

**Overview of Geothermal Energy Development and Regulatory
Mechanisms for Borax Lake Chub (*Gila boraxobius*)¹
Oregon Department of Fish and Wildlife
January 2017**

Borax Lake is located on private land owned by The Nature Conservancy (TNC) in the Alvord Basin of southeast Oregon. The critical habitat for Borax Lake Chub, which are only found in Borax Lake and adjacent wetlands, is owned by TNC and managed by TNC and the U.S. Bureau of Land Management (BLM). Land surrounding the critical habitat, and within the Alvord Known Geothermal Resource Area (AKGRA; Figure 1) is a mix of federal (BLM) and private lands (Figure 2). The following describes the regulatory protections in place that can protect the unique habitat and fauna of Borax Lake and the surrounding area from potential harm due to geothermal development that may affect the aquifer sustaining Borax Lake. The extent of the aquifer associated with Borax Lake is unknown and likely dynamic.

1) BLM protective responsibilities/authorities for proposals to develop geothermal resources within the AKGRA

BLM has responsibility/authority to review all applications for geothermal development within the AKGRA that occur on BLM lands and some applications for geothermal development that occur on private lands in the surrounding area (specific conditions are outlined below).

Federal Land: BLM has responsibility/authority to review proposals for geothermal development that are sited on the Federal Mineral Estate (regardless of private or public surface ownership) and Federal lands (which may not be part of the mineral estate). Activities on land under BLM jurisdiction surrounding Borax Lake are guided by two regulations: the Area of Critical Environmental Concern (ACEC) and the Steens Mountain Cooperative Management and Protection Act of 2000 (Steens Act). ACEC areas in the Alvord basin are shown in Figure 3. The ACEC prevents geothermal development within public (e.g., BLM) lands surrounding Borax Lake. The Steens Act defines a “withdrawn area” (blue boundary in Figure 2) that precludes geothermal development on BLM lands within the Alvord Known Geothermal Resource Area (AKGRA), except for 332 acres in the southwest corner of the AKGRA.

Private/State Land: During review of a proposed action on BLM land that does not involve drilling for geothermal development (e.g., installation of transmission lines), BLM also has responsibility/authority to review the connected activities that will occur on private land if the connected activity is likely to affect BLM land. For example, a proposal to run power lines over BLM lands would constitute an action and if the power lines distribute power from a geothermal operation on private land, the geothermal operation would be considered a connected activity and thus included in the evaluation. Dependent upon the project location and specific conditions in the proposals, BLM can restrict siting of transmission lines and power transmission across their lands (“connected action”). To make this determination, the BLM would follow the NEPA process, with appropriate conditions, allowances, or denials as dictated in the Andrews Management Unit Resource Management Plan (AMU RMP) or the Steens Mountain Cooperative Management and Protective Area (CMPA) (the relevant plan is dependent on the location of the proposed action).

¹ This overview is based on management agencies’ staff knowledge, and is not intended to represent full or complete legal counsel.

Additionally, if the project's development is dependent upon BLM's approval of an action, then the entire project and the action's environmental impact would be analyzed under the NEPA process, with appropriate conditions, allowances, or denials as dictated in the CMPA or AMU RMPs, thereby extending protection to non-federal lands. The CMPA RMP provides protection to Borax Lake habitat and fauna by closing the federal lands to mineral/geothermal development. The AMU RMP requires that connected activities be evaluated based on criteria in the RMP, including 1) maintain, restore, or improve riparian vegetation, habitat diversity, and geomorphic stability to achieve healthy, productive riparian areas and wetlands and associated structure, function, process and products that provide public land values such as forage, water, cover, structure, and security necessary to meet the life history requirements of fish and wildlife; public recreation and aesthetics; water quality and quantity; and livestock forage and water, 2) provide diverse, structured, resilient, and connected habitat on a landscape level to support viable and sustainable populations of wildlife, fish, and other aquatic organisms, and 3) maintain, restore, or improve Special Status plant populations and animal habitats; manage public land to conserve or contribute to the recovery of threatened or endangered species; and prevent future ESA listings.

On sites where the action and project occur entirely outside of Federal lands and/or the Federal mineral estate, BLM would be notified of potential geothermal energy development on surrounding private land during the Department of Geology and Mineral Industries (DOGAMI) review process. When pumping on private land in the region, drainage (pulling of geothermal waters) from federal land is a possibility, therefore BLM would comment on this action based on the language in the Steens Act and the ACEC. Additionally, the DOGAMI permitting process requires a permittee to prove no harm by drilling a test well sited within the area of influence; in the case of Borax Lake this would be within the withdrawn area.

