

Appendix I: Supplemental Information for Bureau of Land Management (BLM) Lands in the Southern Luckiamute Watershed (Maxfield Parcels)¹

¹ (Four parcels of BLM lands in Maxfield, Soap Creek and Berry Creek subwatersheds)

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The analysis for this project was conducted in the spring of 2004 by employees of the Bureau of Land Management, and the data in this document were the best available at that time. The analysis generally follows the federal guide for watershed analysis (Version 2.2, August 1995). No warranty is made as to the accuracy, reliability, or completeness of the data or maps contained in this Appendix. The Luckiamute Watershed Council and Earth Design Consultants, Inc. are not responsible for the content of this Appendix.

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I. Introduction

Federal Government lands comprise approximately 4% of the Luckiamute Watershed area. Most lands in the watershed managed by the Bureau of Land Management (BLM) were analyzed in a previous watershed analysis (Mill Creek, Rickreall Creek, Rowell Creek and Luckiamute River Watershed Analysis, USDI Bureau of Land Management, (Licata et al, 1998)(hereinafter referred to as “1998 BLM Watershed Analysis”). However, four small, isolated parcels of land (the Maxfield parcels) managed by the BLM in the southern portion of the Luckiamute watershed were not included in the 1998 analysis and are included in the Luckiamute/Ash Creek/American Bottom Watershed Analysis. This appendix was written to provide specific information recommended for watershed analysis of federal lands (Ecosystem Analysis at the Watershed Scale: Federal Guide for Watershed Analysis, version 2.2, REO, 1995.) supplemental to the 1998 BLM Watershed Analysis and the main body of the Luckiamute/Ash Creek/American Bottom Watershed Analysis. Much of the prescribed federal watershed analysis process and information has been met for the Maxfield parcels, and only supplemental information pertinent to the Maxfield parcels is contained here.

Information in this analysis is tiered to the same documents listed in the 1998 BLM Watershed Analysis, Preface, page i.

II. Characterization

- a. Location and Size: Lands managed by the BLM total approximately 8,340 acres in the Luckiamute watershed. The Maxfield parcels, the subject of this Appendix, total 766 acres. There are four parcels found in the southern portion of the Luckiamute. Their general location, relationship to the 1998 BLM Watershed Analysis area, and sixth-field watersheds are shown in Map 1. Legal location of these parcels is T. 10 S., R. 6 W., Section 22, and T. 10 S., R. 5 W., Sections 19 and 29.
- b. Land Tenure: *The Salem District Record of Decision and Resource Management Plan (ROD/RMP) (USDI-BLM 1995)* designates the Maxfield parcels as land tenure zone 3: scattered or isolated parcels that can be sold, transferred or exchanged (see Map 2).
- c. Land Use Allocations: *The Final Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl* (known as the Northwest Forest Plan, USDA, USDI, 1994)

designated three land use allocations (LUAs) for the Maxfield parcels: Late Successional Reserve (LSR), Adaptive Management Areas (AMAs), and Riparian Reserves. Objectives for management of each of these LUAs are described in the 1998 BLM Watershed Analysis. LUA and total acreage of each LUA for the four parcels are shown on Map 1. Riparian Reserves, associated with standing or flowing water bodies, are shown on Map 3, and overlie all other LUAs. The Salem District Record of Decision and Resource Management Plan (ROD/RMP) also designates two other land use allocations: Visual Resource Management Areas and Rural Interface Areas. The Maxfield parcels are in visual resource management class 4 (management activities may dominate the view and be the major focus of viewer attention), and do not fall in a Rural Interface Area.

- d. Landscape relationships: The Forest Peak Area of Critical Environmental Concern (ACEC) in T. 10 S., R. 5 W., Section 29, is included in LSR RO807 (total 159,507 acres) and analyzed in the *Late-Successional Reserve Assessment of Oregon's Northern Coast Range Adaptive Management Area* (USDA, USDI, 1998) (see Maps 1 and 2). The remaining area in the Maxfield parcels is designated AMA. The LSR Assessment delineated landscape zones and cells to help prioritize areas for treatment. The Maxfield LSR parcel is in the buffer landscape zone, areas that are isolated and unlikely to develop large, contiguous blocks of late-successional habitat, in mixed seral landscape cells, and are given a relatively low priority for treatment. Furthermore, these parcels are too small and distant from larger blocks of federal land to fully meet the purpose of LSR.

III. Issues and Key Questions:

The Maxfield parcels differ from the BLM lands analyzed in the 1998 Watershed Analysis in their isolation from other federal lands, a past disturbance regime of frequent fire, and a larger component of 'special habitats', primarily meadow and Oregon white oak woodland. However, issues and key questions identified in the 1998 BLM Watershed Analysis (Chapter II) adequately portray those associated with the Maxfield parcels.

IV. Reference and Current Conditions

- a. Soils: In the last 60 years, the Maxfield parcels appear to have had ground-based harvest on approximately 300 acres, resulting in soil compaction and displacement.
- b. Vegetation- Fire and Forest Uplands: This area of the Luckiamute River watershed is an ecotone between the Willamette Valley bottoms and the upland conifer forests of the Oregon Coast Range. The major plant association groups in conifer forests in the Maxfield parcels are in the grand fir series on dry south slopes and western hemlock series on moist sites and north slopes (*Field Guide to the Forested Plant Associations of the Northern Oregon Coast Range*, McCain and Diaz, 2002).

The Maxfield parcels are different from most of the BLM lands analyzed in the 1998 BLM Watershed Analysis because they contain a large component of meadow and Oregon white oak habitats comprising about 52 ac (7%) of the area. Meadow and oak habitat can occur in highly productive conifer forest matrix as a result of natural disturbance or geomorphic features (soils are too wet, shallow, or dry). Landscape patches created by natural disturbance

can vary greatly in size but are usually short-term in duration, while geomorphic features usually create small sized but long-term patches (more than 100 years) which are maintained, in part, by periodic disturbance. The present extents of meadows are primarily geomorphic, long-term patches of unique habitat that bring plant and animal diversity to the forest matrix of the Oregon Coast Range landscape. There are three types of meadows; wet, which are usually associated with streams or other low elevation geomorphology, mesic, which most often occur on or near ridge tops, and dry, which are commonly associated with shallow soils on steep south slopes. The Maxfield Creek meadows are of the dry type and several of the meadows are surrounded by Oregon white oak (*Quercus garryana*) woodland or savanna.

The grand fir sites were likely dominated by meadows and oak woodland and savanna in the past. Native American burning in and around the Willamette Valley probably created a frequent, low-intensity fire regime that suppressed the spread of conifer forest (see also Luckiamute/Ash Creek Assessment Sections 4.4.1.1 Historical Land Cover Condition and 5.1 Terrestrial Analysis). Fire history since settlement times has continued to shape vegetation in the Maxfield parcels. Widespread fires, including all the parcels in Section 19 and 29, occurred in 1850, 1890, 1920 and 1940. A few scattered trees can be found that pre-date the 1890 fire, but the oldest stands date from 1890. More recent fires apparently resulted in low mortality of trees, but may have slowed conifer encroachment into meadows and oak savannas.

An absence of stumps, snags or logs on grand fir sites indicate that these areas either had severe stand-replacement fire in 1890 or were non-forested prior to that time. Conifer forest that occurred previously on grand fir sites likely had a different structure than forests there today. A regime of frequent, low intensity fires would have led to open, low density forest of scattered, large fire-resistant Douglas-fir often described as a 'woodland' structure, compared to relatively dense, closed conifer forest found there today.

The western hemlock sites were likely dominated by conifer forest in the past, possibly in late seral stages. Current seral stages of conifer forest are shown on Map 3. Timber harvest has reduced levels of late seral forest and likely increased hardwood (red alder and bigleaf maple) forest.

- c. Vegetation- Riparian Reserves: Riparian Reserves, and the seral stages of forest stands within them, are shown on Map 3. Riparian Reserves constitute approximately 392 acres, or 51% of the land in the Maxfield parcels. Riparian areas on south slopes likely had much less conifer forest cover under past conditions that favored meadows and Oregon white oak savanna. Today, only about 22 acres (6%) of the Riparian Reserves are non-forested. On the moister western hemlock sites, conifer, red alder, and bigleaf maple forest dominated and it may have been late seral structure. Today, riparian stands with older forest characteristics such as large trees, snags and downed wood are generally lacking in the Maxfield parcels and will take a long time to develop without further management. In Section 19, past harvest on western hemlock sites has led to a greater proportion of hardwood (primarily red alder and bigleaf maple) in those stands.

Approximately 57% of the Riparian Reserves are less than 80 years old, some consisting of uniform even-aged Douglas-fir stands, and others that contain a hardwood component. Stream shade within the Maxfield parcels is probably greater than reference conditions, due to the increase of conifer forest on south slopes. Within the Maxfield parcels, a lack of shade on

approximately 1,500 feet of streams (3.4 acres) creates high temperature risk at low flow (acres within 15 meters/49 feet of second order and higher streams that are non-forested or have stands less than 10" dbh). (See Map 4).

