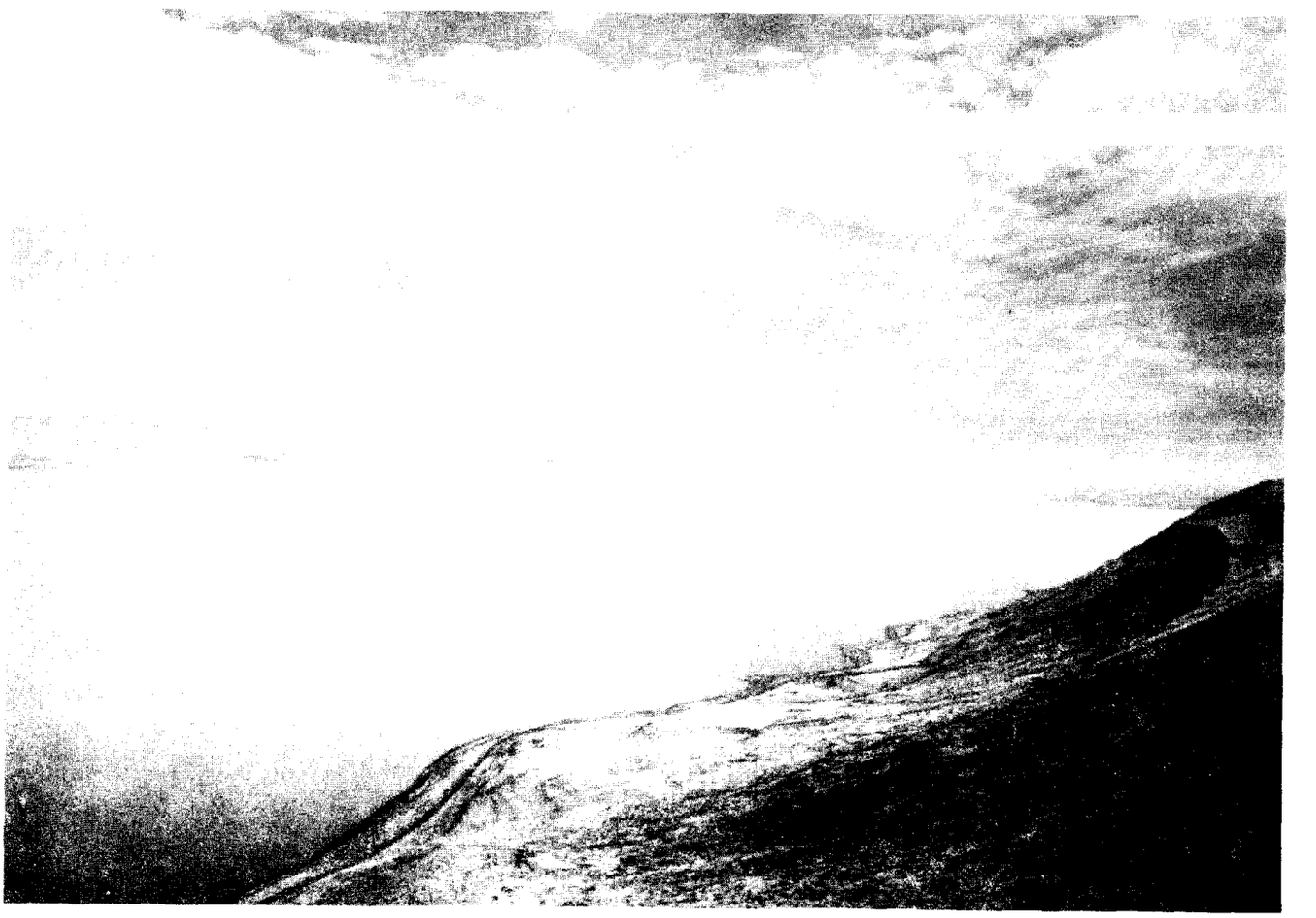
U.S. Department of the Interior
Bureau of Land Management

Lakeview District Office
1000 South 9th Street
Lakeview, Oregon 97630

May 1995

High Desert Management Framework Draft Plan Amendment and Environmental Impact Statement for the Proposed Lake Abert Area of Critical Environmental Concern (ACEC) in Lake County, Oregon



As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation The Department assesses our energy and mineral resources and works to assure that their development is in the best interest of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U S administration

BLM/OR/WA/EA-95/014+1792

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Lakeview District Office
P.O Box 151 (1000 Ninth Street S.)
Lakeview, Oregon 97630

IN REPLY REFER TO
1610/1613 (015)

May 1, 1995

Dear Concerned Citizen:

Thank you for your interest in our effort to amend the High Desert Management Framework Plan (MFP) which covers a proposal to designate the Lake Abert area as an Area of Critical Environmental Concern (ACEC). The enclosed environmental impact statement (EIS) addresses seven management alternatives for the area. The purpose of the EIS is to analyze the potential environmental impacts of the alternatives on Bureau of Land Management (BLM) administered land in the plan amendment area. I would appreciate your comments on the adequacy of this analysis.

The following types of comments would be most helpful in the decision process: 1) are as specific as possible; 2) address the appropriateness of the alternatives; 3) identify unaddressed issues: 4) provide new information or data; 5) address the adequacy of the analysis; or 6) identify errors in the data or analysis.

Two public meetings will be held during the 90-day review period. The first will by held at the Lakeview BLM District conference room. 1000 South Ninth Street. Lakeview. Oregon, on June 27. 1995. The second will be held in Room 161 of the Boyle Education Center, Central Oregon Community College. 2600 NW College Way, Bend, Oregon, on June 29, 1995. Both meetings will start at 6:30 p.m.

Comments may be submitted at the public meetings or sent to the following address by **August 16, 1995:**

Scott Florence. Area Manager
Bureau of Land Management
Lakeview Resource Area
P. O. Box 151
Lakeview, Oregon 97630

If you would like further information about the plan amendment process. beyond that presented in this document, please contact Paul Whitman, Planning and Environmental Coordinator at (503) 947-6 1 1 0

I appreciate your involvement in this process to date and encourage you to continue to be involved in the management of your public lands.

Sincerely,

Scott R. Florence

Scott R. Florence
District Manager, Acting

Enclosure (as stated)

U.S. Department of Interior
Bureau of Land Management

HIGH DESERT MANAGEMENT FRAMEWORK DRAFT PLAN AMENDMENT AND ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED LAKE ABERT AREA OF CRITICAL ENVIRONMENTAL CONCERN (ACEC) IN LAKE COUNTY, OREGON

Prepared by

Lakeview Resource Area Office
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January 1995

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Oregon State Director

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District Manager
Lakeview District Office

Scott R. Florence 1/23/95
Scott R. Florence
Area Manager
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HIGH DESERT MANAGEMENT FRAMEWORK DRAFT PLAN AMENDMENT AND ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED LAKE ABERT AREA OF CRITICAL ENVIRONMENTAL CONCERN (ACEC) IN LAKE COUNTY, OREGON

Draft (X) Final ( ) MFPA/EIS
Department of the Interior, Bureau of Land Management, Lakeview District

TYPE OF ACTION: Administrative (X), Legislative ( )

ABSTRACT: This draft Plan Amendment and Environmental Impact Statement addresses the management of resources within approximately 123,000 acres of public land and 101,700 acres of reserved mineral estate administered by the Bureau of Land Management, Lakeview Resource Area of the Lakeview District. The planning area is located approximately 30 miles north of Lakeview, Oregon, in Lake County. This document was prepared in response to proposals by a public organization and a State agency to designate the Lake Abert area as an Area of Critical Environmental Concern (ACEC). During the planning process, 16 issues were identified relating to the management of the area. A total of 10 management goals were developed to address those issues. A total of seven management alternatives were developed to meet the goals. These ranged from No Action (Alternative 1; no ACEC and continue existing management) to designating and protective management of the entire planning area as an ACEC (Alternative 2). Variations within this range included no ACEC designation, but some changes in management (Alternative 6) to ACEC designations with various degrees of protective management (Alternatives 3, 4, 5, and 7). The preferred plan (Alternative 7) involves designating approximately 49,900 acres of public land within the planning area as an ACEC. Special management direction identified under the proposed plan has been developed to protect those resource values previously identified as relevant and important (aquatic ecology, cultural resources, visual resources, and wildlife) and would involve the following resources: air quality, minerals, hydrology, water quality, vegetation, aquatic communities, fire, rights-of-way, rangeland, wildlife, special status species, cultural resources, visual resources, and recreation. The potential impacts of the alternatives, including the proposed action, are described in detail in the document.

COMMENT PERIOD: The comment period on the draft Plan Amendment/Environmental Impact Statement will last 90 days and end on the date specified in the cover letter at the very front of this document.

FOR FURTHER INFORMATION CONTACT:

Paul Whitman
Planning and Environmental Coordinator
Bureau of Land Management
Lakeview District
P.O. Box 151
Lakeview, OR 97630
Ph: 503-947-6110

Summary

The Lakeview District of the Bureau of Land Management (BLM) has prepared this plan amendment to address the appropriateness of designating Lake Abert and the surrounding area as an Area of Critical Environmental Concern (ACEC). This designation (accompanied by special management actions) has been evaluated as a means of protecting significant resources in the area.

A total of seven alternative plans covering a wide range of management actions were developed for the planning area. These are discussed in great detail in Chapter 2. Alternatives 1 (No Action) and 6 call for no ACEC designation within the planning area. Alternatives 2, 3, 4, 5, and 7 (Preferred Plan) include an ACEC designation for all or part of the planning area. Management action, by resource, for each alternative is summarized in Table S- 1. The impacts of each alternative are summarized, by resource, in Table S-2.

Table S-l. Comparison of Management Action by Alternative

RESOURCE	ALTERNATIVE 1 (NO ACTION)	ALTERNATIVE2	ALTERNATIVE3	ALTERNATIVE4	ALTERNATIVES	ALTERNATIVE6	ALTERNATIVE7 (PREFERRED PLAN)
Lands	No specific direction Acquire lands through exchange. if in the public Interest.	Actively acquire inholdings where there is a willing seller preferably through exchange.	Same as Alternative 1	Same as Altematrve I	Same as Altematrve I	Same as Altematrve I	Same as Altematrve I
Rights-of-Ways	Open to the location of new rights-of-ways, except Abert Rim WSA.	Allow no new rights-of-ways.	Allow new rights-of-ways. but only in accordance with the restrictions of VRM class. lake levels, total dissolved solid levels. and wilderness IMP	Same as Altematrve 3	Same as Alternative 3.	Same as Altematrve I	Same as Altematrve 3
Roads and Transportation	Restrict vehicle traffic on those roads lacking subgrade re-inforcement where critical erosion is likely. See also OHV restructions under Recreation Mineral leasing and ROWs would require an increase in existing roads and maintenance. Railroad spur could also be required.	Same as Alternative 1, except no new roads or railroads would be constructed. OHV use would be eliminated or restricted. See discussion under "Recreation".	Same as Alternative 1, except OHV use would be limited to existing roads and trails and some seasonal closures imposed See "Recreation" discussion.	Same as Alternative 3	Same as Alternative 3.	Same as Alternative 3	Same as Alternative 3
Soils	Restrict vehicle traffic on those roads lacking subgrade re-inforcement where critical erosion is likely.	Same as Alternative I	Same as Alternative 1	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative I	Same as Alternative 1.
Air Quality	No specific direction	Plan and implement prescribed burning plans such that they do not violate air quality standards.	Same as Alternative 2.	Same as Alternative 2	Same as Alternative 2.	Same as Alternative 1	Same as Altematrve 2.
Hydrology and Water Quality	No specific direction	Establish goals and objectives for water quality and quantity.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative I	Same as Alternative 2.
Aquatic Communities	No specific direction	Aquatic communities would be protected due to the closure of the area to mining and new ROW location and by meeting water quality standards.	Aquatic communities would he protected by placing restictions on mining and new ROWs.	Same as Alternative 3.	Same as Alternative 3	Same as Alternative 1, except for restrictions on lake levels and total dissolved solids.	Same as Alternative 3

Table S-l Continued)

RESOURCE	ALTERNATIVE: 1 (NO ACTION)	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5	ALTERNATIVE 6	ALTERNATIVE 7 (PREFERRED PLAN)
Special Forest Products	MFP allows for the disposal of timber products and other vegetation products on juniper woodlands to meet the public demand Such products include firewood, posts, poles, berries, and boughs from Juniper. District policy also addresses the cutting of Christmas trees and gathering mushrooms Firewood cutting is allowed in designated firewood cutting areas only No such areas exist in the planning area Current policy also closes WSAs and ACECs to harvest of special forest products	Entire ACEC would be closed to the harvest of all special forest products. consistent with District policy	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2	Same as Alternative I	Same as Alternative 2.
Wildlife	Continue 180 bighorn sheep months use on Abert Kim Maintain 3 developed bighorn sheep water catchments on Abert Rim. Prohibit OHV use in raptor nesting areas between Feb. I and June 30	Same as Alternative I, except would allocate all AUM's (over and above the existing 180 bighorn sheep months) on Abert Rim to bighorn sheep and other wildlife.	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2	Same as Alternative I	Same as Alternative 2
Animal Damage Control	Continue existing or expanded predator and grasshopper control programs by APHIS/ ADC. Restricted by Wilderness IMP within Abert Rim WSA.	No control work allowed.	Same as Alternative 1.	Same as Alternative I	Same as Alternative I	Same as Alternative I	Same as Alternative 1
Special Status Species	Allow no land or surface disturbance on or near any known special status plant site. Eliminate, reduce, or maintain existing livestock/ wildlife use on rare plant sites Manage all known potential habitats in manner that maintains or enhances the ecosystem required by special status species	Reintroduce sensitive plant and animal species that were historically present in the area. Currently, only the desert allocarya is known from the area. Columbia cress and long-flowered snowberry are suspected. New information or future listings during the life of the plan could necessitate other reintroductions.	Reintroduce desert allocarya within the Cave Springs exclosure.	Same as Alternative 3	Same as Alternative 3	Same as Alternative I	Same as Alternative

Table S-l Continued)

RESOURCE	ALTERNATIVE 1 (NO ACTION)	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5	ALTERNATIVE 6	ALTERNATIVE 7 (PREFERREDPLAN)
Special Areas	No ACEC designation (Map 1, Appendix B) Manage Abert Rim WSA in accordance with the Wilderness IMP	Designate and manage the entire planning area (immediate drainage totalling about 99,900 acres of Federal land) as an ACEC (Map 4, Appendix B) A portion of Abert Rim WSA would he in the ACEC, but would be managed similar to Alternative I.	Designate and manage the lake and surrounding area (approximately 31,600 acres of Federal land) up to the legally surveyed high-water mark (elevation 4260 feet) as an ACEC [Map 5, Appendix B) Abert Rim WSA would he outside the ACEC, hut would be managed the same as Alternative 1	Designate and manage the area (approximately 39,300 acres of Federal land) up to the highest recently-recorded water (elevation 4262 feet) mark on the north, west, and south and up to the top of Abert Rim on the east as an ACEC (Map 6. Appendix B). A portion of Ahert Rim WSA would he within the ACEC. hut would be managed similar to Alternative 1	Designate and manage the lake, surrounding archaeological district and northern playa as an ACEC (approximately 42,100 acres of Federal land) with the boundary established as Highway 395 on the east, an existing county road on the north, an existing jeep trail on the northwest and southwest, and an existing exclosure fence on the west (Map 7, Appendix B) Abert Kim WSA would be outside of the ACEC, hut would he managed similar to Alternative I	No ACEC designation (Map 1, Appendix B). Manage Abert Rim WSA similar to Alternative 1.	Designate and manage the lake, archaeologic district, northern playa, part of Abert Rim WSA, and some adjacent lands (approximately 49,900 acres of Federal land) as an ACEC (Map 8, Appendix B). Abert Rim WSA would be managed similar to Alternative 1.
Fire	Allow wildfire to burn with limited suppression over the entire area, if life or property are not in danger and it meets the fire prescription for the area. Severe wildfires are typically reseeded with non-native species to prevent erosion and sedimentation.	All wildfires would be suppressed using a limited suppression strategy in situations where life and property are threatened. Prescribed burn plan(r) would he developed as needed Areas where an adequate seed source does not exist would be reseeded following the fire to prevent erosion and sedimentation. Seed mix would emphasize native species	Same as Alternative 2.	Same as Alternative 2	Same as Alternative 2	Same as Alternative 1	Same as Alternative 2
Cultural	Retain all listed and potential National Register sites in Federal ownership. Close all sites to OHV use except on existing roads. Prevent destructive. discretionary uses to National Register sites.	Conduct a Class III archeological survey of the area. as time and funding permit Place signs where they can be observed by the general public requesting that they report any observed digging in the area Perform regular patrols of sites to protect against excavation and monitor general site condition Provide cultural site interpretation of some sites where the public is already stopping and other resource? are being interpreted (i.e. the existing 'Watchable Wildlife' site) Expand the existing archaeological district to include other eligible sites around the western lakeshore Identify Native American traditional uses and concerns through consultation	Same as Alternative 2, except sites would be added to the existing archaeological district. as time and funds allow.	Same as Alternative 3	Same as Alternative 3.	Same as Alternative I. except site interpretation would be expanded for public education purposes.	Generally the same as Alternative 3, except additional sites would he included within the ACEC boundary.

Table S-1 Continued)

RESOURCE	ALTERNATIVE 1 (NO ACTION)	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE: 5	ALTERNATIVE 6	ALTERNATIVE 7 (PREFERRED PLAN)
Traditional Uses	Identify Native American traditional uses and concerns through consultation.	Same as Alternative 1	Same as Alternative I	Same as Alternative I	Same as Alternative I	Same as Alternative I	Same as Alternative I
Recreation	Keep all public lands open to OHV use except special status plant and National Register Sites Seasonally close areas near raptor nesting sites and in crucial deer winter range. Restrict OHV use to existing roads and trails in areas with erosion problems and in potential National Historic Register sites. Keep area open to hunting, wildlife viewing, and other recreation activities	Close the area within the Abert Rim WSA and the northern playa to all OHV use Restrict OHV use in the remainder of the area to existing roads and trails Continue to allow hunting. wildlife viewing, and other low-impact recreation opportunities.	Restrict OHV use throughout the ACEC to existing roads and trails Seasonal closures would be placed on the playa at the north end of the lake and in deer/bighorn sheep critical winter range Though outside of the ACEC, OHV use within Abert Rim WSA would remain restricted to existing roads and trails. The rest of the planning area would remain open to OHV use. Would maintain existing "Watchable Wildlife" site on the south end of the lake and would construct a new site on the north end of the lake. Would continue to allow hunting and other low-Impact recreation opportunities Would convert an existing two-track road at the mouth of Juniper Creek to a foot trail consistent with the wilderness IMP.	Same as Alternative 3	Same as Alternative 3.	Same as Alternative 1, hut allow and/or develop more low-impact recreational opportunities	Same as Alternative 3
Visual	Manage the area in accordance with the existing VRM class objectives (I, III, and IV).	Manage Abert Rim in its existing VRM Class (I). Designate and manage the remainder of the planning area as VRM Class II.	Manage the area from the eastern lake-shore to the top of Abert Rim in its existing VRM Class (I). Designate and manage the western side of the planning area as VRM Class III.	Same as Alternative 3.	Same as Alternative 2.	Same as Alternative 1.	Manage the area from the eastern lake-shore to the top of Abert Rim in its existing VRM Class (I). Designate and manage the rest of the ACEC and part of the western shore as Class II and the rest of the north and western sides of the planning area as VRM Class III (Map 9, Appendtx B).

Table S-2 Comparison of Impacts by Alternative

RESOURCE	ALTERNATIVE 1 (NO ACTION)	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5	ALTERNATIVE 6	ALTERNATIVE 7 (PREFERRED PLAN)
Lands and Rights-of-Way Impacts	No change. All proposals evaluated on case-by-case basis Least restrictive to location of new ROWs.	No land actions would be allowed except aquisition of in-holdings via exchange Most restrictive of locations of new ROWs.	Similar to Alternative I, except new ROWs, leases, and permits would be allowed provided they are consistent with management objectives.	Same as Alternatives I and 3.	Same as Alternative 3	Same as Alternative I	Same as Alternatives I and 3
Roads and Transportation Impacts	No change from existing conditions unless future development is permitted. This would require additional roads, possibly a new railroad spur, and increased road maintenance.	No new roads or railroads woud be required. Emphasis would be on maintaining existing roads or closing roads where necessary. OHV Impacts discussed under "Recreation".	Same as Alternative 1, except OHV use would be more restricted. OHV impacts are discussed further under "Recreation".	Same as Alternative 3.	Same as Alternative 3	Same as Alternative 1	Same as Alternative 3.
Soil Impacts	Surface disturbance due to road or railroad construction, new ROWs, or mineral activities would increase the potential for soil erosion. Wildfire suppression may lead to increased erosion depending upon fire intensity and amount of mechanical fire lines constructed.	Minimal soil impacts. Wildfire fire suppression impacts similar to Alternative 1 Prescribed fire may cause temporary increase in soil erosion.	Impacts generally the same as Alternative 2. Increased potential for soil erosion during mineral production phase.	Same as Alternative 3.	Same as Alternatrve 3	Impacts generally the same as Alternative 1. However, mineral development would have less potential to cause soil erosion while an increase in other uses (causing an increse in need for road maintenance) could cause greater soil erosion, if roads are not properly maintained.	Same as Alternative 3
Air Quality Impacts	No change. Minimal impacts from natural wind erosion and vehicle traffic causing blowing dust. New construction would also increase the amount of hydrocarbons, carbon monoxide, and particulate matter released in the air. Wildlfires would continue to release uncontroled amounts of smoke, particulates, and carbon dioxtde.	This Alternative would have minimal impacts to air quality. Wildfires would have similar impacts as Alternative 1. However, properly planned prescribed burns would reduce this potential as they would be designed to not violate air quality standards.	New construction associated with mineral development would increase the amount of pollutants released into the air similar to Alternative 1. Fire impacts would be similar to Alternative 2.	Same as Alternative 3	Same as Alternative 3.	Same as Alternative 3.	Same as Alternative 3
Hydrology and Water Quality Impacts	Issuance of new ROWs could impact total dissolved solids. Sodium mining would have the greatest potential to impact lake hydrology and water chemistry. Risk of damage from recreational and fire management activities exists due to removal of vegetation and increased soil compaction, overland flow, and sedimentation.	This represents the most protective alternative with respect to water quality and hydrologic function, Increased use of prescribed fire could temporarily increase overland flow and sedimentation from burn areas, but would generally be less severe than suppression activities under Alternative 1	Impacts on hydrology and water quality from: ROWs would be similar to Alternative 1; mineral development and recreation would have low risk of causing significant impacts: fire management would be similar to Alternative 2.	Fire management impacts would be similar to Alternative 2. ROW, recreation, and mineral development impacts would be similar to Alternative 3.	Fire management impacts would be similar to Alternative 2. ROW and recreation impacts would be similar to Alternative 3. Mineral development activity would have lower risk of causing significant impacts than Alternatives 3 and 4 due to less area available for mining.	Most impacts to water quality and hydrology would be similar to Alternative 1. Mineral development is expected to be the most impactive activity, but would be less so than under Alternative 1.	Fire management impacts would be similar to Alternative 2. ROW and recreation impacts would be similar to Alternative 3. Mineral development activity would have lower risk of causing significant impacts than Alternatives 3 and 4 due to less area available for mining.

Table S-2 Continued)

RESOURCE	ALTERNATIVE 1 (NO ACTION)	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5	ALTERNATIVE 6	ALTERNATIVE 7 (PREFERRED PLAN)
Geology and Mineral Impacts	This would be the least restrictive alternative as the planning area would be open to locatable mineral entry, all mineral leasing, except within the WSA, and salable mineral disposal, except within the WSA. This would provide for the availability of the most mineral resources wherever a demand exists and there is economic viability.	This would be the most restrictive alternative as the planning area would be closed to locatable mineral entry via withdrawal. Leasing and salable mineral disposal would not be allowed. Two existing gravel pits would be closed and reclaimed. Mineral resources would not be made available, regardless of demand.	The planning area would be open to mming. but subject to the following: Sodium mining would be subject to lake level and total dissolved solid stipulations. This could cause interuptions or shutdown of the operation from time to time which could affect economic feasibility. Salable mineral disposal would be restricted to the 2 existing pits. This could adversely effect any activity that requires road, dike, or pond building and/or maintenance. Geothermal, oil, and gas leasing would be subject to no surface occupancy within the ACEC which would negatively impact these activities as more expensive directional drilling would be required. Geophysical exploratton that requires surface occupancy from within the ACEC would be precluded.	Impacts would be similar to Alternative 3	The Impacts would generally be the same as Alternattve 3, except less land would be available for sodium leasing and a greater area on the northern end of the ACEC would be subject to the no surface occupancy restrictions Because the area would be managed as VRM class II, there would be additional restrictions placed on any type of activity within the ACEC which alters the appearance of the landscape. This could result in the need to use costly "masking" techniques as a part of any mineral development to conform to VRM Class objectives.	The impacts would generally be the same as Alternattve 3. except locatable mineral activities and material disposal activities would be similar to Alternative I	Impacts would be similar to Alternative 5, except a larger area would be subject to no surface occupancy restrictions and more area would be open to leasing. Mineral material disposal would be allowed outside of the ACEC
Groundwater Impacts	No change; no impacts expected.	Same as Alternative 1.	Same as Alternative 1	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative I.	Same as Alternattve 1
Paleontological Impacts	No change; no impacts expected.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1.	Same as Alternative 1	Same as Alternative I	Same as Alternative 1
Vegetation Impacts	No significant changes expected to existing plant communities.	Natural processes would be reintroduced (fire) and native species reestablished resulting in improved habitat conditions and increased species diversity.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 1.	Same as Alternative 2
Rangeland Resource Impacts	No significant impacts beyond those described in "Lakeview Grazing Management EIS". May be an increased need for cattle guards in the area.	The area would remain open to livestock grazing, but portions could be closed where documented evidence exists that resource degradation is occurring This could require construction and maintenance of more exclosures and water sources in the area and a potential loss of 50 to 100 AUMs. All AUMs on Abert Rim would be officially allocated to wildlife.	Generally the impacts would be the same as Alternative 1, except that all AUMs on Abert Rim would be officially allocated to wildlife and would no longer be available for livestock.	Same as Alternative 3.	Same as Alternative 3	Same as Alternative I	Same as Alternative 3.

Table S-2 Continued)

RESOURCE	ALTERNATIVE 1 (NO ACTION)	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5	ALTERNATIVE 6	ALTERNATIVE 7 (PREFERRED PLAN)
Special Forest Products	No change: no impacts expected.	Entire ACEC would be closed to harvest of special forest products	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2.	Same as Alternative 2	Same as Alternative 2
Aquatic Community Impacts	Highest potential for significant, adverse impacts	Most protective alternative; no significant negative impacts expected.	No significant, adverse impacts expected.	Same as Alternative 3.	Same as Alternative 3.	Same as Alternative 3	Same as Alternative 3
Wildlife Impacts	Forage allocation on Abert Rim would continue to be Insufficient for current use by bighorn sheep. Potential exists for conflict should livestock grazing be permitted in this area. Mineral development could reduce, displace, and/or eliminate local pronghorn antelope predator, rodent, waterfowl, and shorebird populations and/or their habitat.	Most protective alternative; potential for conflict between bighorn sheep and cattle forage allocation would not exist as all AUMs on Abert Rim would be allocated to wildlife. No other impacts to wildlife	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2	Impacts to bighorn sheep, pronghorn antelope, mules deer, predators, rodents, and lagamorphs would be similar to Alternative I. Impacts to waterfowl. shorebirds, and raptors would be similar to Alternative 2.	Same as Alternative 2
Special Status Species Impacts	No change; level of protection is as required by law, regulation, or policy Some animal species could be negatively impacted	This alternative would allow reintroduction of sensitive plant and animal species that were historically present such as desert allocarya, Columbia cress, long-flowered snowberry, and other species listed in the future. Would help insure long-term stability to all sensitive species and prevent Federal listing. Potential negative impacts to sensitive animals of Alternative I would not occur.	Would allow reintroduction of desert allocarya and aid in preventing its being federally listed. Impacts to sensitive animals expected to be similar to Alternative 2	Plants: same as Alternative 7 Animals: same as Alternative 2.	Plants: same as Alternative 7 Animals. same as Alternative 2.	Plants and animals: same as Alternative 1	Plants: same as Alternative 3 Animals: same as Alternative 2
Special Area Impacts	Would result in no ACEC designation or change in current management (Map 1, Appendix B). Existing management would be inconsistent with the intent/ direction of FLPMA with respect to ACEC designation. Abert Rim WSA would continue to be managed in accordance with the wilderness IMP.	The entire planning area would be designated and managed as an ACEC (Map 4, Appendix B). A portion of Abert Rim WSA would be in the ACEC, but would continue to be managed similar to Alternative 1.	The lake and surrounding area up to the legally surveyed high-water mark (elevation 4,260 feet) would be designated and managed as an ACEC (Map 5, Appendix B). Abert Rim WSA would be outside the ACEC, but would be managed the same as Alternative 1.	The area up to the highest recently-recorded water (elevation 4,262 feet) mark on the north, west, and south and up to the top of Abert Rim on the east would be designated and managed as an ACEC (Map 6, Appendix B). A portion of Abert Rim WSA would be within the ACEC, but would be managed similar to Alternative 1.	The lake, surrounding archaeological district, and northern playa would be designated and managed as an ACEC (Map 7, Appendix B). Abert Rim WSA would be outside of the ACEC. but would be managed similar to Alternative 1.	There would be no ACEC designation, but some changes in current management in the planning area (Map 1, Appendix B) Management would be inconsistent with the intent,' direction of FLPMA with respect to ACEC designation. Abert Rim WSA would be managed similar to Alternative I.	The lake, Abert Rim. and surrounding lands (Map 8, Appendix B) would be designated and managed as an ACEC. Abert Rim WSA would be managed similar to Alternative 1.

Table S-2 Continued)

RESOURCE	ALTERNATIVE 1 (NO ACTION)	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5	ALTERNATIVE 6	ALTERNATIVE 7 (PREFERRED PLAN)
Fire Management Impacts	No change: fire would be allowed to burn with limited suppression over the entire area, if life or property are not in danger and it meets the fire prescription (i.e. plan) for the area. Though fire management plans do not exist for the area, they could be written and implemented.	Wildfires would be handled similar to Alternative 1. Prescribed fire management plan(s) would be developed and implemented as needed to meet ecosystem management goals and objectives.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 1	Same as Alternative 2
Cultural Resource Impacts	No significant change expected unless development is proposed. Sites could be disturbed or destroyed if avoidance is not possible. Traditional use areas may be impacted. Existing archaeological district would continue and could be expanded in size.	Cultural resources and traditional uses would be given greater protection due to elimination of mining and ROW locations. A Class III inventory of the area would be a benefit. Signing some sites would allow for increased public education. Regular patrols would protect against illegal excavation and vandalism	Impacts would generally be similar to Alternative 2 except: mineral leasing could have severe impacts upon some cultural and traditional use sites unless avoided. Not as much effort would be expended adding sites to the existing archeological district.	Impacts would generally be similar to Alternative 3 except: much of the cultural and traditional use areas would be bissected by the ACEC boundary. This would make management more difficult as the level of protection for a given site would vary depending on the boundary location.	Impacts would generally be similar to Alternative 3 except: mining within part of a National Register District could make protection of cultural sites more difficult. Closure of the northern part of the ACEC to mineral leasing would protect cultural sites in that area	Impacts would be similar to Alternative 1, except site interpreta-tion would be expanded for public education purposes.	Impacts would generally be similar to Alternative 5, except that more sites would fall within the ACEC boundary.
Traditional Use Impacts	Existing laws and policy dictate that the BLM identify Native American traditional uses and concerns through consultation. This on-going process should result in a better understanding of these uses and concerns and better government-to-government relationships.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Social and Economic Impacts	Generally no change in existing socioeconomic conditions except for the potential for minor increases in area employment and associated spending effects which would result from mineral development. Such development would also result in royalties paid to the state and Federal governments.	Socioeconomic conditions would be expected to remain the same as existing conditions.	Impacts would be similar to Alternative 1, but would probably result in less employment and revenue generating potential.	Same as Alternative 3	Socioeconomic benefits would be similar to, but possibly lesser than alternatives 1 and 3, as less area would be available for mineral development.	Same as Alternative 3	Same as Alternative 5, except more area would be available for mineral leasing and less private land would fall within the ACEC boundary.

Table S-2Continued)

RESOURCE	ALTERNATIVE 1 (NO ACTION)	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5	ALTERNATIVE 6	ALTERNATIVE 7 (PREFERRED PLAN)
Recreation Impacts	There would be no significant impact to non-motorized recreation opportunities within the planning area. OHV use could be further limited by additional seasonal or permanent closures. Potential mineral development activities could negatively impact recreation opportunities.	Minor, negative impacts to recreational opportunities as Abert Rim WSA and the northern playa would be closed to all OHV use.	Impacts would be similar to Alternative 2, except Abert Rim would remain open to vehicle access (restricted to existing roads and trails). Wildlife viewing and hiking opportunities would be improved.	Impacts generally similar to Alternative 3.	Impacts generally similar to Alternative 3.	Impacts would be generally similar to Alternative 1, but increased recreational opportunities could occur.	Impacts generally similar to Alternative 3.
Visual Resource Impacts	The area would be managed in accordance with the existing VRM classifications (I, III, and IV). No impacts would be expected to visual resources unless mineral development occurs or major ROW is issued (hydropower project). Sodium leasing could significantly impact visual quality along south half of lake. Structures located near Hwy. 395 would conflict with VRM I objectives.	Abert Rim would continue to be managed in accordance with its existing VRM Class (I). The remainder of the planning area would be designated as VRM Class II. This would offer the most visual protection for the viewshed.	Abert Rim would continue to be managed in its existing VRM Class (I). The western portion of the planning area would be designated VRM Class III. Impacts would generally be similar to Alternative 1.	Same as Alternative 3.	Impacts would generally be similar to Alternative 2, except that mineral development may not meet VRM Class II criterion and could require visual mitigation and/or cause potential resource conflicts.	Same as Alternative 1	Same as Alternative 5.

Chapter 1 - Introduction

Purpose and Need

The Lakeview District of the Bureau of Land Management (BLM) has prepared this plan amendment to address the appropriateness of designating Lake Abert and the surrounding area as an Area of Critical Environmental Concern (ACEC). This designation (accompanied by special management actions) has been evaluated as a means of protecting significant resources in the area.

Section 202 of the Federal Land Policy Management Act (FLPMA) states, "in the development of land use plans, the Secretary shall give priority to the designation and protection of Areas of Critical Environmental Concern" (ACEC). The Bureau of Land Management (BLM) regulations define an ACEC as an area "within the public lands where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards".

Current land use management activities for the Lakeview Resource Area (which contains the planning area) are guided by the High Desert Management Framework Plan (MFP) completed in 1983 (BLM, 1983). However, this MFP did not evaluate the Lake Abert area as a potential Area of Critical Environmental Concern (ACEC) The BLM has since recognized four Important resource values or processes in the Lake Abert area potentially deserving special management attention: wildlife resources, cultural resources, scenic values, and ecological processes (BLM, 1993).

ACEC designation recognizes the area possesses significant values and establishes special management measures to protect those values. Designation helps assure that the significant values or resources are adequately addressed in future management actions and land use proposals within the area.

The FLPMA and BLM regulations allow potential ACECs to be nominated by staff, other agencies, or members of the public at any time. In 1992, Lake Abert and the adjacent uplands were nominated for consideration as an ACEC by the Oregon Department of Fish and Wildlife (letter dated August 7, 1992) and the Oregon Waterfowl and Wetlands Association (letter dated August 10, 1992).

There are several potential proposals which could occur within the study area during the life of the plan. These include a pump storage hydroelectric project and the issuance of a sodium preference rights lease for sodium

mining Other projects could be proposed in the future. These proposals have drawn attention to the need to develop overall management guidelines for the study area to protect existing relevant and important resource values.

Location

The planning area is located approximately three miles northeast of Valley Fulls in central Lake County. Oregon (Figure I) within the Lakeview Resource Area (formerly called the High Desert Resource Area) and consists of approximately 188 square miles (120,570 acres) of Lake Abert and the surrounding area. Abert Rim Wilderness Study Area (WSA) is located along the eastern edge of the planning area.

Planning Process

Plan Amendment

The plan amendment process is defined in Federal regulations (43 CFR Part 1610) and provides for amending existing management plans due to:

1. The need to consider monitoring or evaluation findings.

2. The availability of new data.

3. New or revised policy.

4. A change in circumstances or a proposed action that may result in the scope of resource uses or a change in terms. conditions. and decisions of the (original) approved plan.

In the case of this plan amendment criteria 2 and 4 were triggered. thereby causing a need to amend the existing High Desert MFP.

Planning Criteria

The following criteria must be considered in the development of the plan amendment:

1 Those issues and procedural steps required by law, regulation. and policy such as the National Environmental Policy Act (NEPA). Federal Land Management Policy Act (FLPMA). 40 CFR Parts 1500- I 508. 33 CFR Parts 1600-1610.8. BLM Manual 1601- 1625. and BLM National Environmental Policy Act Handbooh H-1790-1.

2. Opportunities must be provided for public participation and their input considered.

3. The plan amendment must be widely coordinated and examined for consistency with officially approved/adopted resource plans

a) must examine for consistency with BLM and other Federal agency policies/programs.
b) coordinate the plan amendment with all state and local governments and Indian tribes. Determine consistency with state and local governments. and Indian tribal policies, plans. and programs (43 CFR Part 16 10.3-2(c)).
c) the plan amendment must show how any inconsistencies were addressed.
d) the plan amendrnent should be consistent with state/local policies, plans, and programs as long as they are consistent with Federal laws and regulations that apply to public lands.

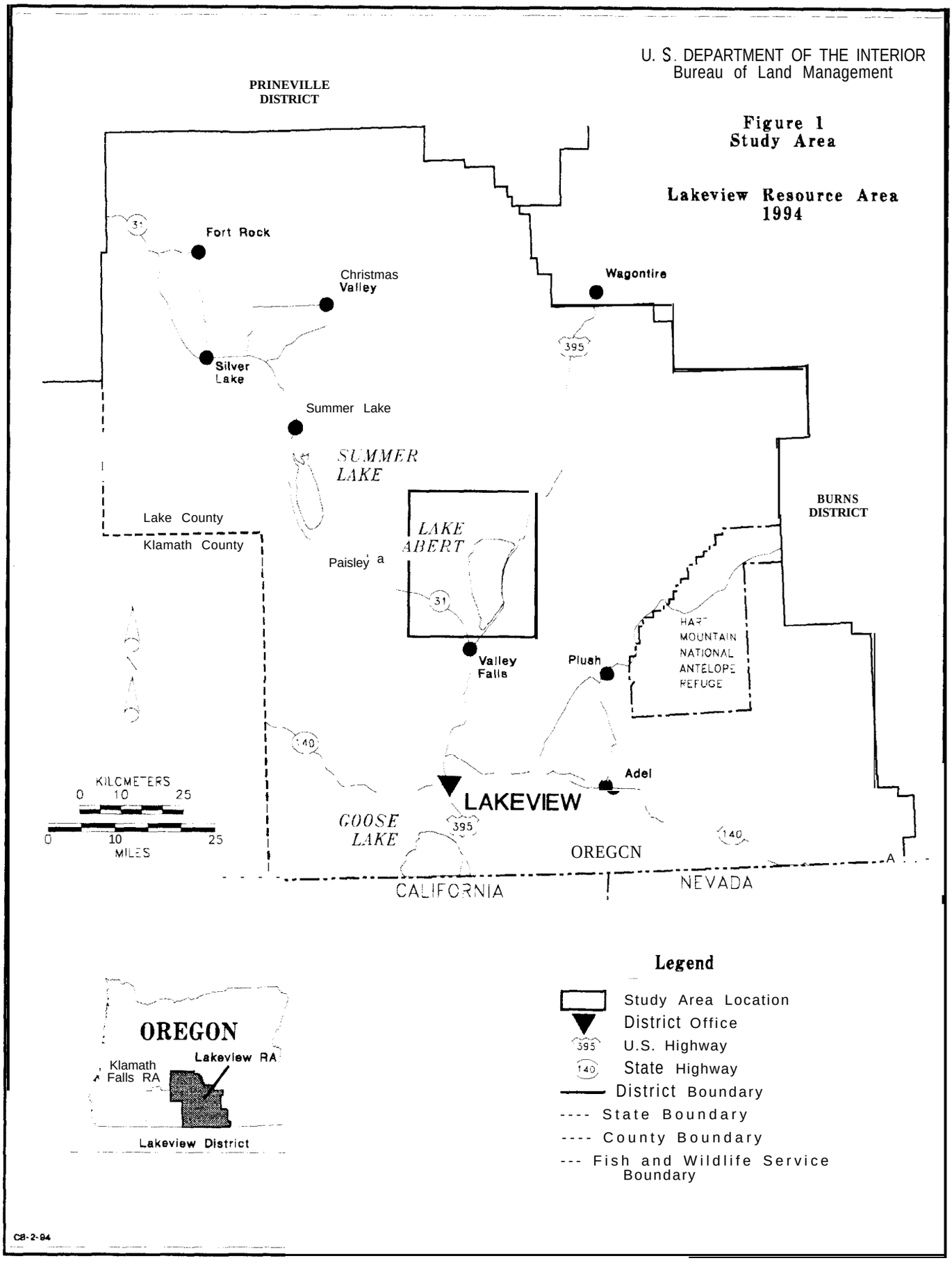
4. Analysis of the Management Situation (BLM Manual 16 16.4 and 33 CFR Part 1610.4-4) should be prepared which describes what resources exist within the planning and how they are currently being managed.

5. A wide number of resources/issues must he addressed in all plan amendments. Resources which apply to this plan amendment are: air quality, soils, water, vegetation, visual, recreation, fish and wildlife habitat, special status species, natural areas, wilderness, rangeland and livestock grazing, cultural resources, lands, energy and mineral resources, and fire management (RLM Manual 1611- 1625).

6. The following steps must be completed in any plan amendment process when potential ACECs are involved:

a) Identify the potential ACEC(s).
b) Obtain information/data on relevance and importance values
c) Evaluate each resource or hazard to determine if it meets the relevance and importance criteria.
d) Drop areas from further consideration that do not meet criteria.
e) Provide temporary management of the potential ACEC(s), if necessary.
f) Develop management prescriptions for potential ACEC(s).
g) Analyze the effects of the management prescriptions.
h) Select the preferred management alternative.
I) Designate the ACEC(s).

7. Watershed analysis - in recent months the BLM has been shifting to an ecosystem management approach. Part of this effort includes the preparation of a landscape or watershed level analysis which defines the current conditions within the watershed, past management practices that led to that


U. S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
Figure 1
Study Area
Lakeview Resource Area
1994
PRINEVILLE DISTRICT
BURNS DISTRICT
Fort Rock
Christmas Valley
Wagontire
Silver Lake
Summer Lake
SUMMER LAKE
LAKE ABERT
Lake County
Klamath County
Paisley
Valley Falls
Plush
HART MOUNTAIN NATIONAL ANTELOPE REFUGE
Adel
LAKEVIEW
GOOSE LAKE
OREGON
CALIFORNIA
NEVADA
KILOMETERS
0 10 25
0 10 25
MILES
OREGON
Klamath Falls RA
Lakeview RA
Lakeview District
Legend
Study Area Location
District Office
U.S. Highway
State Highway
District Boundary
State Boundary
County Boundary
Fish and Wildlife Service Boundary
CB-2-94

condition. future desired conditions within the watershed, and possible management actions which would move the watershed towards the desired future condition. Watershed analysis documents are not considered decision documents and, as such, do not require associated NEPA documents.

While current watershed analysis guidance has focused on western Oregon and Washington forests, the principles involved can be applied to eastern Oregon, as well. At present. watershed analysis is only required prior to initiation of any on-the-ground management activities in western Oregon. However, as a result of the ongoing Upper Columbia River Basin Ecosystem Management Project (UCRBEMP) regional planning effort, watershed analyses will very likely bc required in eastern Oregon within the next few years. prior to initiating any on-the-ground management activities For this reason. this plan amendment will incorporate current guidance on watershed analysis, as appropriate In this manner, the BLM may avoid the need to prepare a separate watershed analysis for the study area in the future prior to Initiating future management actions.

The steps involved in conducting watershed analysis (based on cut-rent guidance) include:

a) Delineation of the landscape analysis unit (i.e. watershed or sub-basin to be studied).
b) Describe the existing environment.
c) Describe the resource management concerns and opportunities.
d) Define the landscape analysis unit objectives.
e) Develop implementation guidelines.
f) Define the management actions needed to reach the objectives.
g) Define the support needed to reach the future desired conditions.
h) Develop an implementation timeline.

ACEC Evaluation Process

To be considered as a potential ACEC, and further evaluated in resource management plan alternatives. inventory data must be analyzed to determine whether there are areas containing significant resources, values, systems or processes. or hazards. To be a potential ACEC. an area must meet both relevance and importance criteria for at least one resource value (43 CFK 1610.7-2).

Relevance Criteria

An area meets the relevance criteria if it contains one or more of the following:

1 A significant historic, cultural, or scenic value (including hut not limited to rare or sensitive archaeological resources and religious or cultural resources important to Native Americans).

2. A fish and wildlife resource (including but not limited to habitat for endangered, sensitive, or threatened species, or habitat essential for maintaining species diversity).

3. A natural process or system (including but not limited to endangered, sensitive or threatened plant species; rare, endemic, or relic plants or plant communities which are terrestrial, aquatic or riparian; or rare geologic features).

4. Natural hazards (including but not limited to areas of avalanche, dangerous flooding, landslides, unstable soils, seismic activity, or dangerous cliffs). A hazard caused by human action may meet the relevance criteria if it is determined through the resource management planning process that it has become a part of a natural process.

Importance Criteria

The value, resource, system, process, or hazard described under the relevance criteria must have substantial significance and value to satisfy the importance criteria. This generally means that the value, resource, system, process, or hazard is characterized by one or more of the following:

1. Has more than locally significant qualities which give it a special worth, consequence, meaning, distinctiveness, or cause for concern, especially compared to any similar resource.

2. Has qualities or circumstances that make it fragile, sensitive, rare, irreplaceable, exemplary, unique, endangered, threatened, or vulnerable to adverse change.

3. Has been recognized as warranting protection to satisfy national priority concerns or to carry out the mandates of the Federal Land Policy and Management Act,

4. Has qualities that warrant highlighting to satisfy public or management concerns about safety and public welfare.

5. Poses a significant threat to human life and safety or to property.

ACEC Evaluation Findings

During the nomination process prehistoric cultural. wildlife, unique natural system (aquatic ecology) and scenic values in and around Lake Abert were identified as reasons for ACEC designation. After careful consideration of these and other potential values, the BLM interdisciplinary team evaluated the four values in detail. The staff prepared several resource inventory reports and combined the information into a

summary report. The report documents that Lake Abert and its immediate surroundings meet the relevance and importance criteria for the presence of: prehistoric cultural values. scenic values. wildlife (both populations and habitat) resources. and natural processes (aquatic ecology). The natural hazards (landslides. rockslides, cliffs and potential for flash flooding) which are present were found to meet the relevance, but not the importance criteria (BLM, 1993).

Decision Making Process

Prior to making a decision to designate the area as an ACEC, a combined planning and National Environmental Policy Act (NEPA) document must be prepared which includes public involvement and inter-agency coordination. The amendment must include the general management practices and uses to be allowed and any mitigation measures, if needed. The District Manager then makes a recommendation to the State Director to approve the proposed plan amendment, The State Director reviews the document and officially documents the decision rationale and approval in a signed Decision Document. Signing of the Decision Document constitutes official ACEC designation for a given area, if that is part of the decision.

Decisions to Be Made

Through the combined planning and NEPA process, the BLM proposes to make the following three key decisions:

1. Should the area be designated as an ACEC?

2. If designation is appropriate, how much area should be included in the designation?

3. If designated, what special management should be proposed and implemented to protect the relevant and important values‘?

Planning Issues

A number of issues were identified during the public scoping and working group processes which were addressed in the preparation of the plan amendment. These were organized into 16 major categories and are listed below. Those that wtre not considered outside the scope of analysis were used to develop management goals. objectives. or alternatives for future management. These following are not listed in any particular order of priority.

1. Economics

a) Protecting existing area economy
b) Future economic development opportunities
c) Mining/hydro electric project
d) Tax base effects

2. Aquatic ecology

a) Water flow into the lake
b) Lake level fluctuation
c) Lake chemistry
d) Water quality
- protect lake water/inflow from pollution
- work with Forest Service to protect water quality/ flows

e) Utilize a watershed-based approach to management

3. ACEC boundary/designation

a) Should an ACEC be designated?
b) How large an area should be designated?
c) The results of scientific processes, not economic factors, should determine if the area should be designated

4. Private property owners’ rights

a) Maintaining access to private lands
b) Private lands in the area may be bought by the government or by a non-profit organization and transferred to the government
d) Future restrictions on lands outside of the ACEC area

5. Cultural resources

6. Recreation opportunities

a) Public hunting
b) Off-highway vehicle use
c) Wildlife viewing
d) General visitor use
e) Tourism/public education opportunities
f) Road closures

7. Visual resources

a) Allow no structures/developments within sight of the lake or ACEC boundary

8. Social/cultural (lifestyle) changes

9. Special status species

10. Management/implementation costs

11. Land tenure adjustments

12. Rights-of-way

a) Pump-storage hydroelectric project

13. Minerals

a) Leasing
b) Locatable/salable
c) Ownership of salts in the lake water (Federal, state, or both?)

14. Agricultural uses

a) Grazing on public lands
b) Water rights
c) Brine shrimp fishery

15. Wildlife resources/habitat

a) Disturbances to existing wildlife populations
b) Lake's relationship to other migratory stops on the flyway
c) Waterfowl nesting habitat
d) Population fluctuations
e) Wetland/riparian habitats

16. Wilderness

a) Allow no development or roads within Abert Rim WSA
b) Designate Lake Abert area and/or lands extending east to Hart Mountain National Antelope Refuge as wilderness rather than ACEC

Management Goals and Objectives

Ten general management goals for the study area were developed along with a number of more specific objectives to aid in measuring. over time (through monitoring), how well an alternative meets the goals. The following goals and objectives were developed to address the issues and concerns raised during the public involvement process. They are not listed in any order of priority and, at first glance, there may be some that appear to be in direct conflict with each other, This reflects the various legal mandates under which the BLM operates. While some goals may conflict, they are not totally exclusive of each other. The alternatives that were developed emphasize meeting some goals over others. The ultimate decision will he based on which alternative or combination of alternatives best meets the goals.

Goal 1

Maintain a viable, sustainable ecosystem within the lake and surrounding area (prevent changes that would cause significant, adverse effects on ecological values).

Objectives

a) Maintain current aquatic and wetland plant community diversity by not allowing any future, human-caused activity that would cause a significant change (defined as a 10% change over any three-year period at an 85% confidence level) in relative species abundance. Should a significant change occur, existing management would be reevaluated.

b) Authorize no future discretionary human action which will increase the number of years by more than 5%, when compared to the 1926-1994 baseline, that the average total dissolved solid concentration in Lake Abert exceeds 130 g/l and/or reduces the level of the lake below 4,252 feet in elevation. (Note: water chemistry changes, primarily the ratio of dissolved carbonates to chlorides, are not addressed by this objective and would require detailed evaluation in a separate, project-specific NEPA document which would include a model of other criteria to be developed at a future date).

Goal 2

Maintain or enhance economic conditions consistent with other listed goals and existing laws, regulations, and policies.

Goal 3

Maintain or enhance existing resource values for future generations (i.e. do not exclude future options by current management actions).

Goal 4

Continue current, traditional, and historic land and resource uses in the area.

Goal 5

Maintain or enhance recreational opportunities and wilderness values.

Objectives

a) Manage the area in accordance with the following Recreation Opportunity Spectrum (ROS) management objectives with the intent of allowing continuation of hunting. limited trail development, and other recreation opportunities within the area:

- Preserve primitive. non-motorized recreation opportunities east of Highway 395 (within Abert Rirn WSA).
- Manage the Highway 395 corridor as a Roaded Natural Environment.
- Manage the playa at the north end of the lake and the westside of the lake as a Semi-Primitive, Motorized area.

b) Mange Abert Rim WSA in accordance with the Wilderness Interim Management Policy (BLM, 1987b) until a final decision on wilderness designation is made by Congress. The Wilderness IMP generally precludes activities which permanently impair existing wilderness values.

Goal 6

Maintain the present visual/aesthetic quality.

Objectives

a) Allow no developments which would cause a significant. adverse visual impact to the casual observer as viewed from the primary travel corridor of Highway 395.

Goal 7

Protect and/or interpret, where appropriate, existing cultural resource values. including protecting and respecting Native American traditional uses.

Objectives

a) Ensure that, in any given year, no cultural sites are damaged due to unauthorized excavation.

Goal 8

Maintain or enhance habitat quality and quantity for native plant and animal species. including special status species (such that the latter do not become Federally-listed).

Objectives

a) Provide or maintain an upland vegetation community (composition by weight of total annual production) of 70-80% grasses. 5-15% forbs, and 5-15% shrubs. on existing seeded areas.

b) Provide or rnaintain an upland native vegetation community (composition by weight of total annual production) of 30-40% grasses, 5-15% forbs. and 25 40% shrubs on existing unseeded areas. These composition ranges can occur in mosaics within the unseeded areas.

c) Provide and maintain habitats within the area capable of supporting the greatest diversity (those minimum species diversity levels presented below) of non-sensitive, native wildlife species at the highest population levels consistent with sustaining that diversity:

- 70 nesting avian species
- 90 migratory and/or seasonal avian species
- 45 resident and/or migratory mammalian species
- 15 resident amphibian and reptile species

d) Provide and maintain habitats capable of supporting the following population levels of sensitive fish and wildlife species known or strongly suspected of breeding in the area:

- Peregrine Falcon - 5 nesting pairs
- Western Snowy Plover - 100 nesting pairs
- Long-billed Curlew - 20 nesting pairs
- California Bighorn Sheep - 125 individuals
- Loggerhead Shrike -to be set after future inventories
- Pygmy Rabbit - to be set after future inventories
- Ferruginous Hawk - to be set after future inventories
- White-tailed Antelope Groundsquirrel - to be set after future inventories
- White-tailed Jackrabbit - to be set after future inventories
- Oregon Lakes Tui Chub - to be set after future inventories

e) Provide and maintain suitable habitats capable of supporting the following sensitive wildlife species known to make seasonal use of the area:

- Bald Eagle - 10 individuals (December - March)
- White-faced Ibis - 50 individuals (February - March)
- Black Tern - 150 individuals (migratory: February - June)

f) Provide, maintain, or restore habitats capable of supporting the following tninimum population levels for all sensitive plant species which currently exist or historically existed within the area. Reevaluate management if an existing population declines by 10% or more over 3 years

Desert allocarya (Plagiobothrys salsus) - 50 plants (to be restored)
Columbia cress (Rorippa columbiae) - to be set after future inventories. if located
Long-flowered snowberry (Symphoricarpos longiflorus) - to be set after future inventories, if located

Goal 9

Maintain or enhance public education and scientific research opportunities.

Goal 10

Maintain exploration and development opportunities for leasable, salable, and locatable minerals to provide needed mineral resources. consistent with other listed goals and existing laws. regulations. and policies.

Conformance with Federal, State, Local, and Tribal Land Use Plans and Policies

Federal

A number of land use or resource management plans have been developed by the BLM and other Federal agencies which t-elate to or otheruise govern how tnanagement is carried out within the planning area. The BLM is responsible for determining if the proposed plan amendment is in conformance with there plans. The following Federal plans have been identified as applicable to the planning area and. unless otherwise noted. are believed to be in conformance with the proposed plan amendment. Where appropriate. the management direction and previous management decisions set forth by these documents. and the impacts outlined therein, are used to tier analyses performed in this plan amendment. or are incorporated by reference, and therefore. are not repeated in detail within this plan amendment. Therefore, pertinent decisions already established by these documents are not being revisted here, but are merely mentioned to give the reader a broad perspective of all management activities occuring within the planning area.

- High Desert Management Framework Plan (BLM, 1983) - not in conformance with respect to ACEC evaluation, thus requiring the proposed plan amendment. A summary of current management direction outlined by this plan is included in Chapter 2 as the description of the No Action Alternative.

- Lakeview Grazing Management Final Environmental Impact Statetnent (BLM, 1982) and Record of Decision - in conformance with respect to grazing administration, but did not consider ACEC designation. A sumtnary of current range management and grazing practices is included in Chapter 2 as part of the description of the No Action Alternative and in Chapter 3 under the section titled "Rangeland Resources".

- Wilderness Studies Management Framework Plan Amendments (BLM, 1982) - which amended the High Desert Management Framework Plan with respect to wilderness issues due to the completion of a state-wide wilderness inventory. The most pertinent section discusses alternative boundary designation for the Abert Rim wilderness study area (WSA). The document did not include a NEPA or decision document. This document led to the next Environmental Impact Statement and subsequent Record of Decision discussed below:

- Oregon Wilderness Final Environmental Impact Statement (BLM, 1989a) and Record of Decision (BLM, 199 1a) - evaluated the impacts of and recommended to Congress designation of certain wilderness areas within the State of Oregon, including designating 23,760 acres on Abert Rim as wilderness.

- Integrated Noxious Weed Control Program Environmental Assessment (OR-01 3-93-03), Lakeview Resource Area (BLM, 1994b) - covers the environmental impacts of conducting an integrated noxious weed control plan throughout the Lakeview Resource Area. Of particular relevance to this plan amendment are known weed infestations around Lake Abert which have been treated unsuccessfully with a biological control agent over the past several years. The decision resulting from the EA is currently under appeal, however, a request for a stay of the action was denied by the Interior Board of Land Appeals. This document is, in turn, tiered to the following three programatic Environmental Impact Statements and subsequent Records of Decisions:

- Vegetation Treatment on BLM Lands in Thirteen Western States Final Environmental Impact Statement (BLM, 1991b).

- Northwest Area Noxious Weed Control Program Final Environmental Impact Statement (BLM, 1985).

- Supplement to the Northwest Area Noxious Weed Control Program Final Environmental Impact Statement (BLM. 1987).

- Draft Weed Management Plan for the Lake Abert Area (HLM. 1995b) - site-specific plan developed to address continued weed expansion in the Lake Abert area. The plan is tiered to the "lntegrated Noxious Weed Control Program Environmental Assessment (OR-013-93-03). Lakeview Reesource Area". (BLM. 1993).

- Site-Specific Environmental Assessment Tiered to the 1987 Final Environmental Impact Statement for Rangeland Grasshopper Cooperative Management Program (APHIS, 1993) - covers the periodic need to control grasshopper outbreaks in various rangeland and agricultural areas within Lake County. including the general vicinity of Lake Abert. The lead for this type of action rests with APHIS, but the BLM does cooperate when treatment involves iands under its administration. This Environmental Assessment is, in turn, tiered to the following programatic Environmental Impact Statement:

- Rangeland Grasshopper Cooperative Management Program Final Environmental Impact Statement (APHIS. 1987).

- Wildlife Damage Management in the Roseburg ADC District in South-western Oregon (APHIS, 1994) - covers wildlife damage management activities in the Lakeview Resource Area, including the Lake Abert area. APHIS is the lead agency for this action. The BLM served as a cooperating agency in the preparation of this Environmental Assessment. A final decision on this action has not been issued by APHIS. Once a decision is issued, control work will be conducted in accordance with this document. At the present time, the Lakeview District continues to operate under the existing Environmental Assessment:

- Animal Damage Control, Lakevieu District (BLM, 1989b) - covers animal damage control activities within the planning area until such time as superseded by the Environmental Assessment listed above. 4 description of current control efforts is included in Chapter 2 as part of the Action Alternative.

The APHIS Environmental Assessment is tiered to the following Environmental Impact Statement and subsequent Record of Decision:

- Animal Damage Control Final Environmental Impact Statement (APHIS. 1994).