2) State of Oregon's mechanisms to protect Borax Lake from the potential effects of geothermal development within the Alvord Known Geothermal Resource Area

2.1) Department of Geology and Mineral Industries (DOGAMI)

In Oregon, ORS chapter 522 authorizes DOGAMI to control drilling, redrilling, and deepening of wells for the discovery and production of geothermal resources. Under this authority, a developer undertaking geothermal (>250 °F) exploration on all lands (private or public) must first obtain a permit from DOGAMI (OAR 632-020-0028).

Upon receipt of a complete application for a permit to drill or operate a geothermal well, DOGAMI circulates copies of the application to the Water Resources Department, the State Department of Fish and Wildlife, the Department of Environmental Quality, the State Parks and Recreation Department, the Department of Land Conservation and Development, the State Department of Energy, the Department of State Lands and the governing body of the county and the geothermal heating district in which the well will be located (ORS 522.125(1)). Any public agency receiving a copy of the application can suggest conditions under which a permit should be granted or provide rationale for denying a permit. DOGAMI takes agency comments into consideration when deciding whether to grant a permit. OAR 632-020-0170 (Environmental Protection) requires DOGAMI to ensure that the development does not pollute or otherwise damage land, water, or air resources.

During the permitting process, a DOGAMI groundwater geologist develops a monitoring plan for the permittee to follow to determine how to test for off-site impacts. As part of this process, the permittee must provide technical data requested by DOGAMI, which includes baseline data regarding potentially affected sites. As part of the conditions for geothermal development on private land, a developer is required to provide the baseline information needed to show there would be no connection to geothermal or groundwater continuity in areas of environmental concern (in this instance, to Borax Lake or federal land that has been withdrawn from entry). In this instance, because the groundwater connections are unknown such an evaluation may require a test well at Borax Lake (see BLM section).

When considering disposal of solid and liquid wastes, OAR 632-020-0150 requires that injection of geothermal fluids does not pollute waters of the state or degrade the biologic habitat of aquatic life and domestic and wild animals. Permits for prospect and geothermal wells will be issued in accordance with ORS 522.019, 522.025, and 522.135. DOGAMI will coordinate with the Department of Environmental Quality and the Department of Water Resources to ensure that permit conditions are consistent and protective of natural resources and the environment. All wells for injection must be tested for mechanical integrity at least once every five years to determine that there is no fluid movement into an underground source of water other than that from which the fluid was produced (OAR 632-020-0157).

2.2) Oregon Department of Energy's Energy Facility Siting Council (EFSC)

The EFSC has regulatory and siting responsibility for large (>35 MW; nominal capacity of less than 38.85 MW) electric generating facilities in Oregon. The EFSC maintains a list of protected areas where no development may occur. Protected areas include designated national monuments, national parks, wilderness areas, national and state wildlife areas, national recreation and scenic areas, state natural heritage areas, state parks, scenic waterways, experimental areas, agricultural experiment stations, research forests, BLM Areas of Critical Environmental Concern (ACEC), and state wildlife areas. Therefore, OAR-345-022-0040 would prohibit EFSC from issuing a site certificate if a developer proposed a geothermal facility of >35 MW of average generation capacity (nominal capacity of less than 38.85) in TNC's Borax Lake preserve (also listed as a state natural heritage area by OPRD) or the Alvord Desert BLM designated ACEC.

If a development (>35 MW) was proposed for a site other than the two protected areas listed above, the EFSC would apply the remaining Division 22 siting standards for fish and wildlife habitat (OAR 345-022-0060), threatened and endangered species (OAR 345-022-0070), and general standards of review (OAR 345-022-000). With specific reference to Borax Lake Chub, OAR 345-022-0060 requires that the proposed facility comply with the habitat mitigation goals and standards of the Oregon Department of Fish and Wildlife (ODFW) as defined in OAR 635-415-0025. Borax Lake Chub are defined as Habitat Category 1 under the habitat mitigation standards.