Coarse woody debris in a stream is generally recruited from within 30 meters (98 feet) of that stream, and the best quality, most durable (high potential) is considered to be conifers over 20" dbh (for this analysis, over 80 years old). Moderate potential includes mid-seral conifer and mid-seral and older hardwood; low potential is young stands and non-forested areas. Coarse woody debris potential in Riparian Reserve acreage in the Maxfield parcels is classed high in 35%, moderate in 44%, and low in 21% (See Map 5).

- d. Hydrology: The Maxfield parcels lie within three 6-field watersheds: the Upper Luckiamute River – Maxfield Creek, Soap Creek, and Berry Creek, comprising a very small percentage of each (approximately 3%, 0.7%, and 0.7% respectively, see Map 1). Consequently, the hydrologic condition and trends in these watersheds are determined primarily by the management activities of private landowners. BLM lands contain headwater tributaries of the Luckiamute River and Soap Creek.

The transient snow zone (defined for this analysis as the zone between 2000 and 3000 feet elevation) is particularly vulnerable to extremes in storm events. It represents an area of higher risk for increasing peak stream flow events as a result of road construction and timber harvest. The Maxfield parcels lie below this sensitive zone, within rain-dominated lowlands below 2000 feet elevation. (See also Luckiamute/Ash Creek Assessment, 6.4.2.3, Stream Flow, Rain-on-Snow).

There are no known domestic or municipal water rights on the Maxfield parcels, and they are not within a municipal watershed.

- e. Stream Channels and Water Quality: Stream channels on or in the vicinity of the Maxfield parcels are primarily small, intermittent 1st and 2nd order headwater streams; they are "source" and "transport" reaches, following the classification of Montgomery and Buffington (1997). These streams are generally Rosgen type A reaches: narrow, steep (gradient 10% or greater), with low sinuosity and moderate to high entrenchment. The largest stream flowing through BLM lands is Maxfield Creek (tributary to the Luckiamute River). The reaches of Maxfield Creek which pass through BLM are primarily Rosgen type B channels (gradient 2-4%), characterized by a series of rapids with irregularly spaced scour pools. Channel morphology is dominated by beaver activity (the creation of dams and backwater pools). Through the section 19 parcel, beaver and large wood/debris structures have widened the main channel, creating a floodplain and marsh. In several places, the Maxfield Creek channel is undercutting the stream bank and threatening to undermine the adjacent roadway.

Refer to Luckiamute/Ash Creek Assessment, Section 6.6.2, Water Quality Evaluation, for a discussion of water quality over the Luckiamute watershed area. The Maxfield parcels contain headwater tributaries to Soap Creek, which is 303d-listed for low dissolved Oxygen levels and tributaries to the Luckiamute River, which is listed for high levels of bacteria. The ODEQ also published the 319 report which identified water bodies with potential non-point source water pollution problems. The Luckiamute River is listed in the 319 report, downstream of BLM lands, for having "severe" water quality conditions, with substantiating

data. The Luckiamute is also cited as having “moderate” water quality conditions affecting aquatic habitat, by observation.

- f. Plant Habitat and Species: Current conditions for plant habitat differ from reference conditions in a number of ways, as described in the 1998 BLM Watershed Analysis. The condition most specific to the Maxfield parcels is the elimination of frequent, low-intensity fire that maintained meadow and Oregon white oak habitat and associated plant communities, and affected the structure of conifer forests on dry sites.

The Forest Peak ACEC/Research Natural Area consists of 134 acres of mature Douglas-fir forest and dry meadow in the Section 29 of the Maxfield parcels. Though the general area was not included in the 1998 BLM Watershed Analysis, Forest Peak ACEC was described (Chapter III, page 38) and recommendations for it was developed.

Cimicifuga elata, tall bugbane, a BLM-listed ‘sensitive’ species is found in the ACEC, and likely occurs in similar habitats elsewhere within the Maxfield parcels.

- g. Fish Habitat and Species: The Luckiamute watershed is dominated by private industrial forest ownership and agricultural lands. These land uses have fractured and altered the habitat within the aquatic environment. Maxfield Creek provides habitat for Upper Willamette Steelhead upstream of BLM ownership in Section 19 (see Map 6), but several undersized culverts are a barrier to juvenile fish passage into its upper reaches. Other streams within the Maxfield parcels do not support Upper Willamette River Steelhead.
- h. Wildlife Habitat and Species: The Maxfield parcels, under reference conditions, may have been dominated by meadows and oak woodlands/ savanna. Species associated with Willamette Valley ecosystems (meadows, oak woodland, and a more open mixed conifer-hardwood forest) may have been more common in the area during reference conditions.

Under reference conditions, the fire regime that favored open forest, meadow and Oregon white oak stands on dry sites would have supported little habitat for species associated with late successional conifer forest, such as spotted owls and marbled murrelet. Any habitat that occurred would likely have been quite isolated from larger habitat blocks further west in the Coast Range. The Maxfield parcels are approximately 35 miles from the Pacific Ocean, greatly reducing viability as marbled murrelet habitat.

The abundance of Oregon white oak and meadow habitat has greatly decreased from the past as a result of fire exclusion and loss to agriculture and development. Current habitat conditions at the Maxfield parcels, in addition to the meadow and oak habitat patches (52 acres), include approximately 250 acres of late-seral (80-199 years) conifer forest habitat, 178 acres of mid-seral conifer forest, 204 acres of early-seral (0-39 years) conifer forest, and 84 acres of hardwood dominated forest (see Map 3).

Due to the small size and isolated nature of the Maxfield parcels very little is known about the species present there and their current conditions or trends. The following table (Table 1, LISTED TERRESTRIAL WILDLIFE SPECIES) summarizes the known sites and habitat requirements of listed species of concern in the Marys Peak Resource Area, specific to the Maxfield parcels, in addition to information in the 1998 BLM Watershed Analysis (Ch. III, page 56).

Table 1: LISTED TERRESTRIAL WILDLIFE SPECIES -MARYS PEAK RESOURCE AREA

Species status as of: April 2003			
INVERTEBRATES	SSS	SAS	Known Sites/ Habitat Requirements
American Acetropis Grass Bug <i>Acetropis americana</i>	BS		No known sites on BLM; associated with tufted hairgrass (<i>Deschampsia cespitosa</i>); may occur on low elevation wet/dry meadows, oak savannah, or grassy openings/balds. May occur in mdw. & oak habitats at Maxfield Crk.
Fender's Blue Butterfly <i>Icaricia icarioides fenderi</i>	FE		No known sites on BLM; known to occur at OSU MacDonald Forest; larvae feed on Kincaid's lupine. May occur in mdw & oak habitats at Maxfield Crk.
Taylor's Checkerspot Bttrfly <i>Euphydryas editha taylori</i>	BS		No known sites on BLM; only known site in OR on grassy bald in OSU MacDonald Forest; larvae feed on grasses, esp. Festuca spp; see 2. above for suitable habitat on BLM. May occur in mdw. & oak habitats at Maxfield Crk.
BIRDS	SSS	SAS	Known Sites/ Habitat Requirements
American Peregrine Falcon <i>Falco peregrinus anatum</i>	SE/BS BCC		No known nest sites on BLM in R.A., best cliff-type nesting habitat occurs along coast, in Portland, and in Columbia Gorge.
Bald Eagle <i>Haliaeetus leucocephalus</i>	FT		One breeding pair on BLM, no known sites in or adjacent to the Maxfield parcels.
Marbled Murrelet <i>Brachyramphus marmoratus</i>	FT		No known sites at Maxfield parcels. Approx. 200 acres of unsurveyed suitable habitat and 50 acres of surveyed suitable habitat (no detections) exists. Parcels are too far from coast and too isolated from other federal suitable habitat to be of value to murrelet recovery.
Northern Spotted Owl <i>Strix occidentalis caurina</i>	FT		No known sites at Maxfield parcels. Approx. 200 ac. of unsurveyed suitable habitat and 50 ac. of surveyed suitable habitat (no detections) exists. Parcels are too isolated from other federal suitable habitat to serve owl recovery.
Oregon Vesper Sparrow <i>Pooecetes gramineus affinis</i>	BS BCC		No known sites on BLM; prefers open areas within or adjacent to oak savannah or open mixed conifer/hardwood forests; not a conifer forest species. May occur in oak habitat at Maxfield Crk.
Purple Martin <i>Progne subis</i>	BS		Known to occur on BLM lands; prefers large snags within early-seral (0-39 years) habitat or adjacent to other open type habitats. May occur in snags in or adjacent to meadow habitat at Maxfield Creek.
MAMMALS	SSS	SAS	Known Sites/ Habitat Requirements
Pacific Fisher <i>Martes pennanti pacifica</i>	BS		No known sites on BLM; rare in the north half of the Coast Range
Townsend's Big-Eared Bat <i>Corynorhinus townsendii townsendii</i>	BS	RR/B RS	No known sites on BLM; no known caves, mines, or cave-like structures on BLM in the RA.
AMPHIBIANS	SSS	SAS	Known Sites/ Habitat Requirements
N. Red-Legged Frog <i>Rana aurora aurora</i>	BA	RR	Known to occur on BLM lands.
Tailed Frog <i>Ascaphus truei</i>	BA	RR	Known to occur on BLM lands.
REPTILES	SSS	SAS	Known Sites/ Habitat Requirements
Western Painted Turtle <i>Chrysemys picta bellii</i>	BS		No known sites on BLM; prefers marshes, slow rivers, ponds and lakes with large amounts of aquatic vegetation and with a muddy or sandy substrate.
Western Pond Turtle <i>Clemmys marmorata marmorata</i>	BS		No known sites on BLM; rare in the Willamette Va. north of Eugene; prefer marshes, ponds, lakes, and quiet rivers with large amounts of emergent logs or boulders for aggregate basking.

