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CLIMATE

Castle Rocks State Park is located in a semiarid climate zone with low humidity, low to moderate precipitation, and extremes in both daily and seasonal temperatures. Rain and snow are from Pacific air masses pushed eastward by the prevailing westerly winds. The rain shadow extending from the Sierra Nevada Mountain Range allows only the strongest storms to bring precipitation into the region. Average annual precipitation ranges from 14 to 22 inches depending on elevation. The higher elevations receive the most moisture. Most precipitation occurs from March thru June. Snowfall can range from 35 to 68 inches a year. The summers are hot and dry with frequent thunderstorms.

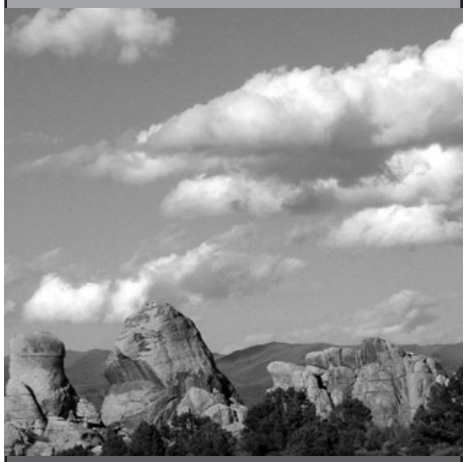
Climate data was gathered from the Oakley weather station, which is closest geographically to the park. It is located northwest of the park and sits at a slightly lower elevation. The mean annual temperature is 48 degrees Fahrenheit (f). The extreme high was 105f and the extreme low was -27f. Average winter temperature is 31f with the average winter daily minimum at 21f. Average daily summer temperature is 67f with the average daily summer maximum at 83f.

GEOLOGY

SETTING

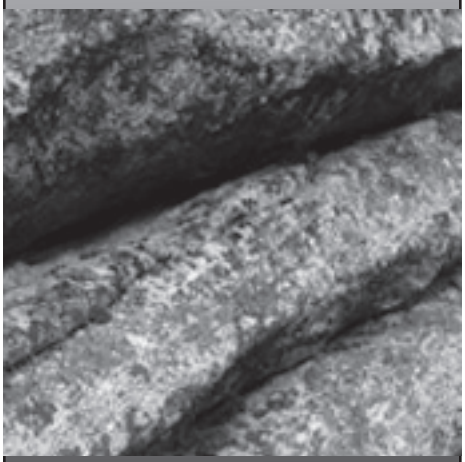
The terrain at the ranch unit showcases exemplary landforms of granitic spires and domes protruding from the slopes of an enclosed upland mountain basin – Big Cove - in the Albion Range of southern Idaho. Unearthed by weathering and erosion of the Almo pluton, these granite towers vary in size and shape and rise upwards of 200 meters above the valley floor. The cove is "hollowed out" of the north half of the City of Rocks anticline, an elongate structural dome of Archean granite gneiss (part of the Green Creek complex) and overlying Proterozoic metasedimentary rocks into which the Almo pluton intruded. Circle Creek Basin and Twin Sisters Basin are similar topographic basins in the south half of the anticline. They are separated from Big Cove by a high ridge of Precambrian rock. The domical structure of these basins can be observed by tracing the curvature of a prominent layer of quartzite, the Elba quartzite, which caps most of the surrounding ridges. Like an overturned elongate bowl, the quartzite dips outward from the center of the arch.

Three other gneiss-cored structural domes mantled by Proterozoic metasediments occur in the Albion Range. All are aligned in a chain-like fashion roughly NNE with the anticline. To the north Big Bertha dome and Independence dome form topographically high promontories that undergird Mount Harrison and Mt. Independence/ Cache Peak. The smallest dome, Moulton dome, lies just south of the City of Rocks anticline. Of these four structural domes, City



Blue skies with light clouds over Castle Rocks State Park

Example of a "Tafoni" geological formation which results from erosive activity



Striations created from "Pancake" weathering

Shea Lewis and Brad Shilling at example of pothole formation

of Rocks is the largest. Granite of the Almo pluton is exposed only in the southern two domes where differential weathering between the granite and metamorphic rocks has formed upland basins that markedly contrast with the high relief of the two northern domes.

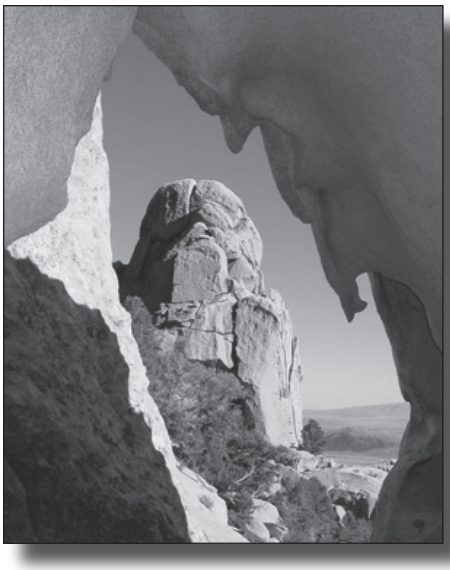
SURFICIAL GEOLOGY

In Big Cove the Castle Rocks are surrounded by at least two stages of alluvial fans – active and abandoned - except on their northwest side where the granite is in contact with the Precambrian metamorphic basement. Abandoned fans represent at least one older depositional surface. Active fans are incised into the older fans on higher, steeper slopes before fanning out in the lower elevations of the cove. Cobbles and boulders weathered from the Elba quartzite are exposed on the surfaces of the fans. Fans play an important role in transmitting and storing water, which contributes to subsurface weathering of the granite into a grussic regolith or saprolite. The upper slopes of the fans contain relict solifluction lobes and remnants of large-scale landslides formed during the most recent alpine glaciation of the Albion Range. The alluvial fan surface down-slope of Castle Rocks has aggraded 45 cm in the last 2450 years based on a radiocarbon date obtained from an archeological site. Intermediate and small-scale landforms provide evidence of a complex erosional history that includes multiple episodes of the classic two-stage process commonly invoked for the formation of tor and bornhardt landscapes. Perched quartzite cobbles and multiple levels of flared slopes on some spires result from exhumation and reburial produced by long-term variations in local climate. Many spires near the perimeter of the cluster have flared slopes at ground level indicating relatively recent exhumation. Although subsurface weathering along joints controls the overall distribution and shape of spires, the formation and growth of panholes and tafoni (concave cavities) may be the most important factor in shaping the spires once they are exhumed. Panholes are absent on freshly exposed rock and enlarge with time on sub-horizontal surfaces. The enlargement and coalescence of adjacent panholes is an important process in removing rock from the spires and may attribute to the formation of pickelhaubes – short spikes of remnant rock on the tops of spires. Their height may be indicative of the depth of former panholes. The rate of rock removal is related to the residence time of water within the panholes and is thus tied to climatic variation. Tafoni are well developed throughout Castle Rocks. They initiate on joint surfaces of all orientations and enlarge through the creation of a sheltered microclimate, typically along an under-hanging surface, that promotes the accumulation of salts.

GEOLOGIC HISTORY

The Albion Mountains stretch for 50 km between the Idaho/Utah border on the south and the Snake

River Plain on the north. Many of the mountain ranges in the Basin and Range of Utah, Nevada and southeastern Idaho consist of unmetamorphosed, fossiliferous Paleozoic sedimentary strata. But, the Albion Mountains is part of the Albion-Raft River–Grouse Creek metamorphic core complex, which exposes some of the most highly extended and deeply-derived rocks of the Basin and Range geologic province (Miller, 1980). Granite, granitic gneiss, schist and amphibolite belonging to the 2.5 Billion year old Green Creek Complex are the



oldest rocks in the range. These basement rocks are uncomfortably overlain by Proterozoic and Paleozoic sediments that were metamorphosed during crustal thickening in the hinterland of the Sevier orogenic belt (Armstrong, 1968). The highland created by the Sevier orogeny began to collapse and extend during the early Cenozoic. The formerly deep-seated Precambrian rocks were arched into broad domes and structurally unroofed along large-scale low-angle normal faults (Miller and Bedford, 1999). During the Oligocene, the core complex was intruded by several bodies of granite that include the 28 million year old Almo Pluton of the Albion Mountains. Following emplacement of granitic plutons at depths of approximately 10 km, the region experienced rapid uplift. By 10 million years ago, a combination of low-angle normal faulting and erosion had exhumed the Almo Pluton, allowing ash flow tuffs from calderas associated with the nearby Yellowstone hot spot to be emplaced on the exposed granite (Miller and Bedford, 1999). During the late Miocene, most of these rhyolitic rocks were translated to the east on low-angle normal faults as the core complex continued to rise (Miller, et al. in prep). Quaternary uplift of the range has occurred along high-angle range-bounding normal faults. The present shape of the mountains results primarily from the headward erosion of streams that are tributaries of the Raft and Snake rivers on the north and east and Birch and Goose creeks on the west. Headward erosion by Raft River tributaries eventually breached resistant Proterozoic quartzites in the structural domes of the southern Albion Mountains. The Tertiary granite cores of the domes where much more easily weathered, particularly in regions of high joint density and hydrothermal alteration. Streams differentially eroded the weathered granite, leaving behind a spectacular landscape of domes,

fins, and spires rising out of broad valleys in the interior of the range. Well-preserved cirques and moraines indicate that the highest peaks of the Albion Mountains, Cache Peak (10,339 ft., 3151 m) and Mt. Harrison (9,265 ft., 2824 m), hosted alpine glaciers during the Pleistocene. Extensive areas of hummocky topography on the flanks of several peaks and ridges suggest that landslides have played an important role in the recent geomorphic evolution of the Albion Mountains.

