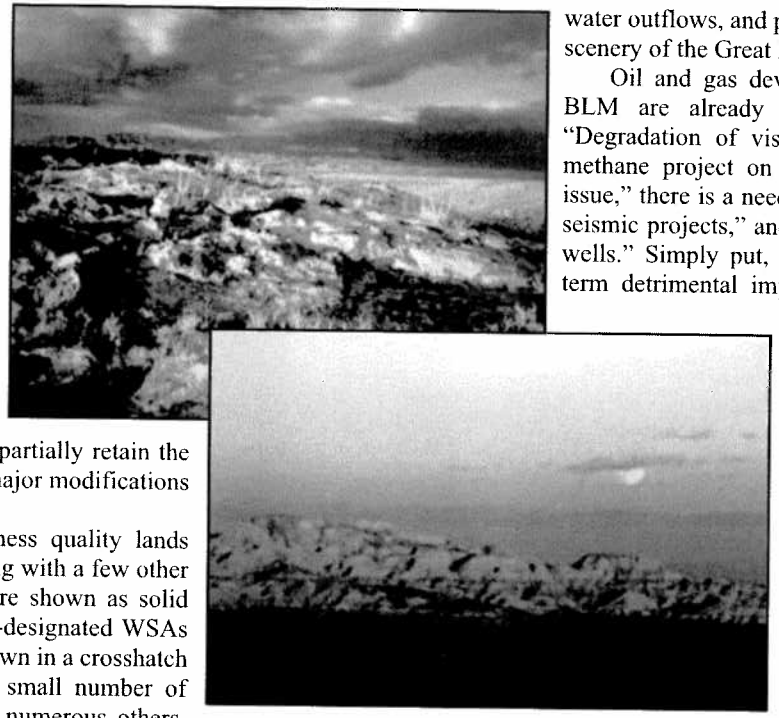
Important Visual Resources and Scenery

Wyoming has traditionally been known for its wide-open spaces and scenic vistas. The BLM lands within the Great Divide possess some of the most beautiful natural scenery in the state. Examples include clay badlands sculpted by wind and water at Prehistoric Rim, active sand dunes of Ferris Dunes, outlooks such as the Ferris Mountains where visitors can see outstanding panoramic vistas for miles, Encampment River canyon "with colorful rock outcroppings and thick riparian vegetation" (Jonas Consulting 2002) and a 35-foot tall scenic waterfall on Duck Creek. In addition, the Cherokee and Overland historic expansion era trails and the Continental Divide National Scenic Trail pass through the Great Divide. The natural settings of these important historical and recreation trails provide a window to our past in a landscape that in many places looks much like it did when the pioneers were crossing the Great Divide. The Seminoe Road Back Country Byway traverses significant BLM lands and small BLM parcels are also near the Snow Range Scenic Highway. Both of these routes are designed in part due to their recreational and scenic values.

On the map on page 35, areas of high scenic value and visual quality deserving protection are shown. The BLM's Visual Resource Management (VRM) definitions have been applied as prescriptions to protect scenery: **Class I**—preserve the existing character of the landscape; **Class II**—retain the existing character of the landscape, with only a low level of change to the landscape allowed. **Class III**—partially retain the existing character of the landscape. **Class IV**—allow major modifications to the existing character of the landscape.

To protect outstanding visual resources, wilderness quality lands within the Great Divide call for Class I protection, along with a few other particularly outstanding non-wilderness areas. Both are shown as solid brick colored polygons on the map on page 35. BLM-designated WSAs have Class I protection in the existing RMP and are shown in a crosshatch pattern. BLM has applied Class II designation to a small number of visually important areas, and citizens have identified numerous others. These are shown with a distinctive crosshatch pattern or in solid blue, respectively. The various historic routes, scenic highways, and recreation trails also are worthy of Class II protection. They are shown in various colored cross-hatch patterns with suggested protective buffers. The buffers could be applied to all lands a given distance from the routes/trails or computer mapping could be used to apply the buffer to the actual viewsheds for each. Class III and IV areas are not shown on the map. Brief descriptions of the potential wilderness areas are given in the wilderness section of this report; descriptions of most of the other Class I and II areas are given below.



Ferris Mountain View and Moon Over the Haystacks
Photos © Scott Smith (top) and BCA

Threats: Many of the scenic treasures mentioned above, and a number of the other stunning areas in the Great Divide described below, are under great threat from the current boom in energy development and increasing off-road vehicle use. According to BLM (2003b): "The most likely sources of potential future impacts on visual resources are OHV [Off-Highway Vehicle] use and the rapid increase of oil and natural gas exploration and extraction in the Rawlins RMPPA [Rawlins RMP planning area]... Even with strong adherence to guidelines, standards, and APD [Application for Permit to Drill] stipulations, oil and gas development affects the visual quality of large areas within the RMPPA to a degree dependent on the density of well pads and the extent to which roads to pads are properly sited and dust control measures are followed." The corresponding increases in the miles of new oil and gas roads, produced water outflows, and power lines are also diminishing the scenery of the Great Divide.

Oil and gas developments recently authorized by BLM are already impacting the scenic resources. "Degradation of visual resources within the coalbed methane project on Seminoe Road" is an "emerging issue," there is a need for "more effective mitigation on seismic projects," and "more effective mitigation on all wells." Simply put, "[m]ineral development has long-term detrimental impacts on visual resources" (BLM 2003b).

Wyoming's open space and beautiful scenery are defining characteristic of the state. Protecting these resources is important for Wyoming residents and their quality of life, but also for out-of-state citizens who also co-own the public BLM lands. In addition, Wyoming derives many economic benefits by maintaining natural values and vistas. For example, a recent survey announced by the Wyoming Travel and Tourism Office concluded that "more and more adventuresome souls are traveling to Wyoming" to pursue hiking, kayaking, rock and mountain climbing, horseback riding, hunting, and fishing, and other "adventure travel" activities. According to a state travel official, up to 25 percent of the $1.8 billion spent by travelers in Wyoming was for "adventure travel" (Billings Gazette 2003a).

Descriptions of Scenic Areas (Outside of Wilderness)

Cherokee Rim – This series of rolling bluffs above the Little Snake River is robed in a mixture of juniper woodlands and grassy parks.

Sand Creek Canyon – Below its confluence with Willow Creek, Sand Creek has carved out a rugged canyon in outcrops of hard sandstone.

Powder Rim – This lofty swell of country rises at the south end of the Washakie Basin, robed in extensive woodlands of old-growth juniper dotted with innumerable parks. The south side of the Rim is a maze of scenic hillocks and valleys where the junipers are interspersed with sagebrush parklands.

Prehistoric Rim – A series of clay badlands sculpted by wind and water, long promontories of eroded slopes jut eastward into the Washakie Basin. This area is dotted with primrose blossoms in the spring and also is a prime rockhounding area.

Rendle Butte – One of the highest series of rims along the Atlantic Rim country, Rendle Butte forms the headwaters of Wild Cow Creek and Deep Gulch.

North Flattop Mountain – This impressive mesa towers above Mexican Flats, its lower slopes ribbed with banded slopes of red and white bedrock.

Red Creek Rim – A low ridge robed in juniper, this area is a large block of pristine habitat visible from several of the main trunk roads south of Flattop Mountain. The ridge offers fine views of South Flattop.

Willow Creek Badlands – A maze of low sandstone canyons with views of the stark cliffs of the Willow Creek Rim; parts of this area have already been impacted by gas development.

Wild Horse Butte – This area encompasses the scenic foothills and hogbacks at the foot of the Sierra Madre Range. Grasslands dominate this area, but stands of juniper and aspen are found in protected areas.

Ferris Dunes/Seminoe Mountains – The Ferris Dunes include a substantial field of active dunes, which wash up against the flanks of the Seminoe Mountains. This rugged range features forests of large, old ponderosa pines, with steep draws and numerous permanent streams.

Freezeout Mountains – This lonely and windswept range rises along the southern edge of the Shirley Basin, robed in grasslands with pockets of timber.

Shirley Mountains – The Shirley Mountains are a relatively isolated mountain popular with recreationists, particularly hunters. This small but varied range includes lodgepole and aspen forest, plus extensive limber pine woodlands; it offers wonderful views of surrounding plains and mountains.

Chalk Mountain – Here, castellated cliffs of limestone rise above Bates Hole, providing a scenic backdrop for travelers. In several places, the cliffs have weathered into visually interesting pillars and hoodoos.

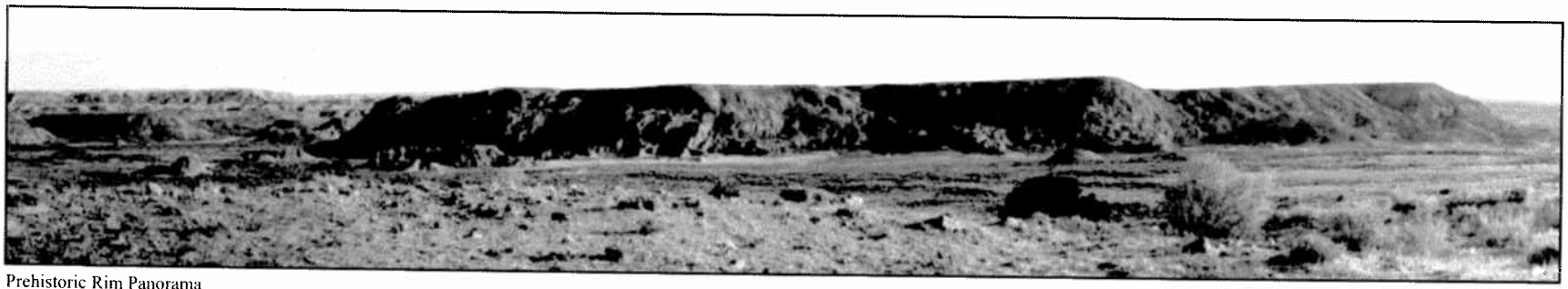
Twin Buttes – This area encompasses some of the picturesque limestone cliffs that line the eastern side of Bates Hole.

Cyclone Rim – This high and windswept divide rises along the northern rim of the Great Divide Basin, a remote series of rolling ridges punctuated by the occasional steep hogback. The limited gas development in this area intrudes only in a limited way on the area's scenic integrity, and safeguards are warranted to prevent widespread impacts.

Continental Divide Trail – This National Scenic Trail runs through the eastern end of the Red Desert and along the Atlantic Rim. This is one of the few nationally-known recreation features in the area and its viewshed deserve protection commensurate with its national importance.

Duck Creek – In the foothills of the Laramie Range, a small stream crashes over "a 35-foot waterfall that is unique to the area and has a scenic quality that has the potential to attract visitors" (Jonas Consulting 2002).

Cherokee and Overland Historic Trails – These Expansion Era trails date back to the mid-1800s, and trace the journeys of some of the earliest Americans to cross the Red Desert. These trails are part of our historical legacy. Protecting these trails and their viewsheds allows visitors now and in future generations to experience the trails in their original scenic context. The entire length of Overland Trail is considered eligible for the National Register of Historic Places, as is the Cherokee Trail (BLM 2003b).

