HACKAMORE ECOSYSTEM RESTORATION AND ENHANCEMENT PROJECT

ENVIRONMENTAL ASSESSMENT

Modoc National Forest
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1. PURPOSE AND NEED FOR ACTION

This chapter identifies the proposed action, the project area, the purpose and need for the proposed action, the decisions to be made, applicable laws and regulations, public scoping, and the significant issues to be addressed.

A. Proposed Action

The proposed action is summarized below. A detailed description is contained in the description of Alternative 2 –Proposed Action, displayed in Chapter 2 of this document.

We propose to:

1. Thin approximately 16,500 acres of overstocked stands of ponderosa pine over about a five to seven year period. This includes the thinning involved in items 3 and 4 below.

2. Prescribe burn approximately 19,063 acres of pine stands over about a 10 year span and about 500 acres of decadent brush fields in three to four years, to obtain a earlier seral stage of brush and increase forage for deer.

3. Treat fuels utilizing prescribed fire and mechanical methods to protect four Bald Eagle nest stands from stand replacing wildfire. In addition, treat 2,830 acres of potential nesting habitat with a vegetative prescription designed to grow large diameter ponderosa pine, while maintaining existing large trees.

4. We also propose to treat eight northern Goshawk nest stands, utilizing thinning and prescribed fire, to accelerate stand development to late seral conditions; and to reduce the likliehood of stand replacing wildfire. Additionally, we propose to top approximately 2,000 existing snags over about ten years to prevent blow-down and therefore increase their longevity.

5. Obliterate approximately 42 miles of unsurfaced road, repair and stabilize 1 mile of the Bark Springs road.

6. Develop and enhance approximately 1,265 acres of wetland habitat. Install 10 guzzlers to provide alternative wildlife water sources.

7. Construct a picnic area adjacent to State Highway 139 for wildlife viewing and heritage resource interpretation at the Henski/Spaulding Wetland Complex.

These major points of action are coupled with specific constraints, adaptive management measures, and monitoring requirements displayed in detail in the description of

Alternative 2-Proposed Action . These include, but are not limited to; diameter constraints on trees removed from stands, basal area parameters, apparent bitterbrush mortality limits during prescribed burning , and thresholds for determining success of bitterbrush responses, and responsive action.

B. Scope of the Proposed Action

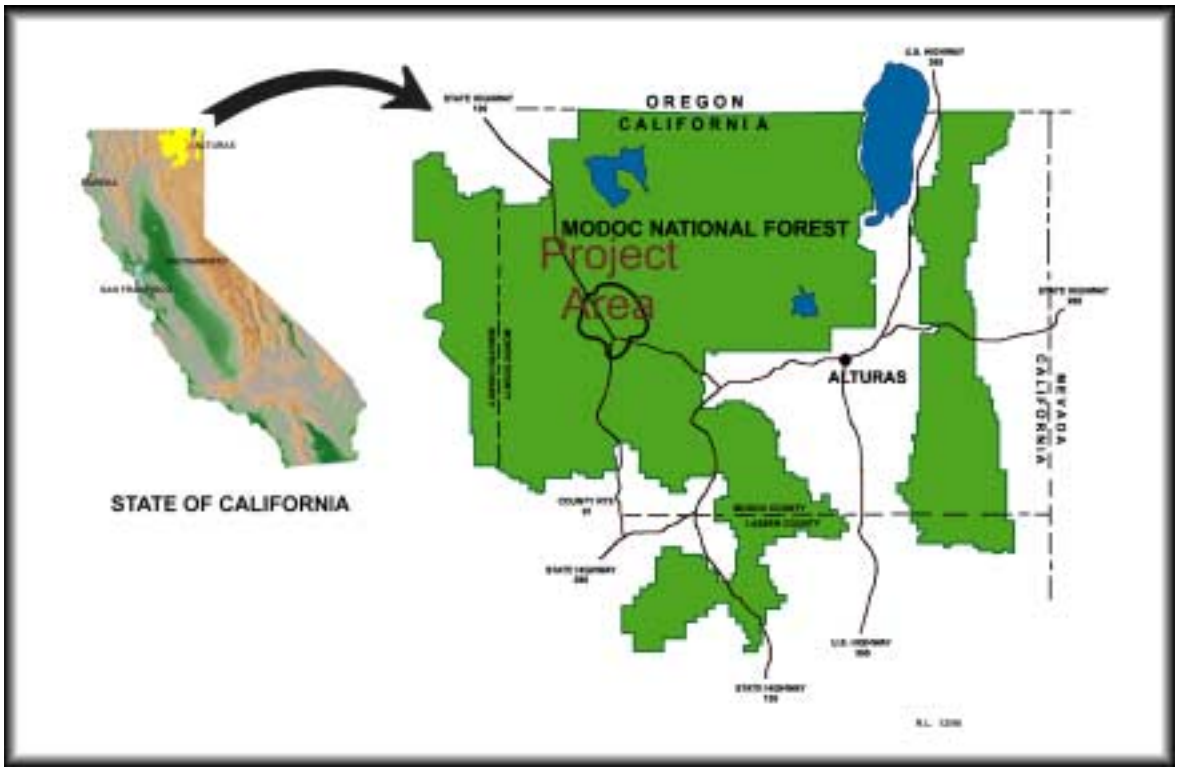
The scope of the proposed action includes the array of site-specific proposals shown above, configured over approximately 158,000 acres of National Forest System lands.

All practices are addressed together in this analysis because the timing and geographic location represent similar actions under 40 CFR 1508.25 (a) (3). Prescribed fire and thinning activities represent connected actions under 1508.25 (a) (1) (iii).

The scope of the proposed action was determined by looking at the proposed action and no action alternatives and their respective impacts (direct, indirect, and cumulative) as specified by the National Environmental Policy Act (NEPA) (40 CFR 1508.25 (c)).

C. Project Area

The Hackamore project area encompasses approximately 158,000 acres of the Devils Garden and Doublehead Ranger Districts on the Modoc National Forest, which lies in the far northeast corner of California.



In the context of the National Hierarchial Framework of Ecological Units, the Hackamore Project area lies within the Modoc Plateau section. The majority of the area encompasses the Mowitz Buttes sub-section while a smaller portion is predominately in the Devils Garden sub-section.

The area is primarily forested by eastside pine interpersed with sizeable sagebrush and juniper woodlands. Wetlands and reservoirs dot the landscape, providing abundant waterfowl habitat and notable fisheries.

The Hackamore Project area is defined by two distinct areas; the northern two-thirds is generally flat and drains north to Clear Lake and ultimately the Klamath River or internally to sumps and wetlands. The southern end is dissected by several steep drainages that flow directly to the Pit River.

Those drainages flowing south to the Pit River provide for the endangered Modoc Sucker, while the drainage that flows north is habitat for the endangered shortnosed sucker. The eastside pine which dominates the forested portion of the area, hosts substantial populations of goshawks and bald eagles; and provides important fall transition range for the Interstate Deer Herd.

State Highway 139 bisects the project area providing ready access to featured recreation sites such as Cottonwood Flat and Howard's Gulch campgrounds, and Duncan and F Reservoirs. An expansive road system, consisting of surfaced and low standard roads, provides access to an array of dispersed recreation opportunities.

D. Purpose and Need

The purpose of the proposed action is to implement the direction and objectives of the Forest Plan (including compliance with, applicable laws, regulations, and policies) in carrying out the proposed activities. More specifically, the purpose and need for the proposed action is as follows:

1. To reduce potential for high intensity stand replacing fire which would put important wildlife habitat (eg. old growth pine stands and bitterbrush fields) and capital investments (eg. plantations) at high risk.

   The **need** for action is clearly demonstrated in the current configuration of fuels in the analysis area. Recent fuels modeling indicates that approximately 96,406 acres, or 61% of the 157,939 analysis area, currently has vegetation configurations conducive to extremely or highly intense fire behavior. In addition, the area has about 53,813 (34%) in a condition that is characterized as producing moderate fire behavior.

   Further, the Hackamore area is moderately prone to lightning and human caused fires as evidenced by historic fire occurrence data which records 714 lightning caused, and 189 man caused ignitions between 1911 and 1998.

The predicted effectiveness of each alternative in reducing the potential for stand replacing wildfire will be measured by expected changes in the intensity of fire behavior and in probable fire size.

2. To create more sustainable and diverse forest conditions, while maintaining and developing late-seral old growth stands. This action is **needed** to correct an imbalance that exists in age classes of the ponderosa pine stands, which may in the long term inhibit the sustainability of a healthy, diverse forest. Seral stages represent age classes that a forest stand will naturally progress through as it matures to old growth. This progression or succession is discussed in depth in Chapter 3 of this document. As indicated below, the greatest imbalance lies in the later seral stages, therefore focusing the need for action on seral stages three and four. The objectives for seral stage distribution are displayed below. The objectives for seral stage distribution shown below roughly represents the balance necessary to sustain the forested ecosystems in the Hackamore area over time.

Seral Stage	Current Condition	Objective
Seral Stage 1	4%	5%
Seral Stage 2	12%	14%
Seral Stage 3	55%	28%
Seral Stage 4	29%	52%

3. The Hackamore area contains over 500 miles of roads. Approximately 25% of the sections in the analysis area have a road density greater than 2.5 miles/section guideline specified in the Modoc National Forest Land Management Plan. Some of these roads exhibit erosion problems and are no longer or seldom used. The **purpose** arising from this condition is to eliminate or repair and stabilize roads exhibiting erosion problems, and to eliminate unnecessary roads that are seldom used, to help in reducing average road density to a level below the 2.5 miles/section guideline.

4. Numerous opportunities exist to enhance deer, goshawk, eagle and waterfowl habitats and interpretative/educational opportunities. Refer to the descriptions of the alternatives in Chapter 2 for details.

E. Decisions To Be Made

This Environmental Assessment (EA) is tiered to the Modoc National Forest Plan, This analysis is more site-specific and the management practices are designed to achieve the goals and objectives of the Forest Plan.

Within the context of the Forest Plan decisions, an interdisciplinary team (ID Team) of resource specialists evaluated management opportunities and needs in the project area, framed a proposed action, formulated alternatives, estimated environmental consequences; and evaluated and compared the alternatives.

The decisions needed are:

- To implement the action as proposed or to select the No Action Alternative.

- To determine if the action may have significant environmental effects therefore requiring an Environmental Impact Statement

This assessment is not a decision document. Rather, it discloses the environmental consequences of implementing the proposed action and alternatives to that action. A Decision Notice signed by the Forest Supervisor after completion of the assessment, will document the decisions made as a result of this analysis.

F. Laws and Regulations

This Environmental Assessment was developed under the implementing regulations of the National Environmental Policy Act (NEPA), Council on Environmental Quality, Title 40, Code of Federal Regulations, Parts 1500 –1508; and the National Forest Management Act (NFMA), Title 36, Code of Federal Regulations, Part 219. This federal action requires compliance with Section 7 of the Endangered Species Act, section 106 of the National Historic Preservation Act, the Clean Water Act, and Executive Order 12898 on environmental justice.

G. Public Involvement

Prior to initiation of NEPA with distribution of a proposed action, an informal public field trip was conducted of the Hackamore project area, in April of 1999. An array of interested public attended, including local government representatives, Tribal government representatives, Fish and Game Commission personnel, timber industry representatives, Modoc High School Academy students, and local Forest Service personnel.

The interdisciplinary team used the information gained in the field trip to refine the purpose and need, and to formulate a proposed action.

Articles to inform the public about the proposed action were published in the Modoc Record and the Klamath Herald and News, in July of 1999. Scoping letters were mailed to approximately 230 individuals, and environmental, professional and multiple-use organizations, Tribal governments and other government agencies. Subsequent field trips, which focused on specific actions or issues, were held with the U.S. Fish and Wildlife Service, California Fish and Game, the Modoc County Land Use Committee, and the California Wilderness Coalition. Government-to-government consultations were conducted with representatives of local tribal governments.

Ten comments were received during this scoping effort. Three from interested individuals, three from special interest groups, one from a federal agency, one from a state agency, one from local government, and one from tribal government.

Issues identified during review of these responses have been incorporated into the analysis document. Specifically, the Proposed Action was modified to respond to these issues.

H. Significant Issues

Significant issues, as defined under 40 CFR 1501.7(a)(2), guided the range of alternatives as they were developed, and prompted refinements to the proposed action. The issues focused the environmental disclosure on site specific, direct, indirect, and cumulative effects that may occur under the alternatives. Other impacts and concerns were also analyzed and summarized as they related to the proposal as directed under CFR 40 1501.7(a) (3). Three significant issues were identified in the ID Team and public scoping process:

1. Several commentors took issue with the expansive application of prescribed fire; and the potential for adverse effects on important wildlife habitat, in particular the bitterbrush that exists throughout the area as an under-story component of the ponderosa pine stands.

This issue reflects the concern that while prescribed fire may emulate natural processes and therefore may have great value in creating sustainable pine stand conditions, it also carries with it, the risk of eliminating the bitterbrush understory component.

The Hackamore area is noted as being a fall transition range, and an area, that in mild winters, may serve as winter range for the Interstate Deer Herd. The bitterbrush understory represents a component crucial to the health and perpetuation of the Interstate deer herd.

Indices that will used to predict and compare environmental impacts relative to this issue are:

- Predicted short-term mortality of bitterbrush on fire treated acres.
- Predicted long-term mortality of bitterbrush on fire treated acres.

2. Two respondents supported the stated goal of maintaining and developing late seral/old growth pine stands. Both however, suggested that thinning designed to produce timber volume rather than maintain and accelerate development to late seral; may be deleterious to the stated objectives.