PREVIOUS INVESTIGATIONS

The geologic history of the Albion Range has been the subject of many published papers beginning with Anderson (1931) who conducted a reconnaissance survey of the geology and mineral resources of Cassia County for the Idaho Bureau of Mines and Geology. His geologic map shows the over-all domal character of the range and distribution of granites, metamorphic rocks, unmetamorphosed upper Paleozoic rocks, and Tertiary volcanic and sedimentary rocks. Cunningham (1971) described the general geomorphology of the City of the Rocks (1971). Armstrong (1968) described the major rocks of the Albion Range, subdividing them into formal stratigraphic units, and was the first to date the igneous rocks. He mapped the entire Albion Range at a scale of 1:24,000 during the 1970's and early 80's, but died before his field maps could be compiled and published. Miller (1980, 1983) concentrated on the detailed structure of the structural domes in the northern part of the range. Compton (1983), Covington (1983), and Todd (1980) focused on the regional-scale structures and the timing of deformation in core complexes of the Idaho-Utah border region. Miller and Bedford (1999) studied structures in the southern part of the range. Using Armstrong's field maps Miller, et al. (in preparation) remapped most of the Almo Quadrangle, which contains the City of Rocks. Professional geological societies have led several field trips into the area to expound on the characteristics and tectonic significance of the metamorphic core complex. Undergraduate geology field courses have conducted student projects in the Albion Range that have examined deformational structures, glaciation, landslides, and geomorphology. Some of these projects are initial attempts to evaluate current and recently active geological processes that are forming today's landscape.

SOILS

The soils found in the Castle Rocks State Park units vary with the terrain. The soils are characterized in general terms by unit as described in the Soil Survey of Cassia County (USDA 1994). A map of the soils classification can be found in Appendix 3D.

RANCH UNIT

This unit is on ground that is transitioning between alluvial meadows to granite pluton rock

outcroppings. The three soils that can be found in this unit are the Acord-Aninto group, Conneridge-Chen-Yeates-Hollow group, and the Itca-Birchcreek group also found in the Smoky Mountain Unit.

The Acord-Aninto soils are characterized as very deep and very well drained. They have slow permeability and a water capacity between 4 and 8 inches. Rooting depth is restricted with a clay layer typically found between 3-18 inches deep. Runoff is medium with a moderate hazard of erosion. There is also a moderate shrink-swell potential due to the clays found in the soils. The major use for this soil is as rangeland. Management factors include stones, cobbles, and gravels found on or below the surface as well as the hazard for water erosion.

The Conneridge-Chen-Yeates-Hollow soils are characterized as shallow to moderately deep and well drained, with medium to moderate soil permeability. Available water capacity is between 2 and 6 inches with rooting depth restricted by bedrock depths between 8 and 60 inches. Runoff velocities can be rapid or very rapid and there is severe to very severe hazard from water erosion. The major use for these soils is rangeland. Management factors are low available water and high content of gravel, cobbles and stones. Steep slopes and severe hazard for water erosion limit usability of these soils.

The Itca-Birchcreek soil complex is characterized by shallow depths but good drainage. It has slow permeability and water capacity of only 1-2 inches. Rooting depth is poor and generally restricted to 10-20 inches due to a shallow depth to bedrock. Runoff is very rapid and there is a severe hazard for water erosion. The major use for this soil complex is woodland with some potential for grazing. Management factors are the stones and cobbles found on and below the surface as well as the shallow depth to bedrock. Low water capacity and a high erosion factor limit the grazing potential of the soil. The dominant vegetation of pinyon pine, juniper and big mountain sage also limit grazing opportunities. A general management consideration is to control grazing and disturbance of these fragile soils to limit erosion.

ADMINISTRATIVE UNIT

This unit is located in the alluvial flats of the Big Cove area between the hills of the Smoky Mountain Unit and the spires of the Ranch Unit. The dominant soil is the Declo-Darkbull soils group. Both the Declo and the Darkbull types are characterized as very deep and well drained with moderate permeability. The soils have moderate water capacity, between 3 and 11 inches, as well as potential rooting depth to 60 inches. Stormwater runoff is slow to moderate and the hazard of water or wind erosion is slight.

The major use for this soil complex is rangeland. There are no major

Erodable soils and high spring runoff causes stream bank erosion

Almo Creek full of spring runoff

Example of past improvements of water distribution infrastructure

management factors. A general management consideration is that the soils are not highly suitable for dryland grazing due to the low soil water capacity during the dry season.

SMOKY MOUNTAIN UNIT

The two parcels that make up this unit are located on flat to hilly terrain that is dominated by the Itca-Birchcreek soil complex. The Itca-Birchcreek soils are described in the Ranch Unit.

A soil survey of the eastern part of Cassia County was completed in 1994 by the U.S. Department of Agriculture.

WATER RESOURCES AND RIGHTS

The largest stream running through the Ranch Unit is Almo Creek, which flows north to south and exits near the southeast corner of the unit. Creeks running through or near the park units start in the snow pack of Cache Peak north of the park. Also running through the Ranch Unit is Stines Creek, which joins Almo Creek in the middle of the unit. Lone Rock Creek runs by the southern most corner of the Ranch Unit. Paralleling this creek to the south is Little Cove Creek, which eventually runs through the Administrative Unit. Circle Creek flows between the two parcels that make up the Smoky Mountain Unit, but no creek flows through either parcel. These creeks eventually drain to the Raft River.

Castle Rocks State Park acquired the water rights that were used by the previous ranch owner. About 350 acres traditionally were irrigated on the east side of the ranch (NPS land exchange EA 2002). The water rights held by the state park are part of Snake River Administrative Basin 43 (www.idwr.state.id.us/water/rights/)(See Appendix 3A). The park holds 9.5 shares in the Almo Water Company. This makes it one of the larger shareholders.

Recharging of ground water is a beneficial use attached to the park's water rights. IDPR and the Almo Water Company are working on improving the water distribution infrastructure and have jointly funded development of new structures.

Little is known about the status of surface water quality or ground water quantity in the park units. Well testing in CIRO have shown water quality within criteria designated for safe use. Depth to groundwater at the Ranch Unit is approximately 20 feet (level 1 pre-ea) during the winter. Domestic water is supplied by wells in all three park units.

VEGETATION

Castle Rocks State Park is located in the upper Raft River Valley. Park elevations range from 5360 feet at the Administrative Unit to 7400 feet in the northwest corner of the Ranch Unit. At lower

elevations, the sagebrush-dominant plant community includes big sagebrush (Artemesia tridentata tridentata), gray rabbitbrush (Chrysothamnus nauseosus), bitterbrush (Purshia tridentata), currant (Ribes alpinum), Sandberg's bluegrass(Penstemon ambiguus), Great Basin wildrye(Leymus cinereus), and an assortment of grasses and forbs such as Idaho fescue (Festuca idahoensis), cheatgrass (Bromus tectorum), Indian paintbrush (Castilleja spp.), lupine (Lupinus spp.), and arrowleaf balsamroot (Balsamorhiza sagittata). At higher elevations, the woodland communities include single leaf Utah pinyon pine (Pinus monophylla), juniper (Juniperus), quaking aspen (Populus tremuloides), and mountain mahogany (Cercocarpus ledifolius). Riparian communities along streams and irrigation ditches support quaking aspen, willow (Salix spp.), elderberry (Sambucus spp.), currant (Ribes spp.), and woods rose (Rosa).

Vegetation in and around the park likely differs from pre-settlement conditions because of past grazing, farming, fire, and other disturbances. Often these influences result in the introduction and establishment of invasive plants or noxious weeds in disturbed areas. The most common plants in this category include cheatgrass, Russian thistle (Salsola iberica) and spotted knapweed (Centaurea maculosa).

Within the park's boundaries, five distinct plant communities are present depending upon elevation, soil type, and moisture availability. These plant communities include pinyon-juniper woodland, shrub (sagebrush)-steppe, aspen woodland, riparian scrub-shrub, and wetlands.

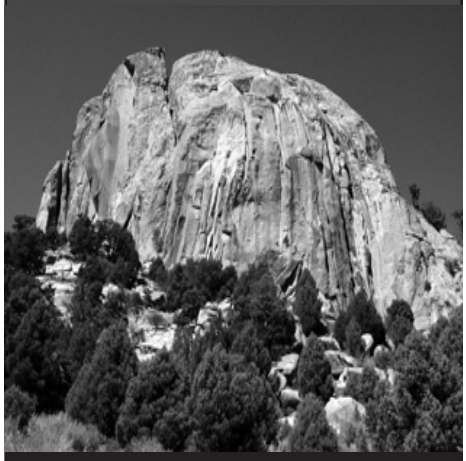
Pinyon-juniper woodland

The pinyon-juniper woodland community generally occurs adjacent to sagebrush (shrub-steppe) areas in the park, but in rockier, higher, and rougher terrain. Occurring at the northern extent of its range in Idaho, this woodland community occurs in the Ranch Unit, at the southeast Smoky Mountain Unit, and on BLM and Sawtooth National Forest lands north of the Ranch Unit. Seven pinyon-juniper woodland communities are recognized as occurring exclusively in Idaho, and all are ranked most rare.

These woodlands are dominated by single-leaf pinyon pine, Utah juniper (Juniperus osteosperma), and Rocky Mountain juniper (Juniperus scopulonum). Interspersed with these dominants are mountain big sagebrush (Artemisia tridentata vaseyana), curl-leaf mountain mahogany (Cercocarpus ledifolius), chokecherry (Prunus virginiana), bluebunch wheatgrass (Agropyron spicatum), and Great Basin wildrye (Elymus cinereus).

The Albion Mountains contain the northernmost range of the single-leaf pinyon pine. The

Wild Iris and Prickly Pear Cactus growing side by side



Rock formation reaching above surrounding pinyon-juniper woodland

edible pinyon pine seed provides important proteins and fats for wildlife, served as an important food source for indigenous people, and is gathered by local residents. When removed by fire, various grasses and shrubs temporarily replace this community.