The EFSC must determine whether the applicant has performed appropriate site-specific studies to characterize the fish and wildlife habitat at the site and nearby. If impacts cannot be avoided, the applicant must provide a habitat mitigation plan. The plan must provide for appropriate mitigation measures, depending on the habitat categories affected by the proposed facility. The mitigation goal for Category 1 habitat is no loss of either habitat quantity or quality. ODFW is required to protect Category 1 habitats by recommending or requiring: (A) avoidance of impacts through alternatives to

the proposed development action; or (B) no authorization of the proposed development action if impacts cannot be avoided.

To issue a site certificate, the EFSC must find that the design, construction, and operation of the facility, taking into account mitigation, are consistent with the fish and wildlife habitat mitigation goals and standards of OAR 635-415-0025 (OAR 345-022-0060 Fish and Wildlife Habitat). The Council reviews this part of the application in consultation with ODFW. Applicants are encouraged to consult with ODFW and to begin relevant biological surveys before submitting a notice of intent. During the review process, the EFSC can choose to exercise their balancing authority and issue a site certificate w/o the applicant meeting the siting standards in Division 22 (Paragraph 2 above) if the greater public good outweighs the residual resource damage after all mitigation actions are considered.

2.3) Harney County

If a developer proposes a geothermal energy facility less than 35 MW of average generation capacity (nominal capacity of less than 38.85 MW) at Borax Lake or on adjacent non-federal lands, the Harney County land use process regulations would apply and none of the above EFSC siting standards would apply. As stated in the Harney County Planning Department Harney County Comprehensive Plan, the County's natural areas goal is to identify and preserve those natural areas that represent the natural heritage of Harney County. The Plan identifies under the Natural Areas Policies and Implementation Strategies (Policy 4), Borax Lake, the site of the endangered Borax Chub, which shall be preserved and protected from all conflicting uses. Policy 5 states that "the County shall work to ensure that natural areas are appropriately identified and preserved and these resources will be inventoried to satisfy OAR 660-023-000 and the requirements of Goal 5 (natural areas and wildlife protections)". The Plan's General Air, Water and Land Resources Policy 6 states "It is the policy of Harney County that wherever threatened and endangered species are present, the effects of the proposed development upon the habitat of the threatened or endangered species shall be considered". The Plan's Water Resources Policy 27 states "It is the policy of Harney County to encourage the management and recovery of endangered and threatened species in a manner that is based upon scientifically established standards and is cost effective". The Plan's Energy Policy 2 states "The County shall support the development of resource sites, for purposes of power generation and/or direct application, in a timely, orderly, and environmentally sound manner". Under the Plan's Energy Facility Siting policy, the plan states that "In applying siting standards through its zoning and land development ordinances, the County shall endeavor to be as consistent with the standards of government agencies as is practical. Such agencies shall be afforded full opportunity for review of, and comment on the county's plan, ordinances, and pending actions". The Harney County Zoning Ordinance provides the legal framework for land use regulations in the County. Under section 6.020, Standards Governing Conditional Use for Energy Facilities Siting Standards (item 5), the Ordinance states for Fish and Wildlife Resources that "Facilities shall be designed and operated so as to protect surrounding fish and wildlife resources as much as practical and shall not jeopardize, in a material way, habitat areas which are necessary to sustain local or migratory populations of such resources". For Geothermal Facilities, the Ordinance states that "Facilities shall be designed and operated so as to minimize land subsidence or induce seismic activity which would result from the production and/or injection of geothermal resources" and "Facilities shall be designed and operated so as to maintain and protect the integrity of groundwater aquifers and geothermal reservoirs, and prevent adverse interference between them". Section 9.030 (Appeals) of the ordinance states that "An action or decision of the Planning Director pursuant

to this Ordinance, as further defined under chapter 2 of the comprehensive plan, may be appealed to the Planning Commission within 15 days after the Planning Director has rendered a decision” and “If an appeal is filed, the Planning Commission shall conduct a new hearing , which can take into account all previous and any new testimony presented by the proponed and/or the opponent to an issue”.

2.4) Department of State Lands (DSL)

DSL has jurisdiction over wetlands, waterways, and any state lands. DSL implements fill and removal within wetlands and waterways through the Oregon Removal Fill Law (ORS 196.795-990; OAR 141-085). DSL is responsible for the management, leasing, and sale of state-owned mineral rights on approximately 3 million acres throughout Oregon.

These mineral rights occur on both the lands managed by DSL, as well as on lands owned by other state agencies (ORS 273.775-790; OAR 141-075). DSL provides input during the local land use and DOGAMI review processes, but would likely not comment on any geothermal development proposal in the Borax Lake region, unless the proposed development site was likely to affect a geothermal-fed wetland or the proposed development would affect state-owned land.