Indices that will be used to predict and compare environmental impacts relative to this issue are:

- Predicted seral stage status.
- Maximum diameter of trees removed
- Residual basal area in treated stands

3. Two respondents took issue with the proposal to obliterate approximately 42 miles of forest road. Their concerns centered on the impacts to recreation and fire suppression access.

Indices that will be used to predict and compare environmental impacts relative to this issue include:

- Predicted effects on recreational opportunities
- Predicted effects on wildfire suppression effectiveness
- Predicted changes in average road density

2. ALTERNATIVES CONSIDERED

A. Alternative Descriptions

1. Current Management (Alternative 1)

Current management is the No Action Alternative. This would include continuation of permitted grazing activities, fire suppression efforts, road maintenance, and fulfillment of those obligations expressed in KV plans associated with previous timber sales decisions. Specifically these previous decisions include:

- Pre-commercial thin 3510 acres
- Site prep. and plant 1615 acres
- Mahogany thinning 30 acres
- Seeding bitterbrush 350 acres
- Planting bitterbrush 200 acres
- Snag topping 245 trees

2. Proposed Action (Alternative 2)

A. Summary

The Proposed Action includes all actions displayed in Alternative 1.

Thin approximately 16,500 acres of overstocked stands of ponderosa pine over about a five to seven year period. This acreage includes goshawk and eagle treatments discussed below. (See Figure 1.)

Prescribe burn approximately 19,063 acres of pine stands over about a 10 year span and about 500 acres of decadent brush fields to obtain a early seral stage of brush and increase forage for deer. (Figure 2)

Treat fuels utilizing prescribed fire and mechanical methods to protect four bald eagle nest stands from stand replacing wildfire. In addition treat 2,830 acres of potential nesting habitat with a vegetative prescription designed to grow large diameter ponderosa pine, while maintaining existing large trees.

We also propose to treat eight northern Goshawk nest stands, utilizing thinning and prescribed fire, to accelerate stand development to late seral conditions; and to reduce the likelihood of stand replacing wildfire. Additionally, we propose to top approximately 2,000 existing snags over about ten years to prevent blow-down and therefore increase their longevity.

Obliterate approximately 42 miles of unsurfaced road, repair and stabilize 1 mile of the Bark Springs road. (See Figure 3)

Develop and enhance approximately 1,265 acres of wetland habitat in the Hackamore project area. (Figure 4)

Construct a pull-off adjacent to State Highway 139 for wildlife viewing and heritage resource interpretation at Henski Reservoir. (Figure 4)

B. Thinning Activity Detail

Thinning Prescriptions

The **"Revised Interim Old Growth Definition for Interior Ponderosa Pine (SAF 237) in Northeast California"** (S. Smith, Zone 2 Ecologist, USDA Forest Service, Dec. 1991) provides a useful ecological definition for LS/OG that's based on field observations of vegetation structure and composition. Data were derived from over 300 plots in minimally disturbed LS/OG ponderosa pine aggregations (approx. .5-1 acre clumps) in a variety of environments on the Modoc, Klamath, Lassen, Plumas and Tahoe National Forests. These guidelines and definitions are the best source of information available to describe structure and composition in LS/OG ponderosa pine on the Modoc Plateau.

What this study doesn't provide however, is information on either fine or broad-scale spatial characteristics of LS/OG pine. This sort of information is extremely useful for preparing prescriptions designed to develop LSOG forest characteristics. Recent retrospective studies in fire-maintained pine stands in eastern Washington found that significant clumping at fine scales (0-15 meters) existed historically and that this was likely due to the xeric (dry) nature of the site and limited seedling establishment which results in larger openings between clumps of trees. This is consistent with the process of stand development in fire-maintained eastside pine, where seedlings are established in a patchy fashion as a result of frequent fire or hot-spots that result from fuel accumulation where patchy mortality has occured. It is likely that historical (assumed to be sustainable, and therefore desirable) LS/OG pine stands at Hackamore had similiar spatial characteristics. These stands exhibited significant clumping, as opposed to possessing a continuous or closed canopy of large old trees. Silvicultural prescriptions at Hackamore will be designed to maintain the clumpy nature of these stands.

The guidelines shown below in Table 2D., from the "**Revised Interim Old Growth Definitions**" will be used to develop stand management prescriptions for LS/OG on R-5 site class 4 and 5 in the Hackamore area.

TABLE 2D. Characteristics of Old Growth Interior Ponderosa Pine Forests in Northeastern California (from Revised Interim Old Growth Definitions for Ponderosa Pine, December 1991)

1. LIVE TREES IN MAIN CANOPY

total trees per acre $\geq$ 21" DBH	16 - 36 trees
average stand basal area	90 -150 ft^2/acre

2. VARIATION IN TREE DIAMETERS

At least 2 of the following diameter classes are present:

1-4"; 5-10"; 11-14"; 15-20"; 21-28"; 29-38"; 39"+.

3. DEAD TREES*

snags	2 per acre (RM 217)
logs	5 per acre (LMP Soils S&G)

*Modoc LRMP requirements and RM 217 guidelines for goshawk provide more specific data for snag and log numbers than the "Revised Interim Old Growth Definitions"

4. DECADENCE

snags	$\geq$ 2 per acre.

5. NUMBER OF CANOPIES $\geq$ 1.

6. TOTAL CANOPY COVER 35% - 65%.

This project proposes thinning on approximately 16,500 acres, or about 19% of the commercial conifer stands in the Hackamore Analysis Area. See Figure 1 for

thinning areas. This will enhance long-term development, distribution and maintenance of LSOG stands. Treatments would be encompass in and around approximately eight northern goshawk territories, protecting and developing critical nesting, post-fledgling family and foraging habitat. This proposal also includes, through thinning and prescribed fire, the development of approximately 2000 acres of bald eagle nesting and roosting habitat, as well as osprey nesting habitat. Thinning would be located where it could strategically provide, in conjunction with prescribed burning, reduced risk of fire in critical habitat, LSOG stands, significant heritage resources and capital investments.

Four general prescriptions have been developed to meet LSOG and eagle habitat objectives. Thinning prescriptions are designed to maintain or develop LSOG and eagle nesting and roosting habitat by altering stand density, diameter distribution, composition, and spatial arrangement of trees. This could include removal of pine and juniper trees up to 21" in diameter in LSOG stands and trees of all sizes in eagle stands. Prescriptions could be slightly altered or detail added as site specific conditions warrant, specifically with regard to outbreaks of either insects or disease, where resulting mortality could affect achievment of term stand objectives.

Specific stands would be selected for treatment and prescriptions prepared with the long-term objective of creating a mosaic of age classes and density conditions well distributed across the landscape, that meet habitat needs, particularly for the northern goshawk and mule deer.

After harvest, basal area and numbers of trees left per acre as well as their spacing would vary stand-to- stand, depending upon site quality, stand age, desired rate of development of large diameter trees and desired stand structure and conditions. Following commercial harvest, all stands will be evaluated with respect to objectives and need for follow-up precommercial (trees less than about 8" diameter) thinning. Where significant small tree stocking and fuel ladder still exist, excess of what's desirable for deer cover and structural diversity, stands will be precommercially thinned.

1. Late Seral/Old Growth Stands

There are approximately 25,900 acres of LS/OG seral stage 4 stands in the Hackamore Analysis Area. A portion of these will be managed specifically to develop goshawk habitat to include roughly 2,800 acres nesting habitat and 5,500 acres of post fledgling family area (PFA). Approximately 37% of the PFA is being proposed for thinning at this time. PFA prescriptions fall under the general LS/OG stand prescriptions. The objective in these stands is to increase the vigor and longevity of large trees, as well as increase growth in the aggregations of smaller trees, accelerating their development into LS/OG. Current levels of stocking predispose LSOG to insect and disease related mortality.

Over the long term these stands should be comprised of LSOG groups and scattered large trees set in a mosaic of groups of several size (age) classes of younger trees and scattered natural openings. Average total canopy cover in the stand should range

between 35-60%, though the upper end of this range will rarely occur except in small groups because of open nature of eastside pine stands. Stands will be managed to support approximately 16-36 trees per acre greater than 21 inches in diameter, with average stand basal areas between 100-140 ft² per acre. Stands will be managed to maintain or develop coarse woody debris (snags and logs) and decadence as described in Table 2D.

LSOG stands are typically comprised of 2 aggregations; either multiple storied groups or even-aged groups, patterned in a mosaic across the stand. Groups of trees with diameters ranging from about 8-13.9 inches will be thinned to a residual basal area of about 80-100 ft² per acre. Trees from 14-18 inches DBH would be thinned to about 100-120 ft² per acre. LSOG groups, with trees mostly above 18" DBH would be thinned, removing only suppressed and intermediate trees. Residual basal areas would be as high as 160+ ft² per acre in LSOG clumps. Under all thinning scenarios trees less than 21" DBH, with poor crown and growth condition could be harvested where they are in excess of decadence guideline Table D, and where their removal would increase growth or vigor of an adjacent tree. Under all thinning scenarios, trees 21" and greater would not be harvested, except in bald eagle nesting and roosting habitat where trees greater than 21 inches in diameter would only be removed to meet specific habitat objectives, as discussed in Item 3 below.

2. Goshawk Nest Stands

The Hackamore Analysis Area contains all or portions of 14 goshawk territories. Within each territory we will manage a two hundred acre nest stand. We are currently proposing to thin approximately 40% of nine nest stands in the Hackamore Area. The objective in these stands is to increase the vigor and longevity of large trees, increase growth in the aggregations of smaller trees, accelerating their development into LS/OG, as well as reduce the density of small trees encroaching into the upper canopy in LSOG groups. Over the long term we want to develop more LSOG groups and scattered large trees set in a mosaic of groups of several size (age) classes of younger trees and scattered natural openings. Average total canopy cover in the stand should range between 35-60%, though the upper end of this range will rarely occur except in small groups because of open nature of eastside pine stands. Stands will be managed to support approximately 25-35 trees per acre greater than 21 inches in diameter, with average stand basal areas between 120-160 ft² per acre. Stands will be managed to maintain or develop coarse woody debris (snags and logs) and decadence as described above in the "Interim Guidelines, Table 2D.

These stands are typically comprised of two aggregations, either multiple storied groups or even-aged groups, patterned in a mosaic across the stand. Groups of trees with diameters ranging from about 8-18 inches will be thinned to a residual basal area of approximately 100-120 ft² per acre, removing intermediate or suppressed. LSOG groups with trees mostly above 18" DBH would be thinned removing only suppressed and intermediate trees. Residual basal areas would be as high as 160+ ft² per acre in LSOG clumps. Maintaining LSOG in a grouped configuration with interlocking, or at least touching crowns is desirable. Under all thinning scenarios

trees less than 21" DBH, with poor crown and growth condition could be harvested where they are in excess of decadence guideline (above) and where their removal would increase growth or vigor of an adjacent tree. Under all thinning senarios, trees greater than 21" DBH would not be harvested.

3. Bald Eagle and Osprey Nest Stands

Approximately 1500 acres have been identified in the Hackamore Analysis Area to develop bald eagle and osprey nesting and roosting habitat. These are fairly isolated, lower site stands with substantial in-growth of juniper and small pine creating a fuel ladder in the understory. The objective in these stands is to develop and maintain approximately 8 large dominant trees per acre greater than 32" in diameter for nesting bald eagle and osprey. To achieve this, we would remove trees of all sizes, leaving the largest thick-branched 18-20 trees per acre. Smaller trees in the vicinity of these large trees that contribute to risk of crown fire will be removed.

4. SS2 and Small Diameter SS3 Stands/Aggregations

Seral Stage 2 and 3 don't often occur as large extensive stands, but rather as small aggregations within larger stands in the Hackamore area. With management, these areas have the potential to develop into LSOG in 80-100 years. Stocking control through thinning will ensure that SS2 ans SS3 stands are recruited to replace currently existing LSOG. The objective is to increase or maintain stand health and accelerate growth, while developing desirable LSOG characteristics . Stands would be thinned to residual basal areas ranging from 60-100 ft^2 per acre, with an emphasis on variable spacing and development of future groups of LSOG. Generally the lower end of the basal area range would be applied where stand diameters are smaller, ranging from 8-14" DBH, while the higher end of the range would be applied between about 14-16" DBH. Thinning will leave the best and healthiest trees as well as maintain or recruit snags and down logs. Thinning will not inappropriately simplify stands by removing layers or structural components, or creating uniform stocking levels.

Thinning Activity Management Constraints and Monitoring Items

Beyond those management constraints incorporated in the thinning prescriptions above, two additional measures were identified to reduce the potential for residual effects on wildlife:

- No more than 50% of Northern Goshawk nest core stands will be treated (thinning or fire) within the decade.
- Limited Operating Periods will be established for all nest cores.
- Cover areas will be provided in PFA’s (25% to 35%)

C. Prescribed Fire Activity Detail

Action

Using low-moderate intensity prescribe fire, burn approximately 19,063 acres of pine stands over about a ten year span to reduce fuels hazard; and about 500 acres of decadent brush fields to obtain a lower seral stage of brush and increase forage for deer. Please see Figure 2 for treatment area locations and tentative scheduling.