- Mineral Disposal Pit Environmental Assessments (BLM, 1978a; 1978b) - assessed the environmental impacts of developrnent and operation of two small (less than 40 acres) gravel pits in the vicinity of Lake Abert which are still in operation today.

- Riparian Exclosure Fence Environmental Assessment (BLM. 1995) - assessed the environmental impacts of a riparian exclosure fence (approximately 3.5 miles in length) along the western shore of Lake Abert

Appropriate Federal agencies are being provided with an opportunity to review the proposed plan amendment and provide comments on its consistency with their plans, policies. and directives. In addition to the plans listed above, two other initiatives are currently underway that will, eventually, automatically amend certain management directions within this plan amendment. Though it would first appear more logical to wait until such initiatives are completed prior to making a decision on this plan amendment. the BLM can not simply stop managing or proposing appropriate changes in management for lands under its jurisdiction until such planning efforts are completed (which is likely to be several years into the future). These initiatives include:

- Range Reform '94 Final Environmental Impact Statement (BLM and Forest Service, 1994) and Record of Decision, the plan amends current grazing administration and management practices. It is expected that standards and guidelines related to range condition and management practices will be developed in response to the Record of Decision, Within the State of Oregon, it is likely these standards and guidelines will be developed as a component of the next initiative listed below.

- Columbia Basin Ecosystem Managernent Project - regional ecosystem-based inter-agency planning effort currently in progress for parts of the States of Oregon, Washington, Idaho. and Montana. Products from this effort will include a scientific assessment of existing conditions and trends within the entire basin and two Environmental Impact Statements. A draft Environmental Impact Statement covering Oregon and Washington east of the Cascade Mountains is expected late in 1995.

State

The State of Oregon uses "Oregon's Statewide Planning Goals" to guide land use planning within the state (Department of Land Conservation and Development. 1994). This requires local governments to develop their own comprehensive plans which are consistent with. and implement on the local level. the state's goals. One other

document which is applicable to the study area is the "Oregon Natural Heritage Plan" (Natural Heritage Advisory Council to the State Land Board. 1993). The Governor and various agencies within the State of Oregon will be given an opportunity to review the proposed plan amendment and comment on its consistency with their goals. policies, and plans.

Lake County

Lake County has an existing land use plan. The plan was developed in response to the State of Oregon's requirement for local governments to develop land use plans. The plan consists of a number of reports, ordinances, and subsequent amendments governing land use practices and policies within the county (Lake County, 1979; 1983; 1989a; 1989b; 1989c; 1992).

The plan classifies the lands surrounding the lake as rangelands. The open space inventory within the "Lake County Atlas" (Lake County, 1979) recognizes the area along the northwest shore of the lake as critical deer and antelope habitat. The southeast shore is recognized as critical deer habitat. It further states that "one of the primary functions of the County Plan is to identify and recognize natural areas" (page 96) and lists Abert Lake and Rim as one of many recognized research and potential natural areas found within the county (page 97).

The atlas was amended in 1983 (Lake County, 1983) and recognized Abert Rim's wilderness study area status (page 18) and value as a scenic corridor (page 19). The wildlife habitat map recognized additional portions of the area as valuable wildlife habitats (deer and antelope range; wetlands). The revised open space map shows Lake Abert proper as a designated natural area.

In 1992, the county passed an "Emergency Ordinance and Interim Public Land Management Plan" (Lake County, 1992) to supplement the existing land use plan, as amended. This ordinance does not support the designation of any additional wilderness areas. roadless areas, or research natural areas within the county. Though it does not specifically discuss ACEC designation, its intent was to discourage any more special area designations. The ordinance encourages exploration and development of mineral/energy resources within the county, continuing of livestock grazing/ agricultural uses at historic levels consistent with sound management practices, as well as continuing the control of predatory animals and noxious weeds.

The proposed plan amendment is consistent with most aspects of Lake County's plan, with the exception of the 1992 ordinance's intent that no more special areas be designated within the county. The Lake County Commissioners are being provided with an opportunity to review the proposed plan amendment and comment on its consistency with their approved plans and policies.

Tribal Governments

Four recognized tribal governments are known to have an interest in the Lakeview Resource Area: the Klamath Tribes, Confederated Tribes of the Warm Springs Reservation, Burns Paiute Tribe, and Fort Bidwell Tribe. It is unknown if any of these government bodies have a formal land, resource, or economic development plan which would be consistent or in conflict with the proposed plan amendment. However, the Klamath Tribes are known to have a policy calling for no surface disturbance of their ceded lands.

These tribal governments have been given several opportunities to participate in the preparation of this plan, review the plan, and provide a consistency determination. To date, no formal comments have been received related to the consistency of the alternatives in meeting the goals of any tribal plans.

Chapter 2 - Alternatives

Introduction

NEPA requires that whenever a Federal agency proposes a major Federal action, the agency must evaluate a wide range of (but not necessarily all) possible alternative actions. During the planning process, the public, the working group, and BLM ID Team members provided input into the development of management goals and objectives for the area (see Chapter I), as well as, a number of possible alternatives to meet the goals and objectives. Ten general management assumptions were used in the development and evaluation of the alternatives. A total of eleven alternatives wet-e considered with seven being studied in detail. These are discussed in detail in the following section.

Management Assumptions Common To All Alternatives

There are a number of assumptions that apply to the all of the management alternatives that were evaluated in detail. These are listed below,.

1 All alternatives must comply with existing laws. regulations, executive orders. and policies.

2. All alternatives must be feasible and cost effective

3. All alternatives will be long-term in scope (I O-15 year timeframe) and will be modified only when necessary following BLM planning process.

4. Management will be adaptive and responsive to new data, information, or changing conditions. Continued inventory and monitoring will be required regardless of the alternative selected. The amount of inventory and monitoring required may vary between alternatives. This is discussed further in Appendix D. As new information, data, or better techniques or models become available they will be utilized to the extent practicable, Should these suggest or support modification to one or more of the original objectives, this will be accomplished without further public input or a new plan amendment as long as any such new objective(s) is consistent with the goals of this plan amendment.

5. All alternatives apply only to BLM-administered lands within the planning area boundary. However, the BLM would emphasize more coordination with other agencies and landowners and, where possible, enter into partnerships, cooperative agreements, and memorandums of understanding with them, in order to become better informed on other activities occurring within the basin and provide input on other proposed actions which may have an adverse impact on the lake ecosystem.

0 All alternatives will recognize or be subject to valid. existing rights (i.e. such as mining claims. existing rights-of-w av. access to priv ate inholdings. etc.).

7 Any land acquisition proposed under any of the alternatives would be conducted in accordance with existing requirements to equalize the local land/tax base. The preferred method would be through exchange. Any lands subsequently acquired as a result of implementing the proposed plan which are adjacent to or within an ACEC boundary would automatically be managed in accordance with the goals and objectives specified in this plan amendment and would not require the preparation of a new plan atnendment.

8 Implementation of any alternative plan would be coordinated with other agencies, Native American groups, private land owners. and other public members interested in the watershed.

9. Unless specified otherwise. those lands within the planning area outside of any ACEC boundary (in alternatives having an ACEC boundary) would be managed similar to Alternative I (No Action).

IO. Mineral development could occur on private or state lands under any of the alternatives, including those which close or restrict mineral activities within an ACEC boundary, as the ACEC designation applies only to lands administered by the BLM. In addition, mineral development is restricted by the Wilderness IMP within Abert Rim WSA regardless of the alternative analyzed

Alternatives Considered But Eliminated From Further Study

A number of alternatives were considered for evaluation during the plan amendment process. Several were eliminated from further study. A brief description of the alternative and the reason for its elimination from further study is discussed below.

ACEC Designation with No Change in Existing Management

This alternative consisted of designating the entire lake up to the surveyed high water mark (elevation 4260 feet) as an ACEC. but did not specify any change in current management. as existing management was felt by some to be mot-c than adequate in protecting the relevant and important resource values present. This alternative was eliminated from further study as the management actions and associated Impacts would be very similar to those of the No Action Alternative and, by definition, an area can not be designated as an ACEC unless special management attention is required (43 CFR Part 1601 .O-5).

Designation of the Entire Watershed as an ACEC

This alternative consists of designated the entire Lake Abert watershed as an ACEC. This alternative was eliminated from further consideration as approximately 53% of the watershed is under private, state, or Forest Service ownership. By law, an ACEC designation can only apply to lands under BLM administration. However, the BLM does recognize the importance of those lands in relation to Lake Abert. To this end, the BLM has considered the effects of land use practices and other activities throughout the watershed, including those beyond the BLM's control which influence the lake and the ability to manage the lake effectively in the future. This plan amendment includes a watershed analysis approach as discussed further in Chapter I.

Wilderness Designations

Two closely related alternatives suggested during the scoping process had to do with designation of the lake and the area extending east from Abert Rim WSA to Hart Mountain as wilderness. rather than as an ACEC. Consideration of such wilderness designations were dropped from further analysis for several reasons. The entire Lakeview Resource area, including Lake Abert and lands to the east of Abert Rim were previously inventoried for wilderness characteristics and determined not to meet the criteria (BLM, 1979; 1980a; 1980b). In addition, for the purposes of this plan atnendment, the lands east of Abert Rim were considered to be outside of the planning area and region of influence on the lake itself.

Termination of All Livestock Grazing within the Area

This alternative was suggested during the public scoping process and consistd of eliminating all grazing on public land within the planning area. This alternative was considered, but eliminated from detailed analysis because the Lakeview Grazing Management EIS (BLM, 1981) already evaluated the impacts of eliminating livestock grazing within the entire Lakeview Resource Area, which includes the Lake Abert area, In addition, several of the alternatives analyzed in detail contain large portions of the planning area that would

be excluded from livestock grazing. Finally, livestock grazing is a valid use of public lands under the Taylor Grazing Act and the multiple use mandate of the Federal Land Policy and Management Act.

Alternatives Evaluated In Detail

Alternative 1 (No Action - Continue Existing Management)

This alternative would consist of continuing current management practices within the study area (Map I, Appendix B) in accordance with the existing High Deserr MFP. Lakeview Grazing Management Final EIS (BLM, 1983; 1981), other programmatic and activity level plans (BLM. 1989a; 1989b; 1994b), and current BLM policies and directives. The area would not be designated as an ACEC. This interpretation of the no action alternative is consistent with the Council on Environmental Quality's (CEQ) definition (CEQ. 1982). This alternative must be included, by law, and serves as a baseline for comparison purposes in the impact analysis. A summary of current management decisions and direction is discussed in the following paragraphs.

The High Desert Management Framework Plan (MFP) (BLM, 1983) is the existing land use plan covering the study area. Current management direction is also guided by a number of other documents developed concurrently with or subsequent to the High Desert MFP. These documents automatically amended the High Desert MFP. The impacts of those management decisions recommended in the MFP related to grazing management were evaluated in the Lakeview Grazing Management Final Environmental Impact Statement (EIS) (BLM. 1981). Other management actions within the general study area have been evaluated via programmatic or regional EISs or activity-level environmental assessments (EAs). These include such topics as wilderness suitability (BLM, 1982), wilderness designation (BLM, 1989a), interim wilderness study area management (BLM, 1987b), noxious weed control (BLM, 1987a; 1994b), and animal damage control (BLM, 1989b; APHIS, 1994).

For the purposes of impact assessment, a number of assumptions have been made concerning what may or may not happen in the future under the no action alternative. These assumptions are necessary as an aid in guiding the impact assessment process. For some resource values there is expected to be little change from the present management conditions. For other resource values there could be a wide range of management possibilities due to the flexibility provided by the existing land use plan. These assumptions are based on what appears "reasonable" into the "foreseeable future", as defined by the CEQ NEPA regulations.

In addition to the management assumptions listed at the beginning of Chapter 2, it is assumed that under this alternative, certain types of mineral developments and rights-of-way applications could be proposed and possibly approved with few restrictions. It is also possible that such future developments may never be proposed. Wildlife and special status species resources could require mitigation in response to such developments. Fire plans may or may not be developed. Current range, recreational. cultural, and other resource management practices would be expected to continue mostly unchanged.

'The current management direction as outlined in the High Desert MFP and subsequent amendments relating to the immediate area of the Lake Abert subbasin are summarized below:

Lands Management

No specific land tenure adjustments were identified in the High Desert MFP related to the planning area. However, current BLM policy is to "block-up" or acquire. with exchange being the preferred method, parcels within the existing checkerboard land ownership pattern, in order to improve land management efficiency when it is in the general public interest.

Rights-of-Way Management

The planning area is currently open to the location of new rights-of-way with the exception of Abert Rim WSA which IS managed in accordance with the existing wilderness Interim management policy. This policy restricts the location of new rights-of-way within WSA boundaries, but at the same time can not deny access to private inholdings.

Soils, Roads and Transportation Management

During the wet season, vehicle traffic may be restricted on those roads lacking subgrade reinforcement where critical erosion is apt to occur. Those roads which are not needed for management, as identified in the transportation plan, are to be closed and rehabilitated. Currently, no roads in the planning area which are part of the transportation plan have been identified as unnecessary, nor are any apt to be so identified in the future.

Road maintenance is to be continued as needed and funds permit. New roads or transportation features could be

constructed in response to discretionary approval of rights-of-way or other permitted developments. See also OHV restrictions discussed under "Recreation Management "

Mineral Management

Within Abert Rim WSA. no mineral leasing or mineral disposal is allowed (Map 1. Appendix B). Locatable mineral activity (under the 1872 mining act), other than non-surface disturbing casual use. would require a Plan of Operation. In addition. any activity requiring reclamation can no longer be allowed. If Congress decides to include this area in the wilderness system, the area would be officially withdrawn from all mineral activities (locatable, leasable. and salable). However, if Congress decides to release the area from WSA status, it would become open to all mineral activities.

The remainder of the planning area is open to mineral material disposal, locatable mineral entry, and all mineral leasing. Federal regulation (43 CFR 3500.7 which deals with solid mineral leasing other than coal and oil shale) requires that any lease issued must be issued in conformance with the decisions. terms, and conditions of a comprehensive land use plan for the deposit. Before a lease or permit can be issued. the authorized officer tnust comply with NEPA.

The current plan calls for disposal of rock, sand, gravel, and cinder from existing deposits wherever there is a demand. This includes. but is not limited to reserving those areas surrounding existing rock, sand, gravel, and cinder pits for disposal ot such materials. Currently there are two such pits in the planning area which have existing NEPA documents (BLM. 1978a; 1978b). All areas classified by USGS as prospectively valuable for sodium. potassium, and lithium are open to mineral leasing. Geothermal, oil, and gas leasing could occur.

There would be no more segregation of public land from mineral leasing or location, unless preceded by a minerals report which shows the land does not contain significant mineral resources, with the exception of OHV or road closures. Currently. all lands under the preliminary Federal Energy and Regulatory Commission (FERC) permit (#11419) are closed to locatable mineral entry, This closure would continue until the permit expires or is vacated,

Paleontological Resource Management

Current guidance requires that such resources be protected and preserved whenever located. Scientific research could follow any new discoveries.

Special Forest Products

Though there is no commercial forest land within the planning area. the area does contain aorne resources classified as special forest products. The MFP allows for the disposal of timber products and other vegetation products on juniper woodlands to meet the public demand for such products throughout the resource area. Such products include firewood. posts, poles, berries, and boughs from Juniper. Current district policy also addresses the cutting of Christmas trees for personal use and gathering mushrooms.

Firewood cutting in the resource area is currently limited to designated firewood cutting areas. No such areas exist in thc planning area. Current policy also closes WSAs, ACECs, and RNAs to the harvest of special forest products.

Noxious Weed Management

The on-going integrated noxious weed control program includes plans to continue treatment of a large, existing mediterranean sage infestation on the eastern edge of Lake Abert, extending up to the top of the rim and small satellite populations scattered throughout the area. There have been several attempts at establishing biological control organisms in recent years. Additional infestations of mediterranean sage and other noxious weeds would be treated as the need arises.

Rangeland Resource Management

Forage is allocated and range improvement projects implemented in accordance with the High Desert MFP, Lakeview Grazing EIS, and subsequent decisions and agreements as reported in later Rangeland Program Summaries (Table 5).

Current management includes continuing the current exchange of use agreement with the permittee on the north end of the lake (allotment 0425) for the benefit of maintaining snowy plover nesting habitat (on Federal and private land) in an early successional stage. This also includes continuing to exclude livestock grazing on Abert Rim (part of Paisley Commons allotment 0400), maintaining the small Cave Springs exclosure fence on the west side of the lake (allotment 0427), and excluding grazing from other small exclosures located throughout the planning area. This would also include maintaining a new exclosure fence (approximately 4 miles long) on the west side of the lake which is currently in the planning stage and is expected to be constructed before this plan amendment is completed.

Wildlife Management

One hundred and eighty bighorn sheep months use on Abert Rim (allotment 0400) have been allocated and 3 water catchments for bighorn sheep have been constructed on Abert Rim.

The current plan specifies Off-Highway Vehicle (OHV) use in raptor nesting areas on Abert Rim be seasonally restricted.

Though OHV use in the Lake Abet-t Archeological District and Abert Rim WSA were restricted to existing roads via Federal Register Notices dated December 28, I98 1, and January 22, 1988, (46 (248) FR 62712 and 53 (14) FR 1856) respectively, no seasonal seasonal restrictions were implemented.

Animal Damage Control Management

Animal damage control within the planning area consists primarily of predator (coyote) and rangeland grasshopper/ Mormon cricket control efforts. These programs are under the authority of the Animal and Plant Health Inspection Service (APHIS), not the BLM (APHIS, 1993; 1994).

Predator control activities are carried out by APHIS at the request of the Oregon Department of Fish and Wildlife or livestock permittees in response to wildlife depredation (mule deer and pronghorn antelope), livestock depredation. or human health/safety concerns. Abert Rim WSA is currently identified as a no-control area, except in emergency situations. and is restricted by the Wilderness IMP. The rest of the planning area is within the general control zone. with the exception of public safety zones (one-quarter mile buffer on each side) along Highway 395.

Future predator control activities under this alternative could be expanded to include cougar, black bear, and a number of other predatory animals pending the final decision resulting from a regional NEPA document recently released by APHIS (APHIS. 1994).

Rangeland grasshopper and Mormon cricket control could also be conducted under this alternative should the need arise, though there has been no need in the recent past. The recent APHIS (1993) Environmental Assessment did identify the possibility of outbreaks in the general vicinity of the planning area, but has not contacted the BLM concerning a need to treat.

Special Status Species Management

No land or surface disturbance (including OHVs), land exchanges, mineral sales, or range improvements on or near any known sensitive, threatened, or endangered plant site is allowed.

Existing livestock and wildlife use on a number of specific' rare plant sites was to be eliminated. reduced, or maintained at current levels. An exclosure was constructed to protect the reintroduction of desert allocarya (Plagiobothrys salsus), but was unsuccessful.

All known potential habitats are managed in a manner that maintains or enhances the ecosystem required by sensitive. threatened. or endangered plant species.

Special Area Management

Abert Rim WSA (Map 2, Appendix B) is managed in accordance with the wilderness interim management policy (BLM, 1987b) such that wilderness values are not impaired. pending final action by Congress on designation or release from WSA status.

Fire Management

Fires are allowed to burn with limited suppression over the entire area, if life or property are not in danger and it meets a fire prescription for the area. However, a fire prescription has not yet been written for the area. No mitigation measures related to impacts of fire suppression activities are specified in the High Desert MFP, though it was common to reseed major fires areas in the past to prevent erosion.

Cultural Resource Management

All listed and potential National Register sites are to be retained in Federal ownership including the Lake Abert petroglyph site (which is part of the Lake Abert District), Lake Abert District (Map 2, Appendix B), and the area within one-half mile of the western shore.

All National Register sites should be removed from mineral entry through withdrawal including the Lake Abert District. However, a proposed withdrawal was terminated due to Abert Rim's WSA status which effectively excludes the area from discretionary mineral leasing and sales actions. This was deemed adequate to protect cultural values until such point in time as it becomes officially designated as a wilderness area, when full mineral withdrawal is expected to be performed through the designation legislation.

The existing archaeological district could be expanded to include all other eligible sites around the lakeshore. This would likely involve a zone approximately one-half mile wide around the western shore,

The plan calls for closing the Lake Abert National Historic District to OHV use except on existing roads. OHV use in this area was restricted to existing roads via a Federal Register Notice dated December 28, 198 1 (46 (248) FR 627 12).

Destructive, discretionary uses to National Register sites, including the Lake Abert District, are to be prevented. Surface disturbing activities within the Lake Abert District are subject to coordination with the State Historic Preservation Officer (SHPO) under Section 106 of the National Historic Preservation Act and consultation with Native American tribes.

Native American traditional uses and concerns are to be identified through continued tribal consultation.

Recreation Management

All public lands within the planning area are currently open to OHV use except rare plant sites P-l and SL- 1 and designated National Register Sites. OHV use has been limited as follows:

1) OHVs are limited to highway vehicles in sensitive plant sites which are not closed and use prohibited entirely if plants become Federally-listed.

2) OHV use rnay be restricted to existing roads and trails in areas with erosion problems and in potential National Historic Register sites. No such areas have been identified or closed to date. For the purposes of this and other alternatives, an existing trail is defined as any well defined one or two-track access that is not officially designated or maintained as a road which exists on the landscape at that point in time when a. decision is made on this plan amendment.

3) OHV use in the Lake Abert Archeological Zone was restricted to existing roads via a Federal Register Notice dated December 28. 1981 (46 (248) FR 62712). OHV use within Abert Kirn WSA was limited to existing roads and trails via a Federal Register Notice dated January 22, 1988 (53 (14) FR I 856). This restriction will remain in effect until Congress either designates the area as wilderness or releases it from WSA status.

The MFP recommends placing Abert Rim in a scenic withdrawal class as a means of protecting natural heritage values. The proposed withdrawal has not been completed due to Abert Rim's WSA status which effectively excludes the area from discretionary mineral leasing and sales actions, but does not prevent all potential mining activity (i.e. locatable minerals under the 1872 mining act). However, WSA status was deemed adequate to protect existing natural heritage values until it becomes officially designated as a wilderness area, when full mineral withdrawal would be pertormed via the designation legislation.

The area is open to hunting. wildlife viewing (which includes a "Watchable Wildlife" site on the south end of the lake). and other recreation activities.

Visual Resource Management

The area is managed in accordance with the appropriate visual resource management (VRM) class objectives. Currently. parts of the study area are classified as VKM Class I. III. and IV (Map 3. Appendix B).

Other Resource Management

No specific management actions were identified within the study area with respect to groundwater resources, hydrology, water quality, air quality, vegetation (other than that specified for noxious weeds and special status plants), aquatic communities, Wild and Scenic River designations, or ACEC designations and management.

Alternative 2

Under this alternative, the entire Lake Abert drainage (planning area) would be designated as an ACEC (Map 4, Appendix B). For the purposes of impact assessment, a number of assumptions, in addition to those listed at the beginning of Chapter 2. have been made concerning what may or may not happen in the future under this alternative. Though no mineral developments or rights-of-way would be approved on BLM-administered land, such developments could still occur on state or private lands, as they would not be subject to Federal management restrictions. The likelihood of this happening is probably small, but still requires evaluation. Fire prescriptions would probably be developed and implemented. Range, wildlife, recreational, cultural, and other resource management practices would generally be more protective or restrictive compared to other alternatives. Soils, noxious weed, and paleontological resource management would be managed similar to Alternative 1. This alternative differs from other alternatives in the following areas:

Lands Management

Private inholdings would be acquired where there is a willing seller. Land exchange would be the preferred method.

Rights-of-Way Management

No new rights-of-way would be allowed

Roads and Transportation Management

Road maintenance would occur. No new roads or railroads would be constructed within the planning area, but existing roads could be widened, straightened. or expanded within existing rights-of-way. OHV use would be eliminated or restricted. Refer to th discussion under "Recreation Management".

Hydrology and Water Quality Management

Allow no discretionary actions which would violate State of Oregon water quality standards or conflict with Goal 1, objective b.

Mineral Management

The entire planning area would be closed to all locatable mineral mining and mineral leasing, including sodium, oil. gas. and geothermal. Valid, existing claims, if present, would remain open to mining (Map 4. Appendix B). However, no such claims are known to exist within the planning area. There would be no mineral material disposal. All or parts of the two existing material disposal pits would be closed and reclaimed.

Mineral leasing (oil, gas, geothermal, and sodium) and mineral material disposal (sand, gravel, and rock) are discretionary activities. Therefore, a planning decision to allow no leasing or sale of such resources would effectively close the planning area to such activities. However, a planning decision to close the planning area to mineral entry (locatable minerals) would require initiation of formal withdrawal procedures. Prior to such a withdrawal, a mineral investigation would have to be conducted to assess present and future mineral potential. Under this alternative, all of the planning area would be recommended for withdrawal from locatable mineral entry. Approval of this recommendation would lie with Congress. Withdrawal of the Abert Rim WSA portion of the planning area would most likely be accommodated through wilderness designation legislation. However, should Congress decide not to designate Abert Rim as wilderness, the withdrawal could be included with the withdrawal proposal for the rest of the planning area.

Air Quality Management

Any prescribed burning plan(s) would be planned and implemented such that it does not violate state air quality standards.

Aquatic Community Management

No active management or manipulation would occur, However those measures described under rights-of-ways. water quality. mineral. and visual resource management are designed to protect the aquatic community and ecology of the lake system.

Vegetation Management

The area would be managed using such techniques as prescribed fire, livestock grazing, livestock exclosures, and vegetation reestablishment where necessary to maintain or improve the existing wetland. riparian, and upland habitats and overall botanical species diversity. (See also special status species management section). Preference would be given to the use of native species when reseeding sites which are damaged by disturbance (i.e. pit reclamation), severe fire. or have been treated for noxious weeds and lack an existing native seed source. Existing seeded areas would be maintained as they are currently.

Rangeland Resource Management

Forage would be allocated and exclosures maintained in a manner similar to alternative I. Areas currently open to livestock grazing would remain open unless documented scientific evidence exists that significant, adverse impacts are occurring to the relevant and important resource values. Ail remaining AUMs (over and above the existing 180 bighorn sheep months) on Abert Rim (part of allotment 0400) would be allocated to bighorn sheep and other wildlife.

The current exchange of use agreement with the permittee on the north end of the lake (allotment 0425) would be continued and refined, if needed. for the benefit of maintaining snowy plover nesting habitat in an early successional stage on private and Federal land.

Special Forest Products

Under this alternative, the ACEC, including Abert Rim WSA would be closed to the collection of all special forest products, consistent with current district policy on special forest products.

Wildlife Management

Management would be the same as Alternative 1, except all remaining AUMs (over and above the existing 180 bighorn sheep months) on Abert Rim (part of allotment 0400) would be allocated to bighorn sheep and other wildlife.

Animal Damage Control Management

No control work would be allowed. The area would be designated as a no-control zone within the APHIS/BLM animal damage control annual work plan.

Special Status Species Management

Sensitive plant and animal species that were historically present would be reintroduced. Currently one extirpated plant species is known from the area. Two others are suspected. No animal species are currently proposed for reintroduction.

Special Management Areas

The entire planning area would be designated as an ACEC with the boundary being set as the immediate drainage (Map 4, Appendix B). This boundary would incorporate the

majority of the hydrologic functions which are currently under the control of the BLM and would encompass all lake ecosystem. cultural, wildlife. and scenic values. A portion of Abert Rim WSA would be included in the ACEC boundary. However, WSA management would be the same as for Alternative I.

Fire Management

All wildfires would be suppressed using a limited suppression strategy in situations where life and property are threatened. Wildfire areas would be reseeded (with an emphasis on the use of native seed) if natural revegetation did not occur or soil erosion was considered to be an immediate threat. A prescribed burn plan(s) would be developed where appropriate or as needed to meet ACEC objectives. Prescribed fires would be designed and implemented to encourage natural revegetation by fire-tolerant native species and break up large tracts of monotonous vegetation types into a mosaic of different vegetation types.

Cultural Resource Management

A Class III archeological survey of the entire area would be conducted, as time and funding permit.

Signs would be placed where they could be observed by the general public requesting that they report any observed digging in the area.

Regular patrols of sites within the area would be performed to protect against unauthorized excavation and monitor general site condition. Patrols would be conducted by both law enforcement and cultural resource personnel.

Cultural site interpretation of some sites would be provided within the area where the public is already stopping and other resources are being Interpreted (i.e. the existing "Watchable Wildlife" site).

The existing archaeological district would be expanded to include other eligible sites within approximately one-half mile of the western shore. This area would be protected from mineral entry through withdrawal of the entire planning area.

Native American traditional uses and concerns would be identified through consultation.

Recreation Management

With the exception of administrative use. the area within the Abert Rim WSA and the northern playa would be closed to all OHV use. OHV use would be restricted in the remainder of the area to existing roads and trails. Hunting, wildlife viewing, and other low-impact recreation opportunities would continue

Visual Resource Management

Abert Rim would be managed in its existing VRM Class (I) which would allow no actions that would impact the existing visual character. The remainder of the planning area would be designated and managed as VRM Class II.

Alternative 3

Under this alternative, a portion of the planning area would be designated as an ACEC (Map 5, Appendix B). For the purposes of impact assessment, a number of assumptions have been made concerning what may or may not happen in the future under this alternative. In addition to the management assumptions listed at the beginning of Chapter 2. it is assumed that certain types of mineral developments and rights-of-way applications could be proposed and possibly approved, but would be subject to protective stipulations. It is also possible that such future developments may never be proposed. Wildlife and special status species resources may require mitigation in response to such developments. Fire prescriptions would probably be developed and implemented. Current range, recreational, cultural, and other resource management practices would be somewhat protective or restrictive.

Lands, soils, paleontological resources, noxious weeds, wildlife, and animal damage control would be managed similar to Alternative 1. Air quality, hydrology, water quality, vegetation. special forest products, and fire would be managed similar to Alternative 2. This alternative would differ from other alternatives in the following areas:

Rights-of-Way Management

New rights-of-way could be allowed within the ACEC, but only in accordance with the goals and objectives for VRM class (Goal 6), lake levels, total dissolved solid levels, and water chemistry (Goal 1, objective b), and wilderness interim management policy (none can be located in WSAs). The burden of proof that a new right-of-way proposed within the ACEC met the goals and objectives and, thereby, did not cause an adverse impact on the lake ecosystem, would be on the applicant.

Roads and Transportation Management

These resources would generally be managed similar to Alternative 1 except OHV use would be limited to existing roads and trails. Seasonal closures would be placed on the northern playa and in deer/bighorn sheep critical winter range, as needed. See also the discussion under "Recreation Management". Authorized administrative use, on a limited basis, such as law enforcement, emergency search and rescue operations, wildlife surveys, project maintenance, and permittee access may be exempted from these restrictions.

Mineral Management

Within the ACEC boundary mineral leasing could be allowed (Map 5, Appendix B), but only in accordance with the goals

and objectives for VRM Class (Goal 6). lake levels, total dissolved solid levels (Goal 1, objective b. The burden of proof that a proposed leasable mineral development within the ACEC met the management goals and objectives and, thereby, did not cause an adverse impact on the lake ecosystem. would be on the applicant. No surface occupancy would be allowed within the ACEC boundary for geothermal, oil, or gas leasing.

All locatable minerals within the ACEC boundary would be subject to the preparation of a separate Plan of Operations and associated NEPA document. Mining and disposal of all salable minerals (sand, gravel, rock, and cinder) within the planning area would be restricted to the two existing pits located in the area.

The conditions specified in 43 CFR 3500.7 (as described in alternative 1) would apply.

The existing FERC permit (#11419) area would remain closed to locatable mineral entry unless the permit expires or is vacated. Though Abert Rim WSA is outside of the ACEC. the mineral activities as discussed under Alternative I would remain in effect. (If Congress decides to include this area in the wilderness system. the area would be officially withdrawn from all mineral activities (locatable, leasable, and salable). However. if Congress decides to release the area from WSA status, it would become open to mineral activities).

Rangeland Resource Management

Rangeland resources would be managed similar to Alternative I except that all AUMs on Abert Rim would be allocated to wildlife.

Aquatic Community Management

No active management or manipulation would occur. However those special stipulations and conditions described under rights-of-way, hydrology and water quality, mineral, and visual resource management are designed to protect the aquatic community and ecology of the lake system.

Special Status Species Management

Desert allocarya would be reintroduced (within an improved exclosure where it was historically present).

Special Management Areas

Under this alternative, the lake and surrounding area up to the legally surveyed high-water mark (elevation 4.260 feet) would be designated and managed as an ACEC (Map 5, Appendix B). This boundary was derived because it encompasses the lake ecosystem and most of the important wildlife values. Much of the important scenic and cultural values would remain protected by Abert Rim's WSA status. However, the boundary fails to include all important cultural sites, particularly along the west shore. Though the WSA would be outside of the ACEC boundary, it would continue to be managed as in Alternative 1.

Cultural Resource Management

Cultural management would be the same as for Alternative 2, except sites would be added to the existing archaeological district, as time and funds allow and there would be no mineral withdrawal.

Recreation Management

With the exception of administrative use, OHV use would be restricted throughout the ACEC to existing roads and trails. Seasonal closures would be placed on the playa at the north end of the lake and in deer/bighorn sheep critical winter range. Though outside of the ACEC, the OHV designation for Abert Rim WSA would remain restricted to existing roads and trails. The remainder of the planning area would be open to OHV use. The existing "Watchable Wildlife" site on the south end of the lake would be maintained and a new site constructed on the north end of the lake. Hunting and other low-impact recreation opportunities would continue.

An existing two-track road at the mouth of Juniper Creek would be converted to a foot trail, in a manner consistent with the wilderness interim management policy.

Visual Resource Management

The area from the eastern side of the lakeshore up to the top of Abet-t Rim would be managed in accordance with its existing VRM classification (Class I). The western side of the planning area would be designated and managed as VRM Class III.

Alternative 4

Under this alternative, a portion of the study area would be designated as an ACEC (Map 6, Appendix B). For the purposes of impact assessment, a number of assumptions have been made concerning what may or may not happen in the future under this alternative. In addition to the management assumptions listed at the beginning of Chapter 2, it is assumed that certain types of mineral developments and rights-of-way applications could be proposed and approved, but would be subject to protective stipulations. It is also possible that such future developments may never be proposed. Wildlife and special status species resources may require mitigation in response to such developments. Fire prescriptions would probably be developed and implemented. Current range, recreational, cultural, and other

resource management practices would be somewhat protective or restrictive.

Lands, soils, paleontological resources, noxious weeds, wildlife, and animal damage control would be managed similar to Alternative 1. Air quality, hydrology, water quality. aquatic communities. vegetation. special forest products, visual, and fire would be managed similar to Alternative 2. Rights-of-way. roads and transportation, minerals. rangeland resources, special status species, cultural resources, and recreation would be managed similar to Alternative 3. This alternative would differ from the other alternatives in the following areas:

Special Management Areas

The area up to the highest recently-recorded water (elevation 4,262 feet) mark on the north, west, and south and up to the top of Abert Rim on the east would be designated as an ACEC (Map 6, Appendix B). This alternative boundary was developed as it encompasses the lake ecosystem, most of the important wildlife values. and most of the scenic and cultural values. The boundary would not incorporate all cultural sites, particularly on the west shore. A portion of the Abert Rim WSA would fall within the ACEC boundary, but would be managed similar to Alternative 1.

Alternative 5

Under this alternative, a portion of the planning area would be designated as an ACEC (Map 7, Appendix B). For the purposes of impact assessment, a number of assumptions have been made concerning what may or may not happen in the future under this alternative. In addition to the management assumptions listed at the beginning of Chapter 2, it is assumed that certain types of mineral developments and rights-of-way applications could be proposed and approved. but would be subject to protective stipulations. Mineral leasing would be very restricted compared to the other alternatives (with the exception of Alternative 2). It is also possible that such future developments may never be proposed. Wildlife and special status species resources may require mitigation in response to such developments. Fire prescriptions would probably be developed and implemented. Current range, recreational, cultural, and other resource management practices would be somewhat protective or restrictive.

Lands. soils. paleontological resources, noxious weeds. wildlife, and animal damage control would be managed similar to Alternative 1. Air quality. hydrology, water quality. aquatic communities. vegetation, special forest products. visual, and fire would be managed similar to Alternative 2. Rights-of-way. roads and transportation, rangeland resources, special status species. cultural resources, and recreation would be managed similar to Alternative 3. This alternative differs from the other alternatives in the following areas:

Mineral Management

The northern portion of the ACEC area (Map 7, Appendix B) would be closed to sodium leasing. The existing FERC permit (#11419) area would remain closed to locatable mineral entry unless the permit expires, is vacated, or a license issued. Though Abert Rim WSA is outside of the ACEC, the mineral activities within the WSA as discussed under alternative 1 would remain in effect. (If Congress decides to include this area in the wilderness system, the area would be officially withdrawn from all mineral activities (locatable, leasable, and salable). However, if Congress decides to release the area from WSA status, it would become open to mineral activities).

The rest of the planning area would be open to mining, but subject to the same special stipulations (lake level and total dissolved solids) as Alternative 3. However, geothermal, oil, and gas leasing could occur throughout the ACEC, but no surface occupancy would be allowed within the ACEC boundary. Locatable mineral activity would be allowed throughout the ACEC. but would be subject to a separate Plan of Operations and associated NEPA document. Mineral material disposal would continue from the two existing pits. The conditions specified in 43 CFR 3500.7 (as described in Alternative 1) would apply.

Special Management Areas

Under this alternative, the lake, the surrounding archaeological sites/district, and playa on the north end would be designated and managed as an ACEC with the boundary being established as Highway 395 on the east, an existing county road on the north, and an existing jeep trail on the northwest and southwest, and a 4-mile exclosure fence on the west (Map 7, Appendix B). This boundary was derived based on its ability to contain most of the lake ecosystem. wildlife, and cultural values. The scenic and some of the cultural values would continue to be protected within Abert Rim WSA despite being located outside of the ACEC. The boundary would not incorporate all cultural sites, particularly on the west shore. The Abert Rim WSA would be outside of the ACEC boundary and would continue to be managed similar to Alternative 1.

Alternative 6

Under this alternative. no ACEC designation would occur (Map 1, Appendix B). For the purposes of impact assessment, a number of assumptions have been made concerning what may or may not happen in the future under

this alternative. In addition to the management assumptions listed at the beginning of Chapter 2, it is assumed that certain types of mineral developments and rights-of-way applications could be proposed and possibly approved. However. mineral leasing would be subject to some restrictions. It is also possible that such future developments may never be proposed. Wildlife and special status species resources may require mitigation in response to such developments. There would be a small increase in recreational opportunities in the area. Fire prescriptions may or may not be prepared or implemented. Current range, cultural, and other resource management practices would be expected to continue mostly unchanged into the foreseeable future.

Most resource management activities within the planning area (i.e. lands. rights-of-ways, watershed, soils, roads and transportation, paleontological, air quality, vegetation, special forest products, rangeland, noxious weeds, wildlife, special status species, animal damage control, fire, and visual) would continue in a similar fashion as Alternative 1. However, some changes in existing management would occur. These changes include:

Mineral Management

Mineral leasing would be allowed (Map 1, Appendix B), but would be subject to those special stipulations (lake level and total dissolved solids) identified in Alternative 3. Surface occupancy would not be allowed near the lake below an elevation of 4,260 feet, otherwise, mining of locatable and salable minerals would be similar to Alternative 1. The conditions specified in 43 CFR 3500.7 (as described in Alternative 1) would apply.

The existing FERC permit (#11419) area would remain closed to locatable mineral entry unless the permit expires or is vacated. The mineral management activities within the WSA as discussed in Alternative 1 would remain in effect. (If Congress decides to include this area in the wilderness system, the area would be officially withdrawn from all mineral activities (locatable. leasable, and salable). However. if Congress decides to release the area from WSA status, it would become open to mineral activities).

Aquatic Communities

Management would largely be similar to Alternative 1 (i.e. no specific direction). However, those special stipulations and conditions described under mineral management would be implemented to protect the aquatic community and ecology of the lake system.

Special Management Areas

Under this alternative, no ACEC would be established (Map 1, Appendix B). Abert Rim WSA would be managed similar to Alternative 1.

Cultural Resource Management

Management would be the same as Alternative 1, except site interpretation would be expanded for public education purposes.

Recreation Management

Management would be the same as Alternative 1, but would allow and/or develop more low-impact recreational opportunities.

Alternative 7 (Preferred Plan)

Under this alternative, a portion of the planning area would be designated as an ACEC (Map 8, Appendix B). For the purposes of impact assessment, a number of assumptions have been made concerning what may or may not happen in the future under this alternative. In addition to the management assumptions listed at the beginning of Chapter 2, it is assumed that certain types of mineral developments and rights-of-way applications could be proposed and approved, but would be subject to protective stipulations. Mineral leasing would be very restricted compared to the other alternatives (with the exception of Alternative 2). It is also possible that such future developments may never be proposed. Wildlife and special status species resources may require mitigation in response to such developments. Fire prescriptions would probably be developed and implemented. Current range, recreational, cultural, and other resource management practices would be somewhat protective or restrictive.

The preferred plan is similar to Alternative 5 in most respects with the following exceptions:

Mineral Management

The northern portion of the ACEC area (Map 8, Appendix B) would be closed to sodium leasing. The amount of area closed would be less than Alternative 5. The existing FERC permit (#11419) area would remain closed to locatable mineral entry unless the permit expires or is vacated. The mineral activities within the WSA as discussed under Alternative 1 would remain in effect. (If Congress decides to include this area in the wilderness system, the area would be officially withdrawn from all mineral activities (locatable, leasable, and salable)). However, if Congress decides to release the area from WSA status, that portion of the WSA

within the ACEC would become open to locatable mineral activity. but subject to a separate Plan of Operation. This area would remain closed to salable and leasable mineral activities.

The rest of the planning area would be open to mining, similar to Alternative 5. Mineral material disposal would continue from the two existing pits and any other potential sources outside of the ACEC should a future need develop for this material.

Special Management Areas

Under this alternative. the lake, the surrounding archaeological sites/district, and playa on the north end would be designated and managed as an ACEC with the boundary being established as the top of Abert Rim on the cast. an existing powerline on the northeast, an existing county road and private property lines on the north, and an existing jeep trail on the northwest, a 4-mile exclosure fence on the west, and legal/property lines on the southwest as shown in Map 8 (Appendix B). This boundary was derived based on its ability to include all of the ecologically important lake system, scenic values, and wildlife values. and mot-e of the cultural values than Alternatives 1, 3. 4, 5. and 6.

Visual Resource Management

The exiting visual resource classifications (Class I, III, and IV) would be modified to more accurately depict the visual quality of the area. The Abert Rim corridor would remain in its existing class I category. The remainder of the lake and ACEC and part of the rest of the planning area would become Class II. The remainder of the planning area would become Class III (Map 9, Appendix B).

Summary of Alternatives and Impacts

A tabular summary of the major components of each alternative and their associated impacts is contained in Tables S-l and S-2 within the “Summary” located at the beginning of this document.

Chapter 3 - Affected Environment

Introduction

The proposed planning area is located approximately three miles northeast of Valley Falls in Lake County, Oregon (Figure 1) within the Lakeview Resource Area (formerly called the High Desert Resource Area) and consists of approximately 188 square miles (123,000 acres), including Lake Abert and the surrounding area. Lake Abert is the largest landlocked saline lake in the Pacific Northwest, covers approximately 55 square miles (39,700 acres) (at a water elevation of 4,260 feet), and is part of the Goose/ Summer Lakes Hydrologic Basin.

The lake contains large populations of brine shrimp and alkali flies which make it an attractive resting and foraging area for waterfowl and shorebirds. Adjacent upland habitats consist of open. desert shrub/grassland communities, some of which are subject to grazing. The area provides habitat for fourteen special status wildlife species. The area contains numerous prehistoric cultural sites. Abert Rim Wilderness Study Area (WSA) is located along the eastern edge of the lake and is comprised of a steep fault scarp that rises over 2.000 feet above the lake.

Land use practices upstream of the study area and/or within the Lake Abert subbasin include: National Forest lands subject to timber harvest, public and private rangelands subject to grazing, private irrigated hay fields/pastures, a small town (Paisley), two major highways, and a wetland restoration project.

No commercial forests, wild and scenic rivers, prime and unique farmlands, or wild horses are located within the study area.

Climate

The following discussion of climate was derived from three sources: Phillips and Van Denburgh (1971), Van Denburgh (1975), and Keister (1992).

The climate of the study area is characterized by broad fluctuations in temperature and precipitation. The study area lies in an area of prevailing westerly wind patterns. Convectional air currents often give rise to local wind gusts. Seasonal temperatures can range from over 90 degrees Fahrenheit (F) in summer to 10 degrees F below zero in winter. Monthly average temperatures range from 29.7 degrees F in January to 65.9 degrees F in July. Mean annual temperature is about 43 degrees F. The frost-free period ranges from SO to 70 days.

Under clear weather conditions, the nighttime loss of heat by radiation from the valley floor is rapid, with the daily range in temperature often greater than 50 degrees F. Relative humidity in summer also has a high variation during the day, typically ranging from 10 to 30 % at midday up to almost 100 % at night. Evaporation rates are high during the typical days marking the normal dry period (May to October). but is much lower at night due to the large drop in temperature and high rise in humidity.

Annual precipitation in the area. as measured at Valley Falls (1Y16-1965) and Paisley (1926-1990) can vary from 5 to 20 inches. with the majority being in the form of snow during the late fail. winter. and early spring.
Aver-age annual precipitation at Paisley is 10.2 inches compared to a slightly higher average annual precipitation recorded at Valley Falls of 12 inches. Mean annual precipitation in the sub-basin valley bottom typically ranges. from 8 to 10 inches. while higher elevations generally receive higher amounts. mostly in the form of snow

Lands

The planning area (Lake Abert drainage) encompasses approximately 123,000 acres of which approximately 8 1.2% (99,900 acres) is public land administered by the BLM and approximately 18.8% (23,200 acres) are in private or state ownership (Table I : Map 10. Appendix B).

In 1983, the Lakeview Resource Area acquired 192.7 acres as a result of an exchange between BLM and the State of Oregon. Currently, there are no exchange proposals within the planning area, however. proposals have been considered in the past. No public sales of BLM lands are currently planned within the planning area. Presently, no private land acquisitions are planned within the area. If future acquisitions are contemplated. the preferred method of acquisition would be through exchange with a willing land owner for public lands outside the area.

Withdrawals

Withdrawals can segregate lands from operations under the general land laws and the mining and mineral leasing laws but. do not affect BLM surface management. Classifications generally segregate the lands from all forms of appropriation under the public land laws. including the mining laws, but not the mineral leasing laws. Currently, the planning area is encumbered by two Federal Energy Regulatory Commission (FERC) withdrawals for the Abert Rim Hydroelectric Pumped Storage power project #11074 and #1I4 19. Power project Xl 1074 amended an earlier withdrawal (#10875) to modify the project location. This withdrawal expired on May 31.1993. but was never- vacated. Withdrawal #1 1419 was filed on June 1. 1993, and supersedes both #10875 and # 11073. The FERC has issued a preliminary permit (for 3 years) to further study project feasibility. This FERC withdrawal segregates all of Lake Abert. lands along the existing powerline corridor (north and east of the planning area), some lands on the south end of the lake. and lands on top of Abert Rim (within and outside of the WSA, but generally outside of the planning area).

Abert Rim WSA has been recommended to Congress for official wilderness designation. Should Congress choose to designate the area as wilderness, the area will be segregated under the general land laws and mining/mineral leasing laws through a formal withdrawal. However. the area is not officially withdrawn at the present time.

Utility Corridors

An existing three hundred foot wide utility corridor crosses the northeast portion of the planning area and runs parallel to the eastern border of the planning area. This corridor is occupied by the Bonneville Power Administration's 750 KV DC Celilo-Sylmar transmission line. Future upgrading of existing electrical transmission lines and or the addition of new lines is likely. This development may require more intensive use of and or expansion of existing corridor width. No other identified or proposed utility corridors exist within the study area.

Rights-of- Way

Additional rights-of-way for stock driveway, county roads, state highway and material site purposes have been granted to accommodate county and state transportation system needs. The BLM has also acquired private land road easements in the area to enhance public land access.

In addition to rights-of-way, a permit to access Lake Abert has been issued for brine shrimp harvesting purposes.

Roads and Transportation

State Highway 395 runs in a northeast/southwest direction along the eastern edge of Lake Abert. The only other major highway in the general vicinity of the planning area is Highway 3 1 which joins with Highway 395 approximately three miles to the south at Valley Falls. One gravel county road (3-09) exists along the north edge of the planning area. Approximately 9 BLM-maintained roads occur within the area running over 42 miles. These road surfaces vary from gravel to dirt and receive occasional maintenance.

Table 1. Acreages Estimates, by Ownership, for the Lake Abert Subbasin of the Goose and Summer Lake Hydrologic Basin

Description of the Sub-Basin Component	TOTAL ACRES	ACRES - PRIVATE & STATE (%)	ACRES - U.S. NAT. FOREST (%)	ACRES - BLM (%)
Interior Drainage; i.e. no flow into Lake Abert in last several hundred years.	130.000	0	0	130,000 (23%)
Chewaucan River/Marsh Drainage; drains river and/or marsh	322,000	137,560 (24%)	127,360 (22%)	57.030 (10%)
Lake Abert Drainage; direct drainage into lake	120,570	14,200 (2%)	0 (0%)	106,370 (19%)
Sub-Basin Acreage Totals	572,570	158,160 (28%)	127,360 (22%)	293,410 (50%)

Additional two-track ways exist within the area, but are not considered official roads, are not part of the BLM transportation plan, and receive no maintenance. No railroad corridors or airports exist within the planning area.

Hydrology

Subbasin Hydrology

Lake Abert and its associated subbasin constitutes one of the major subbasins within the Goose and Summer Lakes Basin. While Lake Abert and Summer Lake were once (late Pleistocene) connected into a 480-square mile water body called Pluvial Lake Chewaucan. the reason for the inclusion of Goose Lake and its watershed into this basin is unclear. For the purposes of this discussion, the Lake Abert subbasin is further divided into three smaller drainages: Chewaucan River. Interior. and Lake Abert drainages.

The Lake Abert subbasin contains a total of approximately 536,960 acres (158.080 acres private and state, 127.361) acres National Forest, and 25 1,520 acres BLM; Table 1), and forms a rough rectangle with Diablo and Jug Mountains on the north and Gearhart Mountain and Drakes Peak to the south. In elevation. the sub-basin varies from about 8.000 feet above sea level on Gearhart Mountain and Drakes Peak to slightly over 4,000 feet at Lake Ahert,

The Chewaucan River drainage is a major component of the hydrology of Lake Ahert. The Chewaucan River begins at the confluence of Dairy and Elder Creeks, several miles east of Gearhart Mountain Wilderness Area (Fremont National Forest). The river flows in a northward direction through mountainous terrain for about 23 miles until it reaches the city of Paisley. From there it flows onto a large valley plain. turns southeast, and empties into Lake Abert. Lake Abert has no natural outflow. Water simply flows in and evaporates over time, leaving salts and other suspended particulates behind. The Chewaucan drainage produces the largest water yield in the Goose and Summer Lake Basin. The river also flows through the Upper and Lower Chewaucan Marsh, just prior to flowing into Lake Abert. These are two former wetland areas that are currently utilized primarily for hay production (Forest Service, undated).

Lake Abert Drainage

For purposes of this land use plan amendment, only that portion of the subbasin draining directly into Lake Abert (i.e. Lake Abert drainage) is being studied in detail (Table 1). This excludes the Chewaucan River drainage portion of the

subbasin, as well as the interior drainage between the Coglan Buttes divide and Diablo Mountain. This does not mean, however, that the primary water source for Lake Abert, the Chewaucan River, has been ignored as part of the lake's hydrology.

The following description of Lake Abert's hydrology was excerpted from. "Hydrology and Geochemistry of Abert, Summer, and Goose Lakes. and Other Closed-Basin Lakes in South-Central Oregon" (Phillips and Van Denburgh, 1971):

> "Lake Abert is a large, shallow body of water that occupies the lowest part of an 860-square-mile closed basin about 25 miles north of Lakeview. Slopes around the lake range from nearly flat to precipitous. At the southern end the Chewaucan River, the lake's principal tributary. leaves the plain of Chewaucan Marsh and drops about 12 feet over a fault scarp to the lake level. West of the lake the surface of a tilted fault block slopes upward to Coglan Buttes. whereas to the north the mud flats near the lake merge into a hilly terrain. Along the entire east shore, steep talus slopes and near-vertical volcanic rock faces rise to the nearly flat crest of Abert Rim, 1,500 to 2,200 feet above the lake and only I mile distant from it. The spectacular cliffs and steep slopes of the narrow tributary belt fringing the east shore are an expression of faulting on a grand scale.

Area, Volume, and Lake Level Fluctuations

At high stages, Lake Abert is about 16 miles long and 6 miles wide, and has a maximum depth of more than 15 feet. The lakebed...area and volume ... at various altitudes are listed in Table 2 . Lake-level records are fragmentary prior to 1950. Since 1950 the level has been observed several times each year, and from September 1961 to May 1963, a continuous record of stage was made. Some levels were deduced from general descriptions of the aerial extent and frotn photographs of the lake. The extreme range since 1843 is well established, as follows:

1. The lake was completely dry in the summer of 1924 for the first time since the area was settled in the 1870's. and it was nearly or completely dry in 1926. 1930, 1931, 1933. and 1937.

2. The lake level rose to an altitude of 4,260.5 feet above mean sea level in June 1958 - the highest level attained since the area was settled by permanent residents. All herbs, shrubs, and trees with root crowns at or below that level were killed by flooding..

Water Supply

Thewater of Lake Abert is derived from four sources - precipitation on the lake. small peripheral springs, ephemeral streams that drain arid areas fringing the lake, and the Chewaucan River. None of these sources can be measured precisely, but the total water supply can be approximated fairly accurately.

Lake-Surface Precipitation

Extended records of precipitation near the lake are available only at Valley Falls (elevation 4,326 feet), which is 10 miles south of midlake. Annual precipitation at Valley Falls has averaged about 12 inches during the period 1915-63. Precipitation on the lake itself may be a little less than at Valley Falls, but for the studies herein, it is assumed to be about the same."

Groundwater and Springs

Little is known about the ground water hydrology of the Lake Abert Basin. However, the presence of springs and seeps along all sides of the lake indicates a ground water gradient towards, rather than away from the lake. Most seeps maintain small spots of green growth or saturated ground, making no material contribution to the water supply of the lake; others discharge up to about 1 cubic feet per second (cfs). The largest spring is about 4 miles north of Lake Abert (measured flows of 1.04 cfs on July 23, 1950, and 1.96 cfs on November 13, 1962). Its water and that of other seeps and springs irrigate hay crops on lands bordering the lake, and a part of the flow is thus consumptively used. The total combined flow of all seeps and springs reaching Lake Abert, along with that of the minor local surface streams, averages an estimated 10 cfs, or 7,000 acre-feet per year. That estimate is based on an inspection of the springs in 1962 (total observed spring flow, 4.9 cfs), when the lake level was about 4,251 feet in altitude, coupled with a study of inflow data and changes in lake level (Phillips and Van Denburgh, 1971). Based upon data collected from 19 16 to 1965. the average combined annual inflow to Lake Abert from springs and seeps along the periphery of the lake is estimated to be about 5,000 acre-feet (Van Denburgh, 1975).

No seeps of significant size were thought to enter the lake below an altitude of 4,251 feet based on an inspection in 1962. No such seeps were reported by local residents, who had seen the lakebed dry in the late 1920s and early 1930s. However, one such observer - Bert Harber of Lakeview - did describe the flow of springs at the Pike Ranch, along the northeast shore, as a wide wet streak that meandered southward for several miles across the lakebed until dissipated by evaporation and seepage. The many springs that rise along the great fault zone near the northeast shore

Table 2. Approximate Area and Volume of Lake Abert

Altitude (ft.)	Area (acres)	Volume (acre-ft.)	Altitude (ft.)	Area (acres)	Volume (acre-ft.)
4,243.5+	0	0	4,253	35,300	206,000
4.244	240	100	4,254	36,300	242,000
4.245	8,000	3,200	4,255	37,300	279,000
4,246	12,400	13,300	4,256	38,200	316,000
4.247	19,100	28,900	4,257	39,000	355,000
4,248	24,800	50.900	4,258	39,700	394,000
4,249	28.100	77.300	4,259	40,300	434,000
4,250	30,500	107,000	4,260	40,800	475,000
4,251	32,400	138.000	4,261	41,300	516,000
4.252	33.900	171,000			

have, within a distance of 8 miles, a combined flow of about 3 cfs (1962), far more than is to be expected from small semiarid area topographically tributary to them (Phillips and Van Denburgh, 1971).

The total dissolved solids contribution of these springs and seeps is significant. Van Denburgh estimates that this source supplies 3.100 tons of the estimated 13,000 tons of dissolved solids that enter- the lake annually.

Based upon the elevated temperatures of several of these springs, 66 to 7 1 degrees F. and their chemical composition, deep convective circulation along portions of the northerly-trending Abert Kim fault zone. and a lesser fault on the west side of the lake, is suggested.

Continuing on from "Hydrology and Geochemistry of Abert, Summer, and Goose Lakes, and Other Closed-Basin Lakes in South-Central Oregon" (Phillips and Van Denburgh, 1971):

Streams

> "ln most years the Chewaucan River supplies most of the water reaching Lake Abert. At the gaging station near Paisley, where the river leaves the forested mountains, the flow was measured during water years 1913-21 (Oct. 1912 to Sept. 1921) and water years 1925-63. The average flow for those 48 years of record is 136 cfs (98.500 acre-ft per yr). For this study. the average annual tlows for water years 1922-24 were cstirnated. on the basis of records for Silvies River near Burns and Camas Creek near Lakeview. as 80. 60. and 25 cfs. respectively. The average flow for the 5 1 -year period I9 13-63. determined from these estimates, is 131 cfs (94.900 acre-feet per year).

The drainage area of the Chewaucan River is 275 square miles at the gaging station near Paisley, 430 square miles at the former gaging station at Hotchkiss Ford, and 490 square miles at the mouth. As of 1963, diversions from the reach between gaging stations supplied irrigation water to 32,000 acres, and diversions below Hotchkiss Ford to about 8,700 acres.

The use of water from the Chewaucan River for irrigation began about 1884: drainage of marshes and irrigation development continued until about 1915.

Stream-flow into Lake Abert was not directly measured. Records of Chewaucan River near Paisley are the only long-term data in the basin. Between that gaging station and the lake, evapotranspiration from Chewaucan Marsh significantly reduced the inflow to Lake Abert prior to the beginning of irrigation. The amount of that natural depletion is not known, but over a period of years it was probably similar to the average depletion for the presently irrigated 41,000 acres. The present net depletion may be about 1.6 acre-feet per acre irrigated. In many dry years the supply available is not adequate to irrigate the entire 41,000 acres. just as the supply was in many years not adequate to flood the entire marsh under natural conditions. Thus. the average annual discharge now reaching Lake Abert probably is about as great as it was under natural conditions. In periods of drought, however, the small available flows may now be controlled and consumed more effectively by irrigation than they were by dissipation in the natural marsh, thereby increasing the frequency with which the lake dries during such periods.

The average annual inflow to Lake Abert from the Chewaucan River may be about 48.000 acre-feet (5 1% of the quantity measured 32 miles upstream, near Paisley), on the basis of water budget computations.