Shrub (sagebrush) -steppe

The shrub-steppe (sagebrush-dominant) community occupies lower, drier elevations and dominates the western half of the Ranch Unit, the undeveloped portion of the Administrative Unit, and the northeast Smoky Mountain Unit. Common shrub species include Wyoming big sagebrush (Artemisia tridentata wyomingensis) basin big sagebrush (Artemisia tridentata tridentata), bitterbrush, gray rabbitbrush and green rabbitbrush (Chrysothamnus viscidiflorus). The understory consists of an assortment of grasses and forbs such as Idaho fescue, Great Basin wildrye, cheatgrass, Indian-paintbrush (Castilleja spp.), lupine (Lupinus spp.), phlox (Phlox spp.), and arrowleaf balsamroot (Balsamorhiza sagittata)

Much of this community has been altered by past disturbances that have led to monotypic stands of big sagebrush interspersed with plants with low forage value such as tansy mustard (Descurainia pinnata), rabbitbrush, Russian thistle (Chenopodiaceae salsolatragus), cheatgrass, and halogeton (Halogeton glomeratus). Crested wheatgrass (an exotic) dominates the understory where past landowners seeded areas to improve livestock forage.

Aspen woodland

At higher elevations, the quaking aspen -dominant woodland community generally occurs along the park's perennial and intermittent streams. Narrowleaf cottonwood (Populus angustifolia), mountain alder (Alnus incana), serviceberry (Amelanchier alnifolia), chokecherry (Prunus virginiana) and snowberry (Symphoricarpos oreophilus) typically occur in the understory of the aspen groves. Rocky Mountain juniper occurs more frequently in the aspen understory than elsewhere in the area.

Riparian scrub-shrub

At lower elevations, the riparian scrub-shrub community occurs adjacent to perennial and intermittent streams, seeps and springs. This important transition zone between aquatic and upland terrestrial communities supports a greater diversity of wildlife and plant species than the adjoining uplands. Many of the riparian zones in the park also include wetlands.

Typical riparian plants in the scrub-shrub community include quaking aspen, willows (Salix spp.), Rocky Mountain maple (Acer glabrum Torr. Var. douglasii), box-elder (Acer negundo), mountain alder, chokecherry, horsetail (Equisetum spp.), elderberry (Sambucus spp.), bulrushes (Scirpus spp.), rushes

(Juncus spp.), sedges (Carex spp.), and bluegrasses (Poa spp.).

Similar to wetlands, the presence of food, water, and cover in this riparian community supports a diversity of mammals, birds, and herptals. Consequently, the preservation and restoration of this plant community is critical to the maintenance and enjoyment of present and future wildlife populations in the park and surrounding area.

Wetlands

In general terms, wetlands are lands where water is the dominant factor influencing the nature of soil development and the types of plant and animal communities found in them. Common to all wetlands is that the soil or substrate is saturated or covered with water at a frequency and duration sufficient to support a prevalence of vegetation adapted for life in saturated soil conditions.

National Wetland Inventory (NWI) maps (USFWS 1992) (See Map 3.2 and 3.3) were used to identify the location and types of wetlands found within the park. Identified from high-altitude aerial photographs, the wetlands shown on the NWI maps are based on dominant vegetation types rather than on local soil or hydrologic (drainage) conditions. Consequently, the NWI wetland boundaries do not necessarily represent the boundaries of wetlands that come under the jurisdiction of the US Army Corps of Engineers (Corps) and Section 404 of the Clean Water Act.

Before initiating any Section 404 activities in park wetlands, wetland delineation studies will be required to determine wetland boundaries and site hydrologic, soil and vegetation characteristics. In April 2004, the United States Army Corps of Engineers (USACE) jurisdiction under Section 404 was extended to include irrigation waters and associated wetlands hydraulically connected to waters of the United States of America

Classification and Description

The wetland classifications shown on the NWI maps are based on the Cowardin et al. (1979) system adopted by the USFWS. The structure of this system is hierarchical, progressing from systems and subsystems, at the most general levels, to classes, subclasses and dominance types. As depicted in the "Wetland Inventory Map," wetland communities in the park fall into four categories. These include palustrine emergent (PEM), palustrine scrub-shrub (PSS), palustrine forested (PFO) and riverine streambed (R4SB). PEM wetlands are the most abundant type and cover the greatest area.

All four wetland types are found in the Ranch Unit in association with streams (i.e., Almo Creek, Stines Creek, Lone Rock Creek, and Johnson Creek) and irrigated lands found in the unit. Wetland occurrence in the other park units

Example of riparian shrub-shrub community

Almo Creek with Cache Peak in distance

is limited to a small, temporarily flooded PEM wetland along the south border of the northeast Smoky Mountain Unit. There are no wetlands at the Administrative Unit or southwest Smoky Mountain Unit.

PEM wetlands are associated with temporarily and seasonally flooded areas. It is the predominant wetland type found along Almo Creek in the eastern portion of the Ranch Unit where flood irrigation is seasonally applied to a large meadow complex used for summer livestock grazing. The irrigation ditches used to distribute water across the meadow complex generally support reed canarygrass (Phalaris arundinanea), bulrushes (Scirpus spp.), rushes (Juncus spp.), sedges (Carex spp.), and/or cattail (Typha latifolia). Overall, this wetland type is characterized by erect, rooted, herbaceous hydrophytes (Cowardin et al.1979).

PSS wetlands are found along natural and irrigation-dependent waterways. In the Ranch Unit these wetlands are commonly dominated by willows including Booth willow (Salix boothii), Geyer willow (Salix geyeriana), and others. Other common shrubs include Rocky Mountain maple, mountain alder, chokecherry, and elderberry. Overall, this wetland type is characterized by woody vegetation less than 20 feet tall and includes shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions (Cowardin et al. 1979).

A few temporarily flooded PFO wetlands occur in the northeast corner of the Ranch Unit along a tributary to Almo Creek. These wetlands are dominated by trees, including quaking aspen, narrowleaf cottonwood, and whiplash willow (Salix lasiandra). Overall, this wetland type is characterized by woody vegetation that is 20 feet or taller (Cowardin et al. 1979).

Wetlands contained within a stream channel are classified as riverine. Most of the riverine wetlands found in the park are seasonally flooded and are depicted by the suffix C. Within the aquatic bed (streambed) class are areas of open water dominated by plants that grow principally on or below the water surface for most of the growing season. Vegetation is typically non-persistent and includes submerged or floating-leaved rooted vascular plants, free-floating vascular plants, submergent mosses and algae (Cowardin et al. 1979)

Wetland Functions and Values

Wetlands function in a number of different ways and are important for various natural resource values. Functions are self-sustaining properties of a wetland ecosystem that exist in the absence of society and relate to ecological significance without regard to subjective human values (COE 1995). Groundwater discharge/recharge is an example of a wetland function. Values are benefits that derive from either one or more functions and the physical characteristics associated with a wetland (COE 1995). The

value of a given wetland function, or combination of functions, is based on human judgment of the worth, merit, importance, or quality attributed to those functions (MDT 1999). Examples of various wetland functions and values include:

- Habitat for federally-listed or proposed threatened and endangered species
- Habitat for sensitive, rare, or other special status species rated by the Idaho Native Plant Society, Idaho Conservation Data Center, Idaho Department of Fish and Game, BLM, and/or USDA Forest Service
- General wildlife habitat
- General fish/aquatic habitat
- Flood attenuation
- Long and short-term surface water storage
- Sediment/nutrient/toxicant retention and removal
- Sediment/shoreline stabilization
- Production export/food chain support
- Groundwater discharge/ recharge
- Uniqueness
- Recreation/education potential

Wetland Mitigation Site

A 10-acre wetland mitigation site and a 2.5-acre fringe area located in the Ranch Unit are protected in perpetuity with funds from an in-lieu-fee mitigation arrangement between the Idaho Transportation Department (ITD) and IDPR (See Appendix 3B). The two protected wetlands are mitigation for the 0.51-acre wetland loss associated with the City of Rocks Back Country Byway Project.

Under a Memorandum of Understanding (MOU) between ITD and IDPR, a wildlife-friendly, wooden 3-pole fence will be constructed by ITD around the mitigation site and fringe area to exclude cattle. Public pedestrian access will be maintained into these areas to view birds, wildlife and plants. Under the MOU, no specific pathway will be delineated or blazed, and the mitigation sites are to be operated and managed in accordance with the Master Plan for the park. (See Appendix 3B.)

The MOU directs IDPR to monitor, maintain, control noxious weeds, and protect the wetlands. A natural resource technician will monitor the protected wetlands, eradicate noxious weeds, repair fencing, prevent cattle from entering, keep reports on activities within the protected wetlands, and monitor and correct, if necessary, adverse conditions that would affect the health of these wetlands in perpetuity.

Wildlife

Because Castle Rocks State Park has many of the same geologic and vegetative conditions as the nearby City of Rocks National Reserve, wildlife populations and habitat in the park and reserve are much the same. Consequently, most of the wildlife information was obtained from the Comprehensive Management Plan for the City of Rocks National Reserve (National

Blacktail Jackrabbit

Western Skink

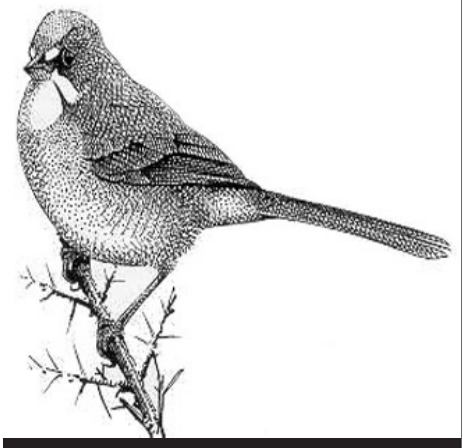


Illustration of the Green Tailed Towhee

Park Service 1994) and the City of Rocks Resource Management Plan (National Park Service 1996). Additional data and information were obtained from the Idaho Conservation Data Center, a herpetological inventory (Shive 2001) of the reserve and park, and a mammal inventory (Madison 2003) of the reserve.

