

ECHOES



Enjoying the park



Many visitors to Dinosaur National Monument are surprised at the variety of sights and activities to be enjoyed here. Use this newspaper as a guide to learning about what there is to see and do during your visit. The index below will help you find the information you want.

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Biologists are crafting a plan to restore the ecosystem of the Green River

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Disabled visitors may drive to the Quarry Visitor Center at any time. The Quarry's upper gallery is *not* wheelchair accessible; ask for a brochure with information on those exhibits and on access to other park areas.



Information auf **Deutsch** über Dinosaur Natl. Monument kann man bei beiden Besuchszentren bekommen.



Vous pouvez obtenir des informations sur Dinosaur en **Français**. Renseignez vous dans les centres de visiteurs.



恐竜国定公園についてのインフォメーションを日本語で読むことができます。訪問者センターでお尋ねください。



Photo by David Whitman

Attending a ranger-led program, such as this one at the Josie Morris historic cabin, is a good way to learn the story behind the scenery.

Discover the diversity of Dinosaur

By Donna Breslin, Quarry Interpreter

You've finally made it! Maybe you had planned your trip to Dinosaur National Monument for a long time, or maybe the kids—who are crazy about dinosaurs—set you on the path. Chances are you've spent a good bit of time on the road wondering if that "monument" is in Utah or Colorado. And where's that place with all those big dinosaur bones?

If one word could characterize Dinosaur National Monument it's *diversity*. Not one, but two, U.S. presidents recognized the area's scientific significance and scenic grandeur. The Quarry area was proclaimed a national monument in 1915 by President Woodrow Wilson; nearly a half-century later, President Franklin D. Roosevelt dramatically extended the park's boundaries to protect the extraordinary Green and Yampa river canyons.

See *Diversity*, page 13

The best job in the world

By Pat Grediagan
Yampa District Ranger

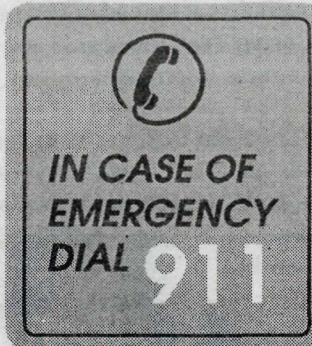
As a young girl hiking with my family in the Oregon Cascades, I once encountered a backcountry ranger. This young man spent the entire summer backpacking in the mountains, and on top of that he was paid to hike and camp. It sounded like the perfect job! As I grew up, the allure of such a career flitted through my mind and memory. So here I am—30 years later—a River Ranger at Dinosaur National Monument. I have a job much like that Oregon backcountry ranger's, except I've

See *River Ranger*, page 13

DINOSAUR:

Why is this a special place?

✓ There are several reasons why Dinosaur is such a significant part of our national heritage. How many can you name? Look for clues throughout this paper and see how many you find.



⊕ Safety first

- Please pay attention to posted speed limits.
- Seat belts must be worn by all vehicle occupants.
- Be alert for wildlife and livestock on roads.
- Pets must never be left unattended.
- The rivers are not safe for wading or swimming.

GENERAL INFORMATION

Essential information for the visitor.

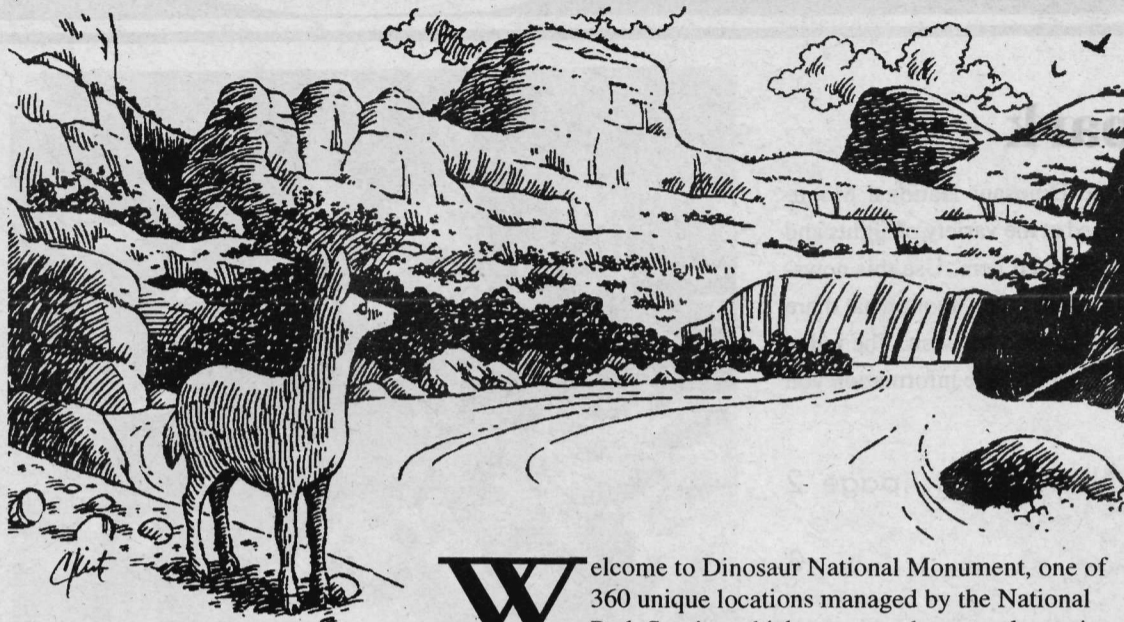
Visitor Centers

THE DINOSAUR QUARRY

Encloses fossil bones, exhibits, and a working paleontology lab. Open daily. Summer season hours (Memorial Day to Labor Day), 8:00 a.m. to 7:00 p.m. Entrance fee. Winter hours, 8:00 a.m. to 4:30 p.m. (Closed Thanksgiving, Christmas Day and New Year's Day.) For further information call (435) 789-2115.

PARK HEADQUARTERS

Provides orientation to the Monument's scenic canyon area (*No fossil bones.*) Information about boating opportunities available from River Office. Closed weekends and holidays in winter. No fee. For further information call (970) 374-3000.



Welcome to Dinosaur National Monument, one of 360 unique locations managed by the National Park Service which preserve the natural, scenic and cultural heritage of our nation. As the name

implies, Dinosaur is best known as one of the finest windows into the world of dinosaurs to be found anywhere on earth.

There is more to Dinosaur, however, than bones. This is a wonderful place for a family to vacation—uncrowded and unusually quiet. Trails, scenic drives and white water rafting are only some of the ways to explore the park's wild and rugged landscape. Discover prairie dogs, mule deer and bighorn sheep. Try deciphering 1,000 year-old Indian rock art or explore a settler's homestead. Admire the yellow, red and blue sprinkle of colors that wildflowers add to the arid valley in spring, and to the mountain heights in summer. Splashing rivers and gurgling creeks bring sustaining moisture to cottonwoods which in turn offer their cooling shade to the traveler.

The park staff is here to help you. Please feel free to ask questions and seek their advice about how to get the most from your visit. I hope you will find Dinosaur to be a place of wonder and enchantment.

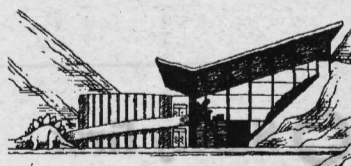
Dennis Ditmanson
Superintendent

Comments/Suggestions

We would like to know if you enjoyed your visit to Dinosaur. What can the National Park Service do to make your next visit more enjoyable? Please send your comments or suggestions to: Superintendent, Dinosaur National Monument, 4545 E. Highway 40, Dinosaur, Colorado, 81610, or call (970) 374-3000.

Quick ideas about what to do while you're here:

Just have an hour or two?



• Don't miss the world-famous **Dinosaur Quarry**.

• Enjoy the **Tour of the Tilted Rocks Scenic Drive**, hike the Desert Voices Nature Trail, and picnic under the cool trees at the Josie Morris cabin historic site. (See pgs. 3 and 16 for more info.)

Here for all day?

• Take the **Harpers Corner Scenic Drive**, and hike to the grand overlooks at the end of **Harpers Corner Trail** (See pgs. 3 and 16 for more information.)

• Drive out to **Jones Hole** for a hike along a clear, rushing stream to fantastic prehistoric rock art. (See pgs. 3 and 14.)



Overnight or longer?



• Sleep out under the stars in a cottonwood grove at the **Green River Campground**. (See page 3 for more information.)

• Inquire about availability of a **one-day, commercial river trip** through spectacular Split Mountain. (See page 4.)

Regulations

It is the visitor's responsibility to be familiar with park regulations.

Because this national park and its resources belong to everyone, **we ask that people not collect or disturb any animal, plant, rock, fossil, or any other natural, historical, or archeological feature.**

• **VEHICLES** of all kinds, including 4-wheel drives, motorcycles, and bicycles, must stay on designated roads. Some older dirt roads have been closed to let plants grow back. All motor vehicles and their drivers must be properly licensed.

• **CAMP** only in designated sites and do no digging or leveling. Keep all vehicle wheels on the pavement or gravel when provided. There is a maximum of eight people per campsite.

• **FIRE** has a role in natural landscapes, but a campground is no place for a wildfire! Campfires may be built only in fire pits or grate boxes. They must be kept small and never be left unattended, even for a minute. Wood, dead or alive, may not be gathered.

• **BACKCOUNTRY CAMPING** requires a free permit. Contact a park ranger to obtain information.

• **PETS** and wildlife do not mix. Pets must be leashed (maximum length 6 feet) or otherwise restrained at all times. Pets are not allowed on trails or in the backcountry, and leashed pets are restricted to areas within 100 feet of developed roads. Pets should not be left tied to an object and unattended without shade and water.

• **HUNTING** is not allowed. Weapons of any kind (including BB and pellet guns, bows, and slingshots) must be completely unloaded and fully cased or broken down. Traps, explosives, fireworks and firecrackers are also prohibited.

• **WATER** is a precious resource in this desert area. Use of soap and disposal of wastewater in streams is prohibited.

• **WILDLIFE** must be treated with respect, and may not be molested, fed or disturbed, both for their protection and yours. Even small, "cute" animals may carry diseases.



ECHOES

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ASSOCIATION

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HIKING & CAMPING

"You can't see anything from your car. You've got to get out of the damn thing and walk!"—Edward Abbey

Hiking trails

(Distances given are round-trip)

1 - Desert Voices

A moderate 2-mile hike which begins at the Split Mountain boat ramp area. Sweeping views of colorful desert and thought-provoking interpretive signs highlight this trail. Some signs were done by and for kids.

2 - Hog & Box canyons

One mile and 1/4-mile-long respectively. Easy walks into narrow, shady canyons at the Josie Morris cabin historic site.

3 - Sound of Silence

A challenging 2-mile route which calls upon hikers to find their way by locating a series of landmarks. Introduction to the unique aspects of desert hiking.

4 - Cold Desert

An easy 1/4-mile trail which begins at park headquarters and explores the ecology of this high-altitude desert.

5 - Plug Hat Trail

Easy 1/4-mile walk. Views of Uinta Basin; introduction to piñon-juniper forest community.

6 - Harpers Corner

Spectacular views of deep river canyons await those who make this moderate 2-mile hike. A park highlight.