2.5) Oregon Department of Fish and Wildlife (ODFW)

ODFW would provide comments/recommendations on risks to all native fish and wildlife arising from a proposed geothermal development project in the Alvord region through all state and county permitting processes. If there was any indication that a proposed geothermal development project would have a geothermal or groundwater connection with Borax Lake, ODFW would recommend that alternatives be developed or that the action not be permitted because of potential negative impacts to the habitat quality (changes in water quantity or quality) in Borax Lake per the Habitat Mitigation Policy (OAR 635-415-0025)².

If there was no indication of a connection, ODFW would still recommend monitoring of water quality, water quantity, and habitat at Borax Lake to verify that the development would not affect the lake. For example, re-injection of geothermal fluids may reduce the temperature in the aquifer in the vicinity of the injection wells.

² Borax Lake is considered "Habitat Category 1" under the Habitat Mitigation Policy. This category includes irreplaceable, essential habitat for a fish or wildlife species, population, or a unique assemblage of species and is limited on either a physiographic province or site-specific basis, depending on the individual species, population or unique assemblage.

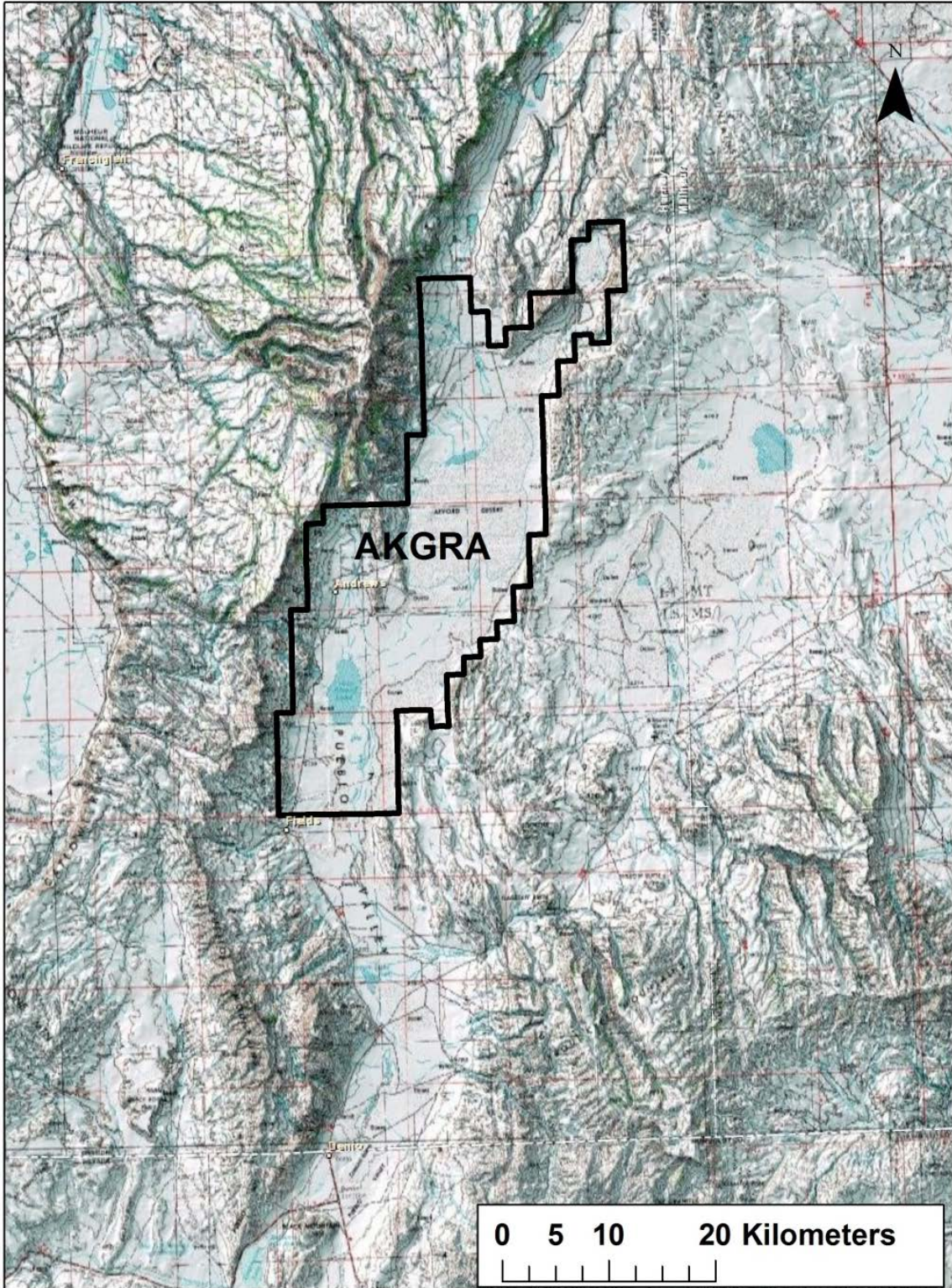


Figure 1. Extent of the Alvorde Known Geothermal Resource Area (AKGRA).

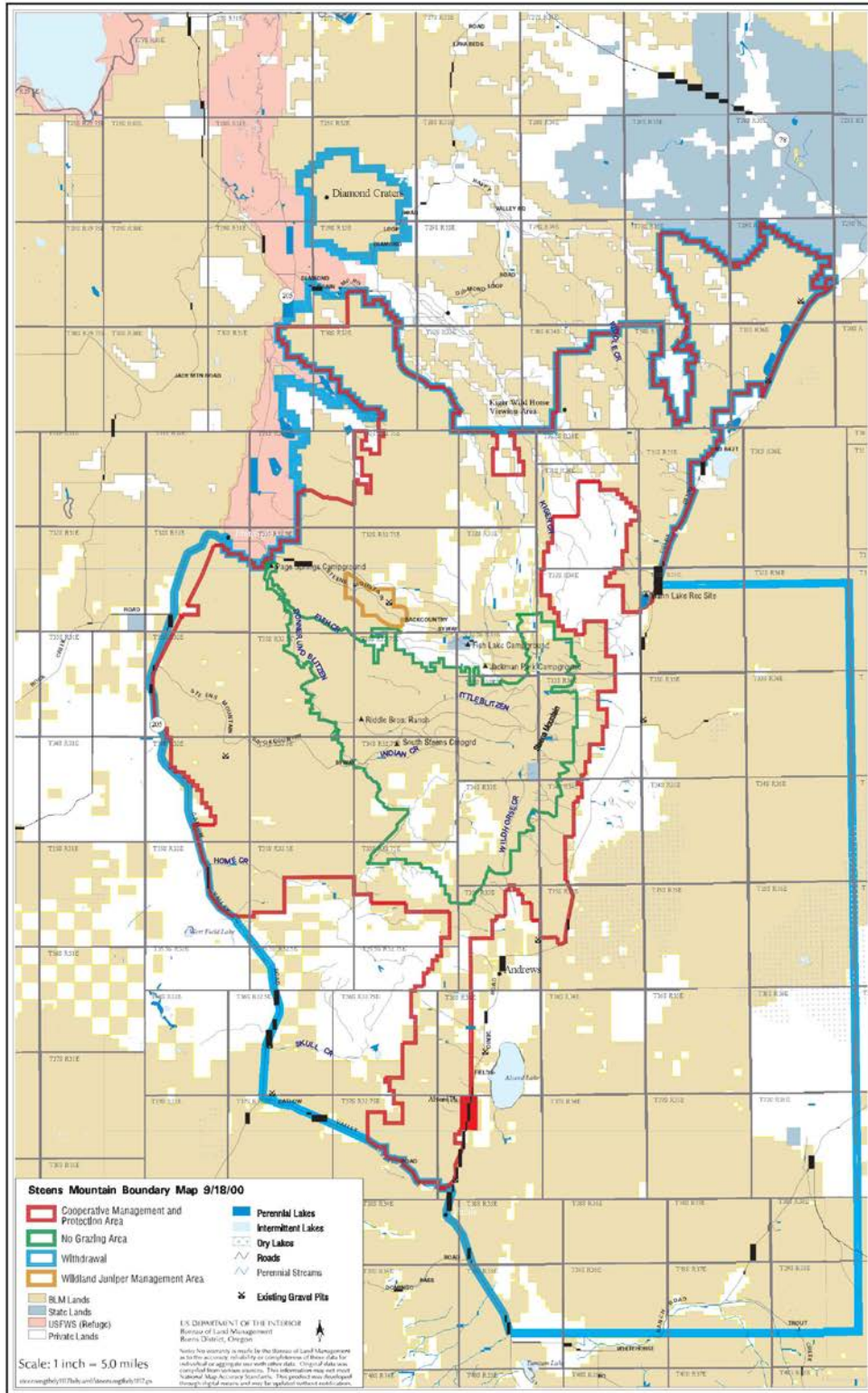


Figure 2. Steens Mountain Boundary Map and lands withdrawn from geothermal/mineral development