A total of 53 mammals are included on the City of Rocks National Reserve checklist with a total of 35 species documented during the 2003 inventory (University of Idaho 2003). A partial list of common mammals in the area include mountain lion (Felis concolor), mule deer (Odocoileus hemionus), coyote (Canis latrans), bobcat (Lynx rufus), american badger (Taxidea taxus), porcupine (erethizon dorsatum), red fox (Vulpes vulpes), least chipmunk (Tamias minimus), mountain cottontail (Sylvilagus nuttallii), blacktail jackrabbit (Lepus californicus), golden-mantled ground squirrel (Spermophilus lateralis), Northern pocket gopher (Thomomys talpoides), Great Basin pocket mouse (Perognathus parvus), pinon mouse (Peromyscus truei), bushy-tailed woodrat (Neotoma cinerea), yellow-bellied marmot (Marmota flaviventris), deer mouse (Peromyscus maniculatus), montane vole (Microtus montanus), and long-eared (Myotis volans), little brown (Myotis lucifugus) and western small-footed (Myotis ciliolabrum) myotis.

About 155 species of birds are known to occur in the area. Common, year-round residents include northern flicker (Colaptes auratus), black-billed magpie (Pica hudsonia), common raven (Corvus corax), mountain chickadee (Poecile gambeli), dark-eyed junco (Junco hyemalis), and Cassin's finch (Carpodacus cassinii). Other common species include sage grouse (Centrocercus urophasianus), Clark's nutcracker (Nucifraga columnbiana), common nighthawk (Chordeiles minor), rock (Columba livia) and mourning doves(Zenaida macroura), cliff swallow (Petrochelidon pyrrhonota), rock (Salpinctes obsoletus) and house wrens (Troglodyes aedon), mountain bluebird (Sialia currocoides), swainson's thrush (Calharus ustulatus), solitary (Vireo solitaris) and warbling vireos (Vireo gilvus), green-tailed towhee (Pipilo chlorurus), spotted towhee (Pipilo maculatus), vesper's sparrow (Pooecetes gramineus), and western meadowlark (Sturnella neglecta). The area also provides breeding and prey habitat for many raptor species including golden eagle (Aquila chrysaetos), prairie falcon (Falco mexicanus), red-tailed hawk (Buteo jamiacensis), northern harrier (Circus cyaneus), sharp-shinned hawk (Accipiter gentilis), Cooper's hawk (Accipiter cooperii), American kestrel (Falco sparvarius), turkey vulture (Cathartes aura), and great-horned owl (Bubo virginianus). Less common species include common poorwill (Phalaenoptilus nuttallii), gray flycatcher (Empidonax weightii), pinyon jay

(Gymnorhinus cyanocephalus), ferruginous hawk (Buteo regalis), Say's phoebe (Sayornis saya), and Virginia's warbler (Vermivora virginiae).
Breeding birds indicative of specific habitats found on the Ranch Unit are listed below:

Shrub-steppe: sage thrasher (Oreoscoptes monatanus), green-tailed towhee (Pipilo chlororus), Brewer's sparrow (Spizella breweri), and vesper sparrow.

Pinyon-juniper woodland: chipping sparrow (Spizella arborea), western scrub jay (Aphelocoma californica), robin (Turdus migratorius), and Cassin's finch.

Aspen woodland: red-naped sapsucker (Syphrapicus nuchalis), mountain bluebird, and mountain chickadee (Poecile gambeli).

Riparian scrub-shrub: house wren (Troglodytes aedon), yellow warbler (Dendroica petechia), Lazuli bunting (Passerina amoena), and red-winged blackbird (Agelaius phoeniceus).

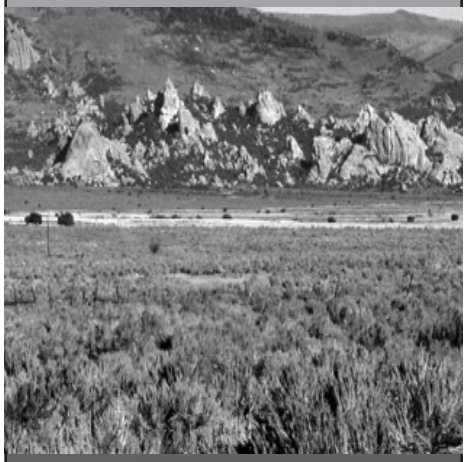
Rock cliffs and ledges: white-throated swift (Aeronautes saxatalis), violet-green (Tachycineta thalassina) and cliff swallows, and red-tailed hawk (National Park Service 2002).

The herpetological inventory (Idaho State University 2001) identified 14 species of amphibians and reptiles as potentially present within the City of Rocks National Reserve and Castle Rocks State Park. Of these, 7 species were observed in the reserve including one amphibian, boreal chorus frog (Pseudacris maculata); two lizards, common sagebrush lizard (*Sceloporus graciosus*) and Western skink (Eumeces skiltonianus); and four snakes, rubber boa (Charina bottae), stripped whipsnake (Masticophis taeniatus), gophersnake (Pituophis catenifer), and terrestrial gartersnake (Thamnophis elegans). The common sagebrush lizard, terrestrial gartersnake, great basin rattlesnake, gophersnake, and western skink were also observed in the Castle Rocks. Overall, the common sagebrush lizard and terrestrial gartersnake were the most widespread and abundant species observed with the sagebrush lizard occupying the greatest variety of habitat types. None of the observed species are considered BLM Sensitive or Idaho Department of Fish and Game Species of Special Concern.

Scenic Inventory and Resources

All the park units are within the historic viewshed of the California Trail as well as the City of Rocks National Reserve. The views seen from the City of Rocks Back Country Byway are also important and critical to protect from scenic degradation. Cassia County adopted the "Historical Preservation Zone Ordinance". It is a tool that may protect important scenic areas within City of Rocks National Reserve, Castle Rocks State Park, and the City of Rocks Back Country Byway from

Great Basin Rattlesnake coiled and ready to strike



View of Ranch Unit and Castle Rock from Smoky Mountain Unit

View looking northeast from Smoky Mountain Unit

View from Smoky Mountain unit over valley shows importance of viewsheds

View of Ranch Unit from entry road

development that impacts the visual qualities important to this rural landscape. Each of the units of the park have differing concerns when it comes to scenic viewsheds and scenic qualities that are important to each park unit.

The Ranch Unit can be seen from great distances along the Byway and public roads that cross the Big Cove Valley. It also is important to remember how far one can see out of the Ranch Unit from its varying elevations. The outward views are especially important when considering the potential number of visitors who will engage in climbing and hiking at these higher elevations. The Cassia County Historic Preservation Zone covers most of the property west of the Castle Rock formation inside and outside the park. Another resource is the Cassia County Design Guidelines (1995) that describe appropriate development in southern Cassia County. The guidelines address development densities, setbacks and siting of built elements, massing and grouping of structures, architectural appearance, signage and planting design.

External views are the priority from the Administrative Unit at the bottom of the Almo Valley. The California Trail bisects a corner of this unit and staff coordinates interpretive activities from the visitor center. From the visitor center, the view northward is of the Castle Rock formation and numerous other formations dotting the toe of Cache Peak. Looking westward, there are views into the City of Rocks. These are the views that would have been seen by travelers on the California Trail and are important to preserve as part of the emigrant experience.

The Smoky Mountain Unit is higher in elevation than the Administrative Unit. Some foreground views are screened by the pinyon-juniper woodlands. This unit is on higher ground along the southern viewshed border of the Byway route into and out of the City of Rocks. Development at this site should be planned with sensitivity to views from the Byway route.

The value of protecting these viewsheds can be seen in the growing popularity of heritage tourism (City of Rocks Back Country Byway Committee 1998) along with maintaining the visual quality of the experience traveling to and from the City of Rocks National Reserve and Castle Rocks State Park. This visual quality of the rural landscape is part of the experience at both parks. The importance of viewshed protection has also been discussed in the Castle Rocks Planning Charette, the City of Rocks National Reserve Comprehensive Management Plan, and the Cassia County Design Guidelines Manual.

LOCAL GOVERNMENT, FEDERAL AND STATE AGENCY, AND OTHER PLANNING AUTHORITIES

Cassia County ordinances govern land use on private lands adjacent to Castle Rocks State Park. The Cassia County Comprehensive Plan was adopted in 1992 and revised in 1999. It lists seven historical and geological sites recommended for protection from incompatible land uses, including Castle Rock and the City of Rocks National Reserve. The comprehensive plan predated establishment of Castle Rocks State Park. A 1993 Interim Historical Preservation Zone ordinance, amended in 1999, creates an overlay that encompasses part of the state park. The ordinance authorizes the planning and zoning commission to review proposed developments or changes to existing properties, to evaluate whether the changes meet the visual compatibility standards of the historic zone on private property.

As previously mentioned, IDPR signed a Memorandum of Understanding with the USDA Forest Service and the BLM for the development and management of 880 acres of Interagency Recreation Area. IDPR must coordinate all planning and management activities that are related to this area with those agencies. IDPR has also signed a Recreation and Public Purposes lease for the 240 acres that makes up the Smoky Mountain Unit. Conditions in this lease must be met as a part of the agreement. The close coordination of recreational management goals benefits management of both Castle Rocks State Park and the City of Rocks National Reserve.