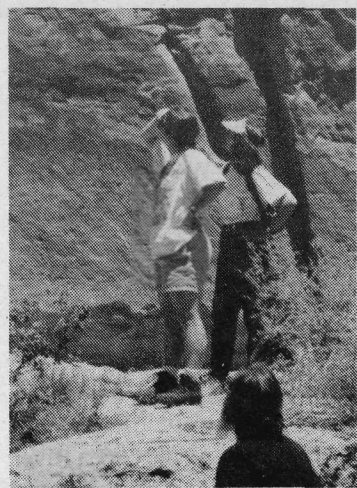
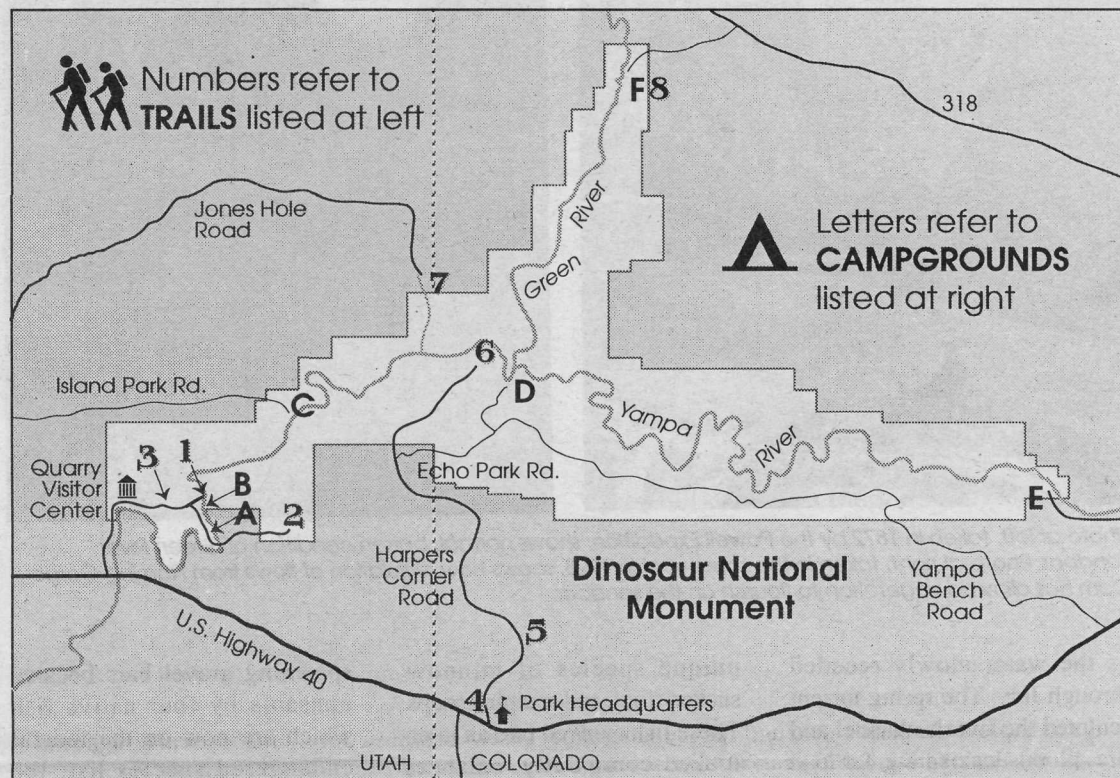
7 - Jones Hole

Moderate 8-mile trail begins at national fish hatchery. Path follows a clear rushing creek through soaring Jones Hole Canyon. Features trout fishing, Indian rock art, and backcountry camping.

8 - Gates of Lodore

An easy 1 1/2-mile hike leads to impressive viewpoint of the Green River as it enters the dark red Canyon of Lodore.

Hard to beat good advice like that. While you're at it you may as well pitch a tent and spend a night or two. You might be surprised at how many stars we've got around here. Happy trails and pleasant dreams...



Hiking safety & etiquette

This is a desert. **Carrying water is a good idea on any hike.** Natural water sources are scarce and may contain the parasite, *Giardia*. Before drinking water from any natural source boil it for 10 minutes or use a 1-micron filter.

Plant life and soils are fragile because of the dryness here. **Where trails exist, stay on them,** and do not cut across curves or switchbacks. When hiking, walk in single-file to minimize the effect of your footprints, and stay in wash bottoms, on slickrock or animal trails wherever possible.

Avoid walking on microbiotic soil—lumpy, dark-crusted areas that are actually gardens of tiny spore-bearing plants. One footstep may destroy a half-century or more of their growth.

Notes for campers

Backcountry campsites at Ely Creek in Jones Hole may be reserved at the Quarry or by phone, (435)789-2115. Backpackers may camp in areas that are at least 1/4 mile off any established road or trail. Further restrictions apply and a free permit is required. **Group campsites** at Split Mountain are by reservation only; call (435) 789- 8277. Application fee required.

Be careful with fire. Be sure it's out cold when you go to bed or leave your campsite. Firewood may not be collected in the Monument but may be purchased at Green River and Split Mountain campgrounds. Fire is a real danger in this dry land. Camp stoves are recommended to minimize fire danger and environmental damage. Dispose of all wastewater in toilets.



Campgrounds

A - Green River

Eighty-eight sites in cottonwood grove along Green River, 5 mi. east of Quarry. Facilities include modern restrooms, tables, fireplaces and drinking water. *Summer ranger talks, handicapped site.* \$12 per site, per night.*

B - Split Mountain

Four group campsites available by reservation only. \$10 reservation fee; \$25 per site, per night. Located 4 miles east of Quarry. Modern restrooms, tables, fireplaces and drinking water.*

C - Rainbow Park**

Two shaded sites near boat ramp on Green River. Vault toilets, tables and fireplaces. No water, no fee.

D - Echo Park**

Magnificent setting, accessible only by steep, rough dirt road. *Check on conditions before attempting.* Nine sites. Vault toilets, tables and drinking water. Charcoal fires only. \$6 per site, per night.*♦

E - Deerlodge Park

Eight sites among cottonwood grove on Yampa River. Vault toilets, tables and fireplaces. No water, no fee.♦

F - Gates of Lodore

Seventeen sites on Green River. Vault toilets, tables, fireplaces and drinking water. \$6 per site, per night.*♦

* Water turned off from fall through spring due to freezing temperatures. No fee when water turned off.

** Access via rough dirt roads, **not suitable for trailers, motorhomes, or other large vehicles. IMPASSABLE WHEN WET.** When dry, these roads can be driven by most vehicles.

♦ Trash not collected. You must carry out your own garbage.

RIVER ECOLOGY

New efforts are being made to restore the ecosystem of the mighty Green River.

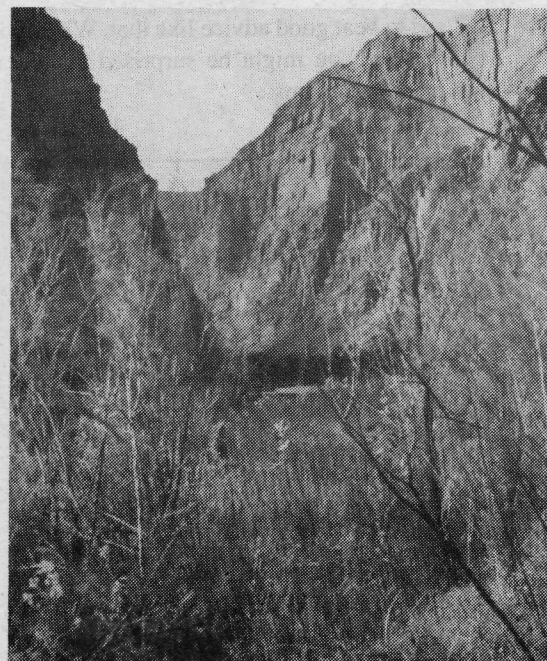
By David Whitman
Chief of Interpretation

Over four million years ago, the Green River was a chisel sculpting rock into the beautiful, deep, shear-wall canyons. The river nourished and punished a green ribbon of life along its banks. It was a highway for nutrients, pollen, seeds, fish, birds, American Indians, trappers, and government explorers and dam surveyors. It's changed now, in subtle ways.

The Green River was once a many-faceted, watery jewel. Its winter face was diminutive, cold and clear, turning white when it was cold enough to freeze the top two or three feet of the river to solid ice. In March its face began to change as the river rose, swollen with snowmelt from the Wind River Range in Wyoming. The river's flooding rage peaked in early June and calmed itself



Photo at left, taken in 1872 by the Powell Expedition, shows normal, barren condition of Green River sandbar. Photo at right, taken in the same spot in 1993, shows how regulation of flows from Flaming Gorge Dam has allowed vegetation to flourish on the sandbar.



as the water slowly receded through July. The spring torrent sculpted the river's channel and life. Floods carried a great load of sand and silt down the river, thickening rapids to muddy soup. Cobble bars, sandbars, and riverbanks were stripped of the previous year's sprouts of new vegetation. By mid-summer, rage was replaced by low, sluggish, warm water that slid by the canyons rocks.

The many moods of the Green River created challenges to the life dependent upon it. Over millions of years this challenging environment gave rise to fish found nowhere else in the world. The river was home to 13

unique species of minnow, sucker, trout, and sculpin groups. These fish evolved into an interlocked community, balanced

spawning gravel bars became unusable by four native fish which are now on the federal endangered species list: the

Over millions of years
this challenging environment gave rise to fish
found nowhere else in the world.

delicately amongst themselves, and attuned to the personality of the river.

Enter dams—big ones—Hoover Dam in 1935, Glen Canyon Dam in 1963, and Flaming Gorge Dam in 1964. When these massive concrete plugs were built only a few lonely voices anticipated that there might be serious environmental consequences downstream on the Green and Colorado rivers.

When Flaming Gorge Dam was completed it created a host of ecological changes in the river and riparian communities. The controlled releases of water from the dam did not match the pre-dam spring flows, and the river banks were no longer seasonally scoured of vegetation. Fish no longer received natural signals to migrate up the Green, and the

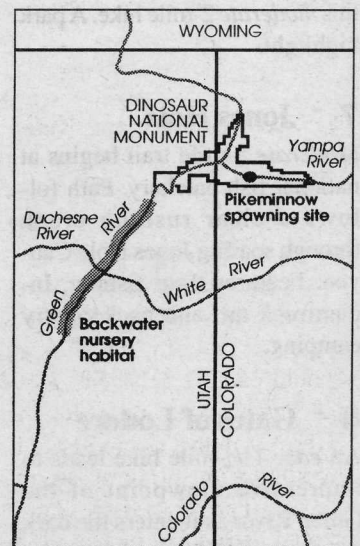
Colorado pikeminnow, humpback chub, bonytail chub, and razorback sucker.

A particularly damaging biological result of depleted spring flows on the Green River is its effect on migration and spawning of the Colorado pikeminnow. Radio telemetry studies show that each year individual pikeminnows migrate up to 150 miles to the same cobble bar to spawn. There, the eggs develop in the gravel, and later the baby fish ride the current downstream. Baby pikeminnows are guided by instinct to seek out flooded areas called backwaters where they can escape predators and feed on plankton. These microscopic organisms are far more abundant in flooded backwaters than in the main river channel.

The dam's elimination of seasonal floods allowed vegetation to become established on riverbanks and sandbars that were previously kept barren. Over time this increase in vegetation has narrowed the river channel. Some of these new plants are exotic, non-native species. Tamarisk is one such invader. It grows in dense communities that crowd out native vegetation such as cottonwood tree seedlings. Cottonwood regeneration now no longer occurs on the Green River between the dam and its confluence with the Yampa. The eventual loss of these trees will deny food, perches, nesting cavities, and dens for scores of wildlife that live along the river.

The endangered fish research completed in the 1980s has pointed biologists toward several strategies that will assist the recovery of native fish and revive the Green River and its ecosystem. Foremost of these is to maintain the natural flow characteristics of the Yampa River—in other words, not to dam it. To do so would eliminate the fragmented endangered native fish spawning habitat which remains, and doom these four ancient species to extinction. Another priority is to monitor the Yampa River and quantify changes in water quality, such as pH level

See *Green River*, page 5

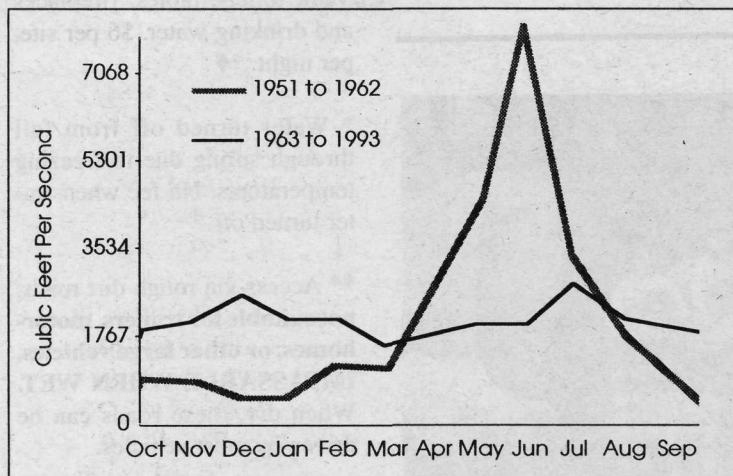


Dinosaur helps to protect river environments which maintain critical spawning habitat for endangered fish.