SSS=Special Status Species in order of priority (they are mutually exclusive):

Endangered Species Act Listings: FE=Federal Endangered; FT=Federal Threatened; **Oregon Dept. of Fish & Wildlife Listings:** SE=State Endangered; ST=State Threatened; **BLM Listings:** BS=Bureau Sensitive, **OR/WA BLM State Office Listings:** BA=Bureau Assessment; **USFWS (Executive Order 13186) Birds of Conservation Concern 2002:** BCC=Bird of Conservation Concern

SAS=Special Attention Species:

Northwest Forest Plan Listings: RR=Riparian Reserve Species; **SM=Survey & Manage Species;** BRS=Bat Roost Site Species

- i. **Human Uses:** In the past 60 years, approximately 372 acres of the total 766 acreage of BLM lands in the Maxfield parcels have been harvested. Consistent with Adaptive Management Area and Aquatic Conservation Strategy objectives, approximately 220 acres of conifer forest is available for commercial density management and 156 acres is available for conifer woodland, meadow, and oak restoration, most within this decade (see Map 7). Approximately 160 acres of conifer forest will be available for commercial density management in the next two decades.
- j. **Transportation Management:** Conditions described in the 1998 BLM Watershed Analysis (Ch. III, page 63) are applicable to the Maxfield parcels. The road system in the Maxfield parcels accesses both BLM lands and adjacent private land. There are 2.4 miles of BLM controlled roads, and 85 miles of privately controlled roads, with a total road density of 5.8 mi/sq mi (see Map 8) in the Maxfield parcels area. The road that lies alongside Maxfield Creek (Rosboro Lumber Co. controlled, through sections 14, 23, 24, and 19) is a chronic source of sediment into Maxfield Creek, and culverts are a barrier to fish passage.
- k. **Recreation:** Recreation use in the Maxfield parcels is limited because the main roads leading into Maxfield Creek and upper Soap Creek are privately-controlled and are gated. The 13 acre parcel at T. 10 S., R. 6 W., Section 22 is immediately adjacent to Pit Road (Benton County) affording excellent access. A Corvallis cross-country running club maintains a running trail there, under a 10 year BLM easement.

V. Synthesis/Interpretation and Management Recommendations

Synthesis, interpretation and management recommendations listed in the 1998 BLM Watershed Analysis (Chapter IV) are relevant to the Maxfield parcels. The following supplemental information repeats the most applicable information and adds information specific to the Maxfield parcels.

- a. Land Tenure: The Salem District ROD/RMP designates the Maxfield parcels as Land Tenure Zone 3: potentially available to be sold, transferred or exchanged, but directs that lands with special resource values be retained. The resource value of the Forest Peak ACEC and the special habitats found in these parcels would likely preclude disposal.

Management Recommendations:

- Create a Salem District Land Tenure interdisciplinary team to determine, at a province level, the best strategy for Land Tenure Zone 3 lands in Salem District. Retention of the Maxfield parcels is recommended for their special resource values.

- a. Soils: Ground-based harvest in the past on the Maxfield parcels has created some soil impacts. Additional disturbance from harvest in the next decade is likely but would be within Best Management Practices Guidelines (Salem District RMP, C-1).

Management Recommendations:

- Use Best Management Practices and Management Recommendations listed in the 1998 BLM Watershed Analysis to prevent further impacts to soils from harvesting in the Maxfield parcels, and ameliorate impacts from past ground-based harvest there.
- Protect shallow soils where they occur in meadows by developing appropriate design features in project planning.

- b. Vegetation- Fire and Forest Uplands: Portions of the Maxfield parcels on relatively dry grand fir sites were influenced by frequent fire, maintaining open conifer stands (woodland structure), meadows, and Oregon white oak savanna. On moister western hemlock sites, mid to late seral conifer forest probably dominated, but much of it has been harvested in the last 60 years and now 60% of the stands in the Maxfield parcels are less than 80 years of age. These stands now generally contain a higher component of red alder and bigleaf maple, are dense and uniform in stocking, and have low levels of snags and downed wood. In addition to the recommendations listed in the 1998 BLM Watershed Analysis (CH. IV, p. 8) the following are recommended:

Management Recommendations:

- c. In stands dominated by dense alder and maple, conduct conifer release treatments where appropriate, considering overall landscape diversity and individual stand development.
- d. Manage tree density in stands of all ages where appropriate to increase growth and achieve structural and density diversity and develop complex crown structure. On grand fir sites consider treatments to re-create structural conditions that existed under past fire regime, and create some openings in the conifer canopy to re-establish an Oregon white oak component.

- e. Consider preparing a prescribed fire plan for underburning in stands, meadows, and oak savanna to increase structural diversity and maintain desired stand and vegetation conditions.
- a. Vegetation- Riparian Reserves: About 18% (69 ac.) of the 374 Riparian Reserve acres in the Maxfield parcels are forested with hardwoods, similar to composition in Riparian Reserves in the rest of the 1998 BLM Watershed Analysis area. Red alder and bigleaf maple found within narrow strips along streams, and in floodplains with high water tables are not appropriate for restoration or conifer enhancement. There are other areas, previously occupied by conifers, where hardwood seeded in after logging and now dominate the site that may be suitable for restoration activities. Current stream-side vegetation shade conditions are likely at or above the range of reference conditions, as forest cover has increased due to fire exclusion.

The trend for BLM lands is toward increased coarse woody debris potential because the goals for Riparian Reserves include increasing coarse woody debris and maturing stands of conifer are available to provide it.

In addition to the recommendations listed in the 1998 BLM Watershed Analysis (CH. IV, p. 11) recommendations are listed in Table 2, Aquatic Conservation Strategy Objectives Review Summary (Northwest Forest Plan, USDA, USDI, 1994, p. B-11).

- b. Hydrology, Stream Channels and Water Quality: Synthesis, interpretation and trends for hydrologic processes in these watersheds are likely to follow those as described in the 1998 BLM Watershed Assessment.

Because BLM lands represent such a small percentage of the three sub-watersheds examined, current and future hydrologic conditions are likely to be driven by actions taken on private lands. Typical actions taken on BLM lands (road construction, road decommission, forest density management, planting, recreation, etc) are unlikely to produce any measurable cumulative effects on the Luckiamute watershed or sub-watersheds, as they are likely to be overshadowed by private actions. As BLM activities do not contribute large amounts of organic matter to the stream system, they are not likely to exacerbate existing degraded water quality conditions (low dissolved oxygen and high bacteria).

In addition to the recommendations listed in the 1998 BLM Watershed Analysis (CH. IV, p. 11) recommendations are listed in Table 2, Aquatic Conservation Strategy Objectives Review Summary (Northwest Forest Plan, USDA, USDI, 1994, p. B-11).