Per the Memorandum of Agreement between IDPR, NPS, and SHPO, all uncompleted historical and cultural evaluation work on archeological sites will be completed as feasible. This agreement stems from the Section 106 review process required during the transfer of land between the NPS and IDPR. (See Appendix 2A.) Details of the State Historic

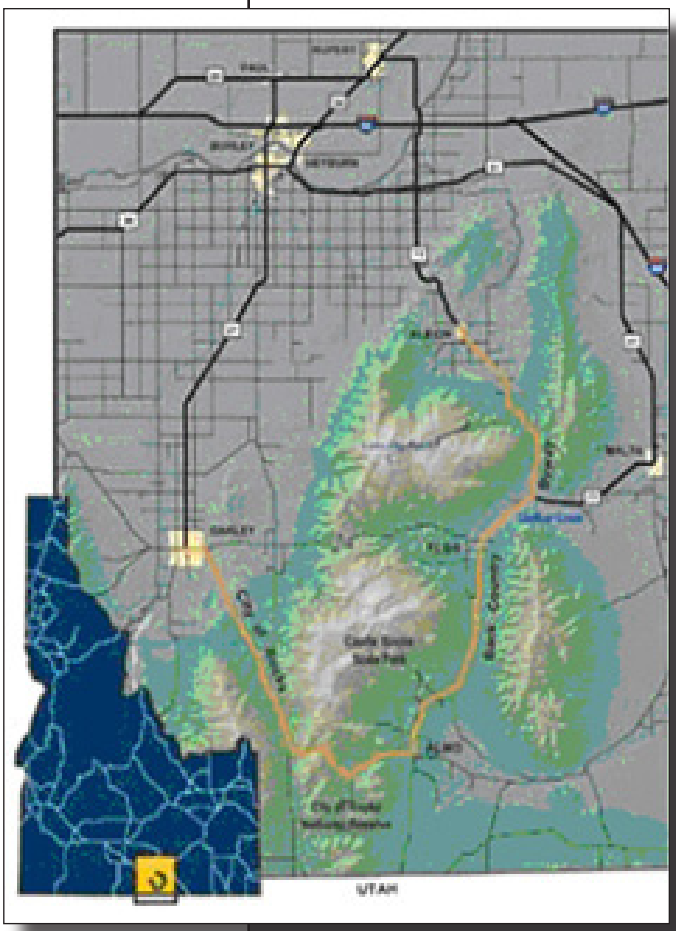
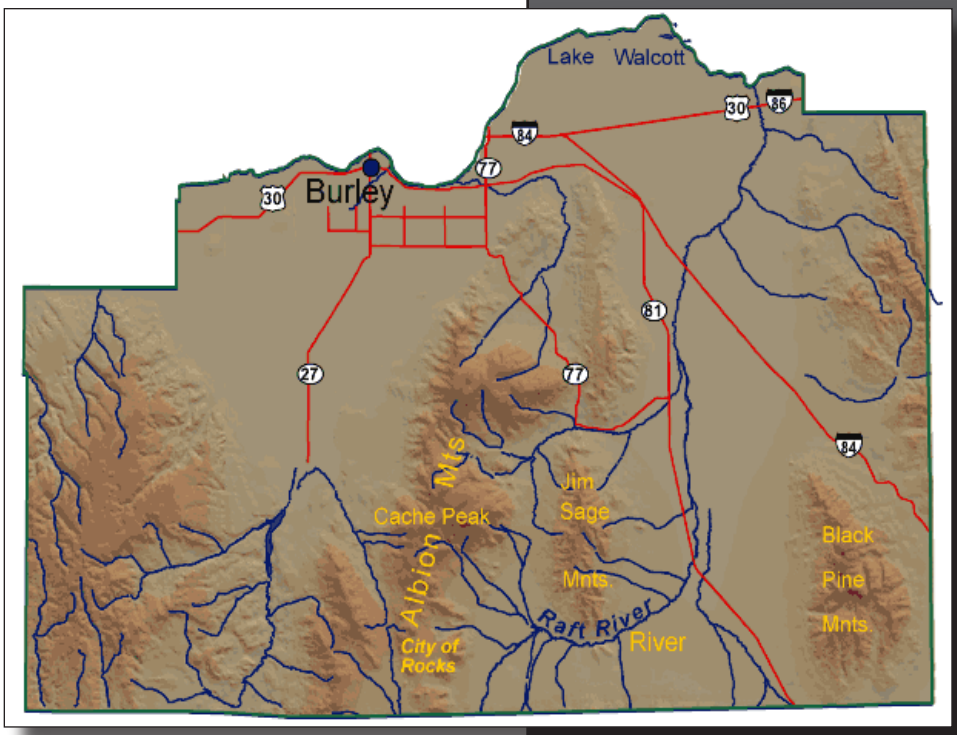


Illustration of the Back Country Byway route between Albion and Oakley



Ranch house with newly added perimeter deck

Existing home at Administrative Unit used as visitor center

Preservation Plan can be found at www.idahohistory.net.

LAND OWNERSHIP

The Land Ownership Map shows land ownership adjacent to the Castle Rocks State Park units. Adjacent lands are both privately and publicly owned. (See Appendix 3C.)

LOCAL TRANSPORTATION NETWORK

Castle Rocks State Park is not on a major transportation route. The City of Rocks Back Country Byway is accessed from Interstate 84 to State Highway 27 on the west and State Highway 77 on the east. About 50% of the Byway is paved. Improvements to the Byway began in 2005.

The park is approximately 45 minutes south of Interstate 84 (See illustration to the right) and US Highway 30, which are the primary east-west routes. The park is approximately 30 minutes west-southwest of Interstate 84 and State Highway 81, which are the primary north-south routes other than the Byway.

There are approximately 400 to 500 vehicle trips per day along Idaho 77 between Albion and Conner Creek. This drops to 140 to 400 daily vehicle trips between Conner Creek and Almo, or the entrance to both Castle Rocks State Park and the City of Rocks National Reserve.

During 2005, safety improvements were being made to the Byway by widening the road and straightening of the curves. Also in 2005, Cassia County began a county wide transportation plan. No information was available at the time of printing of the master plan.

Approximately 58,000 vehicles per year enter the City of Rocks National Reserve through its three entries.

EXISTING UTILITY INFRASTRUCTURE

Potable Water Supply is provided by a well at each of the park units.

Sewage Disposal is provided at each park unit using septic drain fields except the Smoky Mountain Unit where those services are currently proposed.

Electricity is available at all three park units via underground and overhead power lines.

There is land-line telephone service to the Ranch and Administrative Units. Cell phone service is limited. There is a pay phone at the visitor center. A radio system connects all three units.

FACILITIES INVENTORY, STAFFING AND RECREATIONAL OPPORTUNITIES

The Ranch Unit's primary structure is the ranch house. It is currently

being used for visitor contact, display of historical/interpretive artifacts, and resale/support offices. A large deck greatly increases the house's circulation space. To the west of the ranch house is a modern storage shed. A water fountain is between the shed and the ranch house. Two small, old sheds remain north of the ranch house and are proposed to be removed. A vault toilet has been constructed between the parking area and the ranch house. Two pads for recreational vehicles, used by seasonal employees were built to the north and west of the ranch house. A large, landscaped amphitheater was constructed by the prior owner by placing stones in a semi-circle in the lawn area.

The Administrative Unit also has a house, which was renovated to be used as the primary visitor center for the Park and the Reserve. A new maintenance facility serves as the primary facility and has office and conference space. There is a paved parking lot for visitors and parking for staff on the opposite side of the house. A large lawn with shade trees separates the house from the Elba-Almo Road (825 E). A 5,250 sq ft maintenance shop with offices is constructed south of the house. This is surrounded by a gravel yard and is served by its own well and drainage field. Nearby structures are used to store fuel and hazardous materials.

One wood building used for storage was originally an administrative building at the Minidoka Internment Camp during World War II. The building will be returned to Minidoka Internment National Monument. Two other older buildings will be removed in 2006. An existing building is used as an employee residence. This site is suitable for new housing for park staff and RV sites for volunteers.

A new campground will be built in 2006 on the southwestern parcel of the Smoky Mountain Unit. The first loop of the campground will be a 37-unit recreational vehicle camping loop serviced by new water, electrical, and septic systems. The campground will be built at the end of a newly paved entrance road. A dump station will be constructed.

Staffing consists of a staff of six full time employees, 20-25 seasonal employees, and volunteers who help insure the smooth operation of the park.

Recreational opportunities in the park include rock climbing, bouldering, hiking, mountain biking, horseback riding, picnicking, cross-country skiing, snow shoeing, wildlife/wildflower photography, birding, and hunting. Climbing is the most popular activity at the Ranch Unit. Camping likely will become an important park activity when the new campground opens at the Smoky Mountain Unit. The new campground will also have a minimum of five spaces that can accommodate equestrian users.

Wood building originally used for administration at Minidoka Internment Camp

Remnant of truck flatbed used during ranching activities

CULTURAL RESOURCE INVESTIGATIONS IN THE PLANNING AREA

The Castle Rocks State Park units have been surveyed for cultural resources to different degrees of intensity over the past decade.

RANCH UNIT

Archeological surveys have been conducted to identify and evaluate historic and prehistoric cultural resources on the Ranch Unit. During May and August 2001, National Park Service and Idaho State Historic Preservation Office archeologists conducted an archeological survey of the entire property. Based on these intensive surveys, a significant number of archaeological resources in good condition were identified.

To date, no cultural surveys have been done on the Sawtooth National Forest or BLM lands included in the Interagency Recreation Area. Surveys conducted on park lands gives indication that archeological resources extend into adjoining IRA lands.

The undisturbed condition of the archaeological resources found on the Ranch Unit is likely attributable to public inaccessibility due to past private ownership.

During the 2001 survey, a variety of prehistoric sites were found including lithic/artifact scatters, artifact scatters with sub-surface features, rock shelters, and hunting blinds. A total of 28 archaeological sites were recorded. The prehistoric sites indicate that human use of the area has been ongoing for thousands of years. The few diagnostic artifacts recovered during surface surveys appear to be typical of others from the northern portion of the Great Basin culture area.

Since the 2001 survey, excavations have been conducted at a rock shelter site and an open air site. Intact archaeological materials were encountered at both locations.