DINOSAUR:

A special place

✓ The Green River has played a significant historical role in the settling of the West, as well as in the nation's conservation movement.



Annual hydrograph of the Green River comparing average pre- and post-regulation daily mean discharges.

ON THE RIVER

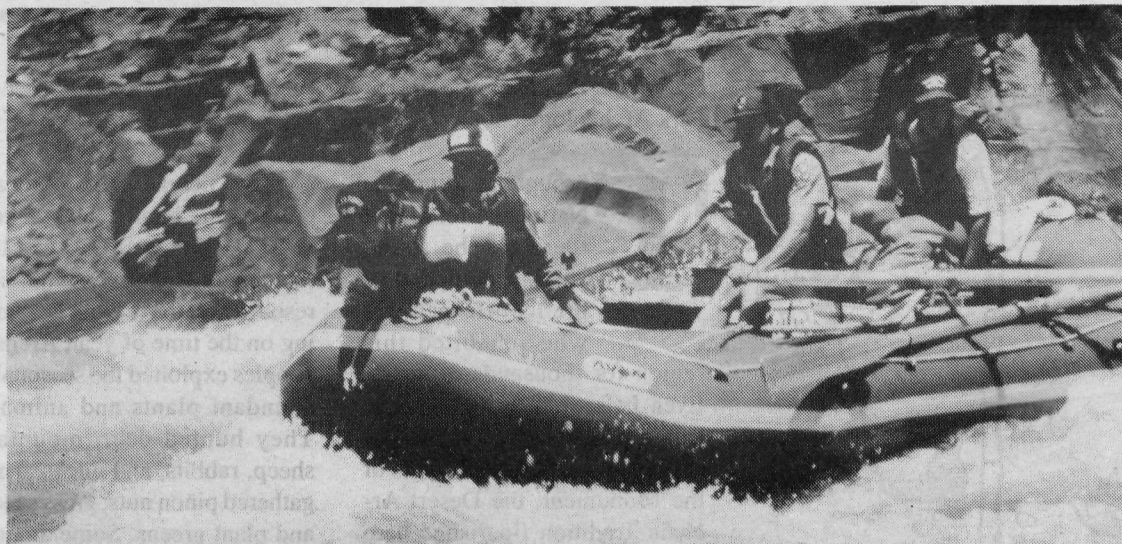
The rivers of this dry landscape offer an irresistible opportunity for boating; one of Dinosaur's most popular recreational activities.

Much of Dinosaur National Monument is a desert, but the best way to see it is by boat. This paradox is due to the Green and Yampa rivers. There are several places where you can drive or hike to see these canyons, but floating through them is the most intimate way to experience their beauty and solitude.

The Green and Yampa are white water rivers; floating them requires proper equipment and skill. Thus, for safety as well as for preservation of the canyons' wilderness qualities, a permit is required for all boating on the rivers in the Monument.

One alternative is to join a guided trip offered by one of the several river running companies authorized to provide this service. River trips in Dinosaur range from several hours to several days, depending on the portion of the river being floated.

It would be hard to find any other two canyons as close together but as different in scenery as Lodore and the Yampa.



Dinosaur's famed Canyon of Lodore features legendary rapids such as Hells Half Mile.

The walls of Lodore are dark-red, rising in giant stairsteps from the river, whereas the Yampa slices through light-colored sandstone that forms sheer, sometimes overhanging cliffs. On some stretches the river is as quiet as a lake but at Warm Springs Rapid and several others it gives boaters a wild ride.

Split Mountain Gorge, just nine river miles between Rainbow Park and the Split Mountain takeout ramp, is the shortest of Dinosaur's canyons, and makes

a popular day-trip. The Green flows briskly through Split Mountain, and several rapids provide roller coaster-like rides.

If you are interested in doing it yourself you can apply for a permit by calling the River Ranger office at (970) 374-2468. For a guided river trip, contact any of several privately operated concessioners. A brochure listing these businesses is available at any ranger facility.

DINOSAUR:

A special place

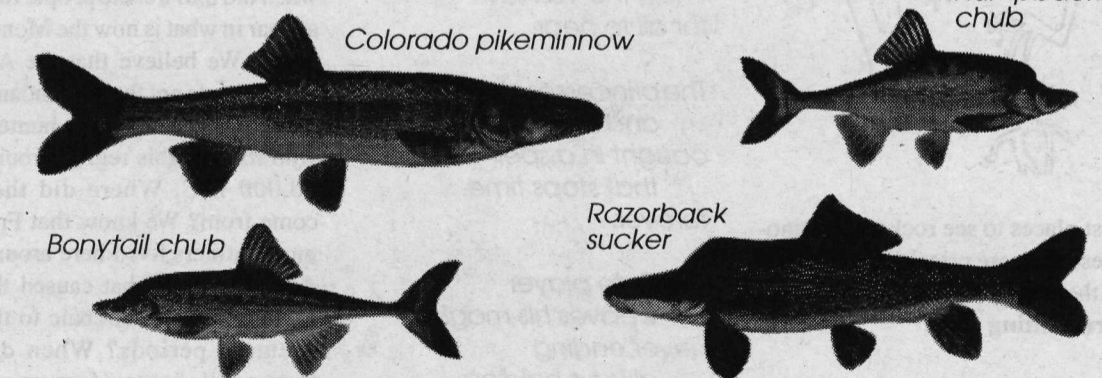
✓ **The Yampa River is the last free-flowing river in the Colorado River System.** Its natural flows help sustain several species of endangered fish.

Green River

Continued from page 4

and toxins, that can adversely affect native fish.

The US Fish and Wildlife Service is currently finalizing a document which will recommend a new strategy for releases from Flaming Gorge. To help revive the Green River's ecosystem and endangered fish populations, they propose that releases from Flaming Gorge should parallel the runoff from the Yampa, a naturally flowing river. When the Yampa River is flooding with spring runoff, releases from Flaming Gorge should be quickly increased, in incremental stages, until the Yampa runoff peaks. After the Yampa peaks, releases from Flaming Gorge should gradually be reduced. Thus the fluctuation



Dinosaur's endangered fish. The distinctive crest behind the heads of some of these may have functioned like a "keel" to help the fish maintain position during heavy spring flows.

of the seasonal water flow in the Green will mimic the natural flow in the Yampa.

Time will tell if these measures will allow Dinosaur's endangered fish to achieve a comeback. There are many environmental factors, only some of

which are directly related to Flaming Gorge Dam. It may be that in the future, water releases from the dam can be increased so that periodic floods are generated to scour riverbanks and sandbars and transport sediment. Major releases—even for a short duration—can perhaps help us fight exotic plants

along the river, create plant-free silt beds for cottonwood tree seeds, and restore sandbars and fish spawning cobble bars. Someday, Flaming Gorge Dam may play a major role in reviving the Green River.

Fishing regulations

On the Utah side...

- Each person 14 years of age and older must have a Utah fishing license to fish any waters on the Utah side of Dinosaur National Monument.

- Juveniles, age 6 through 13, may fish without a license when with an adult and take 1/2 the adult limit.

- Only artificial flies and lures may be used in Jones Hole Creek; bait is prohibited. The daily limit for Jones Hole is two trout of which no more than one may be a brown trout greater than 15 inches.

On the Colorado side...

- Each person 16 years of age and older must have a Colorado fishing license to fish any waters on the Colorado side of Dinosaur National Monument.

- Juveniles under 16 years may fish without a license when with an adult and take 1/2 the adult limit.

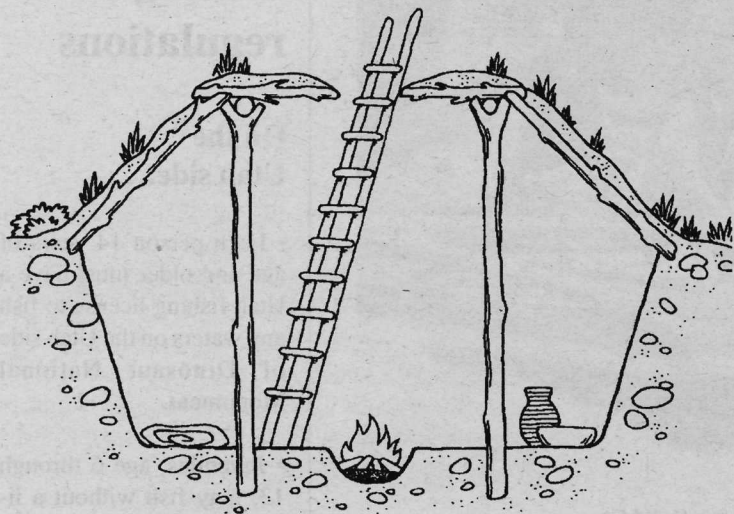
ENDANGERED FISH



Several endangered fish species are present in the Green and Yampa rivers. The angler is responsible for recognizing these fish and returning them unharmed to the water. See article at left.

NATIVE AMERICANS

Understanding Dinosaur's prehistoric peoples is an ongoing search.



Cut-away diagram of generalized Fremont Indian pit house.

By Wayne Prokopetz
Park Archeologist

Throughout Dinosaur National Monument there can be found stirring evidence of prehistoric peoples who inhabited this region for thousands of years. Even before the early farmers, called the Fremont People, occupied the canyons and rivers of the Monument, the Desert Archaic Tradition flourished here for at least 6,000 years.

The people of the Archaic period were hunters and gatherers. They practiced a way of life that made full use of the rich resources of the region. Depending on the time of year, Archaic peoples exploited the seasonally abundant plants and animals. They hunted deer, mountain sheep, rabbits, and ducks. They gathered piñon nuts, grass seeds, and plant greens. Some archaeologists believe these people grew the earliest corn in the West. We see evidence of their passage in the tools they left behind. Archaic hunters left atlatl dart points, nets and throwing sticks, while gatherers left behind baskets and grinding stones. The Archaic people did not make pottery, but were expert basket makers. Some baskets were even waterproof.

as the use of particular arrow points or pottery making procedures or the appearance of corn agriculture. We estimate a pattern in a region when sites of similar age provide similar results. For example, we observe a partial pattern in the way Archaic peoples used their environment. We know that they frequently moved their camps. In doing so they must have met other groups, exchanging ideas and traded goods. Many of these materials were assimilated into the archaeological record at a site. We can learn from this record through the careful study of stone tools, animal bones, and plants excavated from Archaic sites.

In the summer of 1998, Dinosaur National Monument began study of a large Archaic and Fremont site near Split Mountain. The site location and remains suggest that this was a winter camp. Several hearths have been excavated in order to collect Carbon-14 samples which allow us to date the site. The hearths have also provided plant remains.

Hopefully, this on-going excavation and analysis will provide answers to some of the many intriguing questions we have about Dinosaur's early cultures.

Understanding the Desert Archaic period can help to explain much of Dinosaur's past. Archaeologists know of many sites dating to the Archaic period at Dinosaur. Still, few sites are fully known as none are excavated. One question we have is when did the Archaic people first appear in what is now the Monument? We believe that the Archaic people are the descendants of the earliest big game hunters who roamed this region around 10,000 B.C. Where did they come from? We know that Fremont farmers lived here around A.D. 950, but what caused the change from the Archaic to the Fremont periods? When did these people become farmers and potters? When was pottery introduced, and where did it come from?

Archaeologists have more questions than answers about the Archaic past at Dinosaur. One way we answer these questions is to identify patterns in the remains excavated from archaeological sites. By excavating, archaeologists can date the appearance of a new technology, such

Where to see prehistoric rock art in the Monument

Evidence of this area's early human inhabitants can be found etched and painted on sandstone walls throughout Dinosaur National Monument. Most of the "rock art" found here is in the form of **petroglyphs**, designs carved into the rock. More rare, perhaps because these are more easily weathered, are **pictographs**, created by applying pigment to the rock surface.

Fremont creating petroglyph.