Table 2 Aquatic Conservation Strategy Objectives Review Summary (Salem District RMP pages 5-6)

ACS Objective	Management Recommendations/Consistency with ACS Objectives
1) Maintain and restore distribution, diversity, and complexity of watershed and landscape features to ensure protection of aquatic systems.	<p>Maintain and restore: Diverse vegetation appropriate to the water table, geomorphic land type and stream channel type; and multi-layered canopy, mature conifer, coarse woody debris where they occurred in the past. Stream connection to its floodplain. Stream bank vegetation to maintain bank stability. Management recommendations to maintain and restore oak, meadow and woodland habitat and to perform density management in conifer stands is consistent with this objective and will not prevent attainment of ACS objectives.</p>
2) Maintain and restore spatial connectivity between watersheds.	<p>Within BLM lands maintain spatial connectivity between watersheds to the extent possible, and on adjacent private lands through cooperative watershed and fish habitat enhancement efforts.</p>
3) Maintain and restore physical integrity of the aquatic system including shorelines, banks and bottom configurations.	<p>Minimize construction of additional stream crossings. Evaluate any proposed new or renovation stream crossing using the criteria developed in the Benton Foothills (BLM, 1997) Watershed Assessment. Upgrade crossings on potentially unstable stream channels, to allow for the passage of debris torrent material without blocking of streamflow. Replace/upgrade crossings that have an outflow drop that causes appreciable bed scour and represent a barrier to fish or other aquatic species. All failing and/or worn stream crossings should be replaced with bankful-to-bankful, 100-year flood design culverts. Culverts with natural or sunken bottoms should be installed wherever feasible. Recommendations to replace culverts, a bridge, and improve road drainage are consistent with this ACS objective and will not prevent attainment of any ACS objective.</p>
4) Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems.	<p>Upgrade or decommission road segments that represent a risk for cumulative effects, considering proximity to the riparian zone, hillslope stability, road maintenance and use, and age and construction methods. In particular, the road paralleling Maxfield Creek should be renovated (including but not limited to regrading, rocking, road bed stabilization, and cross drain installation). Such work will help attainment of ACS objective.</p>
5) Maintain and restore the sediment regime under which the system evolved.	<p>Renovate or construct roads to route water captured on road surfaces to stable hillslopes, not directly into stream channels, utilizing out-sloping, rolling dips, more frequent ditch relief culverts (cross drains), etc. Place a higher priority on roads actively contributing sediment into the stream system and/or those within Riparian Reserves and/or on high gradient hillslopes.</p>
6) Maintain and restore in-stream flows.	<p>Maintain and restore processes that allow water storage and gradual release to contribute to baseflows, connection to floodplain, and unimpeded channel morphology. Beaver activity in Maxfield Creek system is beneficial to in-stream processes and floodplains. Culvert replacement and road maintenance should be designed to avoid conflicts with beaver activities.</p>
7) Maintain and restore the timing, variability, and duration of flood plain inundation and water table elevation in meadows and wetlands.	<p>Maintain vegetation within the range of reference conditions in meadows, wetlands, seeps and springs. Recommendations to restore and maintain oak, meadow, and woodland habitat and perform density management are consistent with this objective and will not prevent attainment of any ACS objective.</p>

Table 2 Aquatic Conservation Strategy Objectives Review Summary (Salem District RMP pages 5-6)

ACS Objective	Management Recommendations/Consistency with ACS Objectives
8) Maintain and restore the species composition and structural diversity of plant communities in riparian zones and wetlands to provide thermal regulation, nutrient filtering, and appropriate rates of bank erosion, channel migration and CWD accumulations.	<p>Within riparian zones and wetlands, maintain current species composition, except as necessary to restore meadow, oak savanna, and oak and conifer woodland habitats that occurred there under reference conditions.</p> <p>Consider activities in the hardwood dominated stand in T.10 S, R.5 W., Sec. 19 to enhance conifer growth and establishment for long-term CWD recruitment. Density management in conifer stands within riparian reserves is recommended to increase CWD size and input and maintain desired stand structure and species composition to meet ACS objectives. Commercial density management and associated transportation development will not prevent attainment of this and other ACS objectives.</p> <p>Apply the criteria developed in the Benton Foothills WA for evaluating projects for stand manipulation (thinning, conversion of hardwood stands, meadow restoration, etc.) in Riparian Reserve areas.</p> <p>Evaluate the potential benefits of placing coarse woody debris and debris jam structures at natural catch points in transport and response channels (i.e., at tributary junctions, constrictions, outside bends of meanders, etc.).</p>
9) Maintain and restore habitats to support well-distributed populations of native plant, invertebrate, and vertebrate riparian dependent species.	<p>See recommendation for ACS objective number 7, above.</p> <p>Recommendations to restore approx. 156 acres of oak, meadow and woodland habitat and to perform commercial density management on approx. 220 acres of conifer forest in both riparian reserves and uplands are consistent with this objective and will not prevent attainment of other ACS objectives.</p>

- c. Species and Habitats- Plants: Synthesis, interpretation and management recommendations contained in the 1998 BLM Watershed Analysis (Ch. IV, p.12) are relevant to the Maxfield parcels. However, in the Maxfield parcels, conifer succession has played a greater role in changing conditions in plant habitats.

Management Recommendations:

- Initiate the interdisciplinary team process to determine the importance and relevance of expanding the boundary of the Forest Peak ACEC (currently 134 ac.) to include the entire 160 acre quarter-section BLM parcel it is located in. It is recommended that no further non-emergency management action be taken within the 26 acres to be potentially added, until the interdisciplinary team process has been completed.
- Identify opportunities to maintain and expand habitat for species that are found in meadow, woodland, and oak savanna habitat. Control exotic species within these habitats that displace native species.

- d. Species and Habitats- Fish: Synthesis, interpretation and management recommendations found in the 1998 BLM Watershed Analysis (Ch. IV, p. 13) are relevant to the Maxfield parcels. Specific to this area:

Management Recommendations:

- Improve culverts on Maxfield creek for fish passage.
- Continue to look for other restoration opportunities within the Maxfield parcels.

- e. Species and Habitats- Wildlife: Inferences about species conditions can be made from the past, present and expected future conditions of the habitats in and adjacent to the Maxfield parcels. In general, species that depend on conifer forest are probably increasing in richness and abundance while species which depend on meadow and oak habitats are probably decreasing. The Maxfield parcels are too fragmented, too small and too isolated from other federal natural resource lands to provide suitable habitat for species which require large amounts of similar forest, meadow, or oak habitats. Usually species requiring large ranges need interior habitat away from edges, something the Maxfield parcels cannot provide since they are surrounded by multiple landowners. Old-growth conifer forest habitat is currently absent from the parcels and the adjacent lands, so the species associated with it are probably not present. Wildlife that prefer early, mid, and late-seral conifer forest habitat, and do not require large areas of interior forest, should be present in the area. Species which can survive in small meadow and oak patches should also be present.

Meadow and oak habitat represent islands of plant and animal diversity within the conifer forest landscape. As a result of the policies which exclude fire from the landscape, the meadow and oak habitat at the Maxfield parcels is being choked out by conifer tree encroachment. Active restoration management will be necessary to offset the accelerated rate of succession from meadow and oak habitat to conifer forest. Without active restoration, the sites may eventually become closed-canopy conifer stands, a very common habitat in the Oregon Coast Range.

It may not be possible to maintain viable populations on BLM lands of all species associated with meadow and oak habitats since the BLM manages so few acres in the watershed. Listed species which may benefit from meadow and oak release, restoration, and maintenance are listed below and in Table 1 of this Appendix:

American Acetropis Grass Bug (*Acetropis americana*)
Fender's Blue Butterfly (*Icaricia icarioides fenderi*)
Oregon Giant Earthworm (*Driloleirus macelfreshi*)
Taylor's Checkerspot Butterfly (*Euphydryas editha taylori*)
Oregon Vesper Sparrow (*Pooecetes gramineus affinis*)
Purple Martin (*Progne subis*)

Several species of cavity nesting birds, including some neotropical migrants, are closely associated with oak woodland/savanna habitats in western Oregon. Within much of the existing oak habitats there is a lack of large-diameter open-grown oak which provides significantly more mast production and cavity habitat than smaller oak or conifers of the same size. Releasing the largest oaks and thinning the densest stands of oak should improve nesting and foraging conditions for the following species which currently have a downward population trend in western Oregon:

Western Bluebird (*Sialia mexicana*)
Acorn Woodpecker (*Melanerpes formicivorus*)
Lewis' Woodpecker (*Melanerpes lewis*)
White-breasted Nuthatch (*Sitta carolinensis*)

Wildlife management recommendations for the Maxfield parcels are listed as follows. (Note: Of the six recommendations listed on pages III-18 and III-19 in the 1998 BLM Watershed Analysis, only priority recommendation number four would apply to the Maxfield parcels).