The valley in which the Ranch Unit is located has supported Euro-American migration, settlement, agriculture and grazing for more than 150 years. This is evident from the presence of irrigation canals and ranching structures throughout the area. Although grazing has taken place across the entire ranch, the most intensive use has been on the eastern portion of the property, near and around the meadow. This meadow contains many of the resources (i.e., forage, water, and flat topography) needed to support ranching and early agricultural advancement in southern Idaho (National Park Service 2002). Several historic artifact scatters were recorded during the 2001 survey. The historic era resources are representative of several phases of agricultural development. At least one of the sites discovered during the archaeological survey appears to be remnants of early homesteading, possibly during the late 1800s or early 1900s. The primary historic materials

now visible are those associated with ranching. The ranch house, corrals, roads, irrigation canals, and related infrastructure dominate the historic landscape and remnants of that use can be seen across much of the ranch (National Park Service 2002). To date, only the ranch-related buildings have been evaluated and found ineligible for listing in the NRHP.

ADMINISTRATIVE UNIT

The Administrative Unit has been surveyed for cultural resources. The unit is disturbed and partially developed because of its past use as a private residence and its current use as a visitor center and park maintenance area. Because of previous and existing uses, the unit likely does not contain intact archaeological sites. However, the unit will be evaluated for cultural resources before construction is authorized in accordance with an agreement with the Idaho State Historic Preservation Office.

SMOKY MOUNTAIN UNIT - SOUTHWESTERN PARCEL

The southwestern Smoky Mountain Unit was surveyed for cultural resources in 2000 by archeologists from the Vancouver National Historic Reserve and the National Park Service. A total of five sites and 22 isolated finds were recorded.

Sub-surface testing was conducted at three of the five archeological sites on July 20 and 21, 2004. These investigations revealed that these sites are not eligible for listing in the NRHP (See Appendix 3E).

SMOKY MOUNTAIN UNIT - NORTHEASTERN PARCEL

The northeastern parcel of the Smoky Mountain Unit has been fully surveyed for cultural resources in accordance with an IDPR agreement with the Idaho State Historic Preservation Office and requirements set forth in the lease agreement with the BLM.

ISSUES OF SPECIAL CONCERN

SPECIAL STATUS SPECIES

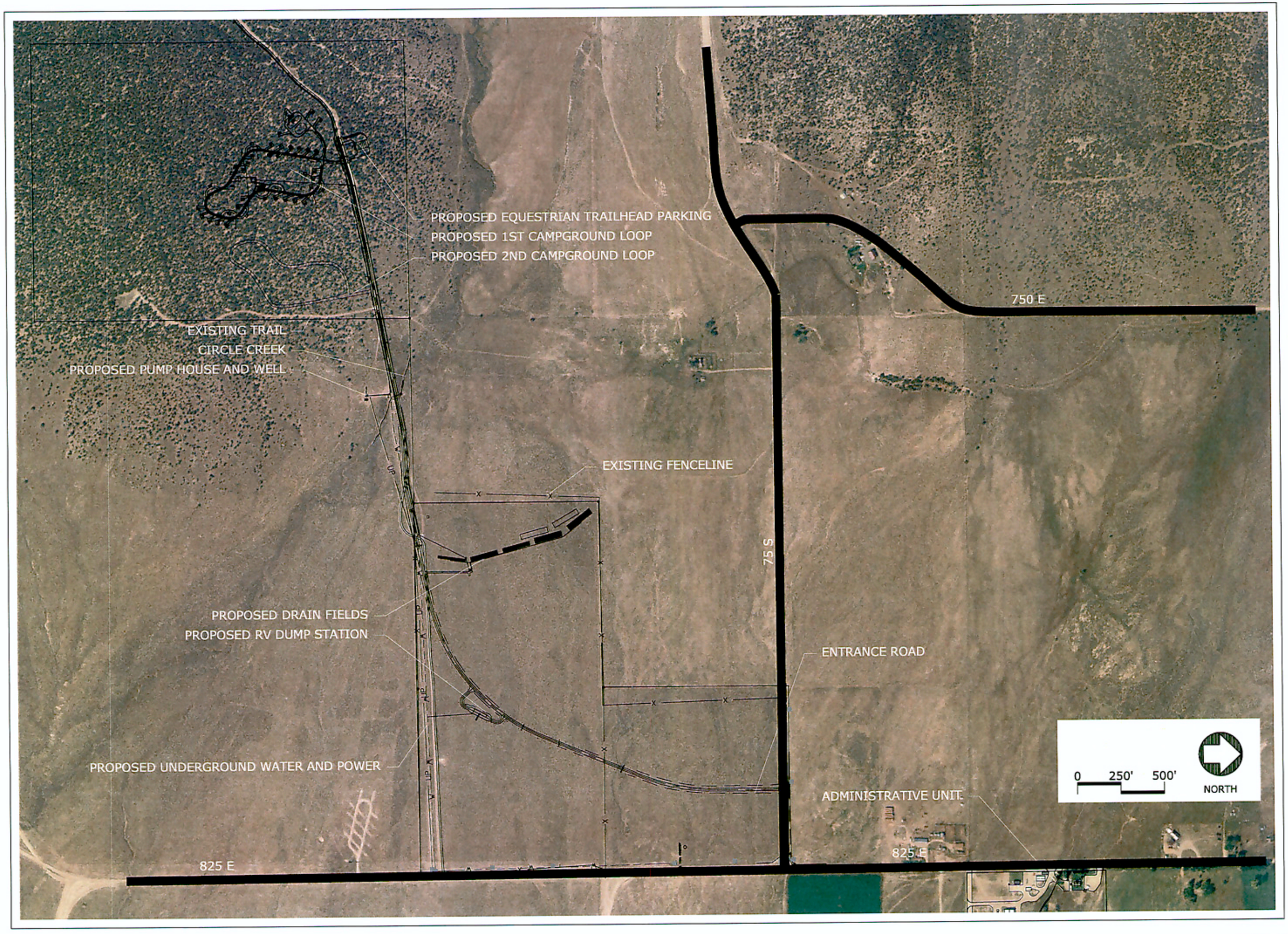
Federally-listed threatened and endangered species protected under the Endangered Species Act that occur in Cassia County include the bald eagle (Haliaeetus leuchocephalus), Snake River physa snail (Physa natricina), and Utah valvata snail (Valvata utahensis). Of these, only the bald eagle has been documented and none are expected to occur in the park.

NOXIOUS WEEDS

Management of noxious weeds will be important in maintaining the character of this natural environment. Staff at Castle Rocks State Park and City of Rocks National Reserve is finalizing the 2006-2010 Weed Management Plan which catalogs the inventory of noxious weeds found within the park and plans for long term

management of the problem. This plan will help both parks meet their obligations under the Federal Noxious Weed Act of 1974 as well as Idaho State Code 22-2407.

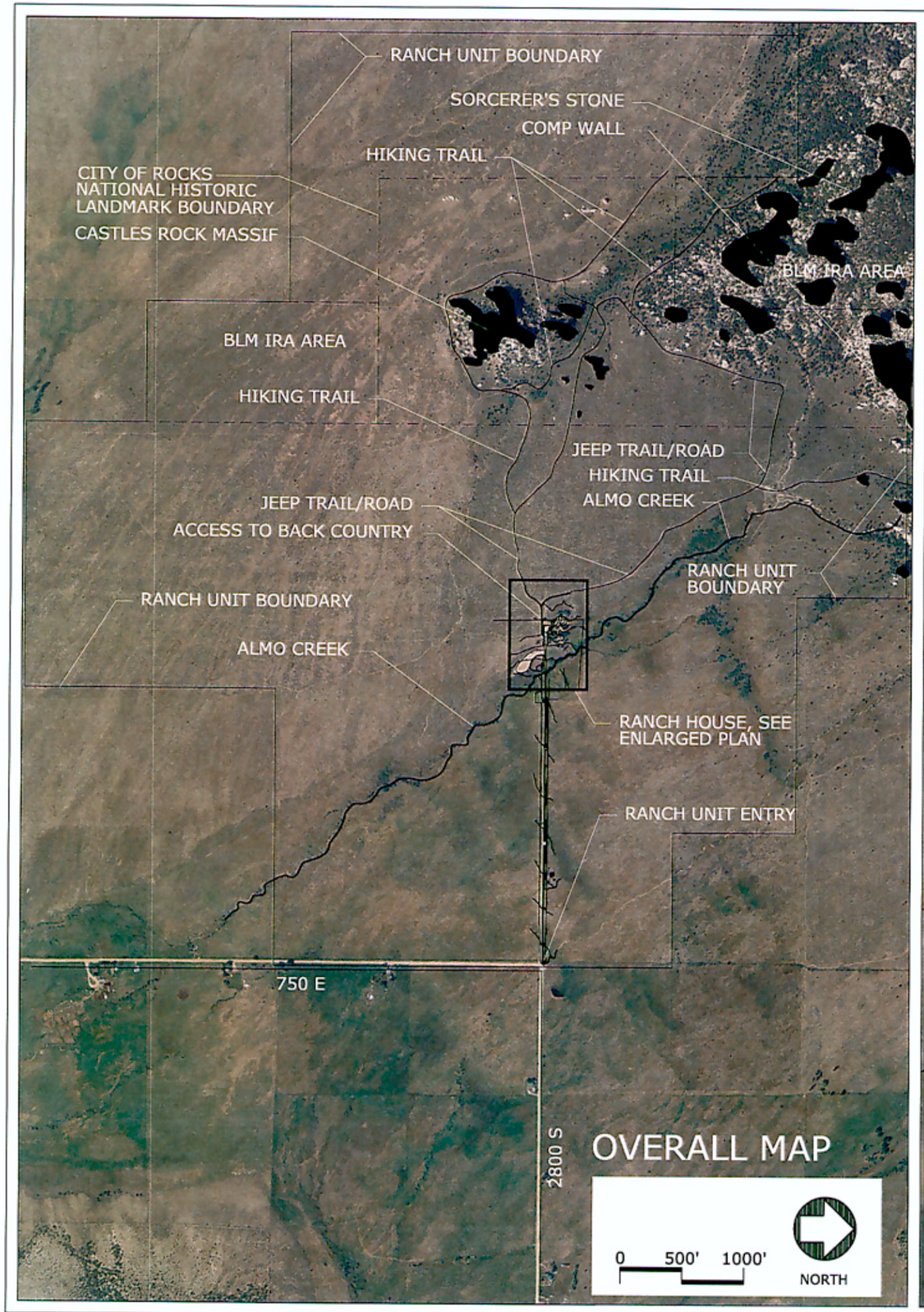
Idaho has approximately 300 exotic weed species throughout the state: 36 of these are considered "noxious". The University of Idaho conducted inventories for noxious weeds in 1995 and again in 2003. The two parks were found to have seven noxious weed species. Those species are black henbane (Hyoscyanus niger), Canada Thistle (Cirsium arvense), Field Bindweed (Convolvus arvensis), Musk Thistle (Carduus nutans), Scotch Thistle (Onopordum acanthium), Spotted Knapweed (Centaurea maculosa), and White Top (Cardaria draba). The plan works to prioritize the level of threat from each species and outline eradication strategies.