Listed below are some of the best places to see rock art in Dinosaur—but please do so with care. These sites are priceless and fragile links to ancient peoples. Please treat them with respect. **Never touch the artworks themselves or the surrounding rock.**

- **Cub Creek**—The most accessible rock art sites are scattered along Cub Creek Road within a few miles of the Quarry Visitor Center. (See Cub Creek Road/Tour of the Tilted Rocks, page 16.)
- **McKee Spring**—At this location near Island Park are some of the finest petroglyph panels in Dinosaur. Look for large, human-like figures and geometric designs on the sandstone cliffs.
- **Jones Hole**—Hiking the Jones Hole Trail will take you to some fine, rare examples of Fremont pictographs.
- **Echo Park**—The distinctive Pool Creek petroglyphs can be seen right along the Echo Park Road, between the old Chew Ranch and Echo Park itself. These faint, pecked patterns are particularly unique.

Music of the petroglyphs

By park visitor Sandra England

*For a thousand years
the flute player
has played
his lovely, eerie tune
for the three princesses
and the carloads
of tourists.*

*Set high
on a mountain wall
carved deep
in the varnish
for all to hear.*

*The princesses stand
and listen
caught in a spell
that stops time
forever.*

*The flute player
weaves his magic
never ending
always holding
them captive.*

*The melancholy sounds
of the flute
echo off the
mountain walls.*

*The three princesses
held in purgatory.*

*They never
dance.*

DINOSAUR:

A special place

✓ **The archeological resources** of the park represent one of the most complete records of human occupation and development in North America known anywhere.

PALEONTOLOGY

A new excavation of Cretaceous Period sauropods requires some heavy lifting by a pair of helicopters.

By Ann Elder
Museum Specialist
(Paleontologist)

Though Dinosaur National Monument is famous world-wide for the fossil discoveries made here many years ago, we are continuing to make significant finds. An excavation site known as "DNM 16" is one which has only recently yielded important results.

This layer of rock in the Cedar Mountain Formation was deposited approximately 110 million years ago during the Cretaceous Period. (The majority of the park's discoveries, by contrast, have been made in the much older Morrison Formation of the earlier Jurassic Period.) By the end of the summer of 1998, the paleontology staff, with the help of many hard working volunteers, had several blocks of bone and rock ready to be transported from the site to the paleontology lab at the Quarry Visitor Center. The blocks weighed from 50 to nearly 2000 pounds, and contained the bones of dinosaurs rarely known from that time period. Only a few bones of these particular sauropod dinosaurs had ever been found in North America. One block even contained a sauropod skull, a rare find indeed. Though the blocks were within sight of the Quarry, rough terrain made transporting them difficult. It was time to call in a helicopter.

On public lands in the western United States, particularly those managed by the U.S. Forest Service and the Bureau of Land Management, helicopters are commonly used in managing wildland fires. Special units, called Helitack crews, train specifically to be able to safely use helicopters in various aspects of fire fighting. So when the paleontology staff has heavy loads to haul, they seek help from the Dinosaur National Monument Fire Program and their inter-government agency partners.



A helicopter delivers another block of dinosaur bones to a drop-zone behind the Quarry Visitor Center.

An available Helitack crew from the nearby Ashley National Forest was quickly located. The crew and their aircraft were brought to the site and a strategy for removing the fossil blocks was mapped out. The dangers of

protective plaster and burlap covering them. Then the slow process of "preparation" can begin wherein the rock around the bones is carefully and patiently removed, freeing the bones inside and allowing them to be properly studied.

▼
*Can dinosaurs fly?
You bet!*

such an effort are significant since a block of these heavy but fragile fossils, dropped during a flight, would surely shatter and break. The Helitack crew took their responsibility very seriously as was evident by the look on one of the pilot's faces when told that his load was indeed priceless. The crew first made sure the blocks were carefully netted and slung, and then a series of flights were made between the site and the Quarry. A Bell 407 lifted six of the smaller blocks, leaving the largest block to the heavier-capacity Kamax ship. Can dinosaurs fly? You bet!

With the blocks safely delivered to the paleontology lab, it was time to start removing the

The paleontology staff will be returning to DNM 16 in the summer of 1999. The jumble of bones remaining in the rock appears to continue downward, suggesting that many more blocks still need to be removed. Firefighters may once again be called on to help our dinosaurs take flight. ☛

DINOSAUR:

A special place

✓ **The Dinosaur Quarry is an internationally significant fossil site** representing an important window into the world of Jurassic dinosaurs.

Morrison Project peels back the layers of a lost world

By Dan Chure, Park Paleontologist

Buried in the rocks of the Morrison Formation of Dinosaur National Monument are the remnants of a long lost world. This ecosystem was populated by brontosaurus, the largest land animals that ever lived, fierce meat-eaters, and bizarre armored dinosaurs.

Rediscovering and understanding this lost ecosystem is a major focus of Dinosaur National Monument's current paleontological studies. Since 1990, the Morrison Ecosystem Project (MEP), a multi-disciplinary, multi-institutional, international study of the Morrison Ecosystem, has attempted to answer some basic questions.

Q: How widespread is the Morrison Formation?

A: The Morrison was deposited across 1,000,000 km² in the Intermountain West. Morrison outcrops occur in Oklahoma, New Mexico, Arizona, Utah, Colorado, Wyoming, South Dakota, and Montana.

Q: How old is the Morrison Formation?

A: This has been the subject of considerable debate. The MEP has produced over 100 new radiometric dates, including dates from recently discovered volcanic ashes near the base of the formation. As a result, we now know that the Morrison took about 7 million years to accumulate, from 148 to 155 million years ago.

Q: What kind of plants did the dinosaurs eat?

A: One of the great problems for paleontologists has been to figure out what plants the giant brontosaurus dinosaurs ate. Unfortunately, plant fossils are extremely rare in the Morrison Formation and only about 30 plant species had previously been found.

By breaking down rock to chemically extract any fossil pollen and spores, paleontologists have now identified over 250 species of Morrison plants, an eightfold increase! Analysis shows that all sites are dominated by the spores of one group of plants—ferns. This abundance and diversity has shown that it was the lowly ferns, and not towering trees, that fed the dinosaurian behemoths.

Q: What kinds of animals lived with the dinosaurs?

A: The MEP discovered a wide range of dinosaur contemporaries, such as clams, snails, algae, ostracods, crayfish, insects, salamanders, frogs, lizards, turtles, crocodiles, and mammals. A number of the species discovered were totally new to science.

Q: What was the climate like during Morrison times?

A: Because of continental drift, the intermountain west was then about 650 km (400 mi) further south. Studies suggest the Earth was appreciably warmer than today and the MEP reveals that the atmospheric carbon dioxide concentration was higher than it is now. Much of the Morrison was in a rain shadow and the climate was semi-arid to arid. Water may have been seasonally abundant but was generally scarce.

Q: Where can I find out more about the Morrison Ecosystem Project?

A: Refer to symposium volume: Carpenter, Chure, and Kirkland. (editors) 1998. The Upper Jurassic Morrison Formation: An Interdisciplinary Study. *Modern Geology* (Special Issue) Part I volume 22 (nos. 1-4): 553 pp., Part II volume 23 (nos. 1-4): 537 pp., or see web site at <http://gopher.coloradostate.edu/~cwis70/morrison.html>. ☛

Publications available by mail order from Dinosaur Nature Association

Prices stated are subject to change without notice. When ordering, please include catalog number listed to left of price. Books are paperback unless otherwise noted. Call toll-free, 1(800)845-DINO, to place your order or to receive a complete catalog.

DINOSAUR National Monument

OF GENERAL INTEREST

Dinosaur: The Story Behind the Scenery Hagood & West, K.C. Publications, 1990. Full-color introduction to the Monument, both the Quarry and the canyon country. 48 pages. N11940.....\$7.95

Echo Park: Struggle for Preservation. Cosco, Johnson Books, 1995. The story of the controversy over, and eventual defeat of, efforts to build a dam within Dinosaur. 144 pages. N10831.....\$7.95

DINOSAURS & PALEONTOLOGY

Dinosaur: The Dinosaur National Monument Quarry. West & Chure, DNA, 1989. Origin, discovery, development, and dinosaurs of the Quarry; illustrated with photos and original art. 40 pages. N10458.....\$5.95

Dinosaurs and Dinosaur National Monument: A Resource Packet for Students and Teachers. West, DNA, Revised 1998. A compendium of information, activity sheets, and class project ideas. 60 pages. N10658.....\$4.95

Dinosaur Mountain: Graveyard of the Past. Arnold, Clarion Books, 1988. History of the discoveries at the Dinosaur National Monument Quarry. Ages 7-12. Hardback, 48 pages. N10508.....\$15.95

MAPS

Dinosaur National Monument Topographic Map. USGS. Scale 1:62,500.
• Standard edition, 1973. N6210.....\$4.00
• Shaded relief, 1966. N6200.....\$4.00

Dinosaur National Monument Trails Illustrated Map. Scale 1:78,125. Ponderosa Publishing, 1989. Waterproof, tearproof topographic map with hiking routes, river miles, camps, and natural history information. N6130.....\$8.99



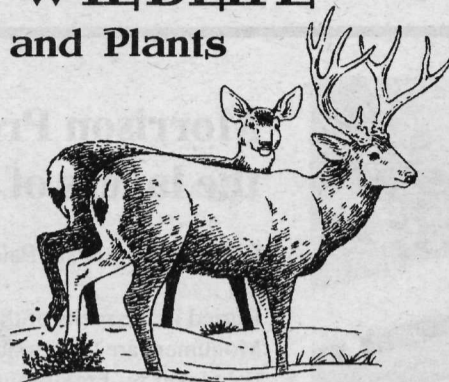
RIVER GUIDES

Dinosaur's Restless Rivers and Craggy Canyon Walls. Hansen, Dinosaur Nature Association, 1996. Explore the canyons of the Green and Yampa with the region's top geologic expert. Waterproof, 104 pages. (Includes free *River Journal* for recording your river trip experiences.) N10734.....\$23.95

Dinosaur River Guide. Evans & Belknap, Westwater, 1993. Strip maps of the Green and Yampa rivers, showing rapids, points of interest, river lore. Waterproof, 64 pgs. N10528.....\$16.95

Desolation River Guide. Evans & Belknap, Westwater, 1974. Companion volume to *Dinosaur River Guide* continuing down the Green River. Waterproof, 56 pages. N10393.....\$16.95

WILDLIFE and Plants

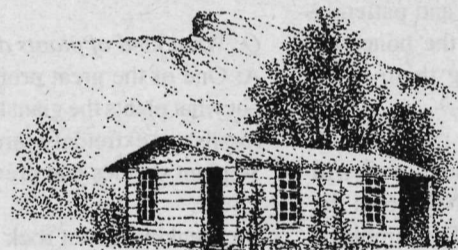


The Birder's Handbook: A Field Guide to the Natural History of North American Birds. Ehrlich, Dobkin, and Wheye, Simon & Schuster, 1988. A portable library of fascinating information on 646 species, not found in your identification guide. N10194.....\$17.00

Colorado Wildlife Viewing Guide. Gray, Falcon Press, 1992. Handbook to 110 of Colorado's premier wildlife viewing locations. 128 pages. C10314.....\$9.95

Sagebrush Country: A Wildflower Sanctuary. Taylor, Mountain Press, 1992. Full-color guide to the wildflowers, grasses and forbs of the sagebrush steppe. 212 pages. C11808.....\$14.00

A Natural History of Western Trees. Peattie, Houghton Mifflin, 1981. Thorough guide to native species with essays on natural and social history. 752 pages. C11472.....\$18.95



AREA HISTORY and Archaeology

Canyon Country Prehistoric Indians. Barnes & Pendleton, Wasatch Publishers, 1979. Profiles of the Anasazi and Fremont peoples. 255 pages. N10243.....\$9.50

The Dominguez-Escalante Journal. Warner, Univ. of Utah Press, 1995. Chronicle of the remarkable 1776 Spanish Crown expedition through Colorado, Utah, Arizona and New Mexico. 154 pages. C10788.....\$12.95

Utes: The Mountain People. Pettit/Johnson Books, 1994. History and culture of the Ute people. 178 pages. N12204.....\$11.95

The Bassett Women. McClure, Ohio University Press, 1985. The story of Josie Bassett Morris, who lived at Cub Creek for half a century, and others in her family. N10143.....\$9.95

Legacy on Stone: Rock Art of the Colorado Plateau and Four Corners Region. Cole, Johnson Books, 1990. Describes rock art and cultures of prehistoric and modern people of the canyon country. 280 pages. N11322.....\$15.95

GEOLOGY General/Regional

Geologic History of Utah. Hintze, Brigham Young University, 1988. Scholarly and comprehensive introduction to Utah's spectacular geology. 202 pages. N11023.....\$15.00

Fossil Butte National Monument: Along the Shores of Time. Ambrose, Dinosaur Nature Association, 1998. A look at the unique ecosystem preserved at Fossil Butte, and a history of its discovery and excavations. 28 pages. N10970.....\$4.95

Visual Dictionary of the Earth. Dorling Kindersley, 1993. Colorfully illustrated guide to the Earth and its processes from the inside out. Hardback, 64 pages. C12220.....\$16.95

The Magic School Bus Inside the Earth. Cole, Scholastic, 1987. Humorous presentation of Earth science for youngsters, as taught by Ms. Frizzle. 40 pages. N11402.....\$4.99

Roadside Geology series. Mountain Press. Each book describes geologic features seen from selected highways in that state.

