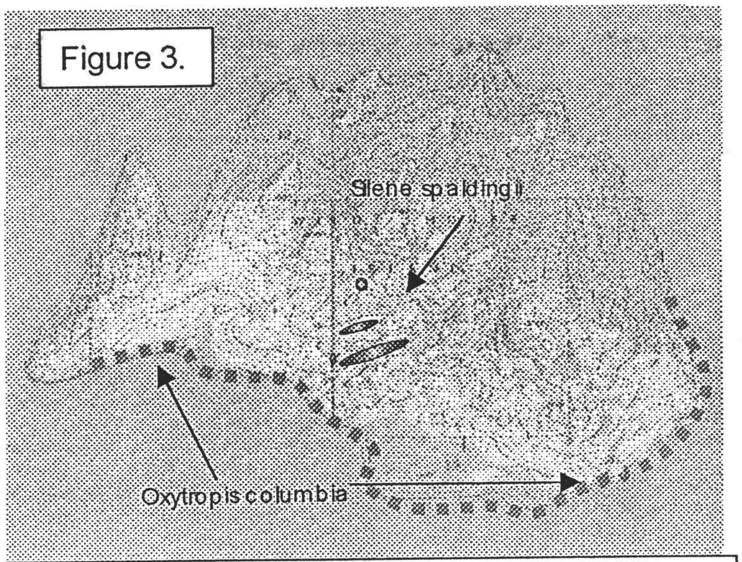
Trees
Ponderosa pine *Pinus ponderosa var. scopulorum* is the dominant tree species with the proposed project area. The Ponderosa stands within this area are typified by a successional advance of Ponderosa seedlings moving inward toward the central region of the management unit polygon. Size class tends to increase towards the perimeter of the polygon. Dense thickets of saplings up to 8' occur on the north and south flanks of the 3,000' saddle that divides Little Skeeko Bay from the southwest shoreline of the island. This region of the proposed project area also contains thickets of Ponderosa pines in the 4-15" dbf class, with 60% to 75% canopy closure. Two-8' class Ponderosa thickets also occur in the draw between the two dominant peaks on the north-central border of the proposed project area. The valley that defines the southeast border of the project area contains mature pines with scattered thickets of 2 - 8' Ponderosa seedlings as well.

Noxious Weeds
Although leafy spurge *Euphorbia esula* and spotted knapweed *Centaurea maculosa* do occur on Wild Horse Island, neither have been documented within the proposed project area. Canada thistle *Cirsium arvense* occurs in dense patches located primarily beneath old growth Ponderosa pine stands in the south-central region of the proposed project area.

Species of Special Concern
Spalding's campion *Silene spaldingii* was last identified on Wild Horse Island in 1995. The plants were located in three separate subpopulations (Figure 3).

Columbia crazyweed *Oxytropis campestris* var. *Columbiana* has been identified in four sections of the southern shoreline of Wild Horse Island (Figure 3).

Figure 3.



Recorded occurrences of sensitive plants.

4. Agricultural

None of the project area is considered agricultural.

5. Wildlife

The proposed project area is utilized by a diverse population of mammals and birds.

Small Mammals

Deer mice *Peromyscus maniculatus* and montane voles *microtus montanus* both utilize the proposed project area, with the former being more abundant. Deer mice utilize open sites, while avoiding areas with high percentages of vegetative cover. Montane voles utilize micro-sites within higher moisture content and denser vegetation cover (Pearson et.al). Red squirrels *Tamiasciurus hudsonicus* occupy the Ponderosa pine stands within the proposed project area.

Large Mammals

Rocky Mountain bighorn sheep *Ovis canadensis,* mule deer *Odocoileus hemionus*, and feral horses *Equus caballus* utilize the proposed project area on a year-round basis. December 1999 aerial and ground surveys counted between 38 and 43 Bighorn sheep, 99 mule deer, one white-tailed deer, and four horses. Anecdotal and fecal evidence occurs periodically for black bears *Ursus americanus*, and anecdotal evidence of mountain lions *Felus concolor* has been documented within the proposed project area. Coyotes *Canis latrans* utilize the proposed project area as well. A 1998 coyote study identified two active den sites on the island.

Birds

Bird species that occur in the proposed project area consist of (but are not limited to) the following species: Savanna Sparrow *Passerculus sandwichensis*, Vesper Sparrow *Pooecetes gramineus*, Western Meadowlark *Sturnella neglecta*, Yellow- rumped Warbler *Dendroica coronata*, Mountain Bluebird *Sialia currucoides*, Red- breasted Nuthatch *Sitta canadensis*, Pileated Woodpecker *Dryocopus poleatus*, Merlin *Falco columbarius*, Common Crow *Corvus brackyrhynchos*, Blue Grouse *Dendragapus obscurus*, Mourning Dove *Zenaida macroura*, Common Nighthawk *Chordeiles minor*, and American Robin *Turdus migratorius*.

Threatened and Endangered Species

One pair of Bald Eagles *Haliaeeus leucocephalus* have established a nesting site on the north-central portion of the island, approximately 1/8-mile from the shoreline. This nesting site does not fall within the proposed project area.

6. Recreation/Aesthetics

Wild Horse Island has experienced an upward trend in visitation since data collection began in 1980. Estimates for 1999 visitation for Wild Horse Island are 10,244 visitors. It is estimated that 9,261 visitors (90%) visited the island between June 1 and September 30 of the 1999 calendar year. These numbers are based on extrapolations from visitor sign-in logs located at five locations around the island's perimeter and visitation surveys conducted in 1998. Commonly, visitors land at one of the five designated sites and walk towards the interior of the island. FWP estimates that approximately 70% of park visitors land at Little Skeeko Bay, where a registration log, an interpretive kiosk, and an island brochure and map dispenser are located. Activities on the island typically involve hiking, wildlife viewing, photography, and picnicking.

FWP development is limited to five registration kiosks located on the perimeter of the island, a self-guided interpretive trail, a public latrine located near Little Skeeko Bay, and a bighorn sheep capture pen. FWP also maintains an historic home site in the island's interior.

Wild Horse Island offers viewing of Palouse prairie habitat and Ponderosa pine forests. The island offers uninterrupted views of the Swan and Mission ranges to the east, and Chief Cliff and Dayton Creek drainage to the west. Vast portions of Flathead Lake and several of its islands can also be viewed from Wild Horse.

7. Commercial

Although commercial activities are prohibited on the island, commercial tour boats and guided kayak tours include Wild Horse Island. These tours circumnavigate the island and offer interpretive commentary. Commercial boat rentals also account for some visitation to Wild Horse Island.

E. MANAGEMENT GOALS AND OBJECTIVES

Management Goals

1. To preserve and, to the greatest extent possible, restore the natural ecological processes and conditions that exist on the island.

2. To provide an educational experience which provides the public an opportunity to understand and appreciate the unique natural and historical features of the island and which stimulates interest in ecological principles.

3. To provide a range of compatible dispersed recreational opportunities, while maintaining the primitive character of the island.

Management Objectives

1. Restore fire periodicity to portions of Wild Horse Island's grasslands
   a. Initiate a rotational fire regime to specific grasslands of Wild Horse Island based on a MFI of 9 to 12 years.

2. Enhance native plant communities through application of fire and thinning.
   a. Quantify stable or increasing vitality of indicator grasses and forbs.
   b. Quantify stable or decreasing frequency of exotic plant species, including noxious weeds.

3. Decrease Ponderosa pine encroachment onto island grasslands and reduce inter-plant competition (Appendix B).
   a. Attain mortality of 80% in Ponderosa pine saplings under two feet in height within treated portions of the proposed project area.
   b. Attain mortality of 50% in Ponderosa pine saplings between two and eight feet in height within treated portions of the proposed project area.
   c. Attain mortality of 25% in Ponderosa pines with a dbf of 4 to 15 inches within treated portions of the project area.

4. Decrease fuel loading as a precaution against wildfires. (Appendix B)
   a. Attain 90 % consumption of dead grass liter within burned portions of project area.
   b. Attain 40% consumption of needle litter within burned portions of project area.

5. Enhance visitor understanding of the role that fire plays in a Palouse prairie and Ponderosa pine ecosystem.
   a. Create fire ecology interpretive text to be added to the self-guided interpretive trail.

II. Applied Fire Alternatives

A. Alternatives Considered and Dismissed

1. Treatment of unforested grasslands only. This alternative would be based on an MFI of 9 to 12 years, with prescriptive fire being applied only to Palouse prairie plant communities during the late dormant period (early spring). The burning of Ponderosa pine trees would be avoided. The primary advantage to this alternative is a decreased possibility of fire escapement. This alternative would also be less labor intensive, as no pretreatment of select stands would be necessary. Aesthetically, this may also be a more attractive alternative to some park visitors, since this alternative would not produce scorched or blackened trees.

FWP feels that this alternative does not adequately address the issue of Ponderosa pine encroachment. This alternative would potentially treat isolated saplings, while allowing existing dense stands to prosper. This alternative may actually encourage Ponderosa pine encroachment by effectively preparing a germination bed for advancing seedlings. As these stands increase in size class, the associated inter-plant competition, fuel loading, and grassland losses become more expensive and timely to mitigate.

2. Experimental controlled burning of small units during early dormant period: This alternative is based on an MFI of 9 to 12 years, with up to four sub-units of 5 to 15 acres each, receiving treatment with fire in late summer or early fall (early dormant period). The burn units would be subunits of management unit A. These subunits are distributed in areas of severe Ponderosa pine encroachment. A control plot for the purpose of preburn and postburn monitoring would compliment each subunit. Postburn monitoring of subunits would be monitored for three summers following the completion of the pilot burn.

This strategy would more closely simulate a natural wildfire season, but due to current litter accumulations and low fuel moistures during the early dormant period, this alternative may be potentially harmful to certain native grasses such as rough fescue and bluebunch wheatgrass (Bradley et al. 1994, Jourdonnais et al. 1986). This alternative would make scorch mortality objectives for Ponderosa pine more attainable due to low fuel moistures.

The heightened potential for fire escapement due to extremely dry fuels during the early dormant period and the associated risks to homeowners on the island are cause for concern. A second potential drawback to early dormant season burning is the temporary loss of winter range forage available for the island's ungulates as they enter the winter months. Finally, the fire fighting agencies who would assisting FWP with applying fire are often involved with other fire fighting duties at this time of the year.

B. Description of Reasonable Alternatives

1. Alternative A - No action: Under this alternative, FWP would incur no risk of negatively affecting Wild Horse Island's native Palouse prairie plant communities through burning. Furthermore, there would be no risk of displacing or disturbing wildlife as a result of applied fire. The potential for temporary displacement of ground-nesting birds is eliminated, as is the potential for property damage due to fire escapement.

The negative impacts of a no-action alternative are speculative, but would certainly include increased loss of Palouse prairie habitat to Ponderosa pine encroachment. Potentially, native grasses could decline in vigor and frequency due to annual litter accumulation in a fire-free environment and through inter-plant competition with Ponderosa pine stands. Continued fuel accumulations through fire suppression could potentially cause naturally occurring or unintentional human-caused fires to burn more severely.

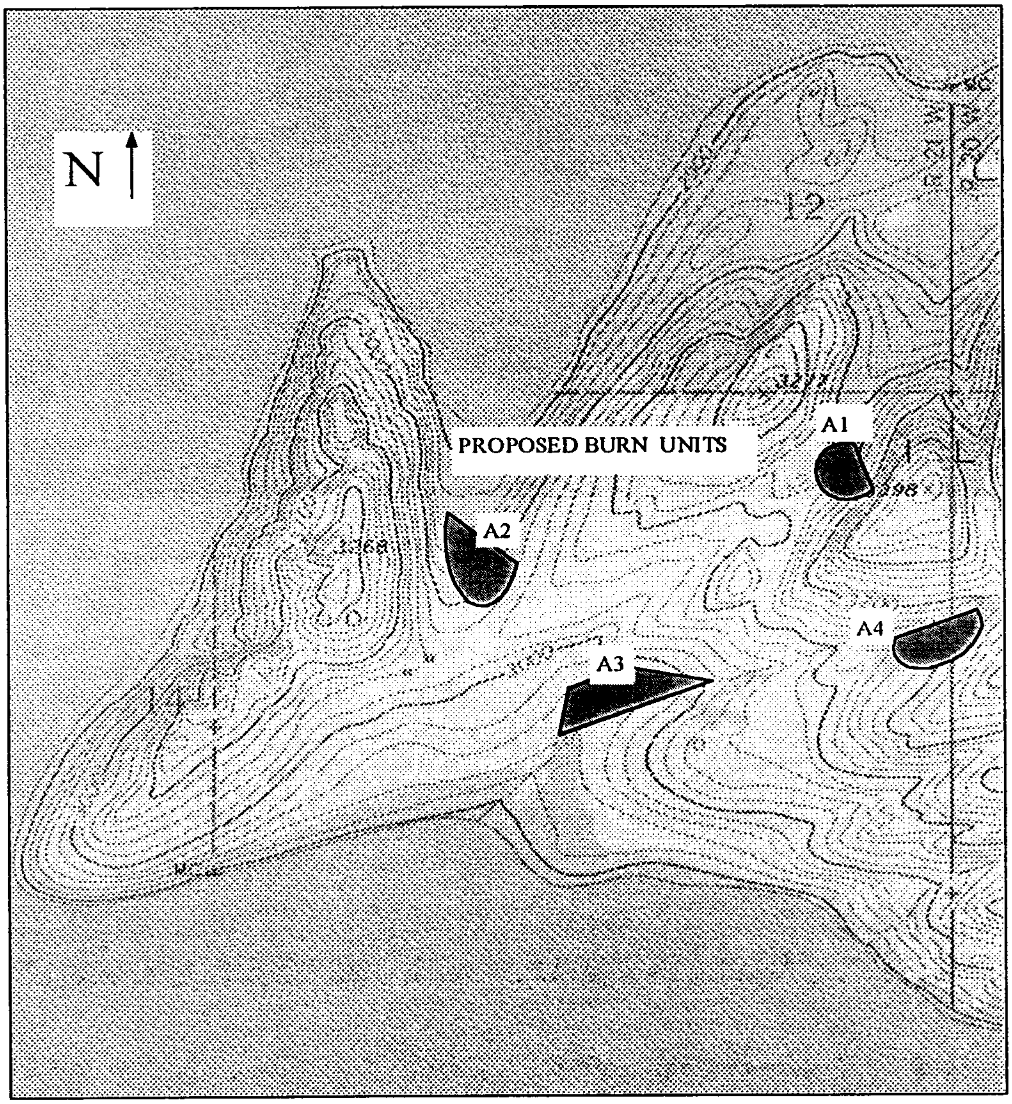
2. Alternative B - Experimental controlled burning of four subunits during the late dormant period: This alternative is based on an MFI of 9 to 12 years, with four subunits of 5 to 15 acres each receiving treatment with fire in the late dormant period (early spring). The burn units would be subunits of management unit A. Subunits A1and A4 are typified by predominantly native grass communities with severe Ponderosa pine encroachment. A full range of Ponderosa age classes are represented, with canopy closure as high as 75% in the smaller age classes.

Subunits A2 and A3 have a much higher nonnative grass component with heavy infestations of crested wheatgrass and quackgrass. Subunit A3 contains localized infestations of Canada thistle as well. Subunit A2 was treated in 1995 with a low level of mechanical thinning and is partially occupied by a dense stand of Ponderosa pine predominantly in the 7" to 14" dbf range. Subunit A3 also contains heavy Ponderosa pine encroachments with a full complement of age classes. Canopy cover in portions of A3 reach 75%.

Control plots for the purpose of preburn and postburn monitoring would compliment each subunit. Postburn monitoring of subunits would be conducted for a minimum of three years following the completion of the pilot burns

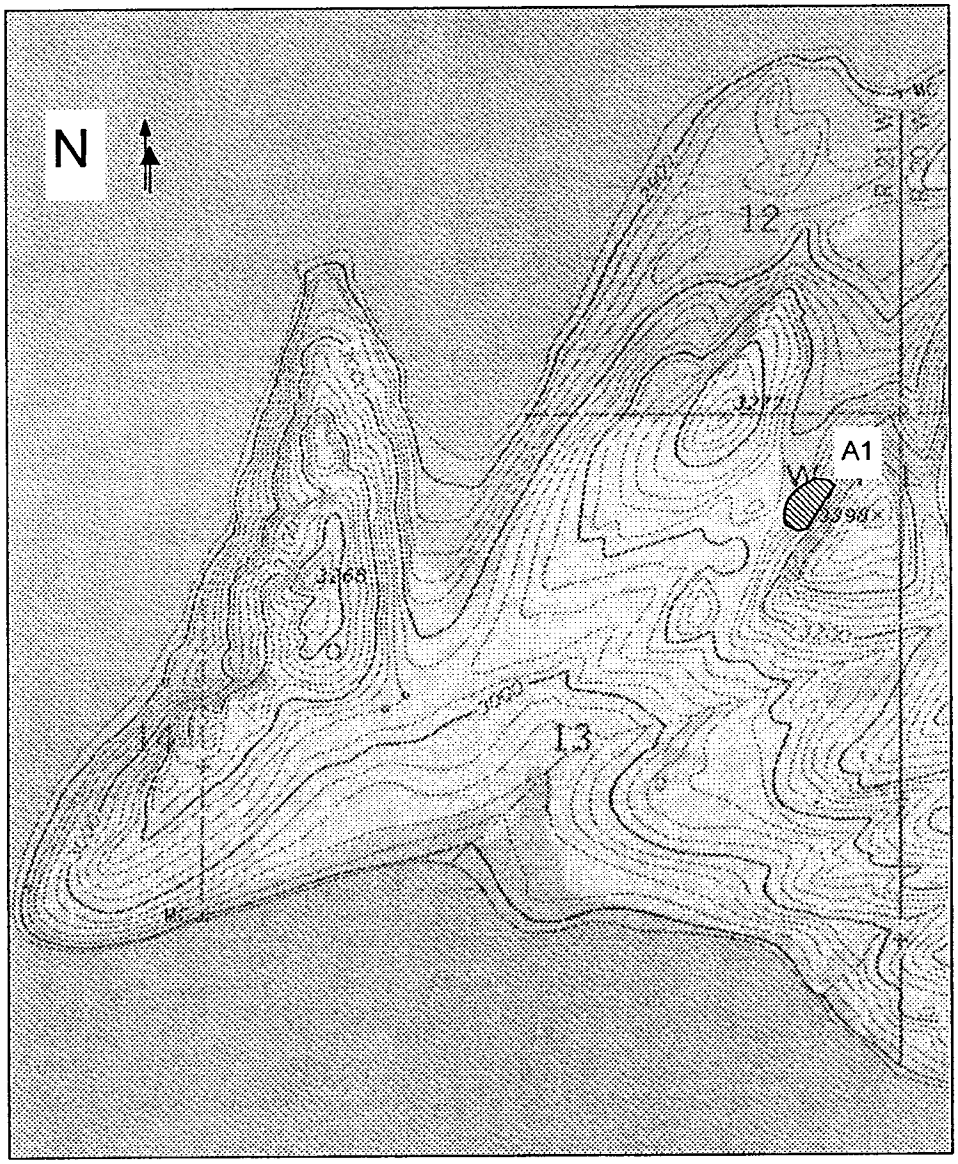
The potential for fire escapement would increase with multiple burn units. This potential would be mitigated through burning in a period where heavy fuels contain enough moisture to discourage escapement and through adequate staffing. As a pilot burning project, the primary concern regarding this alternative is that unexpected negative impacts from burning, such as noxious weed propagation, would be proportionally more difficult to mitigate over larger amounts of burned acreage. Additionally, this alternative would be logistically more difficult, and operational costs would be greater.

FIGURE 4. ALTERNATIVE B
PROPOSED APPLIED FIRE UNITS.