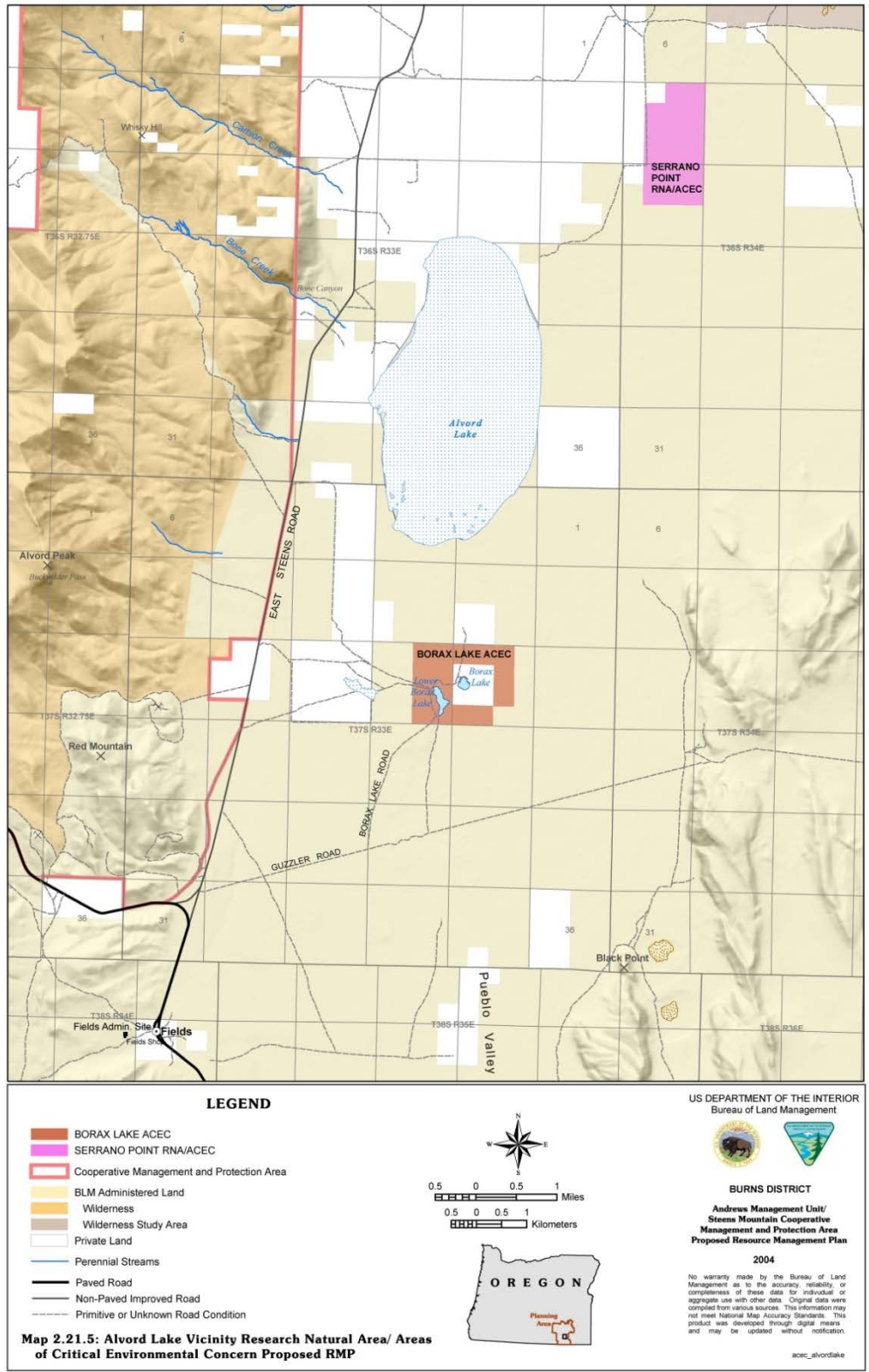


Figure 3. Map of the Alvord Lake Vicinity Research Natural Area / Area of Critical Environmental Concern.