Management Constraints and Monitoring Items

- A maximum of 2,000 acres per year will be burned.
- A maximum of 60% **apparent** mortality will be allowed on bitterbrush during the prescribed burning.
- No more than 10% of any Northern Goshawk post fledgling area (PFA) will be burned in any given year. A maximum of 60% apparent mortality on bitterbrush will be allowed during prescribed burning.
- No more than 40% of Northern Goshawk nest core stands will be treated (thinning or fire) within the decade, and a 3-5 acre buffer around each nest within a territory, prohibiting thinning activities will be established.
- Limited Operating Periods will be established for all nest cores, or within ¼ mile of occupied.
- Reduce coarse woody debris 0-3" in diameter, 30% to 70%.
- Scorch understory brush and herbaceous vegetation no more than 70%.
- Prescribed burning will be planned and implemented to ensure no more than 15% conifer mortality in thinned stands, and 25% conifer mortality in unthinned stands.
- Given the mortality allowance shown above, prescribed burns will scorch no more than 30% of the live crowns of all remaining trees greater than 8" dbh.
- Where they exist protect all snags greater than 15 inches dbh
- Where they exist, retain a minimum of 5 logs (at least 20 inches dbh at the large end, and 10 feet long), per acre.

Adaptive Management Measures/Monitoring Thresholds

Bitterbrush health and vigor has emerged as a significant issue in the Hackamore analysis process, particularly in relationship to the prescribed burning aspect of the proposal. The relationship between bitterbrush and fire is complex and extremely

variable. For these reasons, a number of contingencies have been incorporated into this alternative action to ensure perpetuation of healthy and vigorous stands of bitterbrush. These include:

- A 60% apparent mortality threshold on bitterbrush during burning. Operations will cease if more than 60% of the bitterbrush on any given burn area is scorched during the burning operation.
- Burn prescriptions will be adjusted for the following year burn, to accommodate the findings of the 60% threshold monitoring.
- Monitoring of bitterbrush stands would occur at the third-year juncture. If no evidence of resprouting, rodent caches, or seedlings exist on stands that were burned, then the responsible offical would be required to initiate replanting or reseeding of bitterbrush. If evidence of reproduction does exist the reponsible official would have the discretion to initiate replanting at that time; or if enough evidence of successful regeneration exists, they may defer decision to the next monitoring juncture.
- The fifth-year after burning, is the next monitoring and decision juncture. If previously burned stands of bitterbrush do not demonstrate success at 700 stems/acre (+/- 10%), the responsible official will be required to initiate replanting or reseeding of bitterbrush.

D. Transportation System Activity Detail

This alternative proposes to obliterate 42 miles of unsurfaced road as shown in Figure 3. Additionally, we propose to repair and upgrade approximately one mile of the Bark Springs road which is currently demonstrating erosion problems. Obliteration will be accomplished by a combination of ripping, recontouring where necessary, seeding, and traffic barriers, where necessary to allow re-establishment of vegetation.

E. Wetland Development Activity Detail

We would develop and enhance approximately 1,265 acres of wetland habitat in the Hackamore project area. (See Figure 4)

Deadhorse Flat Reservoir (440 acres)

Reconstuct existing dam to meet current standards
Install concrete spillway
Install headgate in dam
Construct 35 waterfowl nesting islands
Excavate about ½ mile of canals to create natural islands from existing peninsulas
Construct fences around islands subject to livestock use.

Whitney Reservoir (395 acres)

Construct dam, concrete spillway, and headgate.
Excavate potholes and shallow canals within the wetlands basin to create diverse water depths
Construct 40 waterfowl nesting islands

Hackamore Reservoir (128 acres)

Construct 10 waterfowl nesting islands
Excavate shallow potholes and canals to create natural islands and diverse water depths
Divert spillway overflow into Whitney Reservoir through the railroad grade

Duncan Pond (45 acres)

Install headgates on existing culvert on road crossing
Construct 7 waterfowl nesting islands

South Bay below Duncan Reservoir (40acres)

Construct 7 waterfowl nesting islands

Excavate shallow potholes and canals within the basin to create diverse water depths

East Bay Reservoir F (200 acres)

Construct 15 islands
Excavate canals to create natural islands
Construct one small weir
Construct island fencing control livestock use.

F. Henski Wetland Wildlife Viewing and Heritage Resources Interpretive Site Development

Construct:

A pull off and wildlife viewing area at Henski Reservoir, immediately adjacent Highway 139 as located on the attached map.

Acceleration and deceleratrion lanes on Highway 139, approximately 1,500 feet.

Gated access road for winter closure, approximately 200’.

Parking area suitable for 10 RV type vehicles at one time

Acessible vault toilet

6 day use picnic tables

Public information kiosk

Surfaced, wheelchair accessible, self- guided trails for wildlife, archeology, and timber management interpretation, approximately 1 mile.

Two raised wildlife viewing platforms with connecting trails.

Replace 3 existing snags near wildlife viewing platforms

Construct approximately 1 mile of barbed wire fence to exclude livestock grazing within the Henski wetland.

Construct rail fence along highway right-of -way, approximately ¼ mile

Construct pad and facilities for volunter host to occupy.

B. Alternative Comparison

The following summarizes the estimated effects, described in Chapter III, in terms of projected conditions for the two alternatives, in relation to the purpose and need, and the three significant issues identified.

ISSUE	NO ACTION ALTERNATIVE	PROPOSED ACTION ALTERNATIVE
Prescribed fire effects on bitterbrush	None	Short-term mortality on bitterbrush of up to 60% on 2,000 acres annually or a total of 19,000 acres over a ten year span. Long-term effects – no net loss of bitterbrush expected
Thinning effects on late seral status	None to negligible effects	Achieve late seral size trees in SS3 stands on 16,500 acres, 50 years earlier than a no thinning scenario. In addition, the thinning and prescirbed burning will reduce the acreage that

		demonstrates extreme and high intensity fire behavior by 34%, therefore substantially lowering the risk of stand replacing wildfire to the SS3 and SS4 stands. A maximum diameter limit of 21" established on all thinning with exception of bald eagle habitat (1500 acres). Residual basal areas vary by thinning prescription, See page 9,Thinning Activity Detail.
Road obliteration effects on access for recreation and fire suppression	None	None to negligible. Average road density reduced from 2.7 miles/section to 2.3.

C. Other Environmental Considerations

Adverse Effects that Cannot be Avoided

There is an unavoidable increase in short term risk to bitterbrush inherent to prescribed burning.

There is unavoidable short-term soil disturbance associated with the thinning, road obliteration, and wetland development activities.

Irreversible and Irretrievable Commitments of Resources

The Proposed Action will not result in any irreversible commitment of resources. However, once trees of any size class are removed, it is an irretrievable commitment; they cannot be replaced immediately, but others can and will grow in time.

Relationship Between Short-Term Uses and Long-Term Productivity

The Proposed Action was developed to improve the long term productivity and sustainability of the Hackamore Area. The activities the Proposed Action Alternative will not impair the long-term productivity of the site.

3. **ENVIRONMENTAL CONSEQUENCES**

This chapter describes the effects from implementing the alternatives described in Chapter 2 . Direct, indirect and cumulative effects are woven throughout the discussion. Existing conditions and assumptions used, are discussed when they are meaningful in providing insight to the impacts associated with the alternatives.

ENVIRONMENTAL CONSEQUENCES RELATED TO SIGNIFICANT ISSUES

A. Forest Seral Diversity and Sustainability

Effects

Under the Proposed Action Alternative, we would achieve LS/OG size trees in our SS3 stands on 16,500 acres, approximately 50 years earlier than under a no-thinning senario. In addition, the reduced fire risk would substantially increase the likelihood that the SS3 stands would continue to develop into LS/OG SS4; and SS4 stands would be maintained.

Recent fuels modeling indicates that approximately 96,406 acres, or 61% of the 157,939 acre analysis area, currently has vegetation configurations conducive to extremely or highly intense fire behavior. In addition, the area has about 53,813 (34%) in a condition that is characterized as producing moderate fire behavior. (see Figure 9)

With approximately 3500 acres of thinning, the Current Management Alternative would have only a negligible reduction in fire intensity. The Proposed Action Alternative, through a combination of thinning and prescribed fire, would reduce the acreage in extreme and high fire behavior classes from 96,406 acres to 63,611 acres, representing a 34% reduction. (Figure 10)

Current Condition Discussion and Modeling Assumptions

Within the Hackamore Analysis area there is currently a notable imbalance in the distribution of seral stages of forested lands. (see Figure 5) A managed balance of age classes, either within a given stand or across a landscape, is necessary if our goal is to sustain this forest ecosystem over the long term. Table 3A, below, displays the current situation and the long range objective, expressed as a percentage of the landscape, for forest seral-stage distribution in Hackamore. The long range figures represent a rough balance of the age/size classes of trees that would sustain the forested ecosystems within the analysis area over time. This model is based upon several assumptions:

- **Forest stands are dynamic** Precluding management to the contrary or some unpredicted event, even-aged forest stands, as well as individual trees or cohorts

within uneven-aged stands, evolve over time, growing from one seral stage age/size group to the next larger age/size group. Stages 1-4 Table 3A, are somewhat arbitrary groupings of tree size (proxy for age), derived from Wildlife Habitat Relationship Seral Stage model used to represent seral stages (SS) in the Hackamore area.

- **Stand density affects growth.** Within forest stands the degree of competition between trees, often refered to as stocking level, affects the rate of progression of stands or individual trees through seral stages, and ultimately affects the recruitment of stands of large diameter trees (seral stage "4"). Currently we are deficit in SS4, and overstocking in the SS2 and SS3 stands has resulted in very slow recruitment of SS4. Degree of competition between trees will also affect a tree's vigor and ability over the long term to resist insects and disease. Under managed conditions at Hackamore, utilizing thinning, we could achieve desired large tree size in most stands by about 120 years.

- **Managed stand development timeline.** Late seral/old growth (LSOG) stands have both a form and a function component. Form can be described with measurable parameters, such as average stand diameter, basal area/acre, stand structure, snags and coarse woody debris. Desired form can be developed over time with stand specific prescriptions that address these parameters. Function is a much less tangible component, having more to do with how these parameters interact through time (stand age) and space to form habitat and a sustainable ecosystem.

  The following is a very general timeline indicating approximate number of years it would take a typical managed stand at Hackamore to move through the seral stages 1 through 4, eventually developing old growth form, and hopefully function. Based on local experience, most managed stands can conservatively achieve tree diameters of 24" by age about 120 to 140 years at Hackamore. The model used to estimate our long range seral stage balance objectives in Table 3A., assumes that stands of large trees (24"+ DBH) will serve as functional LSOG forest for approximately 160 to 170 years before being regenerated and transitioning back to early seral to cycle through the process again.

  The timeline and associated growth assumptions allow us to estimate the number of acres needed in the long term by seral stage to perpetuate a forested ecosystem shown in Table 3A. below .

Managed Stand Development Timeline

The timeline below demonstrates the number of years it would take, utilizing thinning, to develop a LSOG stand from SS1 through SS4. Below each seral stage heading is a conservative estimate of the number of years a stand or aggregation would exist before transitioning into the next larger seral stage, e.g., for a SS2 stand, with a mid-point diameter of 5 inches, it would take approximately 40 years for this stand to transition to

SS3 size. The model and timeline below assume a life-span (rotation) of 300 years for LSOG stands**.**

SS1 Seedling <1"dbh	**SS2** sapling/pole 1-11"dbh	**SS3** small trees 12-24"dbh	**SS4** med/lrg trees >24"dbh	**SS4** large old growth trees >24"dbh
15 years	40 years	80 years	50 years	115 years

0	15	55	135	185	300
age	yrs.	yrs.	yrs.	yrs.	yrs.

TABLE 3A. Current Condition and Long Range Objective for Seral Stage Distribution for the Hackamore Landscape Expressed in Percent and Number of Acres by Seral Stage

	Current Condition		**Long Range Objective**	
	% of landbase -- approx acres		% of landbase -- approx acres	
seral stage 1 (<1" dbh)	4%	3,200 ac	5%	4,300 ac
seral stage 2 (1-11" dbh)	12%	10,400 ac	14%	12,200 ac
seral stage 3 (11-24" dbh)	55%	47,600 ac	28%	24,400 ac
seral stage 4 (>24"dbh)	29%	25,900 ac	52%	45,300 ac

Comparing current condition to the long-range objectives Table 3A, shows an obvious deficit of SS 4 (late-seral/old-growth) and an excess of SS 3. This is largely the result of the past practice of overstory removal. In addition to the deficit/excess problem at Hackamore, stand diameters in SS3 and SS4 tend to be on the lower end of the diameter range, i.e., SS3 stands have an average stand diameter in the neighborhood of 12 inches; and in SS4, though there are a significant number of 24 + inch trees in these stands, there

is also an extensive matrix of dense smaller trees that comprise the majority of stocking in most of these stands.

Thinning will not only accelerate the development of large trees, but will also accelerate the continueous progression of all stands and trees through the growth cycle. Thinning in SS4 will:

1) accelerate growth and development of small trees to large trees in the matrix of small trees surrounding the LS/OG aggregations and maintaining tree resistance to insects and pathogens .

2) prolong the life of LS/OG by providing more water and nutrients there-by maintaining or improving resistance to insects and pathogens.

Thinning in SS3 will:

1) accelerate growth and development of large trees and maintain resistance to insects and pathogens.

The number of acres in seral stages 1 and 2 are fairly close to our long range objective. Thinning in this age/size class will maintain the balance and assure steady progression along the stand development continuem.

Thinning will also reduce the risk of losing stands through stand replacing fire by reducing the fuel ladder and creating spaces between tree crowns. Table B. provides a comparison of tree growth with and without proposed thinning.

Table 3B. Estimated Tree Size with and without Thinning at 20, 50 and 100 Years from Now.