• **Roadside Geology of Colorado**
Chronic, 1980. 334 pages. N11753.....\$15.00

• **Roadside Geology of Utah**
Chronic, 1990. 326 pages. N11758.....\$15.00

RIVERS

The Exploration of the Colorado River and Its Canyons. Powell, Dover Publications, 1961. John Wesley Powell's historic 1869 descent of the Green and Colorado rivers. 400 pages. N10888.....\$8.95

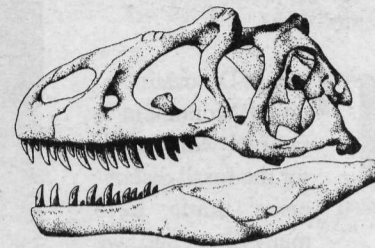
Whitewater Rescue Manual. Walbridge & Sundmacher, Ragged Mountain Press, 1995. Detailed compilation of whitewater rescue techniques for canoeists, kayakers and rafters. 198 pages. N12266.....\$16.95

Riverman: The Story of Bus Hatch. Webb, Labyrinth, 1989. A collection of stories surrounding the life of the famed boatman. 158 pages. N11743.....\$7.95

Cadillac Desert: The American West and its Disappearing Water. Reisner, Penguin, Revised 1993. Classic exposé of the history, politics, and intrigue behind the damming of rivers and irrigation of the West. 582 pgs. N10228.....\$15.95



DINOSAURS and Paleontology



The Ultimate Dinosaur Book. Lambert, Dorling Kindersley, 1993. General reference to all known dinosaurs. Hardback, 192 pgs. N12074.....\$29.95

Dinosaur Worlds. Lessem, Boyds Mills Press, 1996. Discover the latest findings about new and familiar dinosaurs. Hardback, 192 pages. N10565.....\$19.95

The Great Dinosaur Hunters and Their Discoveries. Colbert, Dover Publications, 1984. Describes the scientists who have revealed the prehistoric world for us. 283 pgs. N11117.....\$9.95

Prehistoric Journey. Johnson and Stucky, Denver Museum of Natural History, 1995. Introduction to the History of life on Earth. 144 pages. N11637.....\$19.95

The Complete Dinosaur. Farlow & Brett-Surman, Indiana Univ. Press, 1997. The very latest on dinosaurs from their morphology to biogeography as presented by 47 experts in the field. Hardback, 752 pages. N10568.....\$42.50

Magic School Bus in the Time of the Dinosaurs. Cole, Scholastic Inc., 1994. Ms. Frizzle takes her class back in time to learn about dinosaurs. 48 pages. N11397.....\$4.99

Creatures of Long Ago: Dinosaurs. Sibbick, National Geographic Society, 1980. Excellently illustrated "pop-up" book for kids. Hardback, 12 pages. N10355.....\$16.00

VIDEOS

Dinosaur: Fossils and Paleontology in Dinosaur National Monument. DNA, 1989. Discovery, history, and dinosaurs of the Quarry, and a behind-the-scenes look at recent paleontological work in the Monument. VHS, 27 minutes. N0200.....\$19.95

Fossil Lake: Paleontology and Preparation at Fossil Butte National Monument. DNA, 1991. Expert paleontologists explain the origin and study of the beautifully preserved fossil fish. VHS, 17 minutes. N0230.....\$14.95

Jurassic Utah. Bosworth Comm., 1994. A tour of Utah's rich and varied deposits of Jurassic-era dinosaur fossils. VHS, 58 minutes. N0236.....\$19.95

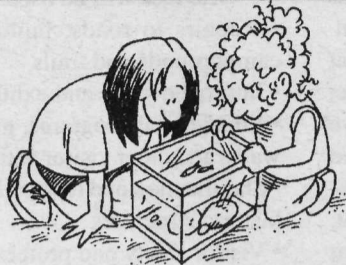
Dinosaurs! PBS, 1992. Acclaimed 4-tape set gives a fresh perspective on the "Terrible Lizards." VHS, 240 min. N0210.....\$59.95

Blue Planet. Smithsonian Institution. Original IMAX film is a stunning look at the Earth from space. VHS, 42 minutes. N0170.....\$24.95

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Available only from Dinosaur Nature Association

About the Dinosaur Nature Association

The Dinosaur Nature Association (DNA) operates the bookstores at the Quarry Visitor Center and park headquarters, and also at Fossil Butte National Monument in Wyoming. DNA is a non-profit organization whose purpose is to provide educational and interpretive materials for park visitors. A portion of profits from all sales are donated to the National Park Service in Dinosaur and Fossil Butte.

These funds help to purchase items as large as the cast skeletons of *Allosaurus* and *Camarasaurus* for the Quarry exhibits, and as small as a roll of film or a videotape for documenting resource management projects. The artwork for the Quarry exhibits, many roadside and trailside displays, numerous free informational materials, and this newspaper have also been purchased or produced through donations from DNA.

DNA Membership

There are six levels of membership available in the Dinosaur Nature Association:

- Basic \$25
- Sustaining \$100
- Patron \$500
- Contributing \$50
- Sponsor \$250
- Benefactor \$1000

All members receive a copy of the Dinosaur National Monument newspaper, as well as the spring and fall DNA newsletters and catalogs. Those at the Contributing level and above will also receive the twice-yearly *Plateau Journal*, an award-winning magazine which highlights the natural history of the Colorado Plateau. Membership is good for one year and entitles the holder to a 15% discount on purchases in DNA's bookstores. The primary benefit of DNA membership is the knowledge that your support directly helps preserve our natural heritage. Call or use the form below to become a DNA member.

POSTERS

Echo Park, Dinosaur National Monument. Gnass, Impact, Dinosaur Nature Assoc. Aerial photo of Steamboat Rock rising above the Green River in the heart of Echo Park. 18"x24" N2330.....\$4.95

Canyon of Lodore, Dinosaur National Monument. Telford, Dinosaur Nature Association, 1995. Photo of the Green River rolling through the brooding red Gates of Lodore. 18"x24" N2305.....\$4.95

Colorado River Basin Poster. DNA, 1995. The Colorado River System is clearly illustrated along with the web of dams and diversions which control its waters. 20"x29" N2310.....\$7.95

Sacred Sites. DNA, 1996. Images of some of the spiritually inspiring Fremont Indian rock art found at Dinosaur National Monument. 18"x24" N2400.....\$4.95

Dinosaur Quarry mural posters. Dawson, DNA, 1990. Reproductions of the colorful murals in the Dinosaur Quarry. Four titles:

• **A Glimpse of the Past**
Portrays river floodplain landscape of the area in late Jurassic time, showing all the local dinosaurs. Two sheets make 12"x70" horizontal poster. N2120.....\$4.95

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Correlated History of the Earth. Pan Terra, 1994. Remarkable, comprehensive look at the history of the Earth, including geologic and biologic changes through time. 28"x38" Laminated. C2038.....\$19.95

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STATE OF THE PARK

An update on resource management issues

WHY FEES?



Quarry Visitor Center exhibits will be enhanced by the fee program.

Dinosaur National Monument, like other national parks and recreation areas, is being cared for today and preserved for future generations by the American people. This dual objective—use and preservation—comes at a price. Protecting our natural and cultural heritage while ensuring that everyone visiting these areas has a safe, enjoyable and educational experience costs money.

Even as the number of visitors continues to climb, government funding available for necessities such as road and building repairs, campground maintenance, visitor protection, and other services has not kept pace with demand. In 1996, to address these needs, Congress directed the U.S. Department of the Interior to implement the Recreation

Fee Demonstration Program in three of its agencies—the National Park Service, the Bureau of Land Management, and the U.S. Fish and Wildlife Service.

▼

The Recreation Fee Demonstration Program helps spread out the costs of managing public lands among those who use them.

The program will help spread some of the costs for managing these lands among those who use them.

Managing our public lands is a major financial investment. While most of that investment comes from the general tax base, those who use these areas derive a greater benefit from—and place a greater burden on—resources than the public at large. These new fees redistribute that burden so that users pay an increased share of the costs.

The Recreation Fee Demonstration Program will:

- Allow a significant portion of the fees collected at a public area to be spent directly on that area.
- Allow each agency to develop fair and equitable fee collection programs.
- Allow each agency to collect fees efficiently and to determine the activities to be covered by fees.

The fees will be used for:

- Repairs to roads, buildings, campgrounds and trails
- Improved signs and exhibits
- Educational programs, guided walks and other visitor activities
- Stabilization and restoration of historic structures
- Visitor safety and protection

Specific projects to be undertaken at Dinosaur National Monument include:

- Rehabilitation of the Josie Morris Historic Cabin
- Casting of our new, juvenile Allosaurus skeleton for display at the Quarry Visitor Center
- New roadside interpretive signs
- A new Headquarters Visitor Center slide program
- A phased rehabilitation of facilities at Green River and Split Mountain campgrounds

FIRE MANAGEMENT

Overgrazing in the 1920s and 30s, accompanied by fire suppression, has bequeathed an explosive legacy to the rangelands of the West. Accumulated shrubbery, plant debris, and fallen trees have created conditions ripe for wildfires of an intensity unimaginable before the summer of 1988, which saw the scorching of Yellowstone National Park and much of the Rocky Mountains.

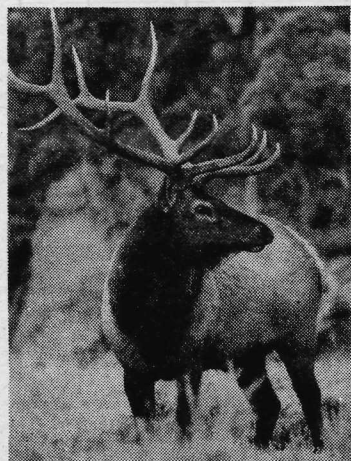
Overgrazing has suppressed fire-tolerant grasses and allowed fire-intolerant sagebrush and juniper to proliferate. Species of plants which depend on fire for soil enrichment and reproduction no longer thrive. Birds and other animals which rely on such plants for shelter and food are faced with diminishing habitat.

Decades of scientific research have shown resource

managers that fire is a necessary process in plant and animal communities. Within Dinosaur National Monument, the Prescribed Fire Management Program includes preservation of naturally functioning ecological processes—including fire. Wildfires which threaten human life, property or historical or cultural sites, are immediately suppressed, but carefully monitored prescribed fires are used to meet

specific objectives such as hazardous fuel reduction, eradication of noxious, non-native plants, rejuvenation of overgrazed landscapes, and restoration of species diversity.

LAW ENFORCEMENT



Bull elk: Target of poachers.

Eight men indicted on federal poaching charges within Dinosaur National Monument have received prison time, fines, and life-time revocation of hunting privileges. The illegal hunts were uncovered by federal game wardens posing as guides in a two year-long undercover sting called "Operation Dinosaur."

As reported in the *Vernal Express*, federal agents infiltrated the outfitting and guide service of Michael McGlone, 45, of Steamboat Springs, Colorado.

Agents first posed as clients and were eventually hired by McGlone. The agents spent months observing illegal hunts where McGlone would lead

▼

Undercover agents spent months observing illegal hunts.

wealthy clients inside the Colorado portion of the Monument. Among those arrested were Robert Clark, a

plastic surgeon from Wichita, Kansas, and Curtis Thurman, a wealthy Dallas businessman.