CASTLE ROCKS STATE PARK

FACILITY INVENTORY - SMOKY MOUNTAIN UNIT

MAP 3.5



CASTLE ROCKS STATE PARK

FACILITY INVENTORY - RANCH UNIT

MAP 3.4

CASTLE ROCKS STATE PARK
WETLAND INVENTORY LEGEND

MAP 3.3

For information on availability of NWI maps, call 1-800-USA-MAPS.

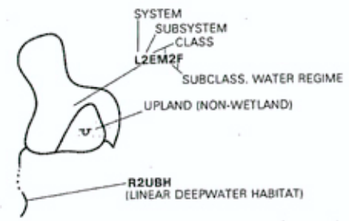
Regional Director (ARDE) Region I
USFWS - ASWE
911 N.E. 11th Ave.
Portland, OR 97232-4181

SPECIAL NOTE

This document was prepared primarily by stereoscopic analysis of high altitude aerial photographs. Wetlands were identified on the photographs based on vegetation, visible hydrology, and geography in accordance with **Classification of Wetlands and Deepwater Habitats of the United States** (FWS/OBS - 79/31 December 1979). The aerial photographs typically reflect conditions during the specific year and season when they were taken. In addition, there is a margin of error inherent in the use of the aerial photographs. Thus, a detailed on the ground and historical analysis of a single site may result in a revision of the wetland boundaries established through photographic interpretation. In addition, some small wetlands and those obscured by dense forest cover may not be included on this document.

Federal, State and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, State or local government or to establish the geographical scope of the regulatory programs of government agencies. **Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, State or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.**

SYMBOLOGY EXAMPLE



NOTES TO THE USER

- Subsystems, Classes, Subclasses, and Water Regimes in *italics* were developed specifically for NATIONAL WETLANDS INVENTORY mapping.
- Some areas designated as R4SB, R4SBW, OR R4SBJ (INTERMITTENT STREAMS) may not meet the definition of wetland.
- This map uses the class Unconsolidated Shore (US). On earlier NWI maps that class was designated Beach/Bar (BB), or Flat (FL). Subclasses remain the same in both versions.

U — Primarily represents **upland** areas, but may include unclassified wetlands such as man-modified areas, non photo-identifiable areas and/or unintentional omissions.

AERIAL PHOTOGRAPHY

DATE:	8 / / 86	/ /
SCALE:	1:58 000	
TYPE:	CIR	

U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Prepared by National Wetlands Inventory

1992

M — MARINE

SYSTEM / SUBSYSTEM / CLASS / Subclass

1 — SUBTIDAL
- RB — ROCK BOTTOM: 1 Bedrock, 2 Rubble
- UB — UNCONSOLIDATED BOTTOM: 1 Cobble-Gravel, 2 Sand, 3 Mud, 4 Organic
- AB — AQUATIC BED: 1 Algal, 3 Rooted Vascular, 5 *Unknown Submergent*
- RF — REEF: 1 Coral, 3 Worm
- OW — *OPEN WATER/ Unknown Bottom*

2 — INTERTIDAL
- AB — AQUATIC BED: 1 Algal, 3 Rooted Vascular, 5 *Unknown Submergent*
- RF — REEF: 1 Coral, 3 Worm
- RS — ROCKY SHORE: 1 Bedrock, 2 Rubble
- US — UNCONSOLIDATED SHORE: 1 Cobble-Gravel, 2 Sand, 3 Mud, 4 Organic

E — ESTUARINE

1 — SUBTIDAL
- RB — ROCK BOTTOM: 1 Bedrock, 2 Rubble
- UB — UNCONSOLIDATED BOTTOM: 1 Cobble-Gravel, 2 Sand, 3 Mud, 4 Organic
- AB — AQUATIC BED: 1 Algal, 3 Rooted Vascular, 4 Floating Vascular, 5 *Unknown Submergent*, 6 *Unknown Surface*
- RF — REEF: 2 Mollusc, 3 Worm
- OW — *OPEN WATER/ Unknown Bottom*

2 — INTERTIDAL
- AB — AQUATIC BED: 1 Algal, 3 Rooted Vascular, 4 Floating Vascular, 5 *Unknown Submergent*, 6 *Unknown Surface*
- RF — REEF: 2 Mollusc, 3 Worm
- SB — STREAMBED: 1 Cobble-Gravel, 2 Sand, 3 Mud, 4 Organic
- RS — ROCKY SHORE: 1 Bedrock, 2 Rubble
- US — UNCONSOLIDATED SHORE: 1 Cobble-Gravel, 2 Sand, 3 Mud, 4 Organic
- EM — EMERGENT: 1 Persistent, 2 Nonpersistent
- SS — SCRUB-SHRUB: 1 Broad-Leaved Deciduous, 2 Needle-Leaved Deciduous, 3 Broad-Leaved Evergreen, 4 Needle-Leaved Evergreen, 5 Dead, 6 *Deciduous*, 7 *Evergreen*
- FO — FORESTED: 1 Broad-Leaved Deciduous, 2 Needle-Leaved Deciduous, 3 Broad-Leaved Evergreen, 4 Needle-Leaved Evergreen, 5 Dead, 6 *Deciduous*, 7 *Evergreen*

R — RIVERINE

1 — TIDAL
- RB — ROCK BOTTOM: 1 Bedrock, 2 Rubble
- UB — UNCONSOLIDATED BOTTOM: 1 Cobble-Gravel, 2 Sand, 3 Mud, 4 Organic

2 — LOWER PERENNIAL
- *SB — STREAMBED: 1 Bedrock, 2 Rubble, 3 Cobble-Gravel, 4 Sand, 5 Mud, 6 Organic, 7 Vegetated
- AB — AQUATIC BED: 1 Algal, 2 Aquatic Moss, 3 Rooted Vascular, 4 *Floating Vascular*, 5 *Unknown Submergent*, 6 *Unknown Surface*
- RS — ROCKY SHORE: 1 Bedrock, 2 Rubble
- US — UNCONSOLIDATED SHORE: 1 Cobble-Gravel, 2 Sand, 3 Mud, 4 Organic, 5 Vegetated

3 — UPPER PERENNIAL
- **EM — EMERGENT: 2 Nonpersistent

4 — INTERMITTENT
- OW — *OPEN WATER/ Unknown Bottom*

5 — *UNKNOWN PERENNIAL*

*STREAMBED is limited to TIDAL and INTERMITTENT SUBSYSTEMS, and comprises the only CLASS in the INTERMITTENT SUBSYSTEM.
**EMERGENT is limited to TIDAL and LOWER PERENNIAL SUBSYSTEMS.

L — LACUSTRINE

1 — LIMNETIC
- RB — ROCK BOTTOM: 1 Bedrock, 2 Rubble
- UB — UNCONSOLIDATED BOTTOM: 1 Cobble-Gravel, 2 Sand, 3 Mud, 4 Organic
- AB — AQUATIC BED: 1 Algal, 2 Aquatic Moss, 3 Rooted Vascular, 4 Floating Vascular, 5 *Unknown Submergent*, 6 *Unknown Surface*
- OW — *OPEN WATER/ Unknown Bottom*

2 — LITTORAL
- RB — ROCK BOTTOM: 1 Bedrock, 2 Rubble
- UB — UNCONSOLIDATED BOTTOM: 1 Cobble-Gravel, 2 Sand, 3 Mud, 4 Organic
- AB — AQUATIC BED: 1 Algal, 2 Aquatic Moss, 3 Rooted Vascular, 4 Floating Vascular, 5 *Unknown Submergent*, 6 *Unknown Surface*
- RS — ROCKY SHORE: 1 Bedrock, 2 Rubble
- US — UNCONSOLIDATED SHORE: 1 Cobble-Gravel, 2 Sand, 3 Mud, 4 Organic, 5 Vegetated
- EM — EMERGENT: 2 Nonpersistent
- OW — *OPEN WATER/ Unknown Bottom*

P — PALUSTRINE

- RB — ROCK BOTTOM: 1 Bedrock, 2 Rubble
- UB — UNCONSOLIDATED BOTTOM: 1 Cobble-Gravel, 2 Sand, 3 Mud, 4 Organic
- AB — AQUATIC BED: 1 Algal, 2 Aquatic Moss, 3 Rooted Vascular, 4 Floating Vascular, 5 *Unknown Submergent*, 6 *Unknown Surface*
- US — UNCONSOLIDATED SHORE: 1 Cobble-Gravel, 2 Sand, 3 Mud, 4 Organic, 5 Vegetated
- ML — MOSS-LICHEN: 1 Moss, 2 Lichen
- EM — EMERGENT: 1 Persistent, 2 Nonpersistent
- SS — SCRUB-SHRUB: 1 Broad-Leaved Deciduous, 2 Needle-Leaved Deciduous, 3 Broad-Leaved Evergreen, 4 Needle-Leaved Evergreen, 5 Dead, 6 *Deciduous*, 7 *Evergreen*
- FO — FORESTED: 1 Broad-Leaved Deciduous, 2 Needle-Leaved Deciduous, 3 Broad-Leaved Evergreen, 4 Needle-Leaved Evergreen, 5 Dead, 6 *Deciduous*, 7 *Evergreen*
- OW — *OPEN WATER/ Unknown Bottom*

MODIFIERS

In order to more adequately describe wetland and deepwater habitats one or more of the water regime, water chemistry, soil, or special modifiers may be applied at the class or lower level in the hierarchy. The farmed modifier may also be applied to the ecological system.