Water Loss

Evaporation

Evaporation from Lake Abert was computed by the mass-transfer method described by Harbeck (1962). ... For the 6-month period of complete record, May-October 1962, the total computed evaporation loss was 30.9 inches. That value must be corrected for effects of lake-water density. which averaged about 1.05 g/ml (grams per milliliter) at 20 degrees Centigrade (C) during the period. Assuming about a 1% evaporation reduction for each 0.001 density unit above I.00, the 30.9-inch computed value would be equivalent to 32.5 inches from a fresh-water body. The 6-month total for 1962 was then adjusted to an average full-year value by comparison with U.S. Weather Bureau records for the Medford Experiment Station, 135 miles to the west the nearest site with a long-term year-round record (1953-63). There. the measured evaporation for May-October 1962 was 78.6% of the full-year value, which in turn was 103.3% of the 21-year average. On the basis of these data, the estimated long term freshwater evaporation rate at Lake Abert would be about 40.3 inches (3.36 feet) per year. Assuming the average density to be about I .04 grams per milliliter at 20 degrees C. the actual lake-surface evaporation rate is probably about 38.7 inches (3.22 feet) per year.

Leakage

Lake Abert does not leak. The lakebed is lower than any other adjacent valley floor except that of Summer Lake. Furthermore. Lake Abert is surrounded by springs and seeps that indicate a ground-water gradient toward. rather than away, from the lake.

Overflow

The lowest topographic divide. which separates the Abert and Summer Lake basins 2 miles north of Paisley, is about 140 feet higher than the bed of Lake Abert. No overflow has occurred there within historic time. During the Pleistocene period. however, inflow to Lake Abert was sufficient to cause overflow, which filled the adjacent Summer Lake basin. forming Lake Chewaucan. At its maximum level. the large Pleistocene lake covered the present-day divide to a depth of about 130 feet. Overflow from Lake Abert has occurred since that time, as evidenced by a channel that meander5 generally northward from the divide to an altitude of about 4.330 feet. The time and quantity of the most recent flow to Summer Lake by way of this channel are unknown.

Water Budget for the Lake

A generalized relationship between the annual streamflow, or discharge, of Chewaucan River near Paisley and the total inflow to Lake Abert has been defined by a study of the water budget of the lake for the water years 1951-62. For those years, the altitude of the lake surface on September 30 is known or has been closely approximated by interpolation between observations. The annual inflow was computed as equal to the change in volume of the lake (computed from water-level data and Table 2) plus the volume of water evaporated (3.22 feet, multiplied by the average surface area) minus the volume of precipitation on the lake (observed precipitation at Valley Falls, multiplied by the average area).

The net yearly inflow so computed for water years 195 l-62 is plotted against the concurrent yearly discharge at the station near Paisley... The relationship in that figure is expressed by the straight-line equation:

Annual inflow (I), in acre-feet = (1.25) [Paisley streamflow (S) - 55,000 acre-ft].

However, the inflow is assumed to be never less than 7,000 acre-feet per year because of the peripheral springs and local runoff. This relationship may not give accurate results for any given year, but it probably provides a fairly accurate estimate over a period of several years."

The only significant information on lake hydrology available since the publication of Phillips and Van Denburgh (1971) is a model developed by Keister (1992) for estimating the effects of the Rivers End Ranch wetland restoration project (immediately upstream) on lake levels. In addition, the all time recent times high lake level was recorded in June 1984 at 4,262 08 feet. Phillips and Van Denburgh (1971) also noted an historic beach ridge in various locations around the lake at an elevation of 4,268 feet. Water levels are not known to have reached this level during this century.

Water Rights

Under Oregon law, all water is publicly-owned. A water right is typically issued by the Water Resources Department which allows the use of a specified amount of water for a specific use. Water from the Chewaucan River has been fully appropriated. The Chewaucan River drainage, from the mouth of Lake Abert upstream, was adjudicated in 1916. This resulted in a total water rights decree of 27,272 acre feet per season. Existing water duties within the drainage, if exercised to their full extent, would exceed the normal flow

within the drainage by a factor of two. Recognizing that the water rights are over-allocated, the State Water Resource Department has adopted a basin plan which identifies a lack of water for the following uses: late season irrigation, livestock, and fish life (Forest Service. undated).

Water Quality

Chewaucan River

The average annual discharge at the stream paging station (I .25 miles upstream of Paisley) is 104.300 acre feet (based on 67 years of data). Stream flow ranges from 30 to 60 cubic feet per second (cfs) during the low-flow, summer months. Little baseline data exists on river water quality What is available comes from stream survey data and professional experience of the Forest Service. Water color and appearance are two parameters influenced by flow rate. suspended sediment, and nutrient inputs. These parameters are considered average compared to other streams on the forest. The lack of storms during the summer months decreases sediment loading to the river, therefore. turbidity is not very great. In July and August, stream temperatures can reach the 70's (degrees F) due to lack of stream shading and other factors (Forest Service. undated).

Lake Abert

The best and most comprehensive data available on the water quality of the lake is contained in Phillips and Van Denburgh (1Y7 1) which deals with several closed-basin, south-central Oregon lakes. Water quality. as such. was not discussed in this report. However, it is assumed that the geochemistry of the lake generally equates to its water quality. Portions of this publication are cited in the following discussion, mostly intact

Geochemistry

Chemical Character of the Lake

"In 1963. Lake Abert contained about 13 million tons of dissolved solids. covered an area of about 55 square miles. and was the largest landlocked saline water body in the Pacific Northwest. The dissolved-solids content of the lake fluctuates considerably, but generally ranges from 20.000 to KU.000 ppm. The three most abundant dissolved constituents - sodium, carbonate. and chloride - make up about 90% of the dissolved solids. Potassium. bicarbonate. and sulfate account for more than 9 of the remaining 10%. Although silica. bromide. orthophosphate. and boron constitute less than I %, these constituents occur in large parts per million (ppm) concentrations. (Table 3) Concentrations of calcium and magnesium in the lake are usually less than 5 ppm at most times.

Among the trace elements, iron, aluminum. vanadium. molybdenum, nickel, lead. and cobalt are present in measurable parts per billion (ppb) concentrations. generally in the listed order of abundance (Table 4).

Variations in Dissolved-Solids Concentration

The dissolved-solids content of samples collected from Lake Abert since 1882 has ranged from 18,700 ppm (July 8, 1958) to 95,000 ppm (July 2 1 . 1939). The estimated (unrecorded) minimum salt content during the entire 80 year period, about 18.000 ppm, occurred in 1958 during the highest historically observed lake stage (altitude 4,260.5 feet above mean sea level). In contrast, amounts greater than 100.000 ppm doubtless occurred during periods of near dryness between ! 924 and 1937.

Except at near-dryness stage, the relation between dissolved solid concentrations and lake levei is almost constant for Lake Abert over periods of several years. such as 1958-62. This is because of the nearly unchanging solute tonnage in the lake during such periods and because the shallow water body remains virtually homogeneous when inflow is negligible...

Changes in Chemical Character

The amounts of many dissolved constituents in Lake Abert have remained virtually unchanged relative to one another during the period of study, despite the large variations in dissolved-solids content However. the relative (%) concentrations of two major constituents. several minor constituents, and all the identified truce elements fluctuated significantly Among the major constituents. the amount of carbonate and bicarbonate vary relative to one another. even though their combined concentration (calculated as carbonate) remained about 22% of the dissolved-solids content...

...on the basis of 2 years of record at Lake Abert (during which the measured concentrations of silica and orthophosphate ranged from 130 to 20 1 ppm and from 55 to 101 ppm. respectively). relative amounts of the two nutrients apparently tend to reach peak values during the summer (June-August) when water temperatures are highest. The smallest relative amounts were found between December and March. The range in fluctuation of silica relative to dissolved-solids content is wide, from 0.248 to 0.385% between April 196 1 and October 1962. equivalent to a range

Table 3. Relative Amounts of Major and Minor Constituents in Representative Samples from Abert, Summer, Goose, Hart, and Crump Lakes*

	Lake Abert	Summer Lake	Goose Lake	Hart Lake	Crump Lake
Dissolved-solids content	40.800	7.200	1,270	781	322
Silica (SiO2)	0.38	1.5	4.6	4.5	12.0
Calcium (Ca)	<.005	0.04	1.0	6.7	11.0
Magnesium (Mg)	<.005	0.004	0.32	3.8	4.3
Sodium (Na)	40.0	39.0	35.0	25.0	17.0
Potassium (K)	1.3	1.6	2.8	2.0	2.0
Bicarbonate (HCO3)	5.8	13.0	29.0	33.0	38.0
Sulfate (SO4)	16.0	17.0	7.4	5.5	1.9
Chloride (Cl)	35.0	22.0	12.0	7.9	6.2
Fluoride (F)	0.01	0.08	0.07	0.27	0.25
Bromide (Br)	0.17	0.1 I	0.07		
Orthophosphate (PO4)	0.14	0.25	0.54	——	0.31
Boron (B)	0.14	0.47	0.30	——	
Hardness as CaCO3	8.0	8.0	49.0	252.0	144.0
pH	9.7	9.6	9.1	8.8	8.3
Sampling date	4-26-61	4-25-61	6-12-62	4-27-6 1	4-27-61

* Amounts of dissolved solids and hardness are reported in parts per million. Amounts of all other constituents are reported as a percentage of total dissolved solids; maximum and minimum percentages for each are in italic

Source: Phillips and Vandenberg, 1971.

Table 4. Trace Element Content of Samples from Abert Lake (in Parts per Billion)

	LAKE ABERT		
Analysis No.	**1f**	**1i**	**8a**
Collection date (1962)	**Jan.12**	**June 12**	**Sept. 17**
Appearance when collected	**Turbid; light tan.**	**Clear**	**Clear**
Time lapse until filtration	2.0	**1.1**	0.8
Aluminum (AI)	270	76	77
Beryllium (Be)	<1.0	<1.9	<1.9
Bismuth (Bi)	<.48	<1.o	<.9
Cadmium (Cd)	<2.4	<4.8	<4.7
Chromium (Cr)	<2.4	<4.8	<4.7
Cobalt (Co)	<2.4	<4.8	8.3
Copper (Cu)	<2.4	<4.8	<4 7
Galium (Ga)	<9.6	<19	<19
Germanium (Ge)	<.48	<1.0	<.9
Iron (Fe)	>96	90	84
Lead (Pb)	<2.4	<4.8	23
Manganese (Mn)	≥2.4	$4.8	<4.7
Molybdenum (Mo)	>48	13	31
Nickel (Ni)	≥.48	17	17
Titanium (Ti)	<1.o	51.9	<1.9
Vanadium (V)	>48	77	≥47
Zinc (Zn)	<19	<19	<19

Source: Phillips and Vandenberg, 1971

from 3 1,000 to 5 1,000 tons of silica. The larger percentages occurred at times of lesser dissolved solids content. Fluctuations in the relative amount of orthophosphate in the lake are smaller and more uniform from season to season than those for silica; the estimated seasonal range was from 0.132 to 0.144% orthophosphate, equivalent to a variation from 16.800 to 18,300 tons. The orthophosphate fluctuations closely follow those of water temperature in Lake Abert.

Changes in the absolute (parts per billion) and relative (percentage) amounts of trace elements in Lake Abert are erratic. No consistent pattern of either seasonal fluctuations or variations with changing dissolved-solids concentration is evident... No major long term net changes were noted in the relative abundance of anions at Lake Abert...

Biologic Controls on Chemical Quality

The biologic assemblage in Lake Abert doubtless exerts controls on, and is also controlled by, the amounts of certain constituents in the lake water, such as silica. calcium, magnesium, sulfate, nitrate, orthophosphate, and probably several of the trace elements. Brine shrimp (Artemia salina) abound in the water during certain periods of the year, and at such times one can hardly dip a single cupful of the lake water without getting several specimens. In early autumn, the lakeshores are lined with small windrows of larval skins discarded by emerging adult brine flies. In summer vast numbers of algae (Cladophora) float freely in the water and cover much of the lake bottom. their filaments clustered into balls formed by the action of waves in the warm shallow water. Several other kinds of plankton, including diatoms and Anabaena, may also be present in significant populations...

The chemical data suggest that assimilation of certain constituents during periods of population growth, and at leas! partial release of the constituents after death, may affect the amounts dissolved in the lake...The amount of sulfate in Lake Abert may be influenced by anaerobic sulfate-reducing bacteria within the lake bottom muds...

Sources of Dissolved Solids

The Chewaucan River and precipitation are. by far. the two most important sources of water for Lake Abert, but they may not be the most important source of dissolved salts. Numerous small springs rise along or near the periphery of the lake, and although their combined discharge is small (an estimated 10 cfs), their total dissolved solids contribution to the lake and adjacent playa may be more than that from surface inflow and precipitation. A significant amount of salts may also be contributed to the lake by wind transport of alkali dust from other parts of the basin and from outside the basin. In addition, the recovery of salts lost during periods of lake dryness or of near dryness is a significant short-term source."

Soils

Lake Abet-t exists as part of a large playa lake basin with a shallow water table. Lake levels may fluctuate greatly each year due to high evaporation during the summer months. The large playa lake basin shorelines consist of deep lacustrine silts and clays.

The combination of high evaporation. high saline and alkaline soils, and fluctuating water levels severely limits plant growth, and thus the ability of vegetation in preventing erosion. The area surrounding the lake has been identified as general soil type 6 which has moderate erodability. The very northern end of the lake bed has been classified as being in general soil type 4 and has a low to moderate erosion factor.

The primary soil in the area is of the Abert series which consists of shallow, cemented sediment split from the Fort Rock series. This series is found primarily is south central Oregon and is not extensive. There are no other series found within this soil family. It is a well-drained soil that formed in aeolian and lacustrme sediments (wind and water deposited sediments). Other drainage characteristics include slow runoff with moderate permeability down to the cemented sediments and slow drainage below. These soils are typically found on basin and lake terraces at elevations of 4,300 to 4.400 feet. Slopes range from 0-8%.

Geology

Lake Abert, a remnant of the much larger pluvial Lake Chewaucan, is located in the northwestern corner of the Basin and Range physiographic province. The large, shallow, saline, alkaline lake occupies a topographically closed basin that lies on the downthrown side of a normal fault at the base of Abert Rim. Because the drainage basin is closed (i.e. there is no outflow), water is lost predominately through evaporation, which has resulted in the concentration of large quantities of sodium salts and extreme alkalinity.

Abert Rim is a steep, slightly-eroded fault scarp that rises over 2,000 feet above the lake. It forms the western edge of a tilted fault block that dips gently to the east towards

Warner- Valley. It has erroneously been called the highest fault scarp in North America (Sherlock et al., 1988). Elevations range from 4,255 feet at the shore of Lake Abert up to about 7.000 feet.

The rim is composed of predominately middle Tertiary-age basalt and andesite flows and minor lenses of interbcdded tuft's and tuffaceous sedimentary rocks, which are capped by younger Tertiary-age basalt flows (Sherlock et. al., 1988). Quaternary-age (Holocene) alluvium and playa deposits make up the sediments of Abert Lake and are visible in small patches along the base of the escarpment. Movement along the fault may have begun in the Pliocene and has continued intermittently into the Holocene (Baldwin, 1964).

During the Pleistocene, Abert and Summer Lakes were part of Lake Chewaucan, which reached depths in excess of 300 feet. Terraces from the various stages of this pluvial lake can be seen on the surrounding highlands.

Relevance and Importance

With respect to the ACEC relevance and importance criteria (Chapter I), the geological features (graben lake - high. steep. little eroded. tilted fault block - massive lava flows, and wave-cut terraces) are very interesting and well displayed. The Oregon Natural Heritage Plan (Natural Heritage Advisory Council to the State Land Board, 1993) Identifies several of these features as unique within the State of Oregon. However, there are many examples of these features throughout the Basin and Range province. The geological features of Lake Abert and Abert Rim were not determined to meet the criteria for relevance (BLM, 1993).

Minerals

Mineral Potential and Ownership

A number of mineral resources arc known to. or may occur in. the planning area and must be addressed in the planning process. These include sodium and other evaporite minerals. geothermal energy, oil. gas. base and precious metals, sand. gravel. and rock (Map 11, Appendix B; Table 5).

The mineral estate should not bc assumed to belong to the owner of the land surface. Within the planning area, the BLM administers approximately 101.700 acres of mineral estate. Of these, the BLM administers approximately 96,300 acres of both the surface lands and minerals, The BLM administers approximately 5.100 acres of mineral estate with private surface ownership.

In addition, the BLM administers approximately 3,500 acres of surface lands in which there is private mineral ownership. Approximately 18,300 acres within the planning area have both private surface and mineral ownership. Total private mineral ownership is approximately 21.800 acres.

The ownership of minerals dissolved in the lake water is a separate issue and is discussed in the following section,

Sodium and Other Evaporite Minerals

Large quantities of sodium salts are contained in the waters, saturated sediments, and playa of Lake Abert. The potential for sodium exploration and development in this area was identified in the High Desert MFP. Over the past 4 or 5 years. a number of companies have expressed interest in the mineral potential, with one company acquiring prospecting permits. Presently, there are no prospecting permits or lease applications on file.

The BLM has taken the position that the lake is not navigable and, therefore. the majority of the lakebed is not owned by the State of Oregon. Lakebed ownership is shown on Map 10 (Appendix B). The State of Oregon is not challenging this position at this time. However, there is a question as to the ownership of the minerals that are dissolved in the water. A recent opinion from the Office of the Solicitor suggests the minerals dissolved in the water column above the lakebed belong to the owner of the lakebed below.

Before lease applications can be approved, the BLM must conduct an economic analysis to confirm if an economic deposit has been discovered and, if so, whether or not the subject lands are chiefly valuable for sodium compounds. Other determinations that must be made include whether or not the lake could support more than one sodium operation.

If leasing occurred, it could involve significant development. with production occurring over tens of years (see Appendix C). Resulting royalties paid to the Federal Government could be significant, perhaps approaching a million dollars per year, with 50% of the royalties going to the State of Oregon.

Geothermal Energy

Lake Abert lies in an area of higher-than-normal heat flou (Oregon Department of Geology and Mineral Industries. 1982). Late Tertiary to early Quaternary-age volcanic rocks occur in the area. Low-temperature (66-7 1 degrees F) thertnal springs flow into Lake Abert in a number of areas.

To date. exploration for geothermal resources has been minimal. However. the Oregon State Department of Geology and Mineral Industries is currently investigating the geothermal potential of Southeastern Oregon, including the Lake Abert area The presence of travertine tuffa (carbonate) deposits along prominent fault traces suggests the possibility of a blind (hidden) geothermal reservoir.

Oil and Gas

The Lake Ahert area lies within Paleozoic- and Mesozoic-age sedimentary basins covered by thousands of feet of volcanic and volcanic-derived sedimentary rocks (Newton. 1982). It is possible that thick sequences of hydrocarbon-bearing sedimentary rock exist at depth. In addition, the U.S. Geological Survey has identified a play (prospect for significant hydrocarbon accumulations) in southeast Oregon (Tennyson and Parrish. 1987). Possible late Miocene- or Pliocene-age nonmarine sediments containing thin coals and lacustrine carbonaceous shales and diatomites arc potential source rocks

Base and Precious Metals

Altered and silicified rocks associated with Tertiary- to Quaternary-age volcanic rocks occur just north and northeast of Lake Abert. Old prospects located in these areas are probably associated with uranium and/or mercury exploration. Mineralization related to Tertiary-Quaternary volcanism could be present at depth within the planning area.

Sand, Gravel, and Rock

There are a number of old sand and gravel pits and a rock quarry located in the area. There are currently two active gravel pits in the planning area. An inactive rock quarry is located near- the southeast shore of the lahe and is controlled by the State of Oregon (Map 1 1, Appendix B). Other deposits of sand, gravel. and rock occur throughout the area.

Paleontological Resources

Paleontological resources (fossil,) are known to exist in the study area. However. no studies or inventories have been conducted which document these resources

Air Quality

The combination of extreme evaporation, high saline and alkaline soils, fluctuating water levels which severely limit plant growth. and frequent high winds causes substantial wind-generated erosion from blowing alkali dust off of Summer and Abert Lake beds. Visual observation diary sheets and photo records were filed during 1983 to 1985 (3 years) which document this phenomena. The area can have a very prominent inversion layer which compounds the effects of the suspended alkali dust and other air pollutants. In addition, foul odors from decomposing organic matter are often present during the summer months.

Table 5. Mineral Potential in the Planning Area

	Mineral Potential (acres of publicly - owned minerals)			
Mineral Type	**High**	**Moderate**	**Low/Unknown**	**Total**
Locatable	**0**	**34.000**	67.700	101.700
Leasable				
Oil/Gas	0	101.700	0	101.700
Geothermal	0	101.700	0	101.700
Sodium	39.300	0	62.300	101,700
Salable	200	101.500	0	101.700

Natural Hazards

Abert Kim has steep cliffs. loose rock. and the potential for flash-flooding which can involve the movernent of large quantities of water, rock. and sediment very quickly. Other potential natural hazards in the area include: landslides. rockfalls, and the saline. alkaline water of Lake Abert itself. The relevance criterion for natural hazards only requires an area to contain hazards; therefore. the area was determined to meet the criterion for relevance, but not for importance (BLM. 1993).

Aquatic Commnities

Lake Abert is a terminal desert lake which has accumulated mineral salts over time. differing greatly from seawater in both chemical composition and concentration. It is the largest saline take in the Pacific Northwest (Phillips and Van Denburgh, 1971), and is among the five largest such lakes in the Great Basin (including Mono, Walker, Pyramid, and Great Salt Lakes). Abert is an alkaline soda lake (pH near 10), containing high proportions of sodium carbonate salts in addition to chloride and sulfate Its salinity varies seasonally and yearly with volume and lake level changes in response to run-off and summer evaporation. Lake Abert's closest ecological relative is the much reduced and highly endangered aquatic ecosystem at Mono Lake in east central California (Patten, *et al.*, 1987).

Although saline lakes like Abel-t typically contain few species. the productivity of these aquatic communities is otter: much higher than that found in freshwater lakes. Above certain salinity concentrations productivity becomes inhibited by physiological stress. Conversely. at low salinity levels, while the aquatic communities become more diverse, the productive salt-tolerant species are displaced by competition and predation.

Algae

The base of Lake Abert's biological productivity rests on three major forms of benthic organisms: diatoms (*Nitzschia frutulum* and many other species). filamentous green algae (*Ctenocladus circinnatus*), and blue-green algae (cyanobacteria such as Oscillatoria) (Herbst et al.. 1989). The filamentous green algae is the dominant form at higher lake levels and lower salinities: cyanobacteria and diatoms are co-dominates at mid-range lake levels and salinities; and diatoms dominate at low lake levels and high salinities (Herbst, 1994; Keister, 1992). In-progress investigations by Dr. David Mason (pers. comm.) would seem to indicate that there may be another replacement at even higher salinity levels (i 80-190+ g/L) of the diatoms by some form of sulphur bacteria

Invertebrates

The benthic algae is. in turn. consumed by populations of various aquatic invertebrates. The composition of this invertebrate community is also determined, in large part, by the salinity of the lake. At mid-range salinities (SO-100 g/L), brine shrimp (*Artemia salina*) and alkali flies (*Ephydra hians*) are the dominant species present. in quantities estimated in the thousands of tons. Conte and Conte (1988) estimated the total brine shrimp biomass to be about 14.5 million pounds (based on work done 1980-1982, at moderate salinities). No comparable estimates are available for the alkali fly. but production could exceed that of the brine shrimp by one or two orders of magnitude. Inventory work at Lake Abert conducted by Hunter (1978), also cited the cladoceran, Moina hutchinsoni, as being nearly a co-dominant with the brine shrimp and alkali fly.

At lower salinity (20-30 g/L) and higher lake levels, major changes in the benthic community occur. The abundance of brine shrimp and alkali flies decrease, and both the abundance and diversity of other benthic invertebrates increases (Herbst, 1988). The amphipod Hyallela azteca becomes especially abundant and numerically dominant in some portions of the lake. Predatory invertebrates, such as damselfly nymphs (Enallagma), dytiscid beetles (Hygrotus), and backswimmers (Notonecta) become common. A large fairy shrimp (*Branchinecta campestris*) was also found in the lake by Hunter (1978), but only in the spring.

Almost no information on the aquatic invertebrate community diversity and abundance at high, sublethal salinity levels (180-200 g/L) is available. Commercial brine shrimp harvest data is available for many years, including high saline years (low water), but since it was not collected using a uniform, scientific methodology, it is of very limited utility in correlating lake conditions with brine shrimp population numbers. Herbst's (1994) experimental work with alkali flies has shown that as external salt concentrations increase. more energy is required by the flies to remove toxic concentrations of salt from the blood and maintain a proper balance of body fluids. The physiological stress of this increased energy demand may curtail growth. reduce the body size of pupae and adults at maturity. and even result in death. Slow growth prolongs generation time and reduces population productivity. It is assumed that these same physiological stresses are at work on the brine shrimp population as well. Other aquatic invertebrate populations are likely eliminated prior to major stress on the shrimp and flies.

Lake Abert is now. and has been several times in the past. at this high. sublethal salinity concentration stage. Recolonization of the lake by aquatic species when salinity levels decrease (and lake levels rise) seems to occur through several mechanisms. The spring seeps and marshlands along the eastern and northern shores provide freshwater and low salinity habitats that serve as refugia for many of the Invertebrate species when salinity levels exceed their particular physiological tolerances. The Chewaucan River likely serves this function for some species. Still others may migrate by flight from nearby habitats and recolonize the lake when conditions are favorabte. Many algae (and crustaceans such as brine shrimp) have resistant cells or stages in their life cycle that may lie dormant under hypersaline conditions. but germinate or hatch when favorable salinities are present. Herbst (1993) reported that "if hypersaline. low lake level conditions do not persist for longer than several consecutive years, and if habitat refugia remain stable. this ecosystem has tremendous capacity for recovery..."

Fishery

There is no fish population in Lake Abert; those entering the lake from the Chewaucan River survive only a matter of minutes. The proximal cause of mortality is the caustic (free hydroxyl ions) properties of the water (Lesh, unpubl. 1971) rather than total salinities. Therefore. an established fishery is absent and is generally not considered to be part of the existing lake ecosystem. However, typical freshwater species known from the Chewaucan River include: redband trout, stocked rainbow trout, speckled dace, and introduced brown bullhead catfish. All of the reaches of the Chewaucan River recently studied by the Forest Service were found to contain poor condition fisheries habitat. The habitat was found to lack woody debris, have low bank stability, low amounts of cover, and high embeddedness. Fish habitat on private lands along the Chewaucun River is also expected to be in generally poor condition.

Relevance and Importance

Lake Abert is an aquatic ecosystem that is exceptionally productive and is comparatively close in functioning to its pristine state. The Oregon Natural Heritage Plan (Natural Heritage Advisory Council to the State Land Board. 1993). identifies the area as a lacustrine, fault block lake system that is unique in the State of Oregon. The aquatic ecology of the lake was determined to be rare and met the criterion for relevance and importance (BLM. 1993).

Vegetation

The Lake Abert subbasin contains a number of distinct native plant communities. The headwaters of the Chewaucan River arise in forests of Ponderosa pine. white fir. and western juniper. Then the stream meanders through 17 miles of broad floodplains and rolling uplands interspersed with meadows containing grasses and forbs. including blue camas. There are occasional stretches of sapling-pole sized ponderosa pine and juniper. Portions of the river edges are vegetated with willows. elder, and other deciduous shrubs. From this area downstream to Paisley (approximately 6 miles), the Chewaucan River is characterized by narrow floodplains with steep-walled canyon. Typical vegetation along the stream bank consists of willow, elder, and a few black cottonwood trees. Vegetation is sparse on the steep canyon walls due to the rocky growing conditions and poor soils.

From Paisley south to the mouth of Lake Abert, the river is characterized by a broad floodplain. Where once meander meadows existed, water removal for irrigation and farming has changed the appearance and community composition. There are still occasional wapato plants (arrowleaf) (*Sagittaria latifolia*) growing; the Klamath tribal name for this plant gives the river its name: Chewaucan. Today, stream banks suffer from high erosion and general lack of vegetation. Vegetation communities in this area vary from irrigated hay fields to native desert shrub-dominated communities.

Vegetation communities in and around the lake itself include wetland/riparian communities, upland seeded areas, sagebrush/bunchgrass and desert shrub communities. Riparian shrub communities exist in the intermittent stream beds and a forest community grows on top of Abert Rim. Noxious weed problems also exist (Table 7, Appendix A).

Information on existing plant communities comes from a variety of sources, including information provided by The Nature Conservancy (letter dated October 13, t 992), the Oregon Naturai Heritage Database, and past inventories. The Nature Conservancy (TNC) letter addressed three points of botanical relevance:

1. The presence of desert allocarya (*Plagiobothrys salsus*), ". ..a sensitive plant species that is known from two sites in Oregon...":

2. The presence of "...high quality natural communities..." that "...cover an extensive area in the take basin..." that "...have not been significantly manipulated..."; and,

3. The presence of numerous springs. associated with greasewood/saltgrass stands. on the north and west sides of the lake. "...which contribute to the diversity of the site."

A discussion of desert allocarya is included in the special status species section. The other two points are discussed further below.

High Quality Natural Communities

TNC's letter did not specifically indicate where the high quality, unrnanipulated plant communities were located. In April and May of 1991, an inventory of nesting habitat condition was conducted on all wetland and associated upland communities found on BLM lands within the basin. The results of this inventory categorized the habitats as being in uniformly poor condition. with extensive invasion of all sites by exotic and/or invader species. However, this inventor-y did not focus on specica composition or density. The intermingled private lands were not inventoried. No high quality natural communities were located on public lands during the inventory.

Wetland and Riparian Plant Communities

There are a large number of springs along the north and west shores of the lake that are usually above the high water line, and which have wetland plant communities associated with them. There are also many springs located along the east side of the lake that are usually below the high water line. but which do develop wetland communities during periods of low water Almost all of the above high water springs are on private property, Cave Springs and a couple of unnamed springs being the exception. These communities play an important role in the food chain and biodiversity of the lake ecosystem.

On the northwest end of the lake are iarge wetland areas (primarily on private land) dominated by cattail and *Scirpus spp.* On the south end of the lake a freshwater wetland restoration project is on-going at the River's End Ranch (private land) which will be rnanipulnted by a dam.

Upland Plant Communities

The Lake Abert area serves as an outdoor classroom demonstrating many of the typical plant communities of Southeastern Oregon. On the west side of the lake is a large crested wheatgrass seeding mosaic. Portions of the area were seeded in 1971, 1972, and 1983 after several different wildfires. Though crested wheatgrass is dominant in this area other species such as rabbit brush, sagebrush, saltbrush, horsebrush, and a few native bunch grasses are present.

Northeast of the lake. much of which is private land, exists an important plant community, the shadscale desert shrub. Though this spiny, drought tolerant community exists throughout the Great Basin. the area north of Lake Abert and around Alkali Lake is its most northern extension.

On the east side of the lake, intermittent creek watercourses form riparian zones. An existing botanical transect runs from the lake edge to the top of the Abert Rim. This transect is important for educational interpretation of elevational, soil. and pH (salinity) differences in desert ecosystems. Tables 7 and 8 in Appendix A contain a more complete plant list, by plant community type, for the area. In addition to the officially-listed noxious weeds discussed in the following section, cheat grass (*Bromus tectorum*) and Russian thistle (*Salsola kali*) are known to occur in the study area.

Noxious Weeds

Mediterranean Sage (*Salvia aethiopis* L.) has invaded the native plant communities on the east side of Lake Abert below Abert Rim (part of allotment 0400). This plant is a biennial in the mint family that develops a rosette of large grayish wooly leaves. and produces yellow-white flowers and seed the second year. The flower stem branches profusely, forming a "Christmas tree" shape. This infestation currently covers over 1,400 acres and has historically been treated with a biological control agent under the district's ongoing integrated noxious weed control program. Though the infestation has been treated for a number of years. the biological control agent has failed repeatedly to establish successfully, apparently due to the agent's inability to over-winter in the shallow soils found there. The main infestation continues to expand. More recently, a draft weed management plan has been developed to address this problem and includes other control methods along with continued biological control. There are currently 6 to 8 outlier sites in the area including one on the west side of the lake. Expansion continues even though livestock grazing has been eliminated since 1981 and an integrated noxious weed control plan is in place.

Spotted knapweed (*Centaurea maculosa* Lam.) and medusahead wildrye (*Taeniatherum caput-medusae* (L.) Nevski) have been observed in the vicinity. Spotted knapweed has been identified along U.S. Highway 395 to the north of Lake Abert. Medusahead wildrye has been observed on rangeland to the southwest.

Rangeland Resources

Livestock Grazing

There are six allotments or portions of allotments with six permit holders in the immediate suhhasin area (Map 10, Appendix B). The permits include 5,996 Animal Unit Months (AUMs) of livestock forage preference, ranging from 70 AUMs in the West Lake (0423) allotment to 4,220 AUMs in the XL (0427) allotment. The majority of the public lands west of Lake Abert are seeded and have extensive livestock facilities. including fences, wells. and pipelines. Season of use by livestock is generally fall, winter. spring, and early summer, which includes the months of October through July. Table A provides information for each allotment within the subbasin.

Except for occasional trailing use, livestock grazing is excluded on the area between Ahert Rim and the east shore of Lake Abert (part of Paisley Commons (0400) allotment) Another area (part of 0400) south of Coglan Butte is also closed to livestock use. 'The riparian zone (containing several springs) along much of the west shore is or will soon hc excluded from livestock grazing.

Monitoring Conducted to date

Trend studies have been or are currently being conducted in the following allotments: XL (0427). Narrows (043 1), and Shale Rock (0435). Trend studies are usually photo points, but some have been converted to nested plot frequency. Utilization levels are measured in the used pastures at the end of the grazing season as appropriate, usually annually. Actual use reports are collected in each allotment at the end of each grazing season. or are based on authorized use as verified by livestock counts Temperature and precipitation data are collected from National Oceanic and Atmospheric Administration (NOAA) reports for the designated reporting stations listed in Table 7.

An allotment evaluation was completed for the XL allotment (0427) in 1992. At that time. Shale Rock (0435) allotment was part of the XL (0427) allotment, and was included in the evaluation. Much of the area in these two allotment was seeded in 1971, 1972, and 1983. The evaluation reports much of the seeded area in static to upward trend [increase in crested wheatgrass frequency). much of the native areas were in static to slightly upward trend, with some areas around the fresh water springs in downward trend. Native vegetation areas around fresh water sources tend to he in early seral stages. areas away from water sources in mid-seral stage, and seeded areas in high vigor. The evaluation is available at the Lakeview District Office. Though monitoring data is currently being collected in Narrows allotment (043 I), an allotment evaluation has not been completed. Subsequently. a data analysis examining trends is not available for that allotment.

Wild Horses

The study area is in the vicinity of, but does not include, the Paisley wild horse Herd Management Area (HMA). The

Table 6. Allotment Information within the Planning Area.

Allotment Name	Turn Out Date	Removal Date	Preference (Livestock/ Wildlife AUMs)	Grazing System
Paisley Common (0400)				
- Coglan Hills	March 20	May 11	117/0	S
- Abert Rim	None	None	0/180	D
West Lake (0424)	March 1	May 15	70/0	D
Pike Ranch (0425)	August 20	November 15	95/0	S
XL (0427)	March i	July 15	4220/175	RR
Narrows (0431)	December 1	January 16	274140	RR
Shale Rock (0435)	October !	March 9	1220/0	RR

RR = rest rotation; S = seasonal; D = deferred rotation;

Table 7. On-going Allotment Monitoring Conducted within the Planning Area

Allotment Name (Number	Allotment Category (1, M, or C[1])	Nested Plot Frequency or Photo Points	Utilization	Actual Use	Climate
Paisley Common (0400)		None	Annual	Annual	Paisley
- Coglan Hills	M				
- Abert Rim	c				
West Lake (0324)	M	None	1994	Annual	Valley Falls
Pike Ranch (0425)	M	None	1994	None	None
XL (0427)	I	5 Plots	Annual	Annual	Valley Falls, Alkali Lake, Paisley
Narrows (0431)	M	4 Plots	Annual	Annual	Paisley
Shale Rock (0435)	M	2 Plots	Annual	Annual	Alkali Lake

[1] I = (Improve) generally in need and capable of range condition improvement.
M = (Maintain) generally in satisfactory condition with a management goal of maintaining existing range conditions.
C = (Custodial) generally small or isolated parcels for which active management is not feasible or economical.

Paisley HMA is located to the west and north. A few horses have drifted into the area in the past if gates are left open, hut are usually moved back into the HMA fairly quickly.

Special Forest Products

Though no commercial forest land exists in the planning area. there are some resources present which are classified as special forest products. primarily related to firewood, posts, poles. berries, and boughs from juniper. and possibly Christmas tree quality ponderosa pine and white fir. These are present primarily in Abert Rim WSA and are, therefore, not available for human use. A few juniper may be scattered in other upland areas within the planning area. No designated firewood cutting areas occur in the planning area. Currently, there is no known or demonstrated demand for other- special forest products within the planning area. It is unlikely that any commonly-sought mushrooms occur in the planning area. For the purposes of this discussion. special forest products should not be confused with Native American cultural or traditional use plants. These are discussed further in the "Cultural Resources" section.

Wildlife

Wildlife was determined to be one of the four relevant and important values within the planning area. This was based primarily on the known or suspected presence of important populations of waterfowl, shorebirds, and special status species (BLM, 1993). A wide variety of other species or groups of species are documented in the area and described in the following section.

Amphibians and Reptiles

No studies or inventories have been conducted on amphibian or reptile populations within the planning area. It is assumed that a typical Great Basin association of species occurs in the area and that is the basis for the species list presented in Table 6 of Appendix A.

Mammals

The Lake Abert subbasin contains a moderately complex association of resident. migratory. and nomadic populations of large ungulate mammals (California bighorn sheep, pronghorn antelope. mule deer. and Rocky Mountain elk). as well as a fairly typical assemblage of Great Basin small mammal and predator species (Table 5, Appendix A). The following discussions of these mammals are based on current data and field experience in the area. Additional inventories are presently in progress: and a more intensive series of inventories to help define population levels is planned to begin in the spring of 1995.

California Bighorn Sheep

The present California bighorn sheep population in the Lake Abert area is the successful result of a reintroduction effort conducted by the Oregon Department of Fish and Wildlife (ODFW) and the BLM in the early 1970's. Between eighty and 100 sheep make yearlong use along Abert Rim, with occasional wanderings into Colvin Timber and White Pine Marsh over the top of the rim. There also seems to be some movement between this herd and its daughter herd along the northern extension of Abert Rim, north of Hogback Butte.

Beyond the two ram permits offered to hunters each year by ODFW, the only significant mortality factor operating on this herd appears to be cougar predation. The magnitude and impacts of this predation is currently unknown. Possible losses to vehicle accidents along the highway at the base of the rim was an initial concern. as sheep movement across the highway to water at lakeshore springs does occur. This, however. has not proven to be a problem to date.

Mule Deer

Mule deer use patterns around Lake Abert are fairly complex. and appear to be driven more by weather conditions than any other factor. The west face of Abert Rim, from the National Forest boundary to approximately Poison Creek to rhe north. is crucial deer winter range The more severe the winter and deeper the snow pack. the more crucial this habitat becomes and the further north along the rim the deer will move. Conversely, during mild. nearly snow-free winters few deer are forced into this area from the forest. Superimposed on this crucial winter habitat is a much more extensive yearlong habitat for a small (20-40) resident deer herd that ranges the entire length of Abert Rim,

Nearly everything to the west and north of Lake Abert receives some limited mule deer use at one time or another during the year. Only in the broadest sense. however, can these deer be considered a resident population. They are almost nomadic in their wanderings around this part of the Paisley Desert in response to forage and water availability.

Pronghorn Antelope

The range of the pronghorn antelope using the Lake Abert subbasin is nearly identical to that of the nomadic mule deer described above; nearly all lands to the west and north of the lake. Their use of these habitats is also similar. being a nearly constant wandering in search of food and water. Consistent use occurs during the spring in various portions of the crested wheatgrass seedings and during late summer along the lakeside spring/meadow complexes. The subbasin provides only a small part of the entire antelope use area, which includes nearly all of the sagebrush/grassland habitats between Valley Falls and Christmas Valley. and between Highways 3 I and 395.

Predators

Cougar are known to occur along Abert Rim and one was seen in July 1994 crossing the highway near the old Pike Ranch at the north end of the lake. Mule deer, bighorn sheep and domestic livestock losses to cougar in the area have been documented, but present population numbers and use patterns are not known.

Bobcats have been observed along the lower slopes of Abert Rim, in the Coglan Buttes. and in the rocky breaks north of Abert Lake. Coyotes are the most common mammalian predator in the area, but badgers and long-railed weasels occur in large enough numbers to be considered cornmon

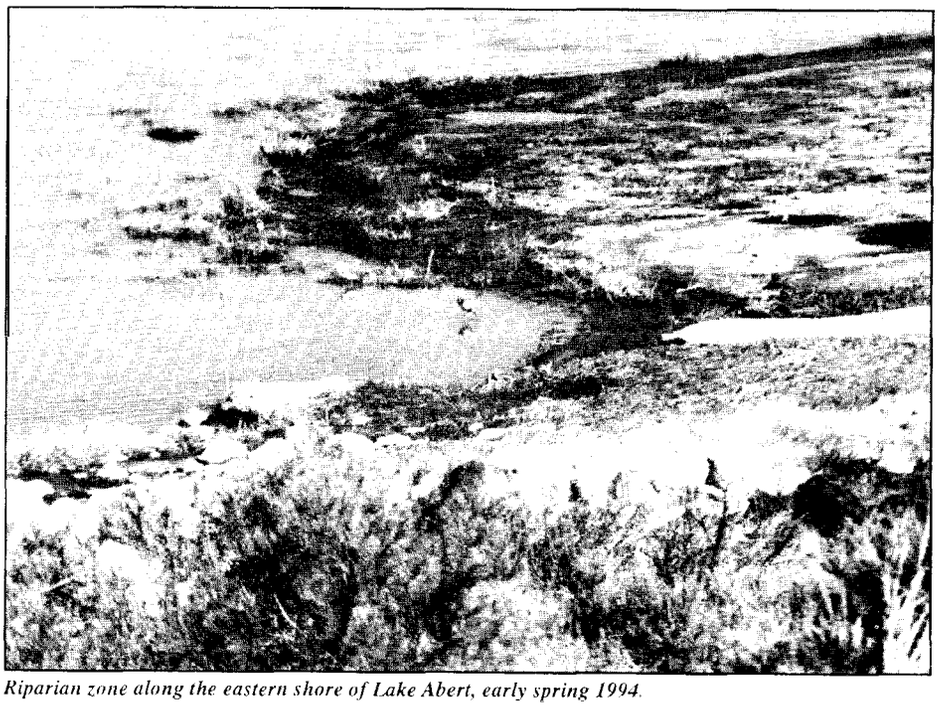
Rodents and Lagamorphs

Little inventory effort has been expended on the rodents and rabbits occurring near Lake Abert, but it appears that a fairly typical Great Basin association of species can be found *there.* Deer mice and voles are the most common rodents and black-tailed jackrabbits are the most common lagamorph. Silver-gray squirrels have been seen along Abert Rim, as have sagebrush chipmunks, white-tailed antelope groundsquirrels, Beldinp ground squirrels. pygmy rabbits and white-tailed jackrabbits. With the exception of the silver-gray squirrels, these species occur in various densities (related to habitat suitability) throughout the subbasin. Current population densities and trends for these populations are unknown, but inventories to fill some of the data gaps are planned for 1995.

Birds

Waterfowl and Shorebirds

Lake Abert and the surrounding area is rich in wildlife habitat and species diversity (Table 1, Appendix A). There is evidence that Lake Abert plays an important role for migratory habitat along the Pacific Flyway, particularly for



Riparian zone along the eastern shore of Lake Abert, early spring 1994.

shorebirds It is likely that a significant percentage of the Pacific Fly way populations of western snowy plover, eared grebes, Wilson's and red-necked phalaropes. and American avocets use Lake Abert. It also provides seasonal habitat for 1.5-2% of the North American population of northern shovelers. The magnitude of the total waterfowl/waterbird use (exceeding 3.75 million bird-use days) demonstrates that it is more than locally significant and, in fact. has flyway (regional) significance

Regional Significance

Over the years there have been many single species and single point-in-time counts and estimates of bird use made at Lake Abert It was not until March 1992, that an intensive and comprehensive inventory of waterfowl and waterbird use of the lake was initiated The discussion below is based upon what has been recorded for Lake Abert, as well as the initial results of the ongoing intensive survey.

Keister (1992) contains the first (and probably only) compilation of bird census work done at Lake Abert. This report covers the time period 1982 through 1991. and can be referenced for the specific sources of the data. It should also be kept in mind that these various counts are probably not at all comparable. in terms of effort. intensity, method, etc.. but they do constitute the best available information.

Starting in 1982, a fairly typical high water/low salinity year. 153,000 birds were counted on the lake in the fall. including 5.000 avocets. 65,000 phalaropes, 3,000 other shorebirds. and 7.000 waterfowl. By the fall of 1983. the count was down to 35,000, with 52,000 fewer phalaropes comprising the bulk of the difference. This may or may not have represented a real decline. as the weekly counts conducted by the BLM from 1992 through the present have shown that a difference of two weeks in the inventory date can result in total count difference of more than 20,000 birds. There is nearly constant movement into and out of the Abert ecosystem by extremely large flights of shorebirds. grebes, and waterfowl.

For 19X4 and 1985, only counts of phalarope numbers are available (6,400 and 4.500 respectively). These numbers are a tenth or less than the 1982 numbers but, ongoing surveys by the BLM show that phalaropc numbers peak from mid-July to mid-August. The birds may have been there and gone. or never have been there at all for those two years; there is no uay of knowing for sure. The 19X6 count was again of al] species, and the numbers were back up to 38,000 (24,000 shorebirds and 14,000 waterfowl).

The next major count was conducted in the fall of 1990, but for some reason, waterfowl were not included. This count shows a total of 39.000 shorebirds and there were likely at least an additional 7-8,000 waterfowl present. The fall, 199 1. count did include waterfowl, and found 23.000 shorebirds, 2.000 other waterbirds (primarily grebes), and 7,500 waterfowl present.

Starting in early March 1992, weekly counts of all waterfowl and waterbird (avian Orders Podicipediformes, Pelicaniformes, Ciconiiformes, Anseriformes, Gruiformes, and Charadriiformesi species using Lake Abert have been conducted (Tables 2. 3. and 4. Appendix A). These counts have shown that there is a much more complex movement pattern into and out of Lake Abert than had previously been thought.

In 1992, total numbers peaked in late April at about 26.000 birds. dropped off to 3.000 by the end of May. and peaked again in late July at 28,000. The relative percentages of the various Orders of waterbirds also indicate a fairly complex emigration/immigration pattern. Taking waterfowl as an example, they comprised i 6% of the total population in early March. This increased to 43% by early April, fluctuated between 1% and 9% through August. and clitnbed to 50% as

of the end of September 1992. A much more thorough analysis ot this movement pattern will be conducted at the completion of the Lake Abert waterbird inventory project, but initial indications arc that there is a nearly continuous movement of birds to and from Lake Abert for the better part of the year.

Data for 1993 and t 994 are Incomplete. but do show, however. a 1993 peak in October of 73.000 shorebirds and grebes (waterfowl were not counted: Tables 3 and 3. Appendix A). So far in 1994, there was a late-March/early-April migration peak of about 10.000 individuals: followed by a slight decline leading to a mid-summer peak of nearly 97.000 (primarily avocets. phalaropes and gulls).

So far as the total bird use of the lake ecosystem is concerned, Keister (1992) estimates that Lake Abert, conservatively. supports 1 .7 million use-days annually by waterfowl and waterbirds. In 1992. the ongoing study recorded 2.3 million use-days between March 3. and September 20. During approximately the same time period in ! 993. slightly more than 3 5 million bird-days of use was recorded.

Another unknown to bc factored into the total waterbtrd use picture for Lake Abert is the current population status and trends for the various species using the lake. The Pacific Flyway population of eared grebes suffered a catastrophic toss of mot-e than a quarter million birds (K. Voget, Salton Sea NWK. pers. comm.) in southern California late in the 199 l-92 winter. To all field observers involved in the 1992 work at Lake Abert, the eared grebe numbet-s seemed to be much reduced over previous years. but there is little previous documentation to support this. In 1992, the grebes peaked at 12.000 in late April. with a second peak of 9.000 in mid-August; maintaining a population in-between of well under a thousand individuals. Past "impressions" by the field biologists is that the take usually has several thousand non-breeders present between April and August. These "impressions" may be in error. the birds that usually would use Lake Abert died at the Salton Sea earlier this year. or increased salinities impacted brine shrimp production to the point where other habitats had to be found - any or all of these may be true. And the eared grebes arc the only waterbird (excepting waterfowl) species using the lake, out of the more than 20 species recorded there during 1992. for which any kind of regional information is available.

It is unlikely that Lake Abert has little more than local importance for most waterfowl species. except for the northern shoveler. Using the largest number recorded (30,000) for this species (Boula. op. cit.). and comparing it against the best available data for the Continental population (USFWS. 1992). Lake Abert seasonally supports between 1.5 to 2% of North America's shoveler population. This is probably a significant percentage. and the current census project should give us some refinement on actual use. For no other waterfowl species do the numbers recorded for Lake Abert comprise even a tenth of a percent of the total Continental, or even Pacific Flyway. population.

Raptors

For this dtscusston, raptortai birds are considered to be owls. hawks. falcons. eagles. vultures and kites: and the environs of Lake Abert provide a moderately diverse array of habitats for these species Three species. the peregrine falcon. ferruginous hawk and bald eagle. are considered Special Status Species and a description of their use of the Lake Abert area can be found in that section of this document. The remaining raptors and what is known of their use of the area is presented by species. below.

Great Horned Owl. This large nocturnal predator is a common nester along Abert Kim. with a nesting density of approximately one nest per mile of rim. This is one of the earlier nesting btrd species in the area and tt is not uncommon to see an adult on the nest completely covered in snow during incubation. Quantitative data is lacking. but field observations Indicate that black-tailed jackrabbits and cottontail rabbits comprise the main prey species. There are no indications that the great horned owl population here is anything other than healthy and active

Burrowing Owl. Only five active burrowing owl nests are known from Lake Abert and the immediately surrounding uplands, but this is considered tnore a function of limited inventories than any scarcity of owls. A more complete inventory fot- this species is planned for 1995.

Short-eared Owl. The grassy meadows on the northern periphery of the lake provide nesting habitat for an unknown number of this early-morning and late evening hunting owl. This species is commonly seen on cloudy days hunting for mice and voles over any of the meadows visible from Highway 395.

Red-tailed Hawk. This is the tnost common of the broad-winged hawks in the area from April through October. and is a common nester along Abert Rim and other appropriate habitats. Mice. voles and the occasional rabbit provide the prey for this hawk. A limited number aiso winter in the area on a average year. but are almost complete!) absent on severely cold or deep-snow winters.

Rough-legged Hawk. Large numbers of this large. tundra nesting hawk, spend their winters around Lake Abert and in the brush uplands Subsisting on rabbits and mice. this is the most commonly seen raptor from October through March

Golden Eagle. A nesting density of approximately one eyrie for every one-half mile of Abert Rim has been recorded for this majestic raptor. Its nesting success and, in part. its nesting density. is determined by the available rabbit prey base. During periods of high rabbit populations, golden eagles commonly fledge three young per nest. Conversely, when rabbit numbers are low. many eagles make no attempt to nest at all. Based upon the numbers of juvenile eagles seen in the Lake Abert area. the population here is healthy.

Turkey Vulture. There are at least eight active turkey vulture nesting cliffs along Abert Rim. Beyond this, little is known of their population status in the area.

Black-shouldered Kite. Sporadic use of the lower slopes of Abert Rim and the lake-side meadows has been observed for this species. which is normally found much further south. No nesting kites have been found, and it is speculated that the observed use here is in response to scarce hunting habitat during high rainfall (and high grass growth) years on the California annual grasslands. The last large number of kite sightings was during the early 1980s.

Prairie Falcon. This is a very common resident raptor species. with nesting along Abert Rim and in the rims to the north of the lake. Prairie falcons can almost always be seen hunting over the upland habitats surrounding the lake.

American Kestrel. This is another very common species in the area. It is a resident during all but the most severe winters.

Other Bird Species

Little is known about the population status of the other bird species using the Lake Abert area. beyond that presented in Tables h-9 (Appendix A).

Relevance and Importance

The presence and significance of the populations and habitat for shorebirds and waterfowl was determined to meet the criterion for ACEC relevance and importance (BLM, 1993).

Special Status Species

Plants

Desert allocarya (*Plagiobothrys salsus*), is an annual plant that grew in an enclosed spring site on the west side of the lake until 1983 when it was extirpated. On June 10. 1992. the resource area botanist prepared a report on P. salsus. the only sensitive plant species known from the west side of Lake Abert. The report states that desert allocarya formerly occurred near a spring and was also collected in 1941 at the south end of Abert Lake. Currently there is only one known existing population of desert allocarya in Oregon, on private land in the Warner Valley. Outside of Oregon. the species occurs sporadically in Nevada. The habitat for the species is moist. alkaline areas."

From this, it appears that Lake Abert may be important as a reintroduction site for this annual plant. In addition, it appears that the area contains potential habitat for Columbia cress (*Rorippa columbiae*), though it has never been found in the area

On Abert Rim there is suitable habitat for the long-flowered snowberry (*Symphoricarpos longiflorus*), an Oregon Natural Heritage Program List 2 and BLM assessment species. Its presence is suspected, but not confirmed to date.

Animals

There are 14 animal species documented at Lake Abert for which a special status has been assigned by either the State of Oregon or the Federal government. One species (peregrine falcon) is listed as Endangered by both the state and Federal governments, one (bald eagle) is jointly listed as Threatened, one (western snowy plover) is State Threatened and a Federal Candidate, four (white-faced ibis, loggerhead shrike, pygmy rabbit, Oregon lakes tui chub) are Federal Candidate and State Sensitive, three (black tern, California bighorn sheep, long-billed curlew) are Federal Candidates with no state listing, and four (ferruginous hawk, greater sanclhili crane, white-tailed antelope squirrel, white-tailed jackrabbit) are State Sensitive with no Federal status. The area supports the third or fourth largest breeding population of western snowy plover in the world These species were particularly important in the determination of relevant and important wildlife values within the planning area.

American Peregrine Falcon (*Falco peregrinus anatum*). This sub-species of the peregrine falcon is Federally listed (USFWS, 1991) as endangered throughout its range in North America, and has been reported at Lake Abert several times. The earliest report (B. Claggett, pers. comm.) is that peregrine falcons were commonly seen at Lake Abert during the late 1950's and early 1960s, hunting over the lake shore and mudflats: no documented nests were known. In 1982 (W. Devaurs, BLM inventory files), an adult female was observed for several days hunting over the northeast quarter of the lake; again, no nesting was documented. In 1989 (Kristensen et al., 1991). an adult falcon was observed along the lake shore. The latest sighting was made in September 1992 (M Allen, 1992). of a single sub-adult falcon, over a period of three weeks.

There arc currently three active reintroduction programs in progress within a fitty mile radius of Lake Abert (Summer Lake. Warner Valley, and Surprise Valley). any of which could be the source of the 1989 and 1992 sightings. As it predates any reintroduction efforts in this part of the country. the 1982 sighting is almost assuredly a "wild" falcon From whatever source, peregrine falcons are using Lake Abert for hunting habitat at least. and may well bc nesting in the cliffs of Abert Rim to the east. Nesting inventories along the rim would be required to document or disprove a currently active breeding status for peregrine falcons at Lake Abert.

Bald Eagle *(Haliaeetus leucocephalus).* The bald eagle is Federally-listed, in Oregon and Washington. as a Threatened species (USFWS. 1991). This bird is commonly seen (BLM Winter Raptor Inventory files) at and around Lake Abert from early November through February. They have been observed hunting and feeding over most of the lake, with usual concentrations at the mouth of the Chewaucan River and at the north end of the lake. Most of their hunting seems to be concentrated on sick or injured waterfowl, but adult birds have been seen taking fish from the lower Chewaucan River. During the winters of 1982 through 1987. one eagle was consistently observed (Devaurs, 1990) snagging stunned fish as they left the fresh water plume of the river and hit the toxic salinity levels of the lake water. No nesting by this species has been observed at Lake Abert, nor is any likely given the total lack of suitable nest substrate and spring/summer prey base

Western Snowy Plover *(Charadrius alexandrinus nivosus).* The western snowy plover is listed as state-threatened (Oregon Natural Heritage Data Base, 1989), and as a Category 2 Federal Candidate species (USFWS, 199 1a). Since 1985, Lake Abert has had the largest breeding population of these plovers in Oregon (Kristensen et al., op. cit.): and. depending upon regional water conditions, the breeding population at Lake Abert varies between the third and fourth largest in the world (Page *et al.*, 1989).

Lake Abert is considered as a vital area for the perpetuation of the western snowy plover. serving as a major nesting and staging area (USFWS, 1985). The coastal breeding population has already been proposed for listing as an Endangered species, and the Abert breeding population alone averages four to five times as large as the entire world's coastal breeding population (Marshall, 1988). Beyond the total size of the Lake Abert breeding population. the hatching success there (75%) is far higher than for the California coast (58%), the Oregon coast (1328%). and inland California sites (58%) where inventory data are available (Stern et *al.*, 1988). In this report. Stern concluded that "unlike these other breeding areas. we believe neither predation nor disturbance of the nest is a limiting factor on plover productivity at Abel-t Lake".

Color banding of nesting adults and hatchlings at Lake Abert has also shown (Stern *et* al., 1990) that there is a possibility of interchange between the coastal and interior populations. as they share the same wintering grounds. 'The Abert population, as well as other interior populations, could serve as a reservoir for restocking the coastal nesting areas. Additionally. Lake Abert appears (Stern *et* al.. 19Y 1) to be the main staging area for plovers during migration. Birds from other Oregon breeding areas and possibly those from other sites in the Intermountain West to the south, stage at Lake Abert before moving to the California and Baja coasts for winter.

White-faced Ibis *(Plegadis chihi).* This species is a Federal category 2 Candidate species (USFWS, 199 I a) and is listed as a state-sensitive species (Marshall, 1992). Ibises have been regularly seen at the north end of Lake Abert during April and May since 1987 (Kristensen, op.cit.; M. Allen, op. cit.), using the shallow marshes and meadows as feeding habitat. Suitable nesting habitat is currently lacking. It is assumed these birds are foraging from the recently established nesting colony in the nearby Lower Chewaucan Marsh.

Black Tern *(Clidonias niger).* This tern species is also a Federal category 2 Candidate species (USFWS, I99 I a). They appear to be an infrequent visitor to Lake Abert (W.Devaurs, pers. obs., Kristensen, op. cit., Allen, op. cit.), feeding over the shallow marshes at the north end of the lake and near the mouth of the Chewaucan River. Nesting habitat is presently lacking for this species.

Loggerhead Shrike *(Lanius ludovicianus).* This species was recently (USFWS, 199 1 a) listed as a Federal category 2 Candidate species, and is a relatively common nester in the shadscale and greasewood dominated uplands surrounding Lake Abert. During mild winters a few birds can be found around the lake. but most are migratory.

California Bighorn Sheep *(Ovis canadensis californica).* Abert Rim supports a self-sustaining population of this Federal category 2 Candidate species, which is based on transplants from Hart Mountain Nations! Antelope Refuge during 197 1-74. A second population is becoming established in the Coglan Buttes. immediately west of the lake, also based on a transplant from Hart Mountain in 1989. Animals from both herds have been observed along the lake shore at various times. apparently using the freshwater springs that rise there.

Pygmy Rabbit *(Brachylagus idahoensis).* This species is another recent addition to the Federal Candidate category 2 species list. and is also a state-listed sensitive (Marshall, 1992) species. It does occur in some of the upland habitats bordering the lake. but little is known about its numbers. densities. or trends.

Oregon Lakes Tui Chub *(Gila bicilor oregonensis).* This sub-species is endemic only to the Lake Abert basin, particularly to the freshwater springs at the northwest corner of the lake. It is listed as a Federal category 2 Candidate species (USFWS, 199 I a) and as a state-sensitive species (Marshall, 1992). To date. it has only been collected from springs on private lands, but several unconfirmed reports have been received of its presence in springs arising on and/or flowing through public lands.