3. Alternative C (preferred alternative) - Experimental controlled burning of a single unit during the late dormant period: Alternative C creates one subunit of management area A approximately 10 acres in size. (See figure 5)

FIGURE 5. ALTERNATIVE C
PROPOSED APPLIED FIRE SUBUNIT



Subunit A1 is located in an area of heavy Ponderosa pine encroachment. The prairie component of this subunit is still primarily native grasses and forbs, with a smaller component of nonnative invaders. Subunit A1 would be treated with fire in early spring (late dormant period). An early spring burn would decrease the potential for fire escapement, thus lowering the potential for damage to dwellings on the island (pers. comm. - Confederated Salish & Kootenai Tribal fire specialists and Department of Natural Resources and Conservation fire specialist.) The proposed project would commence when fuel moisture levels are such that project objectives can be met. The project would not commence after spring green-up has begun, thus avoiding permanent damage to Palouse prairie plant communities (Bradley et al. 1992, Jourdonnais et al 1986, Wright et al 1982).

Like Alternative B, this alternative would focus treatment on a portion of the project area that is experiencing heavy Ponderosa pine encroachment. Post- burn vegetation monitoring would be conducted by FWP personnel for a minimum of three years and measured against baseline vegetation data for the sake of quantifying effects of applied fire on the Palouse prairie plant communities. Some of the advantages to this alternative are listed below:

- Relatively low fire escapement potential.
- Less potential for permanent damage to native grasses and forbs.
- Lower personnel and equipment requirements.
- Adverse fire effects could be more easily mitigated.

A potentially negative outcome of applying fire to a single burn unit is that grazing animals may be attracted to a postburn flush of vegetation. A concentration of grazers on a small burn plot may cause harm to native plant communities through overgrazing (pers. comm. – John Vore, FWP Wildlife Biologist).

Due to high fuel moistures during the late dormant period, and the size and remoteness of subunit A1, FWP feels that this alternative creates the lowest potential for fire escapement and permanent damage to native bunch grasses and forbs. FWP also feels that a single unit pilot burn can be more thoroughly monitored for fire effects and more easily mitigated in the event of negative impacts. Finally, assistance from fire fighting agencies is more readily available during the late dormant period. For these reasons, Alternative C is the preferred alternative.

III. Environmental Review

A. Evaluation of Alternatives on the Physical Environment

1. Land Resources

Alternative A - No action: A no-action alternative does not have any apparent immediate effects on land resources.

Alternative B - Experimental controlled burning of four subunits during the late dormant period: The dominant soils of the project area are described in the U.S. Department of Agriculture's Lake County soil survey as noncalcareous loams and silt loams that are less than 20 percent clay, and sandy clay loams, sandy clays, and hemic soil material. These soils are classified as slightly erodible. Because vegetation will be burned off of portions of the project area, the opportunity for erosion will be increased. However, none of the four subunits in this alternative are situated on a slope greater than 3%, thus diminishing erosion concerns. Regeneration of vegetation will further mitigate erosion concerns. FWP will restrict public access to recently burned areas by administrative signing until sufficient revegetation has occurred.

Alternative C - Experimental controlled burning of a single unit during the late dormant period: The dominant soils of the project area are described in the U.S. Department of Agriculture's Lake County soil survey as noncalcareous loams and silt loams that are less than 20 percent clay, and sandy clay loams, sandy clays, and hemic soil material. These soils are classified as slightly erodible. Because vegetation will be burned off of portions of the project area, the opportunity for erosion will be increased.

This effect will be mitigated naturally through regeneration of vegetation. Subunit A1 is situated in an area of little topographical relief, thus mitigating runoff. FWP will restrict public access to recently burned areas by administrative signing until sufficient revegetation has occurred.

2. Air Resources

Alternative A - No action: A no-action alternative would have no immediate effect on air resources within the proposed project area.

Alternative B - Experimental controlled burning of four subunits during the late dormant period: Proposed spring burning on Wild Horse Island's Palouse prairie and Ponderosa pine ecosystem would result in minimum, temporary effects on air quality in the immediate burn area. Confining ignitions to as short a time frame as possible would mitigate this effect. The cooperating fire officials have estimated that two to four days of ignitions would be required to meet project objectives. All applicable air shed permits would be acquired before burning takes place.

Alternative C - Experimental controlled burning of a single unit during the late dormant period: Proposed spring burning on Wild Horse Island's Palouse prairie and Ponderosa pine ecosystem would result in minimum, temporary effects on air quality in the immediate burn area. Confining ignitions to as short a time frame as possible would mitigate this effect. All applicable air shed permits would be acquired before burning takes place. It is estimated that one to two days of burning would be required to treat subunit A in this alternative.

3. Water Resources

Alternative A - No action: Water drainage patterns would remain unaffected by a no-action alternative in the immediate future. Speculatively, drainage could be altered by continued encroachment of Ponderosa pines into open grasslands.

Alternative B - Experimental controlled burning of four subunits during the late dormant period: Short-term drainage effects could result from removal of vegetative cover on certain aspects within the proposed project area. Burning would take place after snowmelt; thus run-off concerns would result from spring rains. Postburn rains will stimulate regeneration of vegetative cover, thereby reducing potential for erosion. There is no surface water located within any of the subunits in this alternative.

Alternative C - Experimental controlled burning of a single unit during the late dormant period: There are no negative impacts anticipated from proposed activities on subunit A1 in this alternative. A1 is situated in an area with very little topographical relief. There is no surface water present within subunit A1

4. Vegetation

Alternative A - No action: The effects of a no-action alternative on the project area's vegetation are speculative; however, there is research that suggests that Palouse prairie plant communities evolved with fire and are thus dependent on fire events (Agee et al. 1994, Devlin 2000, pers. Comm. Lesica 2000). The effects of fire exclusion on the island are visible in the decadent growth of the island's bunch grasses. Litter and dead growth accumulations are excessive, thus inhibiting light penetration and creating fuel loads that may burn intensely during dry season burning (Bradley et al. 1992). The advance of Ponderosa pine seedlings into former savanna is perhaps the most predictable of effects caused by a no-action alternative. Barrett's research indicates an approximate 20% decrease in the island's open grassland savanna since modern fire suppression began (Appendix A). It is reasonable to believe that this decrease will continue under current fire exclusion.

The general vigor of Ponderosa pine stands may decline as a result of continued fire exclusion, resulting in the following management issues (Covington and Sackett 1984):

- Overstocked sapling stands
- Reduced growth
- Stagnated nutrient cycles
- Increased disease, insect infestations, and parasites
- Increased fuel loading
- Increased vertical fuel continuity due to dense sapling patches
- Increased severity and destructive potential of wildfires.

Alternative B - Experimental controlled burning of four subunits during the late dormant period: The effect of burning on Palouse prairie plant communities is a topic of great debate among range specialists today. As mentioned previously, this type of ecosystem is known to have evolved with fire, and plant species native to this habitat type have adapted. For example, research has shown quantifiable increases, as a result of fire, in bluebunch wheatgrass and arrow-leafed balsamroot, both native to Wild Horse Island. (Agee et al. 1994 and Merill et al. 1980). Silene spaldingii, also referred to as Spalding's catchfly is another Wild Horse Island native forb that is thought to benefit from exposure to low intensity fire (Lecica, 1999). Silene spaldingii has not been observed in any of the burn units within this alternative, but it does exist elsewhere on the island's grasslands. Currently, however, Wild Horse Island's grasslands are inhabited by a variety of nonnative grasses and forbs. Some of these exotics may respond favorably to fire. Cheatgrass for example may increase seed production as a result of exposure to fire (Sewart, 1949). Conversely, some exotics, such as Canada thistle, may respond negatively to fire, aiding its reduction (Young, 1986). By implementing a pilot controlled burn, FWP can measure the effects of fire specific to Wild Horse Island's plant communities. Negative effects, such as noxious weed propagation, that are identified through vegetation monitoring subsequent to the pilot burn, will be mitigated through the use of other management tools such as chemical herbicide application or manual removal.

Ponderosa pine stands may experience a positive response to controlled burning through increased water availability to mature trees through reduction of understory competition and through postburn nitrogen surges (Ryan and Covington. 1986)

An intense, stand-replacing fire would, as the name implies, cause total stand replacement including mature Ponderosa pines. The project objectives for this project specify low mortality in mature Ponderosa stands. The potential for stand replacing fire is mitigated through late dormant-period burning when fuel moistures are high. Fire control techniques will be used to discourage permanent fire damage to most mature trees within subunits A1, A2, A3, and A4.

Alternative C - Experimental controlled burning of a single unit during the late dormant period: Subunit A1 is characterized by a dominant native plant community that is in a transition due to encroaching Ponderosa pine seedlings. The bunch grasses in subunit A1 are decadent, with heavy accumulations of dead debris due to fire exclusion. Application of fire to this subunit may eliminate a large percentage of Ponderosa seedlings, as well as reduce litter accumulation in native bunch grasses. To avoid permanent damage to native bunch grasses, fuel moistures would need to be high enough to prevent complete combustion of individual plants.

Cheatgrass, an undesirable species that has been shown to respond favorably to fire, is present as a minor subcomponent of A1. There is potential for increasing cheatgrass in this unit by applying fire. This potential may be mitigated slightly by burning in the late dormant period (Hull 1949).

As in Alternative B, negative effects that are identified through vegetation monitoring subsequent to the pilot burn will be mitigated through the use of other management tools such as chemical herbicide application or manual removal.

Ponderosa pine stands may experience a positive response to controlled burning resulting from increased water availability to mature trees through reduction of understory competition and through postburn nitrogen surges (Ryan and Covington. 1986)

Again, stand-replacing fire that could potentially cause mortality in older age classes of Ponderosa pines will be mitigated through late dormant-period burning when fuel moistures are high. Fire control techniques will be used to discourage permanent fire damage to most mature trees in subunit A1

5. Fish/Wildlife

Birds

Alternative A - No action: The continued loss of open grassland on Wild Horse Island to Ponderosa pine encroachment may have a negative effect on open grassland species of birds such as Western Meadowlark, Vesper Sparrow, and Savanna Sparrow. A lack of snags typically created by fire may also negatively affect cavity-nesting birds such as the Mountain Bluebird, Tree Sparrow, Red-breasted Nuthatch, Mountain Chickadee, Hairy Woodpecker, Northern Flicker, Black-backed Woodpeckers, and Pileated Woodpeckers.

Alternative B - Experimental controlled burning of four subunits during the late dormant period: "The most obvious effect of applied fire will be the immediate loss of habitat. The treated grassland areas will be marginal habitat for open grassland species such as Western Meadowlark, Vesper Sparrow, and Savanna Sparrow during the first year post-fire. In a low-to-moderate-intensity fire, grasslands will usually recover (structurally) the following year, with possible increased cover two to three years after fire. The literature from Northern Prairies research area indicates that many bird species increase in population densities several years after an initial decline.

The other habitat that will be lost is the encroaching Ponderosa pine coniferous forest. Habitat loss in these areas will reduce forest-dwelling and forest-edge species on the

Island. Likely birds that will be affected include Yellow-rumped Warbler, Ruby-crowned Kinglet, Dark-eyed Junco, and Chipping Sparrow.

Again, depending on the fire intensity, habitat may be created particularly for the cavity-nesting guild of birds. A higher intensity fire could provide a burned pine forest, which would provide trees of adequate size for both foraging and nesting birds. Populations of cavity nesters may increase for the length of time the burned forest provides both food and nesting substrate for birds (approximately eight years). Species that will benefit will include Mountain Bluebird, Tree Sparrow, Red-breasted Nuthatch, Mountain Chickadee, Hairy Woodpecker, and Northern Flicker. Black-backed Woodpeckers are closely related to burned landscape and may be attracted to those areas. Lewis's Woodpeckers may also be found in the burned Ponderosa pine forest.

The timing of the burn will limit negative effects due to the loss of nests and nestlings. A late, dormant-period burn would be prior to most nesting seasons, although some loss may be expected because of early-nesting birds, including American Robin and Mountain Bluebird." - *Dwight Bergeron- FWP Wildlife Biologist.*

Some research indicates an increase in deer mice populations following low-to-moderate-intensity grassland fires (Price et al. 1984). This could affect predatory birds positively.

The relatively small size of the affected areas in this alternative would affect a very small percentage of available habitat on Wild Horse Island.

Alternative C - Experimental controlled burning of a single unit during the late dormant period: Alternative C would create a temporary loss of habitat for open grassland species of birds on subunit A1. As with Alternative B, forest- dwelling and forest-edge species on the island may experience a loss of habitat through controlled burning. Birds that will be affected include Yellow-rumped Warbler, Ruby-crowned Kinglet, Dark-eyed Junco, and Chipping Sparrow. Again, the overall loss of habitat is insignificant in relation to similar available habitat on Wild Horse.

The relatively small size of the effected areas in this alternative would effect a very small percentage of available habitat on Wild Horse Island.

Large Mammals

Alternative A - No action: The island's ungulate populations may be adversely affected by a no-action alternative as grasslands are converted to Ponderosa pine forest. Although research is not conclusive regarding this assertion, some wildlife biologists feel that maintaining grassland habitat is important for bighorn sheep and mule deer. (pers. comm. with FWP biologists Tim Thier and Carolyn Sime.

Alternative B - Experimental controlled burning of four subunits during the late dormant period: Due to the size of the proposed burn subunits, the island's large mammals should experience minimal impacts from human activity associated with the application of fire. It is estimated that fire application would take from two to four days. Wild Horse Island's large mammals are accustomed to human presence, and park managers believe that they will not experience excessive levels of stress as a result of these activities.

Potential positive effects of burning may be observed in postburn forage improvements. Research suggests that Rocky Mountain bighorn sheep and mule deer foraging may increase on grasslands that have recently burned. This may be resultant of improved forage quality, or merely grazing preferences for postfire vegetation (Hobs et al. 1984). Research does indicate an important role for fire in the management of bighorn sheep. Plant succession, resulting from the exclusion of fire, which has allowed conifers to pioneer grasslands, negatively affect bighorn sheep habitat (Woodard et al. 1990, Jenkins et al. 1991). Mule deer may also benefit from grassland fire events. The resultant mosaic effect of postburn areas may enhance mule deer forage.

Alternative C - Experimental controlled burning of a single unit during the late dormant period: As previously mentioned, Bighorn sheep and mule deer may benefit from improved foraging conditions resulting from applied fire. . Research suggests that bighorn sheep prefer open aspects with good visibility and close proximity to cover. A study of sheep response to thinning and prescribed fire in northeastern Utah demonstrated an increased utilization by bighorn sheep of recently logged or burned habitat (Smith et al. 1999).

As with the previous alternative, human disturbance to the island's large mammals will be short-term and localized. Subunit A1 is located below a traditional sheep lambing area, but burn activity would commence well before lambing season.

Small Mammals

Alternative A - No action: A continuation of Ponderosa pine encroachment on Wild Horse Island may have a negative effect on small mammals that require open grassland habitat. Montane voles may enjoy the denser vegetation cover provided by dense stands of Ponderosa pine.

Alternative B - Experimental controlled burning of four subunits during the late dormant period: Deer mice and montane voles both utilize portions of the proposed subunits. Temporary loss of habitat can be expected following burn activity. The project area, however, encompasses a small percentage of available small-mammal habitats. A positive outcome may result from improved rodent habitat in following vegetation regeneration. This is due primarily to increased seed production (Helvorson et al. 1983).

Alternative C - Experimental controlled burning of a single unit during the late dormant period: As with the previous alternative, deer mice and montane voles both utilize the proposed project area. Temporary loss of habitat can be expected following burn activity in subunit A1. The project area, however, encompasses a small percentage of available small-mammal habitats. A positive outcome may result from improved rodent habitat in following vegetation regeneration do to increased seed production (Helvorson et al. 1983).

B. Evaluation of the Proposed Action and Reasonable Alternatives on the Human Environment

1. Land Use

Alternative A - No action: Should no action be taken, it is assumed that the conversion of Wild Horse Island's grasslands to an overstocked Ponderosa pine forest will continue. This conversion could, over time, diminish the opportunity for visitors to explore the native Palouse prairie ecosystem that Wild Horse Island represents. The opportunity for educational and scientific study of this habitat type would presumably be diminished as well.

Alternative B - Experimental controlled burning of four subunits during the late dormant period: Alternative B would have minor, temporary effects on land use by park visitors. The project area and associated staging areas would be closed to public entry for periods ranging from three to ten days. These closures would be during active burning or postburn monitoring periods for the purpose of public safety. These closures would occur during early spring, which is traditionally a low visitation period for the park. Unaffected areas of the park would remain open for public visitation.

Public entry may be restricted for longer periods on certain portions of the project subunits if FWP personnel determine that there is a threat of erosion from foot traffic on recently burned areas. Such a restriction would remain in place until revegetation is sufficient to prevent erosion. Public usage would be redirected to circumnavigate sensitive areas.

Alternative C - Experimental controlled burning of a single unit during the late dormant period: The project area and associated staging areas would be closed to public entry for periods ranging from three to ten days. These closures would be during active burning or postburn monitoring periods for the purpose of public safety. There may also be the need to restrict public access to subunit A1 during periods of heavy precipitation in order to facilitate revegetation. These closures would occur during early spring, which is traditionally a low visitation period for the park. Subunit A1 is located in a lightly visited region of the island, and unaffected areas of the park would remain open for public visitation.

2. Risks/Hazards

Alternative A - No action: It is widely assumed that reduction of natural fuels is a preventative measure against lethal wildfire. A no-action alternative would allow fuel loads to continue accumulation within the proposed project area.

Alternative B - Experimental controlled burning of four subunits during the late dormant period: A temporary health hazard resulting from smoke could be experienced by people with respiratory illness. This hazard would be mitigated by burning during a period of historically low visitation at Wild Horse Island. All applicable air shed permits would be obtained.

There is, understandably, concern for the potential of fire escapement related to this proposed action. There are approximately 25 private structures located along the perimeter of the island, with the nearest dwellings located approximately ¼ mile from subunit A3 of the proposed project area. These hazards would be mitigated by the following means:

1. Burning would take place during the late dormant period, when large fuels contain enough moisture to discourage escapement.

2. Trained fire crews from the Confederated Salish & Kootenai Tribal Forestry Department and the State Department of Natural Resources and Conservation would conduct and supervise burning activities.

3. A contingency plan would be in place in the event of fire escapement. This contingency will include the following elements:

    - Portable water pumps will be staged near dwellings.
    - A helicopter with water bucket capabilities would remain on call during ignition periods.
    - Notification of surrounding emergency response crews and fire fighting agencies would precede all burning activities

Alternative C - Experimental controlled burning of a single unit during the late dormant period: A temporary health hazard resulting from smoke could be experience by people with respiratory illness. This hazard would be mitigated by burning during a period of historically low visitation at Wild Horse Island. All applicable air shed permits would be obtained.

Total acreage treated with fire in Alternative C is significantly lower than Alternative B. Subunit A1, which would be treated with fire, is approximately ¾ mile from the nearest dwelling. The concern for fire escapement has been expressed by private property owners on Wild Horse Island. Salish & Kootenai, and DNRC fire-fighting personnel will conduct and monitor all burning activities. Fire escapement would be addressed with following measures:

1. Burning would take place during the late dormant period, when large fuels contain enough moisture to discourage escapement.

2. Trained fire crews from the Confederated Salish & Kootenai Tribal Forestry Department and the State Department of Natural Resources and Conservation would conduct and supervise burning activities.

3. A contingency plan would be in place in the event of fire escapement. This contingency will include the following elements:

    - Portable water pumps with be staged near dwellings.
    - A helicopter with water bucket capabilities would remain on call during ignition periods.
    - Notification of surrounding emergency response crews and fire fighting agencies would precede all burning activities

3. Aesthetics/Recreation

Alternative A - No action: A no-action alternative will potentially result in the alteration of scenic vistas currently available on Wild Horse Island due to tree encroachment.

Alternative B - Experimental controlled burning of four subunits during the late dormant period: Spring burning of grasslands and selected timber stands will result in the short-term blackening of grasses, forbs, and shrubs within the project area. Long-term discoloration of trees is likely in areas where Ponderosa pines are killed or scorched, but remain standing. FWP would use scorched vegetation to create interpretive opportunities aimed at discussing the role of fire on Palouse prairie ecosystems. It is possible that dead, standing trees may create additional wildlife viewing opportunities.

Alternative C - Experimental controlled burning of a single unit during the late dormant period: Spring burning of grasslands and selected timber stands will result in the short-term blackening of grasses, forbs, and shrubs within the project area. Long-term discoloration of trees is likely in areas where Ponderosa pines are killed or scorched, but remain standing. FWP would use scorched vegetation to create interpretive opportunities aimed at discussing the role of fire on Palouse prairie ecosystems. It is possible that dead, standing trees may create additional wildlife viewing opportunities.

4. Cultural/Historical

Alternative A - No action: A no-action alternative may adversely affect historical resources on Wild Horse Island through conversion of Palouse prairie to forest cover within the proposed project area. Interpretive opportunities to discuss homesteading and Native American uses of the island's grasslands could be lost.

Alternative B - Experimental controlled burning of four subunits during the late dormant period: Returning wildfire periodically to Wild Horse Island may have a positive effect on the project area by maintaining the island's historical attributes. Opportunities to interpret presettlement and post- settlement human uses of Wild Horse Island would be maintained and potentially enhanced by preventing tree encroachment and encouraging native grass and forb communities. The opportunity to view bighorn sheep, mule deer, and wild horses would be maintained as well.

Alternative C - Experimental controlled burning of a single unit during the late dormant period: Returning wildfire periodically to portions of Wild Horse Island may have a positive effect on the project area by maintaining the island's historical attributes. Opportunities to interpret presettlement and postsettlement human uses of Wild Horse Island would be maintained and potentially enhanced by preventing tree encroachment and encouraging native grass and forb communities. The opportunity to view bighorn sheep, mule deer, and wild horses would be maintained as well.

5. Cumulative Effects

Alternative A - No action: If FWP does not implement controlled burning within the proposed project area, environmental impacts may occur as decribed under the no-action alternative. These impacts may include the following:

- Conversion of Palouse prairie grassland to a Ponderosa pine forest type.
- Grassland plant communities may lose vigor, and plant community composition may shift from native to introduced species.
- Interplant competition will create unhealthy stands of Ponderosa pine.
- A loss of available forage to the island's ungulates may be incurred as a result of tree encroachment.
- Preferred habitat for bighorn sheep will decline.
- Grassland-dependent bird and small mammal communities may decline.
- Fuel accumulation will continue, increasing the potential for lethal wildfires.
- Interpretive opportunities regarding historic human activities and natural phenomenon will be lost.

Alternative B - Experimental controlled burning of four subunits during the late dormant period: This alternative has the potential to reverse the gradual loss of native Palouse prairie habitat that the island is currently experiencing. Applied fire will reduce encroachment of Ponderosa saplings onto open grasslands. Fire will also remove several decades worth of accumulated plant litter from native bunch grasses and forbs, potentially increasing available nutrients and encouraging new plant recruitment. The interplant competition that currently exists within dense Ponderosa pine stands may also be partially remedied through the application of fire. Total available forage may be maintained or slightly increased for bighorn sheep, mule deer, and wild horses, and ground-nesting birds and small mammals that are associated with Palouse prairie habitat may benefit after grassland regeneration occurs. Applied fire will provide habitat for cavity nesters through the creation of snags.

In the realm of human activities, this alternative offers an opportunity for FWP to interpret the role of wildfire and other natural processes associated with Wild Horse Island. Through maintenance of the island's Palouse prairie, this alternative perpetuates the opportunity for academic exploration and scientific study of this rapidly disappearing habitat type.

Negative cumulative effects associated with Alternative B include the potential of applied fire to negatively impact native plant communities. As described previously, research shows that some nonnative plant species that occur on Wild Horse Island may benefit from fire, resulting in enhanced vigor and recruitment. Mitigation includes pre- and postmonitoring of vegetation within the project area to quantify effects on native plant communities. In the event that noxious weed infestations occur as a result of burning activities, FWP will use chemical herbicides or manual removal for suppression.

The potential also exists that some park visitors will be displeased with viewing the effects of scorching on Ponderosa pine stands within the project area or with the sight of temporarily blackened grasslands within the project area. These effects will offer an opportunity for FWP to interpret the role of fire on Wild Horse Island's Palouse prairie.

As mentioned previously under risks and hazards to the human environment, FWP, with the assistance of fire officials and fire-fighting personnel from the Confederated Salish & Kootenai Tribal Forestry Department and the Department of Natural

Resources and Conservation, will have a contingency plan in place for response in the event of fire escapement.

Alternative C - Experimental controlled burning of a single unit during the late dormant period: This alternative has the potential to reverse the gradual loss of native Palouse prairie habitat that the island is currently experiencing. Applied fire will reduce encroachment of Ponderosa saplings onto open grasslands. Fire will also remove several decades worth of accumulated plant litter from native bunch grasses and forbs, potentially increasing available nutrients and encouraging new plant recruitment. The interplant competition that currently exists within dense Ponderosa pine stands will be partially remedied through the application of fire, and removal of Ponderosa pine sapling through burning may encourage pioneering of native grasses and forbs. Total available forage may be maintained or slightly increased for bighorn sheep, mule deer, and wild horses, and ground-nesting birds and small mammals that are associated with Palouse prairie habitat may benefit after grassland regeneration occurs. Applied fire may provide habitat for cavity nesters through the creation of snags.

In the realm of human activities, this alternative offers an opportunity for FWP to interpret the role of wildfire and other natural processes associated with Wild Horse Island. Through maintenance of the island's Palouse prairie, this alternative perpetuates the opportunity for academic exploration and scientific study of this rapidly disappearing habitat type.

Negative cumulative effects associated with Alternative C include the potential of applied fire to negatively impact native plant communities. As described earlier, research shows that some nonnative plant species that occur on Wild Horse Island may benefit from fire, resulting in enhanced vigor and recruitment. Mitigation includes pre- and postmonitoring of vegetation within the project area to quantify effects on native plant communities. In the event that noxious weed infestations occur as a result of burning activities, FWP will use chemical herbicides or manual removal for suppression.

The potential also exists that some park visitors will be displeased with viewing the effects of scorching on Ponderosa pine stands within the project area or with the sight of temporarily blackened grasslands within the project area. These effects will offer an opportunity for FWP to interpret the role of fire on Wild Horse Island's Palouse prairie.

As mentioned previously under risks and hazards to the human environment, FWP, with the assistance of fire officials and fire fighting personnel from the Confederated Salish & Kootenai Tribal Forestry Department and the Department of Natural Resources and Conservation, would have a contingency plan in place for response in the event of fire escapement.

IV. Conclusion

1. Based on the significance of criteria evaluated in this EA, is an EIS required?

The environmental impacts of the preferred alternative are primarily positive. Do to the scale of this project, the possible short-term negative impacts identified in this review can be mitigated. This project is consistent with the management objective of preserving Palouse prairie habitat type on Wild Horse Island, as stated in the 1994 Management Plan Update for the park. Based on this analysis, an EIS is not required.

2. **Describe the level of public involvement for this project, if any; and, given the complexity and the seriousness of the environmental issues associated with the proposed action, is the level of public involvement appropriate under the circumstances?**

   Completed copies of the Draft EA will be sent to the following entities: Lake County Commissioners, the Confederated Salish & Kootenai Tribal Offices, the Montana Department of Environmental Quality, the Montana Department of Natural Resources and Conservation, the Wild Horse Island Lot Owners Association, state and local libraries, regional conservation organizations, and citizens who have requested a draft EA regarding this proposed project.

   News releases and legal notice of EA availability and the schedule for the formal public comment period and open house dates will be sent to all regional daily and weekly newspapers prior to these events.

3. **Duration of comment period if any:**

   FWP will accept public comments on this proposal that are postmarked no later than December 10, 2001.

4. **Other jurisdictional agencies/organizations:**

   The Draft EA will be sent to the Lake County Commissioners and Montana Department of Environmental Quality. Copies will also be sent to the Salish & Kootenai Tribal Forestry Department and the Montana Department of Natural Resources and Conservation Fire Program Manager for the Kalispell/Plains Unit.

5. **Name, title, address, and phone number of the person(s) responsible for preparing the EA:**

   David Landstrom, Park Operations Supervisor, Montana Fish, Wildlife & Parks, 490 North Meridian Road, Kalispell, MT 59901, (406) 752-5501, or e-mail c/o mawatkins@state.mt.us.

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Consultations

Bergeron, Dwight. Wildlife Biologist, MT Fish, Wildlife and Parks

Dupuis, Dennis W. Fire Management Officer, Tribal Forestry Department, Confederated Salish & Kootenai Tribes of the Flathead Reservation.

Harwood, Tony. Fuels Officer, Tribal Forestry Department, Confederated Salish & Kootenai Tribes of the Flathead Reservation.

Harrington, Robert. Plant Ecologist, Montana Fish, Wildlife and Parks.

Heidel, Bonnie. Botanist, Montana Natural Heritage Program, Helena, MT

Poncin, Greg. Kalispell-Plains Fire Program Manager, MT Department of Natural Resources and Conservation.

Sime, Carolyn. Wildlife Biologist, MT Fish, Wildlife and Parks

Thier, Tim. Wildlife Biologist, MT Fish, Wildlife and Parks

Unnasch, Robert S., Ph.D. Director, Biological Management, Conservation Science Division, The Nature Conservancy.

Vore, John. Wildlife Biologist, MT Fish, Wildlife, and Parks

Allen K. Wood. Wildlife Mitigation Coordinator, MT Fish, Wildlife, and Parks

APPENDIX A

AN ANALYSIS OF TWELVE PRESCRIBED FIRE ALTERNATIVES FOR WILDHORSE ISLAND STATE PARK, MONTANA

- FINAL REPORT-
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Prepared for Montana Dept. Fish, Wildlife, and Parks

Stephen W. Barrett
Consulting Research Forester

CONTENTS

INTRODUCTION

During the summer of 1999, Montana Department of Fish, Wildlife, and Parks (FWP) initiated a contract to develop management alternatives for the possible reintroduction of fire to the grassland portion of Wild Horse Island State Park (WHI). The park, an approximately 2200 acre island in Flathead Lake near Dayton, Montana, contains an 1100-acre Palouse Prairie grassland on the south half of the island. Previous suggestions to reintroduce fire had generated considerable opposition, exacerbated by the absence of any formal management alternatives combined with public education (pers. comm. with D. Conklin, FWP-ret.). In contrast, the following report contains an array of possible management options, and information about fire's historical role that should be useful for interpretive purposes.

HISTORICAL FIRE REGIMES/CURRENT CONDITION

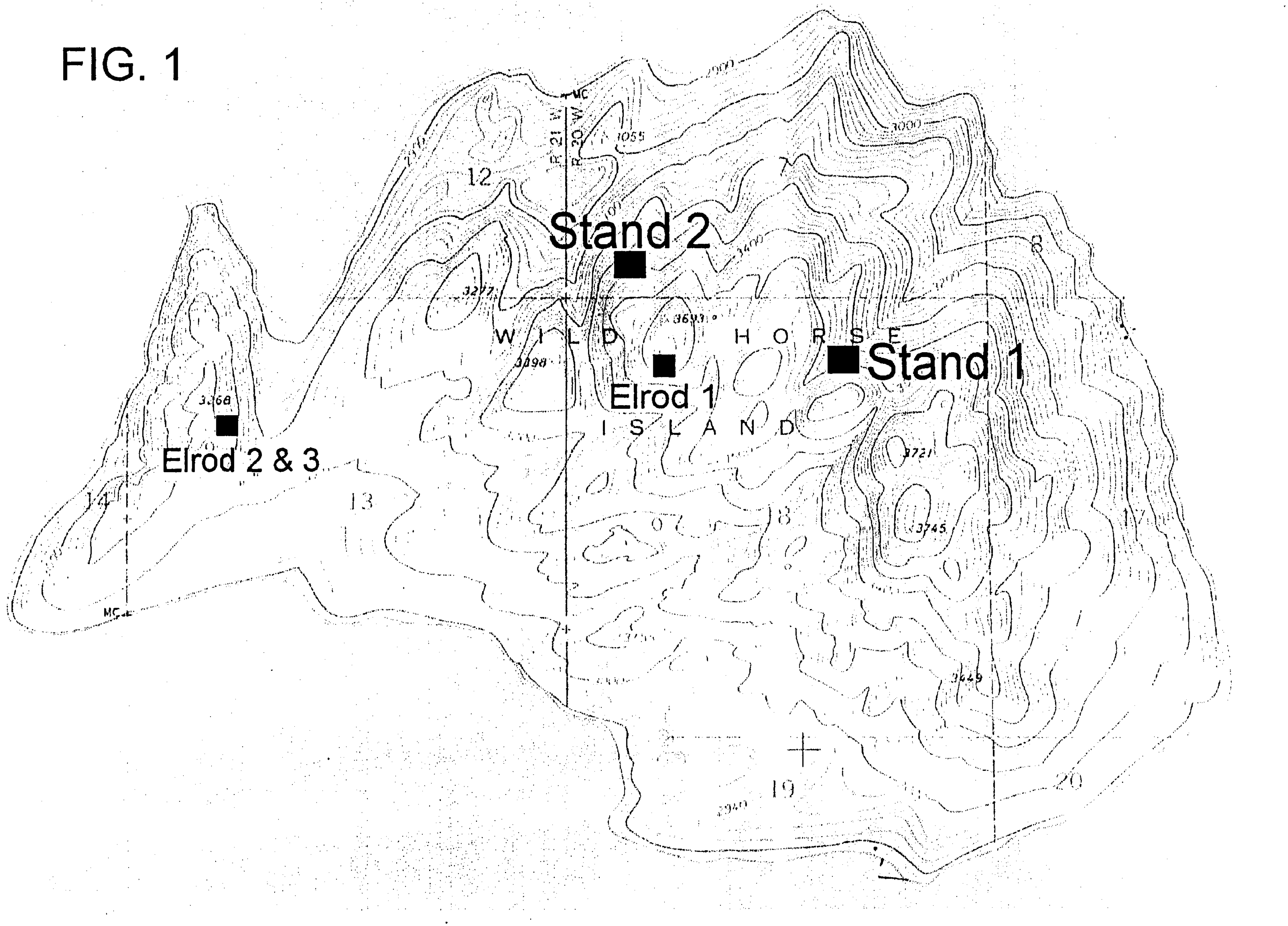
For thousands of years before European settlement, grasslands and adjacent dry forests in the Northern Rockies experienced frequent low severity fires (Quigley et al. 1996). Consequently, many species became fire adapted and thrived under frequent disturbance by lightning- and Indian caused fires (Barrett and Arno 1982, Gruell 1985). After the late 1800s, however, different cultural attitudes about fire resulted in a policy of attempted fire exclusion (Pyne 1982). Fire history studies and agency fire atlases verify the sharp decline in fire frequency in many areas (Barrett et al. 1997), and a resultant decline in vigor occurring in many fire dependent ecosystems (Agee 1993, Quigley et al. 1996).

Recently, limited fire history sampling (Arno and Sneck 1977, Barrett and Arno 1988) was conducted on WHI to determine whether island fire patterns were similar to those on the nearby mainland. Determining presettlement fire history in grasslands is infeasible, but samples from adjacent trees can yield a close estimate of grassland fire frequency (Arno and Gruell 1983). Results from two ponderosa pine stands near the summit show that fire frequency was similar to that in valley-edge stands elsewhere (figs. 1, 2; Appendix A). Stand One had a mean fire interval (MFI) of nine years between 1725 and 1886, but has not burned during the past 113 years. Similarly, Stand Two had a 10-year MFI between 1664 and 1892, but likewise has not burned in this century.

As for frequency variation, most fire intervals in the chronologies ranged from five to 20 years long. However, the current fire intervals (i.e., 107, 113 yrs) are from 10 to 13 times longer than the presettlement MFIs. This is some of the most striking evidence of effective fire exclusion that I have found in two decades of sampling the Northern Rockies. If these results represent overall fire occurrence on the island, then 10 or more fires would have occurred on any given site in this century without fire exclusion. (Note that a *bona fide* fire history study would be necessary to address this question).

During a study of traditional Indian burning in western Montana (Barrett and Arno 1982), Hog Heaven Ridge, several miles west of WHI, also had very frequent fires (i.e., 8-yr MFI). In fact, Kootenai elders in nearby Elmo, Montana, verified that their ancestors had frequently burned the area (Barrett 1981). Most Indian burning, conducted for multiple resource objectives, apparently occurred in the fall. However, burning sometimes also occurred in spring (Boyd 1999). Extrapolating such burning to WHI would necessarily be speculative, but the Indian peeled trees (Barrett 1990) verify past use of the island. Regardless of causes, however, the fire frequency statistics (i.e., 10-year fire cycle; 5–20 interval range) were used in developing

FIG. 1



Stand 2
Stand 1
Elrod 1
Elrod 2 & 3
W I L D
H O R S E
I S L A N D
12
13
14
19
20
3277
3098
3368
3721
3745
3649
2900
3000
1055
R 21 W.
R 20 W.

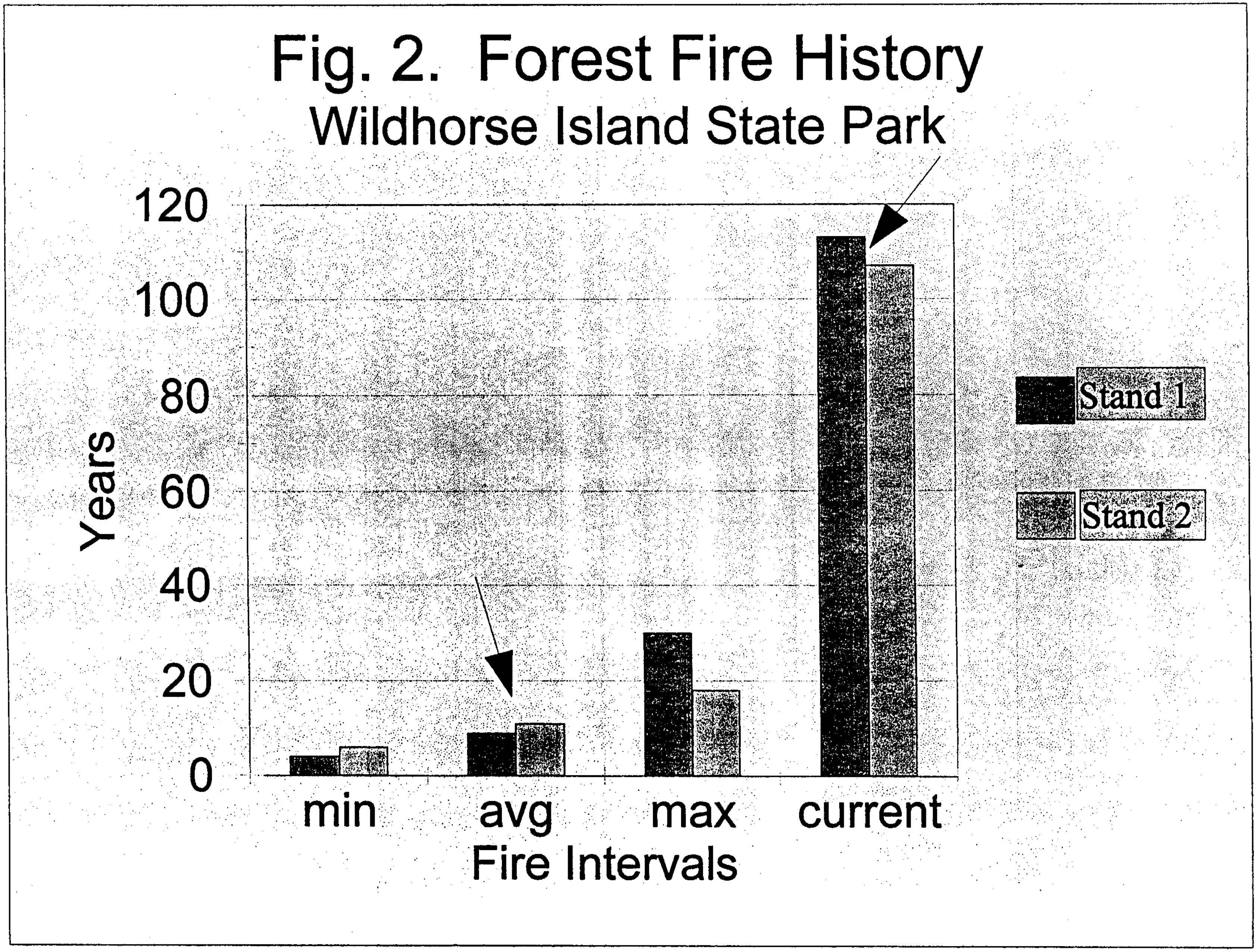


Fig. 2. Forest Fire History
Wildhorse Island State Park
120
100
80
60
40
20
0
Years
min
avg
max
current
Fire Intervals
Stand 1
Stand 2

the prescribed fire alternatives.

Fire atlas records for the period 1963 to 1999 (on file, Bureau of Indian Affairs [BIA] Forestry Division, Ronan MT) also were examined. Eleven of the 12 fires were extinguished before exceeding Size Class "A" (i.e., <1/4 acre), and the remaining fire burned about 30 acres. Whereas fires burned an average of just one acre per year between 1963 and 1999, the presettlement mean may have been 216 acres per year (i.e., 2163 total acres divided by 10-year fire cycle). Results to date thus suggest that fire suppression has been more than 99 percent effective, at least since 1963.

The lack of natural fires raises a number of implications for management. For instance, the atlas shows that humans have continued to be a major ignition source on WHI, causing more than half the fires since 1963. Therefore, given the increasingly heavy visitation, the future does not bode well for forest fire management. Although a more formal fire history study is advisable, the worst case scenario presumably exists in the heavily altered forest. The samples and field observations suggest that suppressing frequent nonlethal fires in ponderosa pine-Douglas-fir forests has promoted a number of negative changes (Arno 1976, Barrett 1988, Agee 1993, Arno et al. 1995, Quigley et al. 1996). The lack of recurrent fires likely has promoted heavy infilling within previously open stands, and the resultant stress renders trees more vulnerable to insects and disease (Hagel et al. 1987). In fact, bark beetles, needle diseases, dwarf mistletoe have produced substantial mortality, particularly among old ponderosa pines (FWP Wild Horse Island Mgt. Plan 1994). Additionally, the heavy buildup of live and dead fuels probably has promoted a shift in fire regimes, from frequent nonlethal fires to infrequent severe burns (Agee 1993, Quigley et al. 1996).

In the grassland, fire size- and severity potentials probably have not changed markedly from the presettlement pattern. However, fire exclusion promotes many negative changes, the most visible of which is long-term tree encroachment (Koterba and Habeck 1971, Lunan and Habeck 1973, Arno and Gruell 1986). Using repeat photography (Gruell 1983, Skovlin and Thomas 1995), the author and FWP Asst. Parks Manager D. Landstrom recently re-photographed three scenes visible in turn-of-the-century photographs by researcher Morton Elrod (on file, K. Ross Toole Archives, Univ. Montana, Missoula)(figs. 3 a-f). (*Note*: a Global Positioning System device will be used to record these photo points for future use). Aerial photographs from 1937, 1971, and 1998 also show the heavy tree encroachment, and infilling in portions of the north-side forest (figs. 3 g-i).

Even the 1964 topographic map (i.e., USGS "Wildhorse Island" 7.5 minute quadrangle) serves as a benchmark. At that time contiguous grassland and savannah occupied an estimated 51 percent of the island (i.e., 1100 acres). In contrast, the 1998 aerial photograph shows that about 200 acres of that area would now be re-classified as woodland or forest cover types (figs. 3i, 4)(Anderson et al. 1998). Grass-dominated terrain now occupies 42 percent of the island—a nearly 20 percent reduction in just four decades. Moreover, if the fire history samples are representative, the pre-1900 grassland may have occupied more than 51 percent because natural fires have not occurred for more than a century. (A more detailed assessment of the changing vegetation, including for the north-side forest, would be possible with a *bona fide* fire history study).

One of the most striking examples of tree encroachment exists near the lowland saddle between Skeeko Bay and the island's south shore (i.e., ex-homestead site). Both sets of

Fig.3a: 1907

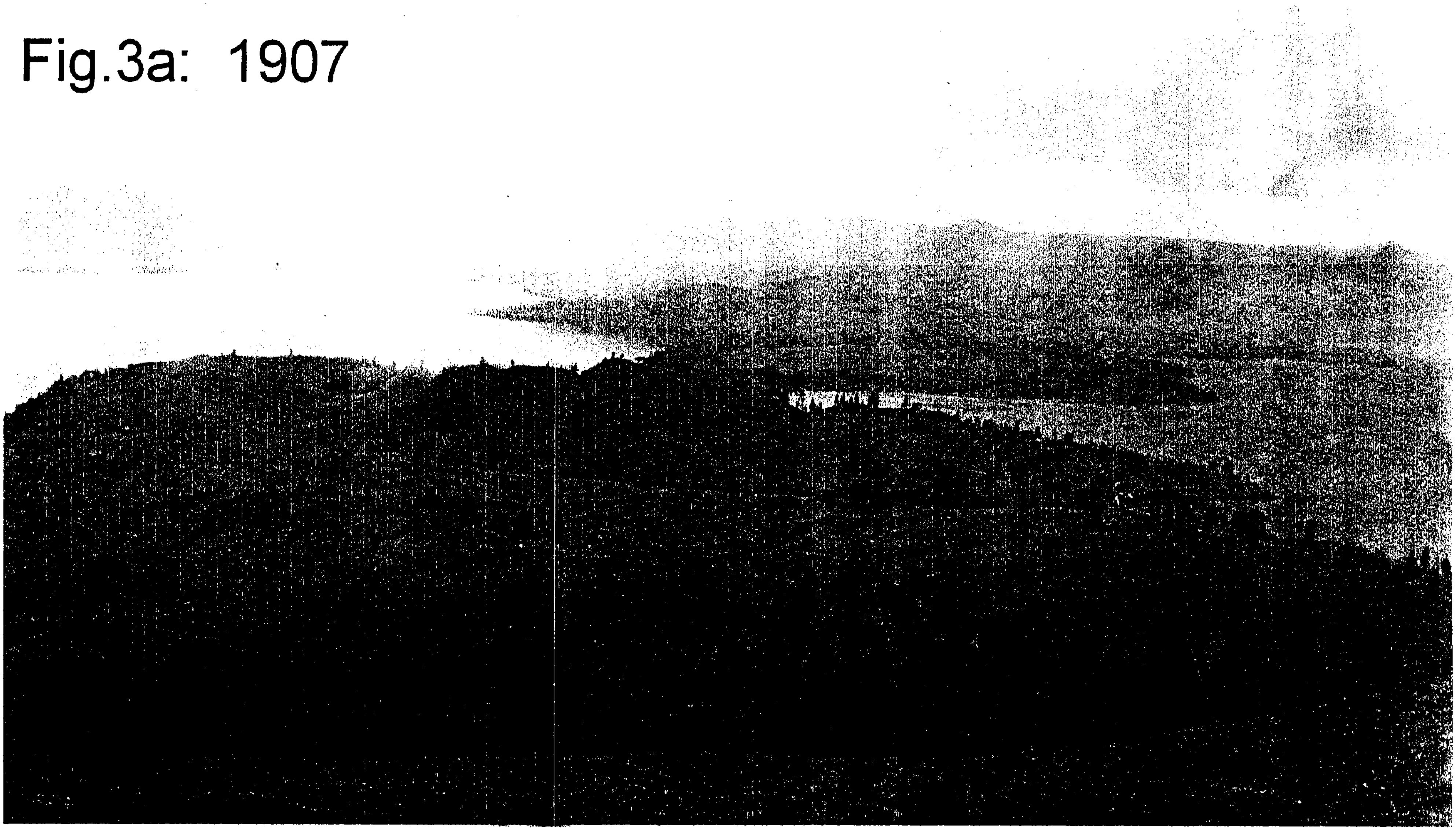


FIG. 3b: 1999

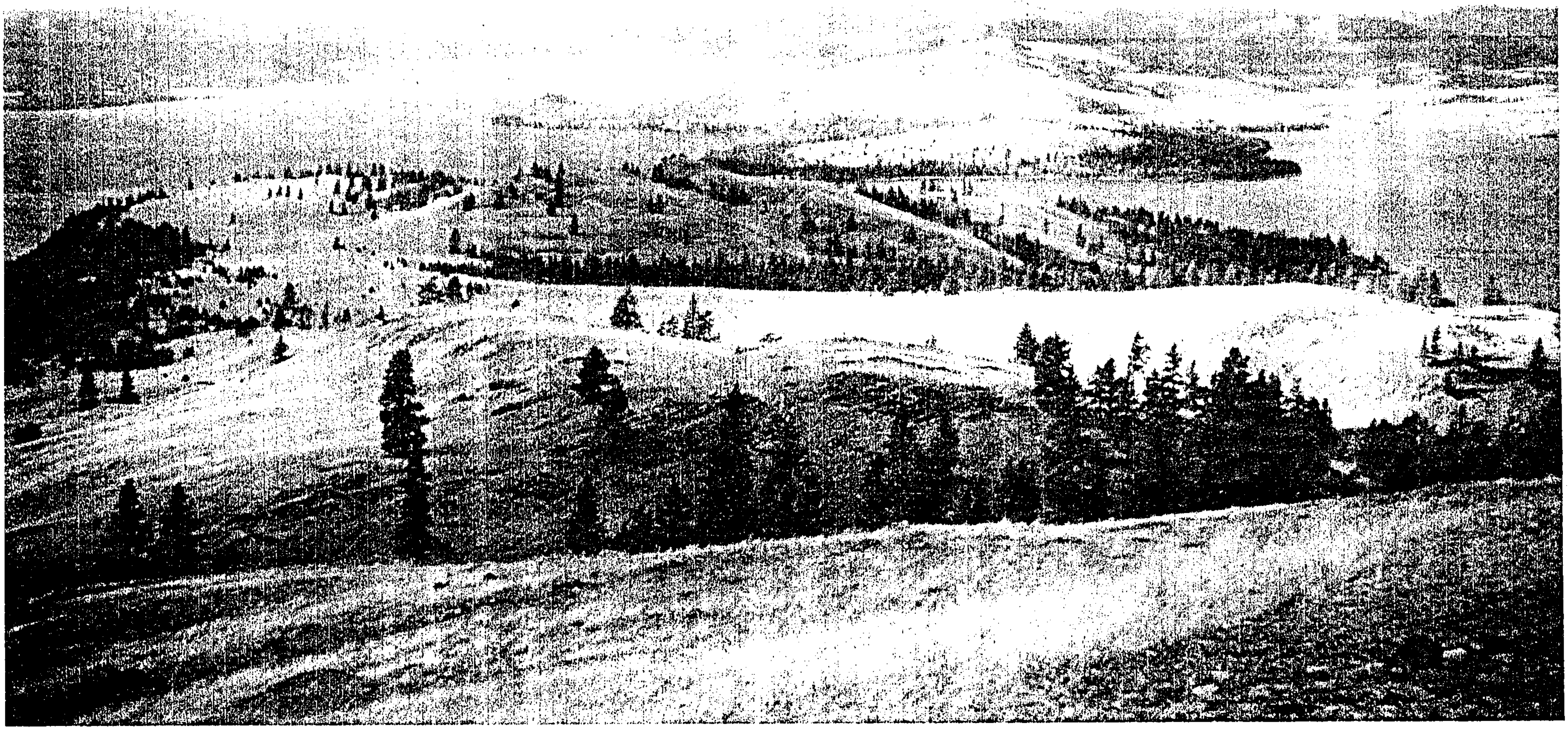


FIG. 3c: 1915

FIG. 3d: 1999

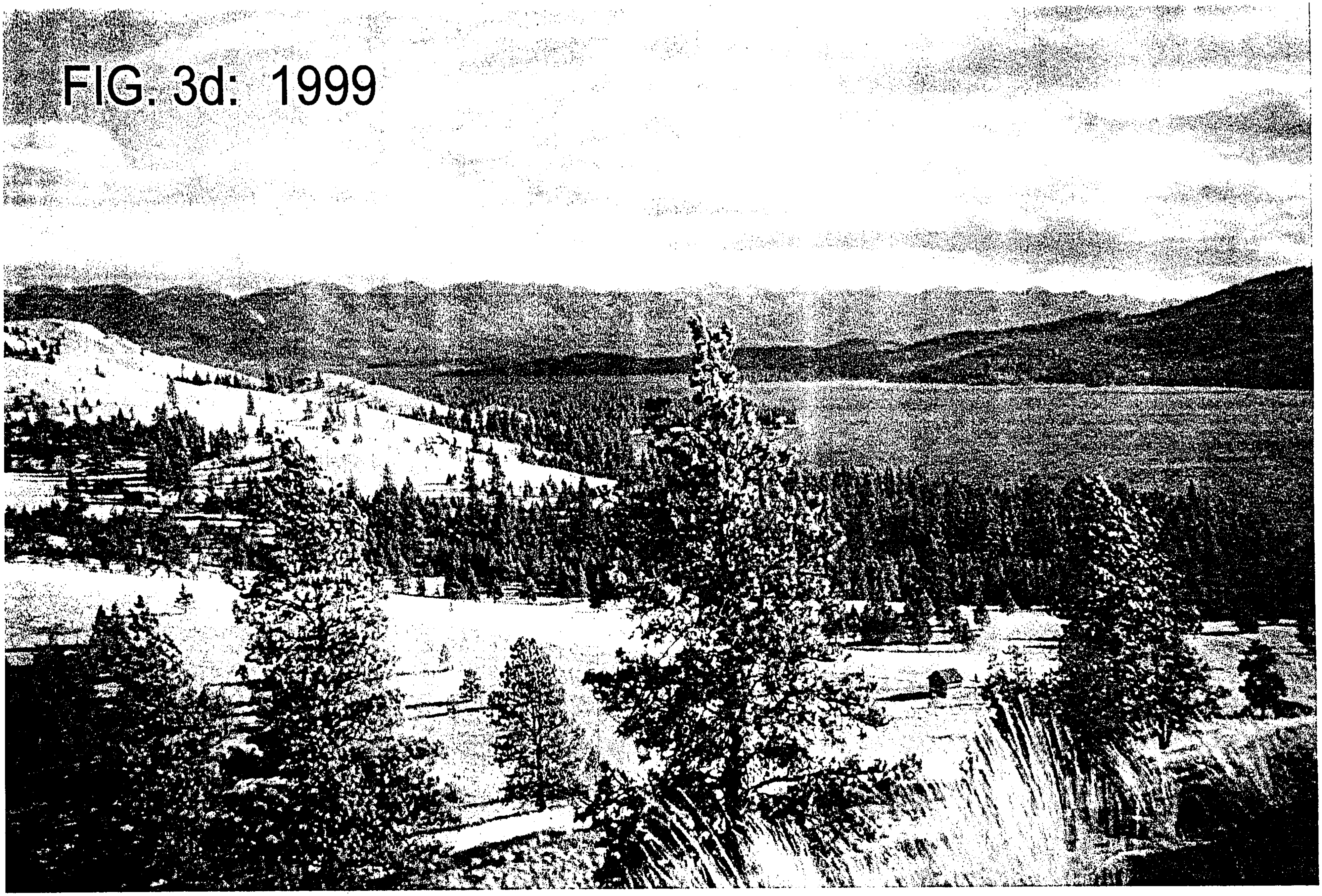


FIG. 3e: 1915

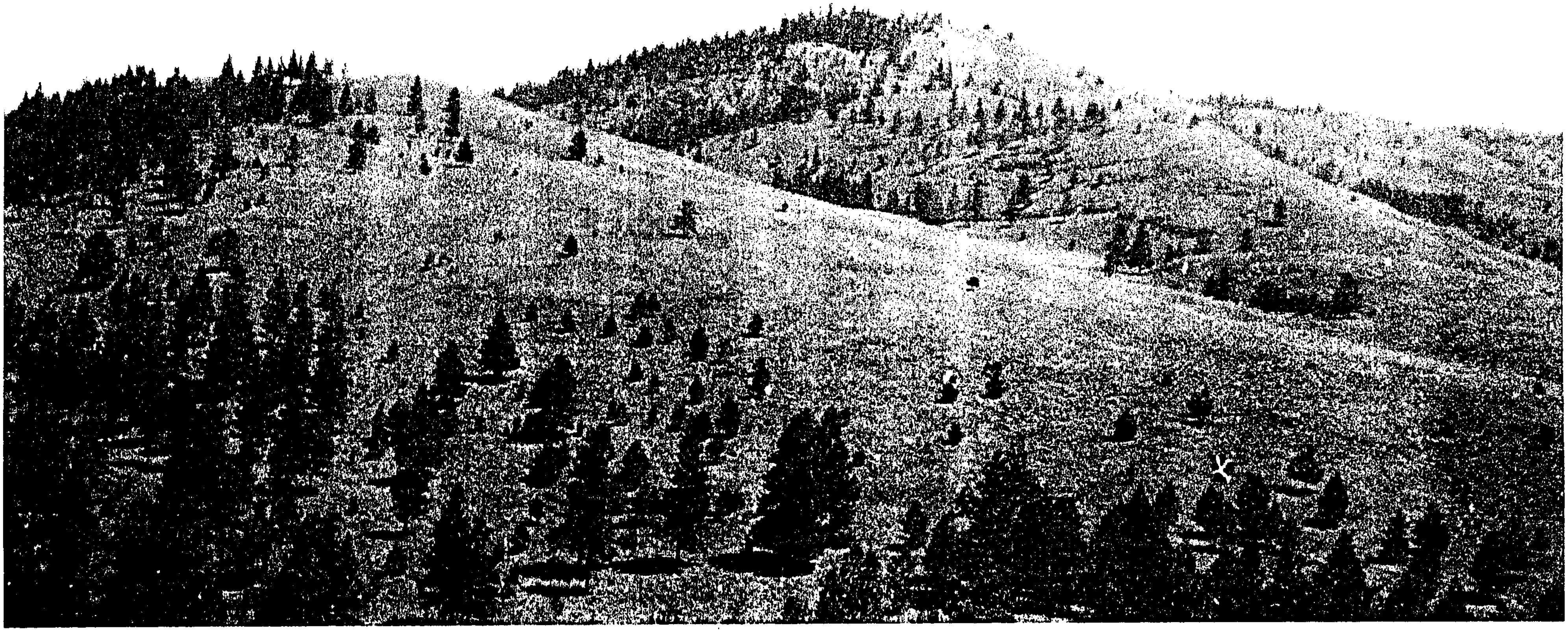


FIG. 3f: 1999

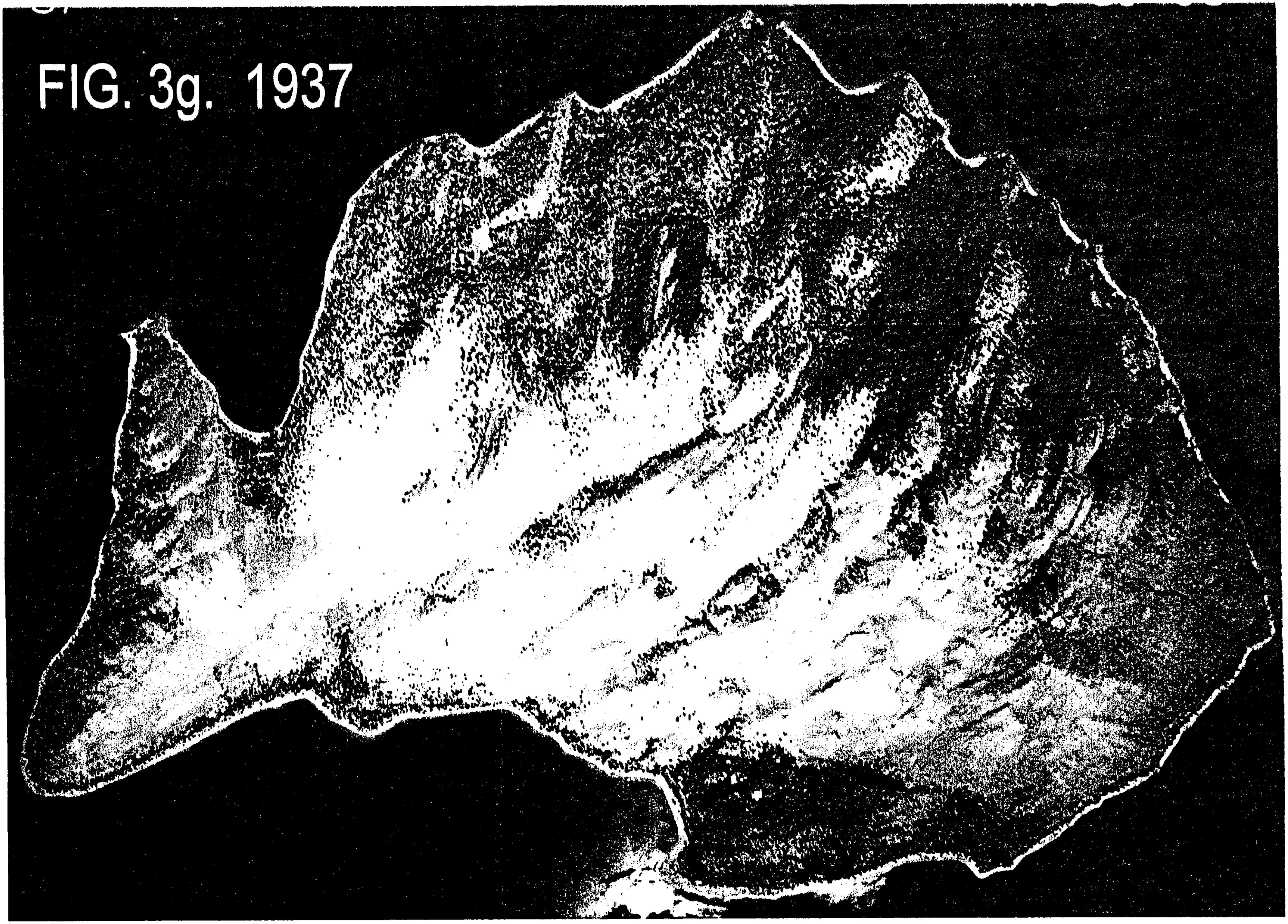


FIG. 3g. 1937

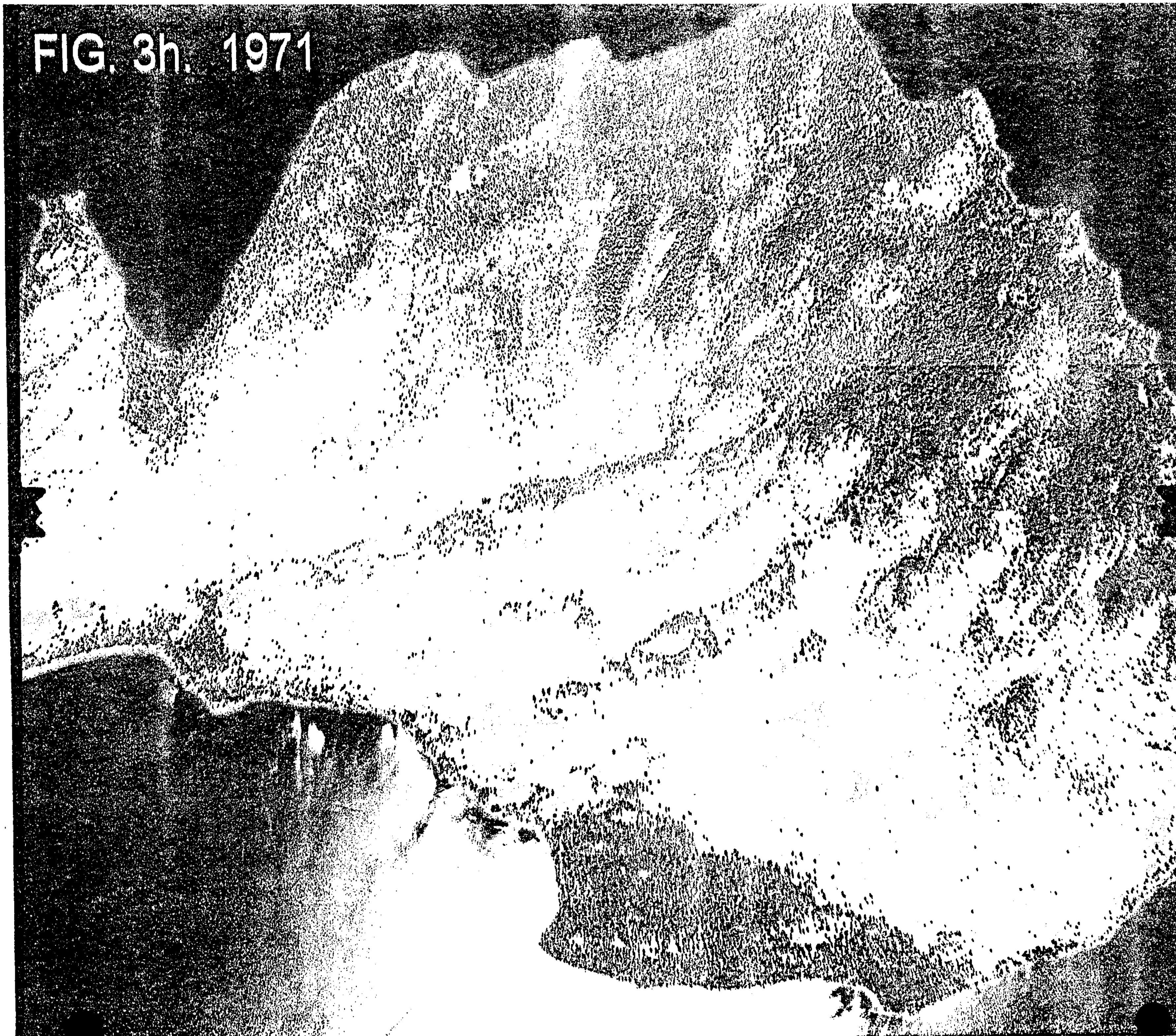
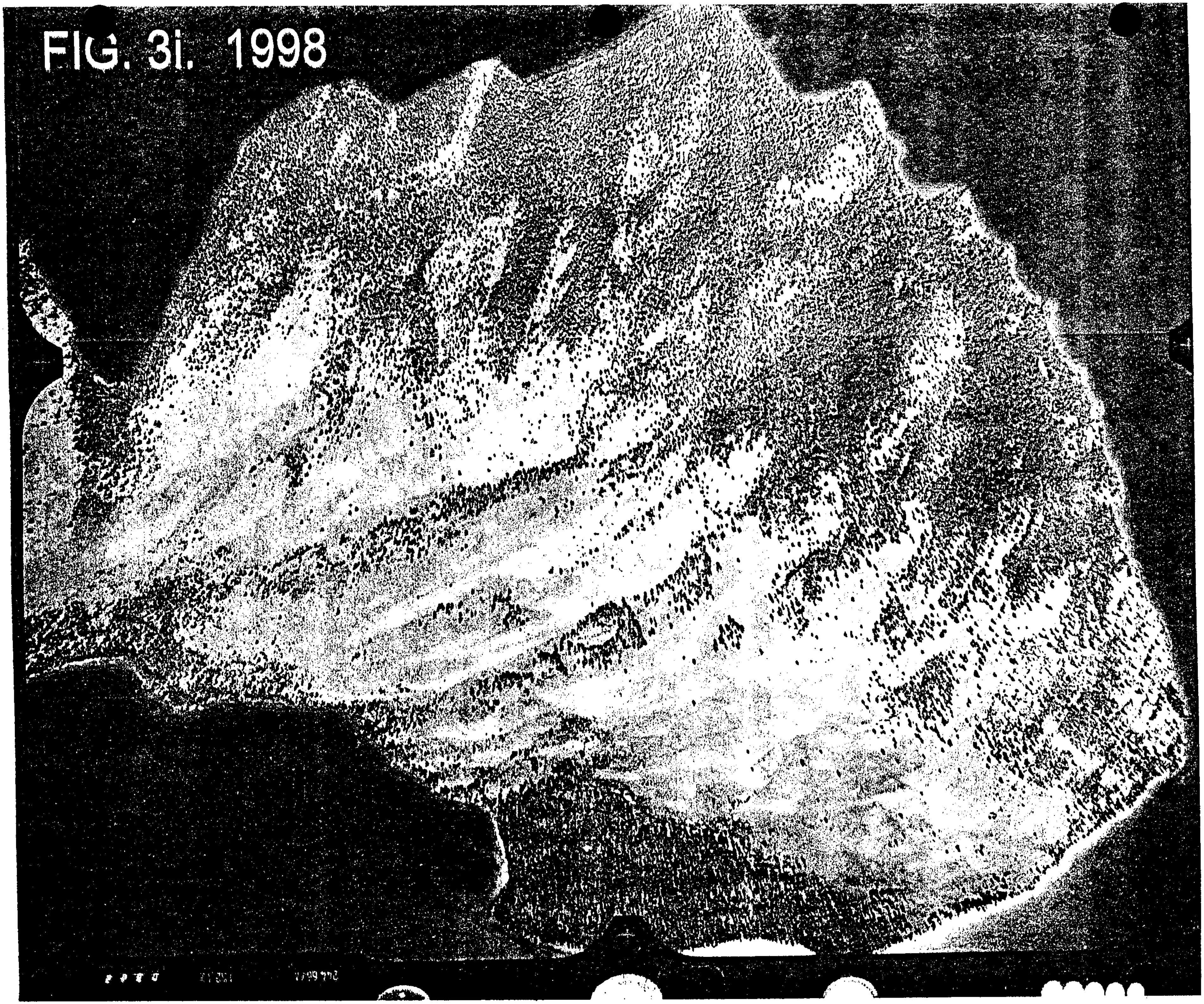


FIG. 3h. 1971

FIG. 3i. 1998



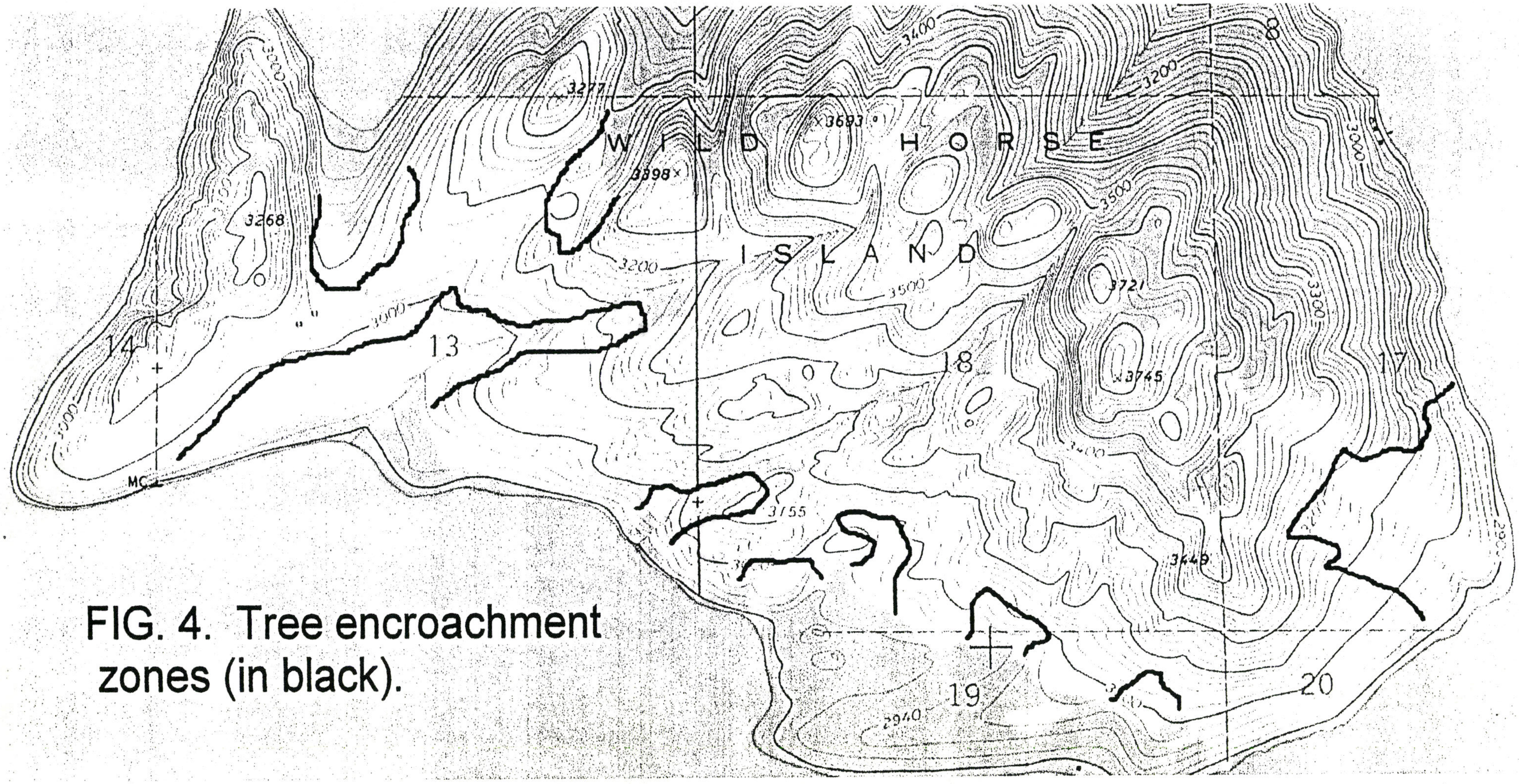


FIG. 4. Tree encroachment zones (in black).

photographs (fig. 3) show that trees began advancing up both sides of the saddle, and up the major draw to the northeast, shortly after the homestead was abandoned in ca. 1920. Another example occurs in the southeastern corner of the island (i.e., near the Hiawatha Lodge site), which has converted to woodland- and forest cover types in the absence of fire. Without prompt restoration, the remaining grassland in both areas could be displaced within the coming decades.

Based on the tree encroachment map (fig. 4), seven of nine identified encroachment polygons are moderate in size, ranging from about five to 15 acres each (mean polygon size: 9 acres). The largest such zones—near Skeeko saddle and in the island's southeastern corner—are about 75 and 60 acres, respectively.

Repeatedly suppressing fires has promoted negative changes elsewhere in the grassland. Fire exclusion, in combination with grazing, has enhanced the spread of so-called "increaser" species (e.g., balsamroot, lupine) and exotic vegetation (e.g., cheatgrass, bluegrasses) at the expense of native bunchgrasses (i.e., "decreasers"). For instance, litter buildups have promoted dense tussocks on productive sites. Heavy litter promotes bunchgrass senescence, which reduces seed production, and limits available seedbeeds. Declining bunchgrass vigor also fosters the spread of rhizomatous exotics (pers. comm. with R. Unnasch, The Nature Conservancy).

Palouse Prairie grasslands are not as "fire dependent" as some vegetation types. Therefore, grasslands are not necessarily at risk because of long-term fire exclusion (pers. comm. with Range Ecologist S. Bunting, Univ. Idaho). Nonetheless, periodic fires can provide many benefits: recycling nutrients, preparing seedbeds, enhancing seedling recruitment by promoting increased flowering, reducing inter-plant competition, inhibiting tree encroachment, providing seed scarification, and enhancing soil warming in the spring (Daubenmire 1968, Koterba and Habeck 1971, Antos et al. 1983, Lesica 1999, Lesica and Martin 1998).

PRESCRIBED FIRE ALTERNATIVES

An array of prescribed fire alternatives were developed for WHI, after consulting with numerous botanists, range ecologists, fire managers, and wildlife biologists. These experts expressed qualified support for the goal of re-introducing fire, but several themes emerged from the interviews. First, to avoid inadvertantly damaging cool season grasses and other herbaceous plants, prescribed fire should be applied only after the active growing season, or before growth initiation. The grassland "dormant period" generally spans from mid summer to early spring in western Montana.

Three biologists specializing in birds and large mammals also said that burning during the dormant period would help avoid disturbing wildlife during the reproduction period (i.e., mid- to late spring). They had no specific concerns about fire's effect on wildlife habitat, but were generally supportive of reintroducing fire an ecosystem process.

Fire also can influence the population dynamics of the endangered herb *Silene spaldingii*. Experimental burning at The Nature Conservancy's Dancing Prairie Preserve in northwestern Montana (Lesica 1999) generally had positive effects on plant growth, recruitment, and survival. Spring burning was somewhat more effective than fall burning for preparing seedbeds, and helped retain a light litter layer to mitigate drought-induced seedling mortality. However, even more-intense fall fires stimulated the *Silene* population.

Twelve alternatives were developed, ranging from "No Action" to relatively broad-scale prescribed burning. The discussion below focuses on such major issues as: 1) potential for enhancing overall grassland vigor, 2) potential for addressing the tree encroachment problem, 3) budget/logistics, and other issues. (Appendixes B and C also contain assessments in tabular- and matrix formats.) Other issues, seemingly critical, are mentioned only briefly. For example, most prescribe fire alternatives have little potential for generating escaped wildfires, so minimal discussion is devoted to that topic. Similarly, most prescribed fire alternatives have little potential for causing heavy smoke pollution: dispersion generally is optimal in early spring, and output is often low with light flashy fuels.

ALTERNATIVE *A*: ***No Action.*** This alternative represents a continuation of the current policy of attempted fire exclusion. Although the least expensive and least controversial in the short-term, such management clearly is tenuous because excluding fires will continue to foster negative changes. That is, ecosystem integrity will continue to decline in both the grassland and forest cover types. Tree encroachment will continue unabated in the grassland, and long-term fuel buildups in both vegetation types will increase the risk of increasingly severe and unnatural wildfires. A degraded park also could promote a decline in the quality of visitor experiences (e.g., forest fire "destruction"; impaired wildlife habitat), thereby possibly generating criticism of park management. Increasingly expensive, impactive, and possibly less effective restoration measures such as logging and weed spraying might also become necessary over time. Overall, Alternative *A* scored relatively poorly in the matrix of alternatives (Appendix C).

ALTERNATIVE ***B*****:** ***Frequent spring burns, large units.*** This alternative seeks to emulate the frequency and possible sizes of natural fires. Specifically, burning would occur in relatively large units (e.g., 350 acres) on a 10-year fire cycle.

"Fire cycle" (Romme 1982) is a statistical concept illustrated as follows. The sampling suggested that fires burned acreage equal to the entire 1100-acre grassland about every 10 years. Dividing the grassland acreage by the 10-year MFI yields an average of 110 burned acres per year before 1900 (or, 216 acres island-wide when including the forested portion). The sizes of actual fires undoubtedly were often substantially larger than 100 acres, which is a rationale for choosing relatively large burn units. In any given 10-year period, however, some sites burned more than once whereas others did not burn. Such spatial variation is indicated by the range of fire intervals found during sampling (i.e., 5-20 yr). (Spatial heterogeneity also occurred during fires because they often spread non-uniformly).

These fire frequency statistics are useful for both short- and long range planning. To promote ecosystem diversity, managers can use the range of site fire intervals to incorporate spatial variation in the overall strategy. For example, a heavily tree-encroached unit could be reburned after just five years, to maximize tree mortality and reduce subsequent cone crops and tree regeneration. Conversely, a nearby treeless unit could be reburned after as many as 20 years.

The fire cycle for the entire grassland also can serve as a gauge for monitoring progress over time. At the end of any given ten year period, for example, acreage equal to the entire 1100-acre grassland must have been burned for the ecosystem to remain on cycle.

One advantage of using relatively large burn units is that burning would not have to occur annually on the island to stay on cycle. With 350-acre units, for example, burning would only have to occur every three years, on average. (In contrast, burning would have to occur nearly every year if smaller units were used to achieve a 10-year fire cycle [see Alternative *C* below]). This approach would reduce the amount of "intrusive" management on the island, and presumably would entail less complex budgetary and logistical planning. Large-scale burning would also help reduce the potential for overgrazing. That is, grazing animals would likely prefer recently burned areas because such sites "green up" earlier in the spring (i.e., blackened soil warms up earlier) and because burning fosters nutrient-rich, succulent growth. (Oral history informants verified that early-day Indians also possessed this ecological knowledge, which was one reason for burning grazing lands [Barrett 1982, Boyd 1999]).