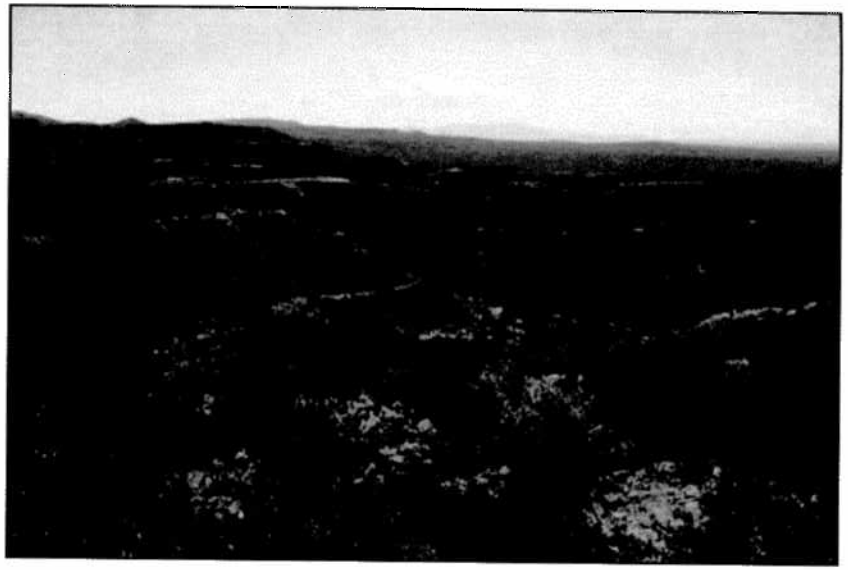


Prehistoric Rim Panorama

Photo by BCA

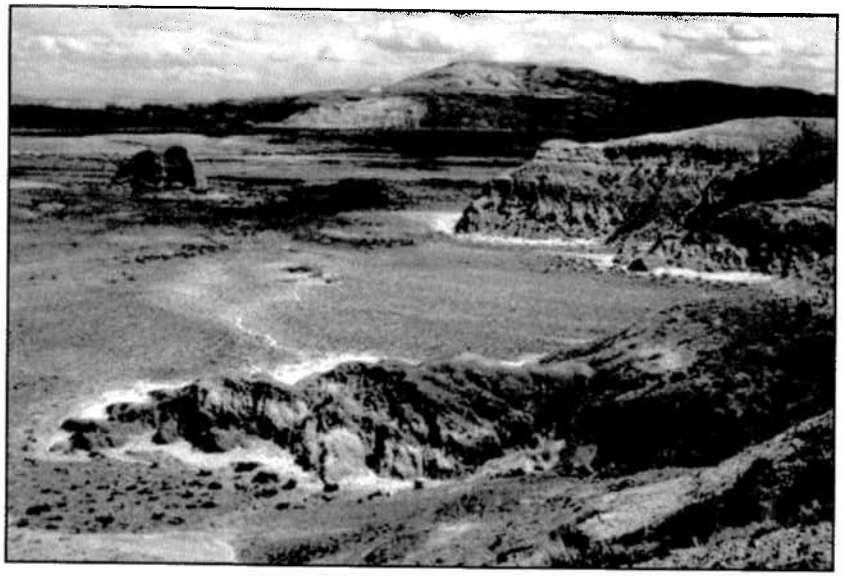
Robber's Gulch

Photo © Ken Driese



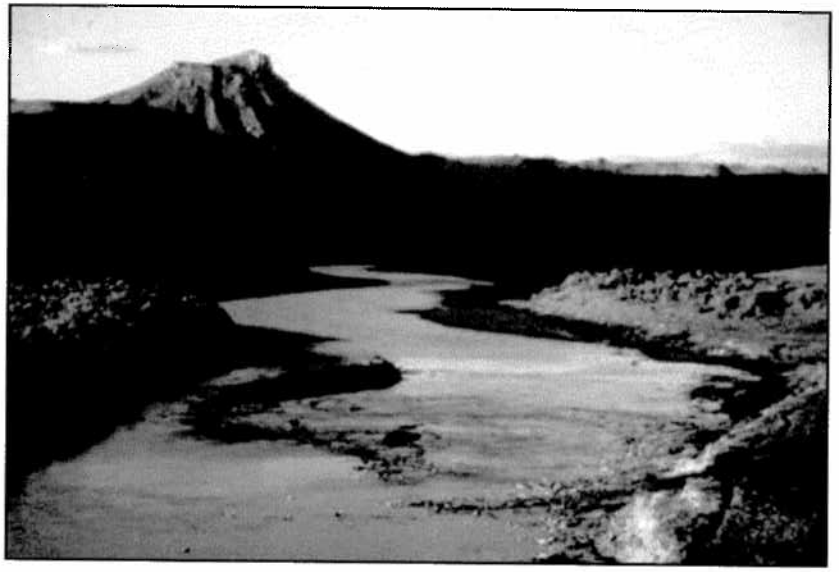
Hangout Wash

Photo by Erik Molvar



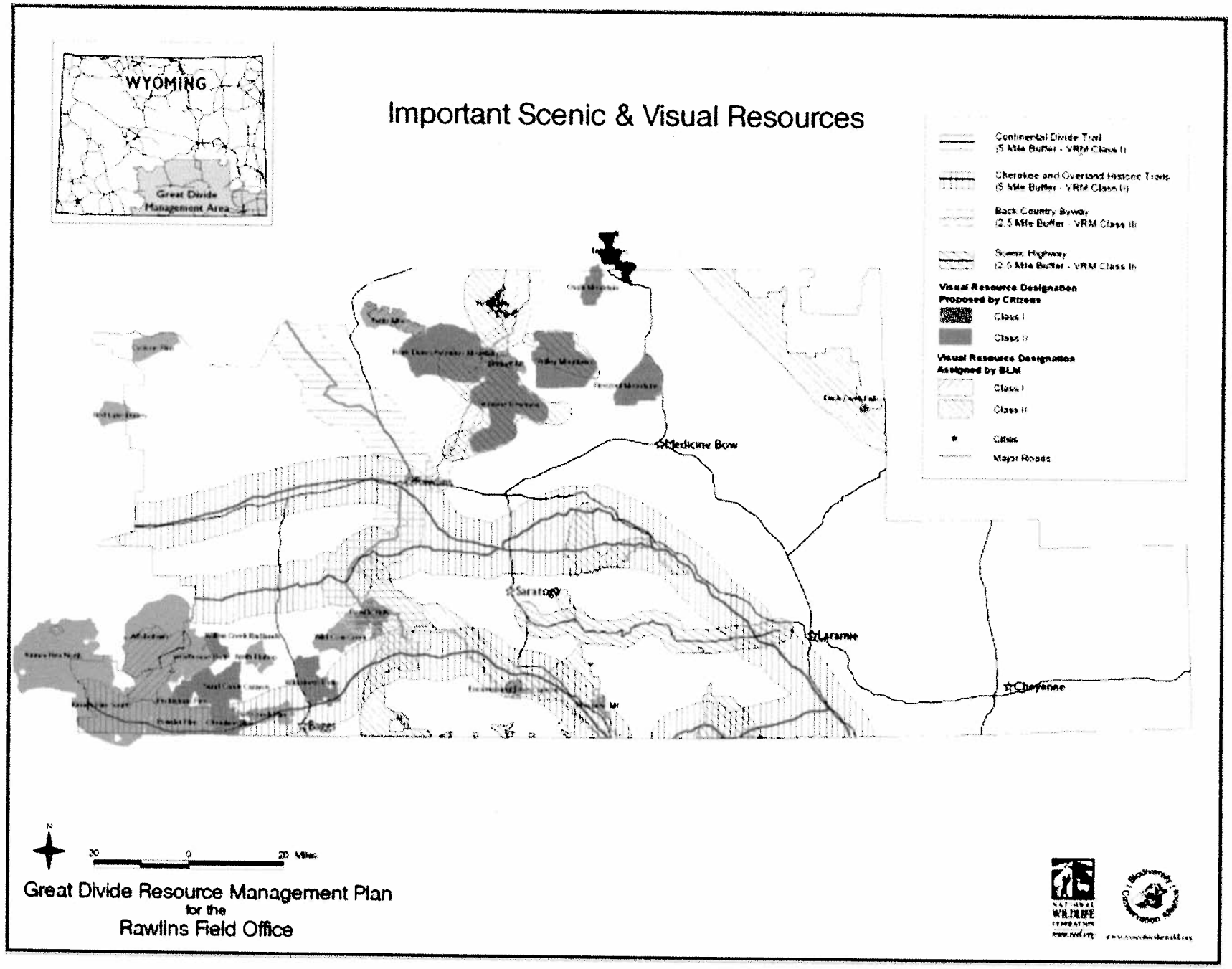
Flattop Mountain

Photo by BCA



Medicine Bow River View

Photo by BCA


WYOMING
Great Divide Management Area
Important Scenic & Visual Resources
Continental Divide Trail
(5 Mile Buffer - VRM Class I)
Cherokee and Overland Historic Trails
(5 Mile Buffer - VRM Class II)
Back Country Byway
(2.5 Mile Buffer - VRM Class II)
Scenic Highway
(2.5 Mile Buffer - VRM Class II)
Visual Resource Designation
Proposed by Citizens
Class I
Class II
Visual Resource Designation
Assigned by BLM
Class I
Class II
Cities
Major Roads
Medicine Bow
Saratoga
Laramie
Cheyenne
Rawlins
N
30
0
20 Miles
Great Divide Resource Management Plan
for the
Rawlins Field Office

Mountain Plover Observations and Primary Habitat

The mountain plover is one of the rarest birds in North America, with an estimated population of 5,000 to 11,000 individuals on the continent and 2,000 to 5,000 birds in Wyoming (Knopf 1996, FWS 2003d, 2002, 1999). Mountain plovers are ranked S2 (imperiled in Wyoming because of rarity or factors making it vulnerable to extinction) by WYNDD and are on the Wyoming BLM sensitive species list (Keinath, et al. 2003; BLM 2002b). Globally significant numbers of these imperiled birds are currently found within the Great Divide. Declines in mountain plover populations nationwide have been so severe that the FWS proposed to add it to the endangered species list (FWS 2002, 1999). FWS recently dropped its proposal to list the plover, but conservationists are currently challenging this abrupt reversal which contradicts two peer reviewed processes that unanimously supported listing.

Although Wyoming was previously considered to be on the periphery of the range of mountain plover, Wyoming is now "the core" of the remaining range of this rare bird (Beauvais, 2003).

Within the Great Divide, more than 305 plovers (244 locations) have been observed from 2000 to 2002, with over 500 observations in the last 25 years (WYNDD 2002). Digital data of actual observations were obtained from WYNDD and from Regan Plumb at the University of Wyoming and are shown on the map on page 38 as red crosses. In the last few years researchers have found several "concentration areas" of plovers within the boundaries of the Great Divide, primarily in the Shirley Basin, Eagle Nest Springs, and Mexican Flats areas (Dinsmore 2003 and 2002; Plumb 2002, Knopf 2002). These are shown with green hatching on the map based on polygons suggested by Plumb. Beauvais (2003) also found significant numbers of plovers in the vicinity of the Plumb Shirley Basin concentration areas. The BLM also reports a concentration of observations just to the southeast of the Haystacks (BLM 2003c) within the boundary of the Desolation Flats natural gas project. Primary habitat for mountain plovers as modeled in the Wyoming Gap project is shown on the map as pink cross-hatching (Merrill et al. 1996), and the slightly more sophisticated but less predictive habitat model in Beauvais (2003) (as conceived in Beauvais and Smith 1999 and 2003) is shown in shades of yellow to brown, with the brown areas having the greatest probability of plover presence.

Mountain Plover Photo by Fritz Knopf

In years past, significant numbers of plovers also have been observed in the Laramie Valley and on Foote Creek Rim near Arlington. (Dinsmore, 2003 and Johnson et al. 2000). However, on Foote Creek Rim in the direct vicinity of a large wind power project, plover nesting population estimates have declined from 59 plovers in 1995 to 41 in 1996, 31 in 1998, and 11 in 1999 (Johnson et al. 2000). The Shirley Basin and Mexican Flats regions are particularly important for breeding and potential recovery of the species (Beauvais 2003 and Dinsmore; Deibert 2004). These areas deserve maximum protection from habitat disturbance.

Habitat requirements for plover consist of short vegetation, bare ground, and flat topography; habitat associations favored by plovers include plains, alkali flats, prairie dog towns, and low shrub communities, but rarely in association with surface water (Long 2001, Kotliar et al. 1999). According to Dinsmore (2003), "[plover] conservation hinges on the protection of remaining breeding habitat, including prairie dog colonies, and through the use of proactive plover management that protects nesting sites...." Another important concern is increased predation resulting from artificial structures (fence-posts, power lines, telephone poles, etc.) that can serve as avian predator perches (Dinsmore 2003).

Mountain plovers exhibit strong site fidelity, with adults returning to the previous year's nest sites, and chicks often returning to their hatch sites to nest (FWS 1999, Graul 1975, and Beauvais and Smith 1999). This makes plovers vulnerable to failed nesting when they return to sites with lost or degraded habitat. Thus, protection of existing habitat is extremely important. "Further, the mountain plover's narrow range of habitat requirements combined with high degree of site fidelity (see the 1999 proposed ESA listing rule) increases its vulnerability to impacts at traditional breeding locales" (FWS 2002). Recent research showing a shorter lifespan than previously known also has implications for plover conservation. "[A] mean lifespan of less than 2 years influences opportunities to reproduce, seek alternate breeding and wintering sites, and engage in intraspecific behavior that may influence population recruitment" (FWS 2002).

Threats: The core area of the remaining range of plovers is now under tremendous development pressure, particularly from oil, natural gas, and CBM development, as can be seen in the Threats From Oil and Gas Development section near the end of this report. Oil and gas development in nesting areas is a direct threat to mountain plover population viability. For example, the FWS found that the Seminoe Road CBM pilot project "is likely to adversely affect the proposed mountain plover," stating that wellfields are likely to become an "ecological trap," attracting feeding plovers to roadways where they become susceptible to vehicle-related mortality, or alternately increased vehicle traffic could drive plovers away from preferred nesting areas (Long 2001). The FWS (1999) noted that vehicle traffic on roads could lead to stress and chick abandonment. These officials noted that any human disturbance that significantly modifies adult behavior could cause death to chicks, which can die in as little as 15 minutes due to exposure to sun at temperatures greater than 81° F. FWS officials have also stated that, "Resource extraction is a potential problem for the plover, in part because of the disturbance from people. Human activity makes the birds leave the nests. The eggs are then vulnerable to predation and sun addling" (Rippe 2000). Long (2001) noted that construction equipment and permanent structures inherent to oilfield development create a radical increase in raptor perches that could result in increased predation

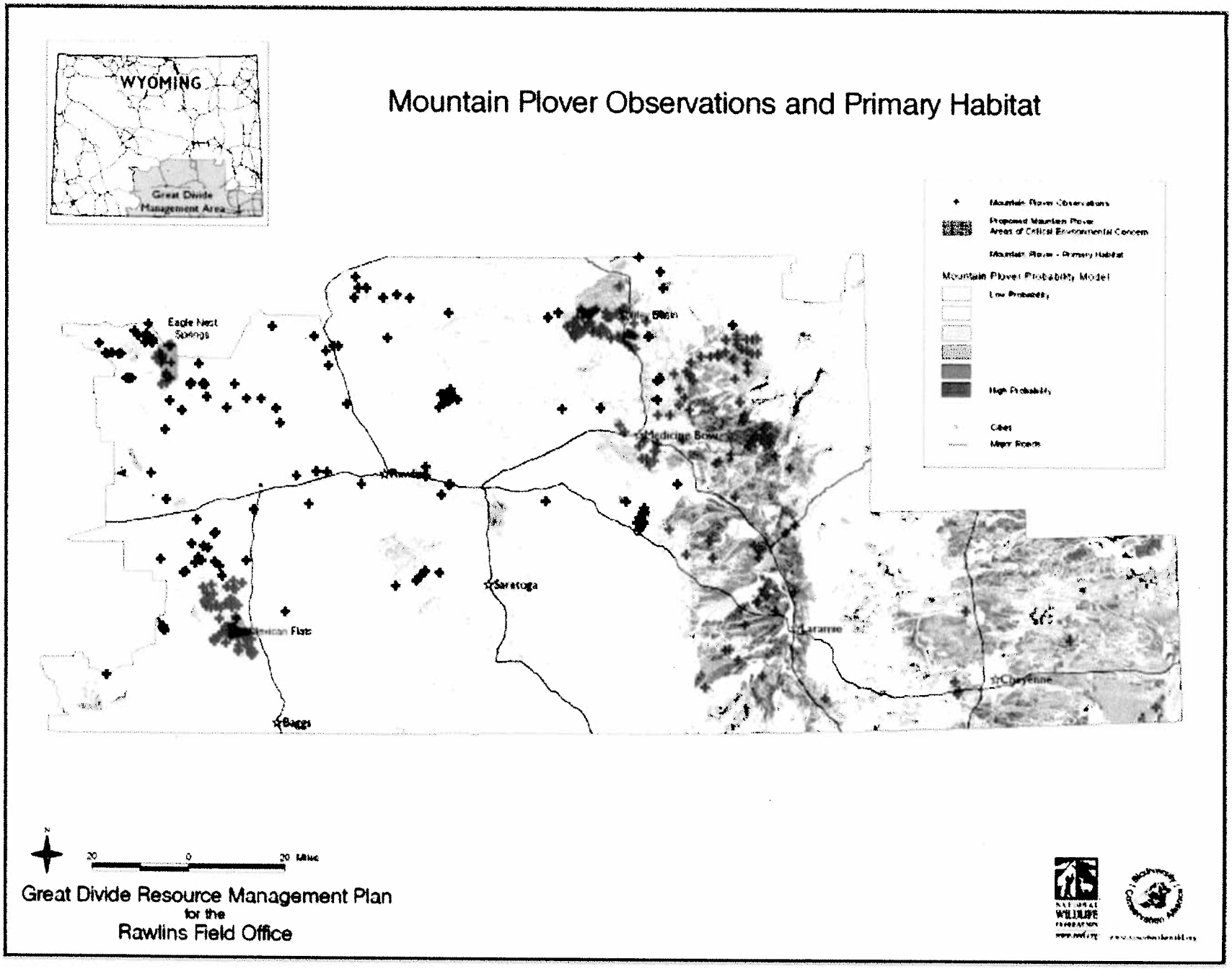
pressure. In addition to these problems, wellfield development can lead to increased invasion rates of non-native weed species, which can have serious impacts on plover nesting habitat by decreasing the availability of bare ground (Good et al. 2001). Also of importance, unlike other related birds, "mountain plovers avoid moist sites in favor of dry uplands" (Beauvais 2003). Water produced from coalbed methane wells and similar sources is therefore a great concern as well since this water is often stored on the surface in reservoirs, simply dumped on the ground, or channeled into ephemeral draws.

To protect existing plovers and their habitat, Dinsmore (2003) recommends nesting areas "receive full protection from development activities." He points out that existing management has been inadequate. "I am concerned that existing documents permit plover nesting and/or brood areas to be impacted/destroyed, without a provision promoting their long-term persistence."

Dinsmore (2003) also provided specific plover habitat protective measures:

> "I recommend that you define 1) areas of plover concentration, which I define as sites used by plovers ≥3 years in a 5-year period, or sites with ≥5 pairs of plovers in any given year, and 2) sites that are used infrequently, which includes sites that are occupied by plovers <3 years out of any 5-year period, and those sites with <5 pairs in any year." The concentration areas "should receive full protection, perhaps in the form of an Area of Critical Environmental Concern (ACEC) designation," (emphasis added) presumably meaning prohibition of all development activities. Infrequent use areas should have "no surface occupancy (NSO)" stipulations with a no surface occupancy buffer zone of a minimum of 0.25 miles around such sites. Areas occupied by white-tailed prairie dogs are very important to plovers and "should be withdrawn from surface development and should only be developed under no surface occupancy drilling. I recommend the same no surface occupancy buffer zone (a minimum of 0.25 miles) around these areas." Artificial structures where avian predators can perch must also be avoided. "Future construction/site preparation should include measures to minimize or avoid building structures (fence posts, phone poles, etc.) that can serve as avian predator perches." Furthermore, surface disturbance in plover habitats must be prevented: "I strongly recommend that, whenever possible, you seek to avoid surface disturbance during mining operations. No surface occupancy drilling is an alternative to surface disturbance, and would ameliorate some of the negative effects of drilling operations on Mountain Plovers."

Mountain Plover with Eggs Photo by Fritz Knopf


WYOMING
Great Divide Management Area
Mountain Plover Observations and Primary Habitat
Mountain Plover Observations
Proposed Mountain Plover Areas of Critical Environmental Concern
Mountain Plover - Primary Habitat
Mountain Plover Probability Model
Low Probability
High Probability
Cities
Major Roads
Eagle Nest Springs
Medicine Bow
Rawlins
Saratoga
Laramie
Cheyenne
Baggs
20 0 20 Miles
Great Divide Resource Management Plan
for the
Rawlins Field Office

Native Fish Observations, Water and Wetlands

The Great Divide planning area contains portions of the Colorado River, North Platte and South Platte river drainages, and the Great Divide enclosed basin. Each of these except the closed basin are home to native fish populations and habitat, and some are of national importance. For example, the only existing population of hornyhead chub within Wyoming is found here, in the Laramie River just upstream from Duck Creek (although two historic observations, ca. 1979 and 2001, are also shown on the map on page 42). Numerous wetlands vital to wildlife (mammals, birds, amphibians, as well as fish) are found here as well. On the map on page 42 locations of native fish of conservation concern are shown along with larger rivers, lakes, wetland features, and major watershed boundaries.

At least seven native fish species occurring in the study area are rated NSS1 or NSS2 by WGFD (2003c) and should receive special management consideration: bluehead sucker, Colorado River cutthroat trout, flannelmouth sucker, hornyhead chub, orangethroat darter, plains topminnow, and roundtail chub. These are labeled "High Conservation Concern" on the map. According to Wyoming Game and Fish Commission (1998), for NSS1 and NSS2 fishes, habitat directly limits populations and restoration may be impossible. Therefore, habitat function must be maintained if habitat modification is allowed to occur. In addition to the NSS1 and NSS2 species, the Colorado pikeminnow is federally listed as Endangered; this species has been documented within the Field Office in the Little Snake River (Marsh 1991), and is "believed to be present" by the WGFD (2003d) but is not shown on the map. Eight other native fish species, labeled under the "watch list" on the map, have been found to be of moderate conservation concern due to declining distribution, abundance, or other concerns (Kessler et al., in prep.).

Humpback Chub

Photo by Erik Molvar

Additional information on the fish of high conservation concern can be found in Weitzel (2002a, 2002b, 2002c), Behhke (2002), and Center for Biological Diversity (2002).

Several individual rivers or streams stand out as particularly important for protecting native fish populations and communities within the Great Divide. A section of the Laramie River running through BLM land near the Laramie Mountains in southeastern Wyoming is home to hornyhead chub. Recent declines of this species in the state, particularly as a result of fire retardant/sediment inflows after a forest fire in 2002, have made the Laramie River population above Duck Creek "even more important in management. This is the only remaining known location of this species in Wyoming. Repopulation of the Laramie River below the Duck Creek confluence will happen normally over a period of years from the River upstream of Duck Creek, if that stream stretch is managed properly" (WGFD 2002b).

On the north slope of the Ferris Mountains is Arkansas Creek, home to a rare native fish community: "Non-native fish have never occupied Arkansas Creek in the Ferris Mountains. This characteristic alone may place Arkansas Creek in the 'outstandingly remarkable values category' for its potentially unique native biota. Therefore, BLM should reconsider Arkansas Creek... to determine if Arkansas Creek should be considered as a Wild and Scenic River" (WGFD 2003a).

Littlefield Creek, within the Muddy Creek drainage, is the site of a Colorado River cutthroat trout (CRCT) restoration effort, to which fish were released in 2001. As one of the few low-land CRCT restoration projects it is of great conservation value.

Native fish data were obtained from WGFD, several researchers at University of Wyoming, BLM, WYNDD, and the Bureau of Reclamation. Rivers and lakes data were obtained from the Wyoming Geographic Information Science Center at University of Wyoming (WYGISC), and wetlands features were acquired from WYNDD (from FWS National Wetlands Inventory).

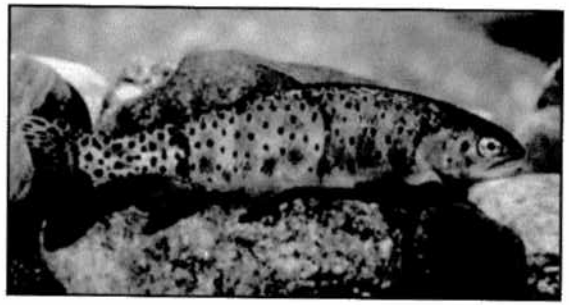
Sensitive Warmwater Species of the Little Snake Watershed: Roundtail chubs, flannelmouth suckers, and bluehead suckers, all believed to be declining and already rare in Wyoming, can be found in the Little Snake watershed (Wheeler 1997; Bower 2000; Bezzerides and Betsgen 2002; Weitzel 2002a). These species reside in large, slow-moving rivers and also in smaller tributary streams (Bezzerides and Bestgen 2002). According to Wheeler (1997), these species "have experienced dramatic reductions in their range in western Wyoming since 1965, and may need immediate conservation attention." In the Upper Colorado Basin, the roundtail chub has been extirpated from 45% of its historical range, bluehead suckers occupy about 45% of their historical range, and the flannelmouth sucker occupies about 50% of its historic range (Bezzerides and Bestgen 2002). Bluehead suckers are considered rare by WGFD (Weitzel 2002a). Muddy Creek is a waterway of particular concern for conserving sensitive native fishes. The presence of the bluehead sucker and roundtail chub led Knight et al. (1976) to propose Muddy Creek as a potential National Natural Landmark.

Muddy Creek drains the southern two-thirds of the Atlantic Rim uplift. This watershed is currently slated for major CBM developments (BLM 2001) which could radically alter water flow timing and quantity, temperature and quality in the Muddy Creek drainage if the produced water is discharged to the surface or coal-seam dewatering results in surface spring depletion. This could have potentially disastrous consequences for these fish.

Importance of the Little Snake to Endangered Fishes of the Upper Colorado River Drainage: The Little Snake River is home to populations of the endangered humpback chub, razorback sucker, and Colorado pikeminnow, and spawning sites for these species have been identified (Marsh 1991, FWS 2000b, Hawkins et al. 2001a). During baseflow periods in late summer and autumn, pools

along the lower Little Snake River serve as refugia for native fishes and are isolated by river reaches that are shallow, sandy, and impassable barriers to dispersal (Hawkins et al. 2001a). The Little Snake's unusually high peak flow to baseflow ratio, large sediment load, and extremely low base flow have been cited as principal reasons that the Little Snake still harbors a largely native fish fauna, including humpback chub and Colorado pikeminnow (Hawkins et al. 2001). The latter researchers recommended conservation measures to, "[i]dentify and maintain the discharge and physio-chemical conditions in the Little Snake River that support Colorado pikeminnow, humpback chub, and a mostly native fish community. These conditions might include the timing, magnitude, and pattern of runoff and baseflow and associated physio-chemical conditions such as turbidity, diel temperature fluctuations, or sediment load."

The flows and sediment loads of the Little Snake are also a keystone in maintaining the downstream native fish faunas of the Yampa and Green Rivers which are home to all four species of Colorado River endangered fishes. The flow and sediment contribution of the Little Snake help maintain the nursery habitats for Colorado River endangered fishes as far downstream as the alluvial reaches of the Green River (Hawkins and O'Brien 2001). "One of the most important resources of the Little Snake River to the habitat and recovery of endangered fish is the highly variable water discharge and sediment supply to the Green River system" (Hawkins and O'Brien 2001).



Colorado River Cutthroat Trout

Photo courtesy BLM

The timing of migration and spawning for these species is linked to water temperature and flow rates. The maintenance of natural temperature regimes are critical for Colorado pikeminnows (Kaeding and Osmundson 1988, Bestgen and Williams 1994, Muth et al. 2001), humpback chubs (Vanicek and Kramer 1969, Hamman 1982, Kaeding and Zimmerman 1983; Marsh 1985), razorback suckers (Pimintel and Bulkley 1983; Marsh 1985) and bonytail (Marsh 1985). Hawkins et al. (2001a) also noted that natural flow regimes in these waterways favor endangered native fishes over non-native predators and competitors. Thus, the maintenance of natural flows, chemical signatures, and temperature is critical to Colorado River endangered fishes.

Threats: The FWS (Long 2002) points out that groundwater withdrawals, such as those associated with CBM development, can cause flow depletions to the waters important to the endangered fish, which could harm natural habitat conditions necessary for these species. In addition, surface disposal of CBM wastewater could alter flow regimes and chemical signatures of waterways used by these fishes, potentially interfering with survival, migration, and spawning. CBM wastewater is covered under the *Threats from Oil and Gas Development* section of this report.

Colorado River Cutthroat Trout: Colorado River cutthroat trout (CRCT) are native to the upper Colorado River basin in Colorado, Wyoming, Utah, and New Mexico but "by the mid-twentieth century... occupied only a tiny fraction of their original distribution" (Behhke 2002). Recent estimates are as low as 1% to 3.4% of previously occupied stream mileage (Behnke 1979; Center for Biological Diversity 2002). The Little Snake River watershed is one of the last bastions of this fish, with "conservation populations" (those which are genetically pure and isolated by a barrier to nonnative fish) found upstream on the Medicine Bow National Forest in the upper Roaring Fork of the Little Snake and in the headwaters of the North Fork of the Little Snake (Young et al. 1996).

Within the Great Divide, populations formerly occurred in various waters of the Muddy Creek drainage, a tributary to the Little Snake River. However, as early as the 1850s the trout population began to decline. They were completely extirpated until 2001 when 500 fish were transplanted from a natural population in the Medicine Bow National Forest into an 11-mile stretch Littlefield Creek. The restoration effort is part of a multi-agency conservation plan for CRCT in the Little Snake River drainage. The Littlefield Creek population is the sole existing conservation population in the Great Divide (BLM 2002d). Future plans are to restore fish to 20 miles of Muddy Creek proper, connecting to Littlefield Creek, so that a larger, more biologically viable population can be established.

Threats: CRCT face many threats in this area. Beyond Littlefield Creek, "many other sites that should support fisheries, do not" (BLM 2002a). According to WGFD, negative impacts to CRCT in the Great Divide include "livestock grazing, road construction, timber harvest, oil and gas development, and irrigation operations" (WGFD 2003b). Oberholtzer (1987) reported that reaches of Big Sandstone below the Deep Creek road were degraded by overgrazing and Colorado River cutthroats were absent. Road construction also causes long-term damage to native trout habitat (Rhodes et al. 1994, Henjum et al. 1994, Espinosa et al. 1997) granting competitive advantages to non-native trout species (Behnke 1992, Duff 1996). For the Little Snake drainage, Oberholtzer (1987) noted, "[d]iversions of water for irrigation of native hay crops, in many instances, deplete stream flows during late summer, thus diminishing carrying capacity for game fish." In addition, the dams and diversion works associated with the Cheyenne Stage I and Stage II water diversion projects have had heavy impacts on native cutthroats upstream in the Little Snake watershed (Jesperson 1981).

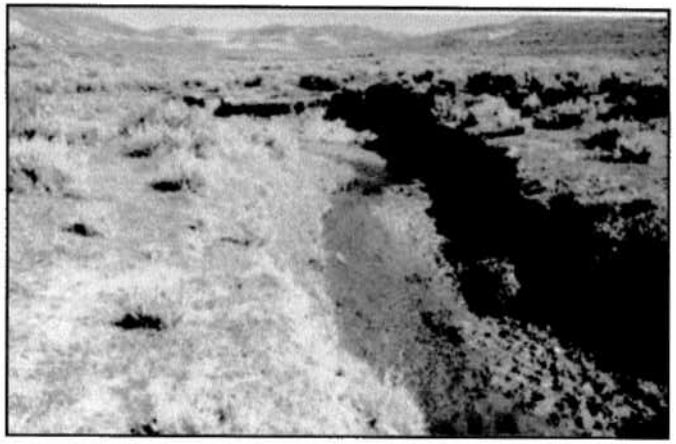
Efforts to recover cutthroat trout "have been hindered by land management practices that continue to degrade the aquatic habitat" (WGFD 2003b). On the other hand, recent experience has shown that improved management can have a dramatic effect on streams and riparian areas. The photos on page 41 demonstrate the effectiveness of better livestock grazing management to bring about riparian area improvements on Littlefield Creek from 1989 to 2000. These improvements, brought about through the Muddy Creek Coordinated Resource Management effort, are still in progress. Currently, managers are working to restore beaver populations to assist in increasing the water table, willow establishment, and other

factors to improve habitat. WGFD has asked BLM to specifically revise the RMP to aid further restoration efforts (WGFD 2003b).

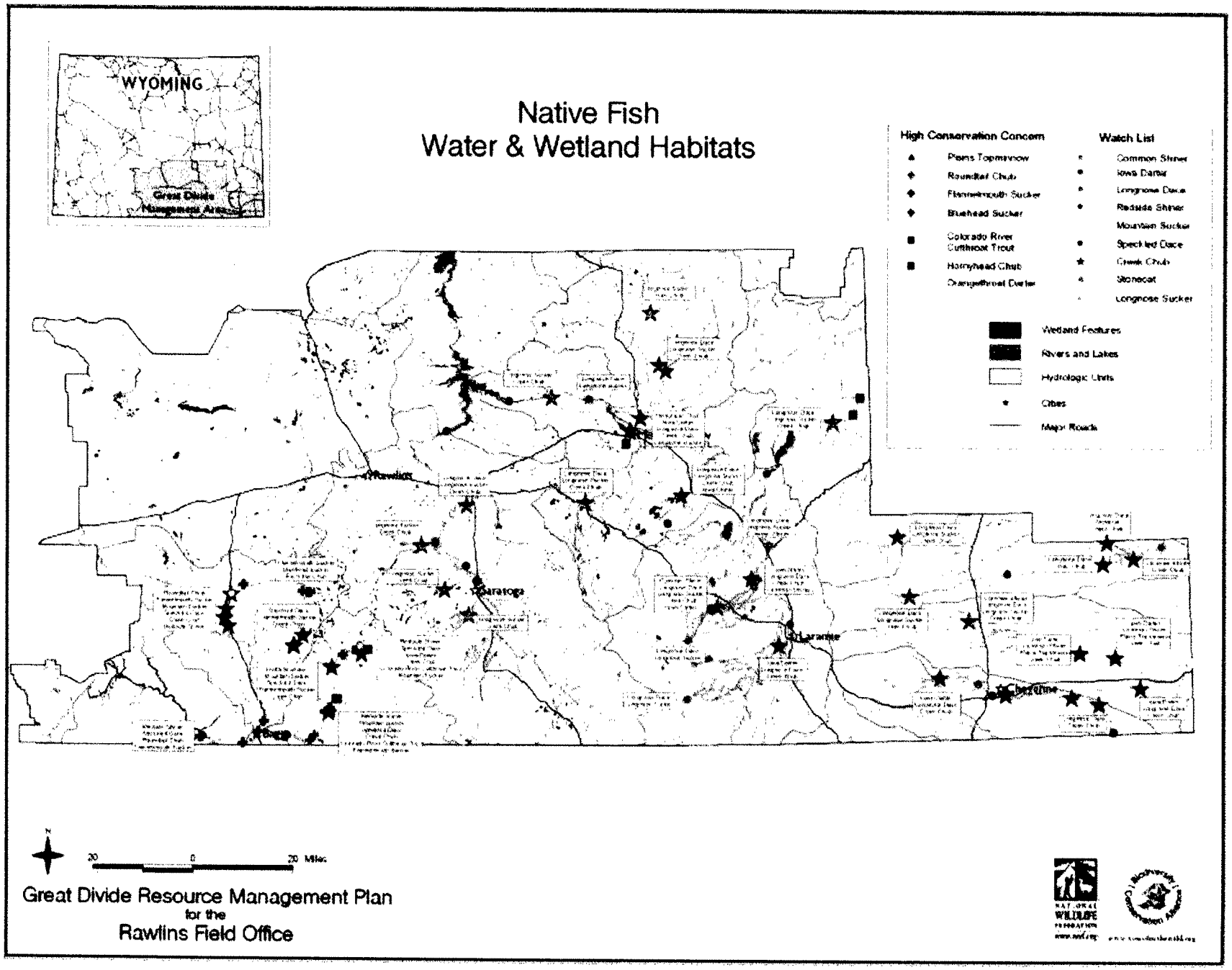
Wetlands and Water Bodies: Because water is so vital in a desert environment, water bodies are far more important than is suggested by the small area they encompass. All water bodies in the area must be protected from adverse impacts associated with development—not only to protect the sites themselves, but also to ensure wildlife will not be displaced from these areas. Indeed, even when development activities are located away from water bodies and wetlands, the sights and sounds of such activities can still cause wildlife to avoid important sources of water. It is therefore essential to buffer known water bodies and wetlands to prevent displacement of wildlife or reductions in habitat quality or utilization.

The map on page 42 shows the known locations of waters and wetlands in the Great Divide Area. The wetlands were identified by the FWS National Wetlands Inventory (provided by WYNDD). No buffers are shown, but they are necessary to protect the unique and irreplaceable natural wetlands. It is unlikely that the map shows all water bodies and wetlands in the area. Springs and seeps are generally not shown, and there are more wetlands in the area than are depicted on the map.

American Avocets in Wetland, near Kinney Rim Photo by BCA



Littlefield Creek 1989 (top) and 2000 showing enhanced riparian vegetation after improved livestock grazing management. Photo courtesy BLM


WYOMING
Great Divide Management Area
Native Fish
Water & Wetland Habitats
High Conservation Concern
Plains Topminnow
Roundtail Chub
Flannelmouth Sucker
Bluehead Sucker
Colorado River Cutthroat Trout
Hornyhead Chub
Orangethroat Darter
Watch List
Common Shiner
Iowa Darter
Longnose Dace
Redside Shiner
Mountain Sucker
Speckled Dace
Creek Chub
Stonecat
Longnose Sucker
Wetland Features
Rivers and Lakes
Hydrologic Units
Cities
Major Roads
Rawlins
Saratoga
Laramie
Cheyenne
Baggs
N
20 0 20 Miles
Great Divide Resource Management Plan
for the
Rawlins Field Office

Rare Plants and Plant Communities and Land Cover

A diverse array of rare plants (also known as plant species of concern and BLM Sensitive Species) and rare plant communities are found within the Great Divide. Yet a recent analysis of the protected status of plants in Wyoming concluded that rare species were not well protected, but instead were "twice as likely to be absent from the existing protected areas network" than more common species (Fertig and Thurston 2001).

Wyoming's only two known occurrences of the federally threatened blowout penstemon are found in the Great Divide. Seven plant species on the Wyoming BLM sensitive species list are present as well, plus about 40 other plant species ranked highly on the species of concern list from WYNDD. Beyond individual species 11 plant *communities* or *cover types* identified and prioritized by scientists based on degree of existing protection and vulnerability also occur in the Great Divide (Merrill et al. 1996).

Shown on the Rare Plants and Plant Communities map on page 45 are observations of rare plants ranked S1, S2, or S3 by WYNDD (2002) within the study area. These are shown as green triangles. S1 species are critically imperiled in the state due to extreme rarity or vulnerability, S2 species are imperiled due to rarity or vulnerability, and S3 are rare or local, or found locally in restricted range. Included in these fifty S1-S3 species are the federally listed blowout penstemon (S1) plus the seven species on the BLM sensitive species list (see table below). These eight species also have high global ranks (G1-G3), meaning they are critically imperiled, imperiled, or rare/local throughout their entire global range as well. It should be noted that several dozen other plant species of concern are found on non-BLM lands within the study area. Surveys for these should take place on the BLM lands.

The 11 highest priority plant species identified in Marriott (2003) and high priority vegetation cover types are listed in the table below. The 11 high priority vegetation cover types found in the Great Divide that "require management priority" in Wyoming also are shown on the map. Highest priority sites are shown in solid red because "their current protection is minimal and because they are potentially the most vulnerable to ongoing land management practices" (Merrill et al. 1996). Second priority cover types are brick colored and are "vulnerable to development, *particularly oil and gas extraction activities*" (Merrill et al. 1996, emphasis added). Third priority cover types are shown in light blue. All three categories are listed in the table as well.

Threats: Marriott (2003b) has highlighted the need to apply conservation measures to rare plants and plant communities in Wyoming: "Resource extraction is the major sources of existing and potential threats to plant biodiversity values on lands managed by the RFO [Rawlins Field Office]. Oil and gas development has both direct and indirect impacts on plants of concern. Surface disturbance through road and facility construction is the most obvious problem. However, a more significant concern is damage through increased access. With construction of new roads, and improvement of existing ones, public access can be increased tremendously, and in many areas, this means increased off-road use as well."

Blowout Penstemon Photo courtesy BLM

Recent expert investigations have reached similar conclusions: "Given the amount of regional endemism, number of rare species, and number of under-represented land cover types, Southwest Wyoming is emerging as a high priority landscape for conservation attention in the state. At present, less than 2% of the region is managed specifically for the enhancement of natural vegetation or plant species, and less than 40% of the high-ranking plant species and 80% of the known land cover types are adequately represented (Stoms et al., 1998). An impending 'boom' cycle in the development of natural gas and other mineral resources in the area makes the status of plants and vegetation a practical management concern" (Fertig et al. 1998).

Highest Priority Rare Plants in the Great Divide (from Marriott 2003)

Species	WYNDD Rank	WYNDD Conservation Priority	Federal Status
Laramie Columbine	G2S2	High	BLM Sensitive
Nelson's Milkvetch	G3S3	Medium	BLM Sensitive
Crandall's Rockcress	G2S1	High	none
Cedar Rim Thistle	G2S1	High	BLM Sensitive
Weber's Scarlet-Gilia	G5T1T2QS1	High	BLM Sensitive
Colorado Tansy-aster	G2T2?S1	High	none
Gibben's Beardtongue	G1S1	High	BLM Sensitive
Blowout Penstemon	G1S1	High	Endangered
Desert Glandular Phacelia	G4T1T2S1?	High?	none
Persistent Sepal Yellowcress	G3S2S3	Medium/ High?	BLM Sensitive
Laramie False Sagebrush	G2S2	High	BLM Sensitive

Land Cover Types of Conservation Concern in the Great Divide (from Merrill et al. 1996)

Land Cover Type	Priority	Land Cover Type	Priority
Vegetated Dunes	Highest	Saltbush Fans and Flats	Second
Active Dunes	Highest	Desert Shrub	Second
Grass-dominated Wetlands	Highest	Shortgrass Prairie	Third
Xeric Upland Shrub	Second	Mesic Shrubland	Third
Limber Pine Woodland	Second		

Specific sites or locations identified as particularly important for conservation of rare plants/communities are shown on the map on page 45 in green crosshatching. Nine such areas in the Great Divide were selected based on presence of one or more of these values: (1) endangered, BLM sensitive, or WYNDD high priority plant species, (2) clusters of WYNDD medium or low priority plant species of concern, (3) vegetation types of concern (Marriott 2003). Brief descriptions taken from Marriott (2003) follow.

***Bates Hole/Chalk Mountain*:** Just north of Shirley Basin, approximately 60 miles northeast of Rawlins. Includes populations of Laramie False Sagebrush (sensitive) as well as concentrations of medium and low priority plant species of concern. Recommend ACEC designation with restrictions on surface disturbance.

***Chain Lakes*:** Low point of Great Divide Basin, approximately 35 miles northwest of Rawlins. Includes several Wyoming Gap priority cover types (Merrill et al. 1996), and has high value for wildlife. All federal lands within the site are leased for oil and gas. Recommend ACEC designation (cooperative management with State).

***Cherokee Rim/Powder Rim*:** Just north of the Wyoming-Colorado state line approximately 12 - 35 miles west of Baggs. Includes two of four Wyoming occurrences of Gibben's beardtongue (one currently protected through withdrawal and fencing), at least nine state rare plant species, Fremont cottonwood riparian woodland (rare in Wyoming and ranked high priority by Merrill 1996) and at least two Wyoming Gap priority shrubland types (Merrill 1996). Most federal lands are included in oil/gas leases and developed fields. Recommend ACEC designation with restrictions on surface disturbance.

***Ferris Dunes*:** Between Ferris and Seminoe Mountains approximately 30 miles north of Rawlins. Includes the two known Wyoming populations of blowout penstemon (endangered), several medium-priority rare plants, and Wyoming Gap high priority cover types: active and vegetated dunes, graminoid-dominated wetlands, and desert riparian communities (Fertig pers. comm. 2003). Land status is mixed BLM and State; southern part includes oil/gas leases. Recommend ACEC designation, mineral withdrawal, restrictions on off-road vehicles and other major surface disturbance, and management for natural disturbance regimes for viability of the penstemon.

***Ferris Mountains*:** East of U.S. Hwy 287 approximately 35 miles north of Rawlins. Includes a population of Cedar Rim thistle (sensitive), concentrations of state-rare species, and at least one Wyoming Gap priority cover type. Recommend ACEC designation with appropriate restrictions.

***Flat Top Mountain*:** East edge of Washakie Basin approximately 15 miles northwest of Baggs. Includes one of four Wyoming occurrences of Gibbon's beardtongue, and state rare species. Most federal lands are within oil/gas leases and developed fields. Recommend ACEC designation with restrictions on surface disturbance.

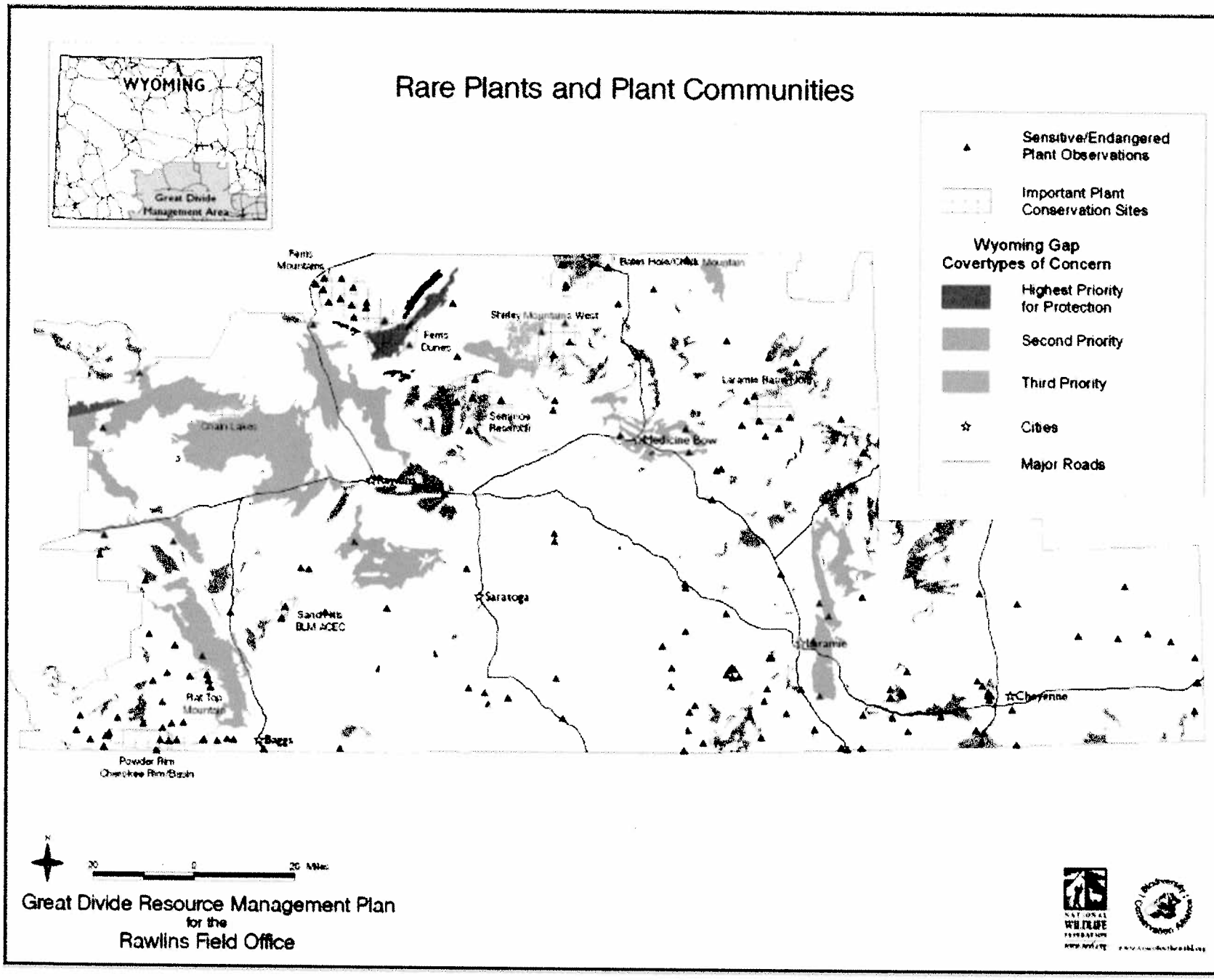
***Laramie Basin North*:** Roughly 18 air miles northeast of Rock River. Includes multiple populations of Laramie false sagebrush (sensitive) and Colorado tansy-aster (WYNDD high conservation priority). Land status is checkerboard BLM and private. Survey is needed at this site as little is known regarding extent of populations.

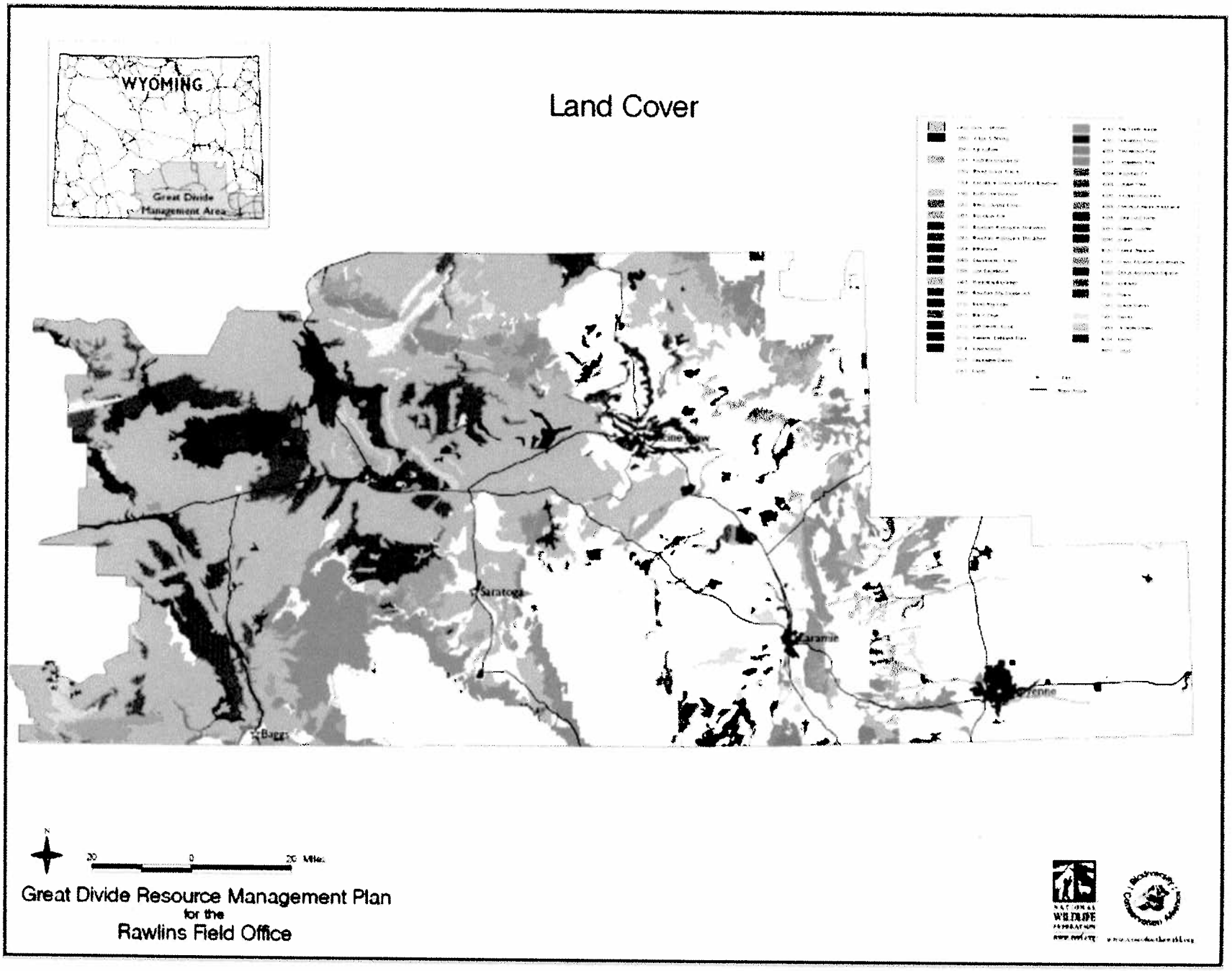
***Seminoe Reservoir*:** Multiple populations of persistent sepal yellowcress (BLM sensitive). Land status is a mix of BLM and Bureau of Reclamation, requiring cooperative management. Much of the federal land is leased for oil/gas.

***Shirley Mountains/Shirley Basin West*:** Basin and mountains west of WY Hwy 77, approximately 50 miles northeast of Rawlins. Includes at least two populations of Laramie false sagebrush (sensitive) as well as state-rare species. Five Wyoming Gap priority land cover types included. Recommend ACEC designation with restrictions on surface disturbance.

Cactus Flower Photo © Ken Driese

Land Cover: The map on page 46 shows the overall land cover types within the study area from the Wyoming Gap analysis (Merrill et al. 1996), that was based on visual interpretation of satellite imagery. The scheme for displaying the data was adapted from Freilich et al (2001). Minimum mapping units of 100 hectares (247 acres) for dry land cover types and 40 hectares (98.8 acres) for wetlands. Thus, vegetation forming small areas relative to the minimum mapping units are not discernable.


WYOMING
Great Divide Management Area
Rare Plants and Plant Communities
Sensitive/Endangered Plant Observations
Important Plant Conservation Sites
Wyoming Gap Covertypes of Concern
Highest Priority for Protection
Second Priority
Third Priority
Cities
Major Roads
Ferris Mountains
Shirley Mountains West
Ferris Dunes
Seminoe Reservoir
Medicine Bow
Chain Lakes
Saratoga
Sandhills BLM ACEC
Laramie
Cheyenne
Flat Top Mountain
Powder Rim
Cherokee Rim/Basin
20
0
20 Miles
Great Divide Resource Management Plan
for the
Rawlins Field Office


WYOMING
Great Divide Management Area
Land Cover
Saratoga
Laramie
Rawlins
20
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20 Miles
Great Divide Resource Management Plan
for the
Rawlins Field Office

Important Biological Conservation Sites Identified In Other Assessments and Conservation Plans

Various locations in the Great Divide have been recognized for their biological importance in earlier reports and analyses prepared by scientists and other experts. These earlier efforts generally were undertaken for the purposes of long-range conservation planning by private organizations, government agencies, or conservation groups including The Nature Conservancy (TNC), the National Park Service (NPS), University of Wyoming, Southern Rockies Ecosystem Project, Heart of the West Coalition and WGFD. Many of these efforts identified the same areas due to the known occurrence of rare species, habitats, or assemblages of species, and because most of the later analyses built upon the earliest documents.

On the map on page 49, "conservation sites" are aggregated from three ecoregional plans prepared by TNC, one each for the Wyoming Basins (most of the Great Divide), the Southern Rockies (areas near the Medicine Bow, Laramie, and Sierra Madre mountains), and the Central Shortgrass Prairie (eastern plains) (Freilich 2001; Neely et al. 2001; and TNC 1998). TNC sites are not solely public lands, so on the map only those portions of each site which fall on BLM surface ownership are displayed (blue-violet). Thus, sites or portions of sites that fall on Forest Service, state, or private lands are not shown. Conservation sites are defined in this way by TNC: "In each ecoregional plan, the goal has been to conserve the viable native species and natural communities (called "conservation targets") by identifying certain areas on the ground ("a portfolio of sites") which, if protected, would provide the greatest protection for all the plant and animal species of the entire ecoregion."

Ferris Dunes Photo by BCA

Also shown on the map (red) are existing ACECs which were designated by BLM for biological values and additional proposed ACECs to protect rare plants and mountain plovers (green cross-hatch and striping). These are repeated from previous maps in this report. Rare plant areas or plover areas not proposed as ACECs are not displayed.

In the mid-1970's the National Park Service (NPS) contracted the University of Wyoming Botany Department to survey and evaluate the Wyoming Basins portion of the Great Divide for potential national natural landmarks (Knight et al. 1976). These researchers identified several areas wholly or partially within the Great Divide with a "high degree of national significance" or which appear to be "nationally significant." These include Washakie Basin, Chain of Lakes, Muddy Creek, Twin Groves Aspen Atoll, Sand Dunes (just west of Seminoe Reservoir), Rattlesnake Creek oak woodland, and portions of the Laramie High Plains. Knight et al. (1976) argue that because "natural areas are becoming not only more difficult to find but also more difficult to maintain... We could easily argue that all of the areas should be protected immediately, primarily because all have value and combined they occupy a small percentage of the basin."

Another recent long-range conservation effort has identified areas within the Great Divide having either important existing conservation value or excellent ecological restoration potential. The effort is known as the Heart of the West Conservation Plan (Heart of the West Coalition 2004). These areas are shown in yellow on the map. Descriptions can be found at www.wildutahproject.org.

Brief descriptions of some of the larger or more important sites are presented below, taken directly from the TNC documents and Knight et al. (1976).

Chain of Lakes is a "unique series of alkaline ponds ... [that] provide a rare habitat in the area" for waterfowl and is also a WGFD Wildlife Habitat Management Area for pronghorn winter habitat and migration. The site was ranked 2A by Knight et al. (1976), meaning it "appears to be nationally significant" and was "in serious impending danger" at the time of their report.

The ***Cherokee Basin*** site "consists partly of the western foothills of the Sierra Madre range with aspen, sagebrush, and some conifers. To the west is the course of the Little Snake River, with Cottonwood riparian. Still farther west is an extensive ridge and basin system with outcrops of sandstones, clays, and shales. These ridges are covered with a mosaic of juniper woodland, Wyoming big sagebrush, bitterbrush, and cushion plant communities. Wetter valleys include Fremont cottonwood riparian communities of importance for migrant wildlife and native fish. Juniper woodlands are important for juniper obligate songbirds. The site includes two large occurrences of Penstemon gibbensii (G1)" (Freilich et al. 2001).

Ferris Dunes and Ferris Mountains. "At the foot of the Ferris Mountains, this site consists of gently undulating terrain of active sand dunes partially stabilized with vegetation. There are surprising occurrences of moist areas and small pools in wet weather especially along periphery of the dunes" (Freilich et al. 2001). "The Ferris Mountains are a steep, narrow, east/west trending range of Precambrian, granitic rock. A substantial altitudinal gradient is represented in the long alluvial fans coming off the mountains. A variety of rare plants are found on these slopes, particularly in the stream-laid alluvium from water courses (Freilich et al. 2001).

Laramie High Plains is a site identified in Knight et al. (1976) and given a ranking of 2C (appears to be nationally significant but in no apparent jeopardy).

According to TNC, ***"Muddy Creek Basin*** and the area up to Cow Creek are on the rim of the Great Divide Basin. Although there is a surprising amount of aspen in the wooded draws, the region is mostly sagebrush-dominated hills. This site constitutes a western extension of the Saratoga Valley site and was included

for its prairie dog colonies and many representative plant communities" (Freilich et al. 2001). Because of the presence of rare native fish (see Native Fish section of this report for further details), Muddy Creek was ranked 1B by Knight et al. (1976). This ranking indicates a "high degree of national significance, recommended without reservation" for protection as a natural national landmark and also that the site "is in some jeopardy."

Rattlesnake Creek oak woodland is a site of mixed private/public ownership identified in Knight et al. (1976) and ranked 1C (high degree of national significance, recommended without reservation, in no apparent jeopardy).

The ***Red Desert*** site "includes playas and the surrounding shrub and grass vegetation typical of the red desert. Broad shallow basins and low rolling hills are occasionally broken up with cliffy mesas or bouldery mounds. This area was included for its importance in adding several representative vegetation communities to the portfolio of sites" (Freilich et al. 2001).

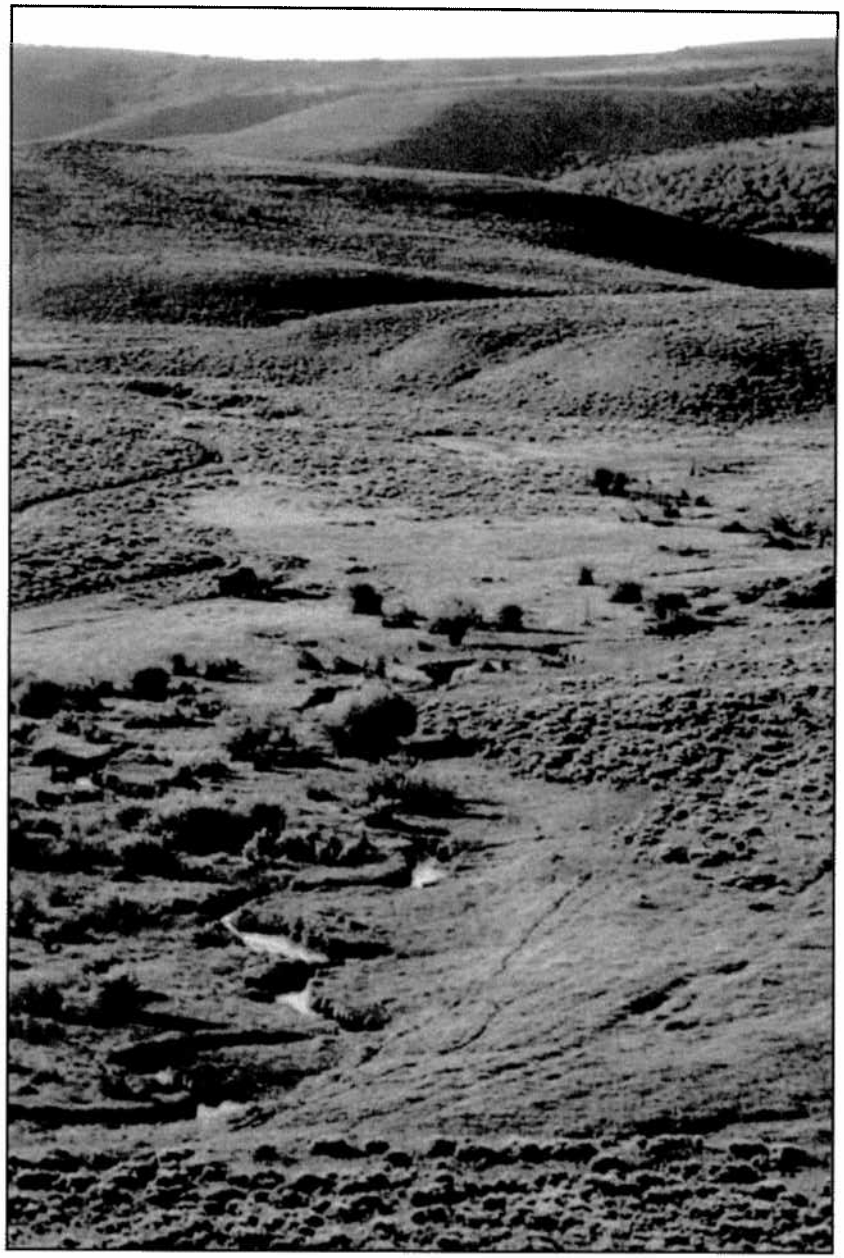
The ***Saratoga Valley*** site "includes the enormous floodplain of the North Platte River with extensive cottonwood riparian zones grading up onto foot-hills of the Medicine Bow and Sierra Madre ranges. This area is well known for its superb fishing, heron rookeries, bald eagle nests, and important wet meadows. The area is now seeing increasing pressure due to recreation and home-building" (Freilich et al. 2001).

The ***Sand Dune Natural Area*** just west of Seminoe Reservoir encompasses active sand dunes and was rated 1B by Knight et al. (1976). At the time of their report the site "was in some jeopardy" despite the fact it possessed a "high degree of national significance" and was "recommended without reservation" for protection.

Shirley Basin "is a vast landscape of wooded mountains, rough hog-backs, and sweeping extents of open sagebrush land. With one of the largest extant colonies of white-tailed prairie dogs, the Shirley Basin has been the site of black-footed ferret reintroductions since 1991. Superb fisheries, riparian bird refugia, and extensive habitat for large carnivores round out this site" (Freilich et al. 2001).

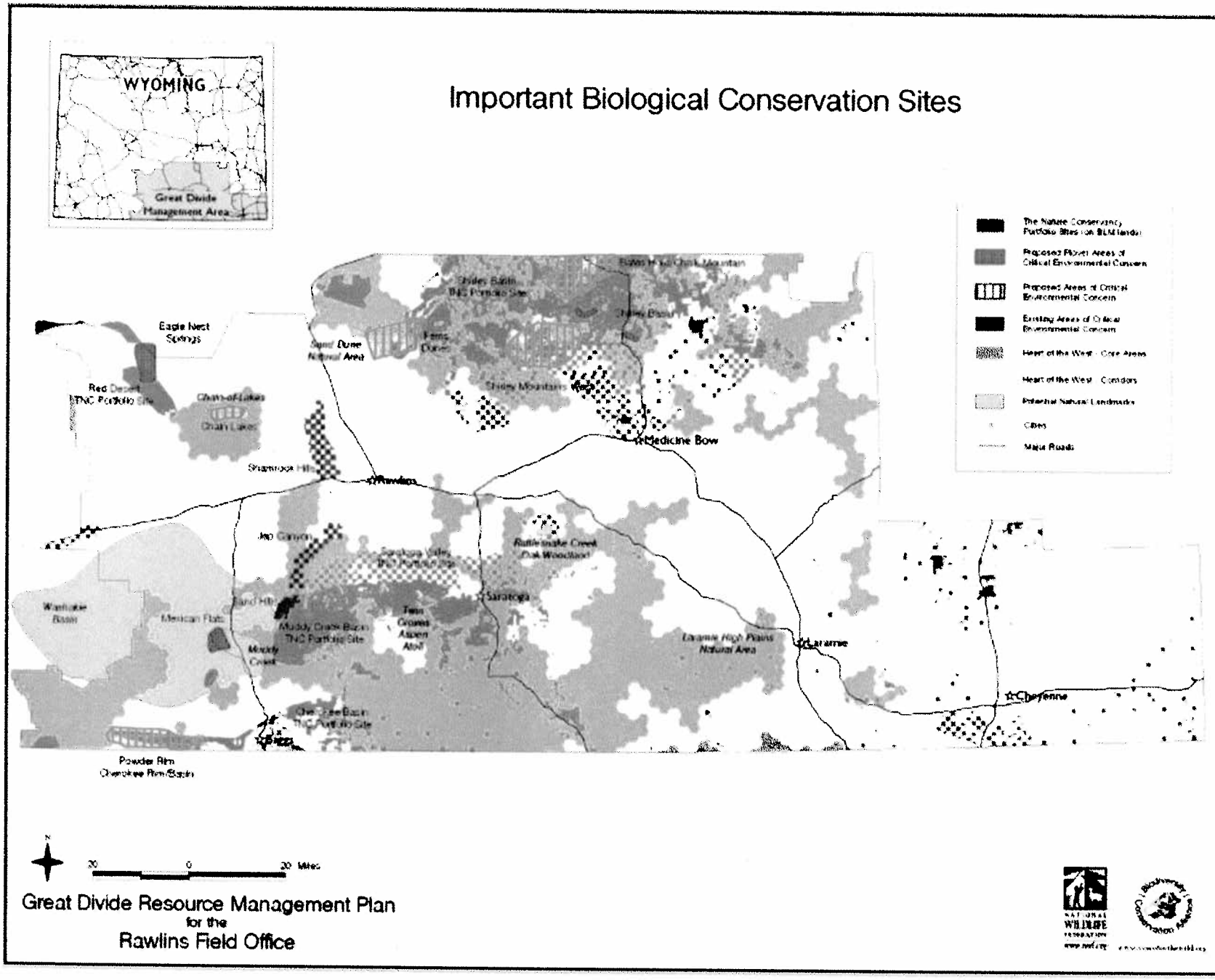
Twin Groves Aspen Atoll is a rare form of aspen stand ranked 2C by Knight et al. (1976) that "appears to be nationally significant" with "no apparent jeopardy."

Washakie Basin is "a very large area that is as yet relatively free from the influence of man" consisting of "dry sagebrush-grassland-greasewood wilderness... buttes, badlands, springs, old forts (100 years old) along the historic Overland Trail, and fossil beds of great significance. The vegetation is quite diverse... It is a very special area in the Wyoming Basin." The same authors ranked the site 1B, indicating a "high degree of national significance, recommended without reservation" with threats putting the site "in some jeopardy" (Knight et al. 1976).



Muddy Creek

Photo by BCA


WYOMING
Great Divide Management Area
Important Biological Conservation Sites
Eagle Nest Springs
Red Desert TNC Portfolio Site
Chain-of-Lakes
Chain Lakes
Shamrock Hills
Jep Canyon
Washakie Basin
Muddy Creek Basin TNC Portfolio Site
Twin Groves Aspen Area
Rattlesnake Creek Oak Woodland
Saratoga
Laramie High Plains Natural Area
Laramie
Cheyenne
Medicine Bow
Rawlins
Powder Rim
Great Divide Resource Management Plan
for the
Rawlins Field Office

Additional Species of Conservation Concern

In the Great Divide there are a number of wildlife species which are considered to be of conservation concern—due to rarity, declines in populations or habitat, or other factors—but which have not been discussed in previous sections of this report. On the map on page 52, locations of observations since 1984 of bird, mammal, amphibian, and reptile species with high conservation ranks by WYNDD (2002; Keinath 2003), sensitive species designated by Wyoming BLM (2002b), or ranked highly by WGFD (2003c) are shown. Please note that many other species of concern to biologists, wildlife managers, and land management agencies have been observed within the study area but observations were recorded prior to 1984. Many of the species shown on the map are listed by WYNDD as "species of special concern" because they "are vulnerable to extirpation at the global or state level due to: inherent rarity (restricted geographic range, small population size, low population density, or specialized habitat requirements), significant loss of habitat, or sensitivity to human-caused mortality or habitat disturbances." Others are ranked highly by WYNDD due to other factors but are instead on the "potential concern" list.

Pygmy Rabbit Photo © J. Witham

Locations at which only a single species was observed are shown with symbols the shape and color of which are unique to each species (and listed on the legend). Locations where multiple species were observed are shown with an "X." Adjacent to each multiple species site is a box listing the species of concern found there. Because some species have been observed only at multiple species sites and are named in box lists adjacent to those sites, not all species are listed in the legend. But all species are listed in the table on page 51. Only those observations which have a date of 1984 or later are shown on the map.

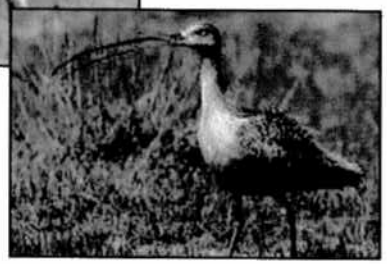
In addition to species locations from WYNDD, annual Breeding Bird Survey Routes along which one or more species of concern was found (as listed in the WYNDD databases) are shown as blue lines. The name of each route is given in blue text. There was insufficient space to list these species on the map, but they are included in the table on page 51 , along with conservation ranking. Breeding bird survey routes were obtained from the United States Geological Survey's Patuxent Wildlife Research Center (1999).

S1 species are critically imperiled in the state due to extreme rarity or vulnerability, S2 species are imperiled due to rarity or vulnerability to extinction, and S3 are rare or local, or found locally in restricted range. A species denoted by WYNDD with a "B" code within the state ranking indicates the rank applies during the breeding season, while an "N" is used for the non-breeding season only (used mostly for migratory birds and bats; WYNDD 2002).

WGFD ranks species NSS1 if they are rare, if "extirpation appears possible," and have declining or vulnerable habitat; NSS2 species are those which are rare, for which "extirpation appears possible," but with stable habitat. NSS3 species have populations which are declining or restricted in numbers and/or distribution; habitat is restricted or vulnerable; and may be sensitive to human disturbance (Cerosvski 2002; WGFD 2003c).

Bird species which depend on sagebrush habitats are of particular concern: Brewer's sparrow, sage sparrow, and sage thrasher. These three are "the primary passerine species of sagebrush habitats" (Knick et al. 2003). All three are on the Wyoming BLM Sensitive Species List, are considered to be of conservation concern by WYNDD and WGFD, and "may be important predictors of impending collapse in sagebrush ecosystems because of their sensitivity to multiscale habitat changes" (BLM 2002b; WGFD 2003c; Fertig and Beauvais 1999; Knick et al. 2003). Brewer's Sparrow and sage sparrow are both species which "clearly needs [sic] conservation action," according to the Wyoming Bird Conservation Plan devised by Wyoming Partners in Flight (Cerovski et al. 2001). Sage thrasher requires monitoring according to the same authors.

Knick and his coauthors have expressed grave concern about the future existence of the sagebrush ecosystem and the birds found there: "The cumulative effects of land use and habitat degradation raise the greater threat of imminent large-scale collapses of sagebrush ecosystem... Shrubland and grassland birds are declining faster than any other group of species in North America" (Knick et al. 2003). BLM lands such as those in the Great Divide play a particularly important role in the survival of sagebrush birds. "Less than 30% of all sagebrush lands are owned privately. Consequently the future of sagebrush ecosystems will be affected primarily by use of public lands and policies of the management agencies... Responsibility for maintaining sagebrush habitats and bird populations rests squarely on public land management agencies because most species' summer ranges are owned publicly and managed by state or federal agencies"(ibid).



Long-billed Curlew Photo courtesy Utah Division of Wildlife Resources

Although not shown on the map on page 52, WGFD has found that "long-billed curlews are regularly seen on the flats north of the Ferris Mountains during the breeding season, and are expected to be breeding there. Observations would suggest that they also breed north of the Seminoe Mountains, and around the Pedro Mountains" (WGFD 2002b).

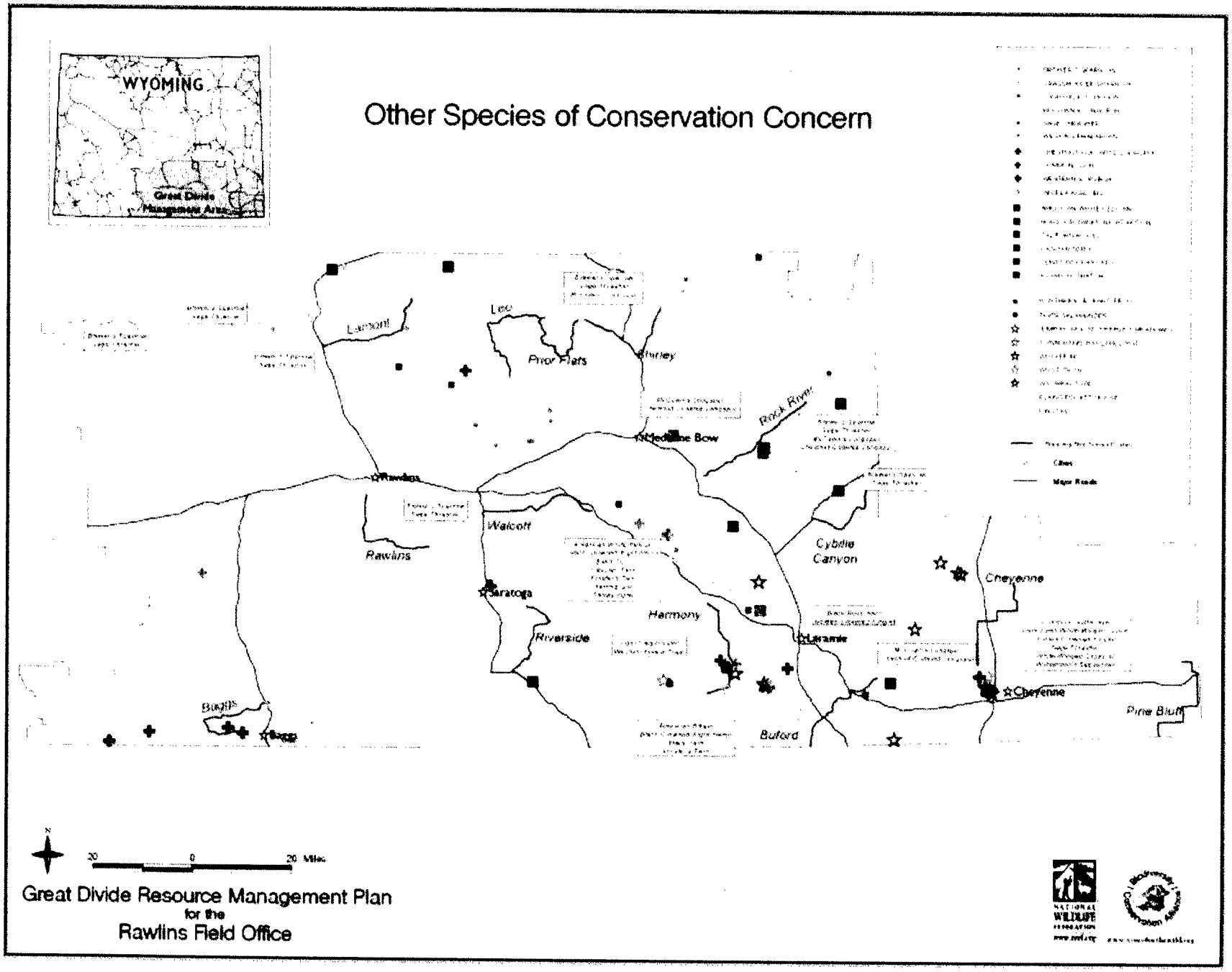
Beyond birds, several other species of concern are found in the Great Divide. The world's only wild population of the federally endangered Wyoming toad is

found in a few prairie lakes of the Laramie Basin in central Albany county managed by the FWS. The Preble's meadow jumping mouse, on the federal threatened list, is found "in the plains and foothills of southeast Wyoming, in brushy, moist riparian corridors" (WYNDD 2002). Recently, critical habitat for this rare mammal was designated along riparian areas in southern and eastern Wyoming.

The dozen or more mountain ranges within the Great Divide are in many respects mountain "islands" in a "sea" of sagebrush. Vegetated with pine, spruce, fir, Douglas-fir, and aspen, these mountains contain habitat for forest creatures. Some species may exist as truly isolated populations on these "islands" (e.g., red squirrels and southern red-backed voles). Other species such as black bears, snowshoe hares, and boreal owls use these "islands" as stepping stones between larger blocks of suitable habitat (TNC 2001).

Additional Species of Conservation Concern

Species	Conservation Status/Rank	Wyoming Contribution
BIRDS		
AMERICAN AVOCET	S3B	
AMERICAN BITTERN	NSS3, S3B	Low
AMERICAN WHITE PELICAN	NSS3, S1B	High
BLACK-BILLED CUCKOO	S2	High
BLACK-CROWNED NIGHT-HERON	NSS3, S3B	
BLACK-ROSY FINCH	S1	High
BLACK TERN	NSS3, S1	Low
BOBOLINK	NSS4, S2	Low
BREWER'S SPARROW	BLM Sensitive	Medium
BUFFLEHEAD	S2B	Low
CALIFORNIA GULL	S2B	
CALLIOPE HUMMINGBIRD	S3	High
CANYON WREN	S2S3	
CASPIAN TERN	NSS3, S1	High
CHESTNUT-COLLARED LONGSPUR	NSS4, S1	High
CLARK'S GREBE	NSS4, S1B	High
CLAY-COLORED SPARROW	S3B	
COMMON GOLDENEYE	S3B	
COMMON LOON	NSS1, S1B/S2N	High
DARK-EYED WHITE-WINGED JUNCO	S2B/S3N	Very High
DICKCISSEL	S1	Low
FORSTER'S TERN	S1, NSS3	High
GOLDEN-CROWNED KINGLET	S3B/S4N	Low
LEWIS' WOODPECKER	NSS3, S2	High
LONG-BILLED CURLEW	NSS3, S3B	Low
MCCOWN'S LONGSPUR	NSS4, S2	Very High
NORTHERN BOBWHITE	S1	Low
PYGMY NUTHATCH	S2/NSS4	High
SAGE SPARROW	S3, BLM Sensitive	High
SAGE THRASHER	S5, BLM Sensitive	Medium
SNOWY EGRET	NSS3, S3B	
WESTERN SCRUB JAY	NSS3, S1	Low
WHITE-FACED IBIS	NSS3, S1B, BLM Sensitive	High
WHITE-WINGED CROSSBILL	S2	Low
WILLIAMSON'S SAPSUCKER	S2	High
WILSON'S PHALAROPE	S3B, S3N	
MAMMALS		
TOWNSEND'S BIG-EARED BAT	NSS2, S2, BLM Sensitive	High
WOLVERINE	NSS3, S2	Low
PLAINS POCKET MOUSE	NSS3	
PREBLE'S MEADOW JUMPING MOUSE	Threatened, S1	Very high
RINGTAIL	S1	Low
AMPHIBIANS and REPTILES		
BOREAL WESTERN TOAD	NSS2, S1	High
NORTHERN LEOPARD FROG	NSS4, S3, BLM Sensitive	High
WOOD FROG	NSS3, S1	Very high
WYOMING TOAD	Endangered, NSS1, S1	Very high


WYOMING
Great Divide Management Area
Other Species of Conservation Concern
Lamont
Leo
Prior Flats
Hurley
Medicine Bow
Rock River
Rawlins
Walcott
Saratoga
Harmony
Riverside
Cyclone Canyon
Cheyenne
Laramie
Buford
Pine Bluff
20
0
20 Miles
Great Divide Resource Management Plan
for the
Rawlins Field Office

Predicted Vertebrate Species Richness

The accompanying map on page 54 shows predicted vertebrate species richness for the planning area. Different shades of red indicate different levels of predicted vertebrate species richness—the darker the red, the greater the number of different species predicted to inhabit the area. The map was produced using the Wyoming Gap Analysis digital data (Merrill et al. 1996) on predicted total vertebrate species richness.

Habitats predicted to be particularly rich in species are found along the North Platte River south of Interstate 80 and north to Seminoe Reservoir, and other rivers and streams; the mixed grass prairie with shrub-dominated riparian areas and wetlands and irrigated croplands with forested riparian areas of the Laramie River valley; and a large area northeast of Baggs dominated by mountain big sagebrush occurring with varying amounts of aspen forest (up to 30%). Mixed grass prairie interspersed with irrigated croplands and riparian areas east of Cheyenne also have high predicted species richness.

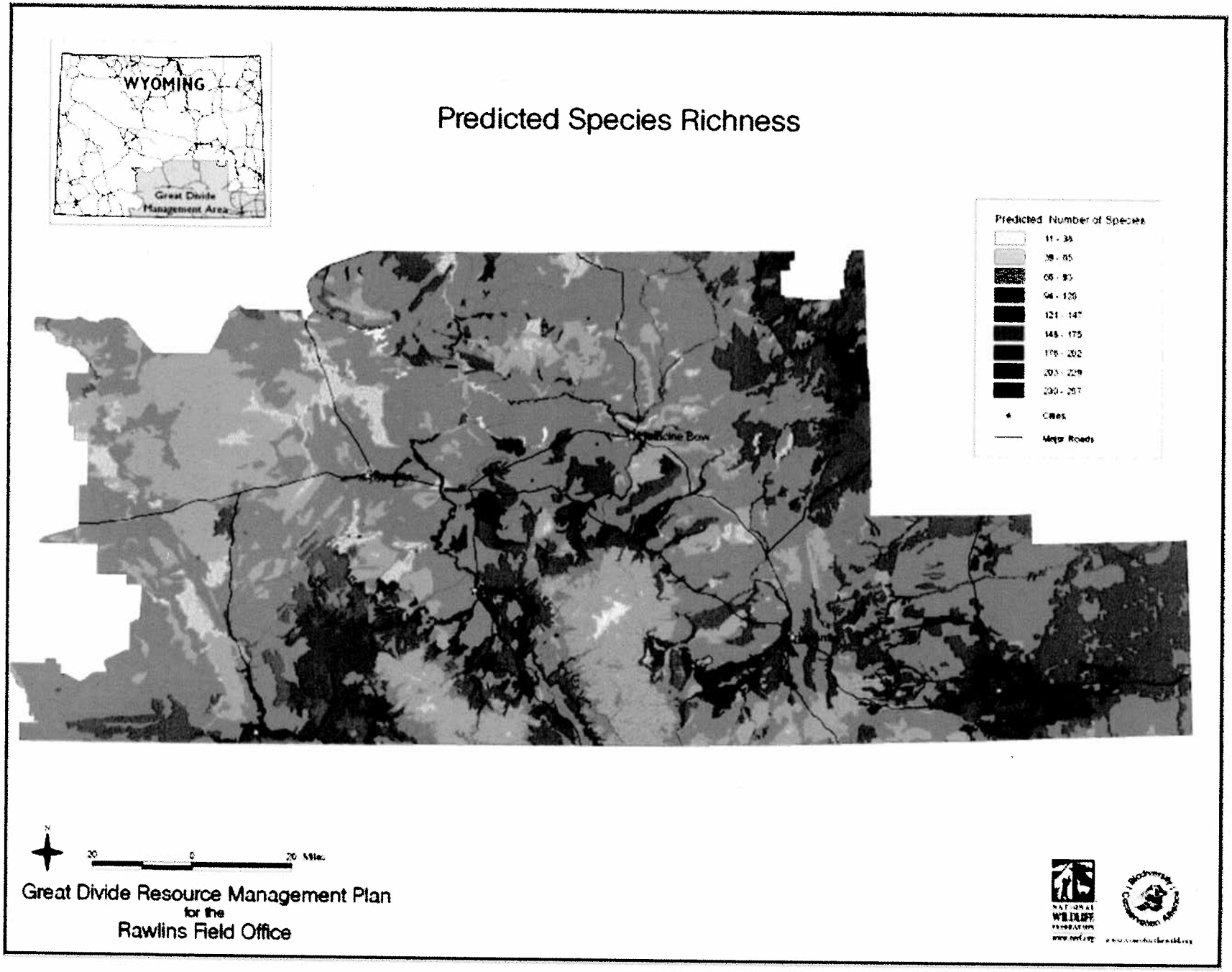
As discussed in the Threats from Oil and Gas Development section, the area predicted to have high species diversity northeast of Baggs dominated by mountain big sagebrush occurring with aspen is currently proposed for a very large CBM development known as the Atlantic Rim Project (BLM 2001). Yet this area currently receives little or no protection from BLM.

Although each type of habitat is important for some species, there are occasions when a particular kind of habitat is used by an unusually large number of different species. Protection of areas where unusually high species richness is known or predicted to be found—biological "hot spots"—is critically important for the conservation of biological diversity across the landscape.

Of course, it is important not to diminish the value of areas with low predicted species richness but which are crucial for biodiversity conservation. A comparison of the Predicted Species Richness map on page 54 with other species maps in this report reveals that many of the habitats where rare and sensitive species are found do not occur in the areas of high predicted species richness. Among other reasons, this may be due to the fact that species are of concern precisely because their habitats are uncommon or specialized, and therefore not likely to be used by many other species. Likewise, important big game habitat and habitat for other more common species of great societal or ecological value do not always occur in areas of higher predicted species richness. Yet those key habitats are undoubtedly important for the species in question.

Predictions of species occurrences in specific habitats were made by Merrill et al. (1996) based on known occurrences; modeling based on land cover, elevation, and the presence of riparian/aquatic features; and knowledge of expert biologists and academic professionals.

Horny Toad (Eastern Short-horned Lizard) Photo by BCA


WYOMING
Great Divide Management Area
Predicted Species Richness
Predicted Number of Species
11 - 38
39 - 65
66 - 93
94 - 120
121 - 147
148 - 175
176 - 202
203 - 229
230 - 257
Cities
Major Roads
Medicine Bow
30
0
30 Miles
Great Divide Resource Management Plan
for the
Rawlins Field Office

Threats from Oil & Gas and Coal Development

Significant threats to the outstanding natural values of the Great Divide include the impact of high intensity exploration and drilling for conventional oil and natural gas and the push to rapidly exploit CBM through vast fields of hundreds, and even thousands, of wells. Both are proposed or occurring now at unprecedented levels across the Great Divide. Such development involves the clearing of well pads, drilling of wells, road and pipeline construction, establishment of produced water and drilling fluid ponds, construction of condensate tanks, pump buildings, and other ancillary facilities. When full-field development occurs, the natural landscape is often overwhelmed by industrial activities with destructive consequences to wildlife and fisheries, recreation, water and air quality, scenery and cultural resources. Existing and proposed oil and gas projects and wells are shown on the map on page 58. Photographs of conventional oil and gas fields and CBM development are shown on the following pages. In addition to oil and gas, coal mining, especially by means of strip mining, also threatens the Great Divide. Areas of potential coal development are shown on the map on page 59.

A critical stage in oil and gas development is the decision by BLM to offer leases of mineral rights for federal lands and minerals. Large expanses of BLM lands in the Great Divide have already been leased to private parties for mineral development. On the map on page 58, existing and pending (proposed) leases are shown in pink and violet, respectively. The lease areas are shown to the nearest square mile section, even if the lease is smaller than one section.

Wamsutter Gas Field in Great Divide Photo by BCA

Under the existing RMP, the entire area, except for designated WSAs, is open to oil and gas leasing as well as geophysical exploration (BLM 2003b). Over two million acres of BLM land in the Great Divide, about 60% of BLM-managed lands, are already leased and additional land is leased during sales held by BLM every other month (ENSR Corp, et al. 2003).

Specific oil, gas, and CBM development projects, which follow leasing, are shown on the map in green crosshatch. These "projects" involve the actual drilling, construction of large numbers of well pads, pipelines, water reservoirs, roads, pipelines, and ancillary facilities. Such projects alter the landscape and impact wildlife behavior, habitat and life cycles, can decrease water and air quality or harm recreational opportunities and scenic vistas, and, in certain instances, degrade wilderness qualities for lands eligible for designation under the Wilderness Act. Not all projects are shown on the map, as new proposals have been announced in an accelerating fashion when this report went to press in March 2005. Known projects are also listed in the table on page 56.

Numerous natural gas and oil projects have been developed in the study area. Existing individual wells are shown with various symbols depending on their status—producing, abandoned, or "other." Wells which have been permitted by governing agencies but were not yet drilled at press time are shown with red triangles. Geophysical exploration projects (also known as seismic exploration) are not shown on the map, even though these types of activities rely on heavy equipment or underground explosions to send vibrations through the earth and can also have serious environmental impacts, particularly the vibroseis methods. Molvar (2003) provides a synopsis of these impacts.

The impacts of mineral development on wildlife and other values have been documented in the literature and in other sources. Impacts to big game from drilling, roads construction, and increased human activity are well-established. Some are described in the Big Game section of this report. Additional examples from the literature and management agencies are presented below.

A recent study on the effects of natural gas development on mule deer in the Upper Green River Valley of Wyoming has shown that mule deer tend to avoid areas close to well pads and associated access roads. The changes in mule deer distribution appeared to be immediate (i.e., year one of development) and no evidence of acclimation to well pads was observed. Rather, as development progressed, mule deer selected areas farther away (Sawyer et al. 2004).

In the northwestern portion of the Red Desert, elk migrations appear to have disappeared "primarily due to the large amount of human disturbance and activities associated with oil and gas development and year-round access" (BLM 2000).

Pronghorn have been observed to avoid development. Cook (1984) found that, "[d]ensities of wintering pronghorns were lowest at Worland-Area 2, where development activity, notably oil/gas development, was considered severe."

Impacts to other wildlife are also of concern. As mentioned in the mountain plover section of this report, the FWS has concluded that gas well fields can be "ecological traps" for these rare birds (Long 2001). Fragmentation of habitat and direct disturbance of animals (e.g., by noise from industrial equipment and activities) have been identified as problems for sage grouse as well. This was discussed in the grouse section of this report, but a conclusion by WGFD bears repeating: "sage-grouse populations in the RMP area have demonstrated long-term declines under existing management, particularly in areas with heavy oil and gas development, and these declines would be expected to increase under continuation of existing management" (WGFD 2002c).

Raptors are also threatened by current mineral development methods. The BLM biologist responsible for monitoring raptors in the Great Divide concluded that "the existing, proposed, and potential levels of natural gas development would significantly impact nesting raptors" throughout the Flat Top Mountain

area of the Great Divide, where the Desolation Flats natural gas project is currently proposed by BLM (Apple 2003). Specific impacts are mentioned in the Raptors section of this report.

Ingelfinger (2001) conducted a study of sagebrush birds in a western Wyoming gas field and found significant declines in nesting songbirds within 100 meters of gas field roads. He found that that as gravel roads increased, densities of sagebrush obligate birds, Brewer's sparrows, and sage sparrows declined, while horned larks (a grassland species) increased. According to his findings, "roads associated with natural gas development negatively impact sagebrush obligate passerines. Impacts are greatest along access roads where traffic volume is high," but "bird densities are reduced along roadways regardless of traffic volume."

It is important to note that the impacts of development on wildlife can be, and typically are, much greater than the area directly disturbed by construction activities. Simply counting the numbers of acres disturbed (e.g., by wellpads and roads) can grossly underestimate the negative impacts. Several studies have shown that elk abandon calving and winter ranges in response to oilfield development. In mountainous habitats, the construction of a small number of oil or gas wells has caused elk to abandon substantial portions of their traditional winter range (Johnson and Wollrab 1987, Van Dyke and Klein 1996). Drilling in the mountains of western Wyoming displaced elk from their traditional calving range (Johnson and Lockman 1979, Johnson and Wollrab 1987). Johnson and Wollrab (1987) found that for drilling on elk winter range in their western Wyoming study area, every acre of surface disturbance resulted in abandonment of 97 acres of winter range.

Produced Water Reservoir in Atlantic Rim Area Photo by BCA

When considering CBM development, Noon (2002) succinctly summarized the issue: "the actual areal impacts of habitat loss following disturbance almost always exceed the area directly disturbed. That is, the effective area of the remaining patches of suitable habitat following project activities (installation of wells, compressors, water handling facilities, roads, pipelines, etc) may be substantially smaller than their map-based areas. This occurs because a number of ecological processes are fundamentally changed at the boundary between the remaining habitat and the CBM well footprint. These include changes in micro-climate (followed by changes in vegetation structure and composition), increased levels of predation or parasitism, behavioral avoidance of boundaries because of human disturbance, changes in the distribution and abundance of food resources, or invasion by exotic organisms that decrease habitat quality." While Noon was referring specifically to CBM development, this larger "area of influence" on wildlife and habitat would apply to conventional natural gas development as well.

Other experts explain that development "will affect and make unusable to some species a far greater amount of the landscape through habitat fragmentation, social displacement, and the temporal and spatial pattern of development on the landscape. Just as rural sprawl affects far more of the landscape than the area covered with a house, the proposed CBM development will affect acreage well beyond the lands physically impacted by drill pads, roads, and pipelines" (Wuerthner and Noss 2002).

With the extremely high projected level of natural gas and CBM development projected to take place in the Great Divide (initial proposals for just two projects, the Atlantic Rim and Seminoe Road proposals, may total over 4,800 wells), it is clear that concrete, enforceable conservation measures will be necessary to assure protection of big game populations and habitat.

Rare plants and plant community types are also vulnerable to impacts from oil and gas development. Merrill et al. (1996) found that the second-highest priority cover types—limber pine woodland, saltbush fans and flats, xeric upland shrub, desert shrub, and greasewood fans and flats—are "vulnerable to development, especially from oil and gas extraction activities...."

Noxious weeds are another threat from mineral development. According to a recent assessment by BLM, "Petroleum development, especially in the western portion [of the Great Divide Basin/Ferris and Seminoe Mountains watershed portions of the Great Divide], has greatly increased noxious and invasive non-native species introduction" (BLM 2003e). In the same assessment, BLM makes clear that this problem is one of the future, not merely the past: "oil and gas development will continue to occur, providing increased disturbance areas for additional weed establishment."

Oil and Gas Projects in the Great Divide

Project Name	Number of Wells	Status
Seminoe Road CBM	1240	EIS in preparation
Atlantic Rim CBM	up to 3,880	EIS in preparation
Hanna Draw CBM	220	Pre-scoping
Desolation Flats	385	Approved
Hay Reservoir CBM	9	EA in preparation
Hay Reservoir Infill	25	EA in preparation
Continental Divide/Wamsutter II	3000	Nearing completion
South Baggs	50	Approved
Red Rim CBM	10	Approved
Cow Creek CBM	16	Approved
Sun Dog CBM	11	Approved
Brown Cow CBM	12	Approved
Blue Sky CBM	25	Approved
Doty Mountain CBM	26	Approved
Jolly Roger CBM	18	EA issued

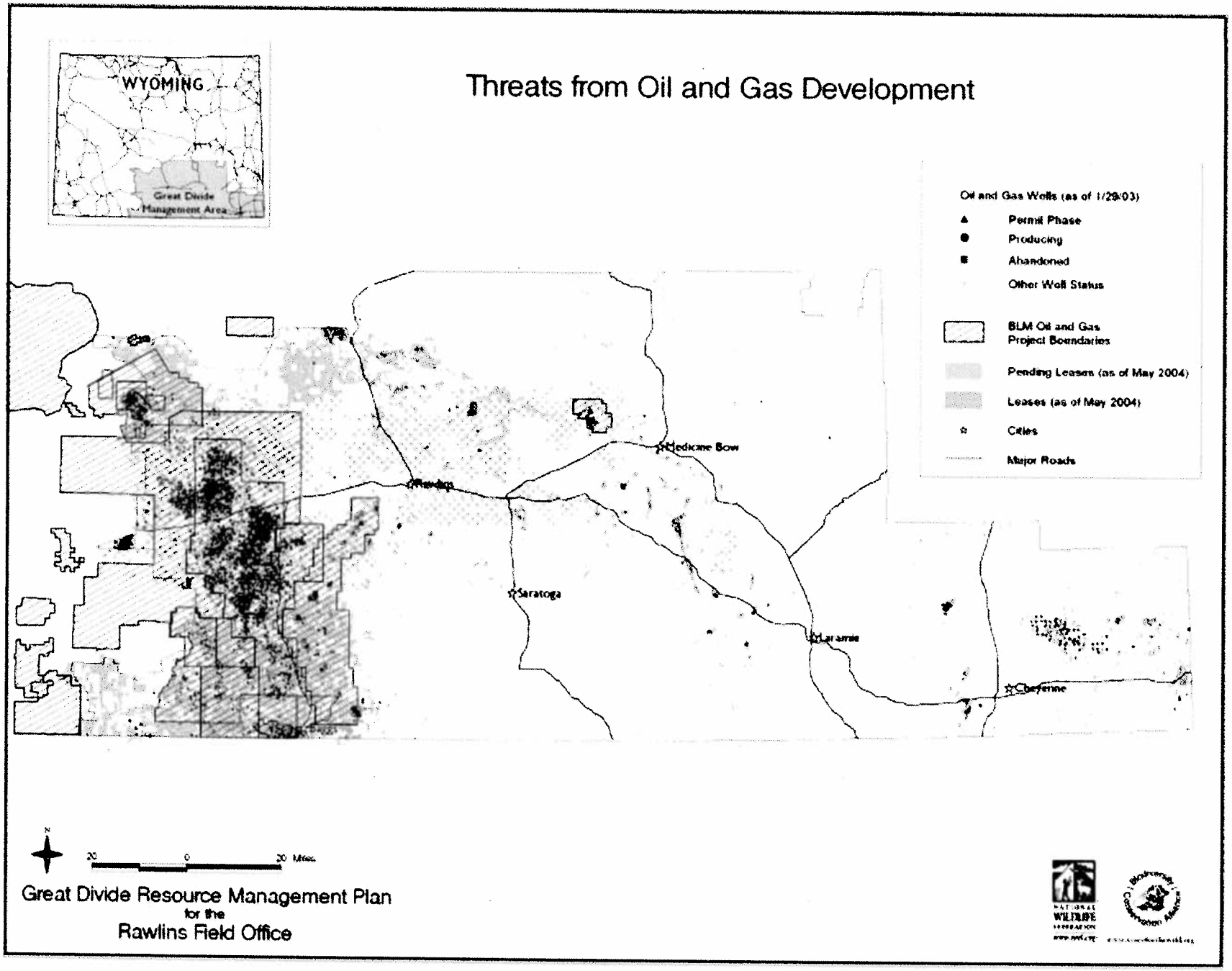
Specific Concerns Related to CBM Development Produced Water: Because of the current boom in CBM development, it is worth noting concerns related to the huge amounts of water produced by such development, expressed by FWS and others. These include water quality concerns such as selenium concentrations greater than two micrograms per liter (and evaporation in pits or ponds which could increase concentrations above this level), high concentrations of dissolved salts ["important wildlife habitat may be severely impacted or eliminated by surface discharge of produced water" (Long, 2002)], contamination of aquifers that are the water source for riparian areas and wetlands and which are also connected hydrologically to rivers, and more. Of course, the concerns related to changes in hydrograph (flow magnitude and timing), chemical signature, and sediment load which are detailed in the Native Fish section of this report are also important.

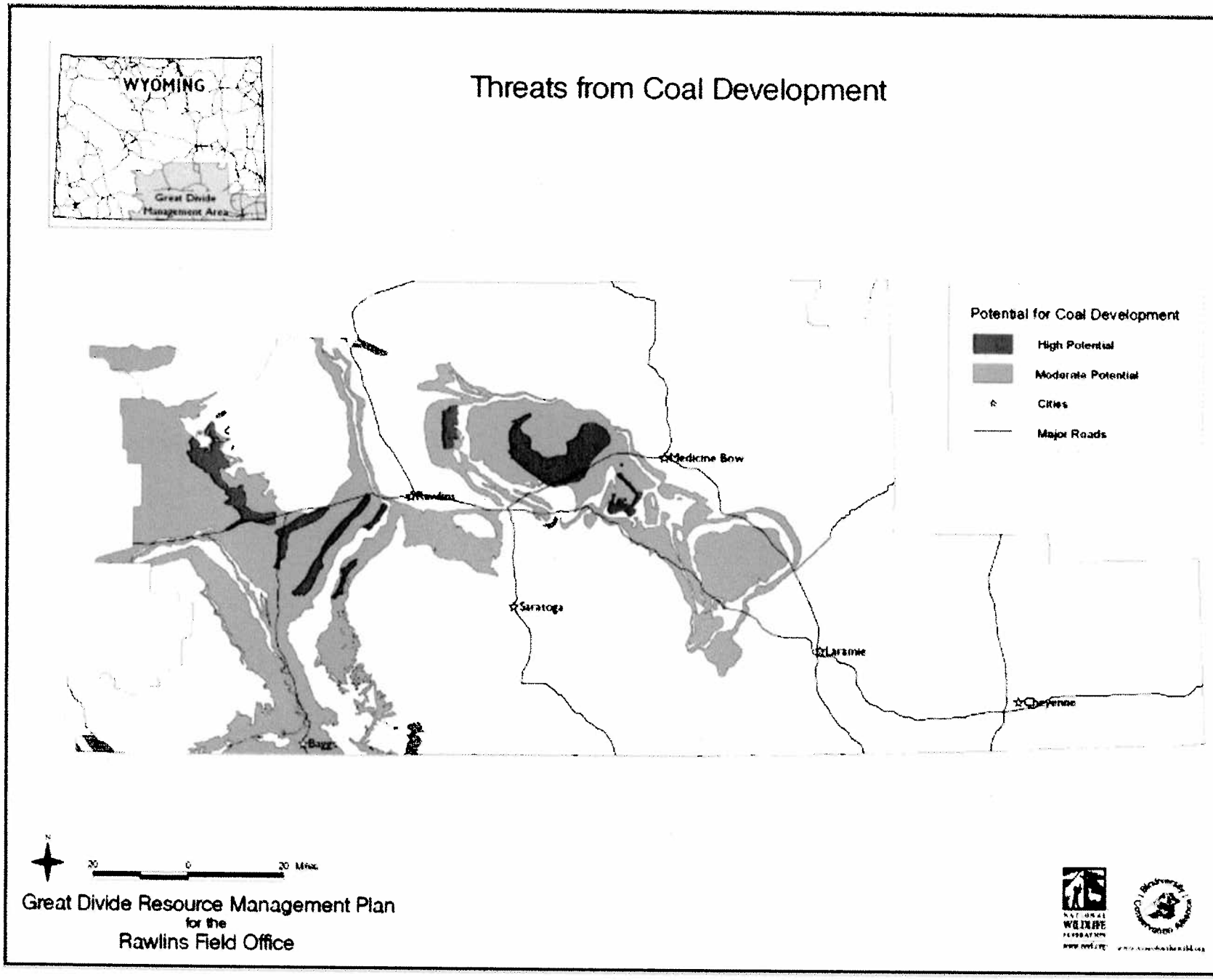
High levels of industrial development without adequate environmental safeguards and protective designations can also negatively impact quiet recreation opportunities, air quality, scenery and visual quality, and potential wilderness. Industrialization of previously undisturbed landscapes bring noise and air pollution from motorized vehicles (from both engine exhaust and particulates from traffic on dirt roads), compressors and pumps, and similar machines. Backcountry recreation opportunities are diminished as noise, new roads and traffic come to wild places. Scenic vistas can be marred by the placement of industrial facilities and by air pollution.