Management Recommendations:

- Restore and maintain selected meadow and oak habitats within the Maxfield parcels to provide historic habitat for associated floral and faunal biodiversity. Several Special Status Species may benefit if these patches are prevented from becoming too small and too fragmented. Restore meadows to the greatest spatial extent possible to maximize the time between future release treatments. Use soils, geomorphic features, vegetation, and existing forest edges as guidelines.
 - Create snags at meadow sites by girdling Douglas-fir trees at least 24 inches DBH. Snags should be clumped and situated for abundant solar heating. Created snags will provide habitat for several Special Attention Species bats, for the Bureau Sensitive purple martin and for many other cavity nesting species. Girdling is recommended also to eliminate conifer where cutting could damage adjacent oak trees.
 - Create conditions to develop large-diameter open-grown oak which produce more acorns and cavity habitat than small suppressed trees, to increase wildlife nesting and foraging habitat.
 - Reduce populations of weeds and prevent their spread following reduction of conifer canopy. Consider use of all prevention and control methods, including the use of herbicides. Maintain and restore native plant species to benefit wildlife.
- f. Human Uses: Objectives established for the North Coast Adaptive Management Area are to restore and maintain late-successional forest and conserve fisheries habitat and biological diversity, and to develop and test new approaches to public forest land management using principles of adaptive management. Projects designed to meet those objectives may also result in availability of commodity forest products, under the following management recommendations:

Management Recommendations:

- Perform density management treatments in stands, including those in Riparian Reserves, to shape stand structure and species diversity to benefit and restore wildlife and aquatic habitat.
 - Identify and implement all current stand management needs for BLM lands in the Maxfield parcels to reduce the frequency of entries.
 - Propose stand management projects to promote ecological values and contribute to AMA and Riparian Reserve objectives using economically viable timber sales.
 - Promote research, monitoring and adaptive management opportunities by designing learning and research objectives into project planning.
- g. Transportation: The BLM controls only 3% of the road system in the Maxfield parcels area, so implementation of management recommendations by BLM is expected to have only a proportionate effect on mitigating issues related to transportation management.

In addition to recommendations listed in the 1998 BLM Watershed Analysis, the following are made:

Management Recommendations:

- f. Cooperate with adjacent landowners to seek long-term alternative route to remove road from Maxfield creek riparian area.
- g. Upgrade/replace bridge in Township 10 South, Range 6 West, Section 14 on Maxfield Creek, through cooperation with private landowners.
- h. Recreation: Use is severely limited by access. Recreation opportunities in the Pit Road parcel, Township 10 South, Range 6 West, Section 22, can be maintained by considering aesthetic values.

i.

Management Recommendations:

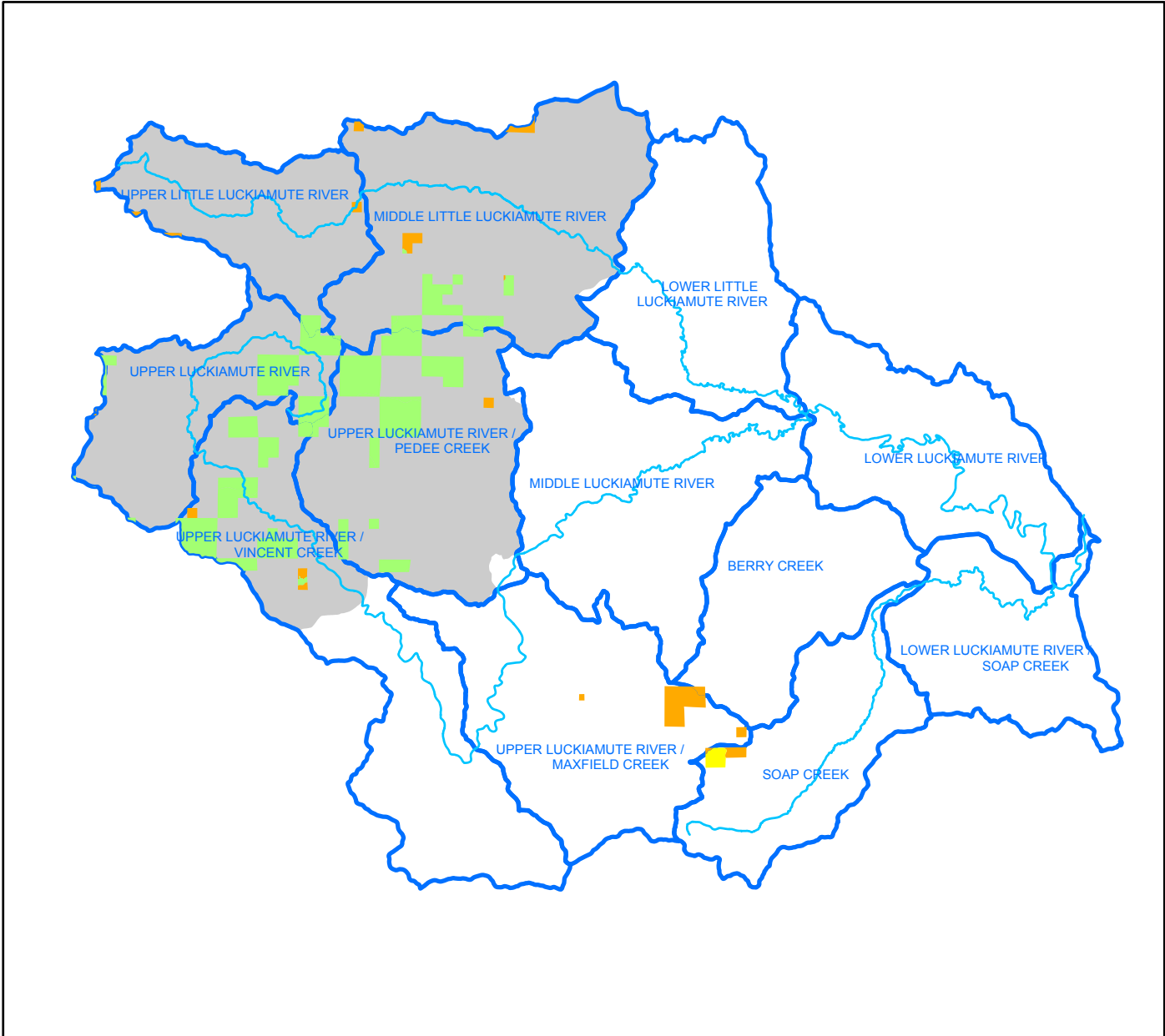
- h. Pursue opportunities to allow greater public access to BLM lands.
- i. Consider safety and aesthetics on running club trail when project planning.
- j. Monitor illegal dumping and inappropriate off-road vehicle use on accessible BLM lands.

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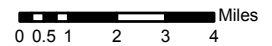
Additional Watershed Analysis for Federal Lands

Map 1: Luckiamute Watershed and 1998 BLM Watershed Analysis



Legend

- major rivers
 - sixth field watershed boundaries
 - 1998 BLM watershed analysis area
- land use allocations
- AMA (1,059 acres)
 - AMR (7,059 acres)
 - LSR (145 acres)



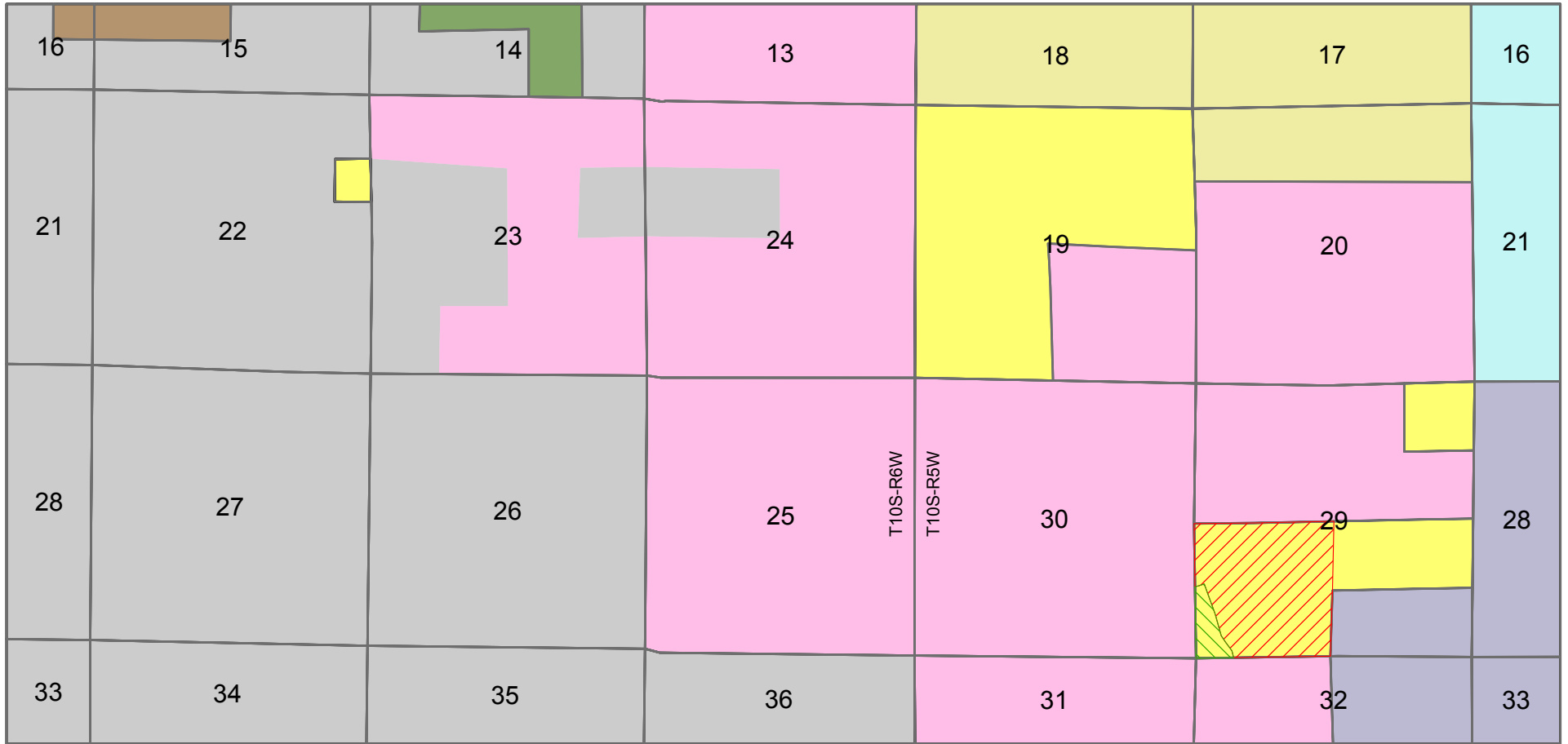
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






Additional Watershed Analysis for Federal Lands

Map 2: Land Status/Visual Resource Management/Area of Critical Environmental Concern (ACEC)



-  Bureau of Land Management (All BLM lands are VRM Class 4)
-  Forest Peak ACEC
-  Recommended Addition to Forest Peak ACEC

Legend

-  State of Oregon (OSU)
-  Boise Cascade Corp.
-  Hampton Industries
-  Rosboro Lumber
-  Starker Forests Inc.
-  Weyerhaeuser Co.
-  Other Lands



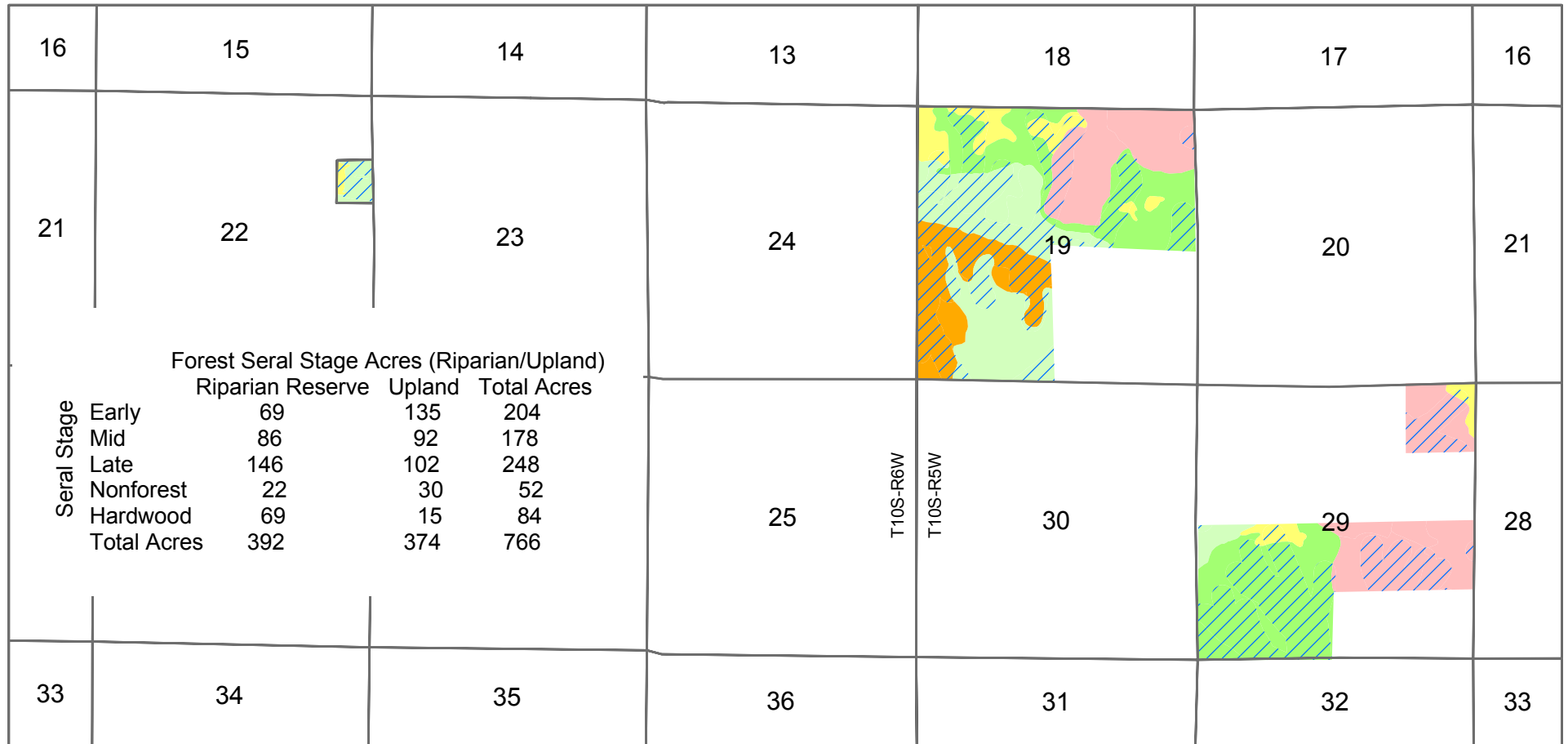
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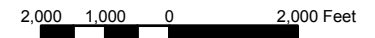
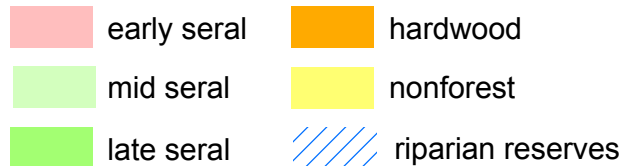
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Additional Watershed Analysis for Federal Lands

Map 3: Conifer Seral Stages/Riparian Reserves



Legend



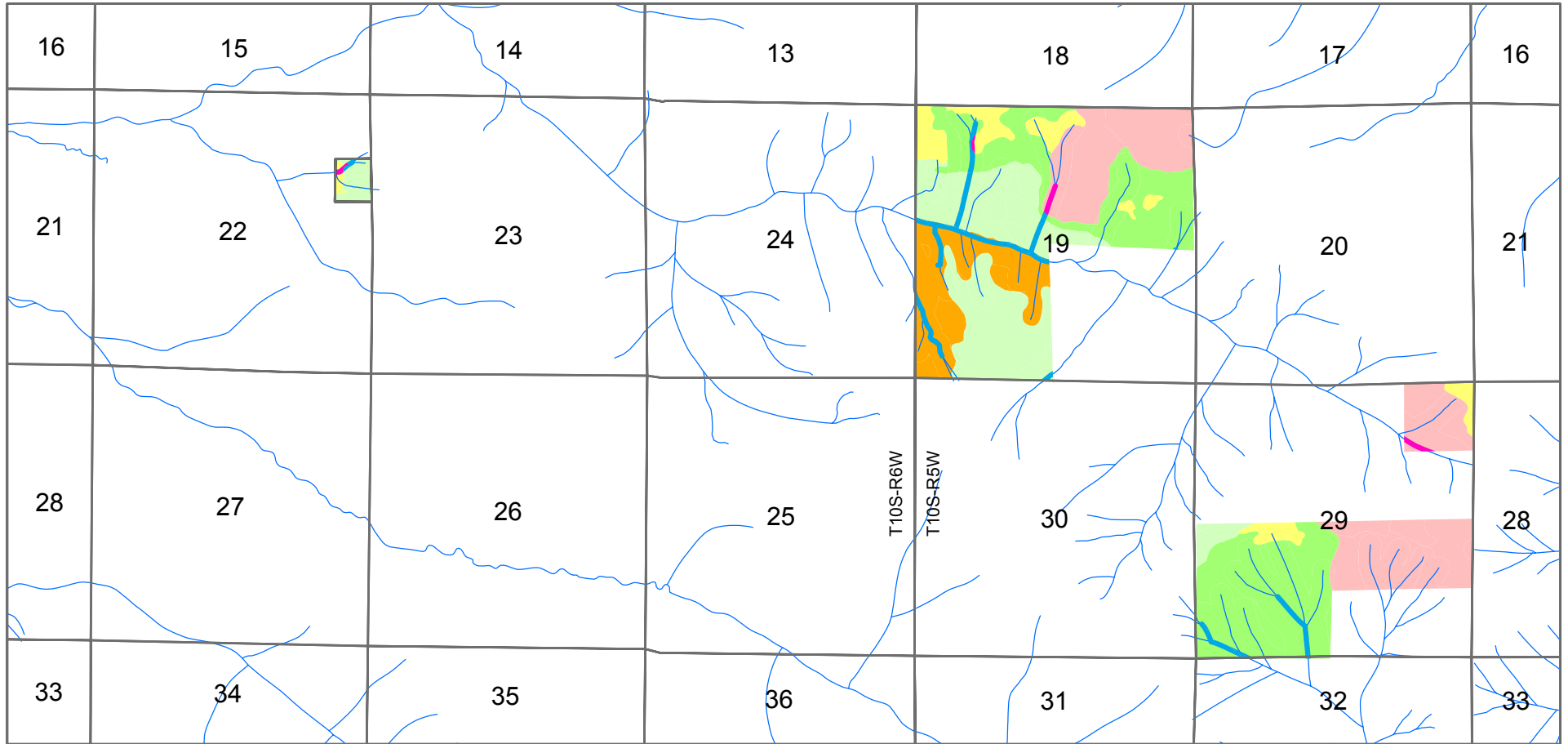
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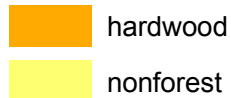
Additional Watershed Analysis for Federal Lands

Map 4: Stream Temperature Risk

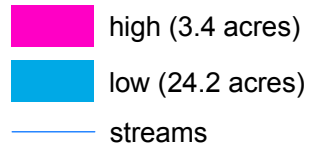


Legend

seral stage



temperature risk



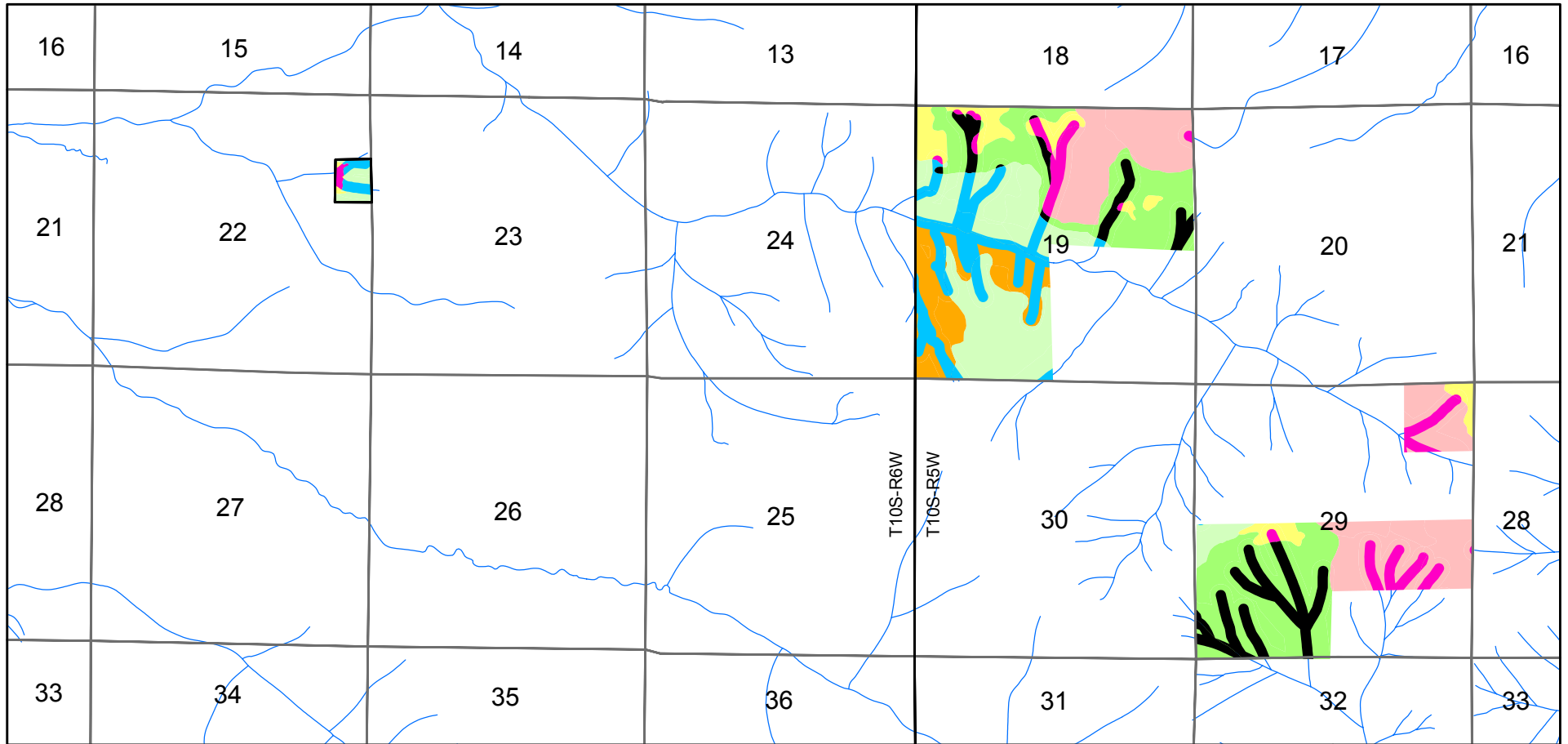
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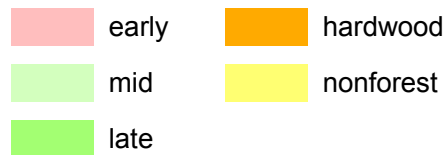
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Additional Watershed Analysis for Federal Lands

Map 5: Large Woody Debris Potential in Streams

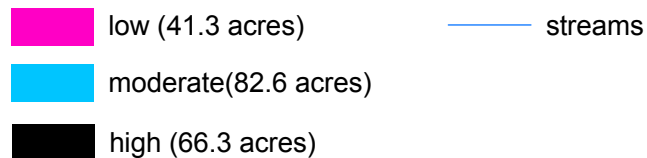


seral stage



Legend

large woody debris potential



1,750 875 0 1,750 Feet

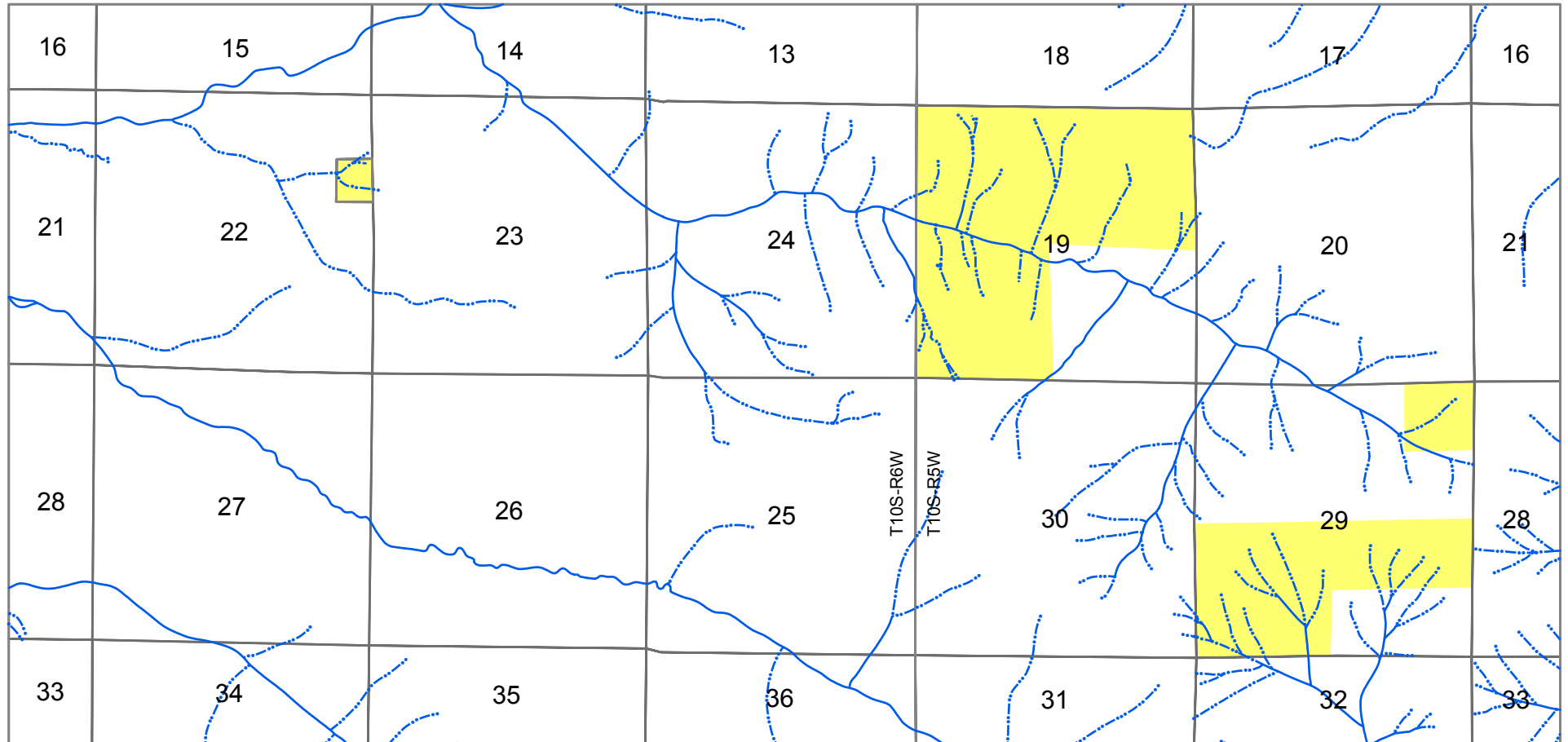
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Additional Watershed Analysis for Federal Lands

Map 6: Fish Presence



Legend

-  fish absent
-  fish present
-  BLM ownership



2,000 1,000 0 2,000 Feet



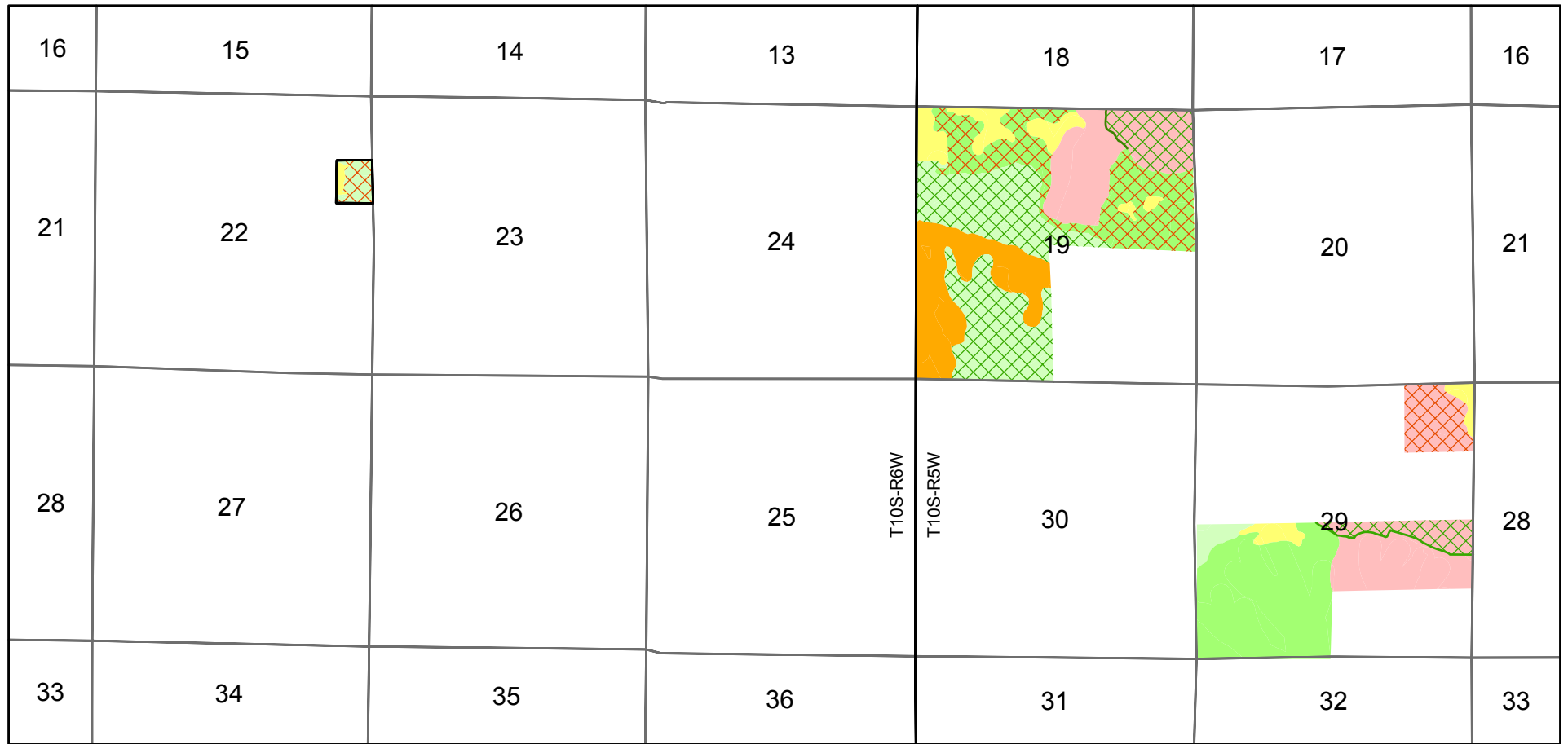
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Additional Watershed Analysis for Federal Lands

Map 7: Stand Treatments



Legend

Seral Stage		Treatment
early	hardwood	conifer density management (220 acres)
mid	nonforest	conifer woodland/ Oregon White Oak/ meadow restoration (156 acres)
late		

NORTH

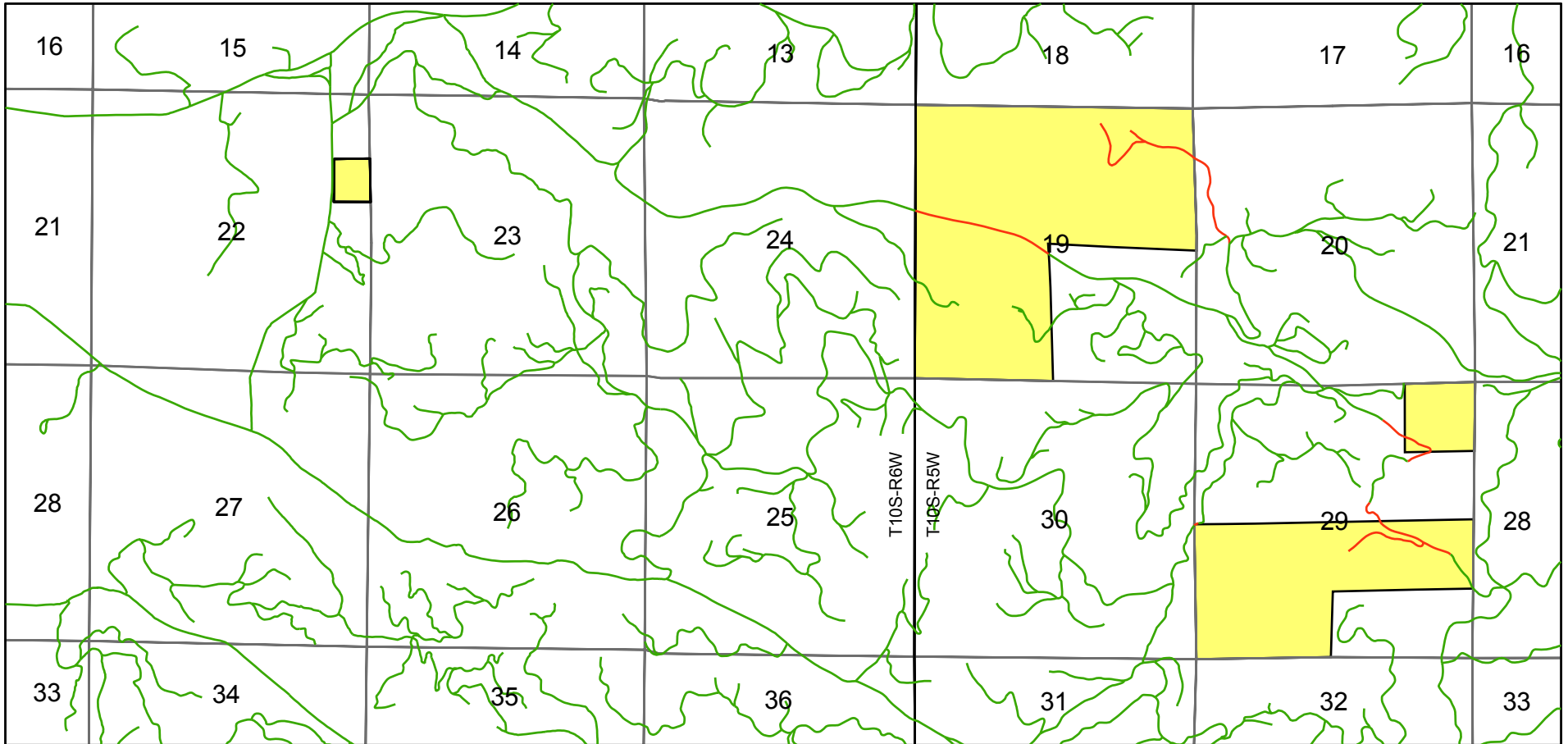
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Additional Watershed Analysis for Federal Lands

Map 8: Road Control and Road Density



Road Control Mileages and Road Density

Control	Miles	BLM ownership
Private and Other	85.4	
BLM	2.4	
Total Mileage	87.8	
Road Density (miles/square mile)	5.8	



Data -

Source: BLM corporate
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