Long-billed Curlew *(Numenius americanus).* While still considered a Candidate species. the curlew has been down-listed to a category 3C, or one for which there is likely no reason to list as Threatened or Endangered. The meadows on the north end of the lake have supported a nesting population of between 7 and 15 pairs for- at least fifteen years (W.Devaurs, pers. oba.).

Species listed as Sensitive by Oregon, but without Federal Status

The following species are considered Sensitive by the State of Oregon(Marshall, 1992) and have been observed at Lake Abert

Ferruginous Hawk *(Buteo regalis).* One or two birds have been observed several times (Devaurs, 1990) during counts of wintering raptors, usually over or near the meadows on the north end of the lake.

Greater Sandhill Crane *(Grus canadensis tabida).* This bird is a consistent nester in the Lower Chewaucan Marsh and meadows at north end of lake; population varies between 3 and 7 pairs.

White-tailed Antelope Squirrel *(Ammospermilophilus leucurus).* This squirrel is a relatively common resident of upland sagebrush and saltbrush communities immediately north of Lake Abert.

White-tailed Jackrabbit *(Lepus townsendii).* This jackrabbit is occasionally observed along the western shore of the lake and in the adjacent uplands; relatively common. especially during winter, in the desert shrub communities to the north and east of the lake; a very cyclic population that appears near its natural low point now.

Relevance and Importance

The presence and significance of the existing populations and habitat for Endangered. Threatened. and Sensitive species meets the relevance and Importance criteria for ACEC designation (BLM. 1993).

Special Management Areas

Wilderness Study Areas

The planning area includes a portion of the Abert Rim Wilderness Study Area (WSA) which runs along the entire eastern edge (Map 2, Appendix B). The BLM currently recommends 23.760 acres for inclusion in the National Wilderness Preservation System. The affected environment of this WSA and the impacts of its designation as wilderness have been addressed in a previous EIS (BLM, 1989) and will not be discussed further in this document. The west facing escarpment has several intermittent stream drainages, most notably Juniper and Poison Creeks. The WSA contains large stands of native grasses at lower elevations with western juniper, fir, and pine in isolated areas at higher elevations on the rim This portion of the WSA is extremely rugged and only has one trail running from the bottom to the top of the rim, Lower end access to this trail is currently blocked by private land holdings outside of the WSA. This area contains extraordinary natural values. including dramatic geologic features. bighorn sheep habitat, native plant communities in an undisturbed state, and outstanding opportunities for solitude and primitive recreation.

Other Special Management Areas

The study area does not contain any Research Natural Areas (RNAs), other ACECs, or Wild and Scenic Rivers. The upper portion of the Chewaucan River was studied as a potential wild and scenic river by the Forest Service (Forest Service, undated) and determined not to be eligible. The lower portion of the Chewaucan River crosses primarily private land, has been highiy modified by man, and appears to be ineligible.

Cultural Resources

The Lake Abert area contains a high concentration of cultural sites. These sites are located along the shoreline of the lake, around the springs in the area of the lake, on the slopes of the rims surrounding the lake. and on the rim overlooking the lake. Survey work has been done on the bottom of the lakebed, along the west and east shores and at some locations on the top of Abert Rim. A National Register District for cultural resources has been created on the eastern shore of the lake. This district runs from Valley Falls north to the old Pikes' ranch area (Map 2, Appendix B).

A number of different site types are present in the area. These are discussed below.

Site Types Present

House Pit Villages

These features consist of the remains of the subterranean shell of a house. A shallow depression would be excavated into the terrace. piling the fill frorn the excavation around its edges in a mound to create walls. Then. a wooden frame structure would be placed over this and covered with mats. brush and dirt. There are numerous locations on the terraces surrounding the lake where large numbers of house pit depressions are found. Over four hundred house pits have been identified at more than 30 sites along the shore of the lake. These are associated with large amounts of lithic debris. artifacts of various kinds. and other constructed features such as rock art, stone rings. stone walls and blinds. The creation ot serni-permanent houses in large numbers along the shore of a lake is extremely rare in the Great Basin. It rnakes the Lake Abert area extremely important in the study of subsistence and settlement patterns.

Stone Ring Sites

Like the housepits. these are the foundations of houses. In this case, the foundation of rocks was cuvercd with a pole and brush structure or windbreak. There are numerous locations on the terraces surrounding the lake where large numbers of stone rings which are the foundations of huts or windbreaks are found. Over two hundred of these structure have been identified. These are associated with large amounts of lithic debris. artifacts of various kinds and other constructed features such as housepits, stone walls, rock art and blinds. The concentration of such large numbers of structures is unusual and indicates long-term and repeated occupation of the shores of Lake Abert.

Lithic Scatters

These are areas where lithic debris from the use or manufacture of stone tools are found. There are many of these areas on the shores of the lake. More than 200 lithic scatter exist in the area. Other types of sites, such as housepit villages. and stone ring sites also contain large amounts of lithic debris.

Rock Art Sites

There arc numerous locations on the shores of the lake w here rock art can be found on boulders. These may contain from one to several dozen petroglyphs per site. These sites are frequently associated with other types of sites such as housepit villages. stone ring sites. lithic scatters. etc. More than SO rock art locations are known from the region of the lake. Nearly every concentration of housepits and stone rings in the area has an associated rock art site. This pattern of having rock art associated with living sites is unusual in the Great Basin. making the study of the rock art in the area Important for undcrstanding the significance and purpose of rock art.

Stone Fences

There are several locations on the lake where stone fences can be found. These are constructed of loose piles stones and are from one to three feet in height, While most are historic, there is the possibility that some of them are prehistoric. These types of structures have not been studied and recorded in the Great Basin to any degree.

Trails

There are historic trails which follow the shores of the lake and one at Poison Creek which goes from the bottom of the rim to the top. The trail at Poison Creek is an historic American Indian trail. In addition, there are segments of old stage and freight roads in the area of the lakeshore. These are relevant to the study and interpretation of the Eurouamerican historic period of the lake.

Rock Shelters and Caves

There are four locations along the shore of the lake where there are shallow caves and shelters which were used by prehistoric people. These contain occupation debris and in some instances. rock art.

Hunting Blinds

Small circular rock structures are found along the lakeshore and on the face of the rim. as well as along the top of the rim. These are thought to he hunting blinds used in the taking of waterfowl along the lake and in huntinp deer or bighorn sheep along the face and top of the rim.

Historic Structures

There are the remains of homesteads in several locations along the lakeshore. These contain structures. corrals. fences and garbage dumps.

Record of Occupation

The record of occupation of the Lake Abert area covers a time period of more than 10,000 years. This length of time can be divided into Early (10,000 to 8.000). Archaic (8.000

to 2,500), Recent Archaic (2500 to 500), Recent (500 B.P. to 150 B.P) and Northern Paiute Period (I 50 B.P. to present). Periods of occupation show frequent changes of activities. intensity of occupation, and length of occupation, Many different types of artifacts are found in the sites along with a wide range of floral and faunal materials. These indicate, along with the large numbers of structures. that besides being an area with a long record of occupation, it is one of intense occupation. This is unusual in the Great Basin where populations were small and large concentrations of people in one location for long periods of time was not the norm,

Traditional Uses

The study area is within the territory of the Northern Paiute Indians. Historically. the group which appears to have occupied the area at the time of contact is the Yahuskin Band of the Nor-them Paiute. Their identified territory runs up the side of Lake Abert on the eastern shore and then northeast from the northern end of Lake Abert. The Klamath people also have an interest in the area since it appears that this group may have occupied the area prior to the Paiute. In addition to the Yahuskin Rand of the Northern Paiute and the Klamath group. other Native American groups are interested in the area. Northern Paiute from Warm Springs, Oregon, Fort Bidwell, California, and Northern Nevada have expressed interest in the area.

Sites located on the southern end of the lake. near the Rivers End Ranch, have been identified by the Northern Paiute as sacred sites which were used by medicine men. Abert Rim is known to some Paiutes as "Kwena Haba Nabashut" and is reported to be an area where medicine men caught eagles to help in healing rituals. Some of the sites in the area are reported by both the Northern Paiute and the Klamath groups to be areas which they visited and camped as children. They report that their elders spoke of these sites and the rim as places of importance in their past. Due to the unusual nature of the rim. it is considered to be an area of great importance. Northern Paiutes report that some of the rock art in the area was made by Paiutes which also indicates the importance of the area

The Klamath people see the sites in the area which are older than archaeological evidence of the Numic Expansion (Northern Paiute) as Klamath sites. They indicate that they, like the Paiutes, consider the area to have special power associated with the old village sites along the lake and rim.

A number of plant species are known to have been traditionally or are currently used by Native Americans within the area These arc highlighted in Table 7 (Appendix A).

Relevance and Importance

The Lake Abert area has significant historic and prehistoric cultural values. It contains a National Register District and has one of the highest site densities in the region. While other areas have similar sites, they are lower in density and are found in different types of environments. There is virtually no portion of the immediate shoreline of the lake where some form of cultural resource cannot be found. The shoreline of the lake is literally one continuous site area. Much research remains to be done on these sites and important information about the past can be gained from them.

The sites are of more than just local importance. The study of the sites at Lake Abert is relevant to the study of other sites in the Northern Great Basin. Several papers and reports have been published to date about the place of Lake Abert in the prehistory of the Northern Great Basin. It is one of the few locations in the Great Basin where undisturbed house pits in large numbers can be found. It is important in the study of peoples relationships to water, to other areas. and to changes in the climate over time.

The prehistoric cultural resources in the area were determined to satisfy the criterion for ACEC relevance. It was also concluded that the prehistoric values within the area are rare, exemplary, fragile, unique, sensitive, irreplaceable, endangered, have more than local significance, are vulnerable to adverse change, and meet the criterion for importance (BLM, 1993). The historic features in the area were not determined to meet the criterion for ACEC relevance (BLM, 1993).

Socioeconimic Conditions

Population and Demographics

Lake County, with 7,350 residents (Center for Population Research and Census, July 1, 1993), is a lightly populated area whose economy is largely based on use of natural resources. Of the thirty-six counties in Oregon, Lake County is thirty-second in population (USDC Bureau of Economic Anaiysis. 1993). As shown in Table 8, the 1990 population density is 0.9 persons per square mile compared to the Oregon statewide population density of 29.6. and the United States density of 70.3 persons per square mile (USDC Bureau of the Census, 1992). Though there are two incorporated cities. Lakeview and Paisley. most residents live in unincorporated areas. About 2,500 people live in Lakeview while about 350 live Paisley.

Local Economy and Business Climate

As can be seen in Table 9. proprietors are a substantial component of total employment. This indicates many small businesses and self-employed individuals. Employment growth has taken place in the services sector. This is consistent with changes being experienced in the rest of the nation. The services sector growth reflects increased tourism. and development of services necessary to agricultural and other businesses.

Lake County IS approximately 78% Federal lands, including Lakevieu District (USDI-BLM), Fremont and Deschutes National Forests (USDA-FS). and the Hart Mountain Antelope Refuge (USDI-FWS). Each of these agencies provides a substantial component of employment to the local economy. as well as being a major source of outside influence on the economic and social fabric of local communities. The extent of Federal land holdings in the county is a subject of concern to local officials, in part because Federal lands are perceived to be beyond their land use control and taxing powers.

Recreation

The study area Includes a portion of the Abert Rim Wilderness Study Area. Highway 395 is a major north-south route in eastern Oregon. and it is estimated that over 70.000 people a year travel this section of highway. That portion of Highway 395 along Lake Abert has been proposed as a state scenic highway Abert Rim offers one of the most spectacular geologic sightseeing views in eastern Oregon, and is a major attraction in this part of the state. A Watchable Wildlife site with interpretive signs is located on the south end of the lake at Juniper Canyon. Potential visitation at this site will likely exceed 60,000 visitors per year based on preliminary assessments of travel and counts taken at the Highway Well Rest Area. This constitutes a significant recreation value.

The east shoreline of the lake receives high visitor use for birding. as well ax upland game bird hunting along Abert Rim Limited deer hunting occurs in the fall with a comparatively higher amount of chukar hunting later in the season. Approximately 500 visitor use days are estimated each year for chuckar partridge hunting. A limited amount of bighorn sheep hunting also occurs with 2 to 6 permits being issued for hunting each year on the average. The State of Oregon also has a geologic sightseeing marker on Highway 395 near Poison Creek that receives high levels of visitation. A number of roads and trails exist in the general area providing access for recreationists. Off-Highway Vehicle (OHV) use in the area appears to be non-existent or very limited at present.

Visual Resources

In the previous land use planning process (BLM, 1981; 1983). the study area was classified through the BLM's Visual Resource Management (VRM) process (Appendix E) into three classes: Class I (Abert Rim WSA. Class III (eastern half of lake), and Class IV (western half of lake) (Map 3, Appendix B). It is important to note that VRM classifications. as shown in this map, apply only to BLM-administered lands.

As part of the plan amendment process. visual quality in the study area was reexamined. As a result of this recent evaluation most of the planning area was determined to qualify as Class I (Abert Rim WSA) or Class II (rest of the area). This classification is derived from scenic quality. visual sensitivity, and distance zones 'The scenic quality is rated as A, due to the dramatic contrasts of form and color between the rugged Abert Rim escarpment, Abert Lake, and the rolling Coglan Hills to the west. Due to its proximity to Highway 395. all of the proposed area is in the foreground/ middleground distance zone of less than five miles. Visual sensitivity is high because of the adjacent WSA and the large number of travelers on Highways 395 and 3 1.

Abert Rim's sheer fault scarp rises vertically over 2000 feet above the lake and is broken by many rough. steep drainages. The texture and varied color of the dark rocky slope and vertical rim contrasts with the vast, open space created by the lake and its white alkaline shoreline below. Between the highway and the lake. many springs seep out into the lake forming bands of bright green vegetation and small marshy areas. To the west, the tawny colored Coglan Hills rise gradually from the lake.

Relevance and Importance

The scenic values of Lake Abert and its environs were determined to meet the criterion for ACEC relevance and importance (BLM, 1993).

Table 8. Socioeconomic Measures

	Lake County	Oregon	United States
Population - 1990	7.186	2,842,321	248,709,873
per Square Mile	0.9	29.6	70.3
Per Capita Income - 1992	$16.152	$18,605	$20, ! 0.5
Transfer Payments - 1991 (% of personal income)	21.7	17.5	16.9
Unemployment Rate - 1993'	9.1%	7.2%	6.8%
Agricultural Employment - 199 1 (% of tot31 employment)	23.0	3.5	2.2

State of Oregon, Employment Department. Regional Economic Profile. 1993

Table 9. Lake County Employment

EMPLOYMENT BY PLACE OF WORK	1981	1991
TOTAL EMPLOYMENT	4.058	4.297
BY TYPE:		
WAGE AND SALARY	3,046	3,091
PROPRIETORS	1,012	1,206
FARM	396	436
NONFARM	616	767
BY INDUSTRY:		
FARM	984	989
NONFARM	3,074	3,308
PRIVATE	2,058	2,238
AGRICULTURE SERVICE, FOREST, FISHING, AND OTHER	53	100
MINING	(D)	30
CONSTRUCTION	161	120
MANUFACTURING	519	449
TRANSPORTATION AND PUBLIC UTILITIES	111	138
WHOLESALE TRADE	(D)	78
RETAIL TRADE	561	60
FINANCE. INSURANCE. AND REAL ESTATE	161	121
SERVICES	383	562
GOVERNMENT AND GOVERNMENT ENTERPRISES	1.016	1.070
FEDERAL. CIVILIAN	381	432
MILITARY	31	34
STATE AND LOCAL	604	604

(D) Not shown to avoid disclosure of confidential information.
Source: BEA. Regional Economic Information System

Chapter 4 - Environmental Consequences

Introduction

For the purpose of comparison, the No Action Alternative is used as the baseline for measuring changes in conditions during the impact analysis. No commercial forests. wild and scenic rivers. fisheries, prime and unique farmlands, or wild horses. would be impacted by any of the alternatives considered. None of the alternatives analyzed would have any significant impact on human health or safety, civil rights, or have any discriminatory effects on minority or low-iticorne populations. or women

In order to address the potential impacts of the various alternatives, it was necessary to make some assumptions about what would and would not likely occur within the planning area if a given alternative were to be implemented. Some things were assumed likely to occur regardless of which alternative is selected. These assumptions were discussed at the the beginning of Chapter 2 in the section titled "Management Assumptions". Other assumptions. specific to a given alternative, are discussed at the end of the description for that alternative in Chapter 2. In addition to these assumptions, it was necessary to develop a ten-year mineral development scenario. as this is a central issue in this planning effort. This describes the mineral potential and possible development of mineral resources within the area which could occur under most of the alternatives (except Alternative 2). This scenario is included as Appendix C.

Actions Which Have Not Been Analyzed In This Document

The impacts of the following actions have been previously analyzed in other NEPA documents. wilderness suitability and designation, noxious weed management, animal damage control (predators, rangeland grasshoppers, and Mormon crickets), and disposai of gravel from two existing pits. Previous decisions of wilderness suitability/ designation of the area are tiered to and incorporated by reference into this plan atnendment. This issue is not covered further by, or analyzed within, this document (see Chapter 2. "Alternatives Considered but Eliminated from Further Study").

The integrated noxious weed control program would continue in the future, regardless of the alternative. Specific to the Lake Abert area, noxious weed control to date has emphasized biological control, though manual and chemical methods could also be utilized. The impacts of this program are discussed further in a separate environmental assessment and are tiered to and incorporated by reference (BLM, 1994b) into this plan amendment.

Animal damage control activities would continue under most of the alternatives evaluated The impacts of these activities are evaluated in other environmental assessments (BLM, 1989b, APHIS, 1993; 1 994). With respect to animal damage control activities, the BLM recognizes the importance of predators in the natural ecosystem However. the BLM also recognizes the authority of the Animal and Plant Health Inspection Service to conduct control activities (related to agricultural damage. livestock depredation. and human health/safety) and the authority of the Oregon Department of Fish and Wildlife to manage wildlife populations. This plan amendment tiers to and incorporates by reference the analyzses per-formed and subsequent management decisions ii e. Decision Records) resulting from the above referenced environmental assessments and. therefore. they will not be discussed further in this document.

Disposal of gravel from two existing pits would continue under most of the alternatives evaluated. The impacts of this activity have been evaluated in other environmental assessments and are incorporated by reference (BLM, 1978a: 1978b)

One additional action which has not been analyzed in this document relates to the impacts associated with the proposed pump storage hydroelectric facility (FERC withdrawal #11419). The BLM could be involved in this proposal in the future through granting or denying a major right-of-way to locate this facility on public land. However. the BLM chose not to address the project. as it is currently proposed, because a right-of-way could not be granted as it is in direct conflict with the BLM's Wilderness Interim Management Policy (BLM, 1987b). Should this proposal be modified in the future so as to not conflict with this policy (i.e. no facilities located within the WSA) or Congress release Abert Kim from WSA status. the BCM would reevaluate the project's compatibility with those management goals and objectives outlined in this document. In addition, the granting of a license by the FERC would require a separate NEPA document.

Land Program Impacts

Alternative 1 (No Action)

Under this alternative. all lands and realty progi-am activities would continue to operate in accordance with the existing management plans and current BLM policies and directives. There would be no adverse impact. other than what exists under present management guidelines. to the lands and realty program. All lands and realty related actions i.e., rights-of-way, leases, permits, exchanges. etc. would continue to be accepted. rejected or modified based upon individual NEPA analyses, on a case-by-case basis.

A portion of the ACEC. as proposed under this alternative, does lie within the Abert Rim WSA which is managed in accordance with the existing wilderness interim management policy. No new lands and realty related activities. such as the expansion of U.S. Highway 395 or BPA's Celilo-Sylmar DC transmission line would be allowed under current policy, outside the limits of their existing rights-of-way. As proposed. the Abet-t Rim Hydroelectric Pumped Storage project would not be allowed in the WSA.

Cumulative impacts could result under this alternative dependent upon the number and type of actions allowed, but would be difficult to assess due to the case-by-case approval basis under this scenario. There would be no irreversible. irretrievable, secondary, or indirect impacts associated with implementation of this alternative.

Alternative 2

Alternative 2 would make public lands within the ACEC area unavailable for operation under the public (realty-related) land laws with the exception of land exchanges and the acquisition of private land in holdings or interests therein. All other lands and realty related activities would not be permitted under this scenario.

Under this alternative the acquisition of private land would be actively pursued. The preferred method of acquisition would be by exchange for public lands outside the ACEC area. Exchanges within the ACEC boundary would be considered on a case-by-case basis and only if the exchange clearly complements ACEC management objectives.

Implementing this alternative would also restrict current rights-of-way, lease and permit holders to their present operations and provide for future expansion only within the parameters of their existing areas of authorization.

An active acquisition program could have irreversible. irretrievable and cumulative impacts on the local county (private land) tax base. if combined with other Federal agency acquisitions in which there may or may not be acreage replacement or monetary compensation for the loss. There would be no secondary or indirect impacts

Alternative 3

Operation of the lands and realty program pursuant to this alternative would be similar to Alternative 1, with the exception of rights-of-way. leases and permits.

Under this alternative. new rights-of-way. leases and permits would only be allowed provided the proposed use(s) are

compatible with ACEC management objectives. Therefore, implementing this alternative may or may not make less public lands available for these activities within the ACEC.

There would be no cumulative, irreversible, irretrievable. secondary, or indirect impacts associated with the implementation of this alternative.

Alternative 4

Under this alternative. impacts to the lands and realty program would be similar to that of Alternative 1, with the exception of rights-of-way. leases and permits. which would be similar to Alternative 3.

Cumulative. irreversible. n-retrievable, secondary, and indirect impacts would be the same as described in Alternatives 1 and 3 (i.e. none).

Alternatives 5 and 7 (Preferred Plan)

All lands and realty program impacts under these two alternatives, including cumulative. irreversible, irretrievable, secondary, and indirect impacts, would be similar to those described in Alternatives I and 3.

Alternative 6

All lands and realty program impacts. including cumulative, irreversible, irretrievable, secondary, and indirect impacts. would be similar to those described in Alternative 1.

Road and Transportation Impacts

Impacts Common to All Alternatives

It is assumed that. under all alternatives, there will be a continued need for basic maintenance of existing roads. In addition. there could be a need for new roads or widening/ expanding existing roads. Those impacts that are above and beyond those described above are highlighted in the discussion below

Alternative 1 (No Action)

This alternative allows for: seasonal closure of existing BLM roads causing erosion problems and permanent closure of BLM roads in the planning area that have been identified within the transportation plan as unnecessary. However. none have been so identified to date or are expected to be in the future. Therefore, there is not expected to be any significant reduction in roads or access within the area.

In addition. new roads and possibly a railroad spur could be constructed within the area (but outside of Abert Rim WSA) due to mineral development as described in Appendix C. The exact location or magnitude of this development on the existing transportation system and area access can not be evaluated at this time. However, it is assumed that increased road maintenance would be required due to increased traffic and area access would be improved over existing conditions. OHV impacts are discussed under "Recreations Impacts".

Alternative 2

Allowing no new rights-of-way under this alternative would negatively affect the ability to locate new roads within the planning area. However. existing roads could still be widened. straightened. or expanded within their existing right-of-way. Railroad transportation would not become available to the area as there would be little or no demand -without a mining operation in the area. OHV impacts are discussed under "Recreations Impacts".

Alternative 3, 4, 5, 6, and 7 (Preferred Plan)

The impacts to roads and transportation systems within the area under these alternatives would be similar to Alternative I OHV impacts for Alternative 6 would be similar to Alternative 1. OHV impacts under Alternatives 3,4,5, and 7 would generally be similar to Alternative 1 except use would be more restricted See also the discussion under "Recreation Impacts"

Secondary, Indirect, Irreversible, Irretrievable, and Cumulative Impacts

There would be no secondary. indirect. or cumulative impacts on the existing roads and transportation system due to any of the alternatives. However, there would be an Irreversible/irretrievable commitment of time. materials. and energy associated with road maintenance and any new construction associated w ith each alternative. The exact magnitude would depend upon the amount of maintenance or new construction completed during the life of this plan.

Hydrology and Water Quality Impacts

The desired ecological conditions for the lake are described in Chapter- 2 (Goal 1, objective b). For the purposes of this discussion, this objective has been evaluated in terms of short term(IO to 1.5 years) and long term (after year 2014) impacts. None of the resource management actions, as described in alternatives I-? for the following resources. are expected to have any significant impact on hydrology or watershed functions, including water quality, within the planning area (with respect to total dissolved solid concentrations and lake levels): soils, air quality, groundwater, paleontological, plant communities, wildlife, special status species. cultural resources, traditional uses, and visual resources. However, other management activities would itnpact hydrology or water quality. These are described below.

Alternative 1 (No Action)

It is nor possible to quantify the hydrologic impacts of future acquisitions. exchanges, and sales of land within the planning area. primarily because the specifics of which and how much land may change ownership is not known. Under current management, it is not expected that much land would be acquired. exchanged, or sold. It is assumed that land managed by the BLM, at a minimum, would contribute to meeting the hydrologic and water quality objectives over the short term and. therefore. lands program activities would have a low risk of adverse effects. However, land managed by others within the planning area may or may not contribute to meeting the objectives. The long term change in total dissolved solid concentrations due to the lands program can not be assessed at this time.

The issuance of future rights-of-way under this alternative could impact the short and long-term total dissolved solid concentrations due to the increased potential for soil erosion and sedimentation. This would be mitigated by requiring disturbed areas to be reseeded following construction. There could he slight increases in overland flows due to the clearing of vegetation and soil compaction associated with rights-of-way developments. This amount would be minimal when considered in the context of a watershed.

The current management plan calls for no vehicle traffic on those roads lacking subgrade reinforcement where critical erosion is likely during the wet season. (However. seasonal road closures in the planning area have never been implemented specifically for erosion control) It is assumed that future road use. new construction (roads or railroads). or drilling pad development which could occur under this alternative could be restricted in a similar manner to minimize impacts on water quality.

The extraction of sodium compounds has the potential to lower the total dissolved solids concentration. The significant impact level has been estimated at 5% below the 30-80 g/l. This level is reported by Keister (1992) as the optimum salinity for aquatic life at Lake Abert. Sodium mining under this alternative has the greatest potential to significantly impact hydrology and water chemistry. The mining of sodium compounds could decrease the total dissolved solids below the objective b (goal 1) and, if the evaporation ponds are located outside ot the lake, take 3,000 to 4.000 acres out of hydrologic production. That means that this acreage of land would not process water naturally. Within this area infiltration rates would be decrease and overland flow would increase. This would change the timing of when water (running off of this area) would reach the lake The lake could fill earlier. If the evaporation ponds are located within the lake there would be no impact to hydrologic production. All other exploration and development could be implemented with minimal impacts to hydrology.

Range management activities, if implemented properly, would not have a significant impact on the hydrology or watershed resources of Lake Abert. Cattle related impacts could occur if riparian areas, creeks, and springs are over used. However, many of these areas on Federal lands are already or will soon be excluded from grazing.

Fire management activities would not significantly impact lake levels, but could temporarily increase overland flow and sedimentation. When fire suppression is achieved by heavy machinery (cats) creating a line around the fire it removes vegetation and creates soil compaction. The amount of line and where it is located would dictate how much damage could occur. The physical removal of vegetation by the fire also leads to increased overland flow and sedimentation. In less severe fires vegetation would grow back, so this would be considered a temporary impact. In more severe fires, where the seed source is destroyed, site rehabilitation, in the form of reseeding the area, is usuually performed. As a mitigation measure, mechanical fire lines would not be located in channels (including ephemeral draws) and would be waterbarred after fire activities cease to prevent channeling of overland flow.

There is a risk of damage occurring from recreation activities through the removal of vegetation and increased compaction associated with roads and trails. The closer a trail is to a channel the more damage that can occur. This alternative (and Alternative 6) would have the greatest risk of impacting the infiltration rates and increasing overland flow because it is the least restrictive.

Alternative 2

Under Alternative 2, a larger area of land would be managed to meet the hydrologic and watershed objectives. Overall, this is the most protective alternative and, therefore. would have much less of a chance of not meeting the objective. both in the short and long term, compared to the other alternatives.

Locating no new rights-of-way and allowing no mineral activity in the planning area would result in no changes in the existing hydrology or watershed conditions. Continued use of existing roads could cause erosion and contribute sediments to area waterbodies This impact would be less than all other alternatives, as no new construction (roads or railroads) would occur. Only basic road maintenance would occur.

Range management activities would have less risk of impacting hydrology and watershed resources compared to the other alternatives because grazing would be removed from areas where damage is documented. Wildfire suppression impacts would generally be similar to Alternative 1. However, prescribed fires would be designed to not destroy the existing seed source and would likely use natural fire breaks and, therefore, would not be as likely to cause the same magnitude of impacts as suppression activities. Recreation impacts under this alternative would have the least risk to hydrology and water quality as it places the most restrictions on OHV use.

Alternative 3

Land program, rights-of-way. roads and transportation, and range management impacts on hydrology and water quality would be similar to Alternative 1. Rights-of-way would have a slightly greater risk of impacts compared to Alternative 2, due to removal of vegetation and increased compaction. Mineral activities under this alternative would have a low risk of causing significant impacts. Fire management activity impacts would be similar to Aiternative 2. Recreation activities under this alternative would have less risk of damage (i.e. soil erosion and sedimentation), compared to alternatives 1 and 6, due to the restrictions placed on where OHVs are allowed.

Alternative 4

Land program. rights-of-way, roads and transportation. and range management impacts to hydrology and watershed resources would be similar to Alternative I. Fire management activity impacts would be similar to Alternative 2 Recreation and mineral activity impacts would be similar to Alternative 3.

Alternatives 5 and 7 (Preferred Plan)

Land program, rights-of-way. roads and transportation. and range management impacts to hydrology and watershed resources would be similar to Alternative 1. Fire management activity impacts would be similar to Alternative 2. Recreation impacts would be similar to Alternative 3. Mineral activity under this alternative would have a lower risk of causing significant impacts than alternatives 3 and 4 because iess area would be available for such activities.

Alternative 6

Land program, rights-of-way, roads and transportation, fire management, recreation. and range management impacts to hydrology and watershed resources would be similar to Alternative 1 Compared to Alternative 1 , the impacts of potential mineral activities under this alterative is the next most impactive, but the impacts would be much less. The risk of significant impacts is low.

Secondary, Indirect, Irreversible, Irretrievable, and Cumulative Impacts

Only the exploration and development that were projected to occur (Appendix C) were assessed. It is not known how many mineral development projects would occur at the same time. It is assumed that only one of each type of mineral project would be going on at one time and that past projects would have all roads and drill pads ripped and seeded which would serve to mitigate or decrease the cumulative effects.

The management activities that have the ability to change the total solids concentration and lake levels have already been assessed individually. The cumulative effects of these activities are assessed by a matrix displaying these managements by alternatives in Table. They will be ranked from the least impactive (1) to the most (5).

The assessment of hydrologic impacts is qualitative and there is very little definable differences between some of the alternatives. Alternative 2 stands alone as having the lowest risk of impacting the hydrology of Lake Abert and not causing any significant changes in the total solids concentration and lake levels. Alternatives 3, 4, 5, and 7 have a greater risk. but the impacts are due to the removal of vegetation and increase of compaction associated with development. not a change in total dissolved solids and lake levels. Alternatives 1 and 6 have the greatest risk of causing significant impacts on total dissolved solids and lake levels.

Table 10. Cummulative Assessment **Ranking for Effect on Hydrologic Processes**

Alternatives	1	2	3	4	5	6	7
Lands	2	1	2	2	2	2	2
Rights-of-Way	3	1	2	2	2	3	2
Roads/Transportation	2	1	2	2	2	2	2
Geology/Mineral	5	1	3	3	2	4	2
Range	2	1	2	2	2	2	2
Fire	2	1	1	1	1	2	2
Recreation	3	1	2	2	2	3	2
Total	**19**	**7**	**14**	**14**	**13**	**18**	**13**

There would bc no secondary. indirect. irreversible, or irretrievable impact\ expected to occur to hydrologic processes under any of the alternatives

Groundwater Impacts

None of the alternatives arc expected to cause significant impacts to groundwater While compaction resulting from mineral exploration and development can decrease infiltration. thereby decreasing groundwater recharge, the amount of surface disturbance forecasted in all of the reasonably foreseeable development scenarios combined (Appendix Cj. would be insignificant compared to the total area within the Lake Abert watershed.

A potential impact would exist from the drilling of an exploratory geothermal well which could cause contamination of other aquifers. However, this impact would be mitigated by existing state and Federal regulations which require isolating fresh water aquifers from the surface and other subsurface zones through the use of casing and cement.

No secondary, indirect, irreversible, irretrievable, or cumulative impacts to groundwater arc expected due to implementation of any of the alternatives.

Soil Impacts

Alternative 1 (No Action)

Considering past development and potential mineral developments within the area, it is expected that a larger impact to soils (i.e. compaction and erosion) would occur from increased vehicle travel in the area for tnineral exploration work. recreational use. proposed development of future projects, and mining notice work.

There would be impacts to soils due to the construction of a railroad or road system that would be developed to support any mining or other types of activities. Any surface disturbance would result in some form of wind and/or water induced soil erosion.

Wildfires could increase the potential for soil erosion. The magnitude of the impact would vary depending on the amount of' acreage burned, the intensity of the fire, and the amount of fire lines constructed using heavy machinery. Hot, intense fires tend to kill the existing vegetation and would have greater potential for soil erosion. Less intense fires would have temporary impacts as the roots of vegetation would retain their soil holding capability and above ground growth would likely return within one or two growing seasons. Continued cattle grazing around the lake would cause increased soil erosion from wind and water and limit the amount of regrowth of existing plant communities to protect the soil surface.

Alternative 2

This alternative would be similar to Alternative 1, except that it would eliminate all mineral activities based on a formal withdrawal(s) from mineral entry in the area. Soil impacts would be minimal based on past and assumed future management proposed for the area. Soil erosion could occur following prescribed fire. but it is expected to be of more temporary nature due to the use of more frequent, but less intense fires and greater use of natural fire lines. This would lessen the likelihood of more intense wildfires and associated soil erosion impacts.

Alternatives 3, 4, 5, and 7 (Preferred Plan)

Up through the mineral exploration phase. as described in Appendix C. the impacts of these alternatives would be generally similar to Alternative 2. Should various types of mineral developments proceed to the production stage, there would be an increased potential for soil erosion due the construction of new roads and other facilities similar to Alternative 1.

Alternative 6

It mineral activity was limited under this alternative it would decrease the amount of potential development that could take place (compared to Alternatives 1. 3. 4, 5, and 7) and result in fewer impacts to soils associated with new construction

However. the increased recreation opportunities, development/construction of expanding cultural Interpretation sites, and generally no restrictions on rights-of-way (except within the WSA) would continue to cause soil erosion due to higher use and an expected greater need for road maintenance. Continued grazing in the area would reduce vegetation around the lake and potentially make it more susceptible to soil erosion from wind and water.

Secondary, Indirect, Irretrievable, Irreversible, and Cumulative Impacts

Any road or railroad construction done on lands outside of the planning area boundary to support mineral development as proposed in Alternatives 1. 3, 4, 5, 6. and 7 would cause soil erosion impacts that would be considered a secondary or indirect impact. The exact magnitude cannot be determined at this time. Alternative 2 would have no such impacts. No irretrievable, irreversible. or cumulative impacts to soils are expected to result from any of the alternatives.

Geology and Mineral Impacts

Tables 10-13 (Appendix A) show the number of acres for which mineral restrictions would be in effect by alternative. Tables 14- 17 (Appendix A) show the numbers of acres of mineral restrictions as it relates to mineral availability or potential for each alternative.

Impacts Common To All Alternatives Except Alternative 2

Except for Alternative 2. which precludes all mineral activity, locatable. leasable, and salable mineral activity would continue to be severely restricted or precluded within the Abert Rim wilderness study area and the proposed Abert Rim pumped storage hydroelectric project (FERC withdrawal) area (Maps 1, 4, 5, 6. 7, and 8). Table 9 (Appendix A) lists all of the special leasing stipulations that would be required for each alternative. In addition. regardless of the alternative, the same restrictions. either no surface occupancy or seasonal (timing) restrictions, would be imposed wherever special status species or significant cultural resources occur. Likewise, existing standard leasing stipulations, surface management, mineral material, and mineral leasing regulations, including NEPA requirements, would be in effect (see Appendix F). Therefore, the analysis of impacts to energy and mineral exploration and development through the alternatives is based upon the discretionary management actions relating to ACEC designation and lake protection that would be implemented for each alternative.

Alternative 1 (No Action)

This is the least restrictive alternative. All land in the planning area currently open to mineral location, leasing, and rnineral material disposal would remain open (Map 1. Appendix B). Only standard lease stipulations and the restrictions common to all alternatives (Appendix F and management assumptions listed in Chapter 2) would be imposed on mineral leasing activities. There would be no lake level or water chemistry restrictions. Locatable mineral activity would be regulated under 43 CFR 3809, except in the WSA where 4'3 CFR 3802 would apply (i e. no activity could occur in the WSA which would require reclamation).

Alternative 2

This is the most restrictive alternative. Under this alter-native. the entire planning area would be closed to all locatable. leasable, and salable mineral activity (Map 4. Appendix B). Lease applications would be denied. as would all future exploration and mining proposals.

Alternative 3

Under this alternative, no activities which would increase the number of years by more than 5%. when compared to the

1926-1994 baseline, that the average total dissolved solid concentration exceeds 130 g/l, and/or reduces the level of the lake below 4,252 feet in elevation would be allowed. Water chemistry changes would be considered in project-specific NEPA analysis. In addition, oil and gas and geothermal leasing would be allowed throughout the ACEC subject to no surface occupancy. Locatable mineral activity would be subject to plans of operation and NEPA analyses, and mineral material disposal would be from existing pits only.

Sodium mining could be interrupted from time to time, with the possibility of having to completely shut down if the lake levels remained too low or if water chemistry remained outside of allowable operating parameters. The uncertainty of the physical and chemical characteristics of the lake from year to year, with respect to the lake water stipulation, could preclude any sodium development as the investment risk could be too high.

While oil, gas, and geothermal leasing would be allowed, the no surface occupancy stipulation would negatively impact these operations as deeper (longer), more expensive, directionally-drilled, exploration and production holes would have to be drilled. In addition, any geophysical exploration that would require surface occupancy would be precluded. Based upon potential for occurrence of these leasable minerals, it is anticipated that geothermal exploration would be impacted the most.

Impacts from requiring a plan of operation for all locatable mineral activities under this alternative would be negligible. Requiring that all mineral material disposal be made from existing pits/quarries could have an adverse affect on any operation that requires road building. In addition, pond and dike construction associated with sodium mining, would require the excavation, transfer, and placement of native materials. If this were not allowed, haul costs could be prohibitive

Alternative 4

The boundary of the ACEC would be the 4,262 feet elevation on the north, south, and west, and the top of Abert Rim on the east (Map 6, Appendix B). The anticipated impacts to locatable, leasable, and salable (mineral material) minerals would be about the same as in Alternative 3.

Alternative 5

The ACEC boundary in this alternative is similar to Alternative 3. However, in this alternative the northern boundary extends to the county road north of Abert Lake. Sodium leasing would be allowed south of the line shown on Map 7 (Appendix B), subject to the same lake stipulation as in Alternative 3. Oil and gas and geothermal leasing would be allowed throughout the AC'EC subject to no surface occupancy. Locatable mineral activity would also be allowed ACEC-wide subject to plans of operations and NEPA analyses. Mineral materials could be disposed of only from existing pits. Except for the fact that there would be less land available for sodium leasing operations, and more land on the north end of the lake would be subject to no surface occupancy for oil and gas and geothermal leasing, the impacts to mineral exploration and development would be expected to be about the same as those described in Alternative 3. Because the entire area would be managed as VRM Class II, there would be significant restrictions placed on any type of activity within the ACEC. Any addition to, or modification of, the landscape would have to be substantially unnoticeable, which could result in costly masking or camouflaging, or, in some areas, complete avoidance.

Alternative 6

There would be no ACEC designated under this alternative (Map 1, Appendix B). Sodium leasing would be allowed subject to the lake stipulation identified in Alternative 3. Oil and gas and geothermal leasing would be allowed, but subject to no surface occupancy below elevation 4,260 feet (Alternative 3). The impacts to leasing would be the same as Alternative 3.

Locatable mineral activities and mineral material disposal would be allowed as described in Alternative 1. Likewise, mineral material disposal could occur wherever the demand and suitable materials occurred.

Alternative 7 (Preferred Plan)

Though similar to Alternative 5, in this alternative the ACEC is larger than in Alternative 5 (Map 8, Appendix B). Alternative 7 includes part of the Abert Kim WSA within the ACEC. If Abert Rim is not designated wilderness, it would continue to be open to locatable mineral entry, but would be subject to a plan of operation. Abert Rim would continue to be closed to mineral leasing and mineral material disposal. While the northwest ACEC boundary would be shifted to the south, the western boundary would be shifted about one quarter to one half mile to the west, which would cause an overall increase in the area subject to no surface occupancy for oil, gas, and geothermal leasing. Sodium leasing would be allowed south of the line shown on Map 8 (Appendix B), which is approximately 5,000 acres more area than allowed under Alternative 5

Alternative 7 would allow mineral material disposal anywhere outside of the ACEC. The visual resource classifications under Alternative 7 would be somewhat less stringent on mineral activities than Alternative 5. Under both alternatives, the Abert Rim corridor would remain VRM

Class I. Under Alternative 5. the remainder of rhe planning area would be desipnatcd as Class II. Under Alternative 7. the remainder of the lake and ACEC. and part of the rest of the planning area would become Class II, with the remaining part of the planning area being designated as Class III.

Secondary, Indirect, Irreversible, Irretrievable, and Cumulative Impacts

The only known secondary or indirect impact which would result from all alternatives to varying degrees would be related to continued road/transportation system maintenance and/or new construction which would require a long-term demand for gravel and cinder from existing or new pits.

The removal of mineral commodities from the planning area and the time and energy required to it (the amount of which varies by alternative) would be considered an irreversible and irretrievable impact. as these are finite resources.

Compliance with applicable environmental laws and regulations adds costs and delays which result in adverse effects on mineral exploration and development that cannot he avoided. The imposition of discretionary (BLM-mandated) mitigation measurea, such as no surface occupancy or seasonal operation restrictions could result in access times that are too short for effective exploration, development, and/or production. Cumulatively these factors could add extra costs and time delays which could effectively prevent or shut down mineral operations.

Considering the cumulative impacts resulting from the total area available for mineral operations within the planning area. and the restrictions relating to other resource values (except for Alternative 2 which closes the entire planning area to all mineral operations). alternatives 5 and 7 would be the most restrictive to mineral activities. followed by Alternatives 4. 3. and 6. The least restrictive would be Alternative 1.

Paleontological Resource Impacts

None of the alternatives considered are expected to have any significant. adverse impact. including secondary. indirect. irreversible. irretrievable. or cumulative impacts on paleontological resources uithin the planning area.

Air Quality Impacts

Alternative 1 (No Action)

Under this alternative there would continue to be minimal impacts to air quality from natural wind erosion blowing dust. Also. there is some minor dust created by vehicle travel on non-paved roads within the planning area. Air quality would be impacted to a great.3 extent during any construction phase for any type of project in the area. for example a mining operation. mining notice work, mineral exploration work, development of the FEKC Permit. etc. Any new construction would increase the amount of air pollutants deposited into the airshed. The increase in any and all activities will increase the levels of particulate matter and the season of year will be affected by the inversion layer. which will trap these pollutants in layers at various elevations.

The implementation of sodium mining in the area would increase particulate matter in the airshed because of the Increased vehicle travel in the region (truck, railroad. pipeline maintenance etc...) and potentially more exposed lake bottom soils. salts. sand. and particulates available for suspension by wind currents. Other air pollutant levels (i.e. smoke, hydrocarbons, carbon monoxide) could increase ii development or recreation activity levels increase in the area above current conditions.

Alternative 2

This alternative would cause minimal impacts to the air quality in the area and would probably be similar to existing conditiona.

Alternatives 3, 4, 5, 6, and 7 (Preferred Plan)

Since mineral and other development activities would be allowed under these alternatives (but would be required to meet Goal 1, objective b. regarding lake levels), the impacts would be expected to be similar to Alternative 1, with one exception. Sodium mining under Alternative 1 could significantly lower lake levels for longer periods of time compared to Alternatives 3-7. This would result in more exposed soil. sand. salt, and particulates being available for suspension by wind currents than under Alternatives 3-7.

Secondary, Indirect, Irreversible, Irretrievable, and Cumulative Impacts

No such impacts to air quality were indentified for any of the alternatives.

Aquatic Community Impacts

This impact discussion was developed with of one basic underlying assumption; that any and all substantive impacts would result from any action that modifies the Lake Abert water regime and/or- water chemistry outside of the range of presently occurring conditions. It must be understood, however, that investigations are still in progress both to define the lake's aquatic communities and to understand the dynamics of these communities with regard to environmental changes.

Alternative 1 (No Action)

This alternative allows for the possibility of mineral extraction (sodium mining) activities at Lake Abert, which is considered to be the only action likely to occur within the life of this plan that would have significant impacts upon the aquatic community in Lake Abert. This mineral development would almost assuredly result in a major increase of consumptive water use at Lake Abert, with resultant impacts on the lake levels and water chemistry. Except as noted and where known. the lake's aquatic community is being considered here in its aggregate rather than its individual components,

A jointly funded (BLM/ODFW) research project was completed in 1994, in an attempt to determine impact thresholds of changing water and water chemistry levels on Lake Abert's aquatic community, The summary of this research (Herbst, 1994) is presented below:

"Based on research results. ecological limits can be defined as follows:

1. Optimal salinity conditions for benthic productivity are in the range of 25 - 100 grams per liter (g/L) (equal to a lake level range of about 4.25 I to 3.25X feet).

2. Salinities in excess of 100 - 150 g/L are critical in that exposure for more than 2 years could threaten sustained productivity and hinder recovery.

3. As the salinity level exceeds 100 g/L, the potential for alkali fly production is reduced due to constraints related to body size (adult emergence, survival and reproduction), food in the form of some benthic algae and species diversity may be limited, and littoral rock habitat area is largely eliminated below the corresponding lake level. All these factors threaten the capacity of the lake to support wildlife.

4. At salinities below 25 g/L, the community composition changes and the alkali fly becomes less abundant under stress of competition and predation from other invertebrate colonists.

5. Lake levels in the range of approximately 4,252 to 4,256 feet maximize the cover area of cobble-sized basalt rock, most used by alkali fly larvae and pupae as benthic aquatic habitat. Vegetation cover and limestone deposits also are greatest within this elevation range. providing further habitat for attachment and protection."

Thus, any likely development action that would increase the number of years that the lake level will fall below the critical 4.250 feet elevation threshold (and salinities above the critical 100 - I SO g/L level), would have adverse impacts on the lake's aquatic community commensurate with the magnitude of the water appropriation authorized for that development. As this possible future level of additional water appropriation is a unknown, several possible levels must be discussed to the extent current information allows.

The most severely impacting would be any new water appropriation that keeps the level of the lake below 4,250 feet and the lake salinity above 150 g/L. At this level, the research by Herbst (1994; Herbst and Castenholz, 1994) and ongoing work by Dr. David Mason (pers. comm.) indicates that aquatic invertebrate reproduction in the lake is severely curtailed and may cease if these conditions persist for any extended period. Conversely, the least impacting new water appropriation would be one that does not increase the number of years of critically low lake level and excessively high salinity.

It is between these two extremes that impact analysis becomes less definitive. because of a lack of data. For example, for brine shrimp, Cnnte and Conte (1988) estimated an annual production of 14.5 million pounds during their study period (1980- 1982), a time of moderate salinities (50 to 75 g/L). No comparable estimates are available for the algae or alkali fly biomass. Neither are any data available for algae, shrimp or fly total production during years of more or less saline conditions, nor for alterations in total production resulting from widely varying salinities,

Any additional appropriation of water (or other hydrological alteration of the system) that increases the number of years that the lake is below the critical 4,250 feet elevation will

have an adverse impact upon the phytoplankton and aquatic invertebrate populations in the lake. The growth of filamentous green algae (Ctenocladus circinnatus) is almost completely inhibited at salinities above 150 g/L (Herbst and Castenholz, 1994). Alkali fly production is also severely curtailed at this salinity level. as well as by the virtual lack of the stabilizing rocky habitats essential for attachment and protective cover for the fly pupae (Herbst. 1994). The magnitude of those adverse impacts, as a function of both lower lake levels and increased salinities. will be in direct I-elation to the number of years that the lake level is below 4,250 feet in elevation. Any year in which the lake is below this level would result in conditions where productivity is likely to be only 10% or less of the potential production at levels above 4.25 1 feet (Herbst. pers. comm.).

From this decline in the aquatic community productivity associated with critical salinity and lake levels, the impacts of a hydrological alteration of the Lake Abert system can be estimated. For example, a project authorized that would increase. over current conditions. the number of years that the 150 g/L salinity (or 4.250 feet elevation) threshold is reached from two to eight over a twenty year span, would result in an aquatic community production loss of about 30% for that twenty year period. This is a conservative estimate. in that the productivity impacts for consecutive years of critical salinities are compounded rather than simply additive; and a time lag in productivity rebound from critical salinities may also exist.

It is also not possible, at this time, to estimate what impacts may be associated with major changes in the lake's water chemistry due to potential mineral extraction developments. The removal of large quantities of carbonates and bicarbonates should shift the water solute balance to some higher relative proportion of chlorides and sulfates, with sodium likely remaining the predominant cation. Neither the extent of this possible anion shift nor its physiological impact on the lake's aquatic populations and dependent wildlife communitica are known.

Alternative 2

As the area would be closed to all mineral leasing under this alternative. removing the likelihood of any additional significant consumptive lake water use. no adverse impacts are anticipated.

Alternatives 3, 4, 5, 6, and 7 (Preferred Plan)

It is assumed under these alternatives that mineral leasing would occur to varying degrees, but the lake level and total dissolved solids (salinity) restrictions listed under Goal 1 would apply and would, therefore. not allow changes that would be any more or less impacting upon the lake's aquatic community than those presently occurring. Thus. no significant, adverse aquatic impacts are anticipated from any of these alternatives.

Secondary, Indirect, Irreversible, Irretrievable, and Cumulative Impacts

Under Alternative 1, the principal secondary impacts would be to the migratory and breeding bird population utilizing the aquatic community production. This is described in the Wildlife Impacts section of this chapter. The indirect, Irreversible, irretrievable, and cumulative impacts of this alternative are not known at this time. No such impacts have been identified for Alternatives 2. 3. 4, 5. 6, or 7.

Vegetation Impacts

Alternative 1 (No Action)

No specific direction was provided in the High Desert MFP related to vegetation management within the planning area (other than forage allocation). Livestock grazing prior to the Taylor Grazing Act of 1934 was unregulated. Extensive. season-long grazing resulted in heavy use near water sources which led to changes in vegetation composition. Shrubs. annual grasses, and annual forbs increased while perennial grasses decreased. Continued livestock grazing around water sources such as springs and riparian areas would prevent some plant species, which are sensitive to grazing. from increasing or reestablishing. However, the planned exclusion of livestock from most of the natural water sources and part of the shoreline/riparian zone on the western shore of the lake would allow some plants sensitive to grazing an opportunity to increase in number or reestablish An increase in litter and shading in this area would lead to a change in relative composition and diversity. There would also be an unquantifiable increase in the potential wildfire risk and related vegetation impacts in this exclosed area because of the expected increase in fine fuels.

In the prehistoric past. fire was an important part of the ecological system that created and shaped plant communities in the area. In more recent times, fires have generally been suppressed. Under this alternative, limited fire suppression would continue. A fire management plan would only be developed if needed and an important assumption under this alternative is that this is not likely to occur in the near future. if at all. Continued fire suppression and the resulting build-up of biomass could lead to increased likelihood of hot.

intense wildfires. Over the past 30 years, several large scale wildfires have occurred in the planning area. Such fires have a significant, negative effect on vegetation by destroying the seed source within the soil and underground plant roots and could deplete soil nitrogen and carbon levels. Use of heavy machinery to fight such fires also removes vegetation and causes soil disturbance and erosion. These, in turn, open up bare soil areas for weed invasion or which require reseeding. Several major fire rehabilitation seedings were done in response to these wildfires and emphasized the use of non-native species, primarily crested wheatgrass. This has contributed to a loss of native plant communities. Future such wildfires could require reseeding, but preference would be given to the use of native species to the extent practicable. The on-going noxious weed control program would continue try to control existing and and prevent future weed infestations as a means of preventing further degradation to existing plant communities.

The existing plant communities in the planning area are a reflection of these historic changes and, under continuation of current management, would not be expected to change significantly from their current condition during the life of the plan (10-15 years).

Alternative 2

Through the planned use of fire or wildfire management, grazing regulation, exclosures, and reestablishment of native species, the diverse plant habitats (wetlands, riparian, and upland habitats) would generally be maintained in their present seral stages, but management would also allow for some successional change or other opportunities to increase diversity. The effects of the planned riparian exclosure on the west shore of the lake would be similar to that described under Alternative 1, though the risk of wildfire in this area would be reduced by a more active prescribed burning program. The effects of the on-going noxious weed control program would be similar to that described under Alternative 1. All habitats would generally be managed in a manner that does not cause significant disruption of the ecosystem, lead to the listing of any plant species as sensitive, threatened, or endangered, or cause species extinction.

This alternative calls for more active fire management in the planning area, including prescribed fire. This would require a future analysis of the prehistoric natural fire regime of these plant communities in order to determine proper management of prescribed and wildfires. A properly designed fire program will likely result in more frequent, but less intense fires covering fewer acres than recent wildfires (described under Alternative 1). In upland habitats this would tend to reduce the vigor or kill wood) species such as sagebrush and stimulate the growth of grasses and forbs, rather than destroying all plant\. In shoreline and wetland areas this would reduce biomass and create openings in dense vegetation stands. This would, in turn contribute to the overall diversity of vegetation types by creating patches of different vegetation types within larger vegetation complexes.

Alternatives 3, 4, 5, and 7 (Preferred Plan)

Impacts to vegetation under these alternatives would be similar to Alternative 2.

Alternative 6

Impacts to vegetation under this alternative would be similar to Alternative 1.

Secondary, Indirect, Irreversible, Irretrievable, and Cumulative Impacts

Secondary and indirect impacts from resulting human recreational activities (such as OHV use and human use of trails) over time under all of the alternatives could damage lakeshore and upland plant habitats. Examples of such impacts include ground compaction on or near trails, trampling or displacement of plants by OHVs, foot, or hoof action, and possible destruction of the cryptogrammic crust between established perennial, plants. The exact magnitude of these impacts cannot be determined.

Failure to control noxious weeds, as described under all alternatives, would cause a severe, adverse cumulative loss of native plant habitats over time.

Mining of sodium compounds, as described under alternatives I, 3, 4, 5, 6, and 7 may change the water chemistry of the lake over time, which might be beneficial for the total diversity of the lake plants, such as algae, and might increase the diversity of the lakeshore wetland plants, Monitoring (Appendix D) would be performed to determine if such changes occur and if they are beneficial or detrimental.

Any human-caused activity which lowers lake levels beyond what occurs naturally over the long term, could cause a cumulative, negative impact to vegetation due to an increase in blowing sand, alkali, and other substrate particles damaging and/or killing plants by abrasion. Though this impact occurs naturally during periods of low water, there would be additional impacts of a cumulative nature, the exact magnitude of which is not known. The saltgrass/saltbrush communities located northeast of the lake have a

demonstrated ability to withstand such abrasion. Other plant communities surrounding the lake are not adapted to this and could be reduced by abrasion and desiccation.

The plant communities around Lake Abert are resilient communities that arose in the Great Basin over the last 10,000 years. They grow where they are because of a complex relationship of soil. climate and plant histories Irregular rainfall and intense cold or heat are tolerated: however, each plant community has a set toleration limit for alkalinity and acidity. Mining action. such as removal of sodium compounds from the lake. would likely change the balance that has developed over the last 10,000 years There is a strong possibility that less alkaline water in the lake would allow other, more competitive weedy species to invade and replace the native vegetation along the shoreline Such a trend could bc irreversible or irretrievable.

Livestock grazing could have secondary, indirect. and cumulative impacts on the wetland and upland plant communities under all alternatives. These impacts relate to the effect of hoof action and trampling on the plant community understory. primarily lichens and mosses This understory component is important in the nitrogen cyling and water holding capabilities of the soil. The extent of these impacts can not bc quantified. but would vary depending upon season of use. extent of grazing. and pasture rotation, and would be relatively equal for all alternatives.

Rangeland Impacts

Alternative 1 (No Action)

Under this alternative, no impacts to livestock management would be expected beyond those already addressed in the Lakeview Grazing Management EIS (BLM, 1982) and Record of Dcoiaion (ROD) of 1983 and subsequent-site specific EAs. Monitoring of USC and evaluation of management would continue under current policy and guidelines. Future bnanges in management or forage allocation that are outside of those identified in the EIS and ROD would require evaluation in site-specific NEPA documentation.

Actions which may be implemented in the future under the EIS and ROD. which have not been implemented to date include: additional pipelines (up to 10 miles) will be needed to improve distribution of grazing in existing seeded areas and allocating additional forage (up to 200 AUMs) to livestock in allotment 0424 based on historical allowance of temporary nonrenewable preference. In addition. an exclosure fence (approximately 4 miles) on the west snore of the lake is currently in the planning stage in allotment 0427 Special status plant species management activities would require future exclosure fence construction and maintenance. This fencing would require additiona! funding and manpower to construct and maintain.

Currently, livestock grazing has been removed frorn Abert Rim (part of allotment 0400). The forage allocation there was relocated to seedings west of the lake as part of the Paisley Commons agreement. Available forage on the rim is currently used solely by wildlife. hut in the future some could be allocated back to livestock through the use of temporary nonrenewable permits. The likelihood of this occurring is low.

Increased use of roads for recreational. mining. mineral extraction, rights-of-nay. or other uses may increase the need for cattleguards to assure control of livestock movements. Installation of cattleguards on or adjacent to existing roads is considered to be an activity of such minimal Impact that it is listed as a categorical exclusion in Departmental Manual 516 DM 2, 5.3 G(2). There is currently very little restriction on the use of OHVs within the planning area This would allow ranchers the continued ability to move and gather livestock in the area using such vehicles. Other activities described in Alternative I should not have additionai impacts on livestock grazing.

Alternative 2

This alternative includes potential for additional exclusion of livestock grazing on limited areas should it prove detrimental to any of the relevant and important resource values Though this would most likely occur around springs or at the margin of the lake, it could occur anywhere in the planning area. Excluding livestock from springs may increase the need to install the pipelines discussed under Alternative 1. Depending on the size of the exclosures, minor adjustments would probably have to be made to permitted use in allotments where those exciosures occur. It is anticipated that adjustments would be limited to 50 to 100 AUMs and would be made in the allotments in which the exciosures occur.

The cxclosure fence on the west shore (as discussed under Alternative 1 j would be constructed and maintained under this alternative. Additional funding and manpower would be required to construct and maintain all exclosures. but this is nor expected to be significantly different than Alternative 1.

All available forage on Abert Rim would be officially allocated to wildlife. Other impacts to livestock grazing would be the same as listed in Alternative 1.

OHV use would be completely restricted or limited to existing roads and trails under this alternative. This would require ranchers to gather or move livestock within the ACEC using horses rather than OHVs.

Alternatives 3, 4, 5, and 7 (Preferred Plan)

Impacts to livestock management under these alternatives would be essentially the same as those listed in Alternative 2. However OHV use would be limited to existing roads and trails within a much smaller ACEC area compared to Alternative 2. Moving or gathering livestock within the ACEC would require the use of hot-ses. Outside the ACEC boundary OHVs and other vehicles could still be used. Alternative 6

Impacts to livestock management would be essentially the same as those listed in Alternative 1.