Dinosaur National Monument Superintendent Dennis Ditmanson said park rangers first became suspicious after observing mysterious car lights in the middle of the night, and later coming upon elk carcasses.

McGlone was sentenced to a year and one day in prison, three years of supervised release, and assessed a \$10,000 fine. Clark was sentenced to four months

home detention, fined \$10,000, and ordered to make a \$10,000 contribution to Colorado's anti-poaching fund. He was additionally barred from hunting in eight western states that participate in the Wildlife Violators Compact. Thurman was sentenced to six months probation, fined \$5,000, and ordered to pay \$17,500 to the anti-poaching fund and another \$17,000 to the National Park Service. He also lost his privileges to hunt in the Compact states for five years.

STATE OF THE PARK

An update on resource management issues

LAND EXCHANGE

On January 8, 1999, Dinosaur National Monument was given title to 2,745 acres within the monument boundary by the State of Utah. This is the result of an historic agreement between Secretary of the Interior Bruce Babbitt and the Governor of Utah, Michael Leavitt.

These former Utah State School Sections will no longer be available for development of minerals, gas, oil, and other resources. Livestock will still graze some of these state school sections under pre-existing permits issued by the state. The Na-

tional Park Service will honor those permits until they expire. At that time the park will manage those former state lands in

▼
This is a win-win agreement for Utah and the federal government.

ways that benefit plant and animal life and fossil and cultural sites. This benefits our efforts to preserve the natural systems of

the park for future generations. This is a win-win agreement for Utah and the federal government.

So how did state land end up in a national park in the first place? When Utah was first established as a state, the federal government allowed Utah to retain two sections in each township as state school sections. Fees generated from permits to graze livestock and develop other resources on these sections go into a fund to support the education of Utah children.

Later, when land in the new state was set aside to create national forests, parks, or other federal reserves, state school sections became encompassed within their boundaries. Sometimes Utah's management of these lands conflicted with that of federal agencies. To settle what had become a long-standing conflict, Secretary Babbitt and Governor Leavitt hammered out their agreement. In exchange for the state school sections in places like Dinosaur, the federal government gave to Utah title to other equitable federal lands within the state. ☛

KID'S PROGRAMS



Park ranger on visit with local schoolkids.

Dinosaur's efforts to help its youngest visitors understand the importance of the park received a boost last summer when it graduated its first class of Junior Rangers. The Junior Ranger program is aimed at kids ages 8 through 12, and challenges them to learn more about Dinosaur's dinosaurs, peoples, and unique ecosystems.

To receive their Junior Ranger commendation, and to be entered onto the roles of Official

Junior Rangers, students must first complete a workbook which is available at park visitor centers.

The new Junior Ranger Program is an outgrowth of Dinosaur's long-standing Environmental Education efforts. Each winter, park rangers (of the senior variety) bring this program to third, fourth, and fifth-grade classes in the six-county area surrounding the park. Using prehistoric fossils, archeological

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The new Junior Ranger Program is an outgrowth of Dinosaur's Environmental Education efforts.

artifacts, plant samples, and games, rangers teach kids that there is much to appreciate about the ecosystem they live in.

A further facet of these efforts is the summertime, in-the-park Young Naturalist Program. This program involves games and nature exploration to learn about the Dinosaur National Monument ecosystem,

For more information about any of these kid's programs ask a park ranger or visitor center bookstore sales clerk. ☛

LIVESTOCK



Cattle on winter range.

The community of animals at Dinosaur includes one species which may surprise you—domestic cattle. It can seem strange to find livestock grazing in a national park. After all, isn't the intent of such places to preserve natural systems? For visitors with this question a little background may help.

As native peoples, bison, and wolves were displaced from this part of the Colorado Plateau, a new type of range activity began. The first cattle were driven into the region in the early 1850s.

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When the park boundaries were expanded in 1938, grazing rights had been in existence for almost 70 years.

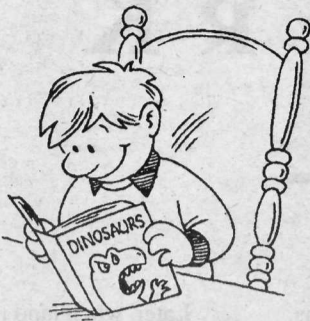
Soon, small ranches were established and the cattle industry in the Uintah Basin had taken hold. The high desert would never be the same.

When Dinosaur National Monument was expanded in 1938 from some 80 acres to over 200,000, grazing rights had existed on the now-park lands for almost 70 years. Not until 1960 did Congress pass legislation providing for the eventual termination of grazing within Dinosaur. Accordingly, about half the permit holders (involving 52,330 acres) ceased operations in 1985. Of those remaining, some allotments will persist through the lifetimes of the permittees and heirs who were dependent on those lands

As with some visitor actions, the impacts of too many cattle can be damaging. The Monument seeks to minimize overgrazing through a program of cooperative management with local ranchers and surrounding land management agencies. ☛

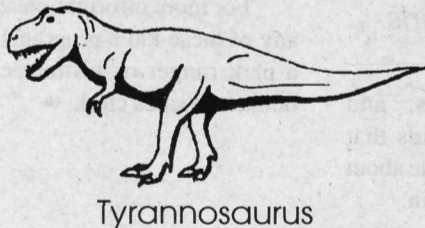
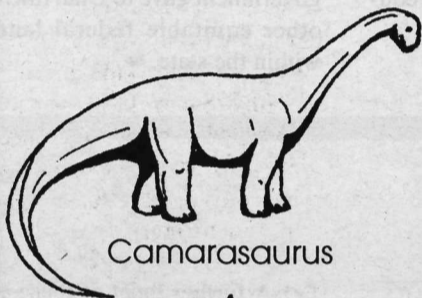
K I D ' S P A G E

Just for kids and no kiddin'!



How much do YOU know about dinosaurs?

Which of the dinosaurs shown below are found at Dinosaur National Monument? (Color or circle these) Which one **isn't** found here and **why**?



ANSWER: Tyrannosaurus rex is not found here though his "cousin" Allosaurus is. T-rex lived millions of years after the dinosaurs found in the Quarry.

DINOSAUR ECOSYSTEM DIVERSITY WORD SEARCH

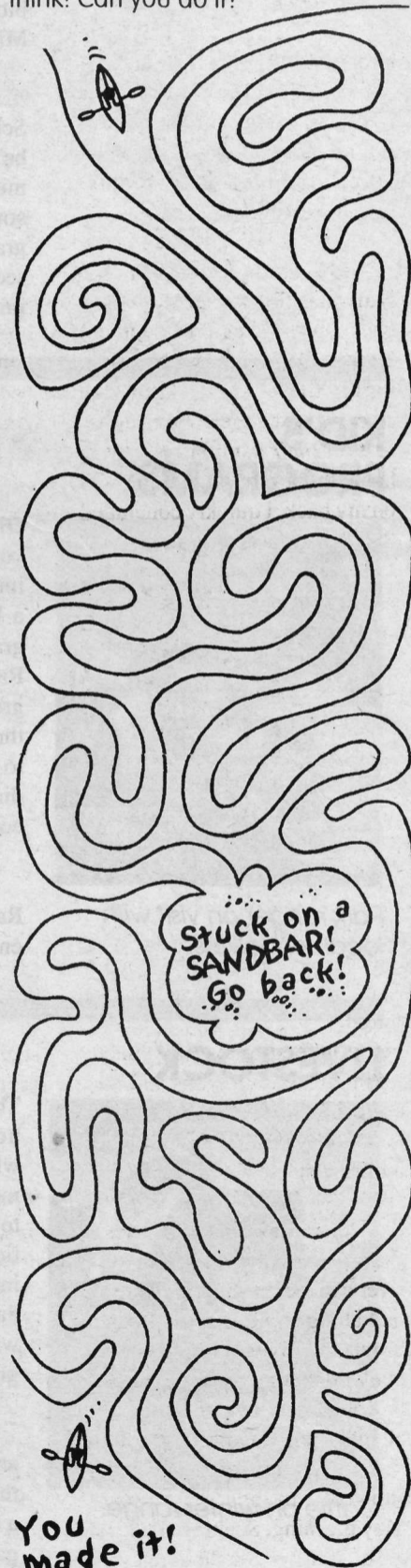
Biological diversity is important to a healthy ecosystem. See how many of the 31 plants and animals listed below which live in Dinosaur National Monument you can find in the word search puzzle. The more you can find the more healthy your ecosystem will be. Remember, all words go either ACROSS or DOWN. Check the box in front of each species you find.

- | | | |
|--|--------------------------------------|--------------------------------------|
| <input type="checkbox"/> CANADA GOOSE | <input type="checkbox"/> PRONGHORN | <input type="checkbox"/> ELK |
| <input type="checkbox"/> MORMON CRICKET | <input type="checkbox"/> BALD EAGLE | <input type="checkbox"/> COYOTE |
| <input type="checkbox"/> GOPHER SNAKE | <input type="checkbox"/> OSPREY | <input type="checkbox"/> JUNIPER |
| <input type="checkbox"/> BIGHORN SHEEP | <input type="checkbox"/> MAGPIE | <input type="checkbox"/> BEAVER |
| <input type="checkbox"/> SAGEBRUSH LIZARD | <input type="checkbox"/> SAGEBRUSH | <input type="checkbox"/> PRAIRIE DOG |
| <input type="checkbox"/> PEREGRINE FALCON | <input type="checkbox"/> BOXELDER | <input type="checkbox"/> PINYON PINE |
| <input type="checkbox"/> MOUNTAIN LION | <input type="checkbox"/> PINYON JAY | <input type="checkbox"/> RAVEN |
| <input type="checkbox"/> PARK ROCKCRESS | <input type="checkbox"/> DOUGLAS FIR | <input type="checkbox"/> BOBCAT |
| <input type="checkbox"/> RAZORBACK SUCKER | <input type="checkbox"/> CHOKECHERRY | <input type="checkbox"/> CANYON WREN |
| <input type="checkbox"/> DESERT COTTONTAIL | | <input type="checkbox"/> BADGER |
| <input type="checkbox"/> COLORADO PIKEMINNOW | | <input type="checkbox"/> MULE DEER |

O N P L P E R E G R I N E F A L C O N D
 C Y R E O U A J N G O P H E R S N A K E
 O B A D G E R U B I G H O R N S H E E P
 L C I Y B P I N Y O N J A Y M O D U S R
 O H R M A G P I E A L C O Y O T E O A A
 R O I N L E C P R O N G H O R N S A G Z
 A K E N D T B E A V E R H P M O E M E O
 D E D R E I P R B L L M E A O Y R O B R
 O C O L A I I B O B C A T R N K T U R B
 P H G E G Y N O X C S U D K C O C N U A
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 I R U E M Y I O R A R M Y C E N N L Z C
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 U C A N Y O N W R E N C M K Y B N K I Y

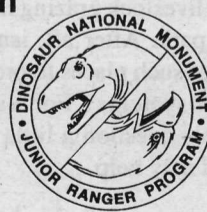
THE YAMPA RIVER IS WILD!

You are about to launch your kayak on the wild Yampa River—but finding where it eventually flows into the Green River may be harder than you think! Can you do it?



PREHISTORIC PEOPLE
 KNOWN AS THE FREMONT DREW PICTURES ON ROCK OF THINGS THAT WERE IMPORTANT TO THEM. THINK OF SOMETHING IMPORTANT TO YOU AND DRAW IT HERE.

Want to learn **MORE** about dinosaurs and other cool stuff? Find out if you've got what it takes to become an official **JUNIOR RANGER!** Ask how at any park visitor center.





Pat Grediagan

River Ranger

Continued from page 1

substituted a raft for hiking boots. The experience has added a dose of reality to that appealing memory: I now know it involves far more than simply hiking (or rowing) and camping.

I began my career with the National Park Service as a backcountry ranger in southern Utah's Canyonlands National Park. After I got to know the river rangers there, and noted that all *their* camping gear was hauled in a raft while mine was on my back, I quickly concluded that being a river ranger was more enticing than being a backcountry ranger. So I switched.

I have now been a river ranger in Canyonlands, Big Bend National Park in Texas, and, currently, here at Dinosaur. What a life! Waking to the wail of a peregrine falcon, and watching the evening light on the canyon walls; canoeing the shallow, rocky Rio Grande in low water, and rafting the Colorado in high (almost terrifying) water; stopping to contact river parties and being invited to stay for lunch; hiking up side canyons and discovering archeological sites, and, always, camping out under a billion stars.

There have also been less-than-great moments. On one river trip the mosquitoes were so bad along shore that we floated down the river as long as we could, delaying the bloodthirsty fate we knew awaited us. The elements are a part of my job in this outdoor life: Wiping the snow off my boat on a dreary May morning. Seeking shade on a July afternoon because my

brain was beginning to bubble from the heat. Contacting river parties who resented having a park ranger in their camp. Going for nine days without a real bath during a cold fall trip. And always—loading the boat and tying everything in just to unload it several hours later. Load. Unload. Load. Unload.

I glory in the sunsets—and dodge the mosquitoes—to protect both the visitor and the resource. During each high-use season I contact a lot of boaters, both private parties and those on commercial river trips. I want to know if they are having any problems, or if there's anything I should know about. We trade information—I let them know the conditions of rapids and campsites ahead, they tell me what they have seen and their impressions of the canyon. While I'm prepared to respond to emergencies (I have law enforcement, firefighting, search and rescue, and emergency medical skills.), I am seldom asked for assistance or required to intercede. River people tend to be law-abiding and self-sufficient.

In addition to maintaining an awareness of the visitor's activities along the river, river rangers continually update their knowledge of the river and its canyon corridor. We memorize rapids at different water flows, note the location of bighorn sheep, check the condition of archeological sites, and keep track of the marmot population at Jones Hole. We document unusual sightings, and assist researchers in their studies of the river environment. Activities and conditions along the river are reported back to management, to those less-fortunate souls who spend the majority of their time in the office.

And I should know. As often happens in this business I have recently given up my low-pay outdoor rangership for a higher grade position with better pay and professional possibilities. Still, as I find myself in the office more and more, I cling to that memory from 30 years ago. I drag my hiking feet toward the new challenges which await me. I am intrigued with the possibilities ahead but I also know I'm leaving the best job I'll ever have behind. 🐾



Visitors learn that the Quarry's fossil deposit extends far beyond the confines of the Visitor Center.

Diversity

Continued from page 1

Within Dinosaur's vast boundaries, there are 330 square miles of spectacular natural beauty with distinct biological communities. These communities are home to plants that provide food, shelter and shade to an array of wildlife—in the air, on the land, underground, and in Dinosaur's streams and rivers. Each community is in carefully evolved natural balance, yet each interacts with adjoining communities to create a diverse ecosystem for even greater numbers of species. Just like you, Bald Eagles, Sandhill Cranes, and countless species of songbirds, come and stay for varying periods, enjoying the resources of the

park, before moving on to another environment.

Colorful geologic formations display a billion-year-old record: evidence of tumultuous changes in the earth's crust. These changes set the stage for a succession of life forms which developed, flourished and ultimately gave way to those that exist today. Fossilized plant and animal remains provide compelling evidence of these vanished environments.

Dinosaur National Monument is most famous, of course, for its fossil-bearing rocks called the Morrison Formation. From these gray and green layers of sandstone have come the world's richest deposits of Jurassic Age fossils. Dinosaurs great and small, tiny mammals and amphibians, and rare preserved samples of plant life tell the story of an extinct ecosystem which thrived in this region 150 million years ago.

Early residents of the area, such as prehistoric Indians, explorers, fur-traders, and homesteaders, have left behind evidence of their own: ruins of their homes, artifacts from their lives, and accounts of their passage.

Some of these people looked for ways to provide for their needs, to find passages to distant places, to learn about what happened long ago, or to simply enjoy solitude and spiritual renewal. Visitors today share similar hopes and dreams with those who came before.

In the two park visitor centers you can see many exhibits and three-dimensional maps. Hiking trails feature provocative signs that will prompt you to ponder your surroundings as well as the impact of humans on the land. It's likely that you'll wish for personal contact with a ranger, and a chance to express your thoughts. The best way to realize this wish is by taking part in interpretive programs.

Throughout the day during the summer season, and on most evenings, rangers present talks and guided walks—some especially geared for kids. Presenters bring to each program their knowledgeable, personal perspective on favorite subjects from astronomy to zoology. Rangers can help you to learn what those "weird-looking bugs" are on Harpers Corner Road, or how paleontologists know where to look for dinosaur bones. Maybe you're wondering: "What will I see at the end of the trail at Harpers Corner?," or "What's so special about Jones Hole?"

One of the first things any visitor should do is to check the schedule of programs and try to visit some of these places with a ranger. Park staff members are eager to help you plan and enjoy your experience here; we want you to learn to love the diversity of Dinosaur as much as we do. 🐾

DINOSAUR:

A special place

✓ The geologic record at Dinosaur is the most complete of any national park and creates conditions necessary for a unique biological diversity.

JONES HOLE

This rare, canyon oasis is a showcase of many of the features that make Dinosaur such an unforgettable place.

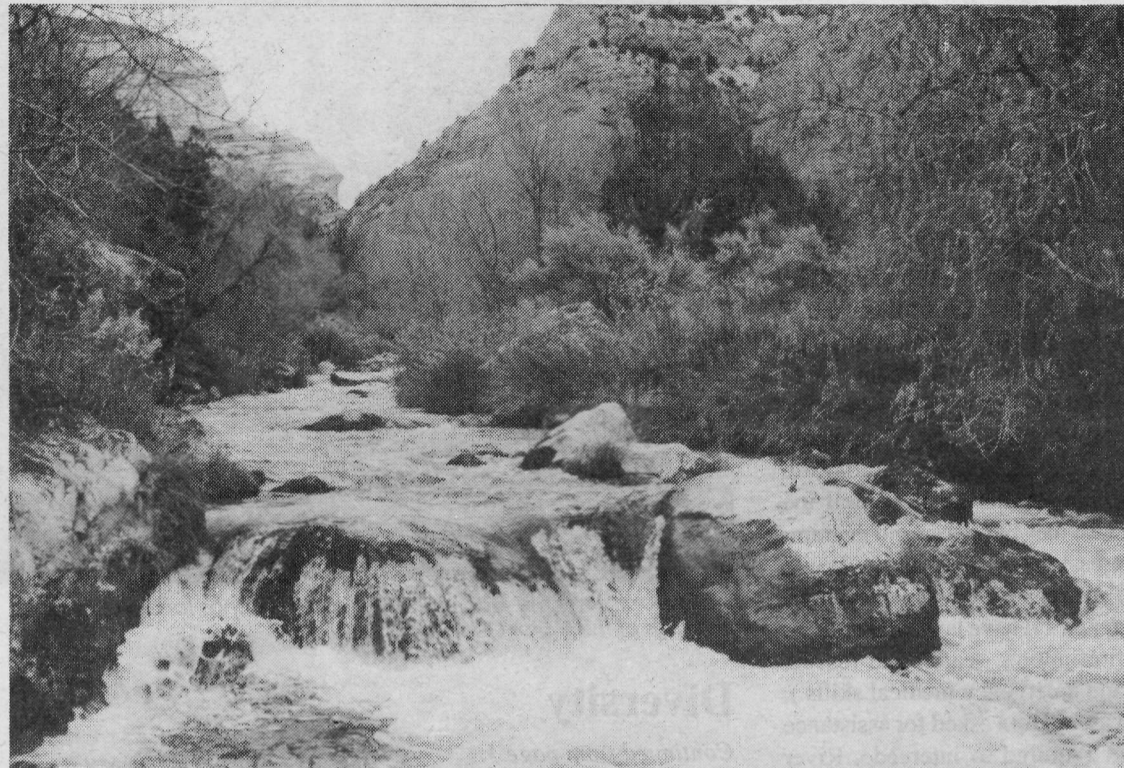
By Clint McKnight
Dinosaur Nature Association

Could a trip to Jones Hole be the highlight of your visit to Dinosaur National Monument? Consider this list of "attractions:" Soaring canyon walls; a clear, rushing stream; Indian rock art; bighorn sheep and mule deer; diverse ecosystems ranging from shady, riparian woods to warm, grassy benches; a national fish hatchery; and a four-mile trail which takes you through these and other wonders to the banks of the Green River.

Jones Hole—named for a local outlaw who found this a good place to "hole up"—is about a 1 hour drive from the Dinosaur Quarry Visitor Center.

You park at the Jones Hole National Fish Hatchery where trout are raised for transplanting in lakes and streams throughout the eastern Uinta Mountains. This facility is open to the public and warrants a restroom stop before embarking on the trail. Here you can also fill up your water bottles (the creek water is beautiful but unsafe for drinking.) Also, be sure to pick up a trail guide at the parking lot information kiosk.

After passing the outdoor raceways (where ravens sometimes stop to snatch a meal) the trail begins where Jones Creek emerges from its underground passage. The water is unexpectedly cold and clear, and provides this canyon with an oasis-like quality that cannot fail to be appreciated on a hot day.



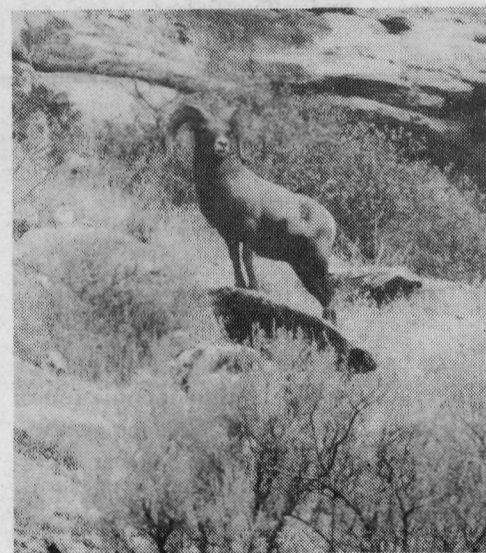
Jones Creek (left) accompanies the trail for much of its route through Jones Hole Canyon. Below, a bighorn ram strikes a regal pose.

Shortly, you will pass into Dinosaur National Monument. The trunks of the leafy grove you walk through here support an abundance of mosses; further evidence of the cooling effect of Jones Creek. Here and there along the route you will also cross raised "bench" areas—much warmer than the creek bottoms—where fragrant sagebrush, expanses of native bunch grasses, and even flowering cactus grow.

Above these benches rise towering cliffs of desert varnish-streaked Weber Sandstone; the blocky, maroon Morgan Formation; and rugged, grey limestone which tells of an ancient seabed, some 310 million years old, when even dinosaurs were yet to be a gleam in God's eye.

This is a wonderful place to walk quietly and be alert for wildlife and its signs. You may see coyote scat on the trail, or beaver-chewed tree trunks. Listen for the high, far call of birds such as the canyon wren. I have come as close to bighorn sheep here as anyplace in the Rocky Mountains. Once, simply standing on the trail, as two large rams butted heads not 10 yards away. Their crashing duel sounded like gunshots, but it is the lack of hunting in this wildlife sanctuary that encourages bighorn and other animals to allow such closeness by people.

Just after crossing the creek on a wooden footbridge you can see some fine examples of 1000-year old Fremont Indian rock art. Bighorn have apparently been common in the canyon for a long time, for there is a particularly nice painted image (called a pictograph) that appears to show a ram with a great set of horns. And is that a hunting dog at its heels? It's fun to wonder about the meanings of these ancient images. *Please do your important part in the preservation of fragile rock art by not touching the rock art or the areas around them.*



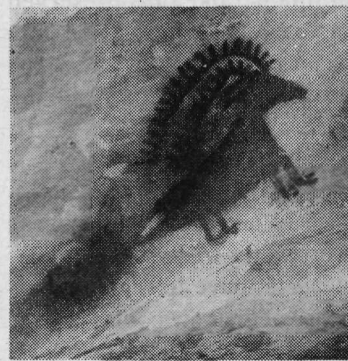
Photos by Clint McKnight

At about the halfway point to the Green River you will come to a small, backcountry campsite (a permit is required.) Here you can take a short detour to tiny Ely Creek Falls; just follow the turn-off to Island Park.