	Seral Stage					
SS1	SS2		SS3			
	thin	no thin	thin	no thin	thin	no thin
mid point DBH						
at present time:	.5 in.		7 in.		14 in.	
20 yrs from now:	4-8 in.	2-4 in	11-14 in.	9-11 in.	18 in.	16 in.
50 yrs. from now:	10-14 in.	5-7 in.	15-18 in.	12-14 in.	22 in.	18 in.
100 yrs from now:	17-21 in.	10-15 in.	22-26 in.	16-18 in.	28 in.	22 in.

Estimated tree size 20, 50 and 100 years from now with thinning and without thinning are based on Table 3C., average radial growth estimates that reflect our local experience.

Actual growth response however, is largely dependent upon site capability, the degree of thinning and the size and health of individual trees.

Table 3C. Average Estimated 10 year Tree Diameter Growth with and without Thinning

Tree Diameter Range	Thinned	Unthinned
1-14 inches	2 inches	1 inch
14-20 inches	1.5 inches	.8 inch
20 inches and greater	1.2 inches	.6 inch

As noted above, the other element key to seral stage diversity and sustainability is risk of wildfire.

The Hackamore area is moderately prone to lightning and human caused fires as evidenced by historic fire occurrence data which records 714 lightning caused, and 189 man caused ignitions between 1911 and 1998. (See Figures 6 and 7) Figure 8 displays large wildland fires on the Hackamore area since 1911.

Recent fuels modeling indicates that approximately 96,406 acres, or 61% of the 157,939 acre analysis area, currently has vegetation configurations conducive to extremely or highly intense fire behavior. In addition, the area has about 53,813 (34%) in a condition that is characterized as producing moderate fire behavior. (see Figure 9)

With approximately 3500 acres of thinning, the Current Management Alternative would have only a negligible reduction in fire intensity. The Proposed Action Alternative, through a combination of thinning and prescribed fire, would reduce the acreage in extreme and high fire behavior classes from 96,406 acres to 63,611 acres, representing a 34% reduction. (Figure 10)

A compounding destructive effect is demonstrated when probable fire size is estimated by intensity class. Utilizing the BEHAVE program, the estimated burned acreage was modeled based on 90th. percentile weather elements for an average summer day; and considering fireline production rates based on typical initial attack forces that would respond to the Hackamore area. Those modeling results are as follows:

Low Fire Intensity: 1-10 acres
Moderate Fire Intensity: 15-125 acres
High Fire Intensity: 85-780 acres
Extreme Fire Intensity: 780+ acres

B. Effects on Bitterbrush Understory

As noted in the Significant Public Issues section of this document, bitterbrush represents a significant understory species in the 158,000 acre Hackamore area. It occurs throughout the area, in extremely variable densities and conditions.

The Current Management Alternative (No Action) incorporates approximately 3500 acres of thinning. On that acreage, this alternative is expected to bring about a negligible increase in bitterbrush vigor and reproduction, over the long term (10-20 years).

The Proposed Action Alternative incorporates approximately 16,000 acres of thinning and 19,000 acres of prescribed burning. Approximately 10,000 acres of the burning overlaps the thinning.

On the remaining 6,000 acres of thinning that is not burned, a negligible increase in bitterbrush vigor and reproduction is expected in the long term (10-20 years).

On the19,000 acres that are burned, on thinned or unthinned sites, up to 60% mortality of bitterbrush is possible in the short term. With incorporation of those adaptive management measures displayed in the description of the Proposed Action Alternative, no long term reduction of the bitterbrush component is expected.

C. Effects of Transportation System Management on Recreation and Fire Suppression Access.

The No Action Alternative would have no effect on the transportation system.

In the Proposed Action Alternative, we propose to obliterate 42 miles of secondary roads of the over 500 miles, that exist on the Hackamore area . (See Figure 3) These roads are seldom used, redundant to other roads, and some are demonstrating signs of erosion. None of the roads proposed for obliteration, access private inholdings, range management appurtenances, timber management areas, or featured recreation areas such as reservoirs, wetlands, or campgrounds.

Given this setting, it is reasonable to expect that the Proposed Action will not have a deleterious effect on recreation use or fire suppression efforts.

ENVIRONMENTAL CONSEQUENCES NOT RELATED TO SIGNIFICANT ISSUES

This section identifies the environmental consequences of the Proposed Action Alternative and the No Action Alternative for those environmental components not directly related to the significant issues. Only those components where some effect of either the No Action Alternative or the Proposed Action Alternative were projected to occur, are addressed.

A. Wildlife

Bald Eagle

No Action Alternative

Direct and Indirect Effects – There will be no direct effects from implementing the No Action Alternative since no activities are proposed. Indirect effects include: higher mortality rate of large potential nest trees due to competition from adjacent trees, slower growth rates on co-dominant and younger trees which will replace potential nest trees, and a higher risk of stand relacing wildfire ocurring because the existing fuel ladders will not be treated.

Cumulative Effects – In the short-term there will be no cumulative effects, but if mortality of suitable nest trees exceeds the growth of replacement nest trees, potentially suitable, but currently unoccupied, nesting habitat may go unoccupied for a long period of time. In addition, fuels will continue to increase without treatment, therefore the risk of stand replacing wildfires will increase over time.

Proposed Action Alternative

Direct and Indirect Effects – In the 3 occupied nesting territories proposed for treatment, activities will be implemented outside of the nesting season, therefore there will be no direct effect on the birds. Indirect effects include: Reduced competition and stress to existing and potentially suitable nest trees should prolong their life, higher growth rates on residual trees, and a reduced risk stand replacing wildfires because of thinning and fuel treatments.

Cumulative Effects – As many as five new bald eagle nest territories in high quality, long-lived habitat may be enhanced, and all the existing occupied territories will have significantly improved chances for long-term survival and occupancy.

Modoc Sucker and Redband Trout – These two species are combined, since they are found in the same places and any effects will be identical.

No Action and Proposed Action Alternatives

Direct, Indirect and Cumulative Effects – Since no activities are proposed within 300 feet of perennial streams containing Modoc suckers or suitable habitat, or within 150 feet of intermittent streams tributary to Modoc sucker habitat, there will be no effects on this species.

Northern Goshawk

No Action Alternative

Direct and Indirect Effects – There will be no direct effects on this species from this alternative. Indirect effects include the following:

- Understory trees will continue to grow into the lower canopy of the overstory trees, causing a subtle, but continued degradation of nesting habitat quality.
- Risk of stand replacing wildfire will increase over time.
- Mortality of important large old trees will increase as a result of competition and stress.
- Within the Post Fledging Area (PFA), as the canopy closes in, we can expect a reduction in shrubs and herbaceous vegetation, which will probably reduce the prey base.

Cumulative Effects – Over the long-term, current tree density is not sustainable. By not managing vegetation and fire risk within over 70% of the goshawk territories in the Analysis Area, we can expect a slow decline in the nesting population in the Hackamore Management Area.

Proposed Action

Direct and Indirect Effects – In the short-term, there will be an immediate decrease in canopy closure in the stands that are treated. There may also be a short-term reduction in shrubs as a result of ground disturbance. The added sunlight, scarified ground and reduced competion will quickly offset that loss. Topping will directly increase the standing life of snags, and therefore the preybase as well. Spring burning has the potential of disturbing

nesting goshawks and causing nest abandonment. Surveying known nests to determine their status can reduce this risk. Limited operating period restrictions will be in place around active territories or territories where nesting status cannot be determined. Prescribed burning 19,000 + acres has the potential of indirectly affecting goshawk populations by reducing the amount of bitterbrush and dead and down woody material. If the reduction of bitterbrush is long term or if woody material is reduced below levels described earlier in this document, prey populations will decrease which will have an adverse impact on goshawk populations. The adaptive management strategies that will be used should greatly reduce the risk of adverse impacts. On the other hand, prescribed burning will enhance goshawk habitat, by significantly reducing the risk of losing large blocks of habitat to stand replacing wildfire. Installing 10 guzzlers in the Analysis Area may possibly increase prey base somewhat, which would have a positive indirect on goshawk populations.
None of the other proposed actions will have an affect on goshawks.

Cumulative effects – In order to assure long-term vegetation objectives are being met for goshawks and their primary prey, it will be necessary to enter untreated nest stands and PFA's within 10-15 years. Cumulatively, analyzing and treating goshawk habitat over a large area will benefit goshawk populations over the long-term and contribute our Forest goal of having a sustainable population of at least 100 nesting pairs on the Forest.

Swainson's Hawk

No Action and Proposed Action Alternatives

Direct, Indirect and Cumulative Effects – The Swainson's hawk is a species closely associated with open grasslands with scattered juniper trees for nesting and foraging. There are no significant expanses of suitable habitat within the analysis area, and there are no known Swainson's hawks nesting. It is possible, but not very likely, that there could be a nesting pair along the eastern edge of the project area where it is more open. Since no projects are planned that will affect juniper trees in grasslands, there will be no effect on this species from either alternative.

Greater Sandhill Crane

No Action Alternative

Direct, Indirect and Cumulative Effects – Sandhill cranes are known to nest at nine wetlands within the analysis area. This alternative will have no effect on the sandhill crane population in the Analysis Area.

Proposed Action

Direct and Indirect Effects – The wetland enhancement projects are the only ones with potential to affect sandhill cranes in the Analysis Area. These projects will be implemented after the nesting season while the wetlands are dry, therefore, there will no direct effects. Island development will be an indirect beneficial effect, since sandhills often use them to nest on. Increasing the length of time water will remain in Duncan Pond, Whitney, and Deadhorse Flat will be an indirect beneficial effect because it enhance brood rearing habitat, and thus may increase colt survival.

Cumulative Effects – The greater sandhill crane is listed as a threatened species by the California Department of Fish & Game. There are 30 different wetlands on the Devil's Garden Ranger District where cranes are known to nest. Any projects that enhance crane nesting or brood rearing habitat contributes to the statewide population and there becomes a cumulative beneficial effect.

Willow Flycatcher

No Action and Proposed Action Alternatives

Direct, Indirect and Cumulative Effects – There are no records of willow flycatchers from anywhere in the Hackamore Analysis Area. The only potentially suitable habitat is in Howard's Gulch along Highway 139 at the southeast portion of the Analysis Area. Since no projects are planned in this area, there will be no effects to this species.

Pallid Bat

No Action Alternative

Direct and Indirect Effects – Since no projects are planned in this alternative, there will be no direct or indirect effects to this species.

Cumulative Effects – No effects are anticipated to this species from the No Action Alternative.

Proposed Action

Direct and Indirect Effects – The pallid bat uses a variety of substrates to roost, such as cavities in snags, under loose bark, rock cliffs, crevices and overhangs. They are both aerial feeders (close to the gound) and glean insects found on shrubs.
Topping existing snags could be a direct adverse effect to those individuals roosting in the snag. It could be a long, rough ride to the ground. On the other hand topping could indirectly benefit the species, by allowing snags to stand for a longer period of time.

Thinning may indirectly affect the species, if shrubs (where potential prey might live) increased in areas where there was none before. Thinning could also open stands to allow aerially hunting bats access to areas where there was none before – an indirect beneficial effect. Prescribed burning could have an indirect adverse affect on the pallid bat, if it results in a long-term reduction of shrubs and/or snags.
No other proposed projects will have an effect on pallid bats.

Cumulative Effects – Topping snags should overall be a cumulative benefical effect on the pallid bat even though individuals may suffer. The number of snags proposed for topping will add to the nearly 5,000 which have already been topped in the management area.
If prescribed burning over the 10 year period results in long-term reduction in shrubs over large areas, it would result in a cumulative adverse effect. The adaptive management strategies that will be implemented should prevent serious adverse effects.

Townsend's Big-Eared Bat

No Action Alternative

Direct, Indirect and Cumulative Effects – No effects are anticipated to this species from the No Action Alternative.

Proposed Action

Direct and Indirect Effects – This species of bat roosts in caves and crevices. Snags are generally not used as a roost site. Moths provide the primary food for this species of bat, which capture their prey in flight or by gleaning the moths from shrubs.
Snag topping will result in no affect to this species. Thinning and prescribed burning will have the same effects for this species of bat as the pallid bat, described above.

Cumulative Effects – Because this species of bat depends heavily on moths for food, long-term reduction of shrubs over large areas could result in a greater adverse impact to big-eared bat populations than the same reduction of shrubs might have on the pallid bat.
No other project

Sierra Nevada Red Fox

No Action and Proposed Action Alternatives

Direct, Indirect and Cumulative Effects – There has been one reported and reliable sighting of a red fox within the Analysis Area. However, based on habitat descriptions for the species, the fox seen near North Spring was not likely a Sierra Nevada sub species. Therefore, neither alternative will have an effect on this sub species of red fox.

Cascade, Northern Leopard, and Spotted Frogs

No Action and Proposed Action Alternatives

Direct, Indirect and Cumulative Effects – There is no documented presence of any of these species on the Analysis Area. Potentially suitable habitat may exist in the four drainages containing Modoc sucker and redband trout habitat, and perhaps in some of the ponds and wetlands within the Analysis Area. Since wetland improvement activities will occur when the wetlands are dry (at least on the surface), and in no areas where the soils are saturated, there will be no effect on these species, from any of the proposed projects.

Northwestern Pond Turtle

No Action and Proposed Action Alternatives

Direct, Indirect and Cumulative Effects – There is no documented presence of this species on the Analysis Area, but potential habitat does exist. Since the wetland improvement projects will occur when the wetlands are dry, and since this turtle hibernates in the upland, no effects are anticipated from either alternative. In addition, other potential habitat (Modoc sucker and redband trout habitat) will not be affected.

Canada Goose and Mallard

No Action Alternative

Direct, Indirect and Cumulative Effects – Since no activities are planned under this alternative, no effects are anticipated.