Secondary, Indirect, and Cumulative Impacts

Increased visits to the area by recreationists and other users all alternatives would increase the need for maintenance of cattleguards and fences. There would also be the potential for increased vandalism which would increase maintenance and replacement costs for water troughs, storage tanks. and generators at well sites. This, in turn, would cause an increase in time needed to inspect and repair range improvements. This could increase by as much as 10 work days per year. shared between the BLM and affected permittees. at an estimated cost of $200 per day, including time and vehicle use. This is in effect an additive or cumulative impact when compared to other staff range management responsibilities within the Lakeview Resource Area.

Irreversible and Irretrievable Impacts

No irreversible and irretrievable impacts to livestock grazing are expected. However, manpower time and costs for construction, inspection. and maintenance of range improvement projects would be considered irretrievable resources, but would be relatively equal under all alternatives.

Special Forest Product Impacts

Special forest products, as discussed within this plan amendment, are not the same as Native American traditiona) uses or collection of cultural plants. Though some of the alternatives may restrict the personal or commercial collection/harvest of special forest products, none of them should be construed as restricting the ability of Native Americans to collect/harvest culturally important or traditionally used plants. These rights are protected by law or treaty. Refer to cultural impacts for more information on this topic.

Alternatives 1 (No Action) and 6

tinder these alternatives, the entire planning area, except for Abert Rim WSA, would remain open to collection of special forest products. The main product available in portions of the uplands in the area is juniper, but this is not very dense and has not been collected in any great quantity, if at all. It is not likely that the demand for juniper within the planning area would increase during the life of this plan. Christmas tree and mushroom collection have not been occuring in the planning area, nor are they likely to occur in the future. No designated firewood cutting areas occur in the planning area or would be impacted by this alternative.

Alternatives 2, 3, 4, 5, and 7 (Preferred Plan)

Under these alternatives, the entire ACEC area would be closed to collection or harvest of special forest products. Abert Rim WSA would remain closed. This is not expected to be signficantly different than Alternatives 1 and 6, as current collection/harvest is minimal or non-existent.

Secondary, Indirect, Irreversible, Irretrievable, and Cumulative Impacts

No such Impacts are expected to occur related to special forest product availability for any of the alternatives considered.

Wildlife Impacts

The Wildlife Impacts section of this chapter was developed within the context of several sets of assumptions and/or analysis parameters.

1. Potential Minerals Exploration and Development (see Appendix C).

   - No significant oil and gas exploration and/or development will occur within the life of this plan.

- Limited geothermal resource exploration may occur. but no major geothermal development will happen during the life of the plan.

- No significant locatable minerals exploration and/ or development will occur during the life of this plan.

- All extraction of salable materials (sand and gravel) will be frotn or in the immediate vicinity of existing pits.

- Sodium exploration and developrnent could occur to an extensive and intensive level, including the use of salable materials in any development phase.

2. Wildlife Habitats and Populations

- For the waterfowl and waterbird component of the total wildlife population using Lake Abert and environs. the only major impacts associated with any alternative will be those that impact either the level of the lake and/or the water chemistry. Thus, whether or not an ACEC designation IS made, or just what the boundary of that designation may or may not be. are of consequence to impact analysis only so far as they have bearing on future lake levels and/or water chemistry.

- No intensive, active management program for either wildlife populations or habitats is considered to be inherent to any of the alternatives. Impact analysis. therefore, will focus upon the possible impacts of other resource uses and allocations on the wildlife resource values present at Lake Abert.

Alternative 1 (No Action)

Of all of the possible resource uses and/or allocations (change factors) discussed in Chapter 2 for this alternative, only three are considered to have a major potential for causing impacts on the wildlife population and habitats at Lake Abert: 1) leasable mineral extraction, 2) livestock forage allocation along Abert Rim. and 3) granting rights-of-way.

Reptiles and Amphibians

The potential impacts of this alternative on reptiles and amphibians are unknown.

Mammals

California Bighorn Sheep and Mule Deer. Other than some limited disturbances likely to be caused by increased human activity in the area, it is unlikely that either minerals extraction or the granting of additional rights-of-way will have major impacts on the mule deer or California bighorn sheep populations in the area. Reauthorizing livestock grazing, however, along Abert Rim (last used in I98 1) could lead to serious impacts on the existing California bighorn sheep herd. This could also conflict with existing tnule deer herds. depending on the actual season of livestock use. This could affect both species ability to increase in numbers and expand ranges.

The current official allocation for the bighorn sheep herd is 180 bighorn sheep months of use (36 Animal Unit Months: see glossary), but the actual use is between 900 and 1,000 bighorn sheep months (180 - 200 Animal Unit Months). As the dietary overlap between cattle and bighorn sheep is nearly total, any reintroduction of cattle onto Abert Rim would likely result in a concomitant decrease in bighorn sheep use; or at least a decrease in potential use.

Impacts to mule deer center on the season of use of any reintroduction of cattle. Summer and fall use, which would likely be the case, could lead to severe over utilization of the bitterbrush (critical deer winter forage) community; already greatly impacted by recent wildfires. Both a decrease in the quality of the winter deer habitat and in the total number of deer that it could support are anticipated impacts of returning cattle to the rim.

Pronghorn Antelope. Of the three change factors assumed for this alternative, mineral extraction activities on and near the southwest portion of Lake Abert could have some impacts on pronghorn antelope use in the area. The western lakeshore and adjacent uplands are used periodically throughout the year. but appear to be important late-summer and early-fall water and forage areas; especially during drought years. This area also receives some winter use by pronghorns. Human disturbances during mineral exploration and development, as well as the physical loss of habitat to any developments constructed, will likely displace the current pronghorn use to another area, if available.

Predators. Cougar and bobcats are very susceptible to displacement in response to human disturbances. Any future actions authorized that increases the amount of disturbance will decrease the area's suitability as cougar and bobcat habitat. Additionally, the impacts described above for mule deer and California bighorn sheep would have a secondary impact on the cougar population by reducing the prey base.

For the other predator species found in the planning area, some displacement could occur with future mineral developments; both from a physical loss of habitat and a prey base displacement aspect. Any such impact to the coyote, badger and long-tailed weasel populations. however, is expected to be minimal.

Rodents and Lagamorphs. The physical loss of habitats associated with anv major surface disturbing minerals development would, essentially, eliminate the more sedentary rodent species (mice, voles and ground squirrels) from the immediate area of the development. For the other species. displacement may or may not happen. depending upon the intensity and duration of the human disturbances

Birds

Waterfowl and Shorebirds. The use of Lake Abert by waterfowl and shorebirds. both migratory and nesting. is primarily determined by the aquatic invertebmte population present in the lake. This. in turn, is dependent upon the level of' the lake and the chemistry of the water (total dissolved solids and relative ion concentrations). Any effort to analyze the impacts associated with this, or any other alternative relative to waterfowl and shorebird use at Lake Abert, must focus on anticipated changes in the water chemistry and lake level. from whatever cause.

As detailed in the Aquatic Communities Impacts section of this chapter. *recent* investigations (Herbst. 1994) have determined several of the water chemistry (and thus lake level) parameters within which the aquatic community functions. Since the productivity of the aquatic communities is directly related to use of the lake by waterfowl and shorebirds. a brief restatement of these parameters or ecological limits is necessary for this impact analysis. They are:

- Optimal benthic productivity = salinities ranging from 25 - 100 g/L (equal to a take level range of about 4,251 to 4,258 feet)
- Exposure to salinities in excess of 100 - 150 g/L for mot-e than 2 years are critical in that *it* could threaten sustained productivity and hinder recovery of the benthic community
- The potential for alkali fly production (the primary waterfowl and shorebird food source) is reduced as salinity level exceeds 100 g/L and the lake level drops below 4,25 I feet.

In correlating water withdrawal to lake level, a detailed analysis of potential water withdrawals from the Lake Abert system was conducted by ODFW (Keister, 1992) in conjunction with a wildlife habitat development proposal at the mouth of the Chewaucan River. This report found that for the 64 years for which data were available (1926 - 1990), there were 25 years in which the lake level was below the critical threshold level of 4.250 feet. and 27 years within the optimum range of 4,252 to 4,258 feet. A hydrologic model was developed to assess the impacts of further water withdrawals, and it was found that:

"When different withdrawal rates were analyzed in this manner. it was found that an annual withdrawal of at least 3.700 acre-feet was necessary to produce a significant increase in the number of years the lake would have been below critical (from 25 years without the withdrawal to 27 years with it). There would also have been one more dry or nearly dry year and the maximum lake level would have been reduced from 4,260.08 feet to 4.259.2 I feet. The number of years within the optimum range (4.252 - 4.258 feet) would have been the same (27 years). It would be possible to withdraw 4.400 acre-feet without having an effect on the number of dry years but would have an insignificant (as defined) increase of I in the number of years below the critical level (4.250 feet). There would be an increase of 2 in the number of years within the optimum range."

This analysis was important in leading to an agreement whereby only an additional [2,268] acre-feet/year of water bound for Lake Abert was appropriated; allowing the project to proceed without a significant impact on the fake levels. This leaves, assuming that the model is an accurate predictive tool. only an additional [2,132] acre-feet/year that could be appropriated for any use without a significant increase in the number of years that the lake would fall below the critical 4,250 feet elevation.

Under this alternative, a minerals extraction development project on Lake Abert is possible, with a consequent consumptive use of some additional volume of water above that already allocated. If the volume used is below the [2,132] acre-feet/year level determined by Keister as remaining for appropriation without significant impacts, then such mineral extraction development could proceed without major impacts to the waterfowl and shorebird populations using the lake.

It is. however, extremely unlikely that any feasible extraction development could be designed around this minimal amount of water; unless. perhaps, augmented with ground water. Thus, any likely deveiopment will increase the number of years that the lake level will fall below the critical 4,250 feet threshold elevation (and salinities above the critical 100 - 150 g/L level), commensurate with the magnitude of the water appropriation authorized for that development. As this possible f'uture level of additional water appropriation is a unknown, several possible levels must bc discussed to the extent current information allows.

The most severely impacting would be any new water appropriation that keeps the level of the lake below 3.250 feet and the lake salinity above I SO g/L. At this level, the research by Herbst (1994) and ongoing work by Dr. David Mason (pers. comm.) indicates that aquatic invertebrate reproduction in the lake is severely curtailed and may cease if these conditions persist for any extended period. Without the food base, use of the lake by waterfowl and shorebirds would end. except. possibly. as a resting area during

migration. Just where the 2 to 4 million bird-days of use would relocate, if that is possible, is not known. This would result in the total loss of habitat for approximately 1,000 nesting pairs of American avocets, 150 - 300 nesting pairs of western snowy plover, and the loss of the migratory/staging habitat supporting the species array and numbers (4 to 5 million bird-days of use) discussed in Chapter 3.

The least impacting new water appropriation would be one that did not increase the number of years of critically low lake level and excessively high salinity. Impacts to the waterfowl and shorebird populations at this level of new appropriation would be indistinguishable from those occurring because of the natural fluctuations in lake level.

It is between these two extremes that impact analysis becomes subjective, because of a lack of data. For example, for brine shrimp, Conte and Conte (1988) estimated an annual production of 14.5 million pounds during their study period (1980-1982), a time of moderate salinities (50 - 75 g/L). Of this amount, they estimated that about 0.01% was consumed by waterfowl and shorebirds. No comparable estimates are available for the alkali fly biomass, which is the major dietary invertebrate of these birds (Boula and Jarvis, 1984). Neither are any data available for shrimp or fly production during years of more or less saline conditions, nor for alterations in production resulting from widely varying salinities.

Any action that increases the number of years, over existing conditions, that the salinity of Lake Abert exceeds 150 g/L, or the elevation of the lake surface drops below 4,250 feet, will have an adverse impact on the aquatic invertebrate population in the lake. As detailed under the Aquatic Communities Impacts for Alternative 1, in this chapter, the decline in total aquatic community productivity would be 90% each year the critical salinity/lake level threshold is reached. Exactly how this decreased food base equates, or may equate, to decreased waterfowl and waterbird use of the lake is not known.

It is not known whether or not a 50% increase in the number of years of critically low lake levels equates to a decrease of 50% in the amount of bird use; or any other percentage, for that matter. In fact, all that can be said with certainty is that a continuation of the current water regime (no increase in the number of critically low water years) in the lake will have no impacts beyond those naturally occurring in response to varying water conditions; and an increase in the number of critically low water years will have an adverse impact on the waterfowl and shorebird populations using the lake somewhere between slight and catastrophic. Data that may fill this analysis void is currently being gathered, but completion of the necessary research and inventories is several years in the future.

It is also not possible, at this time, to estimate what impacts may be associated with major changes in the lake's water chemistry due to potential mineral extraction developments. The removal of large quantities of carbonates and bicarbonates should shift the water solute balance to some higher relative proportion of chlorides and sulfates, with sodium likely remaining the predominant cation. Neither the extent of this possible anion shift nor its physiological impact on the lake's aquatic populations and dependent wildlife communities are known.

The human disturbance factor and physical loss of habitat, including wetlands (plant sites, evaporation ponds, dikes, haul roads, etc.) associated with minerals development could have adverse impacts on the use of Lake Abert by waterfowl and shorebirds. The southwestern portion of the lake and shoreline is, on both a seasonal and daily basis, an important foraging area for shorebirds and nesting urea for American avocets. This quarter of the lake tends to thaw earliest in the spring and warm faster than other parts of the lake; giving rise to early hatches of alkali flies which attract the first migrant shorebird flocks of the year. Beyond this early season use, the north-northeast winds common on the lake tend to concentrate aquatic invertebrates along and near this segment of shoreline throughout the summer. Disturbance and structural developments could render this part of the lake unusable to migrating and nesting shorebirds.

Both as a collateral action to mineral development and as a separate action, the granting of rights-of-way for additional major electric transmission lines across the existing waterfowl and shorebird flight paths would lead to a major increase in collision mortality. This is a well documented potential impact and has led, in the past, to the relocation of transmission lines away from major waterfowl and shorebird flight paths in the Summer Lake, Lake Abert, Goose Lake and Warner basins locally, and in the Klamath and Harney basins regionally.

Raptors. The Impacts of this alternative, in all of its varied and undefined possibilities, is not expected to be of major significance on the area's raptor population. There could be a slight to significant diminution in the waterfowl and shorebird prey base, but it is unlikely that this would impact the one or two pairs of peregrine falcons suspected to be present. All of the other raptors present make substantially more use of rodent and lagamorph species than birds; a prey base for which significant impacts are not anticipated.

Alternative 2

For this alternative, no negative impacts to the wildlife resources are anticipated. The potential for major positive impacts is present, however, in that all of the possible negative impacts described for Alternative 1 would not happen.

Reptiles and Amphibians

The impacts of this alternative on reptiles and amphibians are unknown at this time.

Mammals

California Bighorn Sheep and Mule Deer. The potential for competition with livestock for forage would be removed on Abert Rim. allowing full expansion by bighorn sheep and mule deer into available and suitable habitats in that area.

Pronghorn Antelope, Predators, Rodents, and Lagamorphs. No negative impacts anticipated to any of these species

Birds

Waterfowl and Shorebirds. The possible negative impacts outlined for Alternative 1 would not occur.

Raptors. No negative impacts are anticipated.

Alternatives 3, 4, 5, and 7 (Preferred Plan)

Reptiles and Amphibians

The impacts of these alternatives on reptiles and amphibians are unknown at this time.

Mammals

California Bighorn Sheep, Mule Deer, Pronghorn Antelope, Predators, Rodents, and Lagamorphs. The impacts to these species under these alternatives would be similar to Alternative 2.

Birds

Waterfowl, Shorebirds, and Raptors. Since these alternatives would have restrictions placed on human-caused actions affecting lake levels and total dissolved solid concentrations that are expected to be within the natural range of variability. the impacts to these species would be similar to Alternative 2.

Alternative 6

Reptiles and Amphibians

The impacts of this alternative on reptiles and amphibians are unknown at this time.

Mammals

California Bighorn Sheep, Mule Deer, Pronghorn Antelope, Predators, Rodents, and Lagamorphs. The impacts for these species would be the same as for Alternative 1.

Birds

Waterfowl, Shorebirds, and Raptors. The impacts for these species would be the same as for Alternative 2.

Secondary, Indirect, and Cumulative Impacts

The only secondary, indirect, or cumulative impacts identified under Alternative 1 are associated with the migratory and breeding waterfowl and waterbird populations utilizing the aquatic food base produced at Lake Abert. During the spring migration northward to Arctic nesting areas, several tens of thousands of birds make a feeding stop at Lake Abert for varying periods of time. Waterfowl research has shown that the nutritional condition (body fat and protein reserves) of the breeding females upon arrival at the nesting grounds has a direct relationship to nesting success. Females with body reserves sufficient to begin egg laying Immediately upon arrival have a much higher probability of fledging their broods than do females that must build the necessary body reserves after reaching the nesting area. If salinity and/or lake level alterations at Lake Abert seriously reduce the food base, those bird currently building pre-nesting protein and lipid reserves there will have reduced chances of successfully nesting. Reduced nesting success by the portion of the Pacific Flyway population relying on Lake Abert could have indirect and cumulative impacts upon the flyway population as a whole. The magnitude of those impacts cannot currently be defined.

Similarly, southward migrating waterfowl and waterbirds make feeding stops at Lake Abert in the late summer and fall on their journey to wintering areas. The aquatic food base at the lake again plays a significant nutritional role in rebuilding the body weight and reserves lost to the rigors of Arctic nesting. It is unclear just how important this pre-winter conditioning is to overall winter survival of the birds; but, considering the general loss and degradation of the California and Mexican wintering areas, is likely very

crucial. Again, the magnitude of indirect and cumulative impacts upon the Pacific Flyway populations arising from the reduction or loss of the Lake Abert feeding stop are unknown

There is one additional way that the reduction or loss of the Lake Abert aquatic community tood base could have an indirect and cumulative impact throughout a fairly extensive portion of the Pacific Flyway east of the Cascades. There are some very serious indications that the waterfowl and waterbird use of the major wetland complexes in this region (Malheur Basin. Summer Lake-Chewaucan Marsh-Lake Abert, Warner Basin, Upper Pit River Basin, etc.) is intricately inter-related; particularly with respect to varying water conditions in these complexes. For example, the early 1980s flooding in the Malheur Basin drastically reduced the nesting and migratory use there. At the same time, and perhaps consequently, the Warner and Upper Pit River Basins saw a dramatic increase in this use. At Lake Abert, American avocet numbers normally show a spring migration peak (6-10,000), a stable nesting population of around a thousand pairs during the summer. and another migration peak (30-40,000) in the fall. During region-wide droughts. as is currently being experienced. little nesting habitat is available anywhere and the avocet numbers remain high (20-30.000) throughout the summer. It would appear that Lake Abert is providing a refuge for the region's avocets that were unable to find suitable nesting areas. as well as supporting the normal nesting population.

There are many more examples, but it appears that the birds making use of this part of the flyway have adapted then behavior to the localized weather vagaries and will alter long held migratory and/or breeding patterns in response. The removal or serious alteration of Lake Abert from this region-wide picture could have serious impacts to the flyway waterfowl and waterbird populations. Data are lacking for any quantification of the magnitude of this potential impact.

No such impacts were identified for Alternatives 2, 3, 4, 5, 6, and 7.

Irreversible and Irretrievable Impacts

It is not known. at this time. whether or not the impacts associated with Alternative l would be irreversible or irretrievable. No such impacts were identified for alternatives 2, 3. 4, 5, 6. and 7.

Special Status Species Impacts

Plants

Alternative 1 (No Action)

Under this alternative, management would remain the same as currently outlined in the High Desert MFP. At present, there are no special status plant species in the planning area, so management would not be pro-active. The anticipated fence on the west side of the lake would keep livestock from the shore and further protect the extirpated desert allocarya site. This species could be reintroduced, but it would be a low priority.

Alternative 2

Under this alternative, management would allow the reintroduction of sensitive plant species that were in the area historically. This would include reintroducing the state sensitive desert allocarya, which was extirpated from the area by livestock in the recent past, within an enclosure. This enclosure would be further protected by a proposed riparian exclosure fence on the west side of the lake. At present, it can still be found in the Warner Valley (which would be the most likely seed source). Other sensitive plant populations would be actively managed in a manner that maintains or enhances the species and protects it from being listed as threatened or endangered.

Alternatives 3, 4, 5, and 7 (Preferred Plan)

Under these alternatives, management would allow the reintroduction of the state sensitive desert allocarya at its historic location. Seeds would be collected in a similar manner as in Alternative 2. The existing exclosure may have to be reinforced. Management for the species would focus on protection and prevention from being listed in the future as Federally threatened or endangered. Management measures would include requiring any new project proposals such as rights-of-ways or mining operations to avoid any direct or indirect impacts on sensitive species and their habitats.

Alternative 6

The impacts of this alternative on sensitive plant species would be the same as Alternative 1.

Secondary, Indirect, and Cumulative Impacts

Mining (such as heavy machinery. pipelines), grazing (consumption of plants and hoof action). and recreation disturbances (such as OHVs or people walking) in or near sensitive plant sites would have to be mitigated by exclosures or other means of restricting activities in the growing area. These activities would have to be monitored for permanent or cumulative impacts on the plant species (Appendix D).

Irreversible and Irretrievable Impacts

The BLM policy for state sensitive plants is to treat them as it they have Federal status and proceed with monitoring and protection so that they do not become Federally listed. If desert allocarya is not reintroduced (Thus providing an alternative survival site) it is at greater risk of being extirpated from Lake County and the State of Oregon Loss ot this local gene pool would bc irreversible and Irretrievable

Animals

Alternative 1 (No Action)

With the exception of those species discussed individually (California bighorn sheep) or as a group (shorebirds = western snowy plover, black tern, long-billed curlew; raptors = peregrine falcon) in the wildlife impact section, data are not available to support any projected major impacts arising from this alternative.

Alternative 2

The possible negative impacts to special status animal species outlined for Alternative 1 would not occur. Extirpated species known from the area historically. which later become added to the special status list. could be reintroduced under this alternative. This could prevent such species from being Federally listed and contribute to the overall biological diversity of the area. However. no such species are currently known from the area.

Alternatives 3, 4, 5, and 7 (Preferred Plan)

It is assumed that these alternatives would have restrictions placed on human-caused actions affecting lake levels and total dissolved solid concentrations that are expected to be within the natural range of variability. Therefore, the impacts under these alternatives would be similar to Alternative 2.

Alternative 6

The impacts would be similar to Alternative 1.

Secondary, Indirect, Irreversible, Irretrievable, and Cumulative Impacts

These impacts would be as described under the wildlife impacts section.

Special Management Area Impacts

Wilderness

The wilderness interim management policy (BLM, 1987) precludes any activities from occurring within the Abert Rim WSA boundary that would impair wilderness values, other than mineral entry under the Mining Act of 1872. (Noxious weed and animal damage control activities are limited within the WSA. but are not prevented entirely). Due to the low potential for mineral entry in this area, no significant direct impacts are expected to occur to wilderness resources by any of the management alternatives proposed. Likewise, no secondary, indirect, irreversible, irretrievable, or cumulative impacts are expected from any of the alternatives.

Official Congressional wilderness designation for the Abert Rim WSA at some point in time in the future would override any other less protective designations such as an ACEC. The principal impact of wilderness designation on other resource programs would be the withdrawal of the WSA from all forms of mineral entry. Location of new rights-ot-way is currently prevented due to its existing WSA status and would be likewise prevented by any future wilderness designation. However, in the unlikely event that Congress would decide not to include Abel-t Rim into the wilderness system, the area would bc released from WSA status. In this instance. management activities would revert back to that specified in the existing land use plan and/or this plan amendment (for any ACEC Alternative (2, 3. and 7) that includes part of Abert Rim WSA within its boundary) and would generally be much less protective.

Generally speaking, management activities proposed in the various alternatives for lands west of the WSA boundary would not be affected by, nor conversely affect, wilderness resources. Due to the court supported concept of “outside sights and sounds”. activities occurring outside the wilderness that do not physically impact wilderness values (such as the view of city lights versus destruction of air quality) are not considered to impact wilderness. In addition.

management buffer zones are also not allowed to restrain development outside wilderness.

Cultural Resource Impacts

Alternative 1 (No Action)

Under this alternative. the status of cultural resource and traditional use areas would not change from the existing situation unless new land-disturbing activities are proposed. The National Register District would continue to exist and could be expanded in size. Archeological survey would continue to be done on a random basis, driven mostly by the needs of Section 106 impact analysis for land-disturbing projects. Sites could be subject to severe disturbance or destruction if the development of mining or new rights-of-way occurs and it is not possible to avoid sites through relocation of impact zones. Even if site impacts are mitigated through the 36 CFR 800 process and Native American consultations, they would still be impacted or destroyed. Traditional use areas might be impacted by sight and sound of future developments. even if disturbances do not occur directly on such sites. However, it is not possible to completely evaluate impacts to traditional uses as the tribes may or may not have made such uses known to the BLM. This information can only obtained and assessed through continued tribal consultation.

Alternative 2

Under this alternative, cultural resources and traditional use areas would be afforded much greater protection due to the withdrawal from mining and a greater emphasis on the management and protection of such resources. Allowing no new rights-of-way would further protect the cultural resource from damage and destruction.

The completion of a Class III inventory in the ACEC area would allow for a more detailed analysis of the archeological sites in the area and assessment of future needs and uses for the sites. Expansion of the National Register District would allow a more complete assessment of the needs of the sites in the area for protection and recognition of their value for preservation

Signing of some sites for public interpretation should allow the opportunity to bring the public into the protection of the sites by asking them to report illegal activity to the BLM Educational opportunities would also be made available to the public.

Regular patrols of the area would make the monitoring of site conditions easier and more up-to-date. Currently, sites are not monitored on a regular basis.

Currently. the BLM does not have a complete inventory of the traditional uses of the area by Native Americans. It is. therefore. difficult to assess the concerns and needs of these people. Inventory and continued consultation would greatly improve the management of this resource.

Alternative 3

Impacts under Alternative 3 would generally be the same as under Alternative 2 except for the following.

Allowing all mineral leasing could have severe and negative impacts upon the archeological sites and traditional uses of the area unless sites are avoided or no surface occupancy is required. Sites are expected to be protected from oil, gas, or geothermal leasing provided no surface occupancy is stipulated. However, traditional use areas may still be impacted by sight and sound. Even if mitigation is performed, as required by 36 CFR 800, some sites would still be impacted or destroyed,

The addition of sites to the National Register District would not be pursued as actively as under Alternative 2. This could limit the ability to manage and plan for the protection of the cultural resources of the area as a whole unit.

Traditional use areas might be Impacted by sight and sound of future developments, even if disturbances do not occur directly on such areas. However, it is not possible to completely evaluate the impacts of this alternative on traditional uses as the tribes may or may not have made such uses known to the BLM. This information can only obtained and assessed through continued tribal consultation.

Alternative 4

The impacts under this airernative would be similar to those under Alternative 3. The differences would be as follows.

Under this alternative, much of the cultural resources and traditional use areas would be bisected by the boundary of the proposed ACEC. A situation may exist where a site has different levels of protection depending on which side of the boundary line it is located. What is a prohibited action on one side of a site, might be allowed on the other side. It would be more difficult to manage the sites and traditional use areas as a complete unit. Completion and management of a National Register District would be difficult also.

Alternative 5

The impacts under this alternative would be similar to those under Alternative 3. The differences would be as follows.

Allowing mining within part of a National Register District would make management and planning for protection of the District difficult. Severe damage to the overall integrity of the District could occur if sites cannot be avoided or protected by no surface occupancy stipulations. Closure of a portion of the area to mineral teasing would allow the protection of a portion of the cultural resources within the planning area.

Alternative 6

Under this alternative. most impacts would be similar to Alternative I The only difference would be the expansion of site Interpretation to the public.

Alternative 7 (Preferred Plan)

The impacts of this alternative would generally be similar to Alternative 5. However, additional cultural sites would be included within the ACEC boundary on the east (also within Abert Rim WSA) and the western (south half) shoreline of the lake.

Secondary, Indirect, Irreversible, Irretrievable, and Cumulative Impacts

Under Alternatives l, 3. 4. 5, 6. and 7 there would be irreversible and irretrievable impacts expected associated with mining. oil and gas exploration, geothermal leasing, and right-of-way development if it is impossible to avoid sites through relocation of impact zones or no surface occupancy restrictions. Alternatives 3. 4, 5, 6. and 7 would allow the option ot avoidance through no surface occupancy restrictions in various parts of the planning area. whereas Alternative 1 does not. Even if site impact mitigation occurs through the 36 CFR 800 process and Native American consultations. sites would be irreversibly impacted or destroyed. Alternative 2 would have no such impacts.

The impacts described above would also he considered a cumulative loss to the cultural resource base. In addition. cultural resources and traditional uses would continue to be impacted under all alternatives at the present level by ongoing road use. soil erosion. rangeland use. wildfire. fire program Impacts. and recreation. These impacts are of a cumulative nature. but the exact magnitude is unknown.

Secondary and indirect impacts may occur to cultural resources and traditional use areas if future developments (most likely under Alternatives 1 and 6, followed by 5, 3, 4. and 7. and least likely under Alternative 2) bring more people into site areas which could result in an increase in the amount of illegal artifact collection from sites. Native American use of traditional use areas may be impacted by the presence of more people in the area.

Socioeconomic Impacts

During the public involvement process, it became clear that the social perceptions about what impact each alternative would have on the existing social structure, lifestyle. traditional uses, and desired future conditions for the area. varies widely depending on the individual's background, their personal historic use of public lands, and/or what group or government body the individual may be representing (if any). Some of these views and concerns are summarized in Chapter 1, under the section titled, "Planning Issues", and in Chapter 5, under the section titled, "Public Involvement, Views. and Concerns".

In general, local citizens, ranchers, recreationists, and county officials, while recognizing the significant resource values present, felt existing management did not need to be altered significantly to protect those values. In addition, ACEC designation did not seem to be necessary or desirable. In contrast, those representing the environmental community and the brine shrimp fishery favored ACEC designation and/ or more protective management actions.

Alternative 1 (No Action)

Other than the potential for development of the sodium resource at Abert Lake, socioeconomic conditions and trends would not likely change significantly. If the sodium resource were to be developed there could be noticeable changes, principally in the development and operation phases.

Because no mineral development proposal has been submitted to BLM, the following assessment of socioeconomic effects is based upon a hypothetical scenario in order to provide a reasonable perspective to the scale of effects which could result if the resource were to be developed within the life of this plan.

The number of people employed at the exploration phase would be much smaller than at the development phase and would cause little socioeconomic effect on the area. While no development proposal has been made, it is possible that a 150,000 ton per year caustic soda operation could employ eighteen people at the site during the operation phase. Substantially more people might be employed during the

development phase if construction of a new railroad line was part of the development.

People employed during the development phase would probably include a significant component from outside of the area due to the requirements for special skills and know ledge. Typically such employees would seek temporary living quarters in motels and mobile homes in nearby settlements. The most likely sites would be Paisley and Lakeview. This could conflict with tourist demand for these sarne facilities. depending on the actual number of employees involved. Employment could also include local people at the site, as well as providing services to the project and its employees.

The operation phase of mineral development projects frequently provides steady employment, but fewer jobs than the development phase. These people would probably seek homes in the Paisley and Lakeview areas. Due to the skills involved, most of these people could possibly come from the existing Lake County residents.

Based on a sodium plant production rate of 150,000 tons per year, the royalties to the Federal government could amount to one million dollars per year. Fifty percent of the revenues received by the Federal government from leasing the sodium resource would be passed on to the State of Oregon. The spending of that money by the State of Oregon would be done in such a manner as to give preference to the areas affected by the mineral development activities, as required by FLPMA. It should be noted that sodium mining, as well as other types of mining activities. do not represent long-term sustainable economic development to the county as such resources are finite and, if extracted, are no longer available. However, it is very likely that a sodium mining operation and the associated economic benefits would continue well past the life of this plan.

Oil, gas, or geothermal leasing could possibly result in some exploration activity during the life of the plan. These activities involve teams of specialists and equipment brought into the area for one to three months. Crew size may range from one-half to two dozen employees. Economic effects would accrue primarily through the spending by crews for temporary housing and food. There would be a small, temporary increase in restaurant and hotel/motel business.

Recreation visits to the planning area have been estimated at approximately 60,000 visitors per year with most of these visits occurring at the existing Watchable Wildlife site. Visits may be typically less than an hour duration. The area is rarely a tourist destination and there are no places within the planning area for visitors to spend money. While this level of visitation is Important, its overall economic effect is slight because it does not introduce much additional local spending by people from outside of the county.

Since there would be no ACEC designation under this alternative, there should be no negative perceptions, real or imaginary, related to loss of private property rights by area landowners.

Alternative 2

Under this alternative. socioeconomic conditions and trends would be unchanged compared to current conditions (i.e. Alternative 1 without sodium mining development).

ACEC designation is expected to result in an estimated 10% (6,000 visits) increase in area visitation. The limitations placed on vehicle access would cause a minor decrease in motorized travel away from the highway. The net effect on the region's economy are difficult to quantify, but likely would be slight.

Since there would be an ACEC designation under this alternative which. on the surface, appears to include large tracts of private land, there would likely be negative perceptions, real and imaginary, related to loss of private property rights by area landowners even though ACEC designation does not apply to private lands. Of all alternatives with an ACEC designation. this one would have the highest amount of this type of impact as it includes the greatest amount of private lands within its boundary.

Alternative 3

Socioeconomic effects would generally be similar to Alternative 1, but would probably have a lower employment and revenue potential. The exact amount of restriction resulting from special resource protection stipulations is unknown at this time.

ACEC designation is expected to result in a similar increase in visitor use and associated minimal regional economic effect as for Alternative 2.

Since there would be an ACEC designation under this alternative which, on the surface, appears to include large tracts of private land, there would likely be negative perceptions, real and imaginary, related to loss of private property rights by area landowners even though ACEC designation does not apply to private lands. Of all alternatives with an ACEC designation, this one would have the least amount of this type of impact as it includes the least amount of private lands within its boundary.

Alternative 4

Socioeconomic effects would generally be the same as Alternative 3. Since there would be an ACEC designation

under this alternative which. on the surface. appears to include large tracts of private land, there would likely be negative perceptions, real and imaginary, related to loss of private property rights by area landowners even though ACEC designation does not apply to private lands. Compared to other alternatives with an ACEC designation. this type of impact would be relatively larger than Alternative 3, as slightly more private lands would be included in the boundary. but less than Alternatives 5 and 7

Alternative 5

Socioeconomic effects would probably be similar to, but less than under alternatives 1 and 3 because less area would potentially be open to leasing. Since there would be an ACEC designation under this alternative which. on the surface, appears to include large tracts of private land. there would likely be negative perceptions. I-eul and imaginary. related to loss of' private property rights by area landowners even though ACEC designation does not apply to private lands Compared to other alternatives with an ACEC designation, this type of impact would be relatively larger than Alternatives 3. 3, and 7 as more private lands would be included in the boundary, but less than Alternative 2.

Alternative 6

Socioeconomic effects would generally be the same as Alternative 3. except there would be no expected increase in area visitation. However, private landowner perceptions and impacts would be similar to Alternative 1, as no ACEC would be designated under this alternative.

Alternative 7 (Preferred Plan)

Socioeconomic effects would generally be similar to Alternative 5. However, slightly more area would be open to leasing Since there would be an ACEC designation under this alternative which, on the surface. appears to include large tracts of private land. there would likely be negative perceptions. real and imaginary. I-elated to loss of private property rights by area landowners even though ACEC designation does not apply to private lands. Compared to other alternatives uith an ACEC designation, this type of impact would be relatively larger than Alternatives 3 and 4, but less than Alternatives 2 and 5.

Secondary, Indirect, Irreversible, Irretrievable, and Cumulative Impacts

None of the alternatives would have secondary or indirect impacts. A land acquisition program could have a cumulative impact on the local county (private land) tax base, if combined with other Federal agency acquisition programs in which there may or may not be acreage replacement or monetary compensation for the loss. It is not expected that the BLM would contribute to this impact because it is currently is required by language within the 1992 appropriations bill to implement a plan to restore the Federal land ownership ratio within Lake County to the ratio which existed prior to 1992. However. this requirement may or may not apply to other Federal agency acquisition programs within the county. This is important to note because the county currently receives the maximum Payment-in-Lieu-of-Taxes (PILT) payments from the BLM to which they are entitled. If the BLM were to acquire more land. the county would not receive any higher PILT payment. Without equalization, there would be a net loss to the county tax base and would vary depending on the amount and appraised value of the land being acquired. This impact has the highest potential to occur under Alternative 2, as land acquisition would be more active than all the other alternatives. None of the other alternatives are expected to have any irreversible or irretrievable impacts on socioeconomic conditions within the area.

Recreation Impacts

Impacts Common to All Alternatives

In the event Congress officially designates all or part of Abert Rim WSA as wilderness, that area would be officially closed to all OHV use. This would occur regardless of the ACEC management alternative implemented and is expected to be a minimal impact as the WSA is currently restricted to existing roads and trails, Few roads or trails exist on the west slope facing the lake and are seldom, if ever used.

Alternative 1 (No Action)

This alternative would have no impact on non-motorized recreation opportunities in the area. Motorized recreation on the playa could possibly be constrained by future wildlife concerns for habitat protection for snowy plover, either through permanent or seasonal closures. Future mineral

development could negatively impact available recreation opportunities due to leasing activities and disturbance.

Alternative 2

Under this alternative minor negative impacts to recreation opportunities would result as Abert Rim WSA and the not-ther-n playa would be closed to vehicles This does not constitute 3 significant impact. as recreational vehicle use is now rare in these areas. Within the remainder of the ACEC vehicles would be restricted to existing roads and trails

Alternative 3

The impact to recreation opportunities under this alternative would be similar to Alternative 2. except OHV use within Abert Rim WSA would continue on existing roads and trails. In addition. wildlife viewing and hiking opportunities would be improved.

Alternatives 4, 5, and 7 (Preferred Plan)

The impacts of these alternatives would generally be the same as for- Alternative 3. except that management of all or portions of the area as a VRM Class II (Alternatives 5 and 7) could lead to vehicle restrictions to prevent impacts to landscape features. including the northern playa. If this occurred. the Impacts would be similar to Alternative 2 and are considered negligible in light of the low current use

Alternative 6

The Impacts of this alternative would be the same as for Alternative 1. but some minor (low-impact). Increased recreational opportunities could occur.

Secondary, Indirect, Irreversible, Irretrievable, and Cumulative Impacts

The construction of new roads associated with mineral developments as proposed in Alternatives 1. 3. 4. 5. 6. and 7 could allow a secondary /indirect impact of increased access for recreational users. No significant irreversible. irretrievable. or cumulative impacts are expected to recreation activities as a result of other management actions under any of the alternatives. provided mineral. oil. gas, or geothermal development sites are reclaimed following exhaustion of the resource.

Visual Resource Impacts

Alternative 1 (No Action)

Under thia alternative, if no mineral leasing or major rights-of-way are issued there arc expected to be no changes or negative impacts to existing visual resource classifications.

However, if sodium leasing occurs. there could be a significant impact to visual quality from Highway 395 along the south half of Lake Abert. The northern extension of the impact would be determined by the size and location of evaporation basins and dike height With the flat viewshed across the lake. any man-made features such as diking or impoundment wouid be visible as a contrast in line and color of the landscape (water surface) within four miles of the highway. Any disturbance related to a pipeline over the Coglan Hills would also be noticeable as a linear disturbance in vegetation and soils.

The above disturbance would be within objective of management Class III or IV. if mitigation measures (such as painting the structures a neutral or earth tone) are included. Such disturbance wouid not comply with a management Class I (eastside of planning area) designation as the contrast rating for the project would moat likely be too high

Issuing major rights-of-way near Highway 395 (within VRM Class I area) would not be consistent with class I objectives. Issuing rights-of-ways on the west side of the planning area would be noticeable on the landscape and wouid only marginally conform to the management objectives of the existing Class III and IV portions of the planning area

Alternative 2

This alternative would offer the most protection for the viewshed. The only potential negative impact of significance under this alternative would be mining allowed under the 1872 Mining Act. Soil disturbance and structures associated with mining could impact the viewshed. the exact significance of which could not be evaluated until specific mining operarions are proposed. The likelihood of this occurring is low as there are no existing or valid claims known from within the planning area.

Alternatives 3 and 4

These alternatives would include reclassifying the western portion of the planning area as VRM Class II! (currently is Class IV). The Impacts would generally be the same as for Alternative 1.

Alternatives 5 and 7 (Preferred Plan)

The Impacts of these alternatives would generally be similar to Alternative 2 However, it is unlikely that structural elements of any type of mineral leasing proposal would meet VRM Class II criterion in areas classified as Class II (Map 9, Appendix B), thereby causing potential resource conflicts. This does not mean that mineral teasing would be precluded, but substantial visual mitigation would be required before any such proposal would be approved.

Alternative 6

The Impacts of this alternative would be the same as for Alternative 1.

Secondary, Indirect, Irreversible, Irretrievable, and Cumulative Impacts

Provided any mineral. oil, gas, or geothermal development is reclaimed following exhaustion of the resource, there would be no significant secondary, indirect, irreversible, irretrievable, or cumulative impacts to visual quality under any of the alternatives over the long term.

Short-term, Long-term, and Unavoidable Impacts

Any impacts of this type which may occur to a particular resource are discussed within context of the impact discussion for that resource. If they are not specifically mentioned in a given impact discussion, then no such impact was identified or otherwise expected to occur.

Chapter 5 - Consultation and Public Involvement

Public Involvement, Views, and Concerns

Scoping

At the beginning of the plan amendment process public input was sought through public scoping. A scoping document discussing the ACEC nomination proposal was prepared and circulated to all individuals, groups, agencies, and Native American groups with a known interest in ACEC's or general management activities within the Lakeview Resource Area (BLM, 1994). The scoping document was released on January 7, 1994, and was followed by about a 45-day scoping comment period. The scoping period was announced through notices and/or feature stories in the Federal Register (58 (244) FR 67806), the Lake County Examiner (Lakeview). the Herald and News (Klamath Falls), and the Bulletin (Bend) in December 1993.

Public Scoping Meetings

During the scoping period. two public scoping meetings were held in February 1994, one in Lakeview and one in Bend. A total of eighteen people attended the Lakeview scoping meeting, not including approximately 10 BLM staff. A total of 12 people attended the Bend scoping meeting, not including 7 BLM staff. Notes documenting the major issues and concerns raised during the scoping meetings are available for review by contacting the Lakeview District Office.

Written Comments

During the scoping period, 103 comment letters were received. Two additional letters were received after the close of the scoping period which were also considered. Seventy-two consisted of a form letter sent by primarily local residents, ranchers. and representatives of local business and industry who were generally opposed to the proposed ACEC designation. Ten other letters were generally in opposition to the proposal. Nineteen letters from other agencies, environmental groups, concerned citizens, and scientific researchers were generally in favor of designation and/or some form of protection for the area. Two were from agencies that expressed neither opposition or favor of the proposal. One had no comments. Several respondents provided copies of recent scientific publications on the lake ecosystem or pertinent data on resources found in the vicinity. One respondent provided a history of the Mono Lake. California ACEC designation experience which utilized a working group.

The comments have been examined and categorized under one of several general headings: ACEC Nomination is Unnecessary, Nomination Will Result in Limitations on Use, Land/Mineral Ownership, Flaws in the Nomination Proposals, Existing Conditions of the Lake Ecosystem, Perceived Area Problems, Alternatives/Issues Which Should Be Addressed in the Planning Process, and Alternative Boundaries. A complete summary of the public comments received during the scoping period is available for review by contacting the Lakeview District Office. These comments and concerns were used to develop the list of issues, goals, objectives, and alternatives discussed in this document.

Working Group and Additional Public Involvement Opportunities

A letter was sent out to everyone on the mailing list (over 300) inviting their participation on a working group (letter dated March 2, 1994) to provide other agencies, tribal governments, groups, and the general public with additional opportunities to provide input into the planning process. Approximately 35 people responded with an interest in this opportunity and were subsequently sent a packet of information for review prior to the first meeting (letter dated April 4, 1994).

The first working group meeting was held in Lakeview on April 14, 1994, and was followed by a field trip to the planning area on April 15. Twenty-seven individuals representing various state/county governments and local interests attended the first meeting. Four BLM representatives and a facilitator were also present. A total of 34 people, including nine BLM representatives, attended the field trip.

A second meeting was held on May 19, 1994. The major focus of this meeting was to develop issues and management goals to be addressed in the plan amendment. A total of 23 people, including three BLM representatives and a facilitator, attended.

A third meeting was held on June 16, 1994. A total of 21 people attended, including three BLM representatives and a facilitator. The major focus of this meeting was on refining draft goals and objectives, as well as, developing a draft range of management alternatives to be addressed in the planning process.

The fourth meeting was held on August 18, 1994. A total of 21 people attended, including three BLM representatives and a facilitator. The discussion focused on fine-tuning the list of revised management goals, objectives, and alternatives.

A fifth meeting was held on November 1, 1994. A total of 18 people attended, including three BLM representatives and a facilitator. The major focus of this meeting was to discuss the draft impact analysis and determine if future meetings were necessary.

A sixth meeting was held on February 22, 1995. The major focus of this meeting was to inform the group and other interested members of the public of the alternative that the BLM had selected as the proposed plan. The meeting also included discussions of other on-going management activities in the area.

The following representatives of agencies, governments, and Native American groups participated in the Working Group:

Larry Conn, Oregon Department of Fish and Wildlife
William Riggs, Oregon State University Extension Service
Clarence DeGarmo, Ft. Bidwell Indian Community Council
Marc Liverman, Oregon Department of Fish and Wildlife
Ray Simms, Lake County Commission
Jeremiah O'Leary, Lake County Commission
Dennis Glender, Oregon Watermaster
Barbara Gover, Lake County Chamber of Commerce
Walt West, Oregon Department of Environmental Quality
A.K. Majors, Oregon Division of State Lands
Bob Pardue, Lake County Commission

Field trip to Lake Abert, Apeil 15, 1994.

A number of other interested individuals representing concerned citizens. ranchers. proposed hydro power- project. brine shrimp fishery. area recreationists, environmentalists, and researchers participated in at least one of these meetings including:

Eldon and Virginia Kent
Jay and Gloria Counts
Frank Vaughn
Ron Rathhone
Bart O'Keeffe, Abert Rim Hydroelectric Associates
Lincoln Elzner, Abert Rim Hydroelectric Associates
Bob de Braga, ZX Ranch
Orv al Layton
Bob Elder, Area Rancher
Rob Skinner, Oregon Cattleman's Association
Keith Kreuz, Oregon Desert Brine Shrimp
Tim Charnon
Craig Miller
Dan Sherman
Michael Getty. Hunters for Conservation
Bill and Ann Tracy. Weir Ranch
Louis Randall, Oregon Watershed Improvement Coalition
John Merwin, J-Spear Ranch
David Mason. Researcher. Fairhaven College
Trent Seagar, Research Assistant, Fairhaven College

All meetings were open to the public and were announced through news releases in local newspapers prior to the meeting date. Copiea of all meeting notices, mailings, handouts. lists of attenders. and minutes are on file and are available for review at the Lakeview District Office.

During the time between the end of the formal scoping period and the completion of this Draft Plan Amendment/ EIS, all those on the mailing list were sent project updates (letters dated June 10 and Septernher 22, 1994) and were invited to participate in these public meetings and provide feedback. Many written comments were received. Three were from members of the public who had attended one or more working group meetings and were providing comments on information presented at the meetings. Six others were received in response to the planning update packages which were sent out (portions of the draft document, working group rneeting notes and handouts). A summary of these comments and corresponding responses are available for review at the Lakeview District Office. These comments have been incorporated or addressed within this document to the extent possible.

Public Views

A summary of the comments received during the scoping process has been prepared and is available for review at the Lakeview District Office. Those comments having to do with issues which needed to be addressed during the planning process arc presented in Chapter 1, under the section titled "Planning Issues". Many of the comments were used to develop the range of alternatives evaluated in this document. Other written comments and concerns were received as a result of public coordination after the scoping period ended. These were considered and/or incorporated into the document. as appropriate.

Inter-Agency/ Government Coordination and Consultation

A total of 56 representatives of other agencies, governments. and Native American groups received a copy of the scoping document. The following provided written comments or other information on the scoping document:

John Norberg, Bureau of Mines
John Lilly, Oregon Division of State Lands
George Keister, Oregon Department of Fish and Wildlife
Sue Vrilakis, Oregon Natural Heritage Program
William Riggs, Oregon State University Extension Service
Mark DeVoney, Oregon Department of Transportation

The same agencies. governments, and Native American groups were invited to participate in the working group. Initially, 15 showed interest in participating. Those who participated in the group are listed in the section discussing the Working Group.

List of Recipients

In addition to those who attended working group meetings, the following individuals. agencies, government representatives, and iribai governments were sent a copy of this plan amendment/NEPA document:

Federal

Advisory Council on Historic Preservation
Environmental Affairs Program, U.S. Geological Survey (2)
Minerals Assessment Branch, Bureau of Mines
District Manager. Lakeview Soil & Water Conservation
Paisley District Ranger, Fremont National Forest
Lakeview District Ranger. Fremont National Forest
Departrnent of Energy. Office of Environmental Policy
Chief, Division Environmental Contaminants, U.S. Fish and Wildlife Service (3)

Forest Supervisor, Fremont National Forest
Mark Hatfield, U.S. Senator
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Harney County Library
Klamuth County Library
Lake County Library

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Glossary

ACEC - Area of Critical Environmental Concern; type of special land use designation specified within the Federal Land Policy and Management Act (FLPMA).

AUM - Animal Unit Month; the amount of forage required to sustain one cow and calf for one month (one AUM equals 6 bighorn sheep months).

Bighorn Sheep Month - the amount of forage necessary to sustain one bighorn sheep for one month (6 bighorn sheep months equals one cattle AUM).

Bureau Assessment Species - Species on List 2 of the Oregon Natural Heritage Database, or those species on the Oregon List of Sensitive Wildlife Species (OAR 635-100-040), that are identified in BLM Instruction Memo OR-91-57, and are not included as a Federal candidate, state listed, or Bureau sensitive species.

Bureau Sensitive Species - Species eligible as Federally listed or candidate, state listed or state candidate (plant) status. or on List 1 in the Oregon Natural Heritage Database, or otherwise approved for this category by the State Director.

BLM - Bureau of Land Management; government agency with the mandate to manage Federal lands under its jurisdiction for multiple uses.

Candidate Species - Any species included in the Federal Register "Notice of Review" that are being considered for listing as threatened or endangered by the U.S. Fish and Wildlife Service.

CEQ - Council on Environmental Quality; government agency with oversight of the implementation of the National Environmental Policy Act (NEPA).

CFR - Code of Federal Regulations; government publication listing all Federal regulations in existence.

cfs - Cubic Feet Per Second: means of measuring the flow rate of a liquid. usually water.

Confidence Level - An estimate of the precision around a sample mean that indicates the liklihood that the interval includes the true value (i.e. there is no false error).

Cumulative Impact - The impact that results from identified actions when they are added to other past. present, and reasonably foreseeable future actions, regardless of who undertakes these actions. Such impacts can result from individually minor, but collectively significant actions occurring over a period of time.

Easement - A right in the owner of one parcel of land, by reason of such ownership, to use the land of another for a special purpose not inconsistent with a general property in the owner.

Endangered Species -Any species defined under the Endangered Species Act as being in danger of extinction throughout all or a significant portion of its range. Listings are published in the Federal Register.

EA - Environmental Assessment; one type of document prepared by Federal agencies in compliance with the National Environmental Policy Act (NEPA) which portrays the environmental consequences of proposed Federal actions which are not expected to have significant impacts on the human environment.

EIS - Environmental Impact Statement: one type of document prepared by Federal agencies in compliance with the National Environmental Policy Act (NEPA) which portrays the environmental consequences of proposed major Federal actions which are expected to have significant impacts on the human environment.

Environmentally Preferred Alternative or Plan - The alternative plan that results in the least damage or most protection, preservation, or enhancement to biological, physical, historic, cultural, and other natural resources. This alternative is clearly identified in the Record of Decision.

FERC - Federal Energy and Regulatory Commission; government agency with responsibility for issuing permits and licenses tor power projects.

FLPMA - Federal Land Policy and Management Act of 1976; law mandating that the Bureau of Land Management manage lands under its jurisdiction for multiple uses.

FR - Federal Register; daily government publication reporting all activities going on in the Federal government.

FS - Forest Service; government agency responsible for managing National Forests.

g/L - Grams per Liter (equivalent to parts per million); scientific unit of measure.

HMA - (Wild Horse) Herd Management Area; public land under the jurisdiction of the Bureau of Land Management that has been designated for special management emphasizing the maintenance of an established wild horse herd.

Leasible Minerals - Minerals that may be leased to private interests by the Federal government and includes oil. gas. geothermal. coal. and sodium compounds.

Locatable Minerals Minerals subject to exploration, development, and disposal by staking mining claims as authorized by the Mining Law of 1872. as amended. This includes deposits of gold. silver. and other uncommon minerals not subject to lease or sale.

MFP - Management Framework Plan; older generation of land use plans developed by the Bureau of Land Management. This generation of planning has been replaced by the Resource Management Plan (RMP).

Mineral Estate Refers to the ownership of minerals at or beneath the surface of the land.

Monitoring and Evaluation - The collection and analysis of data to evaluate the progress and effectiveness of on-the-ground actions in meeting resource management goals and objectives.

NWR - National Wildlife Refuge: an area administered by the I! S Fish and Wildlife Service for the purpose of managing certain fish or wildlife species.

NEPA National Environmental Policy Act of 1969: law requiring all Federal agencies to evaluate the impacts of proposed major Federal actions with respect to their significance on the human environment.

Noxious Weed - a plant specified by law as being especially undersirable. troublesome. and difficult to control.

ppb - Parts Per Billion: scientific unit of measure

ppm - Parts Per Million: scientific unit of measure

Preferred Alternative or Plan - The alternative plan, in the Draft EIS. which the agency has initially selected that best fulfills the agency's statutory mission and responsibilities and offers the most acceptable resolution of the planning issues and management concerns.

Prescribed Fire The introduction of fire to an area under regulated conditions for specific management purposes (usually vegetation manipulation).

Relative Abundance - A measure of species abundance or dominance within a given area or community type that is often presented in terms of percentages. Example: species A comprises approximately 25% of the total number of individuals present in the project area.

KMP - Resource Management Plan: current generation of land use plans developed by the Bureau of Land Management under the Federal Land Policy and Management Act. Replaces the older generation Management Framework Plans.

Right-of-Way - A permit or easement that authorizes the use of public lands for specified purposes. such as pipelines, roads, telephone lines, electric lines, and reservoirs.

Salable Minerals - High volume, low value mineral resources including common varieties of rock, clay. decorative stone, sand, gravel, and cinder.

Special Status Species - Plant or animal species falling into any one of the following catagories: Federally listed threatened or endangered species, species proposed for Federal listing as threatened or endangered, candidate species for Federal listing, State listed species, Bureau sensitive species, Bureau assessment species (see separate definition for each).

Species Diversity - The number, different kinds of, and relative abundances of species present in a given area.

State Listed Species -Any plant or animal species listed by the State of Oregon as threatened or endangered within the state under ORS 496.004, ORS 498.026, or ORS 564.040.

TNC - The Nature Conservancy; organization dedicated to the preservation of biological diversity.

Threatened Species - Any plant or animal species defined under the Endangered Species Act as likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Listings are published in the Federal Kegister.

USDA - U.S. Department of Agriculture; government department which oversees the Forest Service and many other agencies.

USDI - U S. Department of Interior; government department which oversees the Bureau of Land Management and many other agencies.

USFWS - U.S. Fish and Wildlife Service: government agency responsible for managing fish and wildlife and their habitats

UCRBEMP - Upper Columbia River Basin Ecosystem Management Project; an on-going project examining the effects (on a large. regional scale) of past and present land use activities on the Upper Columbia River Basin ecosystem and a small part of the Great Basin ecosystem.

Visual Resource - The visible physical features of a landscape.

Visual Resource Management Classes - See Appendix E

WSA - Wilderness Study Area: public land under the jurisdiction of the Bureau of Land Management which has 'been studied for wilderness character and is currently in an interim management status awaiting official wilderness designation or release from WSA status by Congress.

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Appendix A
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Table 1. Lake Abert Bird List

Relative Abundance

A = abundant: nearly always seen in proper habitats & season.
C = common: usually been in proper season & habitats.
U = uncommon: can be seen about 25% of visits,
O = expected yearly. but only occasionally seen.
R = rare; a few Individuals or Flocks seen every 2 or 3 years.
X = accidental: seen less than 5 times in past 10 years.

Season of Use

Sp = Spring YL = Yearlong
Su = Summer
Fa = Fall
Wn = Winter

Habitats

Lk = lake & immediate shoreline.
Mf = mudflats & alkali playas.
Md = grass. sedge & rush meadows. with associated springs. seeps ponds & riparian woods.
Sh = sagebrush. rabbitbrush & grease-wood brushfields
Gr = native & exotic bunchgrass stands
Wd = coniferous & deciduous woods.
Rv = Chewaucan River flow channel.
Cl = cliffs, rocks & talus slopes.

Nesting Activity

* = known to nest in area.
** = suspected to nest in area.