Depending on your time and stamina, this may also be a good place to begin your return trip, which would make for a hike of about 3.6 miles. Or, you may choose to continue down the trail another 2.2 miles to where the fabled Green River rolls through the tail-end of what explorer John Wesley Powell named Whirlpool Canyon.

Either way, the sounds of the small cataracts of Jones Creek will guide your route, and will remain with you, along with many other memories of Jones Hole. ■

Fremont Indian rock art has survived in this canyon for 1000 years.



FIELD NOTES

Keeping track of beavers and invasive plants is part of the management challenge in this protected—yet vulnerable—park.



Photo by David Whitman

Combating invasive species begins with taking inventory of both native and exotic plants which are present in the park.

DINOSAUR:

A special place

✓ The park protects a unique, biologically diverse natural ecosystem at the confluence of three distinct physiographic regions.

By Tamara Naumann
Park Botanist

Mobility is a sign of our modern lifestyle. As human populations travel about, however, movement of other species around the globe has accelerated dramatically. Humans carry plants, animals, and diseases across barriers that formerly inhibited such movements—barriers such as mountain ranges, oceans, and deserts.

Our increased mobility has created an unintended and potentially devastating environmental problem. A few aggressive plant and animal species have moved, with our help, out of their own environments and now threaten to overwhelm native plant and animal communities in their new habitats. These newcomers have often originated in similar habitats in Eurasia or the Mediterranean, but arrive here without the natural enemies that keep them in check in their native homes.

Such aggressive, or “weedy” species can cause great disruptions in our natural areas, altering ecosystem processes and displacing or eliminating native species.

Economic losses resulting from weed invasions in agricultural systems amount to many millions of dollars every year. Losses to some of our most treasured natural areas—our national parks—are more difficult to quantify or even to recognize. Here in Dinosaur National Monument the unique flora and fauna associated with the Yampa and Green river corridors are threatened by invasion of salt cedar (also called tamarisk) and perennial pepperweed. These alien plants are crowding out the native cottonwoods, willows, grasses and wildflowers that supported a once-thriving community of birds, mammals, reptiles, and insects.

Salt cedar is capable of altering flow characteristics of the rivers in ways that hamper endangered fish management. Perennial pepperweed (also called

tall whitetop) has invaded streamside and floodplain areas along with salt cedar. Agricultural areas and wildlife refuges outside Dinosaur are especially affected.

Riparian areas are not the only habitats compromised by noxious weed invasions. Russian knapweed has invaded a large area near the Josie Morris cabin; important wetland habitat has been adversely affected, and a rare orchid—the Ute ladies’-tresses—is vulnerable to this pernicious and aggressive weed.

As we study the ecology of weed invasions, we become more aware of the interwoven relationships among all living things. And as we begin to understand the risks to the species and ecosystems our national parks were set aside to protect, we are faced with realization that we are not so very far removed from this threat to habitats upon which we all depend for our food, fiber, recreation, and aesthetic nourishment. We must act soon if we hope to avert real environmental tragedy. ☛

Tracking the beaver: A tale of two rivers

(Editor’s Note: The following report is taken from the field journal of biologist Stewart Breck who is participating in a study of beaver in Dinosaur National Monument.)

• **5 June 1998, 8:00 PM, Deerlodge Park.** Before me lies a scene of peace and tranquility, energy and freedom. I have the Yampa River at early evening with the setting sun to illuminate the colors, and an unusual calm in the air. I look upstream and am greeted by the dark luminescent river boiling from the high water. She is in flood stage. Her message this evening is renewal as her waters scour the banks and bring the nutrients and sediment so critical to the cottonwoods.

The Yampa is free-flowing, free to flood, free to operate as she always has. How rare and wonderful with so many of our rivers dammed and diverted. Because the Yampa is unique, many are coming to study how it operates. Researchers are looking at the cottonwood trees, the sediment, the geology, the birds, and of course the beaver. People now realize that the dams we have built have a major impact downstream, the Green River being a prime example. Flaming Gorge Dam has stopped the floods and created a different ecosystem below it. The cottonwood trees, so important to this area, no longer regenerate. With the floods gone seeds no longer have suitable sites to germinate and

the few young trees that do attempt to grow get chewed down by beaver.

• **26 June 1998, 4:30 AM, Brown’s Park.** Radio-telemetry has proved to be an invaluable tool for following the nocturnal activities of the beaver. These all-night vigils are exhausting, but we now know a great deal about beaver territories, population, and feeding activities in each river. The preliminary conclusion: the Green River provides a more stable environment than the Yampa, and beaver populations have grown because of this.

• **7 December 1998, 10:00 PM, Deerlodge Park.** Found another radioed beaver dead yes-

terday. Mountain lion kill. That makes two killed on the Yampa and zero on the Green for this season. The story we are learning is fascinating! Who would of thought that the free-flowing nature of the Yampa would influence the ability of mountain lions to capture beaver. But it all makes sense. As the Yampa water level drops in late summer, huge sand bars, created during the high water, separate the cottonwood and willow from the river. Beaver on the Yampa have to travel over these expansive sand bars for 8 months of the year to get to their food. Easy pickings for a mountain lion. It’s a hard life for the beaver but it keeps them in check, keeps them from chewing down all the trees.

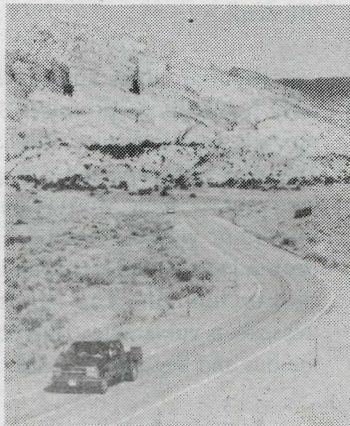
Contrast this to the Green River where flow regulation has created in-stream islands full of willow and easy foraging for beaver. They hardly have to work for their food and there seems to be very little threat by predators. The few young trees that attempt to grow along the Green now are mowed down in short order. All due to the regulated flow.

Tonight my wild river sleeps under a grey sky illuminated by a nearly full moon. The air is cold and it is only a matter of time till the Yampa completely freezes over. Its time to leave for the winter and already I look forward to returning next spring to continue in my quest to understand. ☛

SCENIC DRIVES

*Pack a lunch, pick a direction,
and lose yourself on your own "road less traveled."*

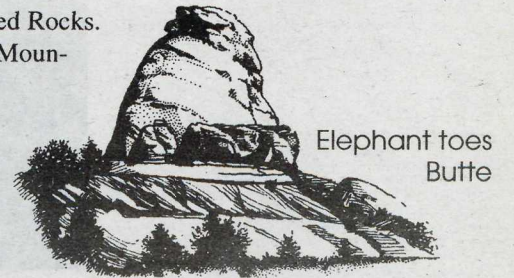
Wilderness in Dinosaur National Monument is not exclusive to backcountry hikers. Beauty and solitude await visitors traveling by foot, bicycle, raft or motor vehicle. Road conditions here vary. Main routes are paved, while some prominent park features are reachable only via dirt roads. Below are descriptions of some of the scenic drives you might enjoy during your visit.



CUB CREEK ROAD

Desert, dinosaurs, and more; discover what else the park has to offer along the Tour of the Tilted Rocks. This self-guiding auto tour begins near the Quarry Visitor Center and provides views of Split Mountain, the Green River, prehistoric Native American rock art, and a pioneer homestead site.

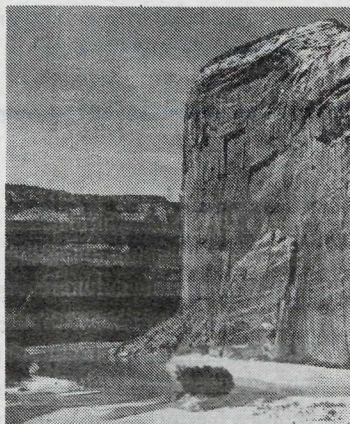
TIME: 1 to 3 hours. **DISTANCE:** 22 miles round-trip.
ROAD CONDITIONS: Last 2 miles unpaved, narrow, and dusty.
VEHICLE REQUIREMENTS: Suitable for all vehicles.
SIDE TRIPS: Desert Voices, Sound of Silence, and Hog Canyon nature trails.
HOT TIP: Pick up a *Tour of the Tilted Rocks* brochure to best enjoy this scenic drive.



HARPERS CORNER ROAD

From the Park Headquarters Visitor Center (where a guide for this scenic drive may be purchased), the road winds up and around Plug Hat Butte. Here there are picnic tables and a short nature trail. The road then climbs gradually over vast, open uplands toward the canyon rims where overlooks provide panoramic views of the gorges carved by the Green and Yampa rivers. *Note: This is open range; be alert for livestock on the road.* A side trip—hiking the 8-mile Ruple Point Trail—will reward you with spectacular views of Split Mountain.

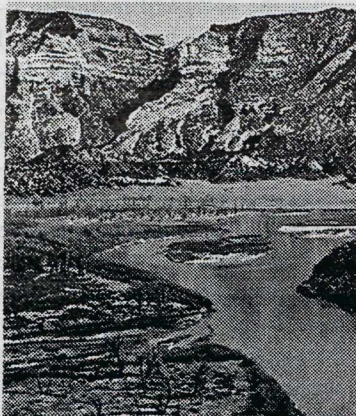
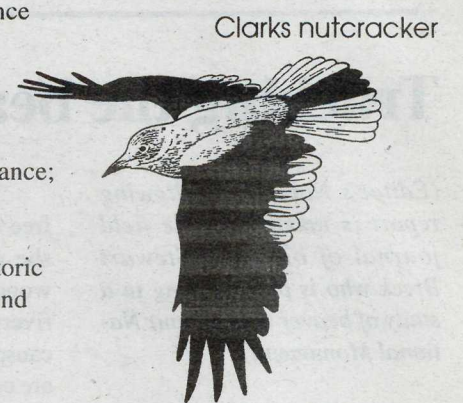
TIME: 2 to 4 hours. **DISTANCE:** 62 miles round-trip.
ROAD CONDITIONS: Paved road.
VEHICLE REQUIREMENTS: Suitable for all vehicles.
SIDE TRIPS: Echo Park Road, Plug Hat Nature Trail, Ruple Point Trail.
HOT TIP: For the most dramatic views, walk the Harpers Corner Trail (see page 3).



ECHO PARK ROAD

From Harpers Corner Scenic Drive, the Echo Park Road makes a dizzying plunge into the heart of the Monument. Unique geologic features, prehistoric rock art, and the dramatic setting for the confluence of the Green and Yampa rivers below Steamboat Rock await those who journey to Echo Park.

TIME: 2 hours from Harpers Corner Scenic Drive. **DISTANCE:** 26 miles round-trip.
ROAD CONDITIONS: Unpaved, steep, winding and narrow; *IMPASSABLE WHEN WET!*
VEHICLE REQUIREMENTS: Can be driven with caution in vehicles having good ground clearance; not suitable for trailers, motor-homes, or other large vehicles.
SIDE TRIPS: 6 to 8-mile round trip hike through Sand Canyon. Ask a ranger for details.
HOT TIPS: This drive will bring you to the historic Chew Ranch (on the National Register of Historic Places) and the refreshing cool air of Whispering Cave. The bulletin board at Echo Park Campground has local day-hike suggestions. Take water.



ISLAND PARK ROAD

Driving to Island and Rainbow parks reveals the quieter side of the Green River as it winds through open, colorful badlands. Don't miss historic Ruple Ranch at Island Park, and superb rock art at McKee Spring. You can reach the Island Park Road from the Quarry by exiting the Monument and following Brush Creek Road toward Vernal.

TIME: 2 hours. **DISTANCE:** 51 miles round-trip to Rainbow Park; add 11 miles for Island Park.
ROAD CONDITIONS: Unpaved, rough dirt and gravel road; *IMPASSABLE WHEN WET!*
VEHICLE REQUIREMENTS: OK for most passenger vehicles. Not for trailers or motor-homes.
SIDE TRIPS: Connects with road to Jones Hole; 33 miles of paved road to national fish hatchery and Jones Hole Trail (see page 3).
HOT TIP: This road leads to the launch site for one-day boat trips. Early morning and late afternoon drivers should be alert for vehicles with wide loads.