Proposed Action

Direct and Indirect Effects – The proposed wetland enhancement work is the only activity with potential to affect these species. There will, however, be no direct effect from the Proposed action. Indirect effects include the following:

- Islands will provide secure nesting sites for both species.
- Water will last longer into the summer months at Whitney, Deadhorse Flat, and Duncan Pond, creating more secure brood rearing conditions.
- More water at the above wetlands will also improve the vegetation quality and food resources for both ducks and geese.
-
- No adverse effects are anticipated from this or other proposed activities

Cumulative Effects – The 1,250 acres of improved waterfowl habitat resulting from this project will contribute to the Forests significant list of wetland enhancement work that

began in 1965. We anticipate 8,000 ducks and about 2,000 Canada geese will be produced over the life of the project.

Mule Deer

No Action Alternative

Direct and Indirect Effects – This alternative will have no direct effect on either resident or migratory deer within the Analysis Area. Indirect effects include:

- Long-term increase in canopy closure, which will adversely affect forage production.
- Continued high risk of stand replacing wildfires.
- Existing brushfields will continue to decline in forage quality.

In some areas of the Analysis Area, water sources will be too widely separated to provide optimal deer habitat.

Cumulative Effects – The Analysis Area is only a portion of range of the Interstate Deer Herd, but it's a very important portion. Things that occur here affect deer survival and production for the rest of the seasons of the year. Since the forage quality and quantity are very important to the health of the herd, doing nothing to manage vegetation could result in a continued decline in the Interstate Deer Herd population.

Proposed Action

Direct and Indirect Effects – There are no direct effects to either resident or migratory deer from any of the proposed actions.
Indirect effects include the following:

- Thinning will open up the canopy in many areas allowing more sunlight to hit the forest floor and allow development of shrubs.
- The soil disturbance caused by equipment during thinning will create a better seedbed for shrubs and herbaceous vegetation.
- Commercial and precommercial thinning will alter cover forage ratios. Maintaining unthinned areas in the precommercial operations will provide desired ratios.
- Installing guzzlers in water deficient areas will improve overall habitat quality especially for resident deer.
- Accepting 60% mortality of bitterbrush within each prescribed burn area carries some risk of adverse impact to deer forage. It will be difficult to conduct a burn in areas with an understory of bitterbrush and limit mortality to only 60%. However, prescribed burning will reduce the duff layer, which will increase survival of rodent caches (more bare soil). Burning will also reduce the risk of stand replacing wildfire that will have far worse consequences to the bitterbrush resource (higher mortality, larger areas, and follow-up silvicultural

treatments of the burn). In addition, some burned bitterbrush will resprout which will provide more nutritious forage. Unburned plants will continue producing seed that will be cached by rodents, eventually restocking the area.

Prescribed burning existing brushfields will enhance their forage value to deer and also reduce the density of the brush to allow access to deer. This will be a short-term (5-to-10 years) benefit.

Cumulative Effects – Adaptive management strategies monitoring the results of burning should prevent any cumulative adverse impact. Thinning, burning brushfields, and water development will, taken together, have a cumulative beneficial effect.

Hairy Woodpecker, Red-breasted and Red-naped Sapsuckers

No Action Alternative

Direct, Indirect and Cumulative Effects – These three species are all snag dependent. The latter two, prefer snags in riparian areas, while the hairy woodpecker uses snags in the general forest area.
This Alternative will continue to provide adequate habitat for snag dependent species. However, studies have shown that roughly 90% of pine snags fall within 15 years of death; therfore, more green trees will be needed over the long-term.

Proposed Action

Direct and Indirect Effects – Topping existing snags will ensure a higher population of snags over a longer time period than the No Action Alternative. Based on monitoring from other areas of the District, it is not unreasonable to assume topped snags will last 2-3 times longer than untopped snags. Forest LRMP snag standards will be exceeded to ensure a higher population of potential prey species for goshawks.
Undoubtedly, prescribed burning will result in the loss of some snags, however, those that fall will probably not be burned up and should contribute to the dead and down component. On the other hand, some trees will be killed by burning and add to the snag component. None of the other proposed actions should have any effect on cavity dependent wildlife species.

Cumulative Effects – The proposed action in connection with continued topping of snags in other areas of the District would cumulatively result in a higher population of cavity dependent wildlife species over the long term.

Other Management Indicator Species: Golden Eagle, Osprey, Prairie Falcon, Yellow Warbler, Western Gray Squirrel, Pronghorn, Rainbow Trout, and Largemouth Bass

These eight species inhabit portions of the Analysis Area for all or part of their annual life cycle. They are combined in this section because:

a) They are found in portions of the Analysis Area that will not be treated, or;
b) Neither alternative will have any effect on the species.

B. Sensitive Plants

Existing Condition

There are seven known sensitive plant species of concern within the Hackamore Ecosystem Restoration Project: long-haired star tulip (*Calochortus longebarbatus var. longebarbatus*), green buckwheat (*Eriogonum umbellatum var. glaberrimum*), Baker's globe mallow (*Iliamna bakeri*), ephemeral monkeyflower (*Mimulus evanescens)*, playa phacelia (*Phacelia inundata*), profuse-flowered pogogyne (*Pogogyne floribunda),* and Modoc County knotweed (*Polygonum polygaloides ssp. esotericum).* Following is a description of each species and there associated habitats.

Calochortus longebarbatus var. longebarbatus

Calochortus longebarbatus ssp. longebarbatus (CALOL) is found in scattered areas from Washington (Yakama County) south to northern California. This species also occurs sporadically in Oregon along the east base of the Cascades. On the Modoc National Forest it is found mainly on the Big Valley, Doublehead and Devil's Garden Ranger Districts. Habitat requirements for this species consist of grassy meadows margins where it is wet in the spring and early summer, but becomes somewhat dry in mid to late summer.

There are approximately 34 known occurrences of CALOL found within the Hackamore Analysis Area. Most occurrences are concentrated within the southwest portion of the Analysis Area near Hwy 139 and Loveness Logging Road.

Eriogonum umbellatum var. glaberrimum

This species was recently added to the Region 5 sensitive species list due to concerns over the lack of sightings within its range. It is only known to southeastern Oregon and Modoc County in California. On the Modoc, this species is only known from three sites within the North Warners and one small occurrence on the Devil's Garden Ranger District at Little Willow Creek. Very little potential habitat on the Modoc has been surveyed for this species, for this reason the exact range of the species is unknown at this time.

Iliamna bakeri

Iliamna bakeri is known form Jackson and Klamath Counties in southern Oregon and Modoc, Siskiyou, Shasta, and Modoc Counties in California. On the Modoc National Forest it is found scattered across the Devil's Garden and Doublehead Ranger Districts. Within potential habitat for this species can be found in areas with volcanic loams or lava beds especially after a burn in juniper woodlands or sagebrush scrub.

Within the Hackamore Analysis Area, this species has been found recently within the Long/Damon burn that occurred in 1996. There are no other known occurrences of this species within the project area, but any prescribed burns have the potential to increase its range throughout the project area.

Mimulus evanescens

Mimulus evanescens was recently described and added to the Regional Foresters' Sensitive plant list. It is known form only a few sites in southwest Idaho, eastern Oregon, and Modoc and Lassen Counties in California. Most of theses sites have not been checked to confirm that the occurrence still exists. On the Modoc National Forest, this species has only been found at Moll Reservoir on the Big Valley Ranger District and Dry Lake on the Devil's Garden RD. Potential habitat can be found in sagebrush juniper dominated zones scattered among rock fragments and alongside small boulders, in moist, heavy gravel that has been inundated earlier in the spring. Plants can also be found in rocky stream banks or drying watercourses and the rocky edges of reservoirs. Very little potential habitat on the Modoc has been surveyed for this species.

The Dry Lake occurrence is approximately 5.5 air miles from the western edge of the Analysis Area. Potential habitat exists around the rocks edges of reservoirs.

Phacelia inundata

Phacelia inundata is known only to Modoc and Lassen Counties in California, western Nevada and southern Oregon. On the Modoc National Forest, this species was only known from Dry Lake Reservoir on the Devil's Garden Range District, but recent surveys have shown that occurrences has been extirpated from that site. It can also be found on Clear Lake Reservoir and at 2 other historical sites within the Doublehead Ranger District though these sites have not yet been confirmed to still exist. Habitat for this species ranges from alkaline flats, to dry lake margins.

Pogogyne floribunda

Endemic to California, *Pogogyne floribunda* is known only to Shasta, Lassen and Modoc Counties in California. On the Modoc National Forest, most populations are scattered throughout the Doublehead and Devil's Garden Ranger Districts. Within the Analysis Area there is one known site of *Pogogyne floribunda* along Hwy 139. Habitat requirements for this species include seasonal wetlands such as vernal pools, reservoir edges and silver sage basins.

Polygonum polygaloides ssp. esotericum

Polygonum polygaloides var. esotericum is known only to Modoc County, California and is found in scattered locations throughout the Devil's Garden Ranger District. Habitat requirements for this species consist of vernal pools and swales. Concerns have surfaced over the last few years over the difficulty in distinguishing between ssp. *esotericum*, ssp. *confertiflorum* and the their intermediates.

There is one known site within the Analysis Area at the 139 Pond along Hwy 139. This occurrence has never been confirmed or relocated since it was discovered in 1988. Potential habitat exists within seasonally wet areas around low sage flats.

In Region 5, the Regional Forester lists all of these species as Sensitive. The California Native Plant Society (CNPS) recognizes *Calochortus longebarbatus, Pogogyne floribunda and Polygonum polygaloides ssp. esotericum* as List 1B species; species rare or endangered in California and elsewhere. *Eriogonum umbellatum var. glaberrimum, Iliamna bakeri, Mimulus evanescens* and *Phacelia inundata* will most likely be recognized and List 1B plants in the new addition of the CNPS's "Inventory of Rare and Endangered plants of California."

Effects Discussion

For the Proposed Action there is a **No Effect** call for *Calochortus longebarbatus var. longebarbatus* and *Eriogonum umbellatum var., glaberrimum* seeing as no projects are proposed within the known habitats for these species. *Eriogonum umbellatum* habitat will not be disturbed since all prescribed fire areas are all within timbered stands. Even though *Calochortus* plants might be found on the edges of timbered areas, fire would stop at the meadow edges during spring burns and all fall burns would occur after the species has set seed and therefore should not affect the bulbs. On the positive side, reduction of competition might help to stimulate higher germination within the areas burned.

There will also be **No Effect** call for *Iliamna bakeri*. There are no proposed projects within the existing occurrences and since no habitat exists within timber harvest areas or the wetland projects, surveys are not required. On a positive side, this species is burn dependent, therefore any prescribed burns could increase its range within the Hackamore Analysis Area.

For those species found around reservoir edges such as *Phacelia inundata, Pogogyne floribunda, Polygonum polygaloides ssp. esotericum* and *Mimulus evanescens*, changing water levels could have a negative effect on occurrences of these species. On the other hand, increased water levels could also just push these annual plants back to the new levels along the shore, and may actually increase habitat availability. It will be important to record the habitat types that reservoir waters will be moving into to determine the impacts on the each of these species.

Pogogyne floribunda, Phacelia inundata and *Polygonum polygaloides* will not be effected because they are found within the higher areas that tend to only be wet early in the spring. These habitat types might even be to far away from the changes in water levels to be effected. *Mimulus evanescens*, unlike the other species, is found adjacent to the water and tends to follow the water line. Effects to this species from changing water levels are unknown at this time.

Surveys will have to be conducted to determine if these species are within the proposed wetland project areas, as well as what habitat types the new water level will occupy. Once on site surveys have been conducted, a better assessment of the effects on these species can be determined.

C. Heritage Resouces

Approximately 300 cultural sites from the prehistoric and historic periods have been documented in the Hackamore Project Area as of November 1999. Currently 28% of the project area has been inspected for cultural remains. The percentage is comprised of both large area surveys for timber sales and small scattered surveys for a variety of undertakings.

As this EA is intended to provide the basis for undertakings scheduled over a 10 year period and on a large land area, compliance with Section 106 of NHPA will be conducted under Section 800.4(b)(2), Phased identification and evaluation.

Phase I consists of those undertakings scheduled for implementation in the year 2000. Heritage resources survey for this phase has been completed and No prehistoric nor historic sites will be affected by any alternative as all sites will be flagged and avoided.

Phase II undertakings are scheduled for implementation in year 2001. Heritage resources survey for these activities is scheduled for the summer of year 2000. Also scheduled for the year 2001 is the development of a rest stop and interpretive center at Henski Reservoir on Highway 139. Heritage Resources will be a part of the interpretation and the excavation necessary to clear the parking and toilet area and provide information for the interpretation is also scheduled for the summer of 2000.

Additional phases will be undertaken in subsequent years through the year 2009 with the heritage resources inventories planned for the previous summers.

Each phase, after Phase I, will have its own report filed either under the programmatic memorandum between the Modoc National Forest and the California SHPO, or in a separate document as appropriate.

Prehistoric Period Sites

Prehistoric occupation of the area began in Paleo-Indian times with Clovis, Folsom, Lind Coulee and Alberta style projectile points recovered from the area. The early archaic is represented by Northern Side-Notched points with Elko series points dominating the Middle Archaic. Rosegate, Gunther and Desert Side-notched points all occur during Late Archaic times.

In protohistoric times the general area was predominantly occupied seasonally by the Astariwawi (Warm Springs) band of the Pit River Indians (Achumawi) with permanent winter villages along the Pit River and in the Warm Springs Valley south and east of the Hackamore area. The very northern portion of the area was occupied by the Kokiwas band of the Modoc Indians, whose permanent villages were located along the shores of Clear Lake to the west. The closest Modoc summer villages were located east of the area near Boles Meadows and Fairchild Swamp. The northeastern portion of the area was shared by the Kokiwas and the Hewisedawi band of the Pit River who also had their permanent habitations outside the project area.

Historic Period Sites

Historic settlement in the vicinity of the Hackamore area began in the 1870s with homesteads built at water sources. Economic pursuits included cattle ranching, subsistence farming, and later, logging. evidence of this past activity can be found in the form of wagon roads, trash dumps, cabin remains, and foundations. The historic Tichnor Road opened in 1872 as a toll road between Alturas and Yreka, California. Approximately 16 miles of this road lies within the Hackamore area.

More recent activity includes a variety of hunters camps, a railroad camp associated with an early attempt to build a logging railroad system (never completed or used), and a CCC camp.

Traditional Cultural Sites

A single traditional cultural site (power place) has been identified in the Hackamore area (Roybal-Evans & Associates 1982). An undertaking (prescribed fire to enhance deer habitat) on and/or near the property is planned (in 2001 or beyond) but will await consultation with the Astariwawi band of the Pit River Tribe prior to any action.

As the life of the undertaking is scheduled over a 10 year period, we will remain alert to the possibility that additional sites may be encountered or called to our attention and take appropriate protective measures.

D. Watershed

The No Action Alternative will have a small amount of soil disturbance in the short term, associated with the 3500 acres of thinning. No long term effects on watershed stability and function, nor on water quality are expected.

The Proposed Action Alternative will result in a slight increase in the ERA (equivalent roaded acreage) percent in the next three to five years as thinning is implemented, wetlands developed, and roads obliterated. The percent ERA will decrease to below current levels in the long term (10 to 20 years), as the disturbances revegetate.

E. Social/Economics

Neither the Proposed Action or the No Action Alternative will have measureable effects on the social structure of the local communities.

The total cost of implementing each activity over the implementation period is shown below:

Wetland Development	$540,000
Deer Habitat Improvement	$125,000
Thinning (Com.)	$1,650,000
Thinning (Precom)	$1,500,000

Prescribed Burning	$950,000
Eagle, Goshawk Imp.	$70,000
Transportation System	$233,000
Henski Interpretive Site	$669,000

Based on an estimated volume of 40,000 ccf of small sawlog material at a selling price of $60/ccf, and 30,000 green tons of biomass material, at a selling price of $.25/ton, the thinning activity could produce incidental gross revenue of $2,407,500.

CHAPTER 4
LIST OF PREPARERS

A. ID Team

Bernie Weisgerber	District Ranger
Curt Aarstad	Team Leader
George Studinski	District Wildlife Biologist
Anne Mileck	Silviculturist
Paul Bailey	Timber Staff
Randy Hall	Fire and Fuels
Yvonne Studinski	Geographic Information Systems
Dee Green	Geographic Information Systems And Heritage Resources

B. Specialist Support

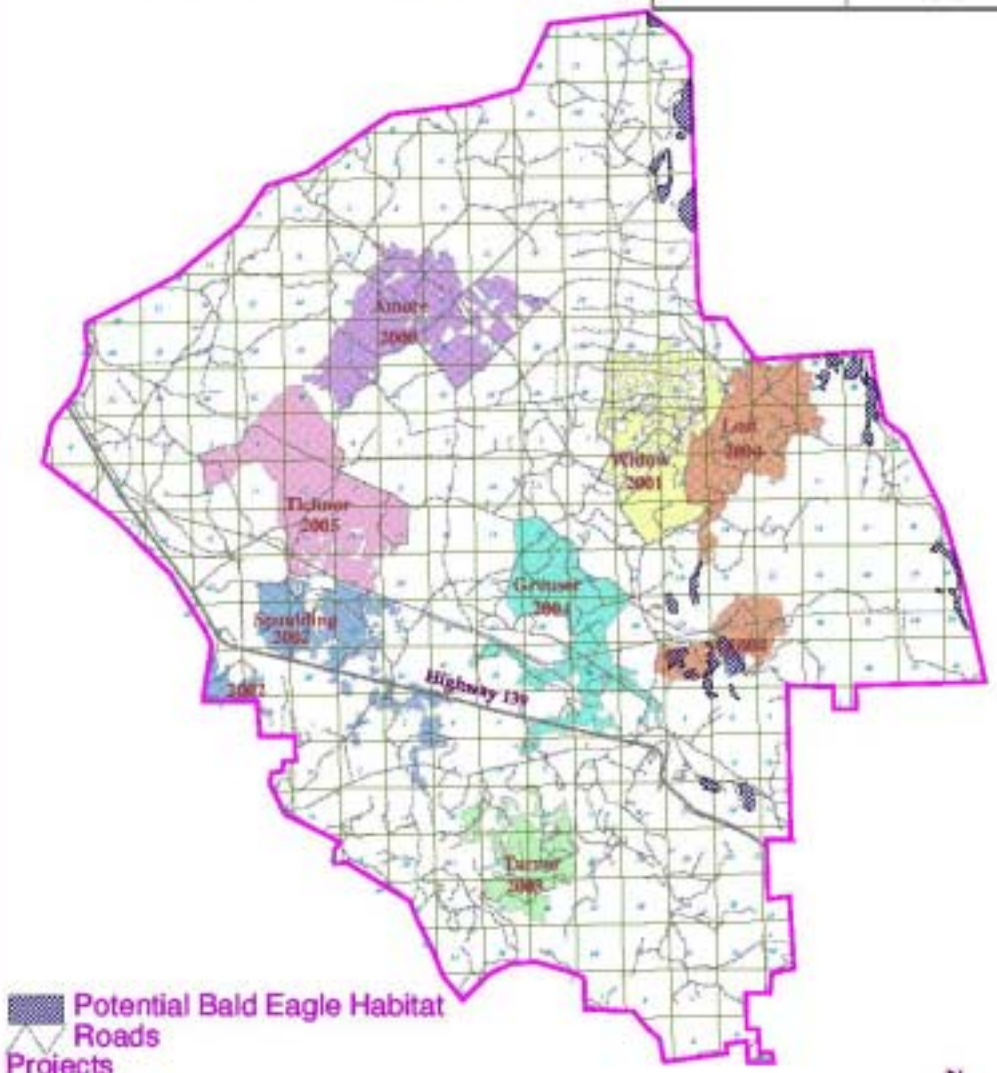
Traci Randall	Geographic Information Systems
Alison Coons	Geographic Information Systems
Dan Meza	Tribal Liaison
John Ford	Transportation Engineer
Jenny Ingraham	Range Conservationist
Allison Sanger	Forest Botanist
Sue Becker	Forest Hydrologist
Nancy Gardner	Public Affairs

Fig. 1

Hackamore Area

Vegetation Treatment Projects (Tentative Schedule)

Project Name	Acres
Amore	4689.0000
Grouser	4120.0000
Lost	5272.0000
Spaulding	3167.0000
Tichnor	5177.0000
Turner	1981.0000
Widow	3645.0000
TOTAL	20851.0000



Potential Bald Eagle Habitat
Roads
Projects
Amore
Grouser
Lost
Spaulding
Tichnor
Turner
Widow

N

1:142852

0 4 8 12 16 20 Miles

$HACK/vegtest/projects.apr

Fig. 2

Hackamore Analysis Area

RX Burns for Eagle, Deer and Hazard Reduction (proposed)

(Year shown is earliest possible for Prescription Burning. Actual burning may vary.)

Treatment Type	Acres
deer	1136.0000
eagle	343.0000
haz reduc	19063.0000
out	756.0000
TOTAL	21296.0000

Potential Bald Eagle Habitat
Fuel Treatments
deer
eagle(occup)
haz reduc
out
2000 Earliest Yr Possible for RX Burns
Roads

1:141065

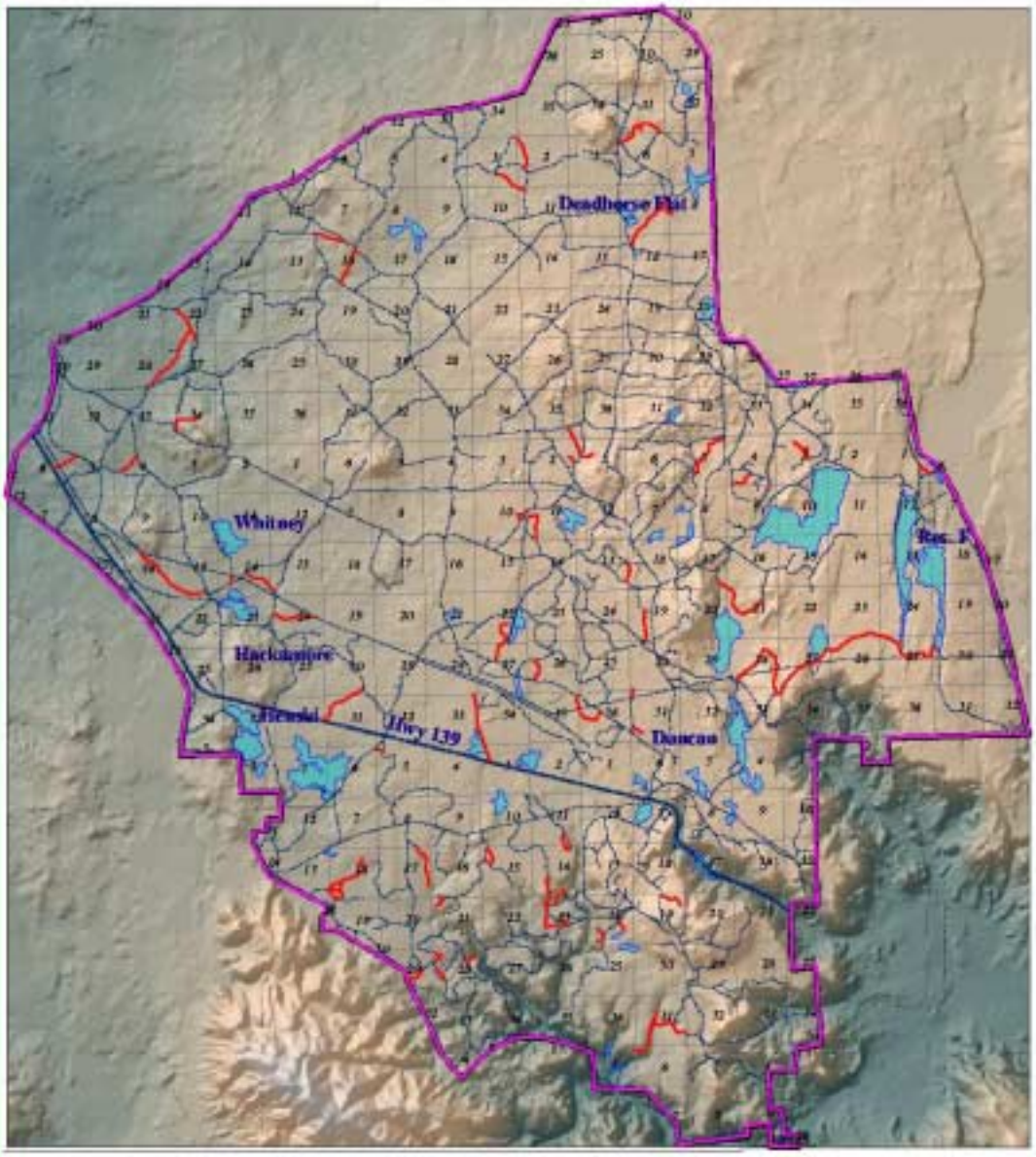
0 1 2 3 4 5 6 7 8 9 Miles

$HACK/fire/fireriskupr

Fig. 3
Hackamore Analysis Area

Roads Proposed for Obliteration

(42 Miles)



0 5 10 15 Miles

1:127428

Roads Proposed for Obliteration
Other Roads
Wetlands

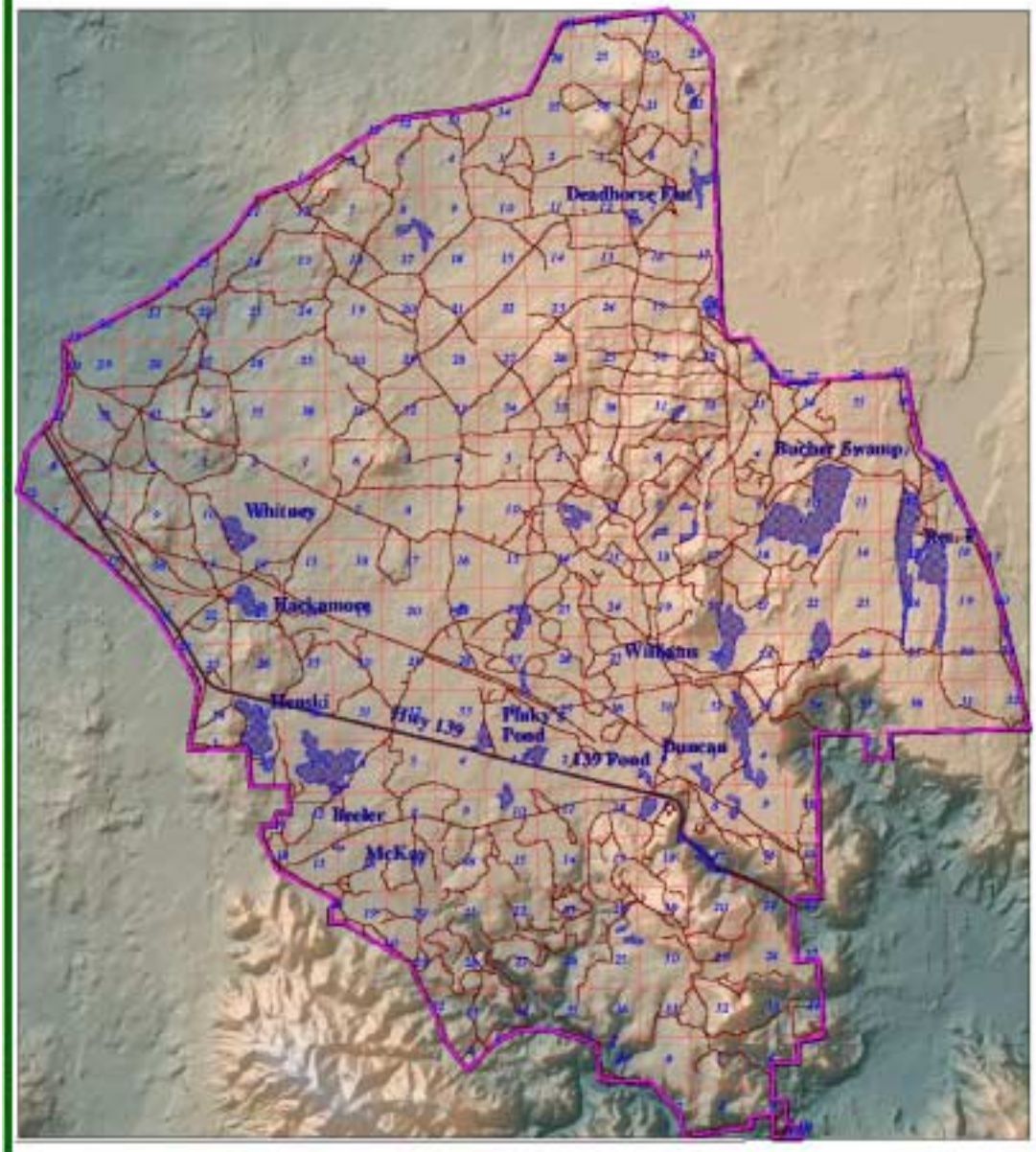
N

$HACK/road_density.apr

Fig. 4

Hackamore Analysis Area

Wetlands



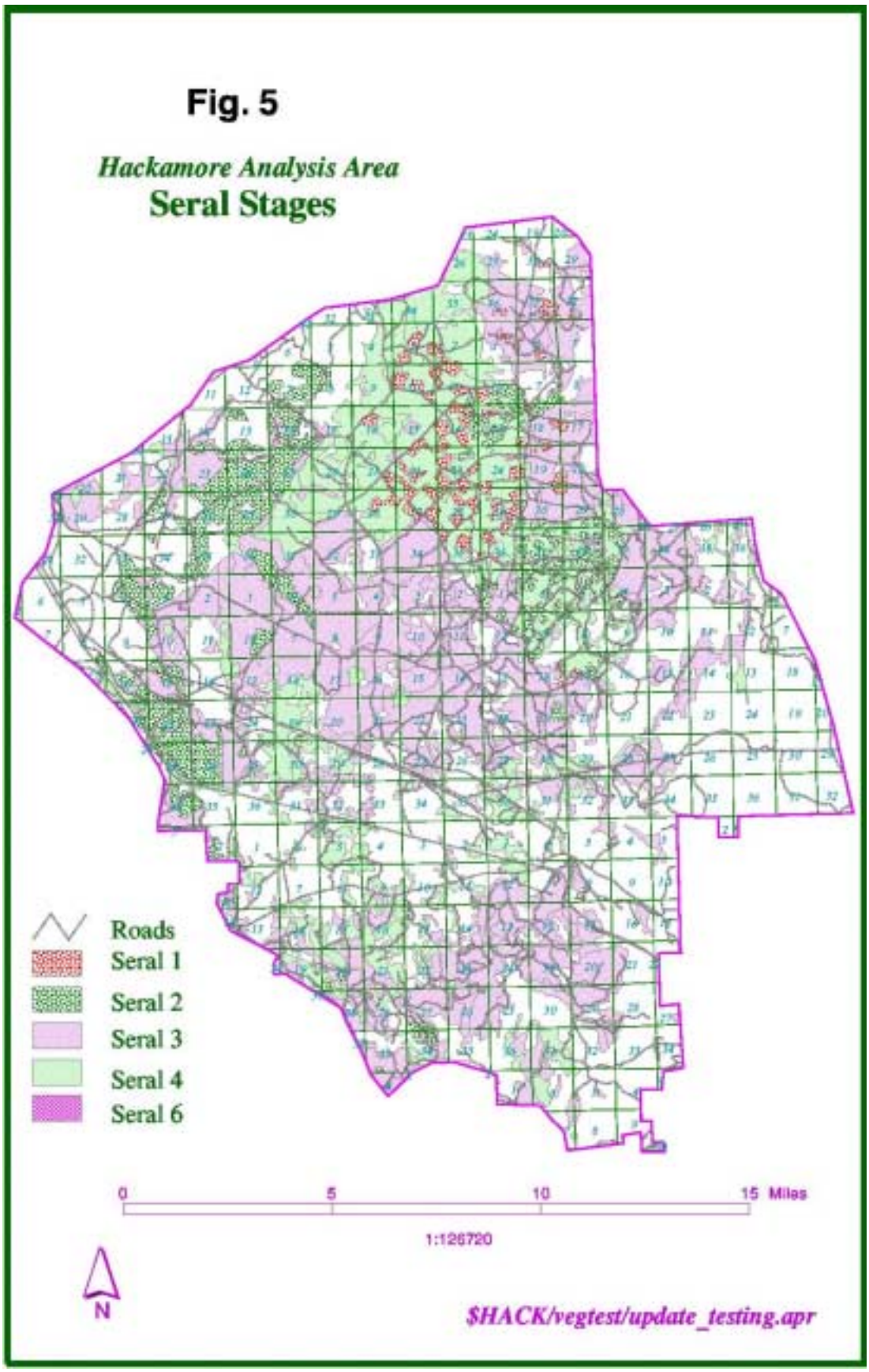


Fig. 5
Hackamore Analysis Area
Seral Stages
Roads
Seral 1
Seral 2
Seral 3
Seral 4
Seral 6
0
5
10
15 Miles
1:126720
N
$HACK/vegtest/update_testing.apr

Fig. 6

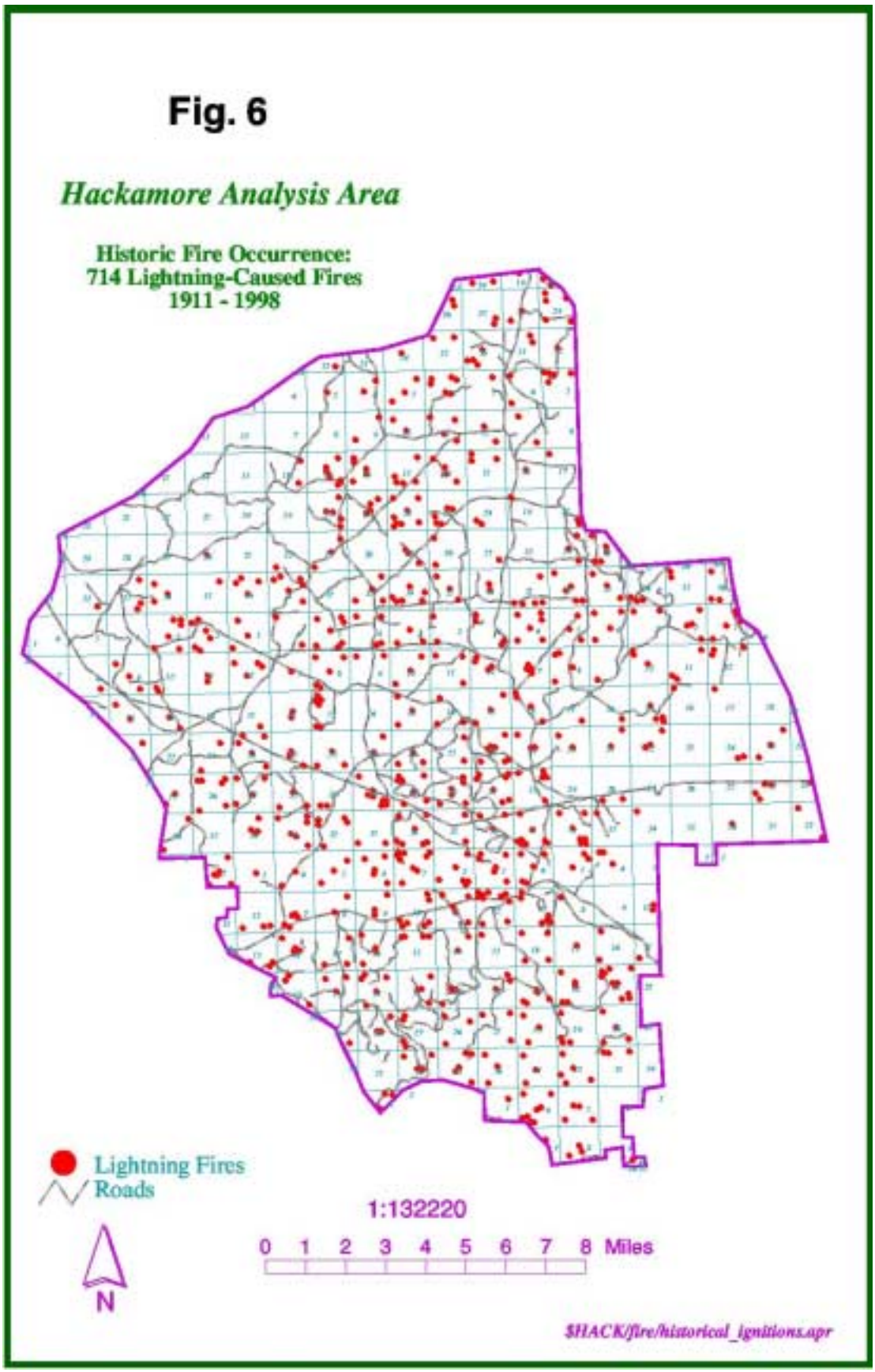

Hackamore Analysis Area
Historic Fire Occurrence:
714 Lightning-Caused Fires
1911 - 1998
Lightning Fires
Roads
1:132220
0 1 2 3 4 5 6 7 8 Miles
N
$HACK/fire/historical_ignitions.apr

Fig. 7

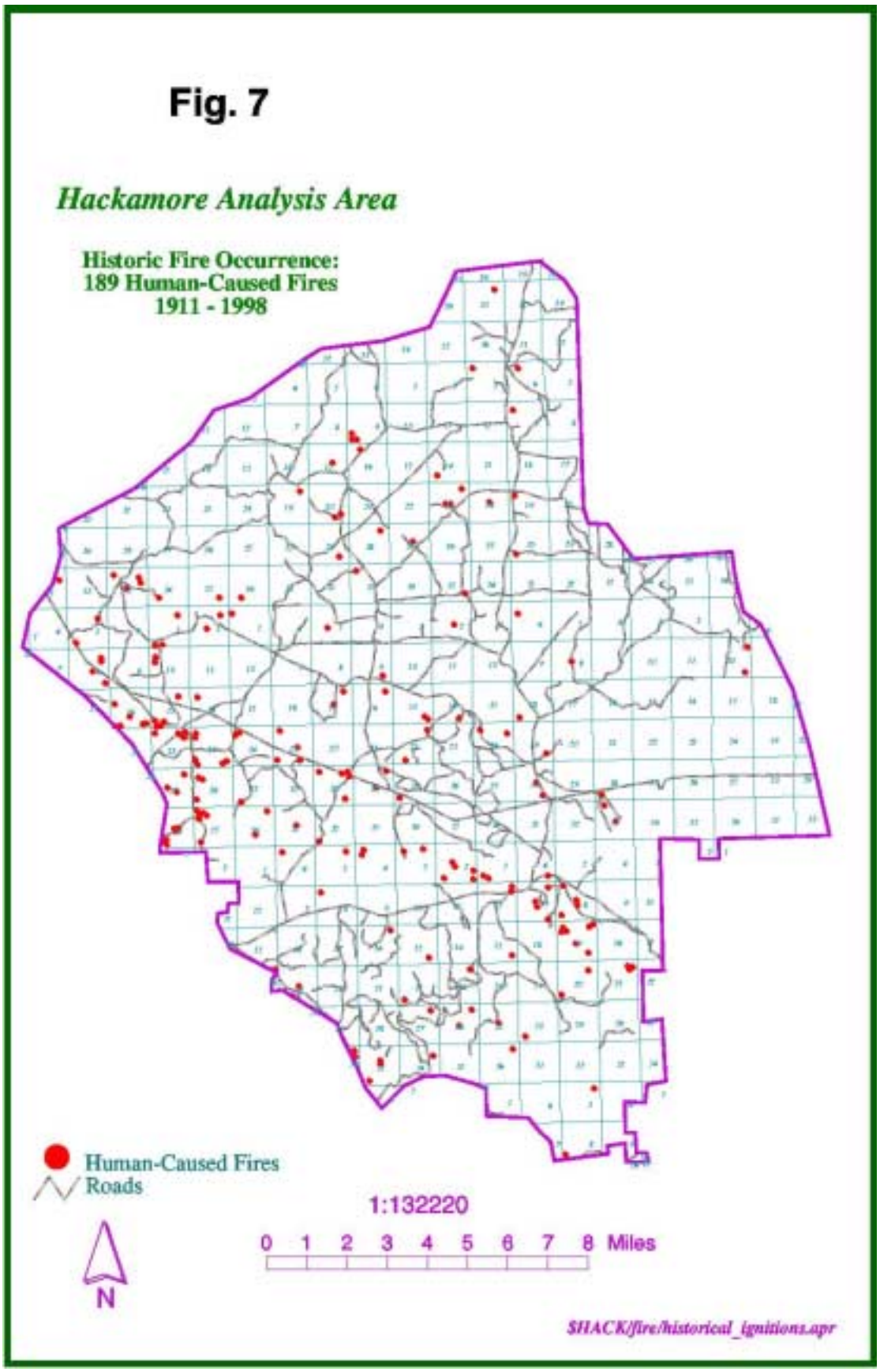

Hackamore Analysis Area
Historic Fire Occurrence:
189 Human-Caused Fires
1911 - 1998
Human-Caused Fires
Roads
1:132220
0 1 2 3 4 5 6 7 8 Miles
N
SHACK/fire/historical_ignitions.apr

Fig. 8

Hackamore Analysis Area

Large Fires:
1911 - 1999

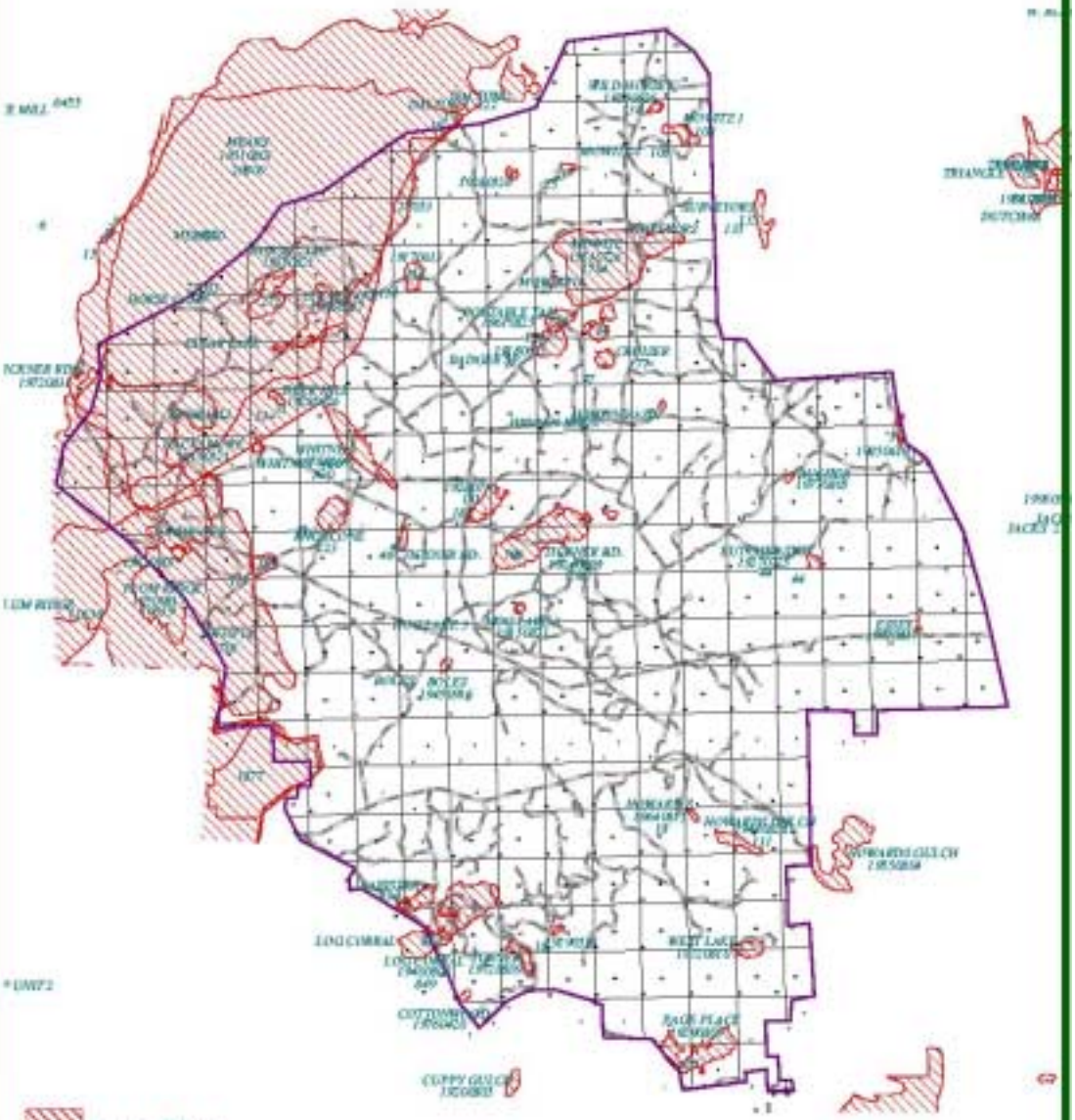
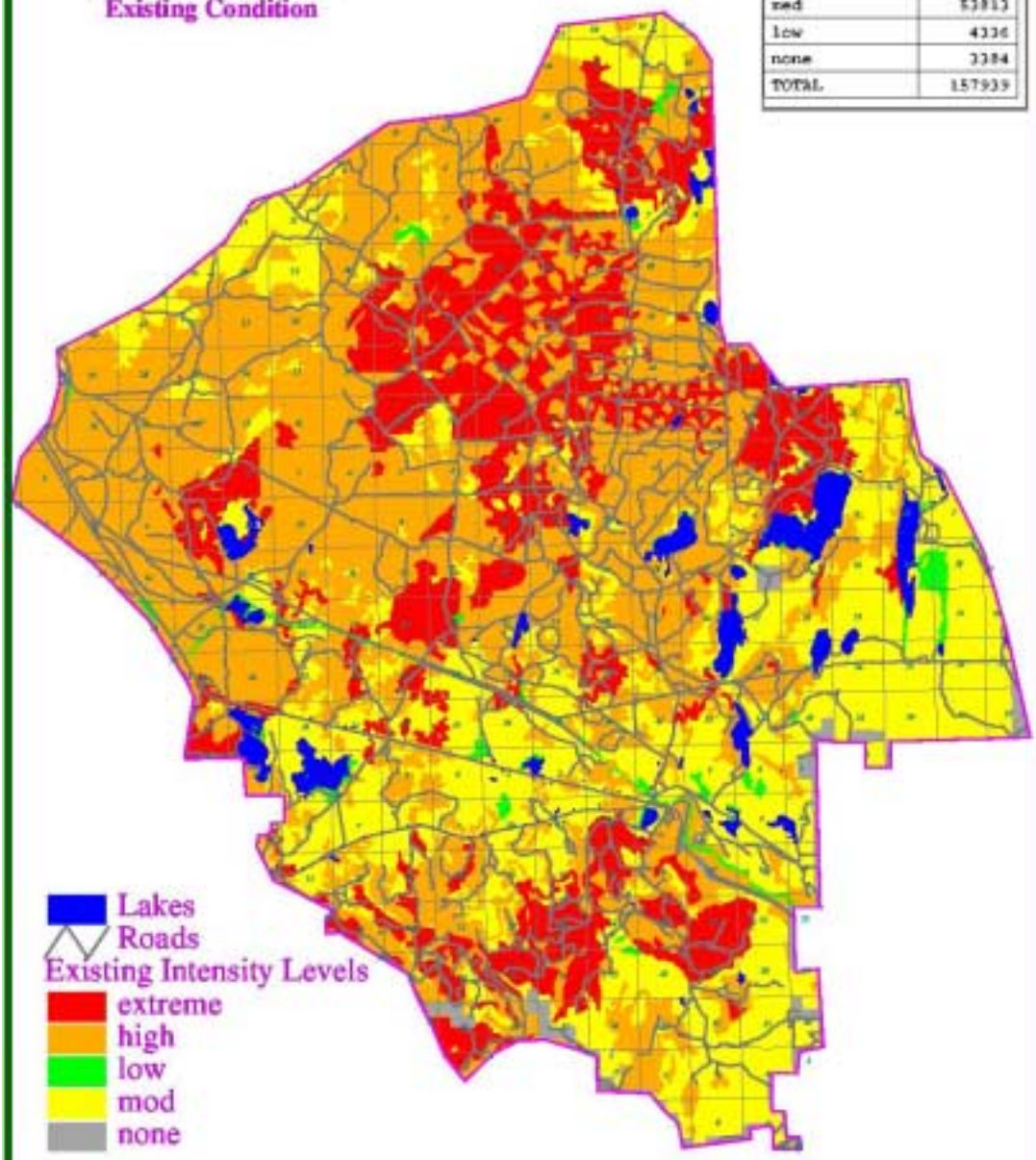


Fig. 9

Hackamore Analysis Area

Fire Intensity Level--
Existing Condition

Intensity Leve	Acres
extreme	28079
high	68327
mod	53813
low	4336
none	3384
TOTAL	157939



Lakes
Roads
Existing Intensity Levels
extreme
high
low
mod
none

0 1 2 3 4 5 6 7 8 9 10 Miles

N

1:126720

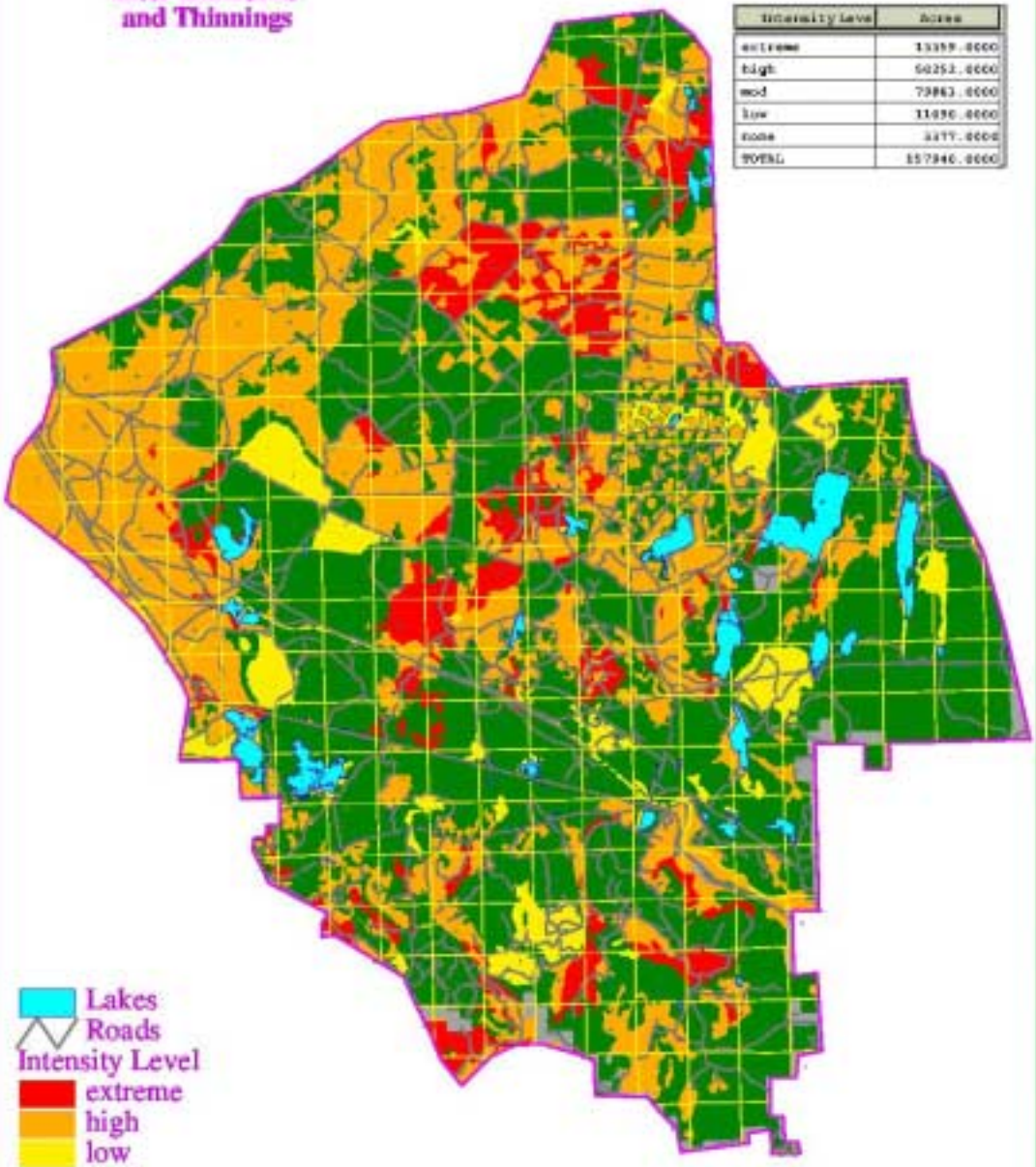
$HACK/fire/fire_intensity_gis_figs_for_EA.apr)

Fig. 10

Hackamore Analysis Area

Fire Intensity Level–
After RX Burns
and Thinnings

Intensity Level	Acres
extreme	13359.0000
high	50253.0000
mod	73863.0000
low	11030.0000
none	1377.0000
TOTAL	157946.0000



Lakes
Roads
Intensity Level
extreme
high
low
mod
none

1:126720

0 1 2 3 4 5 6 7 8 9 10 Miles

N

$HACK/fire/fire_intensity_figs_for_EA.apr