Three burn units, averaging about 365 acres each, are suggested for Alternative *B* (Appendix D). The units were delimited based on potentially defensible topographic boundaries, such as non-timbered ridges and draws. Areas with substantial tree encroachment received the highest priority for scheduling. For instance, the western portion of the island was given the highest priority, because that area contains both heavy encroachment and dense tussocks in the remaining native grasses. Second priority was given to the heavily tree encroached eastern portion (i.e., near the Hiawatha Lodge site)(Appendix D). Because this area contains widespread trees up to 100 years old in a woodland pattern, burning alone likely cannot restore the previous grassland/savannah pattern. However, maintenance burning would at least halt the possible conversion to a forest cover type. The central portion of the island received last priority for scheduling. That area contains less encroachment and tussocking, and a larger amount of sparsely-fueled terrain (e.g., cliffy rocklands).

Rather than "spring burning," a more accurate phrase for this alternative would be "late dormant period" burning. In fact, fires could even be ignited in winter if fuels were receptive. Pre-1900 fires undoubtedly were more common during summer and fall. However, spring fires can be less damaging to fire susceptible bunchgrasses, and would have low potential for disrupting wildlife during the reproduction period. Late-dormant period burning with moderately intense fires also has good potential for arresting, but probably not reversing, tree encroachment. Specifically, most spring fires will not kill pines that have already developed fire resistant bark and open crowns from self-pruning (i.e., large saplings and small poles). (*Note*: Appendix E contains a typical spring burn prescription for a pine-encroached grassland).

Using moderate severity fires would also help protect human safety and infrastructure. Specifically, the potential for escaped fires during the late dormant period generally is low because duff- and fuel moisture in the adjacent forest is often high. Burning during the late dormant period also would be economical because such fires can often be managed by small crews with hand tools such as backpack pumps, without digging firelines. Ten or twelve workers probably could safely and efficiently burn 350 acres, for an average cost of less than ten dollars per acre (pers. comm. with D. Dupuis, BIA Forestry Fire Mgt. Dept.). Burning comparatively large units also yields an "economy of scale," in part because burning would only have to occur periodically, rather than annually. Such an approach also entails less budgetary and logistical complexity than having to burn smaller units every year.

Considerable public controversy could arise with such a program, at least initially. Park- and fire managers would have to show that such burning is ecologically beneficial, and usually not hazardous. A possible advantage in this regard is that burning every few years might generate less controversy than burning annually (as with Alternative *C* below), because it would reduce the frequency of intrusive management. Overall, Alternative *B* had the most favorable score in the matrix (Appendix C).

ALTERNATIVE *C*: *Frequent spring burns, small- to moderate size units.* This approach would emulate natural fire frequency, but would use burn units smaller than most natural fires (e.g., 50-250 acres; Appendix D). To maintain a 10-year fire cycle, therefore, burning would have to be conducted more frequently on the island (e.g., annually) than with Alternative *B*.

This "go slow" approach has some advantages: 1) less risk of escaped fires, 2) inherent flexibility for adaptive management, and 3) possibly less controversial than burning large units. However, annual burning would have some disadvantages. Using Alternative *C* would increase the level of intrusive management, perhaps generating more public controversy over the long-term. Budgetary and logistical planning would also be more complex than under Alternative *B*. Small-scale burning presumably increases the potential for overgrazing. And, although small fires are usually more easy to contain, escaped fire potential might increase over the long run than under Alternative *B*, simply because more fires would be required.

Apart from the overgrazing risk, the potential array of ecological benefits from using Alternative *C* would be similar to those under Alternative *B*. That is, burning during the late dormant period would help stimulate grassland vigor while avoiding damage to newly sprouting vegetation. Similarly, the spring burning would have good potential for halting further tree encroachment, but not for destroying well-established thickets. Overall, Alternative *C* scored relatively well in the matrix of alternatives (Appendix C).

Nine potential burn units were designed for Alternative *C* (Appendix D). As with Alternative *B*, the most defensible topographic boundaries were used, and unit sizes range from 45 to 230 acres each (mean: 133 acres). Although no scheduling priority is given here, the same general objectives and locations would apply (i.e., heavily tree encroached- and tussocked areas).

ALTERNATIVE *D*: *Infrequent spring burns, large units.* This alternative would emulate past fire sizes, but not natural fire frequency. The main disadvantage of this approach is that such burning (i.e., infrequent or one-time applications) would have little potential for promoting ecosystem maintenance or restoration. Ecological benefits to the grassland would be minimal, if fact, such burning could be harmful. For example, infrequent burning might inadvertently stimulate more tree- and weed encroachment—which would not be consumed by any recurrent burns at short-intervals. Fire danger, both from prescribed burning and from subsequent unplanned wildfires, also might increase because of enhanced tree encroachment. Subsequent fire severities also could be exacerbated by bark beetle outbreaks in groups of newly scorched trees.

The potential for generating public controversy seems uncertain with such a fire management strategy. Infrequent burning might be less controversial than frequent burning, because the former approach could help assuage public concerns about safety and aesthetics (i.e., less fire "destruction"). Consequently, failing to promote an initial public "mind set" about the benefits and need for frequent fires could become a barrier to long-range planning.

The budgetary and logistical needs presumably would be minimal under Alternative *D*, as would the potential for causing significant smoke pollution. Because of the potential ecological shortcomings, however, Alternative *D* scored relatively poorly in the matrix (Appendix C).

ALTERNATIVE *E*: *Infrequent spring burns, relatively small units.* This alternative does not emulate natural fire frequency or past fire sizes, and it represents the most token application of fire. As a result, Alternative *E* would be largely ineffective for addressing the major ecological issues of enhancing grassland vigor and combating tree encroachment. Advantages exist primarily in the realm of budget and logistics (i.e., burns that are inexpensive and easy to conduct), and in the "sociological" category (i.e., low controversy with respect to escaped fires, smoke pollution, aesthetics). Also, infrequent and irregular application of small fires would reduce the potential for fire-induced weed spread, and provides opportunity for conservative (e.g., experimental) application of fire.

Overall, Alternative *E* might have low potential for generating public controversy. However, whereas some might criticize FWP for failing to foster long-term ecosystem integrity, others with an "anti-fire" viewpoint would be intolerant of any prescribed burning in parks. Nevertheless, people of more moderate views might see infrequent prescribed burning as more favorable than relatively aggressive burning.

Although Alternative *E* does not emulate the historical fire patterns, this option scored surprisingly well in the matrix. This may be the result of having comparatively favorable scores in the socioeconomic realm, such as low controversy potential and low budgetary/logistical constraints.

(*Note*: *Only the major highlights of alternatives are presented below, rather than repeating the discussion of recommended fire frequencies, fire sizes, and potential burn units*).

ALTERNATIVE *F*: *Late summer/fall burns.* This alternative emulates natural fires that burned during the early dormant period (i.e., late summer and fall). If mid- to large scale burning were conducted on a 10-year fire cycle, this alternative would convey most of the same ecological advantages that are listed under Alternatives *B* and *C*. Unlike with spring burning, however, fall burning poses no risk of harming plants during their early growth stages. Fall fires tend to be more intense, yielding more potential for combating tree encroachment.

As for possible effects on wildlife, fall burning would be less disruptive because burning would occur after the spring reproduction period. Fall burning would deplete the winter forage base, but grazing levels currently are well below range carrying capacity (pers. comm. with J. Vore, FWP).

Major disadvantages lie in the socioeconomic realm. Fall burning would create more budget/logistics complexity, and possibly more controversy as a result of the increased fire risk, smoke pollution, and aesthetic impacts. For example, because fall burning has greater potential for generating escaped fires, a permanent network of excavated firelines might be necessary on WHI. Escaped fire risk could be reduced, however, by burning only after a wetting rain that reduces the forest fire hazard. Overall, Alternative *F* scored relatively well in the matrix because fall burning would closely emulate the natural fire pattern (Appendix C).

ALTERNATIVE ***G: Spring burns, "hot" prescriptions.*** Relatively intense prescribed fires could be used to increase the amount of tree mortality on heavily encroached sites (i.e., without fuel pre-treatment such as slash piling). During a recent field trip to WHI, prescribed fire managers said that more-aggressive prescriptions could be used to achieve moderate levels of mortality in the large sapling and small pole classes (i.e., during low fuel moisture and humidity levels). Still, even aggressive spring burning would not greatly increase the potential for reversing tree encroachment. Based on field observations, many trees have already developed fire-resistant bark and high open crowns from self-pruning. Even if such burning were successful, the resultant groups of standing dead trees might trigger bark beetle attacks that can spread to adjacent old growth trees.

Purposely killing large numbers of trees in this fashion could be controversial (e.g., insect outbreaks, escaped wildfire potential). As for aesthetics, it is difficult to predict whether purposely killing large patches of trees with fire would be more controversial than using mechanical fuel pretreatment, such as piling and burning. Mechanical treatment would be more "artificial" in short-term perspective, but would be more efficient and possibly less damaging ecologically (see Alternative *I* below).

Severe fires on sites choked by heavy litter also could be used to kill introduced rhizomatous grasses (e.g., *Poa* spp.). However, such burning can negatively affect native species as well (e.g., *Festuca* and *Agropyron* spp.), and some might require a decade or more to return to pre-burn levels (Antos et al. 1983). Severe fires also can overexpose mineral soil, inviting weed encroachment (Lesica and Martin 1998, Lesica 1999).

Alternative *G* also would entail more budgetary and logistical complexity than other spring burning methods, primarily due to the increased risk of having escaped fires. Because of the potentially negative tradeoffs, Alternative *G* scored relatively poorly in the matrix (Appendix C)

ALTERNATIVE *H*: *Spring burns, "cool" prescriptions.* This alternative was included to enable a comparison with other spring burning approaches, such as under Alternatives *B* through *F* (i.e., moderate RXs) and Alternative *G* (aggressive RXs). For example, low severity burning has minimal negative impact on fire susceptible native plants, but is less effective for litter reduction and seedbed preparation (Lesica 1999). Low severity fires have little potential for combating long-term tree encroachment. Such prescriptions can decrease the risk of having escaped fires during application, but long-term fire risk might increase because of the maturing tree thickets. Despite such ecological shortcomings, this alternative scored comparatively well in the matrix, particularly in the realm of budget/logistics and public relations (Appendix C).

ALTERNATIVE *I*: *Burning tree piles/broadcast burning.* Alternative *I* would be the most aggressive tree-reduction measure for quickly restoring the historical grassland. Two mechanical treatment strategies, alone or in combination, are feasible. First, felled trees could be piled and burned before reintroducing periodic maintenance burning. Piling and burning is cost- and labor intensive, but has the lowest escaped-fire potential. A similar option is to fell and cure trees in place (i.e., "lop and scatter"), followed by broadcast burning. This approach would be somewhat less cost- and labor intensive, but less effective for total disposal (i.e., incomplete incineration).

Both pretreatment methods can cause short-term negative ecological impact on grassland sites. Whereas both methods can inadvertently stimulate weed regeneration, broadcast burning presumably causes more widespread damage to native grasses and forbs. Broadcast burning of heavy downed fuels also poses more risk of having escaped fires.

Both methods can trigger bark beetle outbreaks (i.e., *Ips* spp.) if the slashing and burning is not carefully timed (Kegley et al. 1997). For example, the best approach would be to cut trees in the fall, followed by burning in the spring. This sequence deprives adult beetles of host material throughout the egg-laying period, which spans from mid-April to late summer (pers. comm. with Entomologist K. Gibson, USDA For. Serv. Region One, Missoula).

Both methods would also be potentially controversial. In short-term perspective, cutting and burning trees would cause considerable visual impact, would require highly intrusive management, and would generate moderate amounts of smoke pollution. However, some members of the public might consider broadcast burning to be more "natural," whereas others might see pile burning as more "tidy."

Despite the potential limitations, Alternative *I* scored relatively well in the matrix (Appendix C) because felling and burning would be the most effective way to reverse tree encroachment.

ALTERNATIVE *J*: *Burn only existing grassland.* This approach entails burning just the remaining grassland sites, avoiding heavily tree-encroached areas. Therefore, Alternative *J* represents a maintenance burning strategy, rather than attempting grassland restoration. Likely advantages would be: 1) less complex budgetary and logistical needs, 2) potentially less controversy (i.e., lower visual impact), and 3) less smoke pollution during burns. Periodic maintenance burning also would halt further tree encroachment by destroying seedlings and small saplings. However, because this alternative fails to address the need for grassland restoration, it would be less effective for fostering long-term ecosystem integrity. Long-term wildfire hazard, and smoke pollution potential, also would increase because of the increasing tree densities on previously grass-dominated sites. Using this alternative would also fail to maximize grazing potential for wildlife. Overall, however, Alternative *J* scored comparatively well in the matrix because it fared poorly only in the "tree encroachment" category (Appendix C).

ALTERNATIVE *K*: *Prescribed burning with weed spraying/mechanical control.* Fires can stimulate both native vegetation and exotics, such as noxious weeds (Lesica and Martin 1998, Lesica 1999). One way to avoid promoting weeds is to use relatively "cool" prescriptions that limit fire severity. Burning with adequate duff moisture helps reduce fire's impact on susceptible grasses, and reduces bare soil exposure near weed dominated areas.

Weed populations also can be avoided when laying out burn units, but this may be largely unnecessary at present. That is, fires would often fail to spread across the sparsely fueled rocky slopes and moist swales where weeds predominate.

Mechanical control methods (e.g., hand pulling, cutting) also can be used before and after burning, especially where populations are highly localized. Where mechanical control is infeasible, post-fire herbicide application would be more effective than pre-burn spraying, because fires reduce the short-term viability of some herbicides (pers. comm. with G. Bennett, Lake County Weed Supervisor). For effective long-term control, some sites also might require more than one application of herbicide in order to deplete seed banks (Lesica and Martin 1998).

As for potential disadvantages, chemical use is usually controversial. Herbicides are also expensive, but might still be economical on WHI because current weed populations are generally low. Overall, this alternative scored comparatively well in the matrix because of herbicides' high efficacy (Appendix C). (Lake County Weed Supervisor Gregg Bennett recently expressed support for the goal of returning fire to WHI, and would like to be kept apprised of future plans).

ALTERNATIVE *L*: *Conduct small experimental/demonstration burns.* For an initial "go slow" approach, managers could use small fires for demonstration and experimental purposes. Small fires are inexpensive, and usually easy to plan and conduct. Such burning also would help ease the "learning curve," for example, for testing the effectiveness of burning tree encroached areas. Experimental fires also can be useful for conducting scientific monitoring, and can help foster public education and acceptance.

However, Alternative *L* could be detrimental to the long-term goal of reintroducing fire to the island. Without adequate public outreach, some people might develop the "mind-set" that only small-scale and infrequent burning is necessary and acceptable. Because small-scale experimental burning has limited potential for promoting grassland restoration and maintenance, Alternative *L* scored only marginally well in the matrix of alternatives (Appendix C).

SUMMARY

This report outlined a number of general strategies for reintroducing fire to WHI. Although the main goal of most alternatives is to reintroduce fire, Alternatives *B* and *C* represent the most long-term commitments for maintenance burning. Some alternatives also feature initial restoration measures, such as tree slashing and burning, to quickly reclaim portions of the historical grassland.

These alternatives were listed as separate entities, but the most effective management would likely incorporate various elements from among alternatives. For example, whereas Alternative *B* might represent a useful strategy overall, fuel pretreatment measures such as tree piling and burning (Alt. *I*) and post-burn weed control (Alt. *K*) also might be useful. Planning could also include an initial demonstration burn (Alt. *L*), to promote public acceptance. Regardless of which fire management strategy ultimately is developed, establishing a program of both short- and long-term monitoring is highly recommended (even for Alternative *A* ["*No Action*"]). Ecosystem monitoring can enhance adaptive management, and can be useful for public relations and interpretive programs.

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APPENDIX A: Stand Fire History Data, Wildhorse Island

Master Fire Chronologies (MFC):

Stand 1	Stand 2
	1892
1886	
1882	1882
1871	1871
	1861
1853	
1848	1848
1842	1842
	1835
1830	1830
1822	1822
1813	1813
1806	1806
1796	1796
	1784
1766	1766
	1759
1751	
1745	1745
1741	
1733	1733
1728	
1725	1725
	1717
	1695
	1674
	1664

Fire Frequency:

	Stand 1	Stand 2
MFC:	1725-1886	1664-1892
# Fires:	18	22
Intvl Range:	4-30 yr	6-18 yr
MFI:	9 yr	11 yr
Last Fire:	113 yr	107 yr

APPENDIX B. Tabular highlights of Prescribed Fire Alternatives for Wild Horse Island State Park.

ALTERNATIVE	*Advantages*	***Disadvantages***
A. No Action (no RX fire)	-Most economical alternative in short-term perspective -No risk of negative impacts to grassland from RX burning (e.g., enhancing weeds, damaging grasses/forbs) -No danger of escaped RX fire -No RX smoke pollution -No public controversy due to perceived fire hazard, visual impacts, or smoke. -No wildlife disturbance (i.e., minimizes mgt. presence)	**-Continuing decline in grassland vigor** **-Continuing tree encroachment** **-Increasing wildfire potential (e.g., due to tree encroachment)** **-Continuing public apathy/ignorance about park ecology**

ALTERNATIVE	*Advantages*	*Disadvantages*
B. Frequent spring burns, relatively large units (e.g., 300+ acre units burned every 3 years in spring to achieve 10-year fire cycle)	-Highest potential for emulating natural fire frequency -One of the most economical RX fire alternatives (i.e., economy of scale) -Burning required only every few years, rather than annually -Potentially low impact on visitor/landowner relations (i.e., minimizes intrusive mgt. presence) -Less potential for wildlife disturbance than Alt. C -Minimizes overgrazing potential by maximizing burn size -No depletion of winter forage base	**-Moderate to high potential for short term controversy (e.g., exacerbating public fears of fire)** **-Danger of "go fast" approach (i.e., steeper "learning curve")** **-Uncertain effects on individual plant/animal species without monitoring** **-Relatively short "burning window" (i.e., must occur before initiation of spring growth)** **-Moderate escaped fire potential** **-Moderate amounts of smoke pollution periodically**

ALTERNATIVE	*Advantages*	*Disadvantages*
C. Frequent spring burns, relatively small units (e.g., 50 to 150 acre units burned annually in spring to achieve historical 10-year fire cycle)	-Emulates natural fire frequency -Relatively low escaped fire potential -Allows "go slow" approach (i.e., gentler "learning curve") while still maintaining natural fire cycle -No depletion of winter forage base -More potential for wildlife disturbance than Alt. B	**-Unnaturally small units enhance potential for overgrazing in burns** **--Uncertain effects on individual plant/animal species without monitoring** **-Less economical than burning larger units (i.e., increased budgetary/logistical constraints)** **-Frequent light to moderate smoke pollution (e.g., annually)** **-Annual burning on the island might increase potential for controversy (i.e., maximizes intrusive mgt. presence)** **-Short burning window** **-Increases escaped fire potential due to annual burning**

ALTERNATIVE	*Advantages*	*Disadvantages*
D. Infrequent spring burns, large units	-Creates a more random disturbance pattern -Less potential for generating public controversy than regularly scheduled burning -Economical -Low potential for causing long-term damage to native species -Low potential for exacerbaing weed spread with fire -Low potential for wildlife disturbance -Low smoke pollution -Easier monitoring of long-term fire effects -Low escaped fire potential due to infrequent burns -No depletion of winter forage base	**-Fails to emulate natural fire frequency** **-Moderately low potential for promoting grassland vigor** **-Moderately low potential for halting/reversing tree encroachment** **-Enhances tree regeneration by preparing seedbeds** **-Moderate potential for escaped fire** **-High potential for controversy (lack of "public mindset" about fire's positive benefits)**

ALTERNATIVE	*Advantages*	*Disadvantages*
E. Infrequent spring burns, relatively small units	-Generally low potential for generating public controversy -Economical -Low potential for causing long-term damage to native species -Low potential for exacerbaing weed spread with fire -Low escaped fire potential -Low smoke pollution -Easier monitoring of long-term fire effects -Low escaped fire potential due to infrequent burns -Low potential for wildlife disturbance -No depletion of winter forage base	**-Fails to emulate natural fire frequency** **-Fails to emulate natural fire size** **-Low potential for promoting grassland vigor** **-Low potential for halting/reversing tree encroachment** **--Enhances new tree regeneration by preparing seedbeds** **-Uncertain potential for controversy**

ALTERNATIVE	*Advantages*	*Disadvantages*
F. Late summer/fall burns (i.e., early dormant period)	-Most closely resembles natural fire pattern -Potentially less harmful to early season grasses/forbs -High potential for halting/reversing tree encroachment -Relatively low potential for wildlife disturbance	**-Highest escaped fire potential** **-Among least economical (i.e., high budgetary/ logistical constraints)** **-High potential for controversy** **-Moderate to high smoke pollution** **-Moderate to high potential for enhancing weed spread locally** **-Depletes winter forage base**
G. Spring burns, relatively "hot" prescriptions	-More closely resembles natural fire pattern than other spring burns -Increases potential for halting/reversing tree encroachment -Minimizes smoke pollution	**-Potentially harmful to early season grasses/forbs if conducted too late** **-Moderate potential for enhancing weed spread locally** **-Increases potential for escaped fire, and can increase long-term wildfire risk (e.g., insect attacks)** **-Moderate potential for disturbing wildlife**
H. Spring burns, relatively "cool" prescriptions	-Less negative impact on early season grasses/forbs -Low potential for enhancing weed spread	**-Low potential for halting/reversing tree encroachment** **-Moderate smoke pollution**

ALTERNATIVE	*Advantages*	*Disadvantages*
I. Tree slashing/RX fire	-Most effective means of halting/reversing tree encroachment -Quickest way to reduce severe wildfire potential (i.e., heavy fuel reduction)	**-Potentially high controversy (i.e., visual impact from slash piles/stumps)** **-Moderate to high potential for smoke pollution, especially in spring** **-Potentially high local impacts on early season grasses/forbs and soil** **-Moderately high potential for weed spread locally (i.e., in slash "jackpot" areas)** **-Slash can trigger bark beetle epidemics in surrounding forest** **-More complex budgetary and logistical needs**
J. Burn only grass (i.e., avoid tree encroachment)	-Easier to conduct and cheaper than burning to halt/reverse tree encroachment -Possibly less controversy due to less visual impact (i.e., no dead trees or stumps) -Possibly less escaped fire potential during burns -Less smoke pollution -More wildlife cover	**-Fails to address tree encroachment problem** **-Possible controversy stemming from declining ecosystem integrity** **-Less available grazing and grassland habitat** **-Long-term fire danger increases due to increasingly heavy area fuels**

ALTERNATIVE	*Advantages*	*Disadvantages*
K. RX fire followed by weed spraying or mechanical control (Note: also includes pre-burn spraying)	-Most effective means of halting fire-induced weed spread	**-Moderately high budgetary/logistical constraints** **-Possibly controversial**
L. *Small experimental and/or demonstration burns* (e.g. before proceeding with one of above Alternatives)	**-Slowly reintroducing fire might enhance public education and acceptance** **-Allows a "go slow" approach (i.e., gentler "learning curve")** **-Simplifies fire effects monitoring** **-Economical** **-Low smoke pollution** **-Low escaped fire potential**	**-Uncertain potential for generating controversy (e.g., "backlash" could occur if fire failed to meet objectives; or public might accept only small-scale fires in the future)** **-Little potential for improving grassland vigor and halting/reversing tree encroachment**

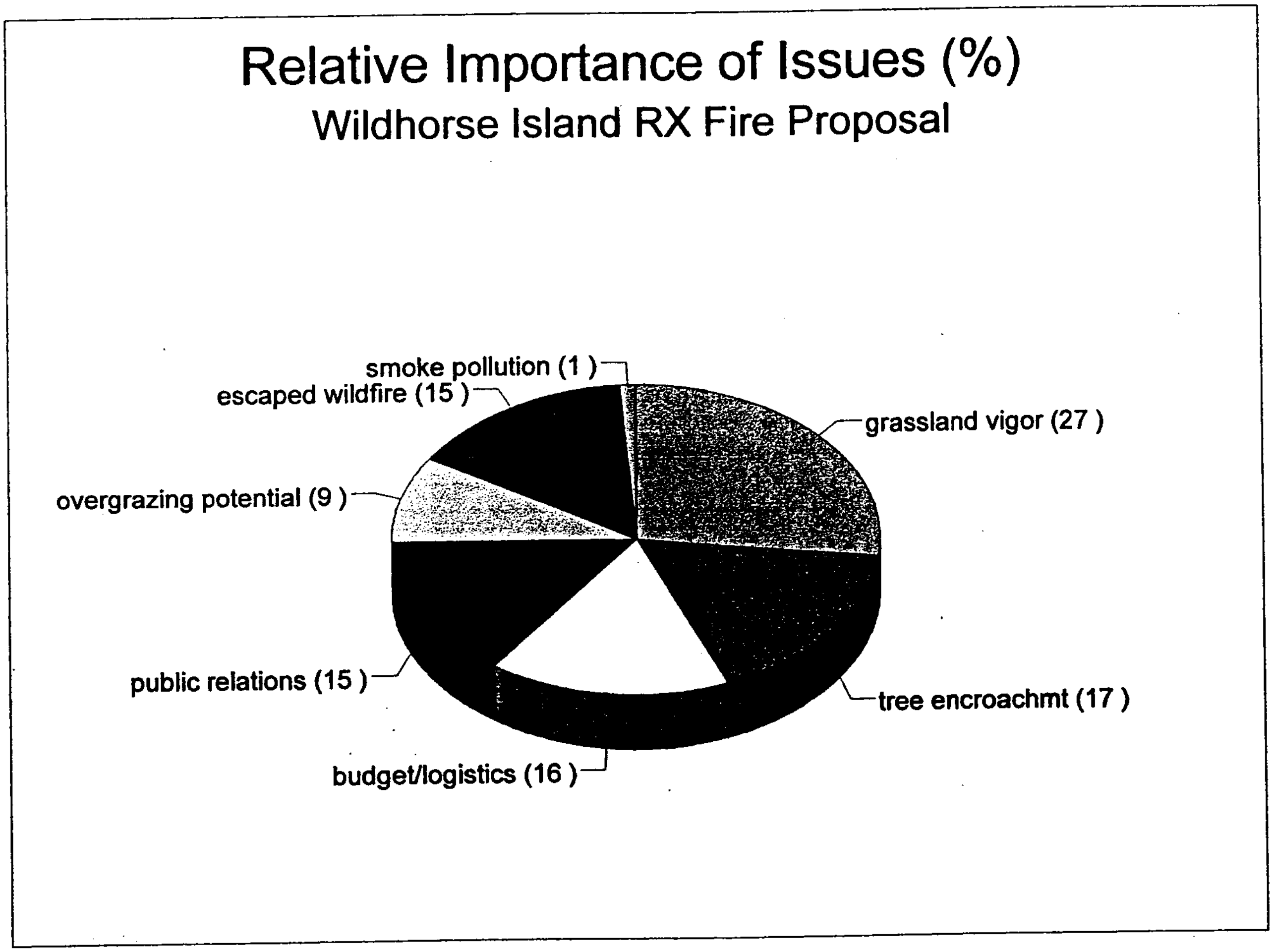
APPENDIX C. Matrix of Prescribed Fire Alternatives

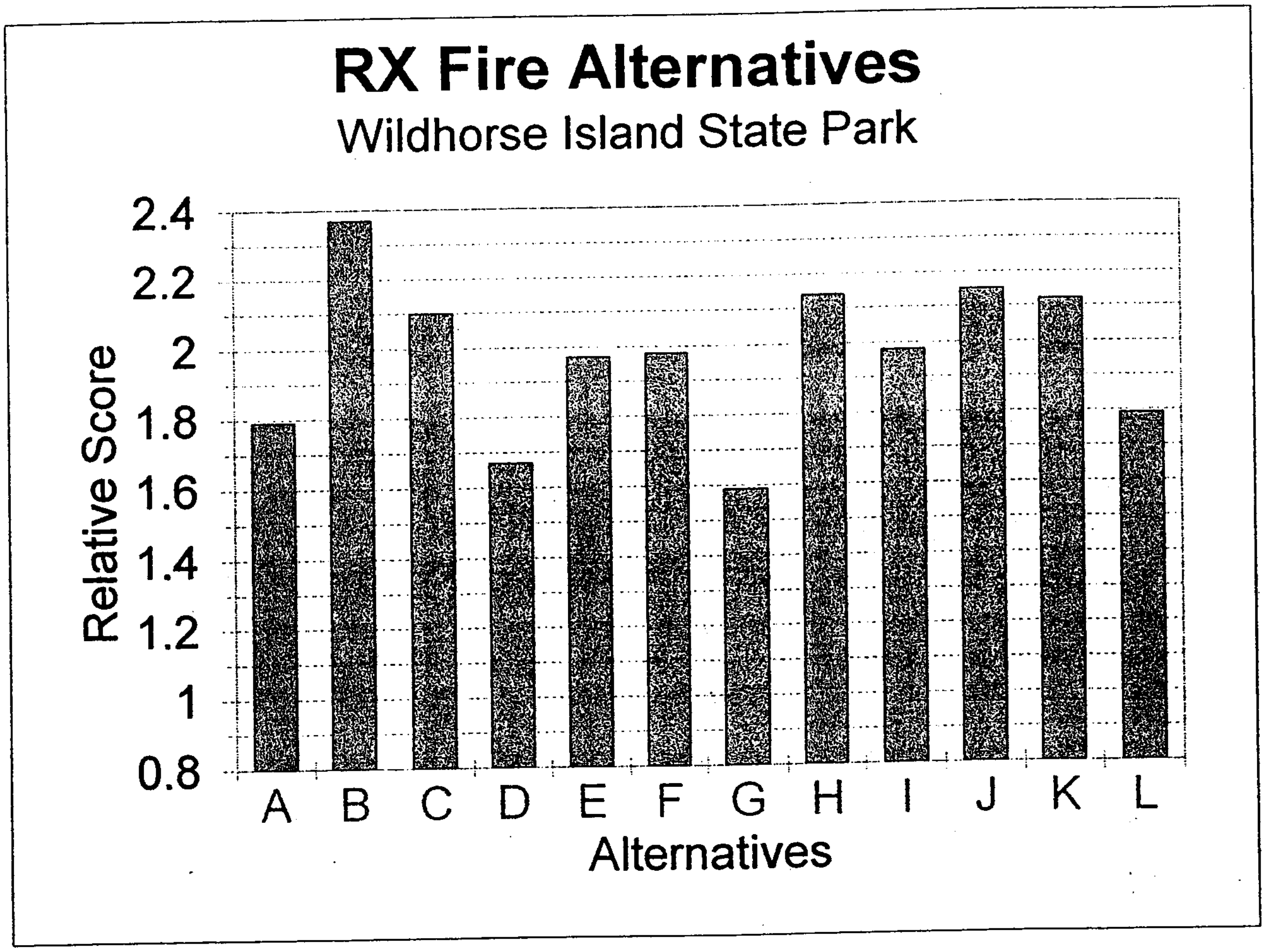
For each category, initial score is multiplied by each issue's relative importance (*parentheses, header*) to derive weighted values (*parentheses, table*). (Also see enclosed pie chart showing relative importance of issues).

Initial scoring: 1=undesirable effect 2=desirable 3=highly desirable

Alt.[1]	Enhance Grassland Vigor (27%)	Halt Tree Encroach-ment (17%)	Budget/ Logistics (16%)	Public Relations (15%)	Escaped Fire Potential (15%)	Overgraz-ing Potential in Burns (9%)	Smoke Pollution (1%)	**TOTAL *weighted value***
A.	1 (.27)	1 (.17)	3 (.48)	2 (.3)	3 (.45)	1 (.09)	3 (.03)	***1.79***
B.	3 (.81)	2 (.34)	3 (.48)	1 (.15)	2 (.3)	3 (.27)	2 (.02)	***2.37***
C.	2 (.54)	2 (.34)	2 (.32)	2 (.3)	3 (.45)	1 (.09)	2 (.02)	***2.10***
D.	1 (.27)	1 (.17)	3 (.48)	1 (.15)	2 (.3)	3 (.27)	3 (.03)	***1.67***
E.	1 (.27)	1 (.17)	3 (.48)	2 (.3)	3 (.45)	3 (.27)	3 (.03)	***1.97***
F.	3 (.81)	3 (.51)	1 (.16)	1 (.15)	1 (.15)	2 (.18)	2 (.02)	***1.98***
G.	1 (.27)	2 (.34)	2 (.32)	1 (.15)	2 (.3)	2 (.18)	3 (.03)	***1.59***
H.	2 (.54)	1 (.17)	3 (.48)	2 (.3)	3 (.45)	2 (.18)	2 (.02)	***2.14***
I.	3 (.81)	3 (.51)	1 (.16)	1 (.15)	1 (.15)	2 (.18)	2 (.02)	***1.98***
J.	2 (.54)	1 (.17)	3 (.48)	2 (.3)	3 (.45)	2 (.18)	3 (.03)	***2.15***
K.	3 (.81)	2 (.34)	2 (.32)	1 (.15)	2 (.3)	2 (.18)	2 (.02)	***2.12***
L.	1 (.27)	1 (.17)	3 (.48)	3 (.45)	3 (.45)	1 (.09)	3 (.03)	***1.94***

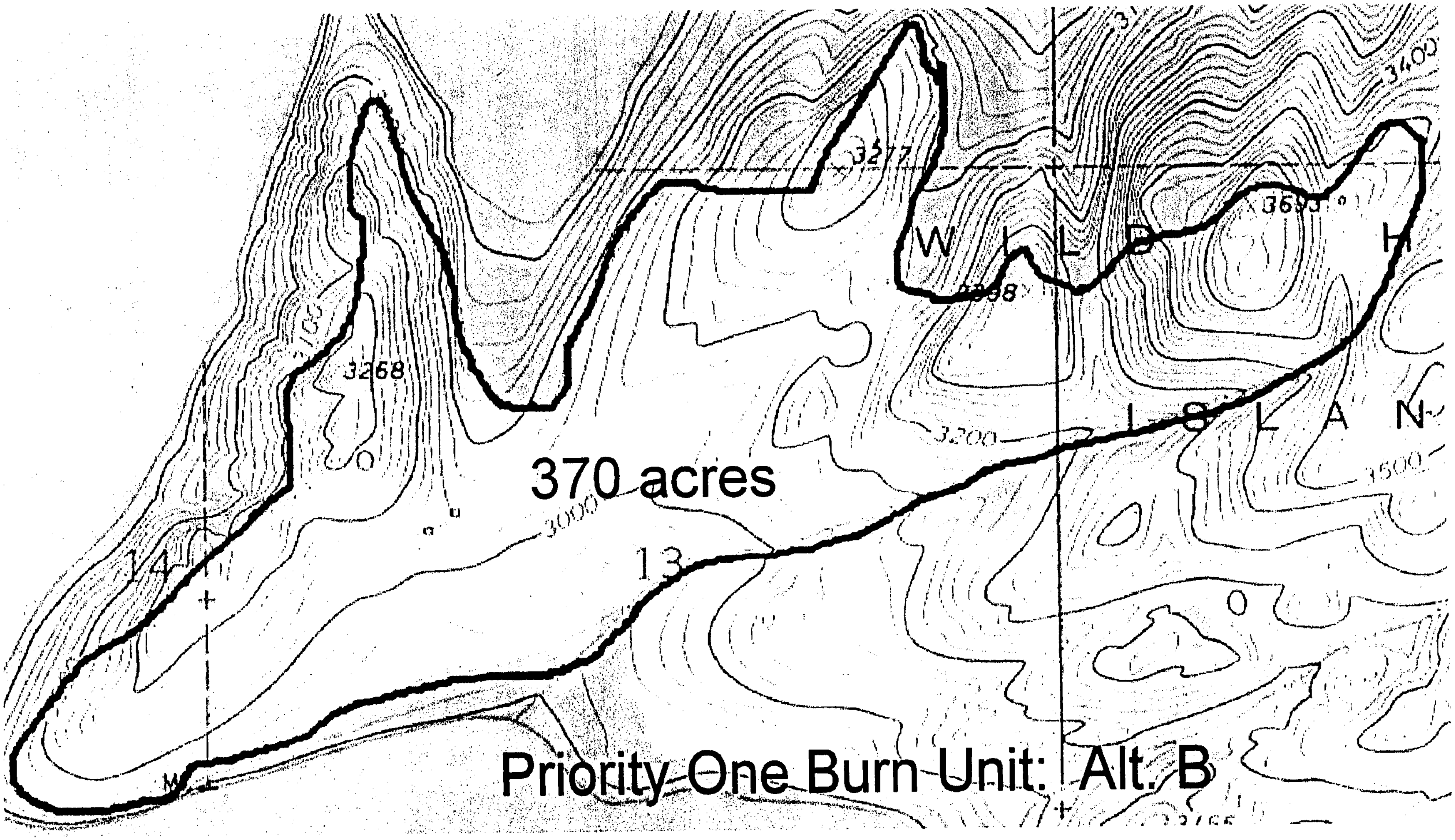
[1] **A.** *No Action* **B.** *Frequent large spring burns* **C.** *Freq. small spring burns* **D.** *Infreq. large spring burns* **E.** *Infreq. small spring burns* **F.** *Summer/fall burns* **G.** *"Hot" spring burns* **H.** *"Cool" spring burns* **I.** *Slash & burn* **J.** *Burn only grass* **K.** *Burn & weed spray* **L.** *Experimental/Demo burn*

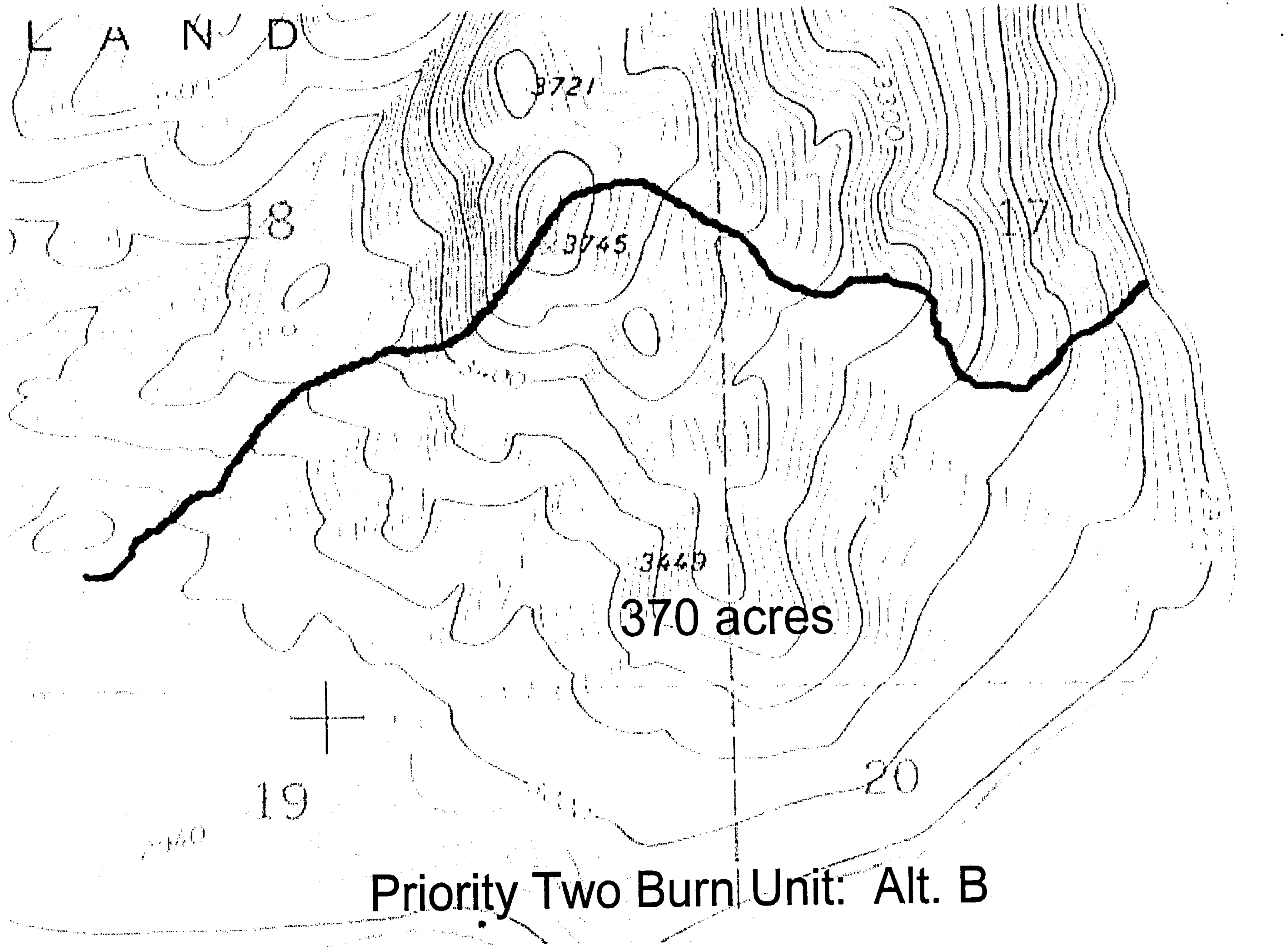

Relative Importance of Issues (%)
Wildhorse Island RX Fire Proposal
smoke pollution (1)
escaped wildfire (15)
grassland vigor (27)
overgrazing potential (9)
public relations (15)
tree encroachmt (17)
budget/logistics (16)


RX Fire Alternatives
Wildhorse Island State Park
Relative Score
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
A
B
C
D
E
F
G
H
I
J
K
L
Alternatives

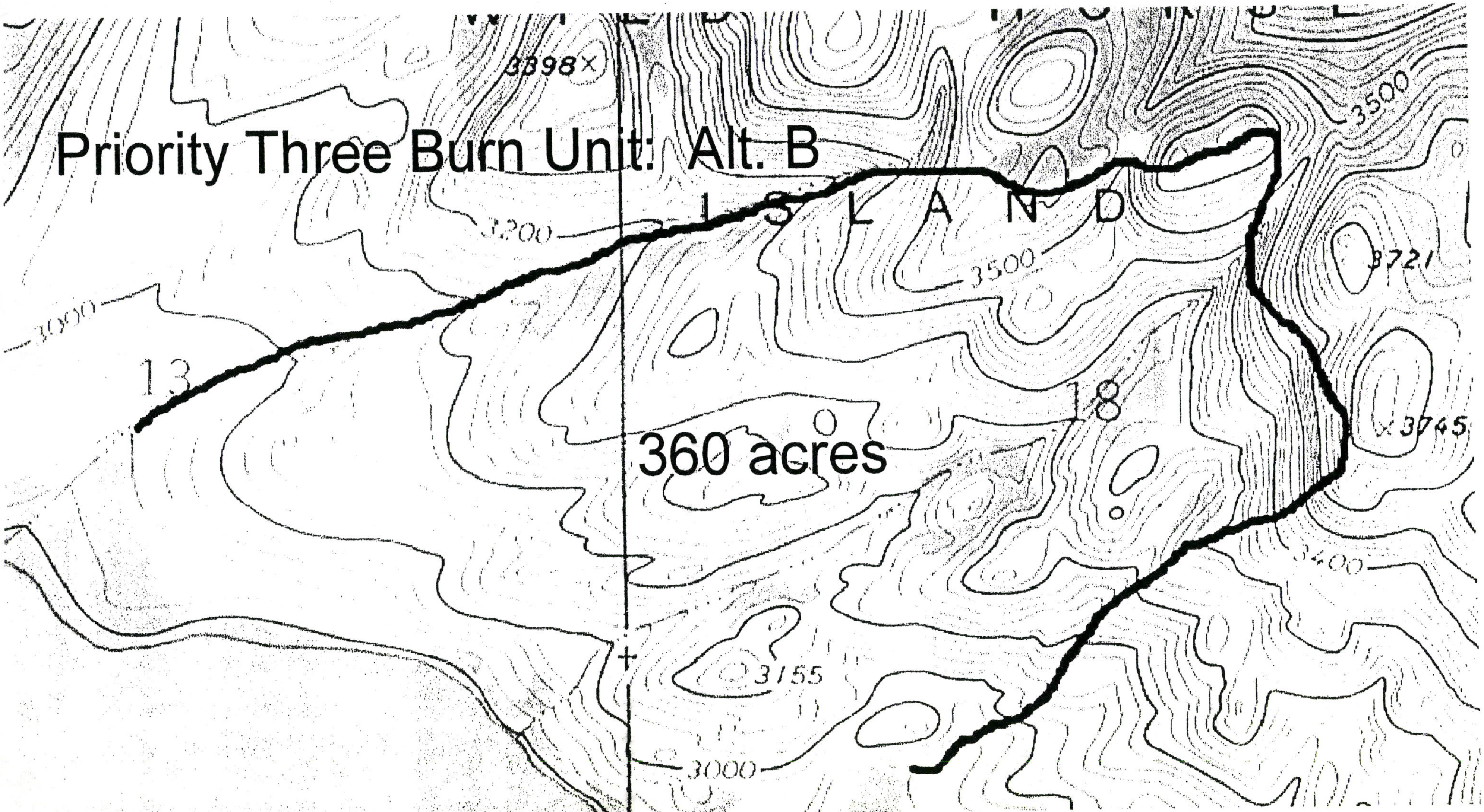
APPENDIX D. Suggested Burn Units for Wildhorse Island

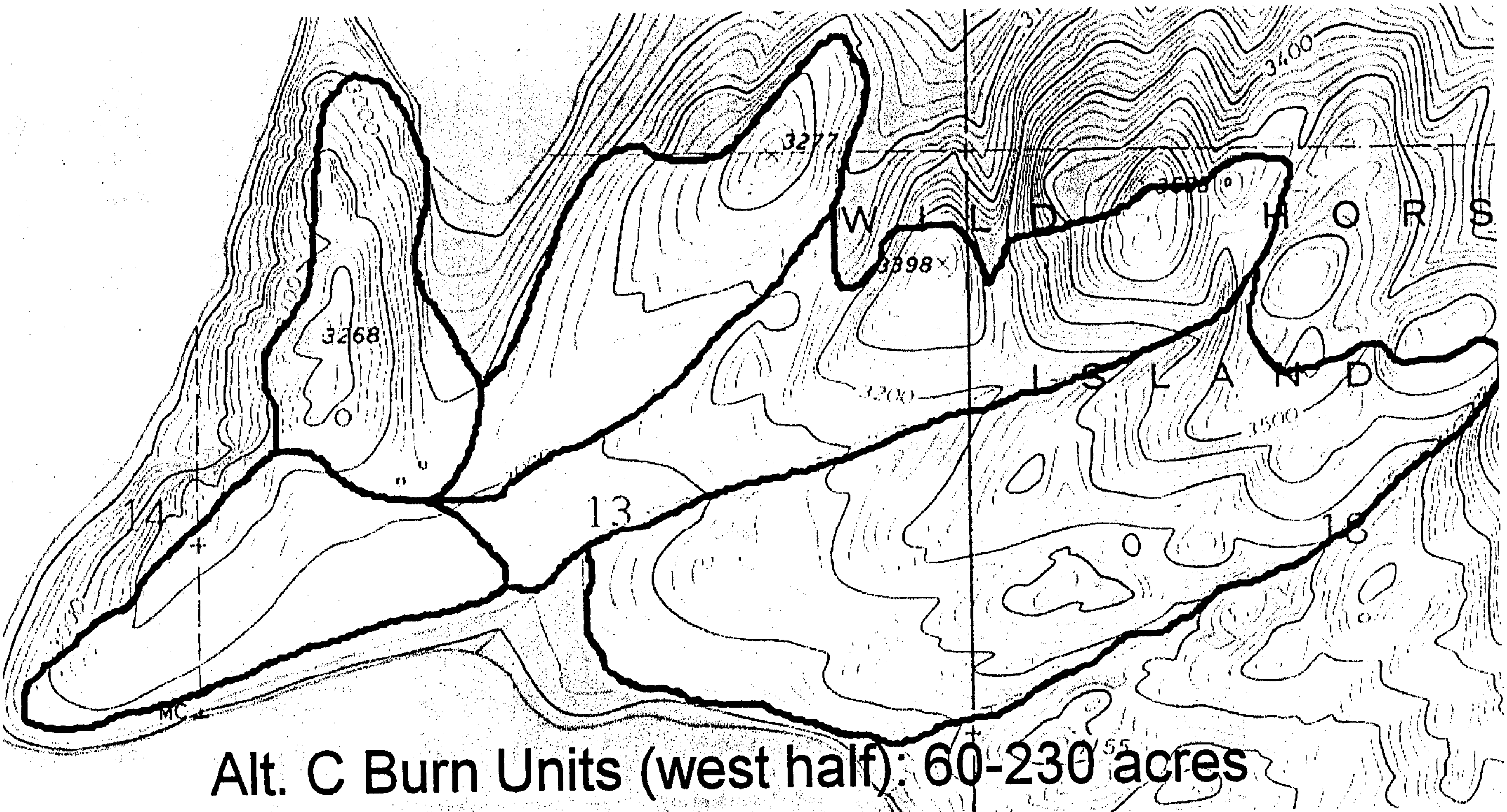
(a. Large units for Alternative B; b. Small units for Alternative C)


370 acres
Priority One Burn Unit: Alt. B
3268
3277
3693
3400
3200
3000
13
14
W I L D
I S L A N

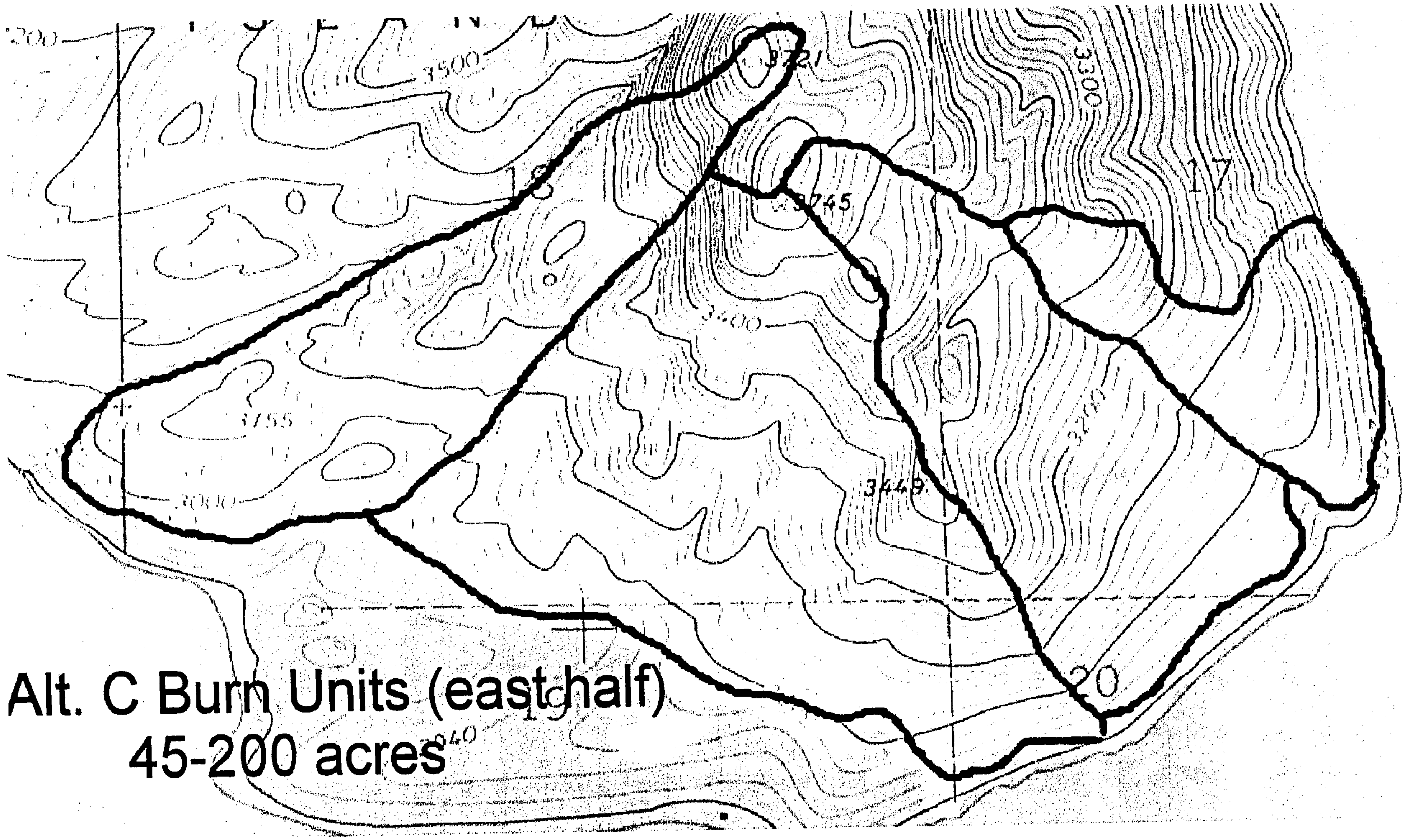


Priority Two Burn Unit: Alt. B


Priority Three Burn Unit: Alt. B
360 acres
3398
ISLAND
3200
3500
3500
3721
3000
13
18
3745
3400
3155
3000



Alt. C Burn Units (west half): 60-230 acres



Alt. C Burn Units (east half)
45-200 acres

APPENDIX E. Sample Fire Prescription for a Pine-encroached Grassland (*Courtesy of D. Hanna, The Nature Conservancy, Pine Butte Swamp Preserve, Choteau MT*)

PINE BUTTE SWAMP PRESERVE BURN PRESCRIPTION

1. LOCATION:

Preserve/Site: Pine Butte Swamp Preserve
Map Location: T25N R8W S3, S4
County/State: Teton County, Montana

Burn Unit: Nesbit East
Unit Area: 250 acres
Ownership: TNC

2. SOURCES OF EMERGENCY ASSISTANCE (location and phone #):

Fire: Teton County Fire Dept, Choteau, 466-5781 or 911
U.S. Forest Service, Choteau Ranger District, Choteau, 466-5341
Law Enforcement: Teton County Sheriff, Choteau, 466-5781 or 911
Medical: Teton Medical Center, Choteau, 466-5763; Teton County Ambulance 911; Mercy Flight air ambulance, Great Falls, 1-800-972-4000
Attorney: Patrick Ramos, Western Regional Office, 303-541-0332
Nearest Phone to Unit: Preserve Office, 466-5526

3. PERMITS AND OFFICIAL NOTIFICATIONS:

Burn Permit/Notification Required? Yes
Source(s): MT State Burn Permit from USFS, Brad McBratney or Norm Kamrud; Teton County burn permit from Teton County Sheriff.

Air Quality Permit/Notification Required? Yes
Sources(s): Handled through notification of Teton County Sheriff on day of burn.

Other Notifications Required? Yes
Sources(s): Teton County Sheriff 466-5781

4. NEIGHBOR NOTIFICATIONS:
e.g.:
Fred & Betsy Smith...........(phone)
Hank & Laura Jones......... (phone)
Joe & Bonnie White.......... (phone)

5. UNIT DESCRIPTION:

Vegetation Types	Fuel Models	% of Unit Area	% Slope	Exposure
Rough fescue grassland	1	85%	0-5	east
Limber pine savannah	2	15%	0-5	east

Total Duration 8-12 hr.

13. MANAGING THE BURN:

Firebreak preparations:
North, east and south lines will be mowed 10-12 feet wide. West line will be mowed 4 feet wide on unit side of two-track. North, east, and south mowed breaks will be blacklined.

Firing techniques and ignition pattern:
Ignition will be by hand with drip torches, starting on downwind line and proceeding in both directions around unit for ring-headfire pattern. Downwind lines and corners will be have at least 50 feet of black/road before main headfire is lit.

Crew communication:
Fire leader and crew will be in contact with five hand held radios, with an additional mobile radio in the pumper truck, and base unit at the preserve headquarters. Telephones to contact additional fire support from county crews are available at the preserve headquarters.

Fire behavior and weather monitoring:
NOAA weather radio will be monitored to determine potential burning conditions. On site weather will be taken at least every hour, or as necessary, beginning with arrival on site. Fire behavior will be initially assessed with a test burn.

Holding:
Fire will be held by backfiring off blacklines and two-track. Pumpers will be stationed as weather parameters require. All crew members will be instructed to watch for spotovers, and ignition will cease if spotovers occur. Special attention should be paid to the possibility of embers blowing off the ridge and over the eastern unit boundary. Any spotover will be attacked by the nearest crews, and the fire leader will assess the situation and direct suppression activities.

Fire sensitive areas or hazards:
Creeping juniper burns long and hot--juniper is throughout unit, with locally heavy coverage where grass fuels are light. Crew must be very careful where juniper is near or on line, and ensure juniper on line is extinguished as fire backs away from line. Limber pines and pockets of shrubs may also provide hot and extended burning conditions. Some small depressions may be wet enough to be impassible by vehicle.

Contingencies:
In case of escape, gravel county road 1 mile to the east and two-tracks to the north, south, and west are alternative holding lines. Unit is surrounded by continuous fuels with only localized breaks. Water is available from ponds in unit, or from preserve headquarters. If at any time the prospect for containment of an escaped fire with on-site equipment is poor, the Teton County Fire Department will be contacted for assistance.

Mop-up:
All hot spots within 25 feet of the perimeter of the burn will be extinguished. Additional mop-up will be completed as weather/fuel parameters require. Of particular importance is the potential for spotting from smoldering fuels if high winds occur.

Follow-up assignments:
At least one crew member will monitor the burn on-site until one hour after visible flames are out. Further on-site presence will be dependent on weather and fuel parameters. If high winds occur while fuels are still smoldering, on-site presence with suppression capability is required until winds subside or fuels burn out. At minimum, unit will be checked near the end of the day of burn and the following morning and afternoon for residual smoke. Preserve

APPENDIX B

Applied Fire Prescription For Proposed Project Area, Written with the assistance of Confederated Salish & Kootenai Tribes.

I. **Burn Unit Description**

Location: T 24N R 20W Sec. 18 Lat. 47 51 Long. 114 14
T 24N R 21W Sec. 13 Lat. ____ Long. ____

Size: 370 acres (with three sub-units)

Elevation Range: 3690' upper 3000' lower

Description of Boundaries:

Project is located on State of Montana, Montana Fish Wildlife and Parks land on the west portion of Wild Horse Island in Flathead Lake. Burn project location is approximately three airmiles east-southeast of Dayton and four airmiles northeast of Big Arm, MT.

Burn Unit Map Showing Vegetation Types or Fuel Models (Attach)

Slope(s) Flat to 10% on south and rolling 30 to 60% on north.

Aspect(s) Primarily south and west with minor southeast and north.

Vegetation Type	% of Burn Unit	Fuel Model
Native Bunchgrass	80 %	FM 1
P.Pine/Bunchgrass	20 %	FM 9

Canopy Configuration by Species:

Mostly open native grassland with widely scattered, mature ponderosa pine with minor pine and Douglas-fir encroachment seedlings and saplings in a FM1 (approx. 80% of area). Secondary component of native bunchgrass and pine litter with fairly dense, encroached pine sapling thickets that have an average canopy closure of 60 to 75% in a FM2 (approx. 20% of area). Very widely scattered pockets of pine blowdown and snags over total project area.

Canopy Heights by Species:

Mature Ponderosa pine and Douglas-fir vary in height from 40-75'. Oldgrowth Ponderosa pine has an average height of 80-100'. Douglas-fir and Ponderosa Pine understory is less than 20 feet in height with a scattered coverage of seedlings less than two feet in height.

Living and Dead Fuels: (Assess loadings pre- and post-burn by size classes, biomass, dead-to-live ratio, age classes, depth, etc. as applicable to fuel type)

Fuels are dominated by cured bunchgrasses with moderate pine needle litter in forested areas and very widely scattered downed logs and snags. Pine and Douglas-fir saplings are about 25 to 40 years in age. Dead to live ratio of ground fuels will be greater than 90 to 10%. Litter and duff depth is estimated at average 2-2 1/2" in FM 2. Natural downed/dead fuels is estimated at average 2-4 tons/acre (including litter).