SPECIES	ABUNDANCE	HABITATS	SEASON
GREBES			
Pied-billed Grebe*	U	Md	SpSuFa
Horned Grebe	R	Lk	SpFa
Eared Grebe	A	Lk	SpSuFa
Western Grebe	O	LkRv	SpFa
Clark's Grebe	O	LkRv	SpFa
PELICANS			
American White Pelican	O	LkRv	SpSuFa
Double-crested Cormorant	O	LkRv	SpSuFa
HERONS			
American Bittern**	O	Md	SpSuFa
Great Blue Heron	U	MdMfRv	SpSuFa
Great Egret	O	MdMfRv	SpFa
Snowy Egret	O	MdMfRv	SpFa
Black-crowned Night Heron*	O	MdRv	SpSuFa
IBISES			
White-faced Ibis	U	Md	SpSuFa
WATERFOWL			
Tundra Swan	R	LkMd	SpFa
Trumpeter Swan	R	LkMd	SpFa
White-fronted Goose	U	LkMd	SpFa
Snow Goose	U	LkMd	SpFa
Ross' Goose	U	LkMd	SpFa
Brant	X	Lk	
Canada Goose*	A	LkMdMf	YL
Wood Duck	R	Lk	SpFa
Green-winged Teal*	C	LkMd	YL
Mallard*	C	LkMd	YL
Northern Pintail*	C	LkMd	YL
Blue-winged Teal**	O	LkMd	SpFa
Cinnamon Teal*	C	LkMd	SpSuFa
Northern Shoveler*	A	LkMd	YL
Gadwall*	U	LkMd	SpSuFa
American Wigeon	U	Lk	SpFaWn
Eurasian Wigeon	O	Lk	SpFaWn
Canvasback	U	Lk	SpFa
Redhead	U	Lk	SpFa
Ring-necked Duck	U	Lk	SpFa
Lesser Scaup*	U	LkMd	SpSuFa
Common Goldeneye	O	Lk	SpFaWn
Barrow's Goldeneye	R	Lk	SpFa

SPECIES	ABUNDANCE	HABITATS	SEASON
RAILS			
Yellow Rail**	R	Md	SpSu
American Coot*	C	Md	SpSuFa
CRANES			
Sandhill Crane*	U	Md	SpSuFa
SHOREBIRDS			
Black-bellied Plover	O	LkMf	SpFa
Snowy Plover*	C	MfMd	SpSuFa
Semi-palmated Plover	O	LfMf	SpFa
Killdeer*	A	LkMfMd	SpSuFa
Black-necked Stilt*	U	LkMfMd	SpSuFa
American Avocet*	C	LkMfMd	SpSuFa
Greater Yellowlegs	U	LkMf	SpFa
Willet*	C	MdMf	SpSuFa
Wandering Tattler	X	LkMf	
Spotted Sandpiper*	U	LkMf	SpSuFa
Long-billed Curlew*	C	MdGrSh	SpSuFa
Western Sandpiper	C	LkMf	SpSuFa
Least Sandpiper	C	LkMf	SpSuFa
Baird's Sandpiper	R	LkMf	SpFa
Dunlin	R	LkMf	SpFa
Dowitcher	R	LkMf	SpFa
Wilson's Phalarope	C	Lk	SpSuFa
Red-necked Phalarope	C	Lk	SpSuFa
Franklin's Gull	R	LkMf	SpFa
Bonaparte's Gull	R	LkMf	SpFa
Ring-billed Gull	C	LkMf	YL
California Gull	C	LkMf	YL
Caspian Tern	R	Lk	SpFa
Forster's Tern	O	Lk	SpFa
Black Tern**	U	MdLkMf	SpSuFa
PIGEONS			
Rock Dove*	U	ClSh	YL
Mourning Dove*	U	GrShMd	SpSuFa
OWLS			
Barn Owl*	U	ClShMd	YL
Great Horned Owl*	C	ClMd	YL
Burrowing Owl*	U	ShGr	SpSuFa
Short-eared Owl*	U	GrMd	YL
NIGHTJARS			
Common Nighthawk*	C	GrShMd	SpSuFa

Table 1. Lake Abert Bird List (continued)

SPECIES	ABUNDANCE	HABITATS	SEASON
Hooded Merganser	R	LkRv	SpFa
Common Merganser	U	LkRv	SpFa
Ruddy Duck	C	Lk	SpSuFa
RAPTORS			
Turkey Vulture*	C	Cl	SpSuFa
Osprey	R	LkRv	SpFa
Black-shouldered Kite	X	ShGr	
Bald Eagle	C	LkMd	SpFaWn
Northern Harrier*	A	MdGr	YL
Sharp-shinned Hawl**	O	Wd	SpSuFa
Cooper's Hawk**	O	Wd	SpSuFa
Red-tailed Hawk*	C	ClMdSh	YL
Ferruginous Hawk**	R	ShGr	WnSp
Rough-legged Hawk	C	ShGr	FaWn
Golden Eagle*	C	ClShGr	YL
American Kestrel*	C	ClShWd	YL
Peregrine Falcon**	U	ClLk	YL
Prairie Falcon*	C	ClShMd	YL
GROUSE			
Chukar*	C	ClSh	YL
California Quail*	U	ShGr	YL
Sage Grouse*	R	Sh	YL
SWALLOWS			
Tree Swallow*	C	MdWd	SpSuFa
Violet-green Swallow	U	MdWd	SpSuFa
N Rough-winged Swallow	R	MdWd	SpFa
Bank Swallow	R	MdWd	SpFa
Cliff Swallow**	O	MdWd	SpSuFa
Barn Swallow*	C	MdWd	SpSuFa
PASSERINES			
Black-billed Magpie*	C	WdMdSh	YL
Common Raven*	C	WdMdSh	YL
Red-breasted Nuthatch	R	WdMd	Sp
Canyon Wren**	U	ClSh	SpSuFa
Rock Wren*	A	ClSh	SpSuFa
House Wren**	R	ClSh	SpSuFa
Marsh Wren*	C	Md	YL
Ruby-crowned Kinglet	U	Md	Sp
Hermit Thrush	R	Md	Sp
American Robin*	C	MdShWd	YL
Sage Thrasher*	C	ShCl	YL
Water Pipit	U	LkMf	Sp
Cedar Waxwing	R	Md	Sp
Loggerhead Shrike*	C	Sh	YL
European Starling*	C	MdSh	YL
Solitary Vireo	R	Md	Sp
Warbling Vireo	U	Md	SpSu
Orange-crowned Warbler	U	Md	SpSu
Nashville Warbler	U	Md	SpSu
Yellow Warbler**	U	Md	SpSuFa
Yellow-rumped Warbler	C	Md	SpFa
Townsend's Warbler	U	Md	Sp
Palm Warbler	X	Md	

SPECIES	ABUNDANCE	HABITATS	SEASON
Common Poorwill**	U	GrShMd	SpSuFa
HUMMINGBIRDS			
Black-chinned Hummingbird	R	Wd	SpFa
Rufous Hummingbird	R	Wd	SpFa
Calliope Hummingbird	R	Wd	SpFa
KINGFISHERS			
Belted Kingfisher	O	RvLk	SpSuFa
WOODPECKERS			
Lewis' Woodpecker	R	MdWd	SpFa
Yellow-bellied Sapsucker	O	MdWd	SpSuFa
Downy Woodpecker**	O	Wd	SpSuFa
Northern Flicker*	U	GrShMdWd	YL
FLYCATCHERS			
Olive-sided Flycatcher**	U	MdWd	SpSuFa
Western Wood-pewee	U	MdWd	SpSuFa
Dusky Flycatcher	O	MdWd	SpFa
Willow Flycatcher	R	MdWd	SpFa
Say's Phoebe*	U	MdWd	SpSuFa
Western Kingbird*	U	MdWd	SpSuFa
Eastern Kingbird	R	MdWd	SpFa
LARKS			
Horned Lark*	A	Gr	YL
PASSERINES			
Northern Waterthrush	X	Md	
MacGillivray's Warbler	R	Md	Sp
Common Yellowthroat*	C	Md	SpSuFa
Wilson's Warbler**	C	Md	SpSuFa
Yellow-breasted Chat	R	Md	Sp
Western Tanager	O	Md	Sp
Black-headed Grosbeak	U	Md	SpSu
Lazuli Bunting	U	Md	SpSu
Chipping Sparrow	U	MdSh	SpSuFa
Brewer's Sparrow*	C	Sh	SpSuFa
Vesper Sparrow*	O	Sh	SpSuFa
Lark Sparrow**	C	ShMd	SpSuFa
Black-throated Sparrow*	O	Sh	SpSuFa
Sage Sparrow*	C	Sh	SpSuFa
Savannah Sparrow*	A	Md	SpSuFa
Fox Sparrow	X	Md	
Song Sparrow	U	Md	Sp
Lincoln's Sparrow	R	Md	Sp
Golden-crowned Sparrow	X	Md	
White-crowned Sparrow	U	ShMd	SpFa
Red-winged Blackbird*	A	MdLk	SpSuFa
Western Meadowlark*	A	ShMd	SpSuFa
Yellow-headed Blackbird*	A	MdLk	SpSu
Brewer's Blackbird*	A	MdLkSh	SpSuFa
Brown-headed Cowbird*	C	MdShLk	SpSuFa
Northern Oriole*	O	Md	SpSuFa
House Finch	R	Md	SpFa
Pine Siskin	R	Md	SpFa
Lesser Goldfinch	O	MdShGr	SpFa
American Goldfinch	R	Md	SpFa
Evening Grosbeak	U	Md	SpFa

Table 2. Lake Abert - Peak Bird Numbers by Species and by Year

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994*
All Shorebird Species		8,400					23,799	24,100	26,983	68,952			89,288
American Avocet	5,000	5,000					5,000	2,587	1,056	6,217	6,500	34,819	28,117
Phalarope ssp.	65,000	13,000	6,395	4,500	17,689	6,135	8,000	9,841	30,000	17,380	20,010	8,650	27,600
Least/Western Sandpiper							5,000	6,000	6,455	5,420	10,910	6,852	19,313
Calif./Ring-billed Gull	5,000	5,000							456	6,000	6,670	18,400	13,450
Western Snowy Plover				194	247	344	318	29X	153	204	204	25	109
All Waterfowl Species	7,000	7,000			14,000				1,760	21,820	3,922	13,655	5,953
G.B.Canada Goose									943	459	523	1,504	1,142
Northern Shoveler								10,000		20,578	3,025	14,650	4,100
Mallard									558	44	320	161	745
Green-winged Teal										50	675	690	1,500
Other Waterbird Species									60	2,000	12,100	5,100	7,200
Eared Grebe							200		40	1,850	12,000	5,100	7,112
Peak Count, all Species	80,000	35,000	6,400	4,694	38,300	8,100	8,318	10,139	39,000	32,300	28,500	88,425	96,799

* Counts for 1994 currently in progress.

The above table reflects all waterfowl and waterbird inventory data that has been located as oF 4/1/95-. Prior to 1990, the counts are the only available data and not necessarily peak numbers. From 1990 to the present, the numbers represent the highest counts of several inventories. The sources for these inventory numbers include ***one or more*** *of the following for* ***any given year:***

Oregon Department of Fish and Wildlife files; Summer Lake WMA and Lakeview District.

Bureau of Land Management files; Lakeview Resource Area.

U.S. Fish and Wildlife Service files; Malheur NWR and Klamath Basin Refuge Complex.

The Nature Conservancy, unpublished reports of cooperatively funded inventory work, 1988-1992.

Keister, George P., Jr. 1992. The Ecology of Lake Abert. Analysis of Further Development. unpublished report, Or.Dept. Fish & Wildlife.

Boula, K.M., and R.L Jarvis. 1984. Foraging ecology of fall-migrating waterbirds, Lake Abert, Oregon. Oregon State University, Corvallis. 29 pp.

Jehl, J.R., Jr. 1988. Biology of the eared grebe and Wilson's phalarope in the nonbreeding season: a study of adaptation to saline lakes. Pages 46-71 in F.A. Pitelka ed. Studies in Avian Biology No. 12 Cooper Ornithological Society. UCLA

Kristensen, K.M., M. Stern, and J. Morawski. 1991. Birds of North Lake Abert, Lake Co., Oregon. Oregon Birds 17(3):67, Fall 1991

Table 3. Peak Waterbird Count Numbers, 1992-1994

DATE	TOTAL	Ducks & Geese	Sndpiprs/Plvers	Grebes	Other
MARCH '92	5,099	975	4,014	480	99
APRIL '92	25,679	1,441	13,326	12,000	3
MAY '92	18,880	265	11,156	6,533	227
JUNE '92	13,756	352	13,084	753	11
JULY '92	28,471	214	26,983	2,330	35
AUGUST '92	25,742	912	16,288	9,150	52
SEPT. '92	13,603	2,648	9,753	3,080	12
OCT. '92	4,306	3,922	887	2	0
NOV. '92	2,705	2,583	164	0	4
DEC. '92	1,487	1,485	2	0	3
JAN. '93	1,604	1,601	16	0	6
FEB. '93	2,287	2,252	191	0	7
MARCH '93	7,110	6.624	484	0	41
APRIL '93	5,086	822	2,378	2,214	20
MAY '93	5,906	288	3,224	2,394	113
JUNE '93	1,402	243	1,188	47	0
JUL-SEP '93	**No** Counts				
OCT. '93	74,418	not counted	68,903	5,100	4
NOV. '93	No Counts				
DEC. '93	17,418	15,226	27	2,150	9
JAN. '94	3,107	2,712	145	57.5	4
FEB. '94	3,241	2,595	646	0	1
MARCH '94	10,090	4,056	6,882	526	0
APRIL '94	9,983	2,660	3,844	4,482	23
MAY '94	8,598	833	5,099	2,801	14
JUNE '94	11,598	365	8,336	3,183	15
JULY '94	61,379	698	57,194	3,470	17
AUGUST '94	96,799	553	89,288	7,112	21
SEPT. '94	20,304	5,228	12,984	3,025	0
OCT. '94	14,713	5,953	7,880	2,615	2
NOV. '94	5,665	5,662	93	1	4
DEC. '94	2,105	2,103	1	1	0

The table reflects the peak numbers counted during any month (usually four counts/month), thus, the numbers are not additative.

Table 4. Monthly Peak Waterbird Numbers for Selected Species, 1992-199

Date	Eared Grebes	American Avocet	Calf. & Ring-billed Gulls	Least & Western Sandpipers	Wilson's & Red-Necked Phalaropes
MARCH '92	480	1,025	3,962	32	0
APRIL '92	12,000	1,750	1,280	10,910	5
MAY '92	6,530	983	1,397	5,820	3,490
JUNE '92	750	6,500	2,920	10	5,500
JULY '92	2,330	4,701	6,670	3,766	20,010
AUG. '92	9,150	4,470	1,985	1,385	10,425
SEPT. '92	3,080	1,825	905	2,542	5,875
OCT. '92	2	59	400	110	0
NOV. '92	0	20	160	4	0
DEC. '92	0	0	2	0	0
JAN. '93	0	0	15	0	0
FEB. '93	0	0	190	0	0
MARCH '93	230	215	476	10	0
APRIL '93	2,214	320	23	1,725	0
MAY '93	2,390	523	330	2,358	254
JUNE '93	33	729	424	0	10
JUL-SEP '93	No Counts				
OCT. 93	5,100	34,819	18,400	6,852	8,650
DEC. '93	No Counts				
JAN. '94	57.5	0	145	0	0
FEB. '94	0	0	646	0	0
MARCH '94	526	1,735	4,956	0	0
APRIL '94	4,482	2,009	2,001	580	135
MAY '94	3,035	1,763	921	378	2,523
JUNE '94	3,183	1,930	639	6	5,761
JULY '94	3,470	17,980	11,020	3,240	24,117
AUG. '94	7,110	28,117	13,450	19,313	27,600
SEPT. '94	3,025	3,200	3,125	2,500	4,250
OCT. '94	2,615	1,990	3,125	613	2,130
NOV. '94	10	25	78	0	0
DEC. '94		0		0	0

Table 5. Lake Abert Mammal List

Relative Abundance

A = abundant: nearly always seen in proper habitats & season.
C = common; usually seen in proper season & habitats.
u = uncommon; can be seen about 25% of visits.
o = expected yearly, but only occasionally seen.
R = rare; a few individuals or flocks seen every 2 or 3 years.
x = accidental; seen less than 5 times in past 10 years.

Season of Use

Sp = Spring YL = Yearlong
Su = Summer
Fa = Fall
Wn = Winter

Habitats

Lk = lake & immediate shoreline.
Mf = mudflats & alkali playas.
Md = grass, sedge & rush meadows, with associated springs, seeps ponds & riparian woods.
Sh = sagebrush, rabbitbrush & greasewood brushfields
Gr = native & exotic bunchgrass stands
Wd = coniferous & deciduous woods.
Rv = Chewaucan River flow channel.
Cl = cliffs, rocks & talus slopes.

Breeding Activity

* = known to breed in area.
** = suspected to breed in area.

SPECIES	ABUNDANCE	HABITATS	SEASON
SHREWS			
Vagrant Shrew	U	Md,Sh,Wd	YL
Water Shrew**	U	Md,Rv	YL
Merriam Shrew*	C	Md,Sh,Cl	YL
MOLES			
Townsend Mole*	U	Md,Sh,Wd	YL
BATS			
Little Brown Myotis	O	Wd,Cl	SpSuFa
Fringed Myotis	C	Sh,Rv,Wd	SpSuFa
California Myotis	C	ALL	SpSuFa
Small-footed Myotis	?	Sh,Md,Wd	SpSuFa
Hairy-winged Myotis	?	Sh,Md,Wd	SpSuFa
Yuma Myotis	?	Sh,Md,Wd	SpSuFa
Long-eared Myotis	?	Wd,Cl	SpSuFa
Silvery-haired Bat	?	Sh,Md,Wd	SpSuFa
Hoary Bat	?	Sh,Md,Wd	SpSuFa
Big Brown Bat	C	ALL	SpSuFa
Pallid Bat	?	Sh,Md,Wd	SpSuFa
HARES			
Black-tailed Hare (Jackrabbit)*	A	Md,Sh,Wd,Rv	YL
White-tailed Hare (Jackrabbit)*	C	Sh,Wd	YL
Nuttall Cottontail*	C	Md,Sh,Wd,Rv	YL
Pygmy Rabbit*	U	Sh,Wd	YL
RODENTS			
Antelope Ground Squirrel*	C	Sh	YL
Belding Ground*	A	Md,Sh,Gr	YL
Golden-mantled Ground Squirrel	R	Wd,Cl	YL
California Ground Squirrel	R	Sh	YL
Least Chipmunk*	C	Sh,Wd,Cl	YL
Townsend Chipmunk	R	Wd	YL
Western Gray Squirrel**	U	Sh,Wd	YL
Northern Pocket Gopher*	C	Md,Gr	YL
Great Basin Pocket Mouse	C	Sh,Wd	YL
Ord Kangaroo Rat	U	Sh,Wd	YL
Great Basin Kangaroo Rat*	C	Sh,Wd	YL
Beaver	R	Rv	SpSu
Western Harvest Mouse	C	ALL	YL
Deer Mouse*	A	ALL	YL
Northern Grasshopper Mouse	?	Sh,Gr,Md	YL
Bushy-tailed Woodrat*	C	Sh,Wd,Cl	YL
Long-tailed Meadow Vole*	A	Md,Gr	YL
Montane Meadow Vole	U	Wd	YL
Muskrat*	U	Md,Rv	YL
Western Jumping Mouse	U	Wd	YL
Porcupine*	U	Sh,Wd,Rv	YL

SPECIES	ABUNDANCE	HABITATS	SEASON
Canids			
Coyote*	A	ALL	YL
Ursids			
Black Bear	X	Wd,Cl	
Procyonids			
Raccoon	U	Rv,Md,Sh,Wd	YL
Mustelids			
Mink	X	Rv	-
Long-tailed Weasel*	C	Md,Wd,Sh,[illegible],Cl	YL
Badger*	C	Md,Gr,Sh,Wd	YL
Striped Skunk*	C	Wd,Sh,Rv	YL
Spotted Skunk	?	Md,Gr,Sh	YL
River Otter	X	Rv	
Felids			
Mountain Lion**	R	Wd,Cl	YL
Bobcat**	R	Wd,Cl,Sh	YL
Cervids			
Mule Deer*	C	Wd,Sh,Md	YL
Antilocaprids			
Pronghorn Antelope*	C	Gr,Md,Sh	YL
Ovids			
California Bighorn Sheep*	U	Sh,Wd,Cl	YL

Table 6. Lake Abert Reptile and Amphibian List

Relative Abundance

A = abundant; nearly always seen in proper habitats & season.
c = common; usually seen in proper season & habitats.
LJ= uncommon; can be seen about 25% of visits.
o = expected yearly, but only occasionally seen.
R = rare; a few individuals or flocks seen every 2 or 3 years.
x = accidental; seen less than 5 times in past 10 years.

Season of Use

Sp = Spring YL = Yearlong
Su = Summer
Fa = Fall
Wn = Winter

Habitats

Lk = lake & immediate shoreline.
Mf = mudflats & alkali playas.
Md = grass, sedge & rush meadows, with associated springs, seeps ponds & riparian woods.
Sh = sagebrush, rabbitbrush & grease-wood brushfields
Gr = native & exotic bunchgrass stands
Wd = coniferous & deciduous woods.
Rv = Chewaucan River flow channel.
Cl = cliffs, rocks & talus slopes.

Breeding Activity

* = known to breed in area.
** = suspected to breedin area.

SPECIES	ABUNDANCE	HABITATS	SEASON
AMPHIBIANS			
Salamanders			
Long-toed Salamander	?	?	?
Spadefoot Toads			
Great Basin Spadefoot*	U	Sh,Wd	YL
True Toads			
Western Toad		Sh,Md,Rv	YL
Treefrogs			
Pacific Treefrog*	C	Md,Sh,Gr,Wd	YL
True Frogs			
Spotted Frog	?	Md,Rv	?
REPTILES			
Collared Lizards			
Collared Lizard	?	Cl	?
Leopard Lizard*	U	Sh,Gr,Wd,Md	YL
Spiny Lizards			
Western Fence Lizard*	C	Sh,Gr,Wd,Cl,Md	YL
Sagebrush Lizars	C	Sh,Wd,Gr	YL
Side-blotched Lizards			
Side-blotched Lizard		Sh,Wd,Gr	YL
Horned Lizards			
Desert Horned Lizard		Sh,Gr	YL
Short-horned Lizard*	C	Sh,Gr,Wd	YL
Skinks			
Western Skink*	C	Sh,Gr,Wd,Cl	YL
Boas			
Rubber Boa	U	Sh,Gr,Wd,Rv	YL
Racers			
Western Yellow-bellied Racer	?	Sh,Wd,Md	YL
Striped Whipsnake		Sh,Wd,Rv	YL
Gopher Snakes			
Gopher Snake*	C	Sh,Gr	YL
Garter Snakes			
Common Garter Snake*	C	Md,Rv,Gr,Sh	YL
Rattlesnakes			
Great Basin Rattlesnake*	C	Sh,Wd,Cl	YL

Table 7. Plants Found Along Transect Running from the East Side of the Lake to the Top of Abert Rim (from the Most Alkaline Soils Running Uphill)

WETLAND LAKESHORE COMMUNITY (where freshwater springs enter lake)	
Carex spp	sedges*
Juncus spp	rushes*
Typha latifolia	cattail*
WETLAND LAKESHORE HALOPHYTE COMMUNITY (alkaline lakeshore)	
Suaeda depressa	waada or Paiute weed*
Suaeda nigra	bush seablite*
Distichylis stricta	saltgrass
Sarcobatus vermiculatas	greasewood
Nitrophila occidentalis	borax weed
Ranunculus testiculatus	hornseed buttercup
Bassia hyssopifolia	bassia (introduced)
SALTBRUSH/SHADSCALE COMMUNITY (up shore above waterline, always dry)	
Chrysothamnus nauseosus	gray rabbitbrush
Chrysothamnus viscidiflorus	green rabbitbrush
Atriplex confertifolia	shadscale or salt bush*
Artiplex spinosa	hop sage
Artemisia spinescens	bud sage (summer dominant)
Artemisia tridentata	sagebrush* (where no fires)
Agropyron cristatum	crested wheat grass (introduced)
Muhlenbergia asperifolia	Roughleaved dropseed, Alkali muhly
Descurainia sophia	tansymustard (introduced)
Sisymbrium altissimum	tumble mustard
Sitanion hystrix	bottlebrush squirreltail
Oryzopsis hymenoides	Indian rice grass*
Elymus cinereus	Great Basin rye*
Tetradymia canescens	horsebrush
STREAM RIPARIAN COMMUNITY	
Rorippa nasturtium-aquaticum	water cress
Prunus emarginata	chokecherry*
Salix spp.	willow*
Rosa woodsii	wild rose*
Ribes cereum	rock currant*
Sambucus cerulea	elderberry*
Cornus stolonifera	red osier dogwood*
Elymus cinereus	Great Basin rye*
Populus tremuloides	aspen*
WOODLAND/FOREST COMMUNITY	
Juniperus occidentalis	western juniper* (some killed by fire)
Pinus ponderosa	western yellow pine*
INTRODUCED WEEDS	
Salsola kali	tumbleweed or Russian thistle
Salvia aethiopis	Mediterranean sage (being treated)
Bromus tectorum	cheat grass

* Native American traditional (cultural) use plants.

Table 8. Plants Found Within Abert Rim WSA

SCIENTIFIC NAME	COMMON NAME
TREES	
Pinus ponderosa	Ponderosa Pine*
Abies concolor	White Fir*
Populus tremuloides	Quaking Aspen*
Juniperus occidentalis	Western Juniper*
Cercocarpus ledifolius	curl-leaf mountain-mahogany*
SHRUBS	
Purshia tridentata	Bitterbrush
Holodiscus dumosus	gland ocean-spray*
Artemisia tridentata ssp. wyomingenisis	Wyoming big sagebrush*
A. tridentata ssp. vaseyana	Mountain big sagebrush*
A. arbuscula	low sagebrush
Chrysothamnus viscidiflorus	green rabbitbrush
C. nauseosus	gray rabbitbrush
Ribes aureum	golden currant*
R. cereum	wax current*
Rosa woodsii	Wood's Rose*
Prunus subcordata	Klamath plum*
P. virginiana	chokecherry*
P. emarginata	bittercherry*
Salix spp.	willow spp.*
Amelanchier almifolia	serviceberry*
Ceanothus velutinus	buckbrush
Sarcobatus vermiculatus	black greasewood
Grayia (Atriplex) spinosa	spiny hospage
FORBS	
Heuchera cylindrica	lava alumroot
Castilleja deustus	hot-rock penstemon
C. chromosa	desert paintbrush
Calochortus marcocarpus	sagebrush mariposa lily*
Arnica chamissonis	leafy arnica
Epilobium spp.	willow-herb
Orthocarpus sp.	owl's clover
Agoseris glauca	pale agoseris
Suaeda nigra	bushy seablite*
S. occidentalis	slender seablite*
Townsendia florifer	showy townsendia
Thelypodium flexuosum	spreading thelypody
Machaeranthera canescens	hoary aster
Balsamorhiza sagittata	arrowlead balsamroot*
B. serrata	toothed balsomroot
Wyehia mollis	mule's ear*
Eriogonum ovalifolium	cushion buckwheat
E. strictum	strict buckwheat
E. umbellatum	sulfur flower
E. heracleoides	Wyeth buckwheat
Arenaria aculeata	prickly sandwort
Phlox hoodii	hood's phlox
P. longifolia	long-leaved phlox
Achillea millefolium	yarrow
Astragalus lentiginosus	specklepod milk-vetch
Lomatium nevadense	Nevada desert-parsley*
L. macrocarpun	large-fruited lomatium*
L. nudicaule	barestem lomatium*
Haplopappus stenophyllus	narrow-lead goldenweed
H. hirtus	hairy goldenweed
Lupinus sericeus	silky lupine
Senecio canus	woolly grounsel
S. intergerrimus	western groundsel
Antennaria microphylla	rosy pussy toes
A. luzuloides	woodbrush pussy-toe
Geum triflorum	prairie smoke avens
Linun perenne	wild blue flax
Hieracium albertinum	western hawkweed
Potentilla gracilis	slender cinquefoil
Sidalcea oregana	Oregon checker-mallow
Linanthus harknessii	Harkness' linanthus
Allium acuminatum	hooker's onion*
Erodium cicutarium	shork's bill
Holosteum umbellatum	jagged checkweek
Ranunculus testiculatus	hornseed buttercup
Montia perfoliata	Miner's lettuce
Draba nemorosa	woods draba
Polemonium micranthum	littlebells polemonium
Lithophragma bulbifera	bulbiferous fringecup
Marrubium vulgare	horehound
Arabis holboellii	Holboell's rockcress
Collinsia parviflora	small flowered blue-eyed Mary
Delphinium andersonii	Anderson's larkspur
Gilia aggregata	scarlet gilia
Mertensia ciliata	ciliate bluebell
Sedum lanceolatum	lanceleaved stone crop
GRASSES	
Agropyron trachycaulum	slender wheatgrass
A. spicatum	bluebunch wheatgrass*
Festuca idahoensis	Idaho fescue*
Elymus cinereus	Great Basin wildrye*
Koeleriga nitida	Junegrass
Hordeum brachyantherum	Meadow barley
Poa nevadensis	Nevada bluegrass*
P. sandbergii	Sandberg's bluegrass*
P. bulbosa	bulbous bluegrass
Sitanion hystrix	bottlebrush squirreltail
Oryzopsis hymenoides	Indian ricegrass*
Danthonia californica	California oatgrass
RUSHES & SEDGES	
Juncus nevadensis	Nevada rush*
J. tenuis	slender rush*
Eleocharis palustris	common spike-rush*
Carex spp.	sedge spp.*

* Native American traditional (cultural) use plants

Table 9. Leasing Stipulations

	Alternatives						Comments
	1	3	4	5	6	7	
No Surface Occupancy (NSO)							
Visual Resource Management Class I		X	x	x	X	X	
Lake Abet-t ACEC		X	x	x	X	X	
Timing (T)							
Snowy Plover Habitat		x	x		X		0 = Covered by ACEC NSO
Golden Eagle and Ferruginous Hawk	x	x	x	x	X	X	
Western Sagegrouse Leks	x	x	x	x	X	X	
Bighorn Sheep Lambing Grounds		x		x	X		Alts 4 & 7 covered by ACEC NSO and No Leasing.
Crucial Deer/Winter Range	x	x		x	X		Note: If WSA is not designated, these 2 stipulations, will apply to Alts 1, 3, 5, and 7
Controlled Surface Use (CSU)							
Visual Resource Management Class II				x		X	
Lake Abert Ecological System		x	x	x	X	X	
Soils, Water		x	x	x	X	X	
Special Status Specie	x	x	x	x	X	X	

Table 10. Salable Mineral Restrictions (acres) by Alternative

Restriction	1	2	3	4	5	6	7
Closed - Nondiscretionary[1]	7,500	7,500	7,500	7,500	7,500	7,500	7,500
Closed - Discretionary[2]	6,500	94,200	94,100	94,100	94,100	32,300	42,400
Open - With Standard Requirements	0	0	0	0	0	0	0
Open - With Additional Restrictions[3]	87,700	0	100	100	100	61,900	51,800

[1] Wilderness study area.
[2] VRM I, entire planning area alts 2,3,4,5, Proposed ACEC Alts 2,3,4,5,7, cultural resource sites, Bureau sensitive plant.
[3] Special status species, soils, water, Federal mineral estate only, seasonal wildlife restrictions VRM Class II.

Table 11. Oil and Gas and Geothermal Lease Restrictions (acres) by Alternative

Restriction	1	2	3	4	5	6	7
Closed - Nondiscretionary[1]	7,500	7,500	7,500	7,500	7,500	7,500	7,500
Closed - Discretionary	0	94,200	0	0	0	0	0
Open - No Surface Occupancy[2]	300	0	32,000	32,100	42,100	32,000	42,400
Open - With Standard Terms	0	0	0	0	0	0	0
Open - With Additional Stipulations[3]	93,900	0	62,200	62,100	52,100	62,200	51,800

[1] Wilderness study area.
[2] Proposed Abert ACEC Alts3,4,5,7, VRM I in alts 5, 7, of cultural resource and Bureau sensitive plant sites.
[3] Seasonal, VRM Class II, soils, water, special status species restrictions.

Table 12. Locatable Mineral Restrictions (acres) by Alternative

Restriction	1	2	3	4	5	6	7
Closed - Nondiscretionary[1]	32,500	32,500	32,500	32,500	32,500	32,500	32,500
Closed - Discretionary[2]	0	69,200	0	0	0	0	0
Open - With Standard Requirements	57,500	0	57,200	57,000	47,400	57,500	46,400
Open - With Additional Restrictions[3]	11,700	0	12,000	12,200	21,800	11,700	22,800

Notes: a) major overlap between FERC withdrawal and ACEC in alternatives 2, 3, 4, 5, 7
b) significant overlap between ACEC and WSA in alternatives 2, 4, 7

[1] Existing withdrawals, Federal Energy Regulatory Commission power project permits (acreage estimated)
[2] BLM withdrawals
[3] Wilderness Study Area, Lake Abert Proposed ACEC, cultural resources sites, Federal mineral estate only.

Table 13. Sodium Leasing Restrictions (acres) by Alternative

Restriction	1	2	3	4	5	6	7
Closed - Nondiscretionary[1]	7,500	7,500	7,500	7,500	7,500	7,500	7,500
Closed - Discretionary	0	94,200	0	0	21,700	0	18,000
Open - No Surface Occupancy[2]	6,500	0	300	300	6,500	6,500	6,500
Open - With Standard Terms	0	0	0	0	0	0	0
Open - With Additional Restrictions[3]	87,700	0	93,900	93,900	66,000	87,700	69,700

[1] Wilderness Study Area
[2] VRM I in alts. 1,3-7 and cultural and sensitive plant site
[3] Seasonal, VRM Class II, soils, special status species, lakelevel/TDS

Table 14. Sodium Availability by Alternative (acres).

Restrictions/ Mineral Potential	1	2	3	4	5	6	7
Closed Non-Discretionary							
High	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Moderate	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Low/unknown	7,500	7,500	7,500	7,500	7,500	7,500	7,500
Closed Discretionary							
High	**0**	39,300	0	0	21,700	0	18,000
Moderate	**0**	0	0	0	0	0	0
Low/unknown	**0**	54,900	0	0	0	0	0
Open: No Surface Occupancy							
High	6,200	0	0	0	6,200	6,200	6,200
Moderate	0	0	0	0	0	0	0
Low/unknown	300	0	300	300	300	300	300
Open: Standard Lease Terms							
High	**0**	0	0	0	0	0	0
Moderate	**0**	0	0	0	0	0	0
Low/unknown	**0**	0	0	0	0	0	0
Open: Additional Restrictions							
High	33,100	0	39,300	39,300	11,400	33,100	15,100
Moderate	0	0	0	0	0	0	0
Low/unknown	54,600	0	54,600	54,600	54,600	54,600	54,600

Table 15. Salable Mineral Availability by Alternative (acres).

Restrictions/ Mineral Potential	1	2	3	4	5	6	7
Closed Non-Discretionary							
High	0	0	0	0	0	0	0
Moderate	7,500	7,500	7,500	7,500	7,500	7,500	7,500
Low/unknown	0	0	0	0	0	0	0
Closed Discretionary							
High	0	0	0	0	0	0	0
Moderate	6,500	94,200	94,100	94,100	94,100	32,300	42,400
Low/unknown	0	0	0	0	0	0	0
Open: Standard Requirements							
High	0	0	0	0	0	0	0
Moderate	0	0	0	0	0	0	0
Low/unknown	0	0	0	0	0	0	0
Open: Additional Restrictions							
High	100	0	100	100	100	0	0
Moderate	87,600	0	0	0	0	61,900	51,800
Low/unknown	0	0	0	0	0	0	0

Table 16. Locatable Mineral Availability by Alternative (acres).

Restrictions/ Mineral Potential	1	2	3	4	5	6	7
Closed Non-Discretionary							
High	0	0	0	0	0	0	0
Moderate	1,700	1,700	1,700	1,700	1,700	1,700	1,700
Low/unknown	30.800	30,800	30,800	30,800	30,800	30,800	30,800
Closed Discretionary							
High	0	0	0	0	0	0	0
Moderate	0	32,300	0	0	0	0	0
Low/unknown	0	36,900	0	0	0	0	0
Open: Standard Requirements							
High	0	0	0	0	0	0	0
Moderate	24,700	0	24,800	24,600	22,900	24,700	25,300
Low/unknown	32,800	0	32,400	32,400	24,500	32,800	21,100
Open: Additional Restrictions							
High	0	0	0	0	0	0	0
Moderate	7.600	0	7,500	7,700	9.400	7,600	7,000
Low/unknown	4,100	0	4,500	4,500	12,400	4,100	15,800

Table 17. Oil and Gas and Geothermal Availability by Alternative (acres).

Restrictions/ Mineral Potential	1	2	3	4	5	6	7
Closed Non-Discretionary							
High	0	0	0	0	0	0	0
Moderate	7,500	7,500	7,500	7,500	7,500	7,500	7,500
Low/unknown	0	0	0	0	0	0	0
Closed Discretionary							
High	0	0	0	0	0	0	0
Moderate	0	94,200	0	0	0	0	0
Low/unknown	0	0	0	0	0	0	0
Open: No Surface Occupancy							
High	0	0	0	0	0	0	0
Moderate	300	0	32,000	32,100	42,100	32,000	42,400
Lowfunknown	0	0	0	0	0	0	0
Open: Standard Lease Terms							
High	0	0	0	0	0	0	0
Moderate	0	0	0	0	0	0	0
Low/unknown	0	0	0	0	0	0	0
Open: Additional Restrictions							
High	0	0	0	0	0	0	0
Moderate	93,900	0	62,200	62,100	52,100	62,200	51,800
Low/unknown	0	0	0	0	0	0	0

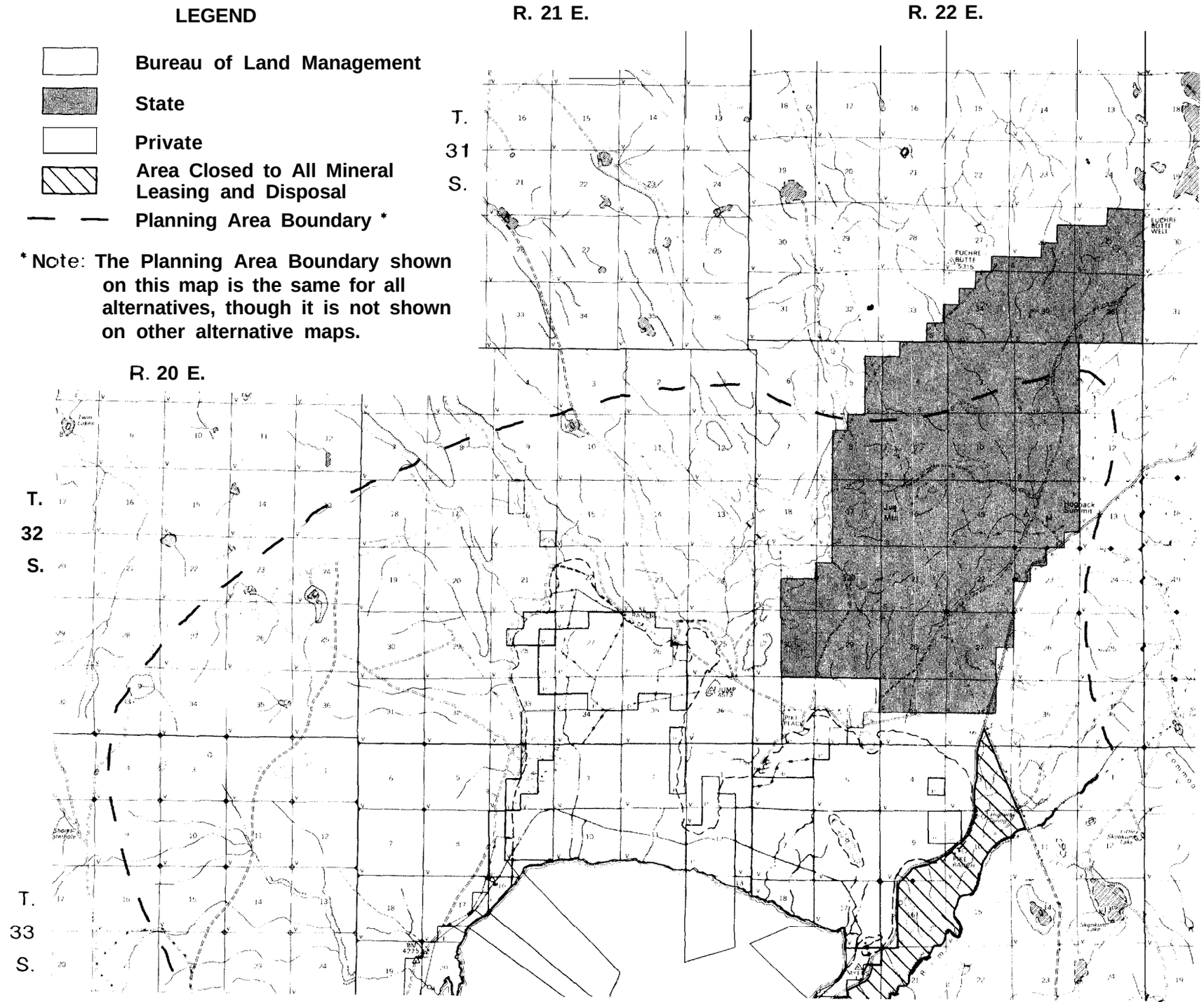
Appendix **B**
Maps

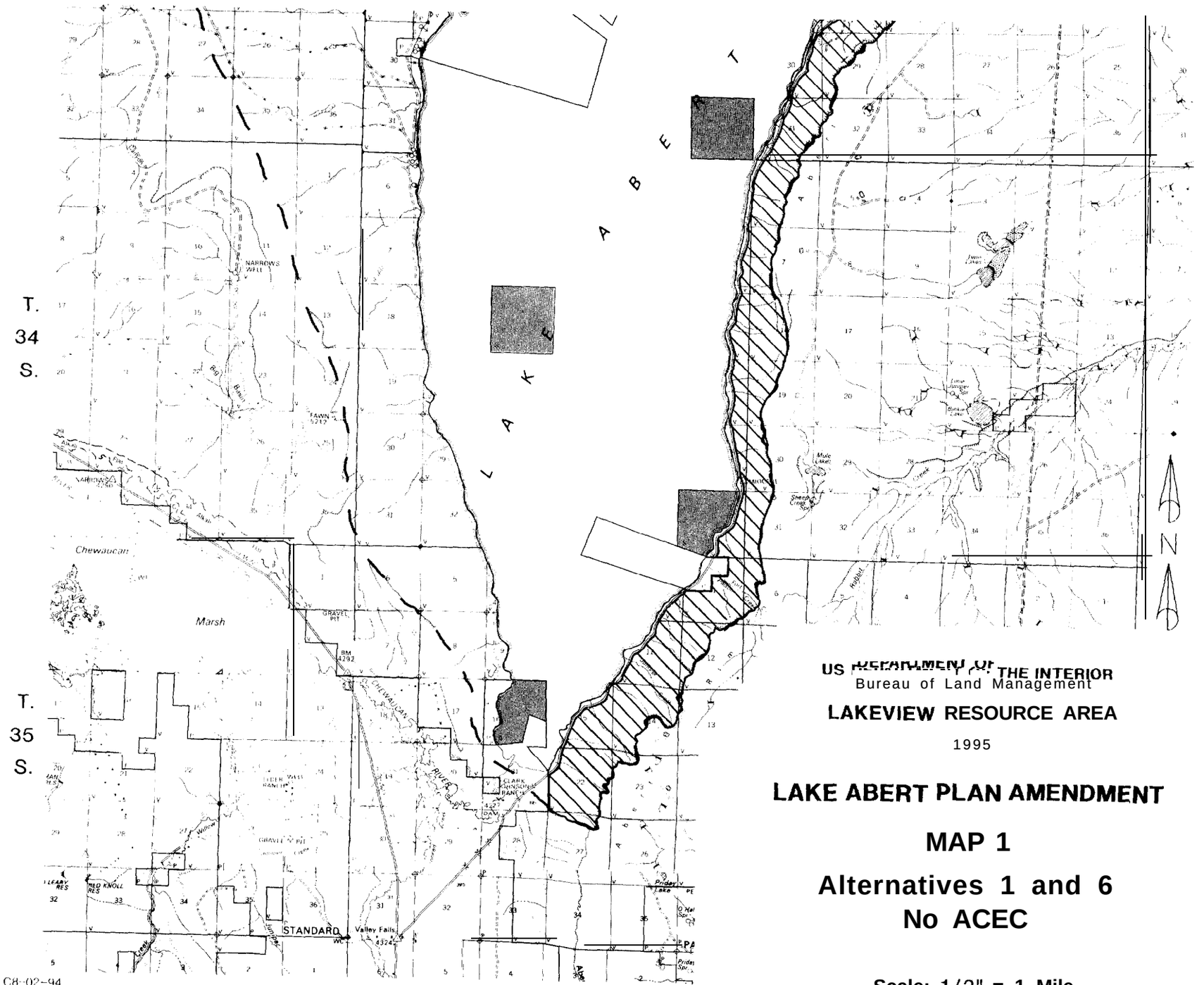
Map No.	Map Name	
1.	Alternatives 1 and 6 - No ACEC	B-2
2.	Abert Rim WSA and Lake Abert Archaeological District..	B-4
3.	Existing VRM Classifications	B-5
4.	Alternative 2 ACEC Boundary	B-6
5.	Alternative 3 ACEC Boundary	B-8
6.	Alternative 4 ACEC Boundary	B-10
7.	Alternative 5 ACEC Boundary	B-12
8.	Alternative 7 ACEC Boundary	B-14
9.	Proposed Visual Resource Management (VRM Classes)	B- 16
10.	Land Ownership and Allotment Boundaries	B-19
11.	Mineral Potential	B-20

LEGEND

- Bureau of Land Management
- State
- Private
- Area Closed to All Mineral Leasing and Disposal
- Planning Area Boundary *

* Note: The Planning Area Boundary shown on this map is the same for all alternatives, though it is not shown on other alternative maps.





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LAKEVIEW RESOURCE AREA

1995

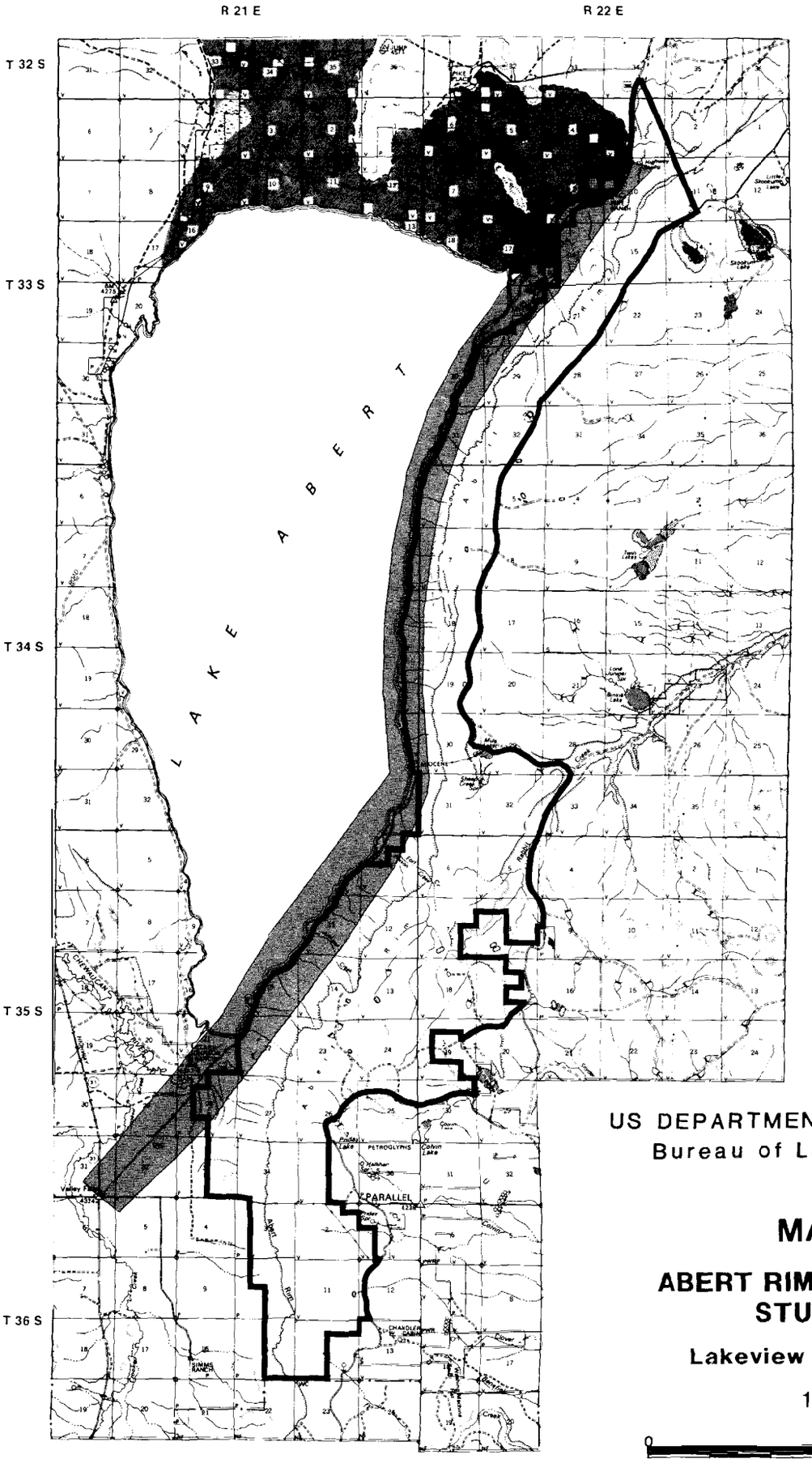
LAKE ABERT PLAN AMENDMENT

MAP 1

Alternatives 1 and 6
No ACEC

Scale: 1/2" = 1 Mile

C8-02-94



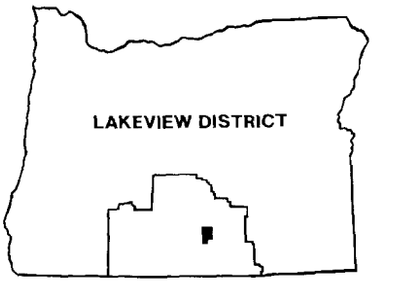
N

Legend

Archaeological District

Dry Lake

WSA Boundary



C08-2-94

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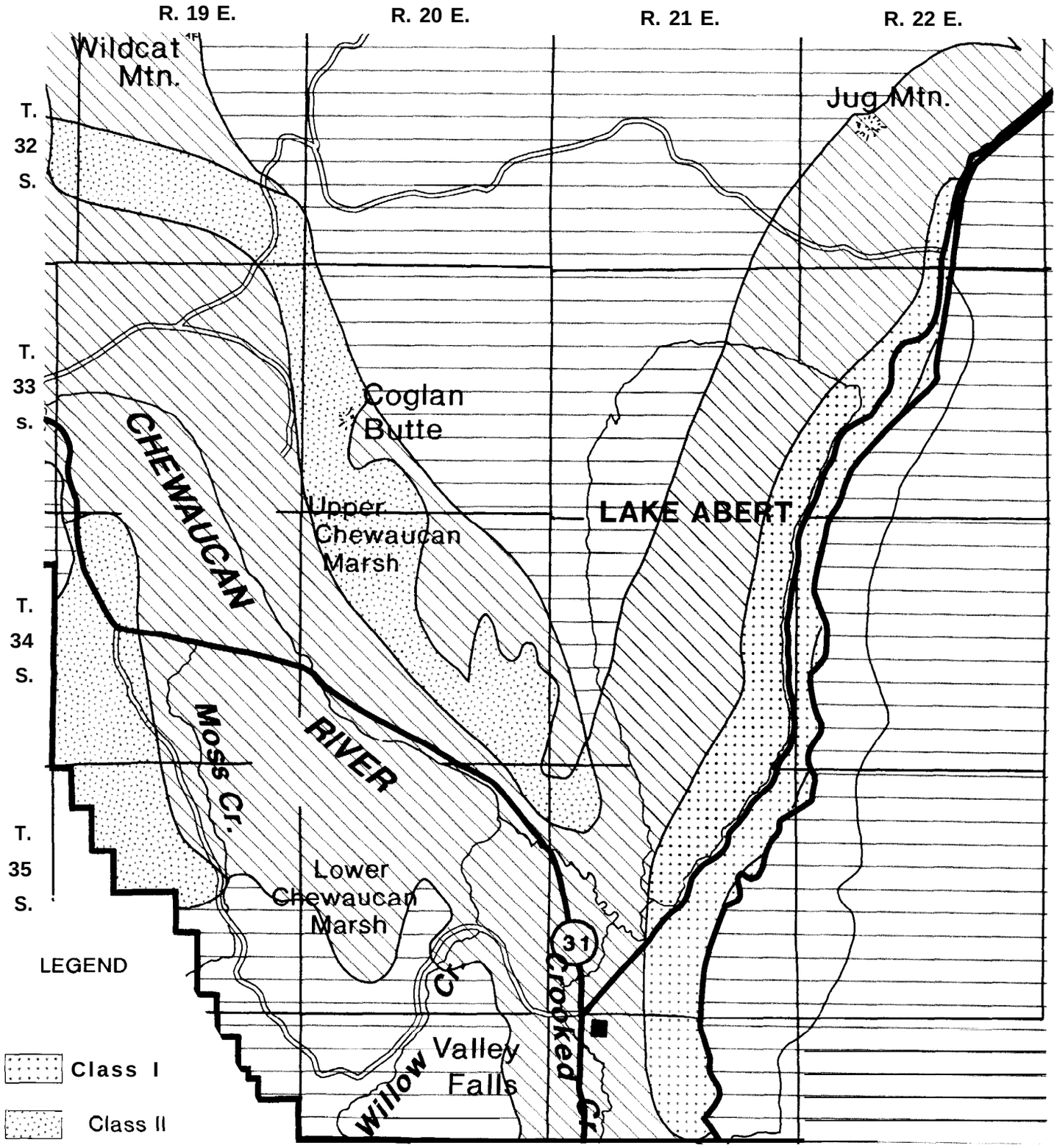
MAP 2

ABERT RIM WILDERNESS STUDY AREA

Lakeview Resource Area

1994

0 3 6
MILES



LEGEND

- Class I
- Class II
- Class III
- Class IV

N

1 0 1

SCALE IN MILES

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LAKEVIEW RESOURCE AREA

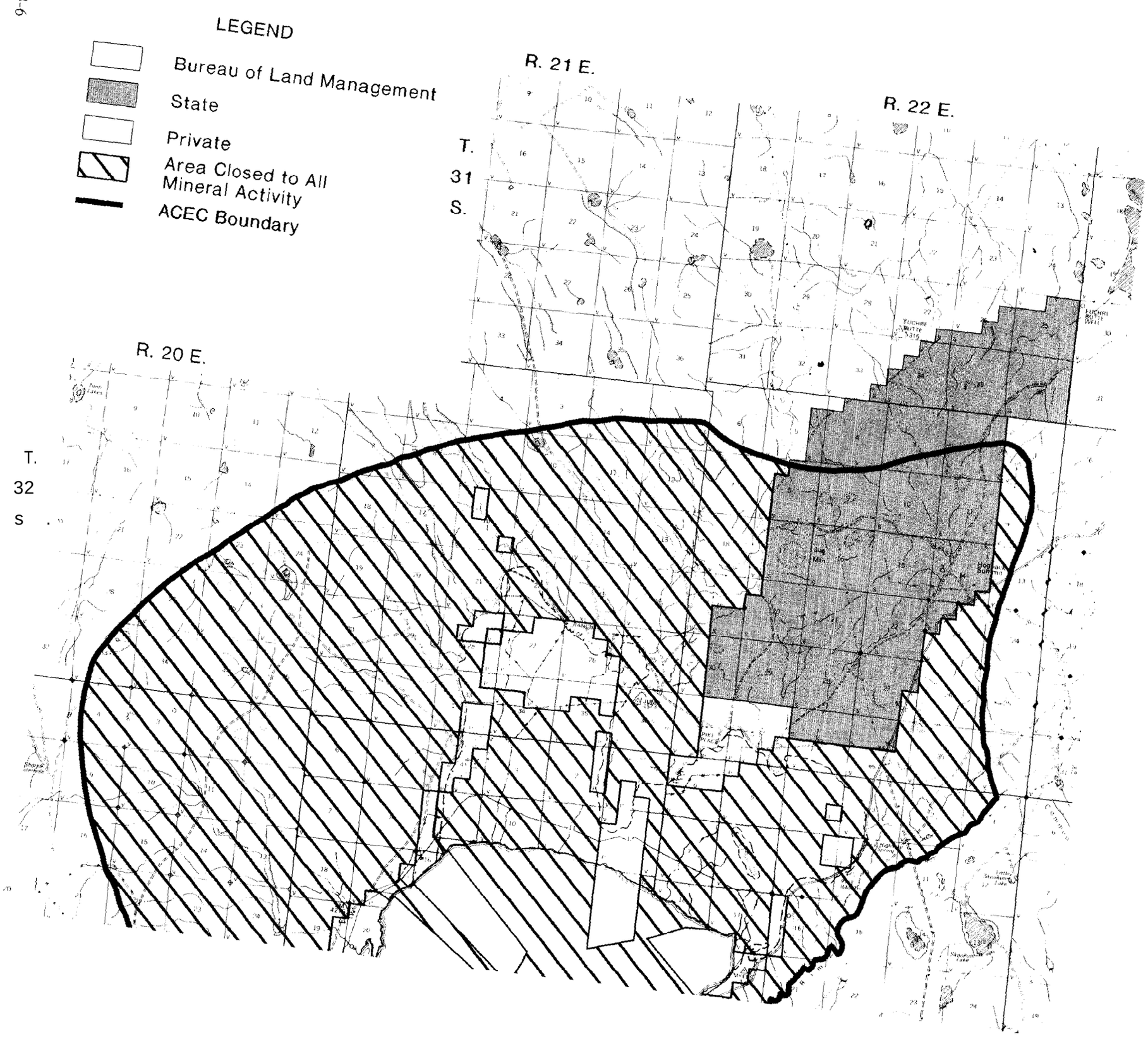
1995

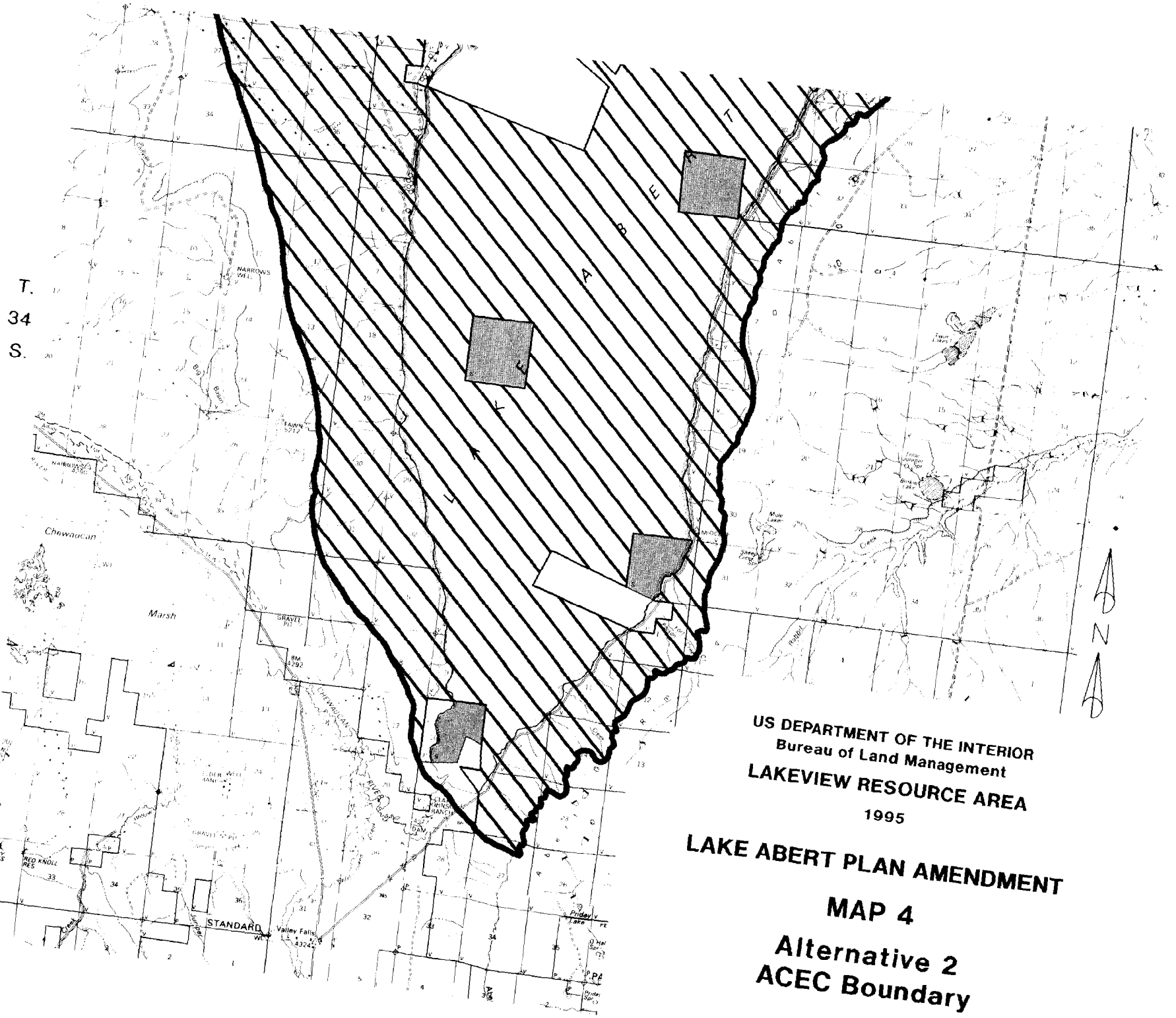
LAKE ABERT PLAN AMENDMENT

MAP 3

Existing VRM Classes

C8-02-94


LEGEND
Bureau of Land Management
State
Private
Area Closed to All Mineral Activity
ACEC Boundary
R. 21 E.
R. 22 E.
R. 20 E.
T. 31 S.
T. 32 S.
T. 33 S.



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1995

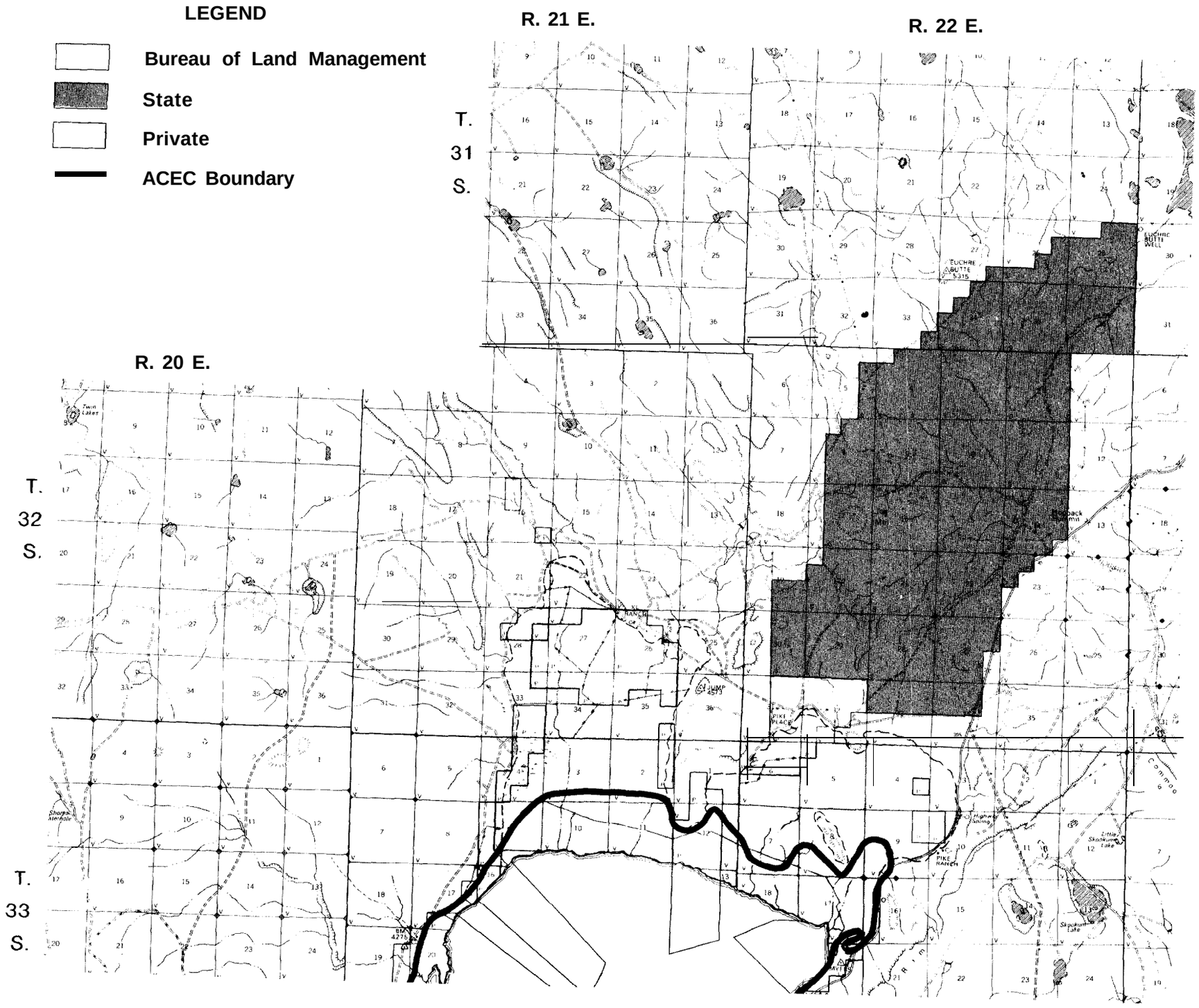
LAKE ABERT PLAN AMENDMENT

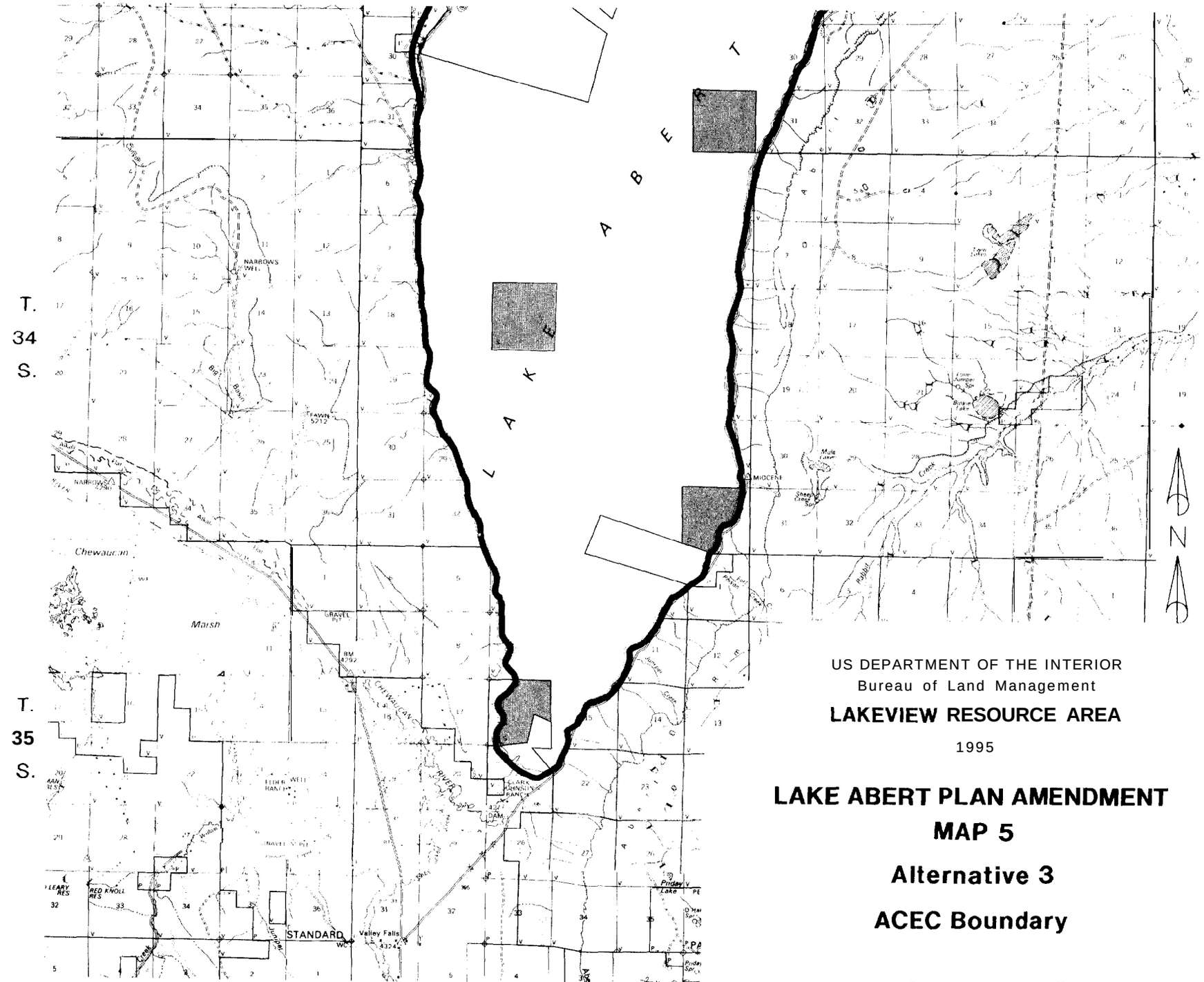
MAP 4

Alternative 2
ACEC Boundary

Scale: 1/2" = 1 Mile

C8-02-94


LEGEND
Bureau of Land Management
State
Private
ACEC Boundary
R. 21 E.
R. 22 E.
R. 20 E.
T. 31 S.
T. 32 S.
T. 33 S.



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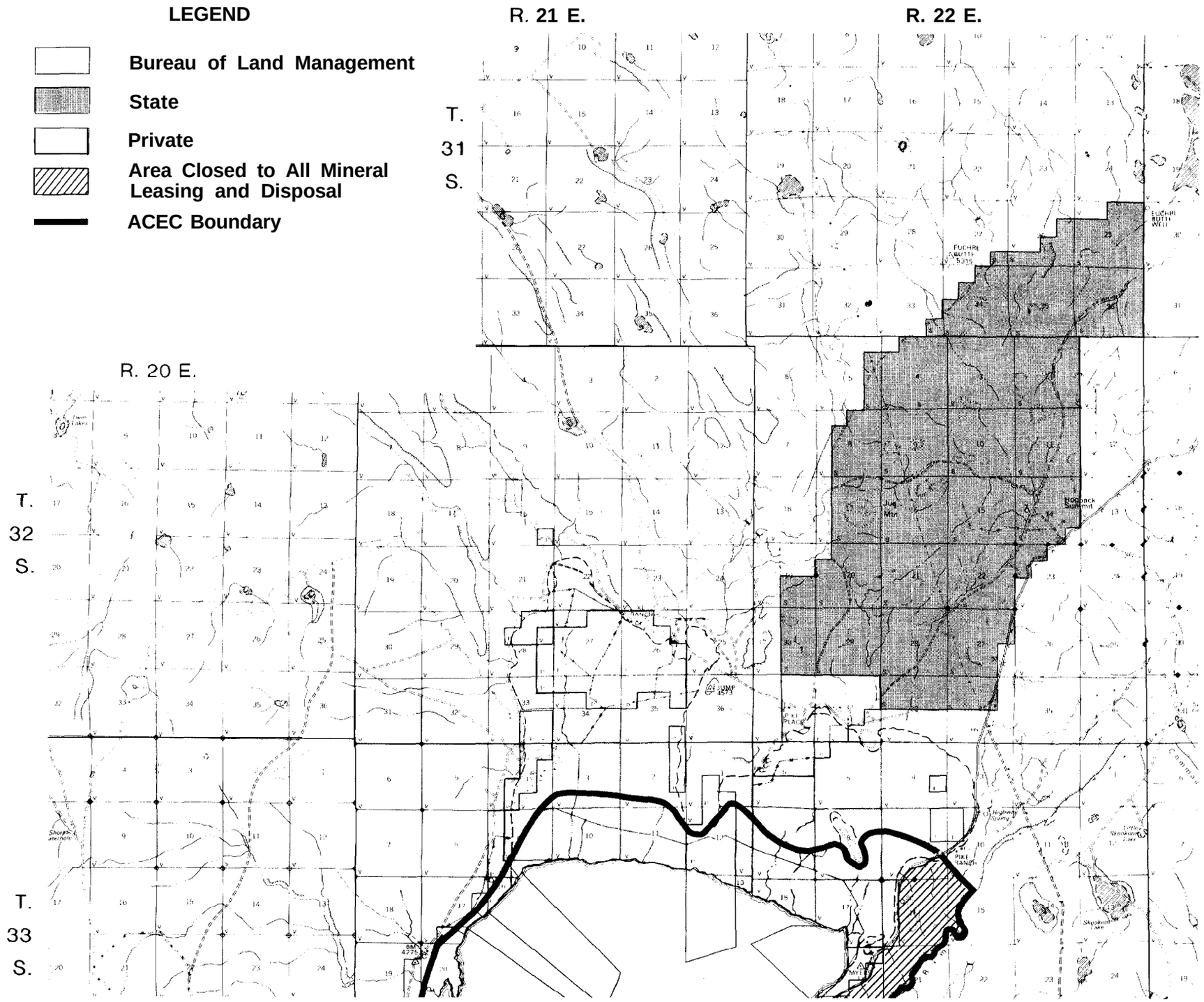
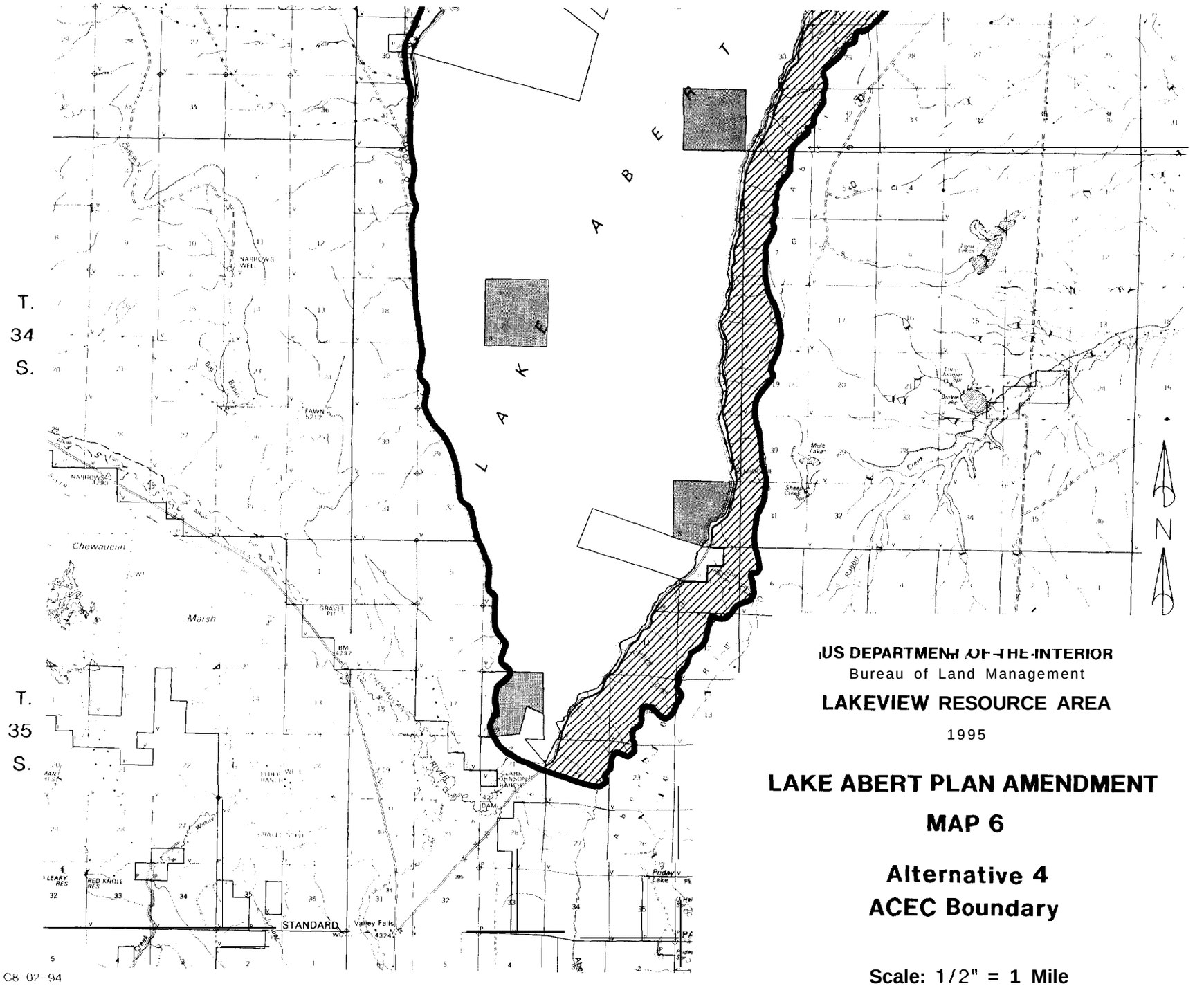
LAKE ABERT PLAN AMENDMENT
MAP 5
Alternative 3
ACEC Boundary

Scale: 1/2" = 1 Mile

C8-02-94


LEGEND
Bureau of Land Management
State
Private
Area Closed to All Mineral Leasing and Disposal
ACEC Boundary
R. 21 E.
R. 22 E.
R. 20 E.
T. 31 S.
T. 32 S.
T. 33 S.
FUCHRE BUTTE WELL
FUCHRE BUTTE
Jug Mtn
Hogback Summit
JUMP
PIKE RANCH



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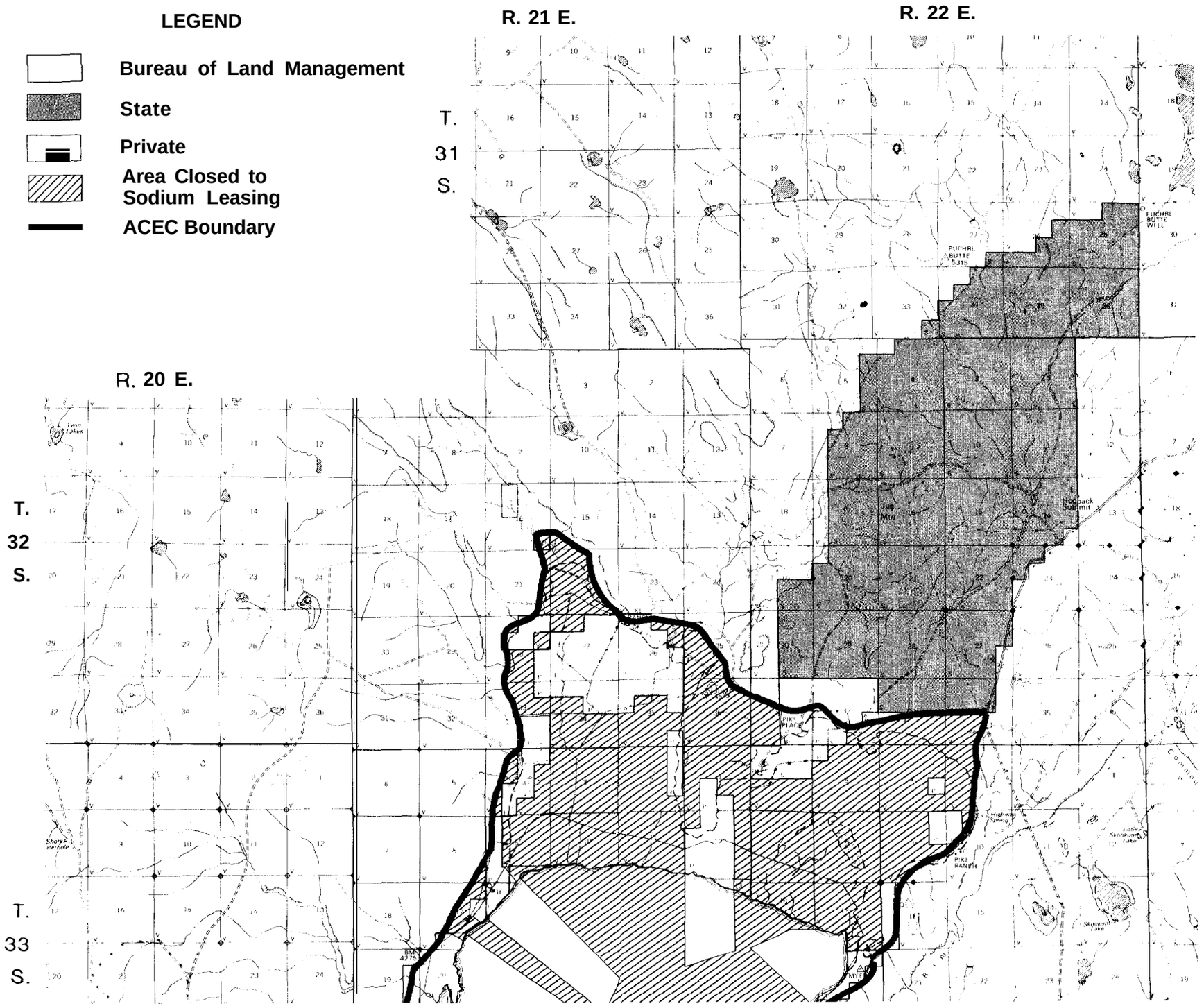
LAKE ABERT PLAN AMENDMENT

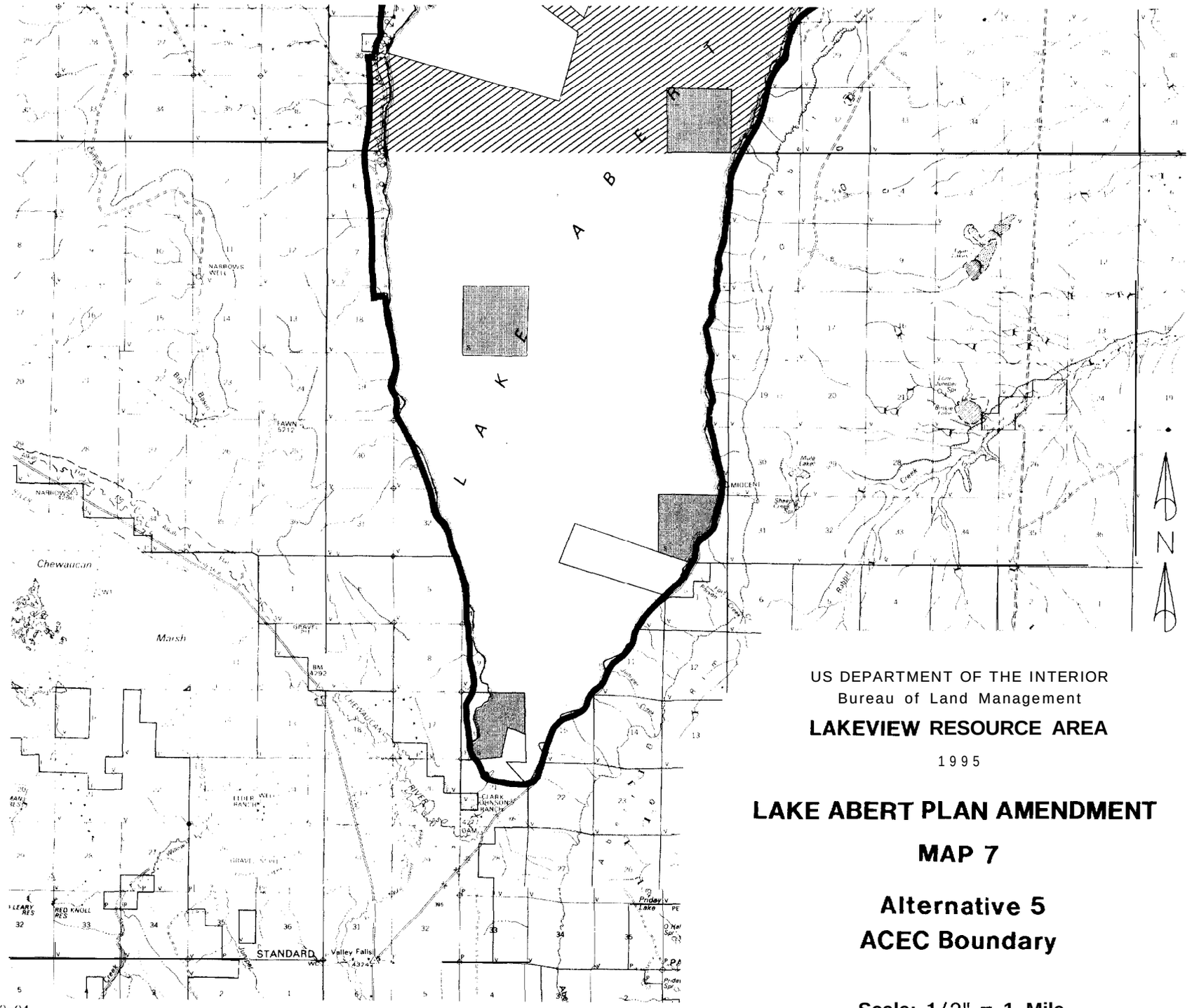
MAP 6

Alternative 4
ACEC Boundary

Scale: 1/2" = 1 Mile

C8-02-94


LEGEND
Bureau of Land Management
State
Private
Area Closed to Sodium Leasing
ACEC Boundary
R. 20 E.
R. 21 E.
R. 22 E.
T. 31 S.
T. 32 S.
T. 33 S.
EUCHRE BUTTE WELL
EUCHRE BUTTE
Hogback Summit
PIKE PLACE
PIKE RANCH



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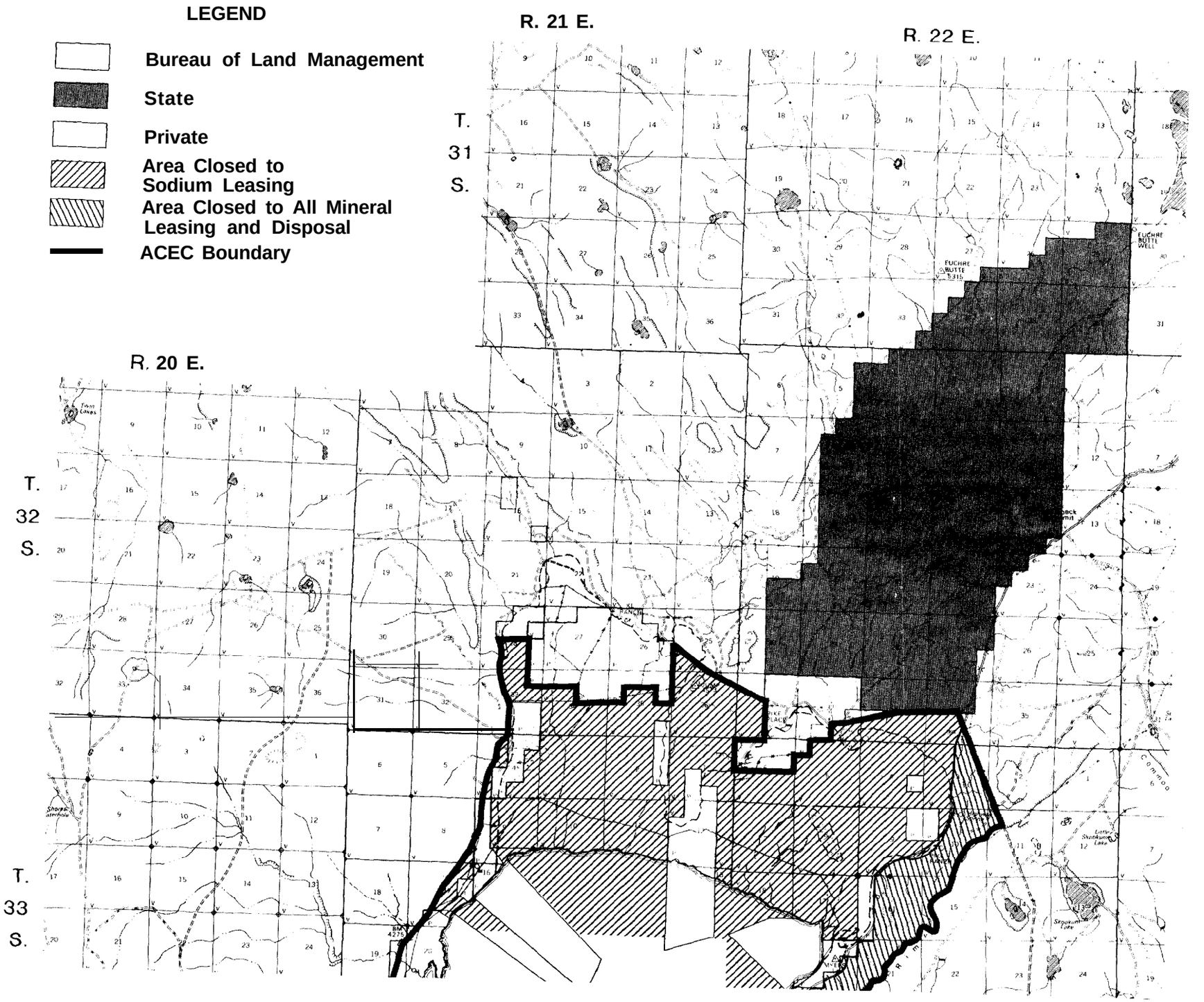
LAKE ABERT PLAN AMENDMENT

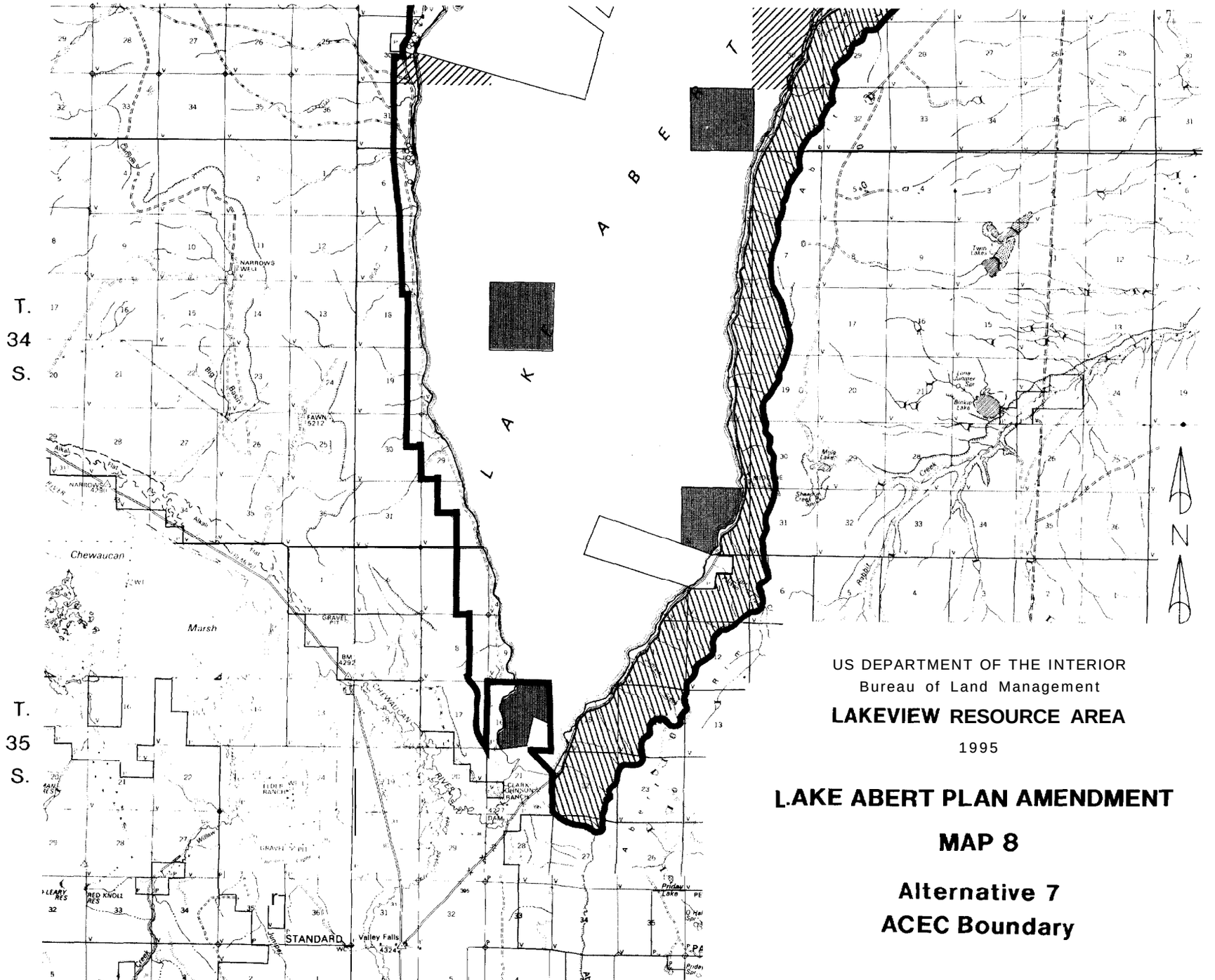
MAP 7

Alternative 5
ACEC Boundary

Scale: 1/2" = 1 Mile

C8-02-94


LEGEND
Bureau of Land Management
State
Private
Area Closed to Sodium Leasing
Area Closed to All Mineral Leasing and Disposal
ACEC Boundary
R. 21 E.
R. 22 E.
R. 20 E.
T. 31 S.
T. 32 S.
T. 33 S.
FUCHRE BUTTE WELL
FUCHRE BUTTE



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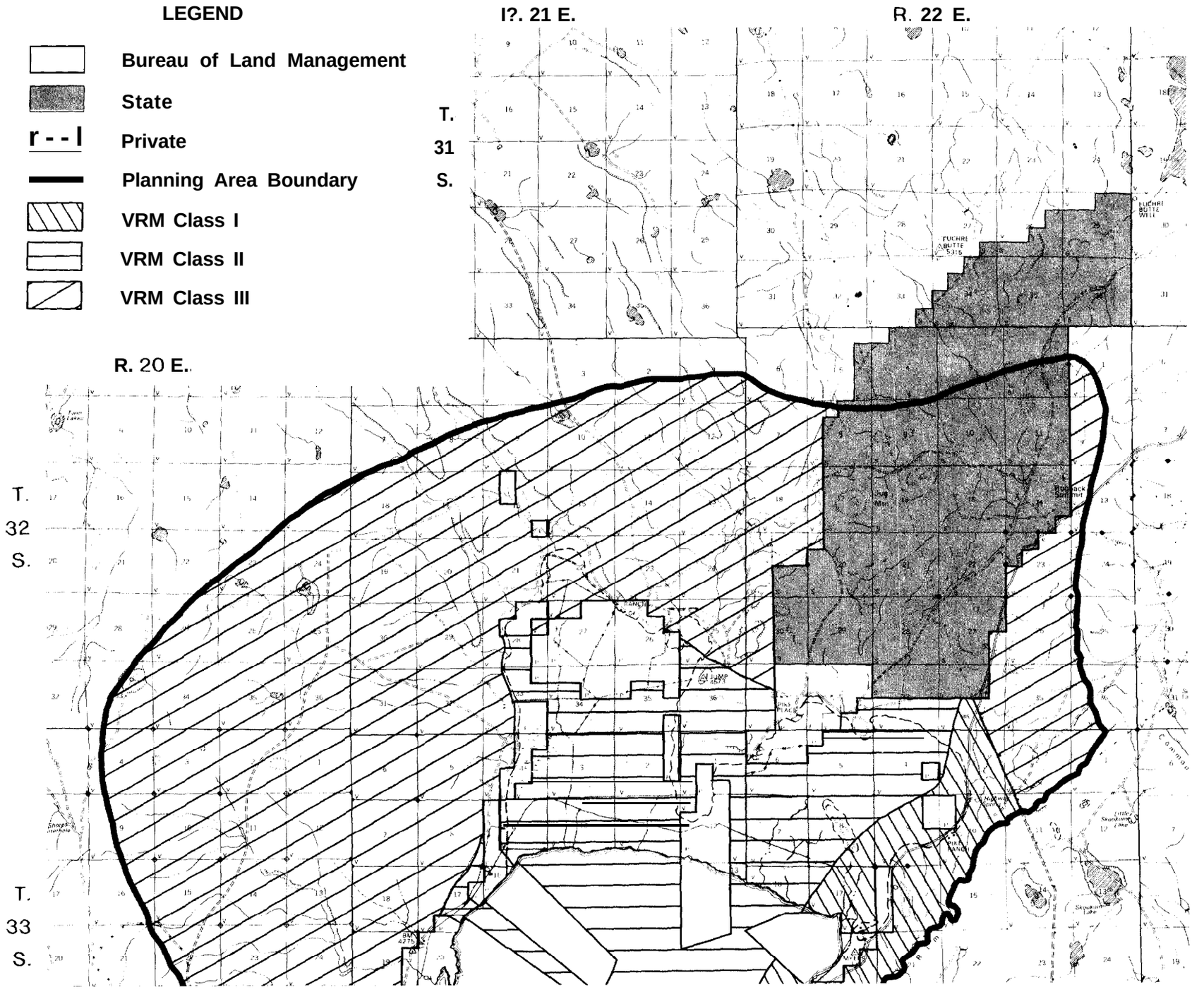
LAKE ABERT PLAN AMENDMENT

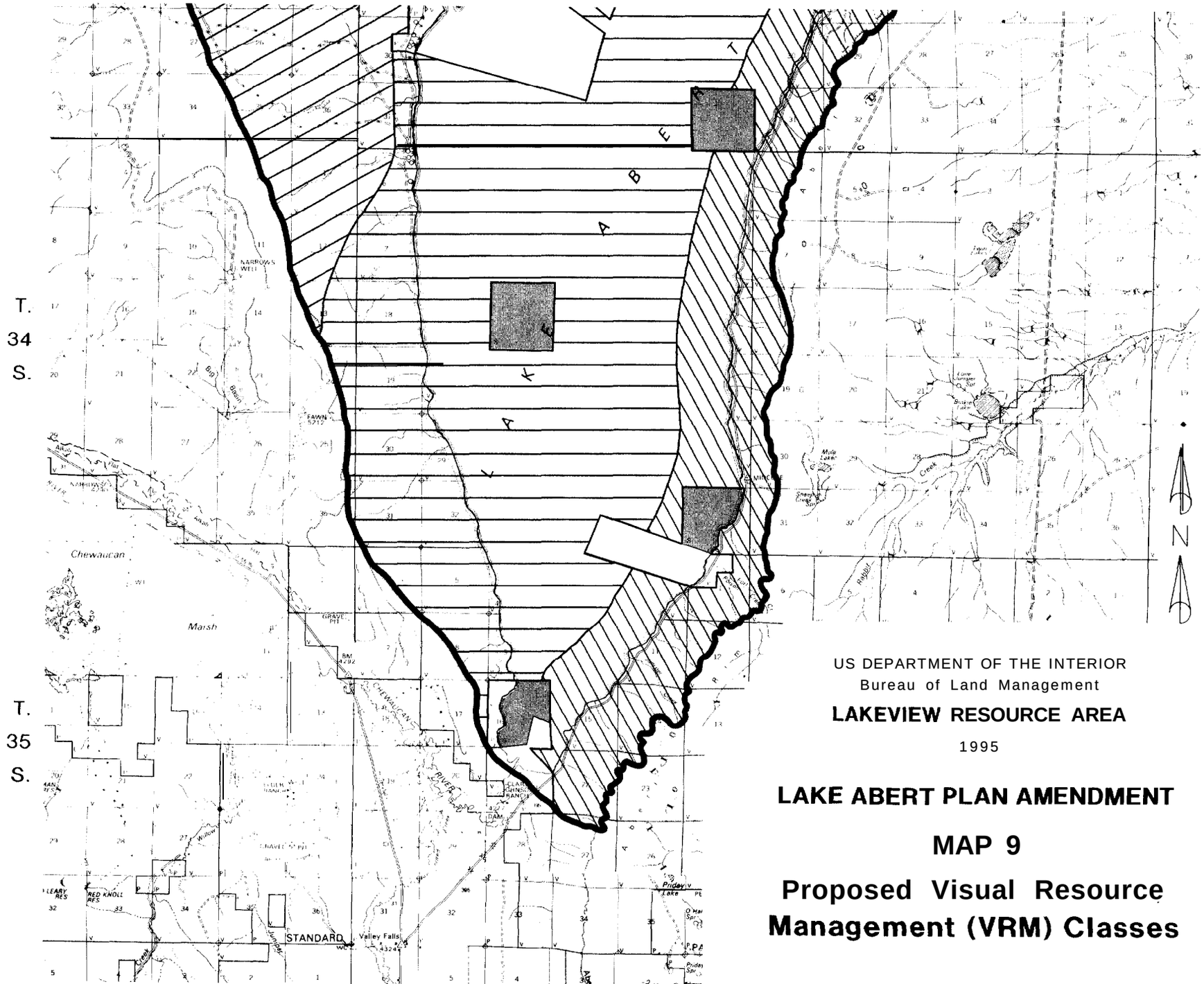
MAP 8

Alternative 7
ACEC Boundary

Scale: 1/2" = 1 Mile

C8-02-94


LEGEND
Bureau of Land Management
State
Private
Planning Area Boundary
VRM Class I
VRM Class II
VRM Class III
I?. 21 E.
R. 22 E.
R. 20 E..
T. 31 S.
T. 32 S.
T. 33 S.



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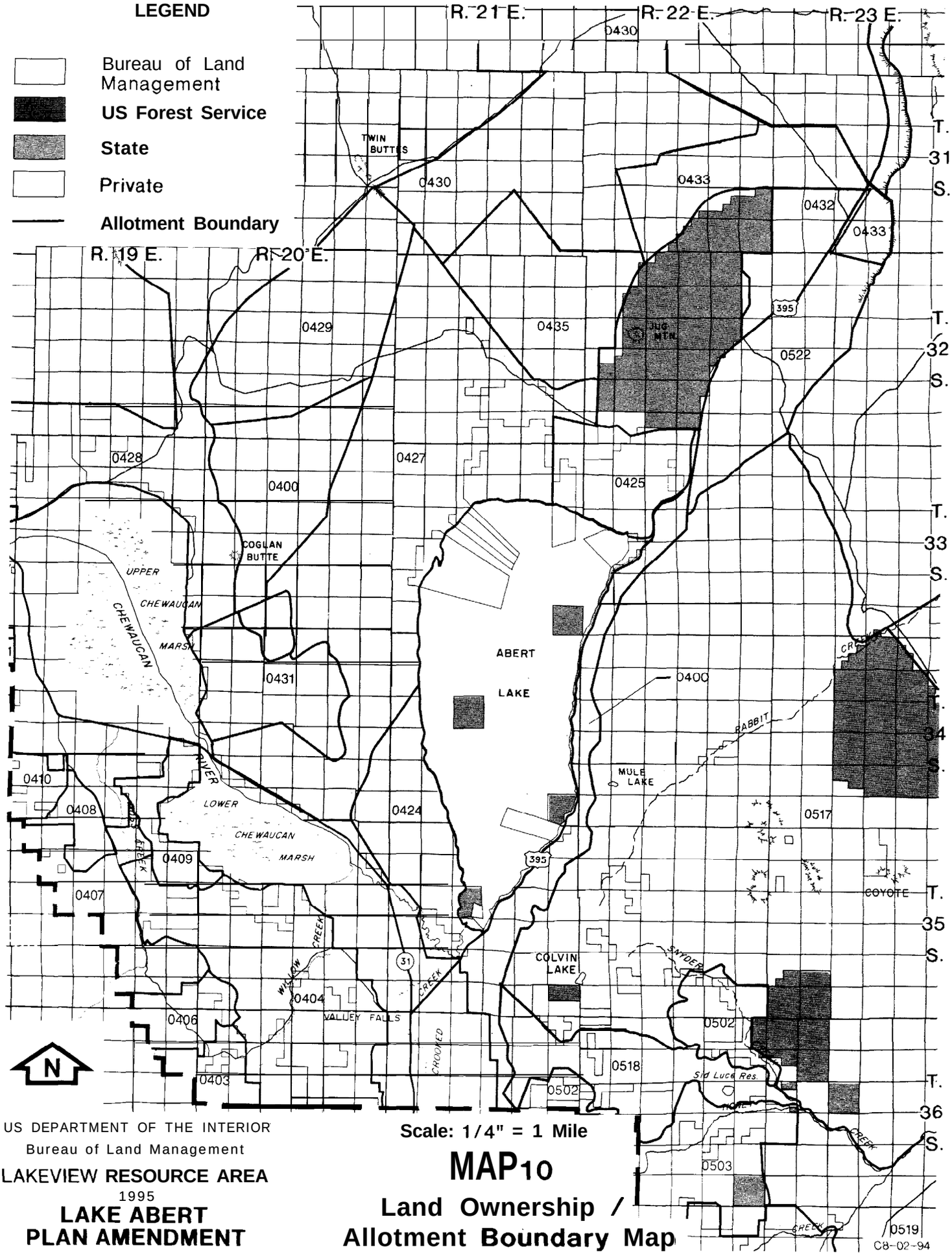
LAKE ABERT PLAN AMENDMENT

MAP 9

Proposed Visual Resource Management (VRM) Classes

Scale: 1/2" = 1 Mile

08-02-94



US DEPARTMENT OF THE INTERIOR
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LAKEVIEW RESOURCE AREA
1995
LAKE ABERT PLAN AMENDMENT

Scale: 1/4" = 1 Mile

MAP 10

Land Ownership / Allotment Boundary Map

C8-02-94

LEGEND

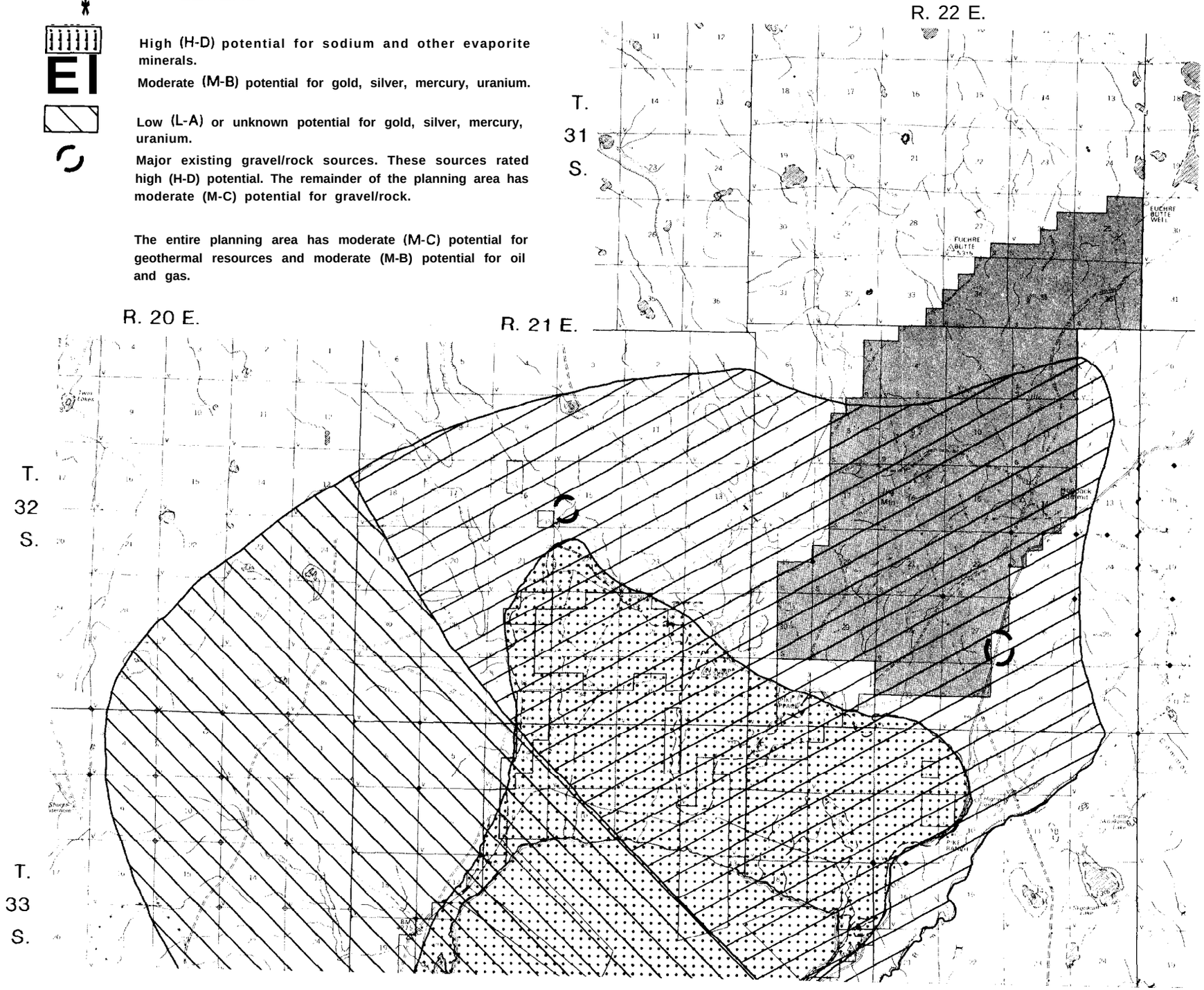
High (H-D) potential for sodium and other evaporite minerals.

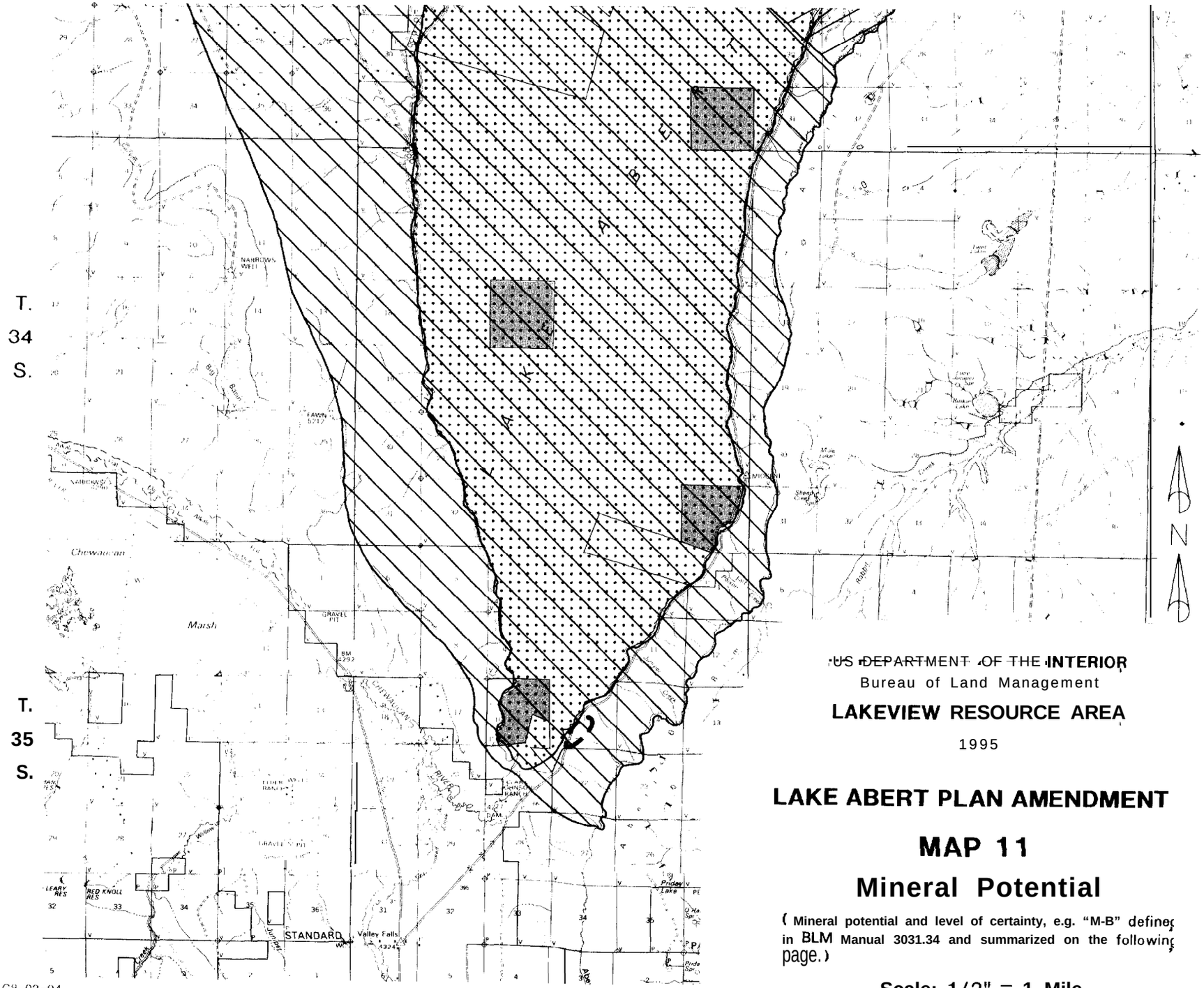
Moderate (M-B) potential for gold, silver, mercury, uranium.

Low (L-A) or unknown potential for gold, silver, mercury, uranium.

Major existing gravel/rock sources. These sources rated high (H-D) potential. The remainder of the planning area has moderate (M-C) potential for gravel/rock.

The entire planning area has moderate (M-C) potential for geothermal resources and moderate (M-B) potential for oil and gas.





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LAKEVIEW RESOURCE AREA

1995

LAKE ABERT PLAN AMENDMENT

MAP 11

Mineral Potential

(Mineral potential and level of certainty, e.g. "M-B" defined in BLM Manual 3031.34 and summarized on the following page.)

Scale: 1/2" = 1 Mile

C8-02-94

Appendix C
Ten Year Mineral Development Scenarios

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Introduction

This appendix describes the reasonably foreseeable (RFD) scenarios for the exploration and development of sodium compounds and common variety sand, gravel and rock. Reasonably foreseeable exploration scenarios for geothermal resources, oil and gas, and gold are also discussed. The purpose of the reasonably foreseeable development scenarios (RFD) is to provide models that anticipate the level and type of future mineral activity in the planning area, and will serve as a basis for cumulative impacts analysis. However, to comply with the Supplemental Program Guidance for Fluid Minerals (Manual Section 1624.2), the potential surface impacts associated with the discovery and development of small oil/gas and geothermal fields, and a wildcat oil/gas well, are also discussed, even though these activities are not anticipated. The current level of activity is discussed in Chapter 3. "Affected Environment".

Scope

The development scenarios are limited in scope to BLM administered lands the planning area. The reasonable foreseeable development is based on the known or inferred mineral resource capabilities of the lands involved, and applies the conditions and assumptions discussed under Future Trends and Assumptions. Changes in available geologic data and/or economic conditions would alter the RFD, and some deviation is to be expected over time. These scenarios apply to alternatives that would allow these actions.

Leasable Mineral Resources

Reasonably Foreseeable Development of Sodium Compounds and Associated Minerals

Future Trends and Assumptions

The demand for soda ash (sodium carbonate) and caustic soda (sodium hydroxide) is increasing, especially in the Pacific Northwest and the Pacific Rim countries. Because acid-based chemicals used in the bleaching of paper pulp produce dioxins, alkali bleaching is ecologically preferable. Besides its use in the pulp and paper industry, sodium carbonate is used extensively in making glass, caustic soda, soaps, and detergents, and for flue gas desulfurization. All soda ash production in the United States is from Wyoming and southern California. As soda ash and caustic soda prices increase and overland transportation costs rise, Oregon deposits, such as the one at Lake Abert, may have commercial significance because of their proximity to the pulp markets in the Pacific Northwest, glass container plants in northern California, Portland port facilities that handle about 60% of the U.S. soda ash export business, and the port of Coos Bay. Considering the increasing demand for soda ash, Lake Abert's sodium potential, and its proximity to use areas and shipping ports, it is projected that exploration will resume and lease applications will be filed on Lake Abert.

Sodium Exploration Scenarios

Sampling of lake water is done using a small row/motor boat or floating platform and hand-operated PVC or stainless steel bailer. Shallow (tens of feet) sediment core samples can be taken from a boat or platform, or land, using piston or thin wall sediment samplers. Hand or hand-held power augers or truck-mounted power augers are also used when taking shallow samples on land.

Deeper subsurface exploration involves the drilling of core holes using a truck-mounted drilling rig, or if done over water, a raft or platform mounted rig. Drilling along the edges of the lake or on the playa using truck-mounted drilling rigs could be done using existing roads and trails or might necessitate the construction of short spur roads from the existing access to the drill sites. If drilling were to occur in these areas during wet periods, roads and drill pads would have to be built up to support the weight of the drilling rig and supply trucks.

It is projected that, *over* the life of the plan, 10 - 20 prospecting permit applications will be filed to perform lake water and shallow sediment sampling, and drill a total of 5 - 15, 100 - 1,000 foot-deep exploratory holes. This could involve the construction of 1/4 to 1 mile of spur road (10 - 12 feet wide) construction, and a total of less than 2 acres for drill pad construction.

Sodium Development Scenario

Presently, U.S. soda ash production comes from two areas; the Green River Basin in Wyoming, and Searles and Owens Lakes in California, In Wyoming, trona, the principal ore from which the soda ash is made, occurs in several beds of varying thickness and covers an area of over 1,000 square miles. The deposit is buried, and extends from 800 to over 2,000 feet in depth. Most of it is mined using room and pillar underground methods, while solution mining is used to recover deeply buried trona. Using an array of injection and recovery wells, dilute sodium hydroxide solvent is introduced under pressure to dissolve the underlying trona. At Searles Lake, a dry lakebed, subterranean brines between 50 and 350 feet below the surface are extracted using an array of injection and recovery wells (numbering in the hundreds), pumps, and pipelines located in several areas the lakebed. At Owens Lake, soda ash has been mined by digging perimeter channels that allow the interstitial fluids to drain, and harvesting the soda ash with front-end loaders (Kostick, 1992). A current proposal at Owens Lake involves the construction of cells or panels in the lake and mining a concentrated deposit of porous, crystalline trona, saturated with a highly concentrated brine, using a floating dredge, and transporting the slurry through a pipeline to a stockpile area and ultimately to a processing plant.

Because the Lake Abert basin is younger, and the lake and its drainage system are less extensive than the Green River Basin in Wyoming, deep, thick deposits are not anticipated. One hole 30 feet deep was bored and sampled in the middle of the playa at the north end of the lake. While thin surface encrustations contained 39% soluble salts (on an anhydrous basis), the salt content of the subsurface muds was found to decrease rapidly from 8% in the first foot to 4% at a depth of 12 feet, and to only 1% at 30 feet (Allison and Mason, 1947). However, no deep exploration holes have been drilled in the area, and the potential for the occurrence of economic deposits of soda ash at depth is unknown. Geologically, Lake Abert is very similar to the Pleistocene-age Searles and Owens Lakes. Whether or not there are extensive subterranean brines, as there are with Searles Lake, is also unknown.

It is known that the waters of Lake Abert contain large quantities of sodium salts. The salts in the playas are redissolved during periods of high water, and recharge the lake waters. Salts in the saturated lake-bottom sediments also diffuse into the waters above. In addition, salts are introduced into the system by springs and inflow from the Chewaucan River, and possibly transported in from the Summer Lake Basin by the prevailing northwesterly summer winds. While future exploration could discover deposits similar to those described in Wyoming and California, the following reasonably foreseeable development scenario is based upon the currently known mode of occurrence of sodium compounds in Lake Abert:

> One or more pumping inlet stations could be constructed, probably in the deeper parts of the lake. Submerged pipelines could transport lake water to one or more large, shallow evaporation ponds where the salts could be concentrated. The total area of the pond(s) could range from 2 to 4 square miles. They could be located within the lakebed itself and/or on the adjacent playa. The concentrated solution would be piped into secondary/tertiary evaporation ponds where the concentrate/precipitate would be loaded and transported offsite for processing. Alternatively, the concentrate/precipitate could be processed onsite, which could necessitate the construction of a processing plant. The area required for an onsite processing facility, including evaporation pond, pumping facilities and pipelines, roads, power lines, the plant itself, and loading facilities, could range from 1 to 3 square miles. If the processing plant were not constructed, the total area necessary for the secondary/tertiary ponds and appurtenances could be somewhat less.
>
> Depending upon the locations of the various aspects of an operation, new road and pipeline construction could vary from 5 to 15 miles in length, with the widths of disturbed areas ranging up to 40 feet. New power line construction also would range from 5 to 15 miles In some areas, roads, pipelines, and power lines would occupy the same corridor.
>
> Unused brine from the concentrating process would be pumped back onto the playa to dissolve more salts, evaporated in waste ponds ranging in size from 0.25 to 0.5 square mile, or pumped directly back into the lake.
>
> An additional 5 to 20 acres would be needed for a water well, rock source for road and facilities construction, and other miscellaneous purposes.
>
> The product would be shipped by truck or rail. Shipping by rail would necessitate the construction of a rail spur from the Lake Abert area south to Lakeview, with as little as less than a mile, to up to about 20 miles constructed on public land.

Before leasing could take place, the BLM would have to determine that a valuable deposit has, in fact, been discovered, and that the area is chiefly valuable for sodium production compared to other potential resource uses. Also, before any development could take place, a lessee would have to submit a detailed, site-specific mining/processing/reclamation plan, including access,

power. and water requirements, and an environmental review would be conducted. Lease stipulations, and conditions of approval developed in part from mitigation measures identified in the environmental review, would be imposed to prevent unnecessary and undue environmental degradation.

It is projected that two proposals to mine sodium salts from Lake Abert will be received during the life of the plan.

Reasonably Foreseeable Development of Oil and Gas

Future Trends and Assumptions

Considering past exploration and foreseeable development potential in the planning area, activity over the next 10 to 15 years is expected to be sporadic. Based upon the geologic characteristics of a southeastern Oregon hydrocarbon play identified by the U.S. Geological Survey (Tenny and Parrish, 1987), it is likely that if hydrocarbons exist in the planning area, they are in the form of natural gas. While impacts associated with the drilling of a wildcat well and the development of a small gas field are presented, it is not anticipated that these activities will occur over the life of this plan.

Oil and Gas Exploration Scenario

Geophysical Exploration. Geophysical exploration is conducted to try to determine the subsurface structure of an area. Three geophysical survey techniques are generally used to define subsurface characteristics through measurements of the gravitational field, magnetic field, and seismic reflections.

Gravity and magnetic field surveys involve small portable measuring units which are easily transported via light off-road vehicles, such as four-wheel drive pickups and jeeps, or aircraft. Both off-road and on-road travel could be necessary in these two types of surveys. Usually a three-man crew transported by one or two vehicles is required. Sometimes small holes (approximately 1 inch by 2 inches by 2 inches) are hand dug for instrument placement at the survey measurement points. These two survey methods can make measurements along defined lines, but it is more common to have a grid of discrete measurement stations.

Seismic reflection surveys are the most common of the geophysical methods, and they produce the most detailed subsurface information. Seismic surveys are conducted by sending shock waves, generated by a small explosion or through mechanically beating the ground surface with a thumping or vibrating platform, through the earth's surface. The thumper and vibrator methods pound or vibrate the ground surface to create a shock wave. Usually four large trucks are used, each equipped with pads about 4-foot square. The pads are lowered to the ground, and the vibrators are electronically triggered from the recording truck. Once information is recorded, the trucks move forward a short distance and the process is repeated. Less than 50 square feet of surface area is required to operate the equipment at each recording site.

The small explosive method requires that charges be detonated on the surface or in a drill hole. Holes for the charges are drilled utilizing truck-mounted or air portable drills to drill small-diameter (2-6 inches) holes to depths of 100-200 feet. Generally 4-12 holes are drilled per mile of line and a 5-50-pound charge of explosives is placed in the hole, covered, and detonated. The created shock wave is recorded by geophones placed in a linear fashion on the surface. In rugged terrain, a portable drill carried by helicopter can sometimes be used. A typical drilling seismic operation may utilize 10-15 men operating 5-7 trucks. Under normal conditions, 3-5 miles of line can be surveyed daily using this method. The vehicles used for a drilling program may include heavy truck-mounted drill rigs, track-mounted air rigs, water trucks, a computer recording truck, and several light pickups for the surveyors, shot hole crew, geophone crew, permit man, and party chief.

Public and private roads and trails are used where possible. However, off-road cross-country travel is also necessary in some cases. Graders and dozers could be required to provide access to remote areas. Several trips a day are made along a seismograph line. usually resulting in a well defined 2-track trail. Drilling water, when needed, is usually obtained from private landowners.

The surface charge method utilizes 1-5-pound charges attached to wooden laths 3-8 feet above the ground. Placing the charges lower than 6 feet usually results in the destruction of vegetation, while placing the charges higher, or on the surface of deep snow, results in little visible surface disturbance.

It is anticipated that 2 Notices of Intent, involving seismic reflection and gravity/magnetic field surveys will be filed during the life of this plan.

Drilling Phase. Once an application for a drilling permit (APD) is approved, the operator may begin construction activities in accordance with stipulations and conditions. When a site is chosen that necessitates the construction of an access road, the length of road may vary, but usually the shortest feasible route is selected to reduce the haul distance and construction costs. Environmental factors or a landowner's wishes may dictate a longer route in some cases. Existing roads, and new short (approximately one-quarter mile) roads would be used to access drill site locations.

During the first phase of drilling, the operator would move construction equipment over existing maintained roads to the point where the access road begins. No more than a quarter of a mile of moderate duty access road with a rock surface 18 to 20 feet wide would be anticipated to be constructed. The total surface disturbance width would average 40 feet with ditches, cuts and fill. The second part of the drilling phase would be the construction of the drilling pad or platform. The likely duration of well development, testing, and abandonment would be less than 8 months per drill site. The total disturbance for each exploratory well and any new road constructed to that drill site probably would be no more than 6 acres.

Field Development and Production Scenario

Because of the low potential for development of hydrocarbons, (even though the potential for occurrence is moderate), the discovery of a producible oil and gas field during the period covered by this plan is not anticipated. However, if a discovery were to be made, the following scenario describes operations and impacts associated with field development and production:

> The minimum size that would be economic would be a field containing reserves of 50-60 Bcf of gas over a productive lifespan of IO years. The total area of such a field would be 200 acres with a likely well spacing of 160 acres. The field would require four development wells in addition to the discovery well. Each development would require one-quarter mile of road. Development well access roads would be cinder or gravel surfaced and would have a width of about 20 feet. The width of the surface disturbance associated with roads would average 40 feet. Produced gas would be carried by pipelines which could possibly be linked the existing and proposed gas transmission lines in the planning area. Average pipeline length is estimated at 30 to 40 miles. The width of surface disturbance for pipelines would average 30 feet. Any produced oil would be trucked to refineries outside of Oregon. Well servicing requirements would be provided by established service companies.
>
> The total surface disturbance for well pads would be 8 acres; for roads, 5 acres; field development, 13 acres; and pipelines, 600 acres. The total surface disturbance caused by exploration and development would be 670 acres.

Plugging and Abandonment. Wells that are completed as dry holes are plugged according to a plan designed specifically for the down hole conditions of each well. Plugging is accomplished by the placing of cement plugs at strategic locations downhole and up to the surface. Drilling mud is used as a spacer between plugs to prevent communication between fluid bearing zones. The casing is cut off at least 3 feet below ground level and capped by welding a steel plate on the casing stub. After plugging, all equipment and debris would be removed and the site would be restored as near as reasonably possible to its original condition.

Reasonably Foreseeable Development of Geothermal Resources

Future Trends and Assumptions

With environmental protection and enhancement being a major consideration in the Pacific Northwest, clean, low-impacting energy sources are becoming more important. The energy surplus in the region is expected to be gone near the end of the decade. The abundant geothermal resources thought to be present in the Northwest are essentially undeveloped. To encourage resource development, the Bonneville Power Administration is participating in three geothermal pilot projects in the Pacific Northwest. With this renewed interest in geothermal energy it is anticipated that areas exhibiting geothermal potential will experience an increase in geothermal exploration and possibly development.

While there has been little, if any, geothermal exploration in the Lake Abert area in the past, a University of Oregon graduate student. working with the Oregon Department of Geology and Mineral Industries. is investigating the geothermal potential of several areas in southeast Oregon, including Lake Abert. Low-temperature (66-71°F) thermal springs flow into Lake Abert.

The presence of travertine tuffa (carbonate) deposits along prominent fault traces suggest the possibility of a blind, or hidden, geothermal reservoir.

While some exploration is anticipated within the life of this plan, development of geothermal resources for electrical generation and direct use is not. However, to comply with the Supplemental Program Guidance for Fluid Minerals (Manual Section 1624.2). the potential surface impacts associated with the discovery and development of geothermal resources are given below.

Geothermal Exploration Scenarios

Geophysical/Geochemical Exploration. As with oil and gas, geothermal geophysical operations can take place on leased or unleased public land. Depending upon the status of the land (leased/unleased), the status of the applicant (lessee/nonlessee), and the type of geophysical operation proposed, (drilling/non-drilling), several types of authorizations can be used if the proposed exploration exceeds "casual use", as defined in 43 CFR 3209.0-5(c). In all cases, the authorizations require compliance with the National Environmental Policy Act and approval by the Authorized Officer. As with oil and gas, the operator is required to comply with all terms and conditions of the permits, regulations, and other requirements, including reclamation, prescribed by the Authorized Officer. Monitoring for compliance with these requirements will be done during the execution of the operations and upon completion.

In addition to the geophysical methods discussed in the Oil and Gas section, the following exploration techniques are often employed in geothermal prospecting:

Microseismic: Small seismometers are buried at a shallow depth (hand-dug holes) and transmit signals from naturally-occurring, extremely minor seismic activity (micro-earthquakes) to an amplifier on the surface. Stations are located away from roads to avoid traffic "noise". These units are often backpacked into areas inaccessible to vehicles.

Resistivity: Induced polarization (IP) techniques are used to measure the resistance of subsurface rocks to the passage of an electric current. A vehicle-mounted transmitter sends pulses of electrical current into the ground through two widely spaced electrodes (usually about two miles apart). The behavior of these electrical pulses as they travel through underlying rocks is recorded by "pots" (potential electrodes), small ceramic devices that receive the current at different locations. The electrodes are either short (2-3 feet) rods driven into the ground, or aluminum foil shallowly buried over an area of several square feet. Two or three small trucks transport the crew of 3-5 people to transmitting and receiving sites.

Telluric: A string of "pots" record the variations in the natural electrical currents in the earth. No transmitter is required. Small trucks are used to transport the crew and equipment.

Radiometric: Radioactive emissions (generally radon gas) associated with geothermal resources are usually measured using a hand-held scintillometer, often at hot spring locations. Another method used involves placing plastic cups containing small detector strips sensitive to alpha radiation either on the surface or in shallow hand-dug holes. If holes are dug, they are covered, and the cups left in place for 3-4 weeks. At the end of the sampling period, the cups are retrieved and all holes are backfilled. These surveys can be conducted on-foot or with the aid of light vehicles.

Geochemical Surveys: Geochemical surveys are usually conducted at hot springs by taking water samples directly from the spring. Sampling for mercury associated with geothermai resources is often done by taking soil samples using hand tools. These surveys can be conducted on-foot or with the aid of light vehicles.

Temperature Gradient Drill Hole Surveys: Temperature gradient holes are used to determine the rate of change of temperature with respect to depth. Temperature gradient holes usually vary in diameter from about 3 1/2 - 4 1/2 inches , and from a few hundred feet to about 5000 feet in depth. They are drilled using rotary or coring methods. Approximately one-tenth to one-quarter acre per drill hole would be disturbed. A typical drill site could contain the drill rig, most likely truck-mounted, water tank(s), fuel tank, supply trailer, and a small trailer for the workers. Drilling mud and fluids would be contained in earthen pits or steel tanks. Water for drilling would be hauled in water trucks, or if suitable water sources are close, could be piped directly to the site. Water consumption could range from about 2000-6000 gallons per day, with as much as 20,000 gallons per day under extreme lost circulation conditions.

Other equipment that would be utilized includes large flatbed trucks to haul drill rod, casing, and other drilling supplies, and in some cases, special cementing and bulk cement trucks. Two or three small vehicles would be used for transporting workers. In most cases, existing roads would be used. It is estimated that short spur trails (usually less than a few

hundred yards long) would be bladed for less than 10% of these holes. All holes would be plugged and abandoned to protect both surface and subsurface resources, including aquifers, and reclamation of disturbed areas would be required, unless some benefit to the public could be gained, for example, a water well or camping area.

Depending upon the location and proposed depth of the drill hole, detailed plans of operation that cover drilling methods, casing and cementing programs, well control, and plugging and abandonment may be required.

Based upon past geothermal exploration in Oregon, and a projected increase in power demand in the northwest by the end of the decade, it is anticipated that during the I O-year life of this plan, 2 Notices of Intent for surface geophysical surveys, and 2 Notices of Intent to drill 10 temperature gradient holes, will be filed,

Drilling and Testing. Drilling to determine the presence of, test, develop, produce, or inject geothermal resources can be done only on land covered by a geothermal resources lease.

A typical geothermal well drilling operation would require 2-4 acres for a well pad, including reserve pit, and 1/2 mile of moderate duty access road with a surface 18-20 feet wide, totalling up to 40 feet wide with ditches, cuts, and fills. Existing roads would be used whenever possible. Total surface disturbance for each well, and any new road is expected to be no more than six acres. In some cases, more than one production well can be drilled from one pad. Well spacing would be determined by the Authorized Officer after considering topography, reservoir characteristics, optimum number of wells for proposed use, protection of correlative rights, potential for well interference, interference with multiple use of lands, and protection of the surface and subsurface environment. Close coordination with the State would take place. It is anticipated that the duration of well development, testing, and if dry, abandonment, would be 8 months.

Prior to abandonment, the operator would be required to plug the hole to prevent contamination of aquifers and any impacts to subsurface and surface resources. Plugging is accomplished by the placing of cement plugs at strategic locations downhole and up to the surface. Depending upon the formations encountered, drilling mud could be used as a spacer between plugs to prevent communication between fluid bearing zones. The casing is cut off at least 6 feet below ground level and capped by welding a steel plate on the casing stub. After plugging, all equipment and debris would be removed, and the site would be restored as near as reasonably possible to its original condition. A dry hole marker is often placed at the surface to identify the well location. If the surface owner prefers, the marker may be buried. Any new roads not needed for other purposes, would be reclaimed.

It is estimated that at least 1 exploratory well will be drilled during the life of this plan.

Geothermal Power Plant Development Scenario

No geothermal power plants are projected to be constructed during the life of this plan. However, if a plant is constructed it is anticipated that the developed geothermal resource would be water-dominated and that the geothermal power conversion system would be either single or double flash, or binary cycle. Before geothermal development could occur, site-specific baseline studies and environmental analyses, with public involvement, would be done. The scenario below describes the level of disturbance that would likely occur from the development of a 24 megawatt power plant:

Five to seven production wells and one or two injection -wells would be drilled. It is anticipated that access would be provided by existing roads, and the construction of short (one-half to one mile long) roads with a surface of 18 to 20 feet wide, totalling up to 40 feet wide with ditches, cuts, and fills. Surface disturbance from well pad and road construction would probably range from two to six acres per well. The power plant facility, including separators, energy converters, turbines, generators, condensers, cooling towers, and switchyard, would involve an estimated 10-15 acres. Pipelines and power lines would disturb an additional three to six acres. If a water cooling system is employed, one to three water wells, requiring about one-quarter acre per well, would be drilled, unless the cooling water was obtained from the geothermal steam condensate. Depending upon location, terrain, geothermal reservoir characteristics, and type of generating facility, total surface disturbance for a 24 megawatt (gross) geothermal power plant, and ancillary structures, would probably range from about 26 to 76 acres, or about one to three acres per megawatt. After construction, approximately one-third to one-half of the disturbed area would be revegetated. Prior to abandonment, the remaining disturbed area would be reclaimed.

Geothermal Direct Use Scenario

Low- and moderate-temperature (50-300 degrees F) geothermal resources have many direct use applications. Direct applications, and potential development scenarios, include space heating and cooling of residences and businesses, applications in agriculture, aquaculture, and industry, and recreational and therapeutical bathing. Depending upon the type of use and magnitude of operation, surface disturbance could range from a few acres for a well and greenhouses, or food processing facility. to tens of acres for larger agricultural or aquacultural developments. No direct use of geothermal resources is anticipated during the life of the plan, but if direct use did occur, 1 to 2 wells probably would be drilled to support 1 geothermally-heated greenhouse or aquaculture operation.

Locatable Mineral Resources

Reasonably Foreseeable Exploration Scenario

Future Trends and Assumptions

The major commodities of interest will continue to be the precious metals, gold and silver. This is based on a combination of price (especially gold) and the favorable geology for these types of mineral occurrences. Reclamation science will continue to advance due to experience and research. More detailed design effort will be placed on the reclamation of mined lands in the future. This will result in an overall increase in reclamation costs but those costs should pay dividends in the long-term with increased reclamation success.

The economics of mining in the planning area will be driven by the relationship between production costs and the market price of the commodity. While production costs can be controlled, or anticipated through management and technology, the big unknown will be in the price of the mineral commodity, especially gold. The overall profitability of an operation, and hence the level of activity at the prospecting, exploration, and mining phases, for development of ore bodies will be closely related to the price of the mineral commodity.

No chemical heap leaching operations are forecasted during the plan period. If such an operation is proposed during the life of the plan, it will be subjected to environmental review under a Plan of Operations pursuant to regulations found in 43 CFR 3809

Locatable Mineral Exploration Scenario

Based on past mineral exploration activity and fairly recent discoveries of Tertiary epithermal disseminated gold deposits, it is anticipated that 2 Notices for gold exploration will be submitted under all alternatives over the life of this plan. It is predicted that approximately 10 holes will be drilled utilizing truck mounted drill rigs for each notice. Drill sites would disturb less than a tenth of an acre. Temporary access roads, IO-12 feet wide, will be constructed for about one-third of the drill holes, but in most cases the existing roads will be utilized. Drill holes would be plugged in accordance with state and federal regulations, and reclamation. including rehabilitation of drill pads and access roads, would be conducted at the conclusion of the exploration program.

Salable Mineral Resources

Reasonably Foreseeable Development Scenarios

Future Trends and Assumptions

The major use of salable minerals (primarily rock and sand and gravel) will continue to be in support of the local transportation system. Any new construction relating to mining or other potential activities, would increase the demand for these materials.

Existing quarries and pits will most likely be used for obtaining mineral materials, but new site development could occur.

Quarry/Sand and Gravel Exploration Scenario

Exploration for quarry rock usually consists of drilling several shallow, small diameter holes with a truck, trailer, or track mounted drill, Sand and gravel exploration usually involves excavating test pits with a backhoe, or using an truck mounted auger, Often, access is by existing roads and trails or overland travel. Minor road construction or blading may be necessary at times, Usually these roads/trails are 8 -10 wide. It is anticipated that during the life of this plan, 3 applications to dig up to 10 test pits. for a total disturbance of less than 2 acres, including access, will be received. Two applications to explore for quarry rock, involving a total surface disturbance of less than 2 acres, including access, are also anticipated.

Quarry/Sand and Gravel Pit Development Scenario

Existing and new quarry and sand and gravel sites, on the average, disturb approximately 2-5 acres of land. This acreage is necessary for the mine itself, rock crushing operations, truck-turn around areas, access trails for bulldozers and drills, overburden stockpile sites, and aggregate stockpile areas. For access to a new mining site, approximately _ acre of land will be disturbed by new road construction. Upon depletion, reclamation work will be conducted on the material sites as well as all un-needed access roads and trails.

It is expected that the existing quarry/sand and gravel sites in this area will be utilized intermittently throughout the planning period, and that l or 2 new sites will be opened up. Any existing pit expansion that causes surface disturbance beyond previously inventoried limits, or the development of any new site, will require resource inventories, site-specific NEPA compliance, and development and reclamation plans.

Appendix D
Future Inventory And Monitoring Needs

General

Monitoring allow management within the area to be adaptive in nature and more responsive to new data. information, or changing conditions, regardless of the alternative implemented. It is expected that the amount of monitoring would not vary greatly between alternatives, but would vary mostly as a result of whether an ACEC is designated (Alternatives 2, 3, 4, 5, and 7) or not (Alternatives 1 and 6). Monitoring can take on three basic forms: implementation (has the proposal been fully implemented?), effectiveness (is the proposal having the desired effect?), and validation (if the proposal is not having the desired effect, are the management assumptions, goals, or objectives still valid?). Monitoring would become more intense in direct response to development proposals such as sodium leasing. In such an instance, the project proponent would be required to conduct monitoring before, during, and after project development.

The types of future inventory and monitoring expected to be needed in the planning area include:

a) For those alternatives having an ACEC designation, inventory and monitoring of existing lake algae and adjacent riparian/ wetland vegetation would occur on an annual basis. This would most likely be accomplished through contract with a credible academic institution as a means of getting baseline information on what different species inhabit the lake, where they are found (i.e. next to freshwater springs), under what conditions do they survive, and at what lake levels are they found.

Riparian/wetland vegetation would be monitored via permanent transects using photoplots for species presence and frequency transects in 5 or 6 key locations around the lake. Occurence and frequency would be compared with annual precipitation.

Additional inventory would occur in the area, including an inventory for *Rorippa columbiae* in 1995 (see g) below). If more than 10% change in species diversity occurs (75% confidence level) over 3-year period management would be reevaluated.

b) Conduct a Class III archeological survey of the entire area, as time and funding permit (under Alternative 2 only). Conduct archaeological clearances, as needed, in response to proposed ground-disturbing activities (Alternatives 1, 3-7). All survey work would be conducted in accordance with BLM Manual standards dealing with cultural surveys.

c) Perform regular patrols of cultural sites within the area to protect against unauthorized excavation and monitor their general condition (Alternatives 2-7). Patrols would be conducted at random by both law enforcement and cultural resource personnel.

d) Monitor lake level using data collected by the State of Oregon from an existing gaging station on the lake,

e) Monitor total dissolved solid concentrations across the lake. Water chemistry monitoring may also be necessary in response to certain types of project proposals, This would bc required as a component of project authorization and would most likely be accomplished through the through contract with a credible academic institution with the cost being borne by the project proponent.

f) Continue to monitor forage utilization, relative shrub, forb, and grass composition, and general rangeland conditions. Establish nested frequency studies as necessary to monitor change in frequency. This would indicate when it will be appropriate to rneasure relative composition of shrub, forb, and grass components. Actual use studies would be conducted in accordance with BLM Technical Reference TR 4400-2 (1984). utilization studies would be conducted as described in TR 4400-4 (page 6, 36).

g) Alternatives with an ACEC designation would more readily facilitate reintroduction of desert allocarya. Following reintroduction, the site would be annually monitored.

Regardless of the alternative, an inventory for *Rorippa columbiae* would be conducted in 1995. Any reintroduction site or new special status species site would be annually monitored: for five years following reintroduction or discovery by counting 100%

of the plants their phenology (seedlings, flowering plants, plants bearing seed). The sixth year after establishment (or discovery) the site(s) would be monitored every other year or in accordance with an established schedule. Inventories would include photoplots inside and outside of protective exclosures to assess threats of wildlife or livestock grazing. After the first year, the area outside such exclosures would be searched for seedlings. Any seedlings found would be flagged and tracked in subsequent years.

h) Continue on-going inventory and, thereafter, monitor wildlife species and their habitats, including sensitive species

Appendix E
Visual Resource Management

Determination of VRM Class Ratings

Visual resource classes are categories assigned to public land which serve two purposes: (1) an inventory tool that portrays the relative value of the visual resources and (2) a management tool that portrays management objectives.

Rating from scenic quality classes, visual sensitivity levels, and distance zones are combined to form visual resource management (VRM) classes. A VRM class identifies the suggested degrees of human modification that should be allowed in a certain landscape from a visual resource standpoint.

Scenic quality classes are rated for landform, water, color, vegetation, intrusions, and uniqueness. These elements are combined, and the area is classified as Class A - unique, outstanding features; Class B - outstanding features common to the physiographic region.

Sensitivity levels are determined on the basis of frequency of travel through an area, use of the area, and public knowledge of the area. These elements are rated and the area is assigned a high, medium, or low sensitivity level.

Distance zones are placed in three categories: foreground/middle ground zone, background zone, and seldom seen zone. The foreground/middle ground zone is closest to the view and requires more attention and consideration in management decisions because of the great detail that can be seen in the landscape. The background and seldom seen zones are viewed in less detail by the observer and most impacts blend with the landscape because of the distance.

Criteria For VRM Classes

After class ratings are completed, scenic quality, visual sensitivity, and distance zones areas are assigned to one of four management classes. These classes are designed to maintain visual quality and describe the different degrees of modification to the basic elements of the landscape allowed.

CLASS I: Those areas where a management decision has been made previously to maintain a natural landscape (e.g., wilderness areas, wild sections of National Wild and Scenic Rivers, and other congressionally or administratively designated areas.

CLASS II: Landscapes with Class A scenic quality, or Class B scenic quality in the foreground/middle ground zone with high visual sensitivity. Changes in any of the basic elements (form, line, color, texture) caused by a management activity should not be evident in the characteristic landscape.

CLASS III: landscapes with Class B scenic quality and high visual sensitivity in the background zone, or with Class B scenic quality and medium visual sensitivity in the foreground/middle ground zone or with Class C scenery of high visual sensitivity in basic elements (form, line, color, texture) caused by management activity may be evident in the characteristic landscape; however, the changes should remain subordinate to the visual strength of the existing character.

CLASS IV: Landscapes with Class B scenic quality and high visual sensitivity in the seldom seen visual zone, or with Class B scenic quality and medium or low visual sensitivity in the background or seldom seen zones, or with Class C scenery quality (except with high sensitivity in the foreground/middle ground zone). Changes may subordinate the original composition and character, but must reflect what could be a natural occurrence within the characteristic landscape.

Management and Contrast Rating Objectives for VRM Classes

For activities proposed on public land, impacts are evaluated with the visual resource contrast rating system, a method of evaluating the visual contrast of a proposed activity with the existing landscape character.

The amount of contrast is measured by separating the landscape into major features (land and water surface, vegetation, and structures) and then predicting the magnitude of change in contrast to each of the basic elements (form, line, color, and texture) to each of the features. Assessing the amount of contrast for a proposed activity in this manner will indicate the severity of impact and serve as a guide in determining what is required to reduce the contrast so it will meet the visual management class requirements for the area.

Objectives for the VRM classes are listed below:

CLASS I: The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. the level of change to the characteristic landscape should be very low and must not attract attention.

CLASS II: The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color and texture found in the predominant natural features of the characteristic landscape.

CLASS III: The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

CLASS IV: The objective of this class is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Appendix F
Proposed Restrictions On Mineral And Energy Exploration And Development Activity

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Appendix F
Proposed Restrictions On Mineral And Energy Exploration And Development Activity

Introduction

This appendix discusses the leasing stipuiations as they will be applied to BLM managed lands in the planning area. Operating standards pertinent to the locatable and salable minerals program are also described. Mineral exploration and development on federal lands must also comply with laws and regulations administered by several agencies of the State of Oregon; however, these specific requirements are not discussed in this document.

Leasable Mineral Resources

Through the land use planning process, the availability of energy and minerals for leasing is analyzed, taking into consideration development potential and surface and subsurface resources. Restrictions on leasing and operations are identified and placed in the leases as notices and stipulations. The leases are then issued from the BLM Oregon State Office in Portland. A leasing notice and specific lease stipulations are listed later in this appendix. Every attempt will be made to place stipulations in the lease and to minimize use of Conditions of Approval attached to site specific permits.

Oil and Gas Leasing

The Mineral Leasing Act of 1920 (as amended) provides that all publicly-owned oil and gas resources be open to leasing unless a specific land order has been issued to close the area. The issuance of a lease conveys to the lessee an authorization to actively explore and/or develop the lease, in accordance with the attached stipulations and the standard terms outlined in the Federal Onshore Oil and Gas Leasing Reform Act (FOOGLRA). Restrictions on oil and gas activities in the planning area will take the form of timing limitations, controlled surface use, or no surface occupancy stipulations used at the discretion of the Authorized Officer to protect identified surface resources of special concern.

All federal lessees or operators are required to follow procedures set forth by: Onshore Oil and Gas Orders, Notices to Lessees, The Federal Oil and Gas Royalty Management Act (as amended), The Federal Onshore Oil and Gas Leasing Reform Act and Title 43 Code of Federal Regulations, Part 3 100.

Oil and Gas Operations

Geophysical Exploration

Geophysical operations may be conducted regardless of whether the land is leased or not. Notices to conduct geophysical operations on BLM surface are received by the Resource Area. Administration and surface protection are accomplished through close cooperation of the operator and the BLM. Seasonal restrictions may be imposed to reduce fire hazards, conflicts with wildlife, watershed damage, etc. An operator is required to tile a "Notice of Intent to Conduct Oil and Gas Exploration Operations" for all geophysical activities on public land administered by BLM. The notice should adequately show the location and access routes, anticipated surface damages, and timeframe. The operator is required to comply with written instructions and orders given by the Authorized Officer, and must be bonded. Signing of the Notice of Intent by the operator signifies agreement to comply with the terms and conditions of the notice, regulations, and other requirements prescribed by the Authorized Officer. A pre-work conference and/or site inspection may be required. Periodic checks during and upon completion of the operations will be conducted to ensure compliance with the terms of Notice of Intent, including reclamation.

Drilling Permit Process

The federal lessee or operating company selects a drill site based on spacing requirements, subsurface and surface geology, geophysics. topography, and economic considerations. Well spacing is determined by the authorized officer after considering

topography, reservoir characteristics, protection of correlative rights, potential for well interference, interference with multiple use of lands, and protection of the surface and subsurface environments. Close coordination with the State will take place. Written field spacing orders are issued for each field. Exceptions to spacing requirements involving federal lands may be granted after joint State and BLM review.

Notice of Staking

Once the company makes the decision to drill, they must decide whether to submit a Notice of Staking (NOS) or apply directly for a permit to drill. The NOS is an outline of what the company intends to do, including a location map and sketched site plan. The NOS is used to review any conflicts with known critical resource values and to identify the need for associated rights-of-way and special use permits. The BLM utilizes information contained in the NOS and obtained from the on-site inspection to develop conditions of approval to be incorporated into the application for permit to drill. Upon receipt of the NOS, the BLM posts the document and pertinent information about the proposed well in the District Office for a minimum of 30 days prior to approval, for review and comment by the public.

Application for Permit to Drill (APD)

The operator may or may not choose to submit a NOS; in either case, an Application for Permit to Drill (APD) must be submitted prior to drilling. An APD consists of two main parts; a 12 point surface plan which describes any surface disturbances and is reviewed by resource specialists for adequacy with regard to lease stipulations designed to mitigate impacts to identified resource conflicts with the specific proposal, and an 8 point subsurface plan which details the drilling program and is reviewed by the staff petroleum engineer and/or geologist. This plan includes provisions for casing, cementing, well control, and other safety requirements. For the APD option, the on-site inspection is used to assess possible impacts, and develop stipulations to minimize these impacts. If the NOS option is not utilized, the 30 day posting period begins with the filing of the APD. Private surface owner input is actively solicited during the APD stage.

Sodium Leasing

The Mineral Leasing Act of 1920 (as amended) also provides that all publicly-owned sodium resources be open to leasing unless a specific land order has been issued to close the area. Sodium prospecting and leasing is regulated by Title 43 Code of Federal Regulations, Part 3500 and Subpart 3520. Issuance of any lease or permit must be in conformance with a comprehensive land use plan and the National Environmental Policy Act of 1969.

The sodium leasing regulations provide the following procedures for qualified applicants to explore for, and develop, sodium resources:

- Prospecting permits allow the permittee to explore for deposits of sodium or any sodium compound.
- Preference right leases are issued to the holders of prospecting permits who demonstrate the discovery of a valuable deposit of sodium or any sodium compound under the permit and that the lands covered by the permit are chiefly valuable therefor.
- Exploration licenses allow the licensee to explore known deposits of sodium or any sodium compound to obtain data but do not grant the licensee any preference or other right to a lease.
- Competitive leases are issued for known deposits of sodium or any sodium compound and allow the lessee to mine the deposit.
- Fringe acreage leases are issued noncompetitively for known deposits of sodium or any sodium compound adjacent to existing mines on non-Federal lands which can only be mined as part of the existing mining operation.
- Lease modifications are used to add known deposits of sodium or any sodium compound to an adjacent Federal lease which contains an existing mine, provided the deposits can only be mined as part of the existing mining operation.

A prospecting permit grants the permittee the exclusive right to prospect on the permitted lands to determine if a valuable deposit of sodium or sodium compounds exists. If, as a result of the prospecting, the permittee discovers a valuable deposit of

sodium or sodium compounds, the permittee can apply for a preference right lease. Using data submitted by the permittee, the Bureau of Land Management must determine whether a valuable deposit of sodium or sodium compounds has been discovered, and whether the lands are chiefly valuable therefore. If these two requirements are met, the permittee is entitled to a preference right lease.

In addition to the special stipulations attached to leases and conditions of approval attached to permits, standard terms and conditions found on the lease and prospecting permit forms require that operations be carried out to prevent unnecessary degradation of lands, natural resources, and cultural and historical values.

A permittee or lessee also may be granted a right to use the surface of unoccupied non-mineral public land for camp sites, refining works and other purposes necessary for the proper development and use of the deposits covered by the permit or lease.

Geothermal Leasing

The Geothermal Steam Act of 1970 (as amended) provides for the issuance of leases for the development and utilization of geothermal steam and associated geothermal resources. Geothermal leasing and operational regulations are contained in Title 43 Code of Federal Regulations, Part 3200.

Geothermal resources within a known geothermal resource area (KGRA) are offered by competitive sale. Outside of KGRAs, such as is the case with the planning area, leases can be issued non-competitively (over-the-counter). Prior to a competitive lease sale, or the issuance of a non-competitive lease, each tract will be reviewed, and appropriate lease stipulations will be included. The review will be conducted by consulting the direction given in this plan amendment. The issuance of a lease conveys to the lessee authorization to actively explore and/or develop the lease in accordance with regulations and lease terms and attached stipulations. Subsequent lease operations must be conducted in accordance with the regulations, Geothermal Resources Operational Orders, and any Conditions of Approval developed as a result of site-specific NEPA analysis. In the planning area, restrictions in some areas will include timing limitations, controlled surface use, or no surface occupancy stipulations used at the discretion of the Authorized Officer to protect identified surface resources of special concern.

In addition to restrictions related to the protection of surface resources, the various stipulations and conditions could contain requirements related to protection of subsurface resources. These may involve drainage protection of geothermal zones, protection of aquifers from contamination, or assumption of responsibility for any unplugged wells on the lease.

Development of geothermal resources can be done only on approved leases. Orderly development of a geothermal resource from exploration to production involves several major phases that must be approved separately. Each phase must undergo the appropriate level of NEPA compliance before it is approved and subsequent authorization(s) are issued.

Geothermal exploration can be done on unleased (and leased) lands under a Notice of Intent to Conduct Geothermal Resource Exploration Operations. Geophysical exploration, similar to that done for oil and gas exploration, and the drilling of small-diameter temperature gradient holes are examples of exploration methods conducted under notices. Conditions of approval are attached to notices to minimize disturbance to land and resources. Bonding is also required.

Leasing Notice And Stipulation Summary

On the following pages, the mineral leasing notice and stipulations for the preferred alternative are shown. In addition to the notice and stipulations, the standard leasing terms (Form 3100-l 1) will be used. The powersite stipulation (Form 3730-l) will be used on lands within powersite reservations.

Stipulations also can include waivers, exceptions, and modifications. Stipulations that involve an issue of major concern can be waived, excepted, or modified only with at least a 30-day public review (43 CFR 3101.1-4). Waiver, exception, and modification are defined as follows:

> Waiver - The lifting of a stipulation from a lease which constitutes a permanent revocation of the stipulation from that time forward.

Exception - This is a one time lifting of the stipulation to allow a permitting activity for a specific proposal. This is a case-by-case exemption. The stipulation continues to apply to all other sites within the leasehold to which the restrictive criteria apply.

Modification - This is a either a temporary or permanent change to the provisions of a lease stipulation. A modification may, therefore, include an exemption from or alteration to a stipulated requirement. Depending on the specific modification, the stipulation may or may not apply to all other sites within the leasehold to which the restrictive criteria apply.

Whenever a special stipulation, such as no surface occupancy (NSO), timing, controlled surface use (CSU), or special status species is used, the need for the special stipulation is described in the objective that follows the stipulation. By imposing these special stipulations, it has been concluded that less restrictive stipulations would not be adequate to meet the stated objective.

Lease notices are attached to leases in the same manner as stipulations; however, there is an important distinction between lease notices and stipulations. Lease notices do not involve new restrictions or requirements. Any requirements contained in a lease notice must be fully supported by laws, regulations, policies, onshore oil and gas orders, or geothermal resources operational orders.

Leasing Notice And Stipulations

Leasing Notice (for all leases)

Cultural Resources: An inventory of the leased lands may be required prior to surface disturbance to determine if cultural resources are present and to identify needed mitigation measures. Prior to undertaking any surface-disturbing activities on the lands covered by this lease, the lessee or operator shall:

1. Contact the Bureau of Land Management (BLM) to determine if a cultural resource inventory is required. If an inventory is required, then;

2. The BLM will complete the required inventory; or the lessee or operator, at their option, may engage the services of a cultural resource consultant acceptable to the BLM to conduct a cultural resource inventory of the area of proposed surface disturbance. The operator may elect to inventory an area larger than the standard ten-acre minimum to cover possible site relocation which may result from environmental or other considerations. An acceptable inventory report is to be submitted to the BLM for review and approval no later than that time when an otherwise complete application for approval of drilling or subsequent surface-disturbing operation is submitted.

3. Implement mitigation measures required by the BLM. Mitigation may include the relocation of proposed lease-related activities or other protective measures such as data recovery and extensive recordation. Where impacts to cultural resources cannot be mitigated to the satisfaction of the BLM, surface occupancy on that area must be prohibited. The lessee or operator shall immediately bring to the attention of the BLM, any cultural resources discovered as a result of approved operations under this lease, and shall not disturb such discoveries until directed to proceed by the BLM.

Authorities: Compliance with Section 106 of the National Historic Preservation Act is required for all actions which may affect cultural properties eligible to the National Register of Historic Places. Also, compliance with the Archaeological Resources Protection Act and the Native American Graves Protection Act is required. Section 6 of the Oil and Gas Lease Terms (Form 3 100-11) requires that operations be conducted in a manner that minimizes adverse impacts to cultural and other resources.

Leasing Stipulations

Standard Leasing Terms

Standard leasing terms for oil and gas are listed in Section 6 of Offer to Lease and Lease for Oil and Gas, Form 3 100-l 1. They are:

Lessee shall conduct operations in a manner that minimizes adverse impacts to the land, air and water, to cultural, biological, visual and other resources, and to other land uses or users. Lessee shall take reasonable measures deemed

necessary by lessor to accomplish the intent of this section. To the extent consistent with lease rights granted, such measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. Lessor reserves the right to continue existing uses and to authorize future uses upon or in the leased lands, including the approval of easements or rights-of-way. Such uses shall be conditioned so as to prevent unnecessary or unreasonable interference with rights of lessee.

Prior to disturbing the surface of the leased lands, lessee shall contact BLM to be apprised of procedures to be followed and modifications or reclamation measures that may be necessary. Areas to be disturbed may require inventories or special studies to determine the extent of impacts to other resources. Lessee may be required to complete minor inventories or short-term special studies under guidelines provided by lessor. If in the conduct of operations, threatened or endangered species, objects of historic or scientific interest, or substantial unanticipated environmental effects are observed, lessee shall immediately contact lessor. Lessee shall cease any operations that would result in the destruction of such species or objects until appropriate steps have been taken to protect the site or recover the resources as determined by BLM in consultation with other appropriate agencies.

Standard terms for geothermal leasing can be found on Offer to Lease and Lease for Geothermal Resources (Form 3200-24), Section 6, and are very similar to those described above for oil and gas leasing.

Special Leasing Stipulations

The following special stipulations are to be utilized on specifically designated tracts of land. Table 9 (Appendix A) lists the stipulations and shows the alternatives where their use would be required.

Special Status Species (to be attached to all leases)

Resources: Botany and Wildlife

Stipulation: Lands within this lease may be within the suitable habitat of the Federal Threatened (FT), Endangered (FE) or Proposed Threatened (PT) and Proposed Endangered (PE) species, either officially listed or proposed for listing as Threatened or Endangered species. If it is determined through an environmental review process that these species or their habitat exist within this lease, all future operations will be analyzed and subjected to a U.S. Fish and Wildlife Service (FWS) or National Marine Fisheries Service (NMFS) Section 7 consultation to ensure the action is not likely to jeopardize the continued existence of the species or result in the destruction or adverse modification of critical habitat.

Lands within this lease may bear some or all of the species discussed in Chapter 3, section “Special Status Species”, of the Plan Amendment/EIS, which have protected status as State Threatened (ST); State Endangered (SE); Federal Candidate (FC); Bureau Sensitive (BS) or are within the suitable habitat of these species. These species are protected by BLM policy as described in Manual 6840. All future post-lease operations must be analyzed, utilizing recent field data collected at the proper time of year, to identify the presence of such species. If the field examination indicates that the proposed activity may adversely impact FC species, technical assistance will be obtained from FWS to insure that the actions will not contribute to the need to list a Federal Candidate as a Federal Threatened or Endangered species. Technical assistance may be obtained from FWS or NMFS to ensure that actions will not contribute to the need to list a ST, SE, or BS species as a Federal Threatened or Endangered species.

Therefore, prior to any surface disturbing activities or even the use of vehicles off existing roads on this lease, BLM approval is required. This restriction also applies to geophysical activities for which a permit is required. The approval is contingent upon the results of site-specific inventories for any of the above mentioned species. The timing of these inventories is critical. They must be conducted at a time of year appropriate to determine the presence of the species or its habitat. The lessee is hereby notified that the process may take longer than the normal 30 days and that surface activity approvals may be delayed.

If no FT, FE, PT, or PE species, or suitable habitat for such species, are found during the inventories, then no Section 7 consultation with the FWS or NMFS will be necessary, and the action will be processed using the procedures found in the applicable Oil and Gas Onshore Orders or Geothermal Resources Operational Orders. However, the lessee is hereby notified that, if any FT, FE, PT, PE, ST, SE, FC, or BS species are found during the inventories, or if the actions are proposed in designated or proposed critical habitat, then surface disturbing activities may be prohibited on portions of, or even all of the lease, unless an alternative is available that meets all of the following criteria: (a) The proposed action is not likely to jeopardize the continued existence of a threatened or endangered species; (b) The proposed action is not likely to destroy or adversely

modify critical habitat for a threatened or endangered species; (c) The proposed action is consistent with the recovery needs in approved FWS or NMFS recovery plans or BLM Habitat Management Plans for the threatened or endangered species; and (d) The proposed action will not contribute to the need to list species as Federal Threatened or Endangered.

Objective: To protect officially listed or proposed threatened or endangered plant or wildlife species; and to ensure that post leasing oil and gas or geothermal operations will not likely contribute to the need to list other special status species as threatened or endangered.

Exception: An exception may be granted by the Authorized Officer if it is determined that portions of the area do not have any officially listed or proposed threatened or endangered species, Federal Candidate, State Threatened or Endangered species, or Bureau Sensitive species, or their habitat.

Waiver: This stipulation may be waived if the species is declared recovered and is no longer protected under the Endangered Species Act. or if other species found within the lease are no longer considered to be in the Federal Candidate, State Threatened or Endangered. or Bureau Sensitive categories.

No Surface Occupancy

A 30-day public notice period will be required prior to exception, modification, or waiver of this stipulation.

Resource: Visual Resource Management (VRM) Class I

Stipulation: Surface occupancy and use is prohibited in VRM Class I areas.

Objective: To preserve the existing character of the landscape.

Exception: An exception to this stipulation may be granted by the Authorized Officer if the operator submits a plan demonstrating that impacts from the proposed action are acceptable or can be mitigated adequately.

Modification: The boundaries of the stipulated area may be modified by the Authorized Officer if the boundaries of the VRM Class I area are changed.

Waiver: This stipulation may be waived by the Authorized Officer if all VRM Class I areas within the leasehold are reduced to a lower VRM class. Areas reduced to a VRM Class II will be subject to the Controlled Surface Use stipulation for visual resources, and areas reduced to VRM Class III will be subject to standard stipulations.

No Surface Occupancy

A 30-day public notice period will be required prior to exception, modification, or waiver of this stipulation.

Resource: Lake Abert Area of Critical Environmental Concern

Stipulation: Surface. occupancy and use is prohibited within the Lake Abert Area of Critical Environmental Concern.

Objective: To protect cultural, aquatic, scenic, and wildlife resources.

Exception: An exception to this stipulation may be granted by the authorized officer if the operator submits a plan demonstrating that impacts from the proposed action are acceptable or can be mitigated adequately.

Modification: The boundaries of the stipulated area may be modified if the ACEC boundaries are modified.

Waiver: This stipulation may be waived if the ACEC designation is lifted.

Timing Limitation

Resource: Snowy Plover and Snowy Plover Habitat

Stipulation: Surface occupancy and use is prohibited from March I to July 31 within the snowy plover habitat shown on Map 8 (Appendix B).

Exception: An exception may be granted by the Authorized Officer if the operator submits a plan which demonstrates that the proposed action will not affect the snowy plover or its habitat.

Modification: The boundaries of the stipulated area may be modified if the Authorized Officer, in consultation with the USF&WS, determines that a portion of the area can be occupied without adversely affecting the snowy plover or its habitat.

Waiver: This stipulation may be waived if the Authorized Officer, in consultation with the U.S.F.& W.S., determines that the entire leasehold can be occupied without adversely affecting snowy plovers or their habitat, or if the snowy plover no longer needs protection.

Timing Limitation

Resource: Wildlife - Golden Eagle and Ferruginous Hawk Nest Sites. (Nest sites location map available at Lakeview Resource Area office.)

Stipulation: Surface occupancy and use is prohibited from February I to June 30 within _ mile of known golden eagle and ferruginous hawk nest sites.

Objective: To protect golden eagle and ferruginous hawk nesting sites.

Exception: An exception may be granted by the Authorized Officer if the operator submits a plan which demonstrates that the proposed action will not affect the nest site. If the Authorized Officer determines that the action may or will have an adverse effect on the species, the operator may submit a plan demonstrating that the impacts can be mitigated adequately.

Modification: The boundaries of the stipulated area may be modified if the Authorized Officer determines that portion of the area can be occupied without adversely affecting golden eagle or ferruginous hawk nest sites or nesting habitat.

Waiver: This stipulation may be waived if the Authorized Officer determines that the entire leasehold can be occupied without adversely affecting golden eagle or ferruginous hawk nest sites or nesting habitat, or if these species no longer need protection.

Timing Limitation

Informal consultation with the Oregon Department of Fish and Wildlife will be required prior to exception, modification, or waiver of this stipulation.

Resource: Wildlife - Western Sage Grouse lek sites (Lek sites ivcation map availabie at the Lakeview Resource Area Office.)

Stipulation: Surface occupancy and use is prohibited from February 15 to May 15 within _ mile of known western sage grouse lek sites.

Objective: To protect lek sites.

Exception: An exception may be granted by the authorized officer if the operator submits a plan which demonstrates that the proposed action will not affect the sage grouse or its lek site.

Modification: The boundaries of the stipulated area may be modified if the authorized officer determines that a portion of the area can be occupied without adversely affecting the sage grouse or its lek site.

Waiver: This stipulation may be waived if the authorized officer determines that there is no longer a lek site on the leasehold

Timing Limitation

Resource: Bighorn Sheep Lambing Grounds

Stipulation: Surface occupancy and use is prohibited from April 1 to July 1, within _ mile of known lambing grounds.

Objective. To protect bighorn lambs.

Exception: An exception may be granted by the Authorized Officer if the operator submits a plan which demonstrates that the proposed action will not affect the bighorn lambs.

Modification: The boundaries of the stipulated area may be modified if the Authorized Officer determines that the action will not affect the bighorn lambs.

Waiver: This stipulation may be waived if the Authorized Officer determines that the entire leasehold can be occupied without adversely affecting bighorn lambs, or if the lambs no longer need protection.

Timing Limitation

Consultation with the Oregon Department of Fish and Wildlife will be required prior to exception, modification, or waiver of this stipulation.

Resource: Wildlife, Crucial Deer Winter Range

Stipulation: Surface use is prohibited from December 15 to March 1 within crucial deer winter range.

Objective. To protect crucial deer winter range from disturbance during the winter use season, and to facilitate long-term maintenance of deer populations.

Exception: An exception to this stipulation may be granted by the authorized officer if the operator submits a plan which demonstrates that impacts from the proposed action are acceptable of can be mitigated adequately.

Modification: The boundaries of the stipulated area may be modified if the authorized officer determines that portions of the area no longer contain crucial winter range. This stipulation can be expanded to cover additional portions of the lease if additional crucial habitat areas are identified, or if habitat use areas change. The dates for the timing restriction may be modified if new wildlife use information indicates that the December 15 to March 1 dates are not valid for the leasehold.

Waiver: This stipulation may be waived if the authorized officer determines that the entire leasehold no longer contains crucial winter range for deer.

Controlled Surface Use

Resource: Visual Resource Management (VRM) Class II.

Stipulation: All surface-disturbing activities, semipermanent and permanent facilities in VRM Class II areas may require special design including location, painting and camouflage to blend with the natural surroundings and meet the visual quality objectives for the area.

Objective: To control the visual impacts of activities and facilities within acceptable levels.

Exception: None.

Modification: None.

Waiver: This stipulation may be waived if the Authorized Officer determines that there are no longer VRM Class II areas in the leasehold.

Controlled Surface Use

Resource: Lake Abert Ecological System

Stipulation: Prior to the extraction of any minerals from Lake Abert, a plan must be submitted that demonstrates how the proposed mining will meet the following High Desert Management Framework Plan Amendment objective for Lake Abert:

> Authorize no future action which will increase the number of years by more than 5%. when compared to the 1926-1994 baseline, that the average total dissolved solid concentration in Lake Abert exceeds 130 g/l and/or reduces the level of the lake below 4,252 feet in elevation. (Note: water chemistry changes, primarily the ratio of dissolved carbonates to chlorides, are not addressed by this objective and would require detailed evaluation in a separate, project-specific NEPA document which would include a model of other criteria to be developed at a future date.

Objective: Maintain a viable, sustainable ecosystem within the lake.

Exception: None

Modification: This stipulation may be modified if new data indicates that the parameters necessary to maintain a viable, sustainable ecosystem within the lake are different than those stated in the stipulation.

Waiver: This stipulation may be waived if it is no longer needed to maintain a viable, sustainable ecosystem within the lake.

Controlled Surface Use

Resource: Soils, Water

Stipulation: Prior to disturbance of slopes over 60 percent, an engineering/reclamation plan must be approved by the authorized officer. Such plan must demonstrate how the following will be accomplished:

- No Surface Occupancy
- Site productivity will be restored.
- Surface runoff will be adequately controlled.
- Off-site areas will be protected from accelerated erosion, such as rilling, gullying, piping, and mass wasting.
- Water quality and quantity will be in conformance with state and federal water quality laws.
- Surface-disturbing activities will not be conducted during extended wet periods.
- Construction will not be allowed when soils are frozen.

Objective: To maintain soil productivity, provide necessary protection to prevent excessive soil erosion on steep slopes, and to avoid areas having excessive reclamation problems.

Exception: An exception to this stipulation may be granted by the Authorized Officer if the operator submits a plan which demonstrates that the impacts from the proposed action are acceptable or can be mitigated adequately.

Modification. The area affected by this stipulation may be modified by the authorized officer if it is determined that slopes over 60 percent in the area are not subject to excessive erosion and do not have excessive reclamation problems,

Waiver: This stipulation may be waived by the Authorized Officer if it is determined that the entire leasehold does not include slopes over 60 percent.

Appendix F
Attachment G-10.1 Locatable Minerals Surface Management 43 CFR 3809 Standards for Exploration, Mining, and Reclamation on the Lakeview District

The following operational guidelines for mining activities have been compiled to assist the miner in complying with the 43 CFR 3809 regulations, which apply to all mining operations on BLM administered lands. The manner in which the necessary work is to be done will be site specific and all of the following standards may not apply to each mining operation. It is the mining claimant's and operator's responsibility to avoid "unnecessary or undue degradation" and they must perform all necessary reclamation work. Refer to 43 CFR 3809 regulations for general requirements. The BLM will provide site specific guidelines for some mining proposals.

Construction and Mining

Vegetation Removal

Remove only that vegetation which is in the way of mining activities. On O&C land merchantable timber must be marked by BLM prior to cutting, and may not be used for firewood. The same requirement is recommended for public land. It is recommended that small trees (less than 6 inches dbh) and shrubs are to be lopped and scattered, or shredded for use as mulch. Trees over 12 inches breast height (DBH) should be bucked and stacked in an accessible location unless they are needed for the mining operation.

Firewood

Firewood may not be cut and sold, or used off of the mining claims.

Topsoil

All excavations should have all productive topsoil (usually the top 12 to 18 inches) first stripped, stockpiled and protected from erosion for use in future reclamation. This also includes removal of topsoil before the establishment of mining waste dumps and tailings ponds if the waste material will be left in place during reclamation.

Roads

Existing roads and trails should be used as much as possible. Temporary roads are to be constructed to a minimum width and with minimum cuts and fills. All roads shall be constructed so as not to negatively impact slope stability.

Water Quality

When mining will be in or near bodies of water, or sediment will be discharged, contact the Department of Environmental Quality. It is the operator's responsibility to obtain any needed suction dredging, stream bed alteration, or water discharge permits required by the D.E.Q. or other state agencies. Copies of such permits shall be provided to the Area Manager if a Notice or Plan of Operations is filed.

Claim Monuments

Due to the history of small wildlife deaths, plastic pipe is no longer allowed for lode claim staking pursuant to state law. It is recommended that existing plastic pipe monuments have all openings permanently closed. Upon loss or abandonment of the

claim, all plastic pipe must be removed from the public lands, and when old markers are replaced during normal claim maintenance, they are to be either wood posts or stone or earth mounds, consistent with state law.

Drill Sites

Exploratory drill sites should be located next to or on existing roads when possible without blocking public access. When drill sites must be constructed, the size of the disturbance shall be as small as possible in order to conduct drilling operations.

Dust and Erosion Control

While in operation, and during periods of temporary shut-down, exposed ground surfaces susceptible to erosion will need to be protected, This can be accomplished with seeding, mulching, installation of water diversions, and routine watering of dust producing surfaces.

Fire Safety

All State fire regulations must be followed, including obtaining a campfire permit or blasting permit if needed. All internal combustion engines must be equipped with approved spark arresters.

Safety and Public Exclusion

The general public may not be excluded from the mining claim. In the interest of safety, the general public can be restricted only from specific dangerous areas (underground mines, open pits or heavy equipment) by erecting fences, gates and warning signs. It is the operator's responsibility to protect the public from mining hazards. Gates or road blocks may be installed on existing or proposed roads only with the approval of the Area Manager.

Occupancy

All structures/trailers on mining claims must be used for mining purposes (must be reasonably incident to mining) and should be covered by a notice or plan of operation. Use of such a structure for residential purposes not related to mining or for recreation is not authorized.

Suction Dredging

Filing either Notice or Plan of Operations is required for any suction dredge operation where the dredge is equipped with a suction intake hose diameter of greater than 4 inches, and for all suction dredge operations involving more than one dredge regardless of size. The operator must have the applicable Department of Environmental Quality suction dredge permit prior to starting work, and a copy should be submitted to the Area Manager.

Tailings Ponds

Settling ponds must be used to contain fines and any discharge into creeks must meet the Department of Environmental Quality standards.

Trash & Garbage

Trash, garbage, used oil, etc. must be removed from public land and disposed of properly. Do not bury any trash, garbage or hazardous wastes on public lands. Accumulations of trash, debris, or inoperable equipment on public lands is viewed as unnecessary degradation and will not be tolerated.

Cultural and Paleontological Resources

Operators shall not knowingly alter, injure, or destroy any scientifically important paleontological (fossil) remains or any historical or archaeological site, structure, or object on federal lands. The operator shall immediately bring to the attention of

the Area Manager, any paleontological (fossil) remains or any historical or archaeological site, structure, or object that might be altered or destroyed by exploration or mining operations, and shall leave such discovery intact until told to proceed by the Area Manager, The Area Manager shall evaluate the discovery, take action to protect or remove the resource, and allow operations to proceed within 10 working days.

Threatened and Endangered Species of Plants/Animals

Operators shall take such action as may be needed to prevent adverse impacts to threatened or endangered species of plants and animals and their habitat which may be affected by operations. Special status species (federal candidate/Bureau sensitive) of plants and animals, and their habitat, will be identified by the Area Manager, and shall be avoided wherever possible.

Reclamation

Reclamation of all disturbed areas must be performed concurrently with mining, or as soon as possible after mining permanently ceases. Reclamation shall include, but shall not be limited to: 1) saving of topsoil for final application after reshaping of disturbed areas has been completed; 2) measures to control erosion, landslides, and water runoff, 3) measures to isolate, remove, or control toxic materials; 4) reshaping the area disturbed, application of topsoil, and revegetation of disturbed areas, where reasonably practicable; and 5) rehabilitation of fisheries and wildlife habitat. When reclamation of the disturbed area has been completed, except to the extent necessary to preserve evidence of mineralization, the Area Manager must be notified so that inspection of the area can be made.

Equipment and Debris

All mining equipment, vehicles, structures, debris and trash must be removed from the public lands during periods of non-operation and/or at the conclusion of mining, unless authorization from the Area Manager is given to the operator or claimant in writing.

Backfilling & Recontouring

The first steps in reclaiming a disturbed site are backfilling excavations and reducing high walls. Coarse rock material should be replaced first, followed by medium sized material, with fine materials to be placed on top. Recontouring means shaping the disturbed area so that it will blend in with the surrounding lands and minimize the possibility of erosion.

Seedbed Preparation

Recontouring should include preparation of an adequate seedbed. This is accomplished by ripping or disking compacted soils to a depth of at least 6 inches in rocky areas and at least 12 inches in less rocky areas. This should be done following the contour of the land to limit erosion. All stockpiled settling pond fines, and then topsoil, are spread evenly over the disturbed areas.

Fertilizer

The Area Manager must be contacted to determine if fertilization will be necessary, and if so, the type and rate of application.

Revegetation

An Area Manager-approved revegetation prescription must be used to provide adequate revegetation for erosion control, wildlife habitat, and productive secondary uses of public lands.

Mulch

As directed by the Area Manager, during review of the Notice or Plan of Operations, the disturbed area may require mulching during interim or final reclamation procedures. Depending on site conditions, the mulch may need to be punched, netted, or blown on with a tackifier to hold it in place. In some cases, erosion control blankets may be cost effective for use.

Roads

After mining is completed, all new roads shall be reclaimed, unless otherwise specified by the Area Manager. High wall and cutbanks are to be knocked down or backfilled to blend with the surrounding landscape. Remove all culverts from drainage crossings and cut back the fill to the original channel. The roadbed should be ripped to a minimum depth of 12 inches to reduce compaction and provide a good seedbed. The road must then be fertilized and seeded if necessary. When necessary, waterbars are to be used to block access and provide drainage.

Tailings Ponds

The ponds should be allowed to dry out and the fines removed and spread with the topsoil, unless the fines contain toxic materials. If the ponds contain toxic materials, a plan will be developed to identify, dispose, and mitigate effects of the toxic materials. If necessary, a monitoring plan will also be implemented. The ponds should then be backfilled and reclaimed.

Appendix F
Attachment G-10.2
Guidelines for Development of Salable Mineral Resources in the Lakeview District

Proposed Operations

All proposed pits and quarries, and any exploration that involves surface disturbance, are required to have operating and reclamation plans that must be approved by the Area Manager. All proposals will undergo the appropriate level of review and compliance with the National Environmental Policy Act.

Operating Procedures

Where practicable, the following requirements should be made a part of every contract or permit providing for the use of mineral material sites on the district:

-Oversized boulders shall not be wasted but shall be broken and utilized concurrently with the excavated material.

-The operator shall comply with local and state safety codes covering quarry operations, warning signs and traffic control. All necessary permits must be obtained from state and county agencies.

-Use of the site for equipment storage and stockpiling rock material is allowed for the duration of the contract or permit. Use of the site beyond that time would be authorized under a special use permit.

-All topsoil shall be stockpiled or windrowed, as appropriate, for use in reclamation.

-Prior to abandonment, all material sites will be graded to conform with the surrounding topography. Oversize material that is not usable, and reject, will be placed in the bottom of the pit, graded, and the pit floor and cutslopes covered with topsoil. Reseeding, if necessary, will be done as prescribed by the Area Manager. Access roads no longer needed by the BLM will be abandoned and reclaimed as directed by the Area Manager.

Quarry Design

Where in steep terrain in the operating area, quarry developments will require a series of benches to effectively maximize the amount of mineral materials to be removed in a safe manner. In most cases, bench height should not exceed 40 feet, and if the bench will be used by bulldozers to access other parts of the quarry, the width of the bench should be at least 25 feet. if the bench is not used by equipment, then this width can be reduced to approximately 10 feet.

Clearing of timber and brush should be planned at least 10 feet beyond the edge of the excavation limit. Most often the brush will be piled and burned at the site, or scattered nearby.

If at all possible. all topsoil and overburden should be stockpiled and saved for eventual quarry site reclamation. These piles may need to be stabilized by seeding in order to minimize erosion during the winter months.

As a standard procedure, the excavation of the quarry floor should be designed with an outslope of approximately 3% in order to provide for adequate drainage of the floor. Compliance with this design should be made a requirement of all operators at the site.

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