Regarding the latter, a federal study of CBM development in the Powder River Basin pointed out that "[i]n a region where clear visibility from horizon to horizon was once an expected experience, now that experience is becoming rare due to the combined effects of increasing industrial activity and a three-year drought. It is only to get worse" due to the large mileage of new road construction and associated traffic (States et al. 2003). The same is to be expected in the Great Divide. Potential wilderness areas not given interim protection via designation as WSAs can be leased and developed to full production, eliminating the possibility of including them in the National Wilderness Preservation System.

Wamsutter Gas Field in the Great Divide

Photo by BCA


WYOMING
Great Divide Management Area
Threats from Oil and Gas Development
Oil and Gas Wells (as of 1/29/03)
Permit Phase
Producing
Abandoned
Other Well Status
BLM Oil and Gas Project Boundaries
Pending Leases (as of May 2004)
Leases (as of May 2004)
Cities
Major Roads
Medicine Bow
Saratoga
Laramie
Cheyenne
20
0
20 Miles
Great Divide Resource Management Plan
for the
Rawlins Field Office


WYOMING
Great Divide Management Area
Threats from Coal Development
Potential for Coal Development
High Potential
Moderate Potential
Cities
Major Roads
Medicine Bow
Rawlins
Saratoga
Laramie
Cheyenne
20
0
20 Miles
Great Divide Resource Management Plan
for the
Rawlins Field Office

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Data Sources for Maps

Map	Coverage or Shapefile	Description	Data Source
Important Big Game Habitat			
	mdrmr_rmp.shp	Mule Deer migration routes	WYGISC
	bhsmr_rmp.shp	Bighorn Sheep migration routes	WYGISC
	elkmr_rmp.shp	Elk migration routes	WYGISC
	antmr_rmp.shp	Pronghorn migration routes	WYGISC
	sma_bnd_rmp2.shp	Wildlife habitat management areas	WYGISC
	bhspa_rmp.shp	Bighorn Sheep lambing areas	WGFD
	mdr99sr_cru_rmp.shp	Mule Deer crucial range	WGFD
	ant99sr_cru_rmp.shp	Pronghorn crucial range	WGFD
	elk99pa_rmp.shp	Elk birthing grounds	WGFD
	elk99sr_cru_rmp.shp	Elk crucial range	WGFD
	add_ex_whma	Composite grid	BCA
Birds	pod_pos_birds.shp		WYNDD
	eor_birds.shp		WYNDD
Threats from Unauthorized Fences	fences_auth_rmp.shp	Authorized fences	WYGISC
	fences_rmp.shp	All fences	WYGISC
	state-o-clp.shp	Surface ownership	BLM
Land Cover	wy_gap_veg.shp	Vegetation classification	WYGISC
Grouse Observations and Primary Habitat	sharp_tail_grouse_1mibuff.shp	Columbian Sharp-tailed Grouse Observations with 1 mile buffer	BCA
	pod_pos_plovsg.shp	P.O.D. - Mountain Plover and Sage Grouse	WYNDD
	lek_buf3mi_current.shp	Current leks with 3 mile buffer	BCA
	leks_oct02.shp	Greater Sage Grouse leks	WGFD
	sagrouse.shp	Greater Sage Grouse - primary habitat	WYGISC
Threats from Oil and Gas Development	vermillionbndry.shp	Vermillion Project boundary	BCA
	recentwyo-west2.shp	Various Project boundaries	BCA
	ken-buff.shp	Project boundary	BCA
	hannahdraw.shp	Project boundary	BCA
	desoflats.shp	Project boundary	BCA
	copper-ridge.shp	Project boundary	BCA
	atlanticrmbd.shp	Project boundary	BCA
	wogcc_wells_rmp.shp	Oil and Gas wells	WOGCC - EJ
	gd-31_012703-pending_lease.shp	Pending leases (as of 1/27/03)	EJ -LR2000
	gd-31_012703_lease.shp	Leases (as of 1/27/03)	EJ -LR2000
Threats from Coal Development	coal_rmp.shp	Potential exploitable coal areas in Wyoming	WYGISC

Map	Coverage or Shapefile	Description	Data Source
Ownership	state-o-clp.shp	Surface ownership	WYGISC
	state-o-clp.shp	Federal mineral ownership	WYGISC
Prairie Dog Ecosystem	raptor01_comp.shp	Species = "BO"	BLM
	pod_pos_raptor.shp	Burrowing owls after 1958 only	WYNDD
	eor_raptor.shp	Burrowing owls only	WYNDD
	pod_pos_lgmam.shp	Swift Fox after 1913 only	WYNDD
	pod_pos_pdogbff.shp	Prairie Dog and Black-footed Ferret only	WYNDD
	pdog_av_clp.shp	1980s WGFD Prairie Dog survey	WYNDD
	bffreintro_clp	Old Black-footed Ferret Potential reintroduction sites	WYNDD
	bffma.shp	Black-footed Ferret management units	WGFD
Rare Plants and Plant Communities	eor_plant.shp	Sensitive/endangered plant observations	WYNDD
	blm_acec_update.shp	BLM ACECs	BLM - BCA
	acec_hollis_rmp.shp	Important plant conservation sites	BCA
	wy_gap_concern.shp	Wyoming Gap cover types of concern	WYGISC - BCA
Plover Observations and Habitat	plover_acec.shp	Proposed Mountain Plover ACECs	BCA
	plover02_rmp.shp	Regan Plumb Mountain Plover observations	Plumb
	eor_plover.shp	EOR Mountain Plovers	WYNDD
	pod_pos_plovsg.shp	POD - Mountain Plover	
	mnplover.shp	Mountain Plover - primary habitat	WYGISC
	plover_model	Mountain Plover probability model	WYNDD Smith and Beauvais
Raptor Nests and Observations	wyndd_eor_nest_buf1mi_b.shp	EOR - Raptor nests with 1 mile buffer	WYNDD
	raptor_01_current2_buf1mi.shp	Raptor nests with 1 mile buffer	BCA
	pod_pos_raptor.shp	WYNDD POD raptors	WYNDD
	raptor_01_current2.shp	Raptor nests - current	BLM
	eor_raptor.shp	EOR - raptors	WYNDD
Recreational Resources	dividetr.shp	Continental Divide Trail	WYGISC
	scenic_highways_rmp.shp	Scenic Highway	BLM
	back_country_byway_rmp.shp	Back Country Byway	BLM
	continental_divide_rmp.shp	Continental Divide	BLM
	natural_areas_rmp_xmb.shp	Natural areas	BLM
	hiking_trail_rmp_xmb.shp	Hiking trailheads	BLM
	fishing_rmp_xmb.shp	Fishing spots	BLM
	campground_rmp_xmb.shp	Campgrounds	BLM
	blm_wsa_rmp.shp	BLM Wilderness Study Areas	BLM
	cowcreek.shp	Cow Creek	BCA
	adobetown.shp	Adobe Town	BCA
	kinneyrim_sbnd_geo83.shp	Kinney Rim South	BCA

Map	Coverage or Shapefile	Description	Data Source
	kinneyrim_nbnd_geo83.shp	Kinney Rim North	BCA
	ferris_addition.shp	Ferris Mountain addition	BCA
	cit_wild_rmp.shp	Citizens' Proposed Wilderness	BCA
	shirleym.shp	BLM Shirley Mountain Area	BLM
	ohvtheme.shp	BLM ORV designation	BLM
Hunter Success Rates			
Pronghorn Antelope	ant_ha2000.shp	Pronghorn hunt areas	WGFD
Elk	elk_ha2000.shp	Elk hunt areas	WGFD
Mule Deer	mdr_ha2000.shp	Mule Deer hunt areas	WGFD
Other Species of Conservation Concern	pod_pos_concern2_gt84_unq_xbbs.shp	POD - other species of concern	WYNDD
	pod_pos_concernt2_gt84_unz_xbbs.shp	POD - other species of concern - num_sp > 1	WYNDD
	eor_concern2_gt84.shp	EOR - other species of concern num_sp =1	WYNDD
	eor_concern2_gt84.shp	EOR - other species of concern num_sp > 1	WYNDD
	bbs_routes_wynnd.shp	BBS routes with WYNDD data	USFWS
Predicted Species Richness	gd_allrich	Predicted number of species	WYGISC
Important Biological Conservation Sites	plover_acec.shp	Mountain Plover ACEC	BCA
	proposed_acec.shp	Proposed ACECs - plants	BCA
	blm_acec_update_excomo.shp	BLM ACEC excluding Como Bluff	BLM - BCA
	tnc-blm-only.shp	TNC portfolio sites (on BLM lands)	TNC
Important Scenic and Visual Resources	trailsdd_rmp	Historict trails - Overland and Cherokee	BLM
	dividetr.shp	Continental Divide Trail	BLM
	back_country_byway_rmp.shp	Back Country Byway	BLM
	scenic_highways_rmp.shp	Scenic Highway	BLM
	historic_trail_buff5mi_sub_clp.shp	Historic Trails 5 mile buffer	BCA
	scenic_roads_clp.shp	Scenic Roads buffer	BCA
	cdt_buf5mi_clp.shp	Continental Divide Trail 5 mile buffer	BCA
	vrmclass.shp	BLM VRM classes	BLM
	vrm_areas3.shp	BCA VRM classes	BCA
Native Fish, Water, and Wetland Habitats	rss.shp	Bower	Bower
	whlr_brs.shp	Redside Shiner	Wheeler
	mts.shp	Bower	Bower
	whlr_mts.shp	Mountain Sucker	Wheeler
	whlr_spd.shp	Speckled Dace	Wheeler
	spd.shp	Bower	Bower
	patt_idt.shp	Iowa Darter	Patton
	whlr_iod.shp	Iowa Darter	Wheeler
	patt_csh.shp	Common Shiner	Patton
	patt_lnd.shp	Longnose Dace	Patton

Map	Coverage or Shapefile	Description	Data Source
	whlr_rtc.shp	Roundtail Chub	Wheeler
	rtc.shp	Bower	Bower
	whlr_fms.shp	Flannelmouth Sucker	Wheeler
	fms.shp	Bower	Bower
	hhc_new_rmp.shp	Horny Head Chub	BCA
	pod_pos_fish.shp	POD Fish observations	WYNDD
	eor_fish.shp	EOR Fish observations	WYNDD
	fish133g_rmp4.shp		WYNDD
	patt_stc.shp	Stonecat	Patton
	patt_ptm.shp	Plains Topminnow	Patton
	patt_lns.shp	Longnose Sucker	Patton
	ckc.shp	Bower	Bower
	patt_ckc.shp	Creek Chub	Patton
	whlr_ckc.shp	Creek Chub	Wheeler
	wetland_poly.shp	Wetlands	WYNDD
	wy_str_rmp2.shp	Major Rivers	WYGISC
	rf3_dgrmp_subru.shp	Streams	WDEQ
	wy_lk_rmp.shp	Major Lakes	WYGISC
	huc250_rmp.shp	Watersheds	WYGISC
Wilderness Study Areas, Potential Wilderness	redlake_wsa.shp	Redlake WSA	BLM
		Redlake Citizens' Proposed Wilderness	BCA
	blm_wsa_rmp.shp	BLM WSA	BLM
	citizens_wilderness.shp	Citizens' Proposed Wilderness	BCA

Data Source Definitions

BCA	Data gathered and/or digitized by Biodiversity Conservation Alliance.
BLM	Data acquired from BLM offices in Wyoming and elsewhere.
Bower	Data from Bower, M. No date. See References section for complete citation.
EJ-LR2000	Data prepared from BLM LR2000 database by Earthjustice, Denver, Colorado.
Patton	Data from Patton, T.M. (1997). See References section for complete citation.
Plumb	Data from Plumb, R. (2002). Digitized by BCA.
TNC	Data from Wyoming Office Nature Conservancy, Lander, Wyoming
USFWS	Data from United States Fish and Wildlife Service website.
WGFD	Data from Wyoming Game and Fish Department, Cheyenne, Wyoming.
Wheeler	Data from Wheeler, C.A (1997). See References section for complete citation.
WDEQ	Data from Wyoming Department of Environmental Quality, Cheyenne, Wyoming.
WOGCC - EJ	Data from Wyoming Oil and Gas Conservation Commission, analyzed by Earthjustice, Denver, Colorado.
WYNDD	Data from Wyoming Natural Diversity Database, University of Wyoming, Laramie, Wyoming.
WYNDD - Smith and Beauvais	Data from Beauvais, G. P. and R. Smith (2003). See References section for complete citation.

Mission Statement of the National Wildlife Federation:
To educate, inspire and assist individuals and organizations of diverse cultures to conserve wildlife and other natural resources and to protect the Earth's environment in order to achieve a peaceful, equitable and sustainable future.

Mission Statement of Biodiversity Conservation Alliance:
To protect and restore biological diversity, habitat for wildlife and fish, rare plants, and roadless lands in Wyoming and surrounding states. We concentrate our efforts on the forests, prairies, and rivers of Wyoming, western South Dakota, and northern Colorado.

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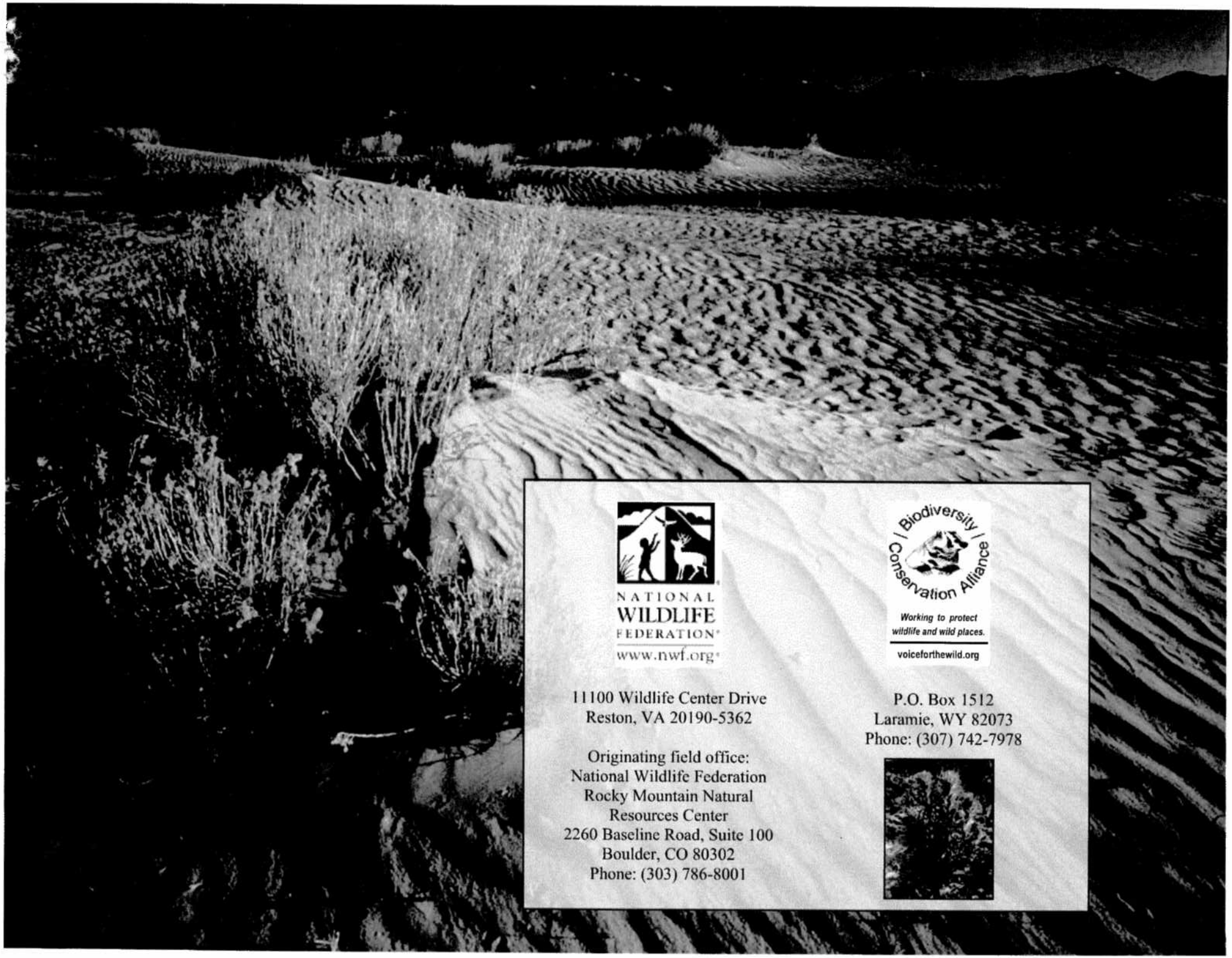

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