WATER REGIME

Non-Tidal
- A Temporarily Flooded
- B Saturated
- C Seasonally Flooded
- D *Seasonally Flooded/ Well Drained*
- E *Seasonally Flooded/ Saturated*
- F Semipermanently Flooded
- G Intermittently Exposed
- H Permanently Flooded
- J Intermittently Flooded
- K Artificially Flooded
- W Intermittently Flooded/Temporary
- Y Saturated/Semipermanent/ Seasonal
- Z Intermittently Exposed/Permanent
- U Unknown

Tidal
- K *Artificially Flooded*
- L Subtidal
- M Irregularly Exposed
- N Regularly Flooded
- P Irregularly Flooded
- *S Temporary-Tidal
- *R Seasonal-Tidal
- *T Semipermanent-Tidal
- *V Permanent-Tidal
- U Unknown

*These water regimes are only used in tidally influenced, freshwater systems

WATER CHEMISTRY

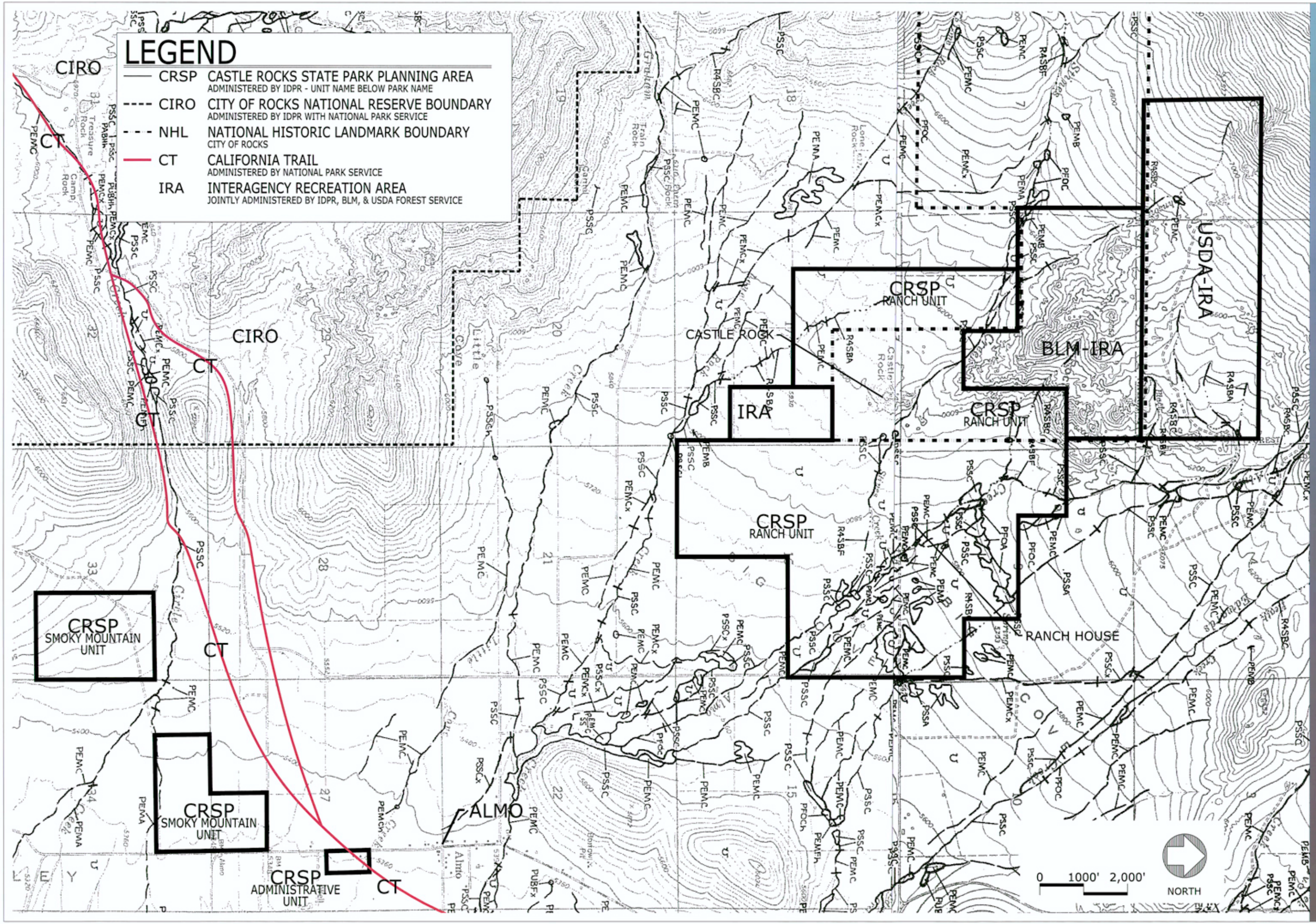
Coastal Halinity
- 1 Hyperhaline
- 2 Euhaline
- 3 Mixohaline (Brackish)
- 4 Polyhaline
- 5 Mesohaline
- 6 Oligohaline
- 0 Fresh

Inland Salinity
- 7 Hypersaline
- 8 Eusaline
- 9 Mixosaline
- 0 Fresh

pH Modifiers for all Fresh Water
- a Acid
- t Circumneutral
- i Alkaline

SOIL
- g Organic
- n Mineral

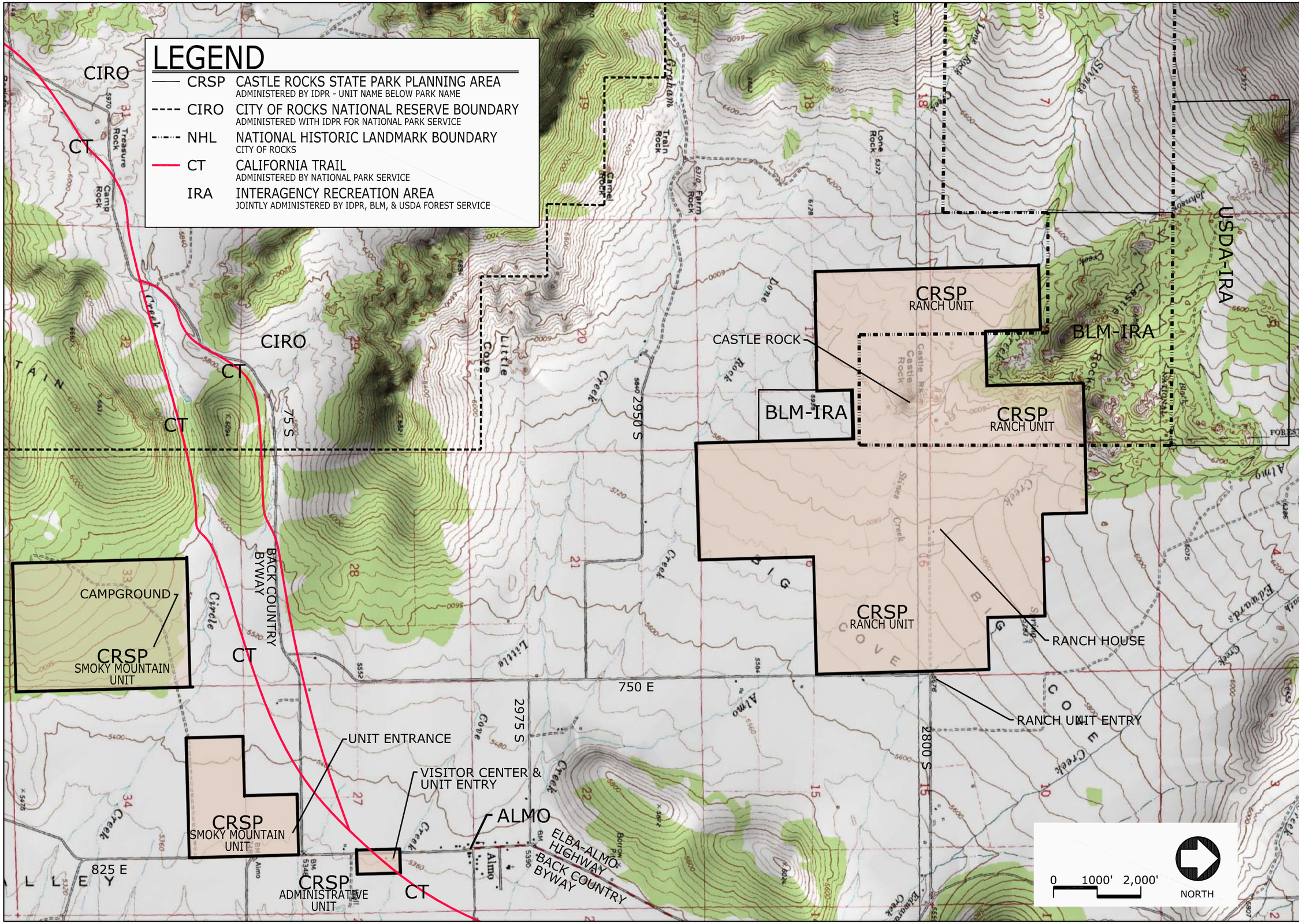
SPECIAL MODIFIERS
- b *Beaver*
- d *Partially Drained/Ditched*
- f Farmed
- h *Diked/Impounded*
- r *Artificial Substrate*
- s *Spoil*
- x Excavated



CASTLE ROCKS STATE PARK

WETLAND INVENTORY MAP

MAP 3.2



CASTLE ROCKS STATE PARK

TOPOGRAPHY AND PHYSIOGRAPHY

MAP 3.1

CASTLE ROCKS STATE PARK

FACILITY INVENTORY - ADMINISTRATION UNIT

MAP 3.6