

FISHING Along The Lewis and Clark Trail

Not an expert on L & C
material provided by
Don Nell

Paul Schullery

Dave Miller

Marshall Bloom

Dr Raymond Burroughs

Natural History of
the L. & C Expedition

My history -

Family 1864 arrive
in Headwaters area

Farm & ranch - Shedd's
Bridge mgr

Tackle business

Angler's Retreat

Fishes identified by
L & C in the Missouri,
tributaries and headwaters

Lemhi Pass on to West
Coast - Blackfoot, Bitter
root, Clearwater
Snake, Columbia

Trout first mentioned
near Fort Benton

Great Falls - trout

Great Falls
R. m White Fish, Grayling
Native trout - W. slope
Cutthroat -

Sargent Guss used tackle

Arrive at headwaters
July 25 - 1805

Wildlife - fish seines - 1 one
hook on g. g

Great Falls - Missouri
to dams - excellent angling
Headwaters streams
See list

Environmental changes
bring other species to
headwaters. Ling, bull
heads, etc.

Fishing Ling Rock

Bruce Schendel

Non-native trout

Habitat - Beaver, Otter

Marshall Ashcraft
Derrick Otter
Restoration

Brown, Lock Laven
Water Quality and Salmon
flies

Wild Flowers + insect
Wild Roses

west of Divide

Columbia River System
variety of salmon
steelhead, cutthroat

L+C fished with crude
tackle.

Army 1860's a member
fly fished

Granney Yates Fished

Hatcheries 1992

Change 1960

Management - land and
water use

Restoration

Enhancement

L & C found headwaters
one of the most beautiful
areas they visited

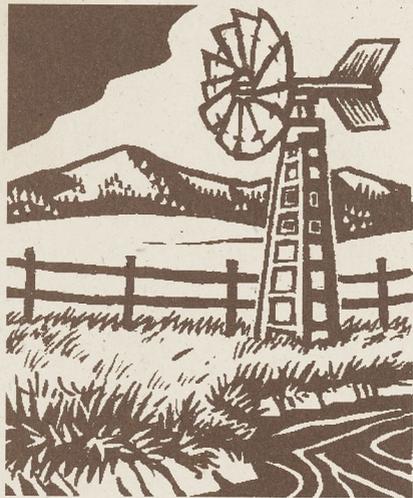
Primitive Park

200 yrs of impact
Good things are being
done. L & C will be pleased

Trout Fishing Along the Lewis
and Clark Trail 1805-1806

and Lily

THE
OLD
RIVER



FARM

Phila. May 18 1803

Mr. Isaac Wheelon

of Geo. Blanton

70. Large hook @ 30/pt \$2. 80

55 ~~medium~~ ~~hook~~ ~~at~~ ~~30/pt~~ 1. 60

1 doz. drum ~~series~~ _____ 4. 00

1 doz. Rock ditto _____ 2. 50

1/2 doz. India Series \$5. _____ 7. 50

1 India Series _____ 4. 90

2 Series - \$1 _____ 2. 00

Sportsman Hook _____ 1. 50

Suttons Bell _____ 3. 00



MuPA Ap 9.93
MuniVA Ap 10.34 +02
MuniAp 10.82 +02
valADB 36.88
WWincBx 8.04
-1.3 +42.2
-9 NA
CapADA p
Fall

Don Nell Paul Schullery
Dave Miller Marshall Bloom

I

Intro-

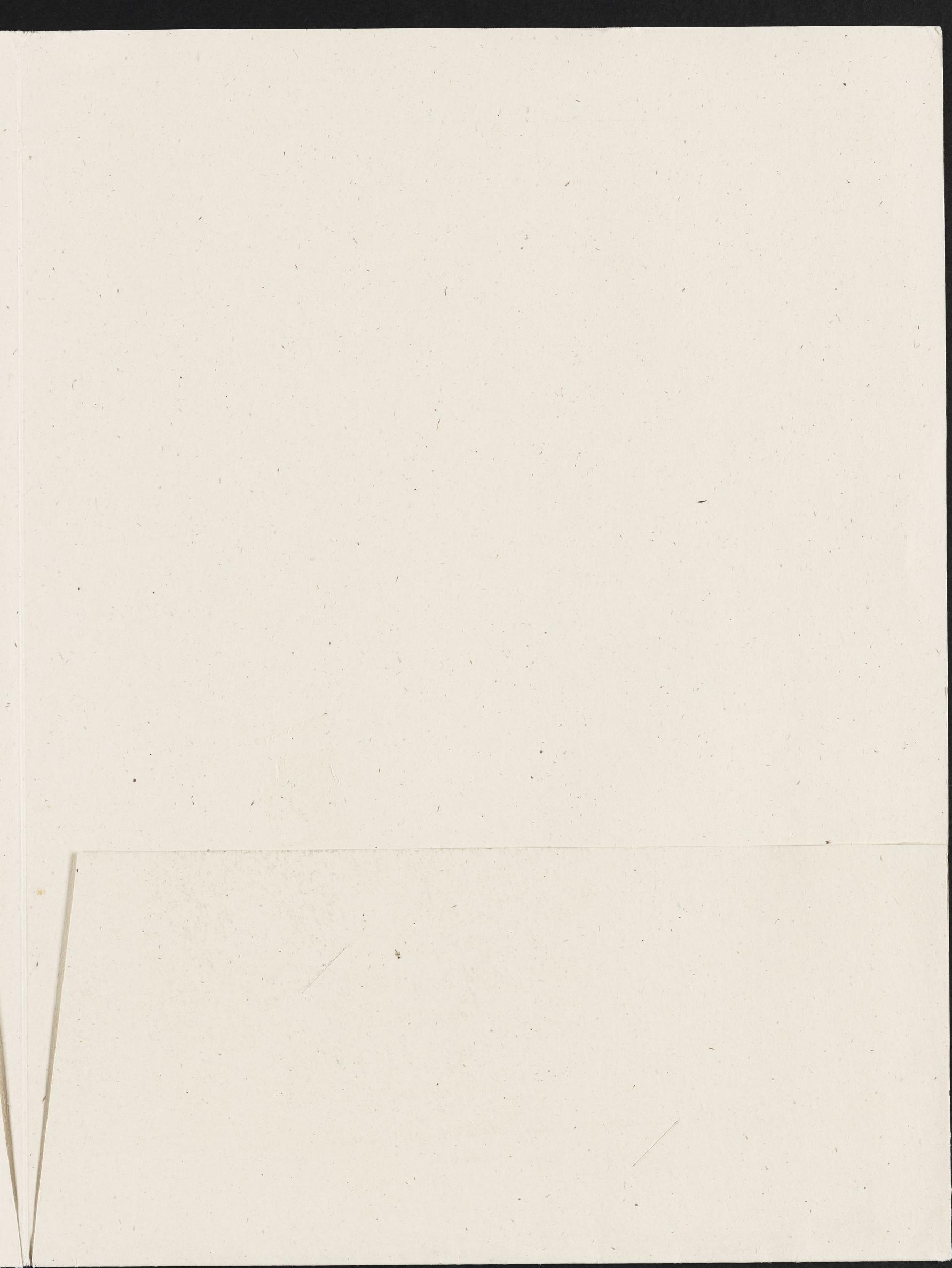
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Fishing Career
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Cutthroat trout mentioned
first near present Fort
Benton - all other are
warm water species

Above Great Falls L & C
wrote of the clear
streams and abundant
fish similar to Eastern
Brook trout. Also
identified Rocky Mt
white fish & Montana
Grayling

The West Slope of Yellowstone
Cutthroat the only native
trout. Brown Trout, Lake
Leven, Rainbow, Eastern
Brook Trout all introduced



Chica. May 18 1803

Mr. Isaac Wheelon

Geo. R. Linton

70 Large books @ 30/pt	\$2.80
55 medium books	1.65
1 doz. drum Series	4.00
1 doz. Book ditto	2.50
1/2 doz. India Series @ 5	7.50
1 India Series	4.20
2 Series - @ 1	2.00
Sportsman's Blank	1.50
Sustance Peel	3.00

\$25.15

Recd by Geo. R. Linton

Received the within article

Meriwether Lewis

Capt. U.S. Army

Geo. R. Linton

CSE HAS THE BEST SERVICE
YOUR CUSTOMER, THE

Laboratory of Persistent Viral Diseases

Rocky Mountain Laboratories, NIAID, NIH
903 South Fourth Street
Hamilton, MT 59840 USA
Telephone: 406-363-8400
FAX: 406-363-9286

Date: 4/22
From: Marshall Becker
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To: Bud Hilley

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Message:

586-8715

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UNDAUNTED ANGLERS:

Lewis and Clark - Montana's First Non-Resident Fishermen

By

Marshall E. Bloom, M.D.

TEXT BOX #1: "I amused myself in fishing, and sleeping away the fortigues of yesterday." Meriwether Lewis, relaxing on June 15, 1805 after having been pursued the previous day by a grizzly bear and 3 buffalo bulls near the mouth of the Medicine (Sun) River.

TEXT BOX #2: "We see a great abundance of fish in the stream some of which we take to be trout but they will not bit any bate we can offer them," Meriwether Lewis, July 29, 1805, on the Jefferson River between Three Forks and the mouth of the Philosophy River (Willow Creek).

Somehow they must have known that the fishing was going to be good and the mosquitoes bad. The records show that when Meriwether Lewis went shopping in Philadelphia in early June 1803, in addition to 200 pounds of rifle powder and 400 pounds of lead, he procured "4 Groce fishing Hooks assorted," 4 pounds of catgut cord and a large quantity of catgut mosquito netting.

Fish and fishing were significant to the Lewis and Clark expedition for several reasons. The Corps of Discovery relied on fish for a portion of their diet. The party encountered Native American cultures almost wholly dependent on fish for subsistence and the iron hooks were good trading material. They described new species of fish as part of their natural history investigations; by some accounts they discovered, or at least reported, 31 species of fish, many now extinct or endangered. As the party labored upstream between the Great Falls of the Missouri and Lemhi Pass, the word "trout" is specifically recorded more than 20 times in the journals. And finally, fishing probably provided diversion and relaxation for the group, especially after the last "gill of ardent spirits" was downed.

So, what trout waters did these first non-resident anglers actually visit? And how well did they plan their trip? From a relaxed vantage point of nearly 200 fishing seasons, it is clear that the party was moving up the Missouri River drainage during the peak trout season in 1805.

They spent mid-June to mid-July in the Great Falls area while the expedition's gear was being portaged around the falls. During this time Lewis sampled the waters at the mouth of the Medicine (Sun) River which was just downstream and across the Missouri from the Upper Portage Camp. On the 15th of July, they passed the "entrance of a beautiful river 80 yards wide which falls in on the Lard. Side" (in this case, eastern side of the Missouri) the Smith River.

which they named for Robert Smith, Jefferson's Secretary of the Navy. A "handsome bold and clear stream," "about 80 yards wide being nearly as wide as the Missouri at that place" was named for Secretary of War Henry Dearborn on July 18. Clark and a few other members of the company on foot reached the Three Forks of the Missouri on July 25, a few days ahead of Lewis and the heavily laden dugouts.

Clark reported on July 25 that "those forks are nearly of a Size, the North fork (soon to be named Jefferson's River) appears to have the most water and must be Considered as the one best calculated for us to ascend Middle fork (Madison's River) is quite as large about 90 yds wide. The South fork (Gallatin's River) is about 70 yds wide and falls in about 400 yards below the middle fork." Before they reached the junction of the Wisdom (Big Hole) with the Jefferson on August 5, members of the group had passed and named the Philosophy River (Willow Creek), Panther Creek (Pipestone Creek) and Reuben Field's Valley Creek (North Boulder River). They camped a few miles upstream of the Philanthropy River (Ruby River) on August 8 and spent the next night just below Beaverhead Rock. While Lewis was ahead on foot, embracing Sacajawea's Shoshone relatives and bartering for horses, it took Clark nearly 3 days to struggle up the 12 miles from Rattlesnake Cliffs (near Barrett's Dam) to the present site of Clark Canyon Dam. On August 17 they established Camp Fortunate near the confluence of Horse Prairie and Red Rock Creeks, a site now inundated by Clark Canyon Reservoir. Here, they sank their boats and prepared to proceed on horseback and shanks' mares.

By the end of August 1805, they had crossed into Idaho over Lemhi Pass and found that the Lewis' River (now the Salmon) was not passable because of the continuous rapids. So, having traded for horses and information and having enlisted a native American guide, named Old Toby, the company struggled into the upper Bitterroot Valley near Lost Trail Pass on September 4, suffering through an early blizzard that covered the explorers with fresh snow. Following present day Camp Creek, they arrived at the East Fork of the Bitterroot River in Ross' Hole somewhat upstream of Sula where they were "received with great cordiality" at a camp of "33 lodges, in which were about 400 souls, among whom 80 were men." Lewis named the river Clark's River. After horse trading, the party spent the next few "dark and rainy" days criss-crossing the river as they traveled downstream. On September 9 near Florence, Lewis described the Clark's River as "a handsome stream about 100 yards wide (which) affords a considerable quantity of very clear water. The banks are low and it's bed entirely gravel." On the night of the 9th they camped on "a large creek (Lolo Creek) which falls in on the West" at which point Old Toby told them they would leave the river.

While at Travellers rest at the mouth of Lolo Creek, the guide described the junction of the Bitterroot with a river that "took it's rise in the mountains near the Missouri to the East of us and passed through an extensive valley generally open prairie which forms an excellent pass to the Missouri." This, of course, is a

open plain which forms an excellent pass to the Missouri. This, of course, is a

description of the Big Blackfoot River, which Lewis would ascend on the return trip.

They traveled up the Indian road on the ridges overlooking Lolo Creek and on Friday the 13th of September 1805, passed several springs. Lewis noted that the Indians had made a "hole to bathe, I tasted this water and found it hot and not bad tasted. in further examination I found this water nearly boiling hot at the places it Spouted from the rocks." And so, with this description of the first resort at Lolo Hot Springs, the Corps of Discovery left Montana and crossed into the Clearwater River watershed.

In the next instalments of this series, I will try to recapture the experiences of these undaunted anglers in more detail. What types of fish did they catch in our state? What tackle and bait did they use? How high was the water? Did they report any of the prolific hatches for which our rivers are now so well known? How bad were the mosquitoes? Who was the best fishermen of the Corps? Finally, I will recap the return trip through Montana in mid-summer of 1806.

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Publ. in Montline - Montana T.M.

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UNDAUNTED ANGLERS: Lewis and Clark - Montana's First Non-Resident Fishermen

By

Marshall E. Bloom, M.D.

On Sunday, August 16, 1805, on the banks of Horse Prairie Creek, Meriwether Lewis mused "This day I completed my thirty first year... I reflected that I had as yet done but little, very little indeed, to further the happiness of the human race, or to advance the information of the succeeding generation. I viewed with regret the many hours I have spent in indolence, and now so arily feel the want of that information which those hours would have given me had they been judiciously expended." This might appear a little self-pitying for the first US citizen to have reached the Continental Divide by laboring up the headwaters of the Missouri. But, let's backcast to the previous sentence. "I had the net arranged and set this evening to catch some trout which we could see in great abundance at the bottom of the river." Hopefully, Lewis was not expressing melancholy, but was merely engaging in the kind of moody introspection that many feel when trout fishing. Anyway he did get to go fishing on his birthday.

And, make no mistake about it, Lewis must have enjoyed trout fishing. On Saturday, June 15, 1805, he rested up from his explorations of the Great Falls of the Missouri. He wrote "I amused myself in fishing and sleeping away the fatigues of yesterday. I caught a number of very fine trout..." The previous day he had shot a bison on the bank of the Missouri across from the mouth of the Medicine (Sun) River and had been chased into the water by a grizzly bear before reloading his rifle. But he wasn't always so lucky, because on Tuesday, June 25, at the Upper Portage Camp near the mouth of the Sun (Medicine) River, "I have made an unsuccessful attempt to catch fish, and do not think there are any in this part of the river." Not far away on the same day his co-captain William Clark recorded "we Catch great quantities of Trout..." interestingly, on Wednesday, July 10, Lewis recorded "having nothing further to do I amused myself in fishing and caught a few small fish... I had thought on my first arrival here that there were no fish in this part of the river." Was this admission of fish in an area he had judged barren a sudden burst of angler's honesty or had he read Clark's account? At any rate, it seems some things haven't changed that much since the summer of 1805 - we tend to judge the number of fish in a location by the number of fish that WE catch!

Lewis and Clark were not the only members of the Corps of Discovery to be captivated by the fishing around the Great Falls. At the lower Portage Camp near the mouth of Belt Creek, Sacagawea was convalescing from what was probably a near fatal episode of gonorrhoeal pelvic inflammatory disease. Lewis noted that she "appears to be in a fair way for recovery, she has been walking

about and fishing." Had she not recovered the expedition might have had a very disastrous outcome. It is pleasant to speculate that fishing speeded her recovery.

However, in any group of fishermen, there is one fisherman who is the best fisherman in the group. In Montana, in 1805, that person was undoubtedly Private Silas Goodrich. Beyond his penchant for fishing, not much is known about Goodrich; he is listed as having been born in Massachusetts and signed on with the Corps on January 4, 1804 at Camp Dubois in the Illinois Territory. On the return trip in summer 1806, Goodrich went with Lewis from Traveler's Rest up the Blackfoot, across present-day Lewis and Clark Pass over the Continental Divide to the Missouri. However, he did not accompany Lewis on the ill-fated

I

Don Nell Paul Schullery
Dawemiller Marshall Bloom

Intro-

Family arrive 1864

Fishing Career

Headwaters of
Three Valley rivers

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Benton - all other are
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Above Great Falls L & C
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The West Slope of Yellowstone
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Leven Rainbow, Eastern
Brook Trout all introduced

L. & C. purchased fishing tackle in Philadelphia in gathering supplies for the expedition.

They used simple willow stick and line with variety of meat, tallow insects as bait.

On occasion commented that fish did not bite

The crew was not fond of fish preferring meat. Supposedly the journals estimated about nine pounds per day per man.

While camped at the Headwaters they reported shooting deer, Elk, Buffalo mountain sheep and bear.

The Native Americans showed them a seine made of willows. Dragging the seine through schools of trout was used frequently.

II

Early American artifacts do show crude fish hooks of rock and bone.

The headwaters streams now hold species of fish that have moved up the Missouri as man's influence raised degree of siltation and warmer water temperature.

I'm a professional fly fisher, but I began as a bait fisher primarily for trout, but I did fish ling rock for Bull Heads and ling. Neighbor drank, I fished and ate well all night.

Bruce Schendel reported a number of warm water fish he has caught that were not in this part of the Missouri drainage when h. & c.

arrived.

The Madison from Bear Trap down on low water years suffers from heat stress on trout and white fish.

Introduction of non-native species has pushed cutthroat and grayling out of main stem streams. C.T and grayling in tributary feeder streams of high country parts of rivers. C.T in only a small per cent of original waters.

L.T.C commented on the great numbers of beaver dams in the streams and rivers in the headwaters area. Also number of otter. The habitat was changed by trapping and clearing out dams.

The presence of otter

III

is a sign of abundant trout that otter kill. The dead trout is gutted and left for the birds.

Marshall Ashcraft the man behind the gun. Owns a ranch upstream from the Demick ranch just over the hill from here. ~~A~~ stream coming from a spring on Marshall's ranch passes through the Demick ranch to enter the Gullation at Headwater State Park.

Marshall has an old photo that identifies the Spring as Lewis & Clark Spring. Marshall has restored and enhanced this spring creek and the trout have returned in great numbers and size. Not the native trout that L & C found but Brown trout brought from Germany and

possibly Lock Leven from Scotland. The Lock as known locally is no longer identified by the FWP but the Ponds or "sloughs" on Marshall's ranch may still have Lock hybrids.

The Spring Creek is the first tributary ~~of~~ head waters rivers as it joins the Gallatin. The restoration of tributaries produces great increase of spawning habitat and more trout in the main rivers.

Since LTC fished here the aquatic insect life has also been influenced by siltation and water temperatures. I remember salmon flies on Madison river in the area of Darlington, McDonald ranches and into Bear Trap Canyon. Now mostly in Bear Trap and above Ennis Lake.

TV

The aquatic insects mirror the appearance of streamside wild flowers. Wild Roses bloom with the emergence of Salmon flies. Book "phenological" shows many high country flowers that ~~come~~ ^{when} ~~with~~ mayflies, caddis flies and other aquatic bugs that fish feed on ^{as they} emerge.

Books by Don Nell, Dave Miller, Paul Schullery and me at Magpie Books in Three Forks.

After crossing ^{and descending} ~~into~~ waters flowing into the Pacific L.C. identify salmon and steelhead. They were forced to eat salmon with fewer large game animals available. They were thoroughly tired of salmon after ~~after~~ a winter on the coast.

Granny Yates story in
Dave Millers book mentions
fishing for trout in 1860's.
This same period an Army
expedition followed L & C
trail and reported fishing
for trout with flies as
they learned on eastern
streams. Fishing was
excellent.

By 1892 a fish hatchery
was built at Bonanza on
Bridger Creek. Early
management of fishery
saw streams and lakes
as conduit for millions
of stocked fish. Rainbows
Brook Trout and Brown
or Lock Leven trout.
Limits were eventually
required and in the 1950's
and 60's regulation of
methods and some
catch and release maintained
increasing numbers of
established wild trout.
Hatchery trout were eliminated
where wild populations
stood on their own.

V

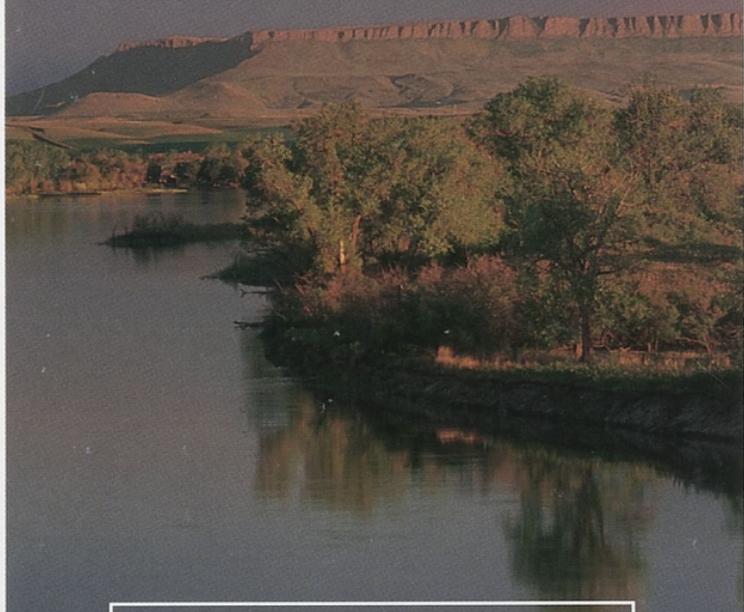
Today with better land and water use, restoration and enhancement of tributary streams numbers of wild trout and native white fish provide great recreational opportunity for anglers. Attracts millions of dollars to Montana.

Lewis + Clark found the headwaters to be one of the most beautiful areas they visited. The plants grasses, wildlife and fishes were astounding. For 200 years ~~as~~ the area has continued to flourish with the impact of all kinds of use and abuse. A gravel quarry in the Gallatin by the bridge nearby an example of not understanding the damage to the river as habitat for trout and other forms of aquatic life.

In many respects the
rivers are better now
than I remember in the
30's + 40's. I'm encouraged
that we will do even better
in the future. Lewis &
Clark will be pleased at
what they find, when they
come again.

Thank you

LEWIS & CLARK'S MONTANA JOURNEY



A GUIDE TO
EASY-TO-REACH
SITES AND FUN
THINGS TO DO.

MERIWETHER LEWIS AND WILLIAM CLARK LED THE FIRST U.S. EXPEDITION ACROSS THE CONTINENT IN 1804-1806.

President Thomas Jefferson sent them to find the headwaters of the Missouri River and an overland route to the Pacific Ocean. The scope and adventure of their journey is unmatched in American history and ranks among major explorations of the world. Well over one-fourth of that exploration was within what is now Montana. Today, highways parallel most of their route, making a scenic loop tour that winds through every region of the state.

Many Lewis & Clark Trail sites in Montana offer views that are nearly unchanged from the early 1800s. It is easy to look at the natural landscapes and imagine what you might have felt if you had been among the 33 "Corps of Discovery" expedition members. Most of the wildlife recorded in the explorers' journals can be seen by the observant visitor today. You may want to keep your own day-to-day journal of discovery to capture memories of your exploration.

THE JOURNEY BEGINS

This guide begins where US 2 crosses into northeastern Montana. Lewis and Clark's Corps of Discovery first entered modern-day Montana on the Missouri River just south of this point.

1 **Fort Union Trading Post National Historic Site**

In April 1805, the captains noted that the area where the Yellowstone River joins the Missouri would be an excellent spot for a trading post. In 1829, Fort Union was constructed near the confluence of rivers and quickly became the top fur-trading post on the upper river. The fort has been reconstructed, and the once-elegant Bourgeois House is now a visitor center. Open year-round except Thanksgiving, Christmas and New Year's days. Living-history demonstrations, special interpretive programs and longer hours during the summer months. At the border of Montana and North Dakota between US 2 and MT 200.

2 **Glasgow**

Nearly every animal noted in Lewis & Clark's journals except grizzly bears still can be seen in eastern Montana. There are three auto tours for viewing wildlife in the Glasgow area. The most concentrated wildlife viewing tour is just southeast of Glasgow on the Missouri River at Fort Peck. This tour features preservation pastures with elk, antelope and buffalo, so sightings are nearly guaranteed. Also a self-guided nature trail for walking and several sites for prime bird/waterfowl observation.

3**Fort Peck**

Boat, fish and camp on this giant lake with 1,500 miles of shoreline. Scenic overlook east of the dam on MT 24 has interpretation for local Lewis & Clark sites. Year-round museum at the powerhouse. Historical Fort Peck Theater offers family-pleasing musicals or dramas weekends June – August.

Route Notes

The fastest way to get to the next major interpretive site, Fort Benton, is to take US 2 across Montana's "hi-line" to Havre and then take US 87 south. Or, you may wish to continue on US 2 for a side-trip visit to Glacier National Park. However, if you prefer to stick more closely to the expedition route and see more back country views of the Missouri River, take US 191 south at Malta to the remote wildlife viewing areas described below.

4**Charles M. Russell National Wildlife Refuge Auto Tour Route**

On their journey west, Lewis and Clark spent 13 days within today's Charles M. Russell Wildlife Refuge. The CMR, as it is locally known, is the second largest wildlife refuge in the continental U.S. Grasslands, sagebrush and ponderosa pines provide some of the wildest prairie habitat left in the country. You might see raptors, antelope, deer, grouse and prairie dogs, along with elk from one of the largest remaining prairie elk herds. Plan at least two hours for this 20-mile auto tour and its marked stops. Begins 55 miles south of Malta off US 191 and ends just one-half mile north of the Missouri on US 191. The gravel road of the tour route may become impassable during extended periods of rain, so use proper caution. This is a US Fish & Wildlife Service site.

5**Missouri Breaks National Back Country Byway**

Just across the river and westward is a Bureau of Land Management (BLM) Byway that parallels the lower 50 miles



Hiker on White Cliffs

of the "Wild and Scenic" section of the Upper Missouri. Interpretive signs for fascinating scenery, geology and wildlife are along the 81-mile loop. April – October, you can take a short side trip to cross the Missouri on the free McClelland Ferry. The BLM has a brochure on the Byway and side trips. From US 191, continue south to Hilger and take Highway 236 to Winifred. NOTE: This Byway is on graveled and unimproved roads which become impassable when wet, so consider the weather in making your plans. The highway map shows a 4-mile unimproved road from US 191 just south of the river to the Byway; HOWEVER, this is a primitive road that is impassable and somewhat dangerous if it is not completely dry.

Route Notes

If you explored the back country routes off of US 191, you can continue to follow US 191 south, then take MT 81 north and MT 80 west to Fort Benton. If you are ready for the services and conveniences in a larger town, continue nine miles past the intersection of MT 81 on US 191, and you'll be in Lewistown. If you are in Winifred after driving the Missouri Breaks Back Country Byway, you could instead take the graveled 236 west to Big Sandy and US 87.

6 **Fort Benton**

Montana's official state memorial statue of Lewis, Clark and Sacagawea with her infant son stands on the historical levee downtown. The walking tour of the four-block-long levee includes museums, the ruins of the Old Fort (currently being rebuilt) and other historical buildings. The BLM's Upper Missouri Visitor Center features a slide show with readings from expedition journals Memorial Day – Labor Day. Tours, float trips, picnicking, museums.

7 **Loma and the Marias River**

When Lewis and Clark reached the Marias River, they camped for nine days while exploration determined which river was actually the Missouri. Loma now sits at that confluence 11 miles north of Fort Benton on US 87. The BLM has interpretive signs at Decision Point overlook on the ridge above the Missouri. Here is the view that the captains had while trying to decide which way to go. 1/4-mile hiking trail; wildlife viewing.

8 **Upper Missouri National Wild and Scenic River**

Taking a trip on this section of the Missouri River is probably the single best way to experience what Lewis and Clark saw on their journey. Guided trips from river outfitters and/or canoe rentals for independent trips are available in Fort Benton, Loma and Virgelle. The BLM maintains a list of resources.



Gates of the Mountains

9  **Great Falls**

The Corps of Discovery came upon a series of five waterfalls instead of the one “great falls” about which they had been told. The party spent a month in the area portaging their boats and supplies around the falls. A must-see is Giant Springs Heritage State Park. Clark found the “Giant Springs” during the portage and guessed correctly that it must be one of the world’s largest. A national interpretive center for the Lewis and Clark National Historic Trail is scheduled to open here in the spring of 1998. Highlights are interactive exhibits, an introductory video by documentary film maker Ken Burns and an outdoor living-history encampment. Rainbow Falls (Handsome Falls) can be seen from an overlook in the park. The Great Falls Information Center (intersection of 2nd Street and 10th Avenue South or follow signs from I-15 on 10th Avenue South) and chamber of commerce have maps and information on overlooks to see the other falls and other historical sites in the area.

10  **Gates of the Mountains**

Noted on expedition maps as “The Gates of the Rocky Mountains,” the Missouri River cuts through 1,200-foot-high cliffs in this three-mile-long canyon. This is an official Wildlife Viewing Site, and commercial boat tours provide a very comfortable way to experience the river for a couple of hours. This site has its own exit off of I-15, about 17 miles north of Helena.

11  **Helena and Canyon Ferry Recreation Area**

Following I-15 or the River Recreation Road southward, you’ll come to Montana’s capital, Helena. The Montana Historical Society (225 N. Roberts) offers a literal walk through Montana’s history in its Homeland Exhibit, and that history emphasizes the expedition. Nearby Canyon Ferry Recreation Area provides 76 miles of shoreline on the impounded Missouri and offers all types of water recreation, picnicking and camping.

12 Missouri Headwaters State Park

Take US 287 south from Helena to get to the headwaters of the Missouri River. This is where Lewis and Clark named the three rivers which combine to form the Missouri (the Jefferson, Gallatin, and Madison rivers). Interpretive signs, hiking, picnicking, camping, fishing and floating are activities now available. Varieties of vegetation here are much the same as in 1805. From Three Forks, go east on Secondary 205, then north on Secondary 286.

Route Notes

The captains chose to follow the western-most river, which they named the Jefferson, to find a route to the Pacific. From Three Forks, follow US 287/MT 2 westward and stay on MT 2 when US 287 branches southward toward Yellowstone National Park. A major attraction on MT 2 is Lewis and Clark Caverns State Park. The explorers were unaware of these beautiful limestone caves which may now be toured, but the park was named in their

honor. To continue to parallel the river route of the expedition, drive on MT 2 west to Whitehall, then take MT 55 south until it merges with MT 41.

13 Beaverhead Rock State Park

Sacagawea recognized this huge rock resembling the head of a swimming beaver and knew that she was near her Shoshone tribe's summer homeland. You'll see the landmark along MT 41 about 14 miles north of Dillon, but most do not readily see the shape of the beaver's head in the rock. This day-use park is undeveloped. There is an interpretive sign south of Beaverhead Rock on MT 41.

14 Clark's Lookout State Park

Clark climbed this area to get a look at the Beaverhead Valley on August 13, 1805. This site is owned by the state for preservation and later development, but signs may not be in place. About 1 mile north of Dillon on Highway 91 (parallels I-15 on the east side).



- Lewis and Clark Route in Montana
- - - Lewis' Exploration Route of the Marias River



Bitterroot Valley

15  **Dillon**

The Beaverhead County Museum at 15 S. Montana is an impressive museum of local history that is open March – November. Just down the boardwalk (which has authentic western cattle brands burned into it) is the town's historical railroad depot, which is now a statewide visitor center. The visitor center has a Lewis and Clark diorama and information about Lewis and Clark Trail sites in the area.

16  **Camp Fortunate Overlook**

Driving south on I-15 from Dillon, take the Clark Canyon Dam exit. An overlook on the west side of the reservoir gives a view that approximates Camp Fortunate (which is now under the water). It was here that the expedition gained from Sacagawea's brother, Chief Cameahwait, the horses they needed to take them across the mountain ranges into the Columbia River drainage. Fishing, boating, camping, picnicking.

Route Notes

Lemhi Pass is where Lewis and Clark crossed the Continental Divide, leaving the Louisiana Purchase territory. There is a small campground and memorial to Sacagawea near the pass. This is a sometimes rutted and boggy road. In the summertime, most passenger cars can make this trip, but the Idaho side is more steep, so traveling with a trailer or motorhome is not recommended. Backtracking up I-15 to county road 278 is a paved shortcut to Montana's western-most Lewis and Clark Trail sites, and it also closely follows the route Clark took on his return journey eastward in 1806.

17  **Lost Trail Pass**

After traveling for a time in what is now Idaho, the explorers again entered Montana very near to Lost Trail Pass. An interpretive sign at the pass explains all of the historical trails in the area. If you have come across Lemhi Pass, take ID 28 to US 93 north. If you have taken the paved route 278, go northwest on MT 43 to reach Lost Trail Pass.

The Big Hole National Battlefield is along MT 43 and is well worth a stop to understand the bitter battles that were taking place by the 1870s between native tribes and the U.S. military.

18  **Sula (Ross' Hole)**

The Corps of Discovery's journey eased as they traveled into the beautiful Bitterroot Valley and came upon a village of over 400 Salish (Flathead) Indians. They camped a few miles north of Sula and learned of the Lolo Trail going west across the Bitterroot Mountains.

19  **Travelers Rest at Lolo**

At Lolo Creek (present-day Lolo), the expedition camped going to and coming from the Pacific. They named their camp Travelers Rest. On the return trip, Lewis and Clark split up to explore different sections of the Louisiana Territory. An interpretive sign at the junction of US 93 and US 12 gives further information. The Lolo Motorway (Forest Service Road 500) is an unpaved road that follows the original trail up on the ridge, while US 12 provides a faster, more comfortable route that parallels the original. Check with the Forest Service or area visitor centers for a map and current conditions if you plan to follow the primitive road.

20  **Lolo Hot Springs**

The expedition stopped here for hot baths on June 29, 1806. Now commercially operated.

21  **Lolo Pass Visitor Center and Packer Meadows**

The visitor center is at the pass as you enter Idaho. The expedition camped at nearby Packer Meadows and an interpretive sign provides more information.

THE RETURN JOURNEY FROM THE PACIFIC

On July 3, 1806, the expedition separated at Travelers Rest as they made their return trip eastward. Clark, 20 men, and Sacagawea with her baby took 50 horses and headed south through the Bitterroot Valley. Clark's party then crossed the Big Hole and traveled the Yellowstone River Valley. Lewis and nine men went north, down the Bitterroot River to the Clark Fork and then east along the Blackfoot. Lewis' aim was to explore the Marias River in the northwest part of the Louisiana Territory.

CLARK'S JOURNEY EAST

Clark and his larger party retraced the trail down to the Lost Trail Pass area (actually nearby Gibbons Pass, which is nearly inaccessible) and entered the Big Hole Valley. Driving MT 43 and then Secondary 278 allows you to follow their journey rather closely.

The party stopped to enjoy the warm waters of present-day Jackson Hot Springs, which is now commercially operated.

They crossed Big Hole Pass (on Secondary 278) to return to Camp Fortunate (Clark Canyon Dam) and retrieve their dugouts and the supplies cached the year before. Just before the pass, you can turn south off of 278 to visit Bannack State Park, site of Montana's first territorial capital (1864). It showcases a gold-rush-era ghost town.

Back at Three Forks, Sergeant John Ordway and nine men took the dugouts down the Missouri River to the Great Falls. Clark and the rest of his party headed east along the East Gallatin River and then came upon the Yellowstone River near Livingston (a gateway to Yellowstone National Park). You can follow the approximate route by driving east on Interstate 90.

22 **Buffalo Mirage Access**

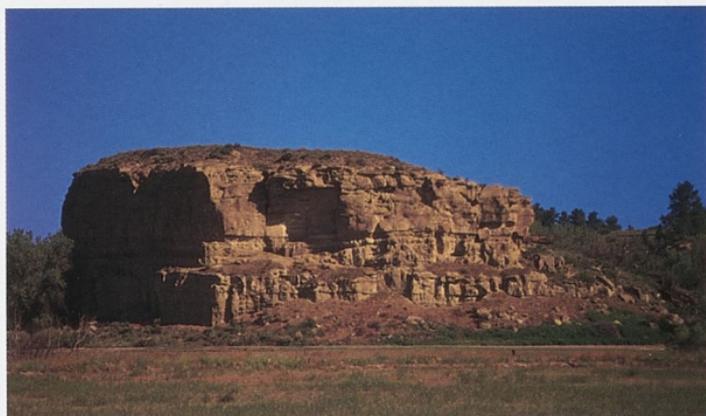
Here, Clark's group carved out two dugout canoes to continue their exploration of the Yellowstone River. To reach the fishing access site at the approximate location, exit I-15 at Park City, follow the signs seven miles east on the frontage road, and then six miles on the county road to the site. Undeveloped fishing access site.

Route Notes

To follow the Yellowstone River, drive on I-90 until the junction with I-94 just east of Billings, then follow I-94 east. There are many communities and points of access to the river along this route. Continue on I-90 east if you want to make a side trip to the Little Bighorn Battlefield National Monument just southeast of Hardin off I-90.

23 **Pompeys Pillar**

Named "Pompy's Tower" on maps of the expedition (Clark had nicknamed Sacagawea's son "Pomp"), this large pillar of sandstone now has stairs to allow visitors to see the incredible view from the top. On July 25, 1806, Captain Clark carved his name and the date on the pillar. This is the only remaining physical evidence of the expedition along the entire length of the trail. Interpretive tours, hiking, picnicking and a visitor center. 28 miles east of Billings, off I-94.



Pompeys Pillar

24 **The Yellowstone River**

There are many opportunities for recreation along the Yellowstone River. Gravel along the river from Custer to Sidney often yields Montana agates (inquire locally or through Custer Country tourism region for guide services or rockhounding tips). Fishing and floating are two other favorite activities on the Yellowstone. Badlands scenery is abundant in Terry or Makoshika State Park (at Glendive) where you can drive to view awesome rock formations.

LEWIS' JOURNEY EAST

On horseback, Lewis followed the Bitterroot River north from Travelers Rest. He crossed the Clark Fork near present-day Missoula, then followed a route along the Big Blackfoot River which the Nez Perce used to get to the plains for buffalo hunting. Today, you can very closely follow in his footsteps by driving US 93 into Missoula, then going east on I-90 to the exit for MT 200. Montana's Highway 200 follows the Blackfoot through Lincoln. Lewis crossed the Continental Divide at Lewis and Clark Pass, but that pass is accessible only by a hiking trail today. When Lewis' party reached the Sun River (just west of where MT 200 begins to parallel that river at Simms), they followed it to their old upper portage camp on the Missouri at Great Falls.

Lewis and three men from his party then rode overland to explore the Marias River. The best way to follow this journey is to drive from Great Falls to Fort Benton on US 87, then follow Secondary Road 223. Just west of where 223 crosses the Marias is where Lewis reached the Marias. He found the headwaters three days later and then followed the northern branch (Cut Bank River). Drive US 2 west from its intersection with 223 and head for Cut Bank to follow his route.

25 **Camp Disappointment**

On Cut Bank River east of present-day Browning, Lewis could see the river exiting the mountains. He called this northern-most campsite of the expedition "Camp Disappointment" since this meant the Marias did not reach 50 degrees north latitude, which would have extended the boundary of the Louisiana Territory. At milepost 233 on US 2, there is a historical highway marker which is four miles directly south of the actual camp site.

THE RENDEZVOUS

Lewis and his party made a hasty retreat back down to the Missouri after killing two Indians who were attempting to steal their horses at a camp on the Two Medicine River. They luckily encountered their expedition boats (Ordway's party) coming down the Missouri from Great Falls. Lewis' party and Clark's party met again close to where the Yellowstone River flows into the Missouri River.

RESOURCES

Statewide travel information:

Travel Montana

800-VISIT-MT or 800-847-4868 (outside Montana)

406-444-2654 (inside Montana)

<http://travel.mt.gov>

Travel information from any of Montana's six tourism regions is available by dialing these toll-free numbers:



Lewis & Clark information:

Lewis and Clark Trail Heritage Foundation

P.O. Box 3434

Great Falls, MT 59403

<http://www.lewisandclark.org>

Lewis and Clark National Historic Trail

National Park Service

700 Rayovac Drive, Suite 100

Madison, WI 53711

<http://www.nps.gov/lecl>

Information on state parks or fishing access sites:

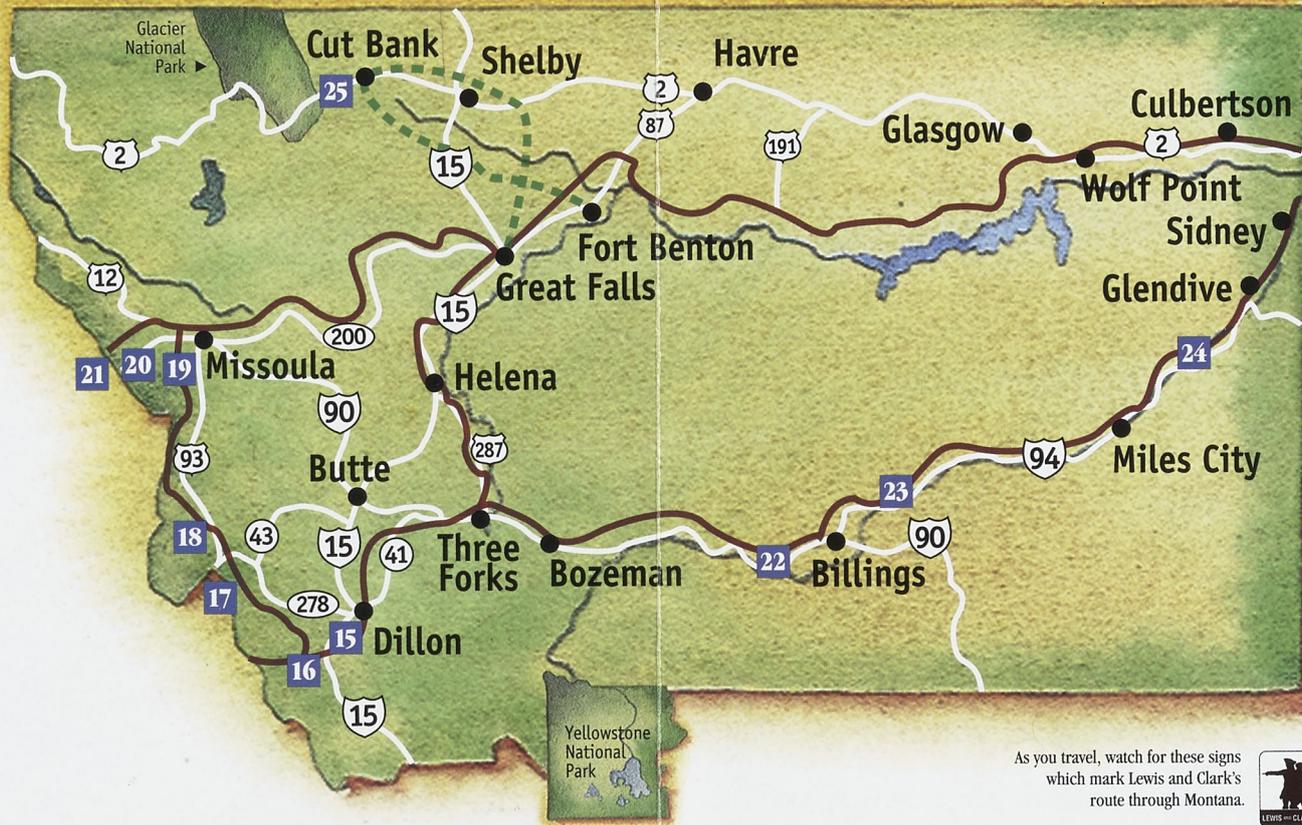
Montana Fish, Wildlife & Parks

1420 E. Sixth Avenue

Helena, MT 59620

406-444-3750

<http://fwp.mt.gov>



As you travel, watch for these signs which mark Lewis and Clark's route through Montana.



- Lewis and Clark Route in Montana
- - - Lewis' Exploration Route of the Marias River

Other Montana resources:

Bureau of Land Management (BLM)
P.O. Box 1160
Lewistown, MT 59457
406-538-7461
<http://www.mt.blm.gov>

Charles M. Russell National Wildlife Refuge
Box 110
Lewistown, MT 59457
406-538-8706, ext. 0
<http://www.glasgow.com/town/cmr.html>

USDA Forest Service - Northern Region
Federal Building
200 E. Broadway, Box 7669
Missoula, MT 59807
406-329-3511
<http://www.fs.fed.us/r1/welcome.html>

A Few Suggestions for Further Reading on Lewis & Clark:

The Journals of Lewis and Clark, abridged edition, edited by
Bernard DeVoto

The Traveler's Guide to the Lewis & Clark Trail,
by Julie Fanselow

*Lewis and Clark: Historic Places Associated with Their
Transcontinental Exploration (1804-06)*, by Roy E.
Appleman, National Park Service

*Undaunted Courage: Meriwether Lewis, Thomas Jefferson
and the Opening of the West*, by Stephen E. Ambrose

Out West: American Journey Along the Lewis and Clark Trail,
by Dayton Duncan

The Story of the Lewis and Clark Expedition, by R. Conrad
Stein (for 2nd - 4th graders)

The Journals of the Lewis and Clark Expedition, 11 volumes,
edited by Gary E. Moulton



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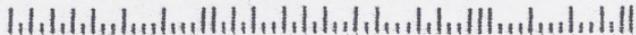
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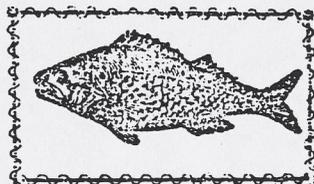
Bud

Thank you for the special talk that you gave to the Headwaters Lewis & Clark Chapter.

- It was great - appropriate, timely and cordial. We all appreciate your great work on behalf of the environment.

R. G. Montgomery

FISHING



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EDWARD POLE.

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FLY, trolling, bottom bag, and all other sorts and sizes of fishing rods, either hollow or solid, plain or ringed,
Plain and Multiplied Brafs Wheels,
Horse hair, silk, hardell, silk-worms gut, Indian Craft, Hempen, Cotton, Layout, and Angling Line,
Deep-seas, for Sea or River Fishing, ready fitted,
Trimmers for Pike Fishing,
Cork Floats, a variety with either Goose or Swan Quills,
Artificial Flies, Moths, Hackles, Minnow, Chubb, Grass-hoppers, Dilderries, Frog, Mice, Birds, Caddis, &c. for Trout and other Fishing,
Best Silk-worms Gut, Indian-grass and Weed,
Leads of various Patterns, for Black Point and other

Fishing.

Best Kirby and Common, Fishing Hooks of every Size, either Loose or ready Hung, on Silk, Hair, Silk-worms Gut, Indian-Craft, or Weed,
Double and Treble, Spring and Lead Snap Pike, and Eel-hooks wire,
Box, and Plain Salmon, Jack, Pearch, and Trout-swivel, 4, 8, 10, & 12, Stave Round and Flat Pocket Reels, ready fitted,
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Lawton was successor to Edward Pole, who was selling fishing tackle in Philadelphia in the 1770s and 1780s. This advertisement was attached to an invoice dated 1803 and made out to Merriwether Lewis, just then outfitting an expedition with William Clark to explore the upper Missouri River and points west. *Courtesy of Gary Saindon.*

Here's more information on the receipt I gave you - it was from Lawton.

(and would later be absorbed by Abbey & Imbrie, the business lasting more than a century). John J. Brown, now mostly remembered as the author of one of the first and most successful American fishing books, his *The American Angler's Guide* (1845), opened his tackle shop at 122 Fulton Street in New York about 1845, changing his location a few times before disappearing from city directories after 1858. Brown offered a full line of tackle. Imagine entering his shop and browsing among just these items he advertised in 1845:

FLIES

Trout, perch, pickerel, basse, salmon and herring Flies, of every size and description, on gut, hair, flax and gimp.

SQUIDS, BAITS, &c.

Pearl, ivory, bone and tin Squids, of various sizes and shapes, for Blue-Fish, Basse, Pickerel, Salmon, Black-Basse, and other kinds of Angling; artificial Minnows, Grasshoppers, Beetles, Frogs, Mice, Shrimp, Wasps, &c. &c.

attall compares to the syllables "gluck tsee," followed by medley of low gurgling notes. On a warm morning in April the males will sit upon the tops of the maple and apple trees in the pastures and orchards for an hour at a time, repeating at short intervals their jingling notes, to the intense satisfaction, apparently, of themselves and their numerous mates who sit around them in admiring circles. While uttering these notes the bird struts and swells like a turkey-cock, and with the same intention—the desire of pleasing his mates.

The food of the Cow Blackbird consists principally of insects, especially flies, grubs, beetles, etc. They eat also the seeds of various plants, and at times join the Red-winged and Crow Blackbirds in plundering the cornfields; but the injury that they thus inflict is very slight, and is far more than overbalanced by the good they do in devouring vast numbers of noxious insects. Hence they deserve the protection of the farmer; but as they are often found in suspicious company, viz., with Crows and Red-winged Blackbirds, they frequently suffer the penalty of associating with proscribed thieves and rogues, by being shot down with them.

NOTES ON THE FAUNA OF THE UPPER MISSOURI.

BY J. G. COOPER, M. D.

In May, eight years since, I was attached to a military expedition on its way to the Pacific Coast, via the Missouri and Columbia Rivers, which had just been connected by a military road constructed by Capt. John Mullan, U. S. A. It was chiefly for the purpose of trying its practicability that the party of about two hundred and fifty men and several officers, under the command of Major G. M. Blake, was sent by this new route instead of by the Isthmus of Panama.

Of the two months spent in ascending the Missouri to Fort Benton by steamboat, I will not write very fully, although the tediousness of the trip was enlivened by many interesting scenes, and by observations and collections of numerous specimens of small mammals, birds and eggs. These I packed and directed to the Smithsonian Institution, but they were never received there; the eggs were all collected west of Fort Union. I will briefly enumerate the species for the benefit of future collectors and students of the summer range of our birds. The valley of the Missouri, along that portion, is usually bordered by low trees and shrubbery in the bottom land, while the uplands are quite bare, or only a few stunted trees occur where springs issue from the bluffs.

June 17th, I found the nest and eggs of *Empidonax pusillus* (probably), on a low tree in a dense dark thicket, built in a sharp crotch; 18th, the nest of the Western Red-tailed Hawk (*Buteo montanus*), with two eggs partly hatched, on a small oak at a distance from the river; also, two eggs of the Dove (*Zenaidura Carolinensis*), and one, said to be that of an eagle (?), were brought in by the men. The Wild Pigeon (*Ectopistes migratoria*) also breeds here. I found the nest and four eggs of the Lark Finch (*Chondestes grammacus*), situated as usual on the ground, and one of some uncertain sparrow. The next day I obtained that of the Shrike (*Collyrio excubitoroides*), with six eggs; and one of the Shore Lark (*Eremophila cornuta*).

A leak having opened in the boiler we were delayed near this place the third day also, and I found it a perfect nursery of birds, the shrubbery on the north bank being full of them and their nests. I obtained there also eight nests of the Redstart (*Setophaga ruticilla*), with eggs; that of the Chat (*Icteria viridis*), with four eggs; of the Black-headed Grosbeak (*Guiraca melanocephala*); of some small Thrush (*Turdus Swainsonii?*); of the Cat Bird (*Mimus Carolinensis*), and two of the Chippy (*Spizella socialis*). I

I think Cooper came through Montana in about 1860.

mony, colocynth, salep, acacia, galls, poppy, *Conium maculatum*, aloe, various Euphorbias, madder and many other medicinal and economical plants.

THE FAUNA OF MONTANA TERRITORY.

BY J. G. COOPER, M. D.

(Concluded from page 84.)

III. REPTILES.

HORNED TOAD (*Tapaya Douglassii* Gir.). A single specimen was obtained at Fort Benton. Though found on the Columbia Plains this species does not seem to cross the mountains at this point, but probably does so by the head of Snake River.

RATTLESNAKE (*Crotalus confluentus* Say, possibly also *C. Lucifer* B. and G.). I saw but two rattlesnakes in the Rocky Mountains, which were on a prairie along Hell Gate River. Expecting to find more I did not preserve them, but as specimens were probably obtained by Lieut. Mullan, I mention the localities of this and other reptiles which I did not preserve. All kinds were very scarce in the mountains, and this, which is so abundant along the Platte, is rather rare near Fort Benton. I mention this as the species seen on the west slope, because the Bitterroot Mountains are a far greater obstacle to the migration of the *C. Lucifer* eastward, than the main divide is to that of this, and I killed some of *C. confluentus*, probably, as high as 5000 feet above the sea on the east slope.

PINE SNAKE (*Pituophis*). I also got a Pine Snake at Fort Benton.

GREEN RACER (*Boscanion vetustus* B. and G., or *B. flaviventris*?). I saw one dead specimen of this snake along Hell Gate River in August.

WANDERING GARTERSNAKE (*Eutainia vagrans* B. and G.). Rather common along Hell Gate and Bitterroot River.

TOAD (*Bufo Columbiensis* B. and G.?). A large toad was occasionally observed along the Hell Gate and Bitterroot Valleys, but was not very common.

SPOTTED FROG (*Rana halecina* Kalm). I saw this frog on the Missouri among the mountains, which it probably crosses, being found at Fort Dalles by Dr. Suckley.

IV. FISHES.

LEWIS' TROUT (*Salmo Lewisii* Girard). This fine trout abounds in the headwaters of the Missouri, up to their sources on the eastern slope of the mountains, and a few were taken at and near Fort Benton by the soldiers, all of them large ones. They bite readily at almost any artificial fly; also at insects, meat, pork, and even leaves and flowers, after they had been tempted with grasshoppers. Officers and men, nearly all who were not on duty, would crowd to the banks of the beautiful mountain streams, and catch as many as the whole command of three hundred men could eat every day, and with tackle of all kinds, from a rude stick with a piece of common twine and a large hook, to the most refined outfit of the genuine trout-fisher. The form differs very much from the figure given in Dr. Girard's Report, and in the Natural History of Washington Territory, being, as the specimens show, much more elongated, like most other species. I also took specimens of small size across, to compare with those on the western slope, and am very doubtful whether these can be considered a distinct species, though a comparison of larger specimens may prove them to be so. If distinct, the trout of the western slope is exceedingly near *S. Lewisii*. It is equally abundant down to the crossing of the Bitterroot, but less so in the streams on both sides of the Cœur d'Alene Range, probably from their excessively shallow and rapid current. I saw no difference, however, in those taken at Cœur d'Alene Mission from those of the Little Blackfoot. The differences noticed between these and those of the Missouri were as follows:—Evidently fatter and in better

condition, from which, I suppose, arose the deeper tint and greater extent of the rosy tint on their side and belly; back paler olive; spots fewer and chiefly near the tail, where they assumed a more stellate arrangement, but this was not constant. Very young specimens, four to five inches long, were barred on the sides. I saw none so small on the east slope.

No. 61, Little Blackfoot River, August 17th. No. 69, near crossing of Bitterroot River, September 2nd. Length, 14.75 inch; olive, below silvery with rosy tints towards sides; spots black; operculum, etc., bronze gilt; chin-mark orange.

Salmo sp.—A single specimen of a species of trout was caught by Lieut. A. V. Kautz, U. S. A., on September 25th, just below the ferry across the Spokan River, at Antoine Plant's. Its very dark hue corresponds to the color of the stream, which is often the case in fish of the same species found in different localities, but it otherwise differs very much from the preceding. There is a high fall of the river below this point not passed by the salmon, so that this species cannot be a hybrid with them or anadromous either. No. 121, dried skin; colors when fresh were very dark olive above; belly dull white (no rosy marks); chin-mark reddish purple; operculum coppery, with a deep purple tint, this continuing as a broad streak along lateral line. Form of head very obtuse.*

SUCKLEY'S SALMONTROUT (*S. Suckleyi* Cooper, nov. sp.).

* Besides *Salmo Lewisii*, the following fish were caught at and near Fort Benton, most of which, probably, do not go above the falls:

PIKE PERCH (*Stizostedion boreus* Gir.). Not very common.

CATFISH. *Pimelodus olivaceus* Gir. was the only catfish seen above Fort Union, below which *P. allurus* Gir. is common. It is excellent eating, preferred by many to trout, which cannot be said of other catfish.

MILK RIVER SUCKER (*Acomus lactarius* Gir.). Common and very poor eating.

MISSOURI SUCKER. (*Catostomus Suckleyi* Gir.). Not very common.

NEBRASKA DACE. (*Pogonichthys communis* Gir.). Abundant below Fort Benton, but scarce so far up.

MISSOURI HERRING (*Hiodon tergisus* Lesu.). Common, and bites sharply like a trout, giving good sport, but is poor food.

SHOVEL-NOSED STURGEON (*Scaphirhynchus platyrhynchus* Baird). Several were caught near Fort Benton.

PIKE (*Esox* sp.). This large pike was cut up before I saw it, and I only got the head, which I gave to Mr. Hildreth to send to Washington.

I obtained also in the Rocky Mountains a species of Whitefish (*Coregonus?*), a Cottoid (?), and four species of *Cyprinoids*, which are probably still undescribed, but the specimens were too much damaged in alcohol to determine them with certainty.

Salmon trout of the Kalispelm or Lake Pend d'Oreille; Suckley, Report on Natural History of Washington Territory, under *S. Gibbsii* (?).* The first of this splendid salmon trout we met with were at the mouth of St. Regis Borgia creek, which flows down the east slope of the Cœur d'Aléne Range, and joins the Bitterroot, where the road crosses and leaves that river. The large specimen was brought to camp by Indians. An old mountaineer who keeps the ferry, said that they could be caught with a hook baited with a small fish, but these two had evidently been speared. We saw several of them in this stream, but all refused to bite at a fly or any common bait. Those caught in the Cœur d'Aléne, on the west slope, seemed to be identical, and I preserved a small one (No. 110, in alcohol). No. 95 was evidently about spawning, the óva being as large as peas, like those of the large salmon. Its colors were pale olive above, with irregular greenish patches; sides yellowish, beneath silvery white; fins and tail tinged with red; spots on back carmine, large and few; tail a little emarginate; length 29½ inches. The other was slightly smaller, otherwise like this. No. 110, young, was darker above, and colors brighter.

DOG SALMON (*Salmo canis* Suckley). Below the forks of the Spokan, the Indians were catching myriads of this salmon, and curing even those washed ashore, in their exhausted, diseased condition, without scales, and presenting all the appearances described in our report of 1853, relating to the salmon of the Upper Columbia.

* This query in Dr. Cooper's manuscript we suppose means that he did not have the book at hand, and was not sure that the specimen he refers to was mentioned by Dr. Suckley under *S. Gibbsii*. As we cannot find a reference to the locality given under *S. Gibbsii*, we think that Dr. Cooper intended to refer to the following paragraph by Dr. Suckley under *Salmo spectabilis* Gir. (Nat. Hist. of Washington Territory and Oregon, page 343). "In Lake Pend d'Oreille, a sheet of water formed in the second chain of the Rocky Mountains by a dilatation of the Clark River, of much the same size, shape, and general character as Lake Geneva in Switzerland, I have seen a very handsome species of red-spotted lake trout. The spots along the flanks are of the size of large peas, and are of a beautiful rose color. The length of the adult fish will average twenty inches. Its form is slender, and the dorsal profile but slightly arched." Much valuable and interesting information relating to the Salmonidæ of the northwestern part of America is contained in Dr. Suckley's chapter on this family in the Natural History of Washington Territory, etc.—EDITORS.

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Here's a citation for Cooper's article was in several parts that year.

ATTN:

LAURA ZIEMER

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BILLINGS GAZETTE, MT 7/19/99

▼ NECESSARY SOLUTION

Poison Cherry Creek to save cutthroat

By **BRUCE FARLING**
Trout Unlimited

Listen to the critics of the cutthroat trout restoration project proposed for Cherry Creek, and you'd think it had been designed by Capt. Hazlewood of the Exxon Valdez. Critics claim that the toxicants used in the project will "destroy ecosystems" and poison ground water 20 miles away. Even the Montana Mining Association — the folks you can thank for weakened water quality standards — is issuing grave warnings about fouled tap water.

Nonsense.

Ignore the headlines. Investigate the scientific record. Talk to the professional biologists doing the project. Here's what you'll find: a well-planned, low-risk project that could help restore our beleaguered state fish. In fact, the caution inherent in this project holds lessons for the mining industry and other real polluters.

After removing and relocating some fish by hand, Fish, Wildlife and Parks will use toxicants to remove the remaining nonnative brook, brown and Yellowstone cutthroats (this subspecies is not indigenous to the Missouri drainage) from 60 miles of streams and a lake in the Cherry Creek drainage. Biologists will then introduce westslope cutthroats, which are native to the Madison drainage and in dire shape east of the Divide. A waterfall on lower Cherry Creek and eight miles above the Madison will prevent nonnative rainbow and brown trout from recolonizing the project area. Project success means that a potential endangered species will get a boost. And, if the popularity of many westslope cutthroat streams in Montana, including Rock Creek and the Blackfoot and Bitterroot Rivers, is any measure, anglers might gain a robust sport fishery in the whirling-disease-wracked Madison drainage.

Only 30 gallons of two toxicants, antimycin and rotenone, will be used over several years across the full project area, which is remote and gets little public use. Antimycin is an organic antibiotic. It impedes respiration in fish and does not harm plants, mammals or people. Rotenone starves fish of oxygen. In the amounts being applied it will at most have a temporary effect on a few other aquatic species. Both chemicals are short-lived and easily degrade in sunlight and stream riffles. This is unlike, say, the metals and acid-mine drainage generated by mining, which can continue killing fish for decades. Specialists will monitor the chemicals, fish and insect life. For added measure, biologists will add a detoxification agent should the chemicals be detected in amounts harmful to fish below the waterfalls.

It's unfortunate that chemicals *are* involved. But electrofishing and angling won't completely work in Cherry Creek. Still, both chemicals have been used in fishery work for years, including at popular Montana reservoirs east of the Divide.

Of course there's more to the criticism than meets the eye. Most of the project area is owned by Ted Turner. He's the great satan to a few vocal advocates of improved hunting access in the area (which I support). Not coincidentally they hate the project. Turner limits access to Cherry Creek. But so did previous owners. The project will not affect public access, yet project opponents raise the issue. The same folks claim that the project creates a private fishery for Turner. Wrong. He can fish anywhere in the world. He doesn't need Cherry Creek. Critics accuse Montana Trout Unlimited, which supports this project, of being paid off by Turner. Wrong again. He's never given the organization a nickel.

It's baffling why mining folks oppose the project. They complain constantly about how endangered species confound their plans. Yet they oppose a project that could help an endangered species, and thus their industry.

The only real risk is that the project won't work. But if it does, Montana will demonstrate that bold and responsible action can both preserve troubled species and create sportfisheries. What's wrong with that?

Bruce Farling is executive director of Montana Trout Unlimited. He can be reached at P.O. Box 7186, Missoula, Mont. 59807, or at 543-0014.

CHAPTER XVIII

Fishes

Thirty-one species of fish are mentioned in the explorers' diaries, but more than half of this number were merely listed as being taken in seining or by hook and line. These included the bass, sturgeon, red horse, buffalo, catfish, white bass, and the "silver fish of the Ohio," which according to Coues, may have been the golden shiner. A few others, such as the hickory shad and fallfish were mentioned incidentally in comparing strange specimens with familiar species.

Lewis and Clark, however, can be credited with the discovery of several species of fishes which are characteristic of the Northwest. They wrote detailed descriptions of the silver salmon, king salmon, and the eulachon; and they included sufficient descriptive information about the blue-backed salmon, the silver salmon, the steelhead trout to leave little, if any doubt as to the identity of the species to which they referred.

In other instances, they provided so little information concerning the specimens which they caught by seine, gig, or hook and line that identification cannot be made with certainty. Thus, it appears that some of the thirty-one species mentioned in the diaries may or may not be valid. Nevertheless, Coues¹ did not hesitate, except in a few cases, to identify them. His classifications, however, are obviously conjectures based on his knowledge of the geographic distribution and relative abundance of different species.

For want of an alternative method of presenting Lewis and Clark's observations relating to fishes we have followed Coues' classification whether the data is conclusive or otherwise.

SKATES

Coues concluded that the "skait" listed by Lewis among the fishes of the Oregon coast was either the big skate, *Raja binoculata* Girard, or the California skate, *Raja inornata* Jordan and Gilbert.

Lewis' brief reference, written at Fort Clatsop on March 13, 1806, is as follows:

"the Skait is also common to the salt water—we have seen several of them that had perished and were thrown out on the beach by the tide."

NORTHERN MOONEYE

Coues concluded that the fish described as follows was the mooneye, *Hiodon alosoides* (Rafinesque). Now classified *Hiodon tergisus* Le Sueur.

FISHES

June 11, 1805 (Vicinity of the Marias River)

"Goodrich who is remarkably fond of fishing caught several douzen fish of two species,—one about 9 inches long of a white colour, round and in form and fins resembling the white chub common to the Patomic; this fish has a smaller head than the chubb and the mouth is beset both above and below with a rim of fine sharp teeth; the eye moderately large, the pupil dark and the iris which is narrow is of a yellowish brown colour, they bite on meat and grasshoppers. this is a soft fish, not very good, tho' the flesh is of a fine white colour. . . we had caught some few before our arrival at the entrance of Maria's river."

SALMON AND TROUT

Lewis and Clark described five species of salmonoid fishes which were, at the time, new to science. Their descriptive names for these fishes may be confusing unless clarified at once:

Silver salmon (Coho)	— "white salmon trout"
King salmon (Chinook)	— "common salmon"
Blue-backed salmon (Sockeye)	— "red char"
Steelhead trout	— "salmon-trout"
Yellowstone cutthroat trout	— "trout resembling our mountain or speckled trout"

March 16, 1806 (Fort Clatsop)

"The white Salmon Trout [*Oncorhynchus kisutch* (Walbaum)] which we had previously seen only at the great falls of the Columbia has now made it's appearance in the creeks near this place, one of them was brought us today by an Indian who had just taken it with his gig. this is a likeness of it; it was 2 feet 8 Inches long, and weighed 10 lbs. the eye is moderately large, the puple black and iris of a silvery white with a small addmixture of yellow, and is a little terbid near it's border with a yellowish brown. the position of the fins may be seen from the drawing, they are small in proportion to the fish, the fins are boney but not pointed except the tail and back fins which are a little so, the prime back fin and ventral ones, contain each ten rays; those of the gills thirteen, that of the tail twelve, and the small fins placed near the tail above has no bony rays, but is a tough flexible substance covered with smooth skin. it is thicker in proportion to it's width than the salmon. the tongue is thick and firm beset on each border with small subulate teeth in a single series. the teeth of the mouth are as before discribed. neither this fish nor the salmon are caught with a hook, nor do I know on what they feed."

March 13, 1806 (Fort Clatsop)

"the common Salmon [*Oncorhynchus tshawytscha* (Walbaum)] and red

charr are the inhabitants of both the sea and rivers. the former is usually largest and weighs from 5 to 15 lbs. it is this species that extends itself into all the rivers and little creeks on this side of the Continent, and to which the natives are so much indebted for their subsistence. the body of this fish is from 2½ to 3 feet long and proportionably broad. it is covered with imbricated scales of a moderate size and is variagated with irregular black spots on it's sides and gills. the eye is large and the iris of a silvery colour the pupil black. the nostrum (rostrum) or nose extends beyond the under jaw, and both the upper and lower jaws are armed with a single series of long teeth which are subulate and inflected near the extremities of the jaws where they are also more closely arranged. they have some sharp teeth of smaller size and same shape placed on the tongue which is thick and fleshy. the fins of the back are two; the first is plaised nearer the head than the ventral fins and has rays, the second is placed far back near the tail is small and has no rays. the flesh of this fish is when in order of a deep flesh coloured red and every shade from that to an orrange yellow, and when very meager almost white. the roes of this fish are much esteemed by the natives who dry them in the sun and preserve them for a great length of time. they are about the size of a small pea nearly transparent and of a redish yellow colour. they resemble very much at a little distance the common currents of our gardens but are more yellowish. this fish is sometimes red along the sides and belley near the gills; particularly the male."—Lewis

Coues concluded that Lewis' description of a white species of trout [*Oncorhynchus nerka* (Walbaum)] with a bluish cast on the back and head probably related to the blue-backed salmon despite the fact that Lewis' reference to the "red char," written at Fort Clatsop on March 13, 1806, specifically states that the red char was not seen above Celilo Falls. It seems to us that the white species of trout taken on the Lemhi River on Aug. 22, 1805, may have been the steelhead trout. The questionable passage is quoted below.

Aug. 22, 1805 (Lemhi River)

"late in the evening I made the men form a bush drag, and with it in about 2 hours they caught 528 very good fish, most of them large trout. among them I now for the first time saw ten or a dozen of the white species of trout. they are silvery colour except on the back and head, where they are of a bluish cast. the scales are much larger than the speckled trout, but in their form, position of their fins, teeth, mouth, etc. they are precisely like them. they are not generally quite as large but equally well flavoured."

March 13, 1806 (Written at Fort Clatsop)

"The red charr are reather broader in proportion to their length than the

common salmon, the skales are also imbricated but reather large. the nostrum (rostrum) exceeds the lower jaw more and the teeth are neither as large nor so numerous as those of the salmon and none of them are variagated with dark spots which make the body of the other. their flesh, roes and every other particular with respect to their form is that of the Salmon. this fish we did not see untill we decended below the great falls of the Columbia, but whether they are exclusively confined to this portion of the river or not at all seasons I am unable to determine."

March 13, 1806 (Written at Fort Clatsop)

"The Salmon Trout [*Salmo gairdneri* (Richardson)] are seldom more than two feet in length they are narrow in proportion to their length, at least much more so than the Salmon or red charr. the jaws are nearly of the same length, and are furnished with a single series of small subulate streight teeth, not so long or as large as those of the Salmon. the mouth is wide, and the tongue is also furnished with some teeth. the fins are placed much like those of the salmon. at the great falls we met with this fish of a silvery white colour on the belley and sides, and a bluish light brown on the back and head. in this neighbourhood we have met with another species which dose not differ from the other in any particular except in point of colour. this last is of a dark colour on the back, and it's sides and belley are yellow with transverse stripes of dark brown. sometimes a little red is intermixed with these colours on the belley and sides toward the head. the eye flesh and roes are like those described of the Salmon. the white species which we found below the falls was in excellent order when the salmon were entirely out of season and not fit for uce. the species which we found here on our arrival early in November has declined considerably reather more so indded than the red charr with which we found them asociated in the little rivulets and creeks. I think it may be safely asserted that the red Charr and both species of the salmon trout remain in season longer in the fall of the year than the common Salmon; but I have my doubts whether either of them ever pass the great falls of the Columbia. The Indians tell us that the Salmon begin to run early in the next month; it will be unfortunate for us if they do not, for they must form our principal dependence for food in ascending the Columbia, above the falls and it's S. E. branch to the Mountains."

June 13, 1805 (Great Falls, Montana)

"Goodrich had caught half a dozen very fine trout and a number of both species of the white fish. These trout [*Salmo lewisi* (Girard)] (caught in the falls) are from sixteen to twenty-three inches in length, precisely resemble our mountain or speckled trout in form and the position of their fins, but the specks on these are of a deep black instead of the red or Gould colour of those common to the U'. States. these are furnished long sharp

teeth on the pallet and tongue and have generally a small dash of red on each side behind the front ventral fins; the flesh is of a pale yellowish red or when in good order of a rose red."

The cutthroat trout is now classified *Salmo Clarki* Richardson.

March 14, 1806 (Written at Fort Clatsop)

"The mountain or speckled trout are found in the waters of the Columbia within the mountains. they are the same as those found in the upper part of the Missouri; but are not so abundant in the Columbia as in that river. we never saw this fish below the mountains but from the transparency and coldness of the Kooskooske² I should not doubt it's existing in that stream as low as it's junction with the S. E. branch of the Columbia."

SUCKERS

This fish [Northern sucker, *Catostomus catostomus* (Forster)] was first taken by Lewis and Clark on the upper Missouri southeast of Helena, Montana.

Aug. 3, 1805 (Vic. of Madison County, Montana)

"The fish of this part of the river are trout and a species of scale fish of a white colour and a remarkable long mouth which one of our men inform us are the same with the species called in the Eastern states *bottlenose*."

Aug. 19, 1805 (Vic. of Grayling, Montana)

"this evening I made a few of the men construct a sein of willow brush which we hawled and caught a large number of fine trout and a kind of mullet about 16 Inches long which I had not seen before. the scales are small, the nose is long and obtusely pointed and exceeds the under jaw. the mouth is not large but opens with foalds at the sides, the colour of it's back and sides of a bluish brown and belley white; it has the faggot bones, from which I suppose it to be of the mullet kind. The tongue and pallate are smooth and it has no teeth."

Mullet are the fish properly called suckers, belonging to the family Catostomidae. This, according to Forster, was probably *Catostomus catostomus*.—Thwaites' footnote.

March 13, 1806 (Written at Fort Clatsop)

"The bottlenose is the same with that before mentioned on the Missouri and is found exclusively within the mountains."

This fish, the Mountain sucker, *Pantosteus platyrhynchus* (Cope), is mentioned on only one occasion by Clark while descending the Yellowstone River. Coues concluded that the specimen referred to was a mountain sucker, *Pantosteus jordani*, the accepted name in 1893.

July 16, 1806 (Vicinity of Livingston, Montana)

"one of the men brought me a fish of a species I am unacquainted with; it was 8 inches long, formed like a trout. its mouth was placed like that of a Sturgeon—a red streak passed down each side from the gills to the tail."

Other species in this family which were merely mentioned as being taken in seining on the lower Missouri included the buffalo fish and the red horse.

THE CHUB

April 26, 1806 (On the Umatilla River)

"after we encamped a little Indian boy caught several chubbs [Columbia chub, *Mylocheilus caurinus* (Richardson)] with a bone in this form which he substituted for a hook. these fish were about 9 inches long small head large abdomen, small where the tail joined the body, the tail wide, long in proportion and forked. the back and ventral fins were equadistant from the head and had each 10 bony rays, the fins next the gills nine each and that near the tail 12. the upper exceeded the lower jaw, the latter is truncate at the extremity and the tonge and pallet are smooth. the colour is white on the sides and belley and a blewish brown on the back."

CATFISH

While ascending the Missouri, Clark frequently referred to the abundance of catfish, but there is little to indicate whether these notations refer to the blue cat, the channel cat, or the bullhead. Probably all species inhabiting the Missouri River were taken at one time or another.

July 24, 1804 (Above the mouth of the Platte River)

"This evening Guthrege caught a White catfish, its eyes small and tale much like that of a Dolfin."

July 29, 1804 (Few miles below site of Omaha)

"in a few minits caught three verry large catfish, one nearly white, those fish are in great plenty on the Sides of the river and verry fat, a quart of Oile came out of the surpolous fat of one of those fish."

Sept. 1, 1804 (Near Yankton, S. Dak.)

"numbers of Catfish caught, those fish is so plenty that we catch them at any time and place in the river."

SAUGER

Lewis characterized this fish which was first taken on the Missouri above the mouth of the Marias River, as a species which resembled the hickory

shad, or oldwife. Coues identified it as *Stizostedion canadense* (Smith) on the basis of the description which follows:

June 11, 1805

"the other species (caught by Goodrich) is precisely the form and about the size of the well known hickory shad or oldwife, with the exception of the teeth, a rim of which garnish the outer edge of both upper and lower jaw; the tongue and pallet are also beset with long sharp teeth bending inwards, the eye of this fish is very large, and the iris a silvery colour and wide.—we had seen none until we reached that place and took them in the Missouri above its junction with that river."

STARRY FLOUNDER

Coues concluded that the flounder discussed below probably belonged to this species, *Platichthys stellatus* (Pallas).

March 13, 1806 (Written at Fort Clatsop)

"The flounder is also an inhabitant of the salt water. we have seen them also on the beach where they had been left by the tide. The Indians eat the latter (flounder) and esteem it very fine."

EULACHON

The eulachon or candle fish,³ was one of the most interesting species discovered by Lewis and Clark. David Starr Jordan's comments concerning the taxonomic history of this species, *Thaleichthys pacificus* (Richardson), is included with Lewis and Clark's description of the fish, since it appears as a footnote in Thwaites' *Original Journals*.

Feb. 24, 1806 (Written at Fort Clatsop)

"The chief and his party had brought for sail a Sea Otter skin some hats, sturgeon and a species of small fish which now begin to run, and are taken in great quantities in the Columbia River about 40 miles above us by means of skinning or scooping nets. on this page I have drawn the likeness of them as large as life; it is as perfect as I can make it with my pen and will serve to give a general idea of the fish. the rays of the fins are boney but not sharp tho somewhat pointed. the small fin on the back next to the tail has no rays of bone being a thin membranous pellicle. the fins next to the gills have eleven rays each. those of the abdomen have eight each; those of the pinna-ani are 20, and 2 half formed in front. that of the back has eleven rays. all the fins are of a white colour. the back is of a bluish dusky colour and that of the lower part of the sides and belly is of a silvery white. no spots on any part. the first bone of the gills next behind the eye is of a bluish cast, and the second of a light gold colour nearly

white. the pupil of the eye is black and the iris of a silver white. the under jaw exceeds the upper; and the mouth opens to great extent, folding like that of the herring. it has no teeth, the abdomen is obtuse and smooth; in this differing from the herring, shad, anchovey, etc. of the Malacopterygious Order & Class Clupea, to which however I think it more nearly allied than to any other altho' it has not their acute and serrate abdomen and the under jaw exceeding the upper. the scales of the little fish are so small and thin that without minute inspection you would suppose they had none. they are filled with roes of a pure white colour and have scarcely any perceptible alimentary duct. I find them best when cooked in Indian stile, which is by roasting a number of them together on a wooden spit without any previous preparation whatever. they are so fat they require no additional sauce, and I think them superior to any fish I ever tasted, even more delicate and lussious than the white fish of the lakes which have heretofore formed my standart of excellence among the fishes. I have heard the fresh anchovey much extolled but I hope I shall be pardoned for believing this quite as good. the bones are so soft and fine that they form no obstruction in eating this fish."⁴

March 4, 1806 (Written at Fort Clatsop)

"the Anchovey is so delicate that they soon become tainted unless pickled or smoked. the natives run a small stick through their gills and hang them in the smoke of their lodges, or kindle small fires under them for the purpose of drying them. They need no previous preparation of gutting etc and will cure in 24 hours. The natives do not appear to be very scrupulous about eating them a little feated."

March 29, 1806 (Sauvies Island)

"They had large quantities of dried Anchovies strung on small sticks by the gills and others which had first been dried in this manner, were now arranged in large sheets with strings of bark and hung suspended by poles in the roofs of their houses."

Lewis and Clark were much interested in Indian methods of taking fish, and their descriptions of the devices used by some of the western tribes were similar in design to certain items of modern fishing gear.

The Shoshones encamped on the Lemhi River employed a unique gig in spearing salmon and trout. It was a forerunner of the modern arrow developed recently by bowmen in shooting carp and other rough fish.

Aug. 21, 1805 (Mouth of Prairie Creek, near Armstead, Montana)

"Their method of taking fish with a gig or bone is with a long pole, about a foot from one end is a Strong String attached to the pole, this String is a little more than a foot long and is tied to the middle of a bone

from 4 to 6 inches long, one end Sharp the other with a whole to fasten on the end of the pole with a beard (i.e. barb) to the large end, they fasten this bone on one end (of the pole) and with the other, feel for the fish and turn and Strike them so hard that the bone passes through and catches on the opposite Side, and Slips off the End of the pole and holds the Center of the bone."

The Shoshone fish weir which Clark found in the Lemhi River and described in detail shows how ingenious the primitive Indians were in making effective use of native materials.

Aug. 21, 1805 (Lemhi River)

"after smoking with them he (Clark) visited their fish wear which was about 200 yds. distant. he found the wear extended across four channels of the river which was here divided by three small islands. Three of these channels were narrow, and were stopped by means of trees fallen across, supported by which stakes of willow were driven down sufficiently near each other to prevent the salmon from passing. about the center of each a cilindric basket of eighteen or twenty feet in length terminating in a conic shape at it's lower extremity, formed of willows, was opposed to a small apperture in the wear with it's mouth up stream to receive the fish. the main channel of the water was conducted to this basket, which was so narrow at it's lower extremity that the fish when once in could not turn itself about, and were taken out by untying the small ends of the longetudinal willows which form the hull of the basket. the wear in the main channel was somewhat differently contrived. There were two distinct wears formed of poles and willow sticks, quite across the river, at no great distance from each other. each of these, were furnished with two baskets; the one wear to take them ascending and the other in decending. in constructing these wears, poles were first tyed together in parcels of three near the smaller extremity; these were set on end, and spread in a triangular form at the base, in such manner, that two of the three poles ranged in the direction of the intended work, and the third down the stream. two ranges of horizontal poles were next lashed with willow bark and wythes to the ranging poles, and on these willow sticks were placed perpendicularly, reaching from the bottom of the river to about 3 or four feet above its surface; and placed so near each other, as not to permit the passage of the fish, and even so thick in some parts, as with help of gravel and stone to give a direction to the water which they wished. the baskets were the same in form of the others. this is the form of the work, and disposition of the baskets."

Other weirs of different construction were found in use by the Wallawalla Indians and the Chopunnish tribes on the Clearwater River in Idaho.

April 29, 1806 (Near mouth of Walla Walla River)

"we therefore though it best to remain on the Wallahwallah river about a mile from the Columbia untill the morning, accordingly we encamped on the river near a fish wear, this weare consists of two curtains of small willows wattled together with four lines of withes of the same materials extending quite accross the river parralal with each other and about 6 feet asunder. Those are supported by several parrelals of poles placed in this manner (sketch) those curtains of willows is either roled at one end for a few feet to permit the fish to pass or are let down at pleasure. They take their fish which at present are a mullet only of from one to 5 pounds wt. with small seines of 15 or 18 feet long drawn by two persons; these they drag down to the wear and rase the bottom of the seine against the willow curtain. they have also a small seine managed by one person, it bags in the manner of the scooping nets; the one side of the net is confined to a semi-circular bow of half the size of a mans arm, and about 5 feet long, the other side is confined to a strong string which being attached to the extremities of the bow forms the cord line to the semicurcle."—Clark

May 8, 1806 (On the Clearwater River, near mouth of Big Canyon River)

"on the creek near our camp I abserved a kind of trap which was made with great panes to catch the small fish which pass down with the stream. This was a dam formed of stone so as to collect the water in a narrow part not exceeding 3 feet wide from which place the water shot with great force and scattered through some small willows closely connected and fastened with bark, this mat of willow switches was about 4 feet wide and 6 long lying in a horizontal position, fastened at the extremity. the small fish which fell on those willows was washed on the willows where they lie untill taken off and I cought or took off those willows 9 small trout from 3 to 7 Inches in length. Soon after I returned from the fishery an Indian came from a fishery of a similar kind a little above with 12 small fish which he offered me which I declined axcepting as I found from his signs that his house was a short distance above, and that those fisheries afforded the principal part of the food for his children."—Clark

Jan. 16, 1806 (Fort Clatsop)

"The Catsops Chinnooks etc. in fishing employ the common streight net, the scooping or dipping net with a long handle, the gig, and the hook and line. the common net is of different lengths and depths usually employed in taking sammon, Charr and trout in the inlets among the marshey grounds and the mouths of deep creeks. the skimming or scooping net to take small fish in the spring and summer season; the gig and hook are employed indiscriminately at all seasons in taking such fish as they can procure by their means. their nets and fishing lines are made of the silk-grass or white-cedar

bark; and their hooks are generally of European manufactory tho' before the whites visited them they made hooks of bone and other substance.

A

C B formed in the following manner A C and C B are two small

D

pieces of bone about the size of a strong twine, these are flattened and leveled off of their extremities near C where they are firmly attached together with sinues and covered with rosin. C A is reduced to a sharp point at A where it is also bent in a little; C B is attached to the line, for about half its length at the upper extremity B. the whole forming two sides of an acute angled triangle, the line has a loop at D by which it is annexed to a longer line and taken off at pleasure."—Lewis

May 11, 1806 (Clearwater River)

"These natives take their fish in the following manner towit. a stand small stage or warf consisting of sticks and projecting about 10 feet into the river and about 3 feet above the water on the extremity of this the fisherman stands with his guig or a skooing net which differ but little in their form from those commonly used in our country . . . with those nets they take the Suckers and also the salmon trout and I am told the salmon also."—Clark

Fish was important in the diet of the Indians of the Columbia River system and the Northwest coast. Their methods of taking, drying, and cooking fish were of much interest to the explorers.

Oct. 16, 1805 (Columbia River above mouth of Snake River)

"I took 2 men and set out in a small canoe with a view to go as high up the Columbia river as the 1st fork which the Indians made signs was but a short distance. . . . The west 4 miles to the Lower point of an Island on the Star'd side 2 lodges of Indians large and built of mats, passed 3 verry large mat lodges at 2 miles on the Star'd Side large scaffoes of fish drying at every lodge, and piles of salmon lying, the squars engaged preparing them for the scaffol. a squar gave me a dried salmon. from those lodges on the Island an Indian woman showed me the mouth of the river which falls in below a high hill on the Lar'd N. 80° W. 8 miles from the Island. The river bending Lar'd. This river is remarkably clear and crouded with salmon in many places, I observe in assending great numbers of salmon *dead* on the shores, floating on the water and in the Bottom which can be seen at the debth of 20 feet, the cause of the emence numbers of dead salmon I can't account for so it is I must have seen 3 or 400 dead and many living the Indians, I believe made use of the fish which is not long dead as, I struck one nearly dead and left him floating, some Indians in a canoe behind took the fish on board his canoe."—Clark

Oct. 17, 1805 (Above mouth of Snake River)

"passed three large lodges on the Star'd Side near which great number of Salmon was drying on scaffolds one of those mat lodges I entered found it crouded with men women and children and the entrance of those houses I saw many squars engaged in splitting and drying Salmon. I was furnished with a mat to set on, and one man set about preparing me something to eate, first he brought in a piece of Drift log of pine and with a wedge of the elks horn, and a malet of Stone curioesly carved he Slpit the log into small pieces and lay'd it open on the fire on which he put round stones, a woman handed him a basket of water and a large Salmon about half Dried, when the Stones were hot he put them into the basket of water with the fish which was soon sufficiently boiled for use. it was then taken out put on a platter of rushes neetly made, and set before me they boiled a salmon for each of the men with me, . . . after eating the boiled fish which was delicious, I set out. . . ."—Clark

Oct. 24, 1805 (Vic. of Celilo Falls)

"the mode of burying those fish is in holes of various Sizes, lined with straw on which they lay fish Skins in which then inclose the fish which is layed very close, and then covered with earth of about 12 or 15 inches thick. . . . on those rocks I Saw Several large scaffols on which the Indians dry fish, as this is out of Season the poles on which they dry those fish are tied up verry Securely in large bundles and put upon the scaffolds, I counted 107 stocks of dried pounded fish in different places on those rocks which must have contained 10,000 lbs. of neet fish, . . ."—Clark

Jan. 14, 1806 (Fort Clatsop)

"From the best estimate we were able to make as we descended the Columbia we conceived that the natives inhabiting that noble stream, for some miles above the great falls to the Grand rapids inclusive annually prepare about 30,000 lbs. of pounded salmon for market. but whether this fish is an article of commerce with the whites or is exclusively sold to and consumed by the natives of the sea Coast, we are at a loss to determine."—Lewis

MIRAN Montana River Action

VOLUME 4, ISSUE 2

MIRAN court suit demands halt on Yellowstone River structures

A suit filed by EarthJustice Legal Defense Fund in Billings Federal Court representing Montana River Action Network, and 5 other conservation groups, asks the U.S. Army Corps of Engineers to immediately halt the issuing of permits for the construction of ripraps, dikes, barbs, and jetties that constrict the Yellowstone River and result in a single, armored channel that flows with increased destructive velocity, thereby accelerating downstream bank erosion.

The Yellowstone River must be allowed to use its floodplain to create and sustain its wetlands for the breeding habitats of plants, animals, birds, and fish. Use of the river's natural floodplain will help to dissipate its velocity during flood conditions, reducing its erosive strength. A river that is allowed to adjust to high water naturally will create wide meanders within the flood plain, thereby storing flood waters and lessening the impact of downstream flooding.

The Corps violates federal laws by not understanding the cumulative impact of 82 projects it permitted in 1996-98. The National Environmental Policy Act and the Clean Water Act (CWA) require the Corps to produce an analysis of the cumulative impact of each river bank project before issuing the necessary CWA-404 permit. Because of the Corps' actions, the U.S. Fish and Wildlife Service wrote 82 official letters expressing serious concern regarding the direct and cumulative adverse impact to fish and wildlife resources on the Yellowstone River. Their concerns were ignored. The Environmental Protection Agency also asked the Corps to suspend the issuance of permits for river bank projects because of their concern that the piecemeal approach to addressing bank erosion might have a cumulative adverse effect on the environment and contribute to the significant degradation of the Yellowstone River

to downstream private property. Their comments were also ignored by the Corps.

In issuing the permits, the Corps admitted that the cumulative impact of the projects was not known and that additional study was needed to avoid an adverse impact on the river.

Recent years have seen an increase in the building of homes along the river, with homeowners having been given a false sense of flooding security by the Corps' approving flood protection structures. However, as property values along the river corridor have risen, property owners have become less tolerant of the river's natural movement and flooding. As a consequence, the last several years have seen a dramatic increase in the number of bank stabilization projects causing a constriction of the river channel and an increase in its flood velocity.

Whenever a river is allowed to reach its floodplain, the flood's energy dissipates as it slows and becomes more shallow. The water moistens the ground, allowing cottonwood seedlings and other plants to germinate. These processes combine to produce essential habitat for native cutthroat trout and riparian-dependent species.

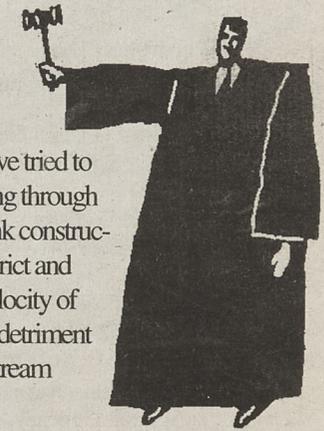
Unless injunctive relief is granted from this court suit, the Corps will continue to allow landowners to constrict the river's flow, thus destroying the river habitat on which numerous species of fish, birds, and river wildlife depend. The public will remain ignorant and uninformed of the effects of Corps' activities, and the opportunity to avoid, minimize, and remediate those environmental injuries will be irretrievably lost. Recognizing that the U.S. Army Corps of Engineers' promiscuous permitting of river bank construction activities, may threaten

the ecological health of one of the nation's premier rivers, Congress recently appropriated \$320,000 for an analysis of the cumulative environmental impact on the 80-mile reach of river between Gardiner and Springdale. The governor-appointed Upper Yellowstone River Task Force is studying the river between Gardiner and Springdale—a total distance of 80 river miles—but this task force is not addressing the 600-mile stretch of the Yellowstone River that lies downstream of Springdale, to the Montana N. Dakota boundary.

The EarthJustice Legal Defense Fund's court suit asks for the total river to be studied for a cumulative impact of river-constricting structures. The 670-mile Yellowstone River is the longest free-flowing river in the lower 48 states. It is renowned for its spectacular scenery, abundant wildlife, and thriving fish populations. The Yellowstone River provides some of the most intact cottonwood/poplar/willow riparian habitat in the West. Many species of birds, small mammals, reptiles, and amphibians rely on this habitat, including several threatened and endangered species. Sixty-two pairs of bald eagles nest along the Yellowstone River. Two-thirds of bird species that migrate through the West use riparian habitat for breeding. The Yellowstone River is famous for its trout fishery that sustains otters as well as fisherman.

Heavy snowpack and rapid melt-offs over the past years have caused flooding and erosion along the Yellowstone River, especially in the 55-mile long Paradise Valley. Such flooding is common and naturally desirable in that enriches the soil, replenishes nutrients, and revitalizes riparian habitat. Property owners along the river have tried to prevent this natural flooding process because of the resulting flooding that can occur to their property and buildings in the

flood plain. With permission from the Corps, they have tried to prevent flooding through destructive bank constructions that constrict and increase the velocity of the river to the detriment of their downstream neighbors.



The Corps' permitting of each project only begets more projects. As each new project increases the river's flood velocity, downstream landowners rush to protect their property from the impact created by the upstream projects. Landowners are rapidly armoring the banks of the river in what has been fittingly described as "riprap anarchy."

The EarthJustice Legal Defense Fund, on behalf of MIRAN and other conservation organizations, request that the U.S. Army Corps of Engineers complete a comprehensive EIS for the Yellowstone River that includes the following:

- an assessment of the cumulative impact of issuing bank stabilization permits and a rigorous analysis of alternatives
- a halt in issuance no-emergency permits until the results of the EIS can be incorporated into the permitting process.

Please write the U.S. Army Corps of Engineers (see pg. 4 for address) to express your concerns. They are headed toward an engineering solution that negatively impacts Yellowstone's river banks resulting in worsening flooding conditions, rather than a natural hydrological solution.

Address Correction Requested

Montana River Action Network
PO Box, 8298
Bozeman, MT 59773

Bud Lilly
2007 Sourdough Rd.
Bozeman, MT 59715

Non-profit Org.
U.S. Postage Paid
Permit No. 304
Bozeman, MT 59715

MIRAN

MONTANA RIVER ACTION NETWORK

MIRAN Board of Directors

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Director, 586-5140

Montana River Action Network is a non-profit river advocacy, conservation organization formed to protect Montana's streams from misuse, pollution and overuse.

MIRAN is governed by a board of directors. Directors, as well as members, are active water conservationists and river users.

MIRAN is committed to fair and equitable sharing of water resources so that adequate flows of clean water will sustain wildlife, recreation and local economies.

MIRAN works cooperatively with public, private and other non-profit organizations to develop and support watershed interest groups that will strive to find long-term solutions to problems.

MIRAN supports programs that benefit fish, wildlife, recreation and economic needs of local areas.

MIRAN is a member of the NW Energy Coalition with offices in Seattle and Portland. The coalition's mission is promoting a clean and affordable energy future for the Northwest.

MIRAN is a partner of River Network with offices in Portland, Washington DC and Helena. River Network is a national, non-profit, non-membership organization whose mission is to build effective local organizations for river protection throughout the United States.

MIRAN

PO Box, 8298, Bozeman, MT 59773
(406) 587-9181

Factory Hog Farms--Hardly the Smell of Bacon

Corporate-run hog factories produce millions of tons of manure every year. The liquefied waste from these factories is stored in huge open pits—lagoon filth pits. More interested in profits than in public safety, these corporate entities are turning the land into a stinking toilet bowl. It is a nightmare scene of dead pigs dumped in ditches, of waste flowing across open fields, and of collapsed lagoons oozing manure.

Corporate-owned factory farms squeeze thousands of animals onto plots of land suitable for only several hundred. Six months are needed to fatten a hog to the 250 pounds it must weigh before it can be shipped to the slaughterhouse. The animal waste produced is stored in lagoons that are vulnerable to spills, with ground and well water often contaminated. Often the sludge is applied to agricultural fields in amounts far beyond a crops' absorption capacity, leaving the excess sludge to ooze into rivers lakes and streams and the toxic gasses to escape into the air.

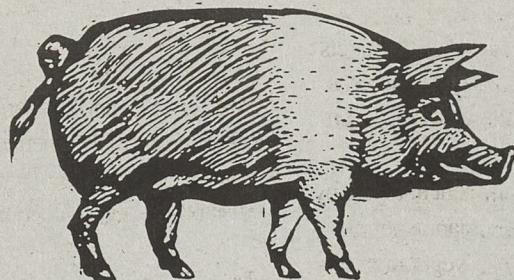
Although small farmers have traditionally applied manure as fertilizer for their crops, large hog factories produce far more manure that can be used on nearby fields. What is sprayed on cropland is often more than the land can absorb, so much of the manure ends up wasted, poisoning the groundwater or washing off into ditches and streams. The rest is dumped into large cesspools. Dumped hog waste eventually and inevitably reaches streams and rivers via ditches dug years ago to drain the land.

Once it reaches the rivers, manure, which is rich in phosphorus and nitrogen speeds algae growth, choking off other aquatic life. A toxic microbe called *pfisteria* thrives on such runoff from factory farms and in waterways that are overloaded with nitrogen and phosphorus from animal waste. *Pfiesteria* kills fish and in humans causes pounding headaches, short-term memory loss, and body lesions that will not heal.

In addition to the health and ecological disasters they are perpetrating, corporate farming is putting many small farmers out of business. In fact, each new factory farm runs 10 family farms out of business. But the rewards reaped by these corporations do not trickle down very far. Factory farms target the poor, uneducated, and disempowered people in non-union, low-wage areas. The average pay for hog workers is \$8.60 an hour (\$16,000 a year), and (not surprisingly)

working conditions are grim.

Factory farms having at least 1,000 animal units—equivalent to 700 dairy cows or 2,500 hogs—are required to have permits under the federal Clean Water Act of 1972. Strict regulation of the factory farms is opposed by the corporate farm



lobby, which wields immense political power through campaign donations to U.S. Senate and House agricultural committee members. Corporate farm lobbyists represent such groups as

the Pork Producers Association, the American Meat Institute, the National Pork Producers Council, Con Agra, Carrolls Foods, and Lundy Packing.

Regardless of the lack of support—but also because of it—there are several important actions that must be taken soon to limit the damage caused by these corporations:

1. We must fight to place a moratorium on new and expanding hog operations until firm pollution controls are in place.
2. We must fight to require more frequent public health and environmental inspections on factory farms.
3. We must fight to pass stricter regulations to stop the flow of waste from these factory farms.

Incredibly, although factory farms in the United States create 130 times the waste created by humans, the waste from these facilities is not treated—or regulated—like municipal waste. The situation is appalling and has reached critical proportions, creating a potential nightmare for us all.

Please write expressing your concerns to:

Water Protection Bureau
Dept. of Environmental Quality
PO Box 200901
Helena, MT 59620-0901

On thing for sure, someone will "bring home the bacon" in a big way if factory hog farms get their foot in the door in Montana.



MIRAN's History

On March 14, 1992, as a result of stream de-watering in 1991, a number of state-wide and locally concerned organizations came together and formulated plans to protect Montana's streams against drying up and de-watering to destructive levels.

On May 28, 1992, Montana River Watch was formed with a full-time paid coordinator and an 1-800 toll free number for reporting low stream flows due to de-watering, which causes fish kills and pollution.

On January 1, 1993, Montana River Action Network was formed as a result of the experience gained during the River Watch effort. It was realized that a state-wide river action organization was needed that could deal with water issues. MIRAN's first president, Deborah Smith, guided the organization in the primary task of protecting the integrity of Montana's river systems.

Montana's river systems are threatened by misuse, overuse, de-watering and pollution. MIRAN is committed to action against these threats by exposing them to public scrutiny, networking with other organizations and devising action plans to protect or remedy the threats.



Upper Yellowstone River Task Force update

The Governor appointed the Upper Yellowstone River (UYR) Task Force in November of 1997. Its purpose is to address problems from the 1996-97 floods through a non-regulatory process of consensus-building that emphasizes education, cooperation, community involvement, and voluntary participation. The Governor has been asked to extend its tenure.



The Montana Dept. of Natural Resources (DNRC) and the US Corps of Engineers, to investigate the cumulative effects of bank stabilization projects, have funded the UYR Task Force. The investigation will reach from Gardiner to Springdale, a distance of 80 river miles of the river channel and floodplain.

Obtaining detailed topographic mapping from aerial photos will be the first step undertaken. Property owners were asked to complete a permission access request for survey crews.

The floods of 1996-97 caused extensive erosion, sedimentation, and channel changes from Mill Creek confluence to Mission Creek. Riverbanks were eroded and riprap, installed for bank protection, was damaged. Riparian habitat crucial for migratory waterfowl and bird species were scoured out and Spring Creeks important to trout fishing were threatened.

Investigation of the cumulative effects includes the following:

- Mapping of river channel and floodplains using low aerial photos prior to

the spring runoff 1999.

- Review of historical channel changes and geomorphology through evaluation of past effects of river channel modification.
- Channel surveys and hydraulic analysis measuring width, depth, slope, and profile as affected by floodplain delineation; and the cumulative effects of channel modifications from dikes, levees, bank revetments, and grade controls.
- Riparian environment analysis by mapping existing riparian vegetation, changes in quantity of vegetation, description of channel processes and vegetation, and estimate effects of channel modifications on riparian resources. Assess proper functions and condition of riparian and wetland areas.
- Fish and Wildlife analysis of cumulative effects of channel modifications on fish and wildlife.
- Water quality assessment.
- Upland land use assessment.
- Socioeconomic assessment.

A technical advisory committee of eight people was appointed to insure that appropriate and adequate questions are asked, the best methods used, the data is objective and reliable, and the answers are relevant and understandable.

A river corridor management plan should result with the full involvement of the public. Among the alternatives presented, selection of a preferred alternative will be followed by the preparation of a management plan and recommendations for regulations by the Corps of Engineers.

Water and instream flow

Streams should be allowed to retain a sufficient flow of water to sustain natural life systems that live in the stream. This instream flow should be regarded as the primary beneficial use of water.

All diversions of water for off-stream uses, shall not reduce the instream flow, below the level where aquatic life and water quality will be decreased. In other words, water for off-stream beneficial uses can be diverted from stream flows only when there is enough water above the basic water level that is needed to sustain the aquatic life in the stream.

The public trust maintains that the state does not have authority to appropriate water beyond a minimum level needed to protect the aquatic life in the stream. Minimum flows must be maintained. If it means irrigation stops in the late summer, so be it. Aquatic life processes must be protected in year-round flowing streams by reducing water diversions when the low flows reach the point where aquatic life and water quality will be diminished.

Some streams can accommodate required instream flow and irrigation diversion with enough for all.

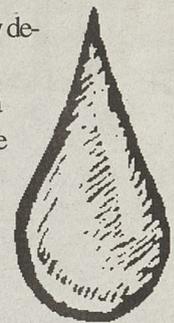
Some streams cannot tolerate any irrigation diversion.

Some streams annually go dry naturally. They are not year-round flowing streams.

- An inventory of dewatered streams which only included fisheries or fish rearing waters revealed:
- 2477 miles of Montana streams (209

reaches) are chronically dewatered each year.

- 1237 miles of Montana streams (83 reaches) are periodically dewatered each year.
- 97.6% of diverted water is used for irrigation.
- Less than 5% of Montanans hold irrigation water rights.
- 20% of diverted water is taken up and used by the plants.
- 80% of diverted water is lost to run-off.
- Agriculture pays \$2.50 for an acre foot of water.
- The city of Bozeman pays \$35 for an acre foot of water.
- The city of Los Angeles pays \$250,000 an acre foot of water.



It is obvious that Montana irrigators are using the public's water at a very low cost and must be reminded that careful efficient water use is necessary to retain an adequate flow in Montana's streams.

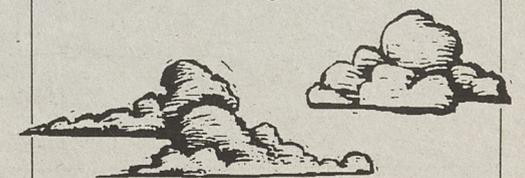
Vision Statement

The **Montana River Action Network** strives to lead the ever-growing grassroots effort to preserve, protect, enhance, and restore Montana's rivers and their watersheds for their natural, recreational, and cultural values.

As the only statewide organization focusing exclusively on watershed conservation, **MRAN** will work extensively with federal, state, and tribal agencies, private landowners, the agricultural community, fellow conservation organizations, and all other entities whose activities affect our precious water resources and our use of them.

MRAN will involve itself in all watershed issues, encourage education on watershed conservation and management, and promote advocacy for those public concerns growing out of increased awareness of Montana's fragile watershed systems.

MRAN will use volunteer efforts, specific programs, and cooperative projects to foster healthy aquatic ecosystems and the public support necessary for their appropriate use and continued survival for generations to come.



I want to support **Montana River Action Network's** continuing efforts to protect Montana's rivers, streams, and lakes. Enclosed is my membership contribution. I look forward to receiving **MRAN's** newsletter, *Montana River Action*, legislative updates, and action alerts.

Name _____
 Address _____
 City _____ State _____ Zip _____
 Phone _____
 E-mail _____

Please make checks payable to Montana River Action Network. Membership dues are tax deductible. Mail to: MRAN, PO Box, 8298, Bozeman, MT 59773

Membership Dues

- Individual \$25
- Family \$35
- Limited Income \$15
- Supporting Member \$100
- Patron \$250
- Benefactor \$500
- Founder \$1000

To help MRAN a little more, I've added \$_____ to my check.

Wild and Scenic Rivers

Last year was the 30th anniversary of the National Wild and Scenic River Act of 1968. The act achieves river conservation by adding rivers reflecting wild and scenic qualities into the national system.

The Interagency Wild and Scenic River Coordinating Council was formed by the Bureau of Land Management, National Park Service, US Fish and Wildlife Service to improve inter-agency coordination and to increase consistency in the interpretation and application of the act. The council is not a decision making body. Recommendations for Wild and Scenic classification must come from the land managing agency. While the National Forest and BLM planning processes allows for Wild and Scenic Act evaluation and planning, it is the responsibility of local grassroots efforts to encourage the analysis of their local rivers.

The National Wild and Scenic River system is credited with preserving many of our rivers in their natural state over its 30-year history of success. Rivers in the national system are classified as wild, scenic, or for recreation. The labels refer to the degree of development along the river.

- Wild rivers represent vestiges of primitive America, free of impoundments, accessible by trail, with shorelines essentially primitive, with unpol-

luted waters.

- Scenic rivers have values listed above but are accessible by roads in places.
- Recreational rivers are readily accessible by road or railroad and may have some development along their shorelines.

Certain rivers and their immediate surrounding environment possess remarkable values such as scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values. Preserving these rivers in a free flowing condition is of paramount importance. Their environments should be protected for the benefit and enjoyment of present and future generations.

In Montana, only 64 miles of wild, 26 miles of scenic, and 59 miles of recreational sections of the Missouri River are protected under the National Wild and Scenic River Act. On the Flathead River, only 97.9 miles of wild, 40.7 miles of scenic, and 80.4 miles of recreational sections are protected by the "Act".

MRAN is working toward obtaining additional protection for our rivers including the Yellowstone, Gallatin, Madison, Jefferson, Clark Fork of the Columbia, Clarks Fork of the Yellowstone, Bitterroot, Blackfoot, Marias, Milk, and Swan Rivers.

American Heritage Rivers Update

The American Heritage Rivers Program is not a substitute for National Wild and Scenic River designation. Instead, its goal is to focus on economic revitalization, historic and cultural preservation, and the protection of river water quality and environmental values. Each American Heritage River will be selected primarily based on community support and the adequacy of the community's plan. Only a unified "community" – including cities, counties, landowners, commercial interests, and nonprofit groups working together – can nominate a river.

The American Heritage Rivers Program will be locally led and managed. Federal and state agencies will participate only to the extent requested by local managers. Federal agencies will be "in

service" to community groups to make federal services and programs available. The methods used will be voluntary rather than non-regulatory.

The Montana River Action Network has been a supporter of the Yellowstone River Heritage Partnership since its first meeting on February 1, 1996, when the Yellowstone River was proposed for inclusion into the American Heritage Rivers program. Unfortunately, the nomination effort was defeated by conservative extremists who feared such rivers would be taken over by the United Nations Congressional delegation and by Montana's Governor Marc Racicot, who actually helped destroy the effort to protect the Yellowstone River.

Directory of Government Officials

Governor Marc Racicot

Room 204, State Capitol
Helena, Montana 59620
(406) 444-3111

U.S. Army Corps of Engineers

Regulatory Office
301 S. Park, Drawer 10014
Helena, MT 59626-0014

MT Dept. of Environmental Quality

Mark Simonich, Director
PO Box 200901
Helena, Montana 59620-0901
(406) 444-2544

MT Dept. of Natural Resources & Conservation

Bud Clinch, Director
PO Box 201601
Helena, Montana 59620-1601
(406) 444-2074

Senator Max Baucus

SH-511 Hart Senate Office Bldg.
Washington, DC 20501-2602
(202) 224-2651
1-800-332-6106 (Billings Office)
max@baucus.senate.gov

Senator Conrad Burns

SD-183 Dirksen Senate Office Bldg.
Washington, DC, 20510-2603
(202) 224-2644
1-800-344-1513 (Billings Office)
conrad_burns@burns.senate.gov

Representative Rick Hill

1037 Longworth House Office Bldg.
Washington, DC, 20515
(202) 225-3211
1-800-949-6825 (Helena Office)
rick.hill@mail.house.gov

Dear Editor...

A letter to the editor of your local daily newspaper is a powerful tool for educating the public and influencing public land management.

Billings Gazette
speakup@bsw.net
PO Box 36300, Billings, MT 59107

Bozeman Daily Chronicle
citydesk@gomontana.com
PO Box 1188, Bozeman, MT 59771

Daily Inter Lake
PO Box 7610, Kalispell, MT 59904

Great Falls Tribune
PO Box 5468, Great Falls, MT 59403

Havre Daily News
PO Box 431, Havre, MT 59501

Independent Record
PO Box 4249, Helena, MT 59604

Missoulian
newsdesk@missoulian.com
PO Box 8029, Missoula, MT 59807

Montana Standard
PO Box 627, Butte, MT 59703

The newsletter deadline for the next issue is **November 15**. Submissions are welcome.

Send by email to:

drusha@montana.campuscw.net

A diskette can be sent to:

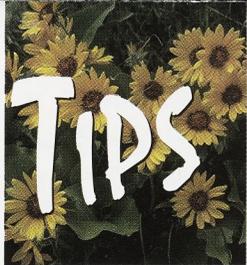
Montana River Action Network
PO Box, 8298
Bozeman, MT 59773

Big Sky Sewage Effluent Lawsuit

Big Sky Water & Sewer District #363 is applying for a permit from Mt. Dept. of Environmental Quality for a sewage waste-water treatment facility which eventually will dump treated wastewater directly into the Gallatin River. MRAN, along with six other conservation organizations and four businesses, filed a lawsuit on 3/16/99 in Gallatin County District court against the Montana Department of Environmental Quality (DEQ) for granting the discharge permit without adequate environmental assessment. Using only a "checklist EA", two pages in length, the DEQ determined that dumping 15 million gallons of sewage effluent into the Gallatin River would have no impact on water quality, terrestrial life, aquatic life, vegetation, or aesthetics. DEQ ignored requirements as specified by the Montana Environmental Policy Act (MEPA).

According to the Montana Department of Fish, Wildlife, and Parks, existing septic systems at Big Sky are polluting groundwater and streams. Mats of algae and increasing levels of nitrogen reveal that the Gallatin River is already suffering without the direct dumping of sewage by Big Sky. DEQ ignored the fact that groundwater around Big Sky is already contaminated from existing septic systems with a history of leaking sewer pipes and lagoons. Polluted groundwater will in time surface into open stream tributaries and rivers.

Approval of 864 new residences at the *Yellowstone Club*, south of Big Sky, will increase pressure on groundwater and surface water. Growth is bringing hundreds of new septic systems into the area that will worsen groundwater contamination.



on
TIPS LAND &
WATER
MANAGEMENT

This booklet will be going to the printers April 1995 for a second printing. 20,000 copies were distributed around Montana in the last six months. If you would like to have your own copies for handing out to clients, contact ColorWorld in Bozeman. Copies will run from \$.75 - \$1.00 per copy.

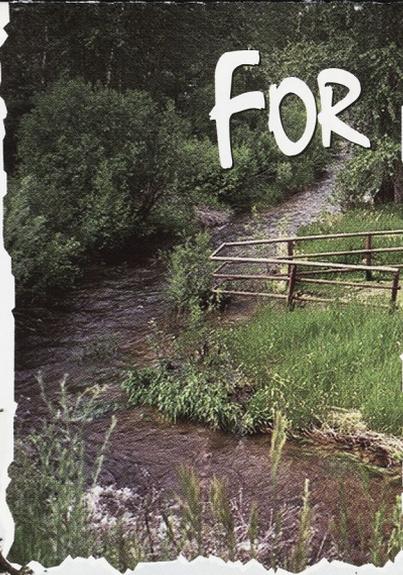
ALL FARMS
RANCHES
MONTANA



TIPS on LAND & WATER MANAGEMENT

FOR

SMALL FARMS
& RANCHES
IN MONTANA



WHY

Is Land and Water Conservation Important To You & Montana?

Montana is a great place to live, and you can help keep it that way!

ARE YOU RAISING HORSES and wondering why you are having to buy more feed each year as your land's productivity declines, leaving bare ground and weeds?

HAVE YOU HAD THE GOOD FORTUNE to buy a place on a creek and are now frustrated that you aren't permitted to remove the brush so you can see the water?

DID YOU JUST FIND OUT that those pretty purple flowers along your fence are noxious weeds and threaten the productivity of your land and your neighbor's land?

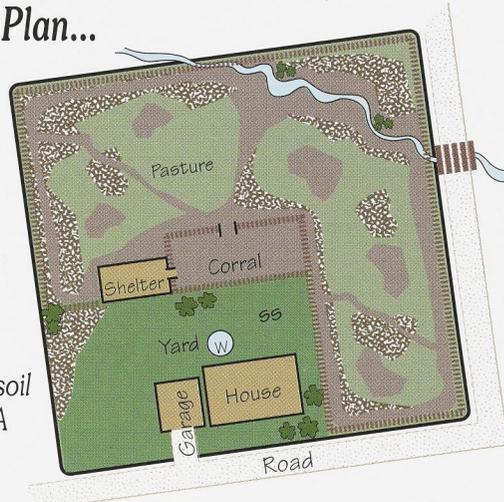
As you can see, there's a lot to know about owning and managing land, and you need to know even more if you're raising livestock, too. This booklet will get you started and give you lots of information and ideas for your place. With a little time, a little knowledge and not a whole lot of money, you can have a "picture perfect" place that you can be proud of...and protect Montana's land and water. Remember, we're all part of a neighborhood and our actions can affect others. Refer to the last page for information on how to avoid contamination and infringement on others' rights. The things that you and your neighbors do can greatly improve the health of our resources...the resources we all appreciate about Montana.

► Look At What You Have

Any landowner needs a management plan. Before developing your plan - look around, make a sketch, and take a few notes about your property. In your sketch, show or note:

- Property boundaries
- Fences and corrals
- Buildings
- Ⓜ Wells (human or stock)
- ss Septic system
- ~ Streams, wetlands, ponds
- ☪ Bare ground
- Weeds
- Lawn, pasture, or crop land
- ☪ Trees or shrubs
- ✓ Soil type (refer to your county soil survey available from the USDA Soil Conservation Service)
- ✓ Depth to groundwater (check with well driller)
- ✓ Neighboring land uses
- ✓ Flat or sloped ground

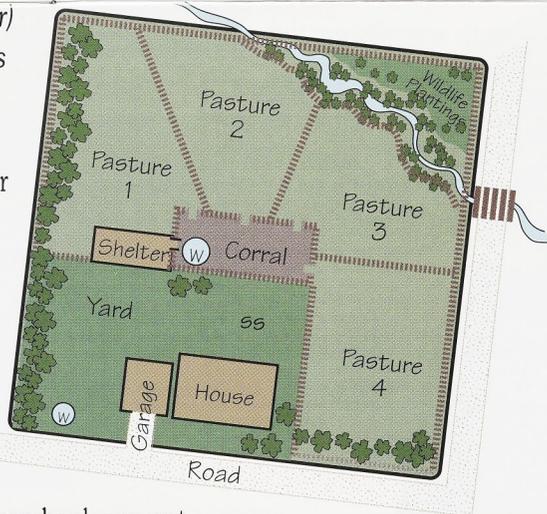
Before You Plan...



► Con\$ervation Value\$

- Saves** money because your land is more productive over the long term
- Ensures** better water quality for you, your animals, and your neighbors
- Provides** wildlife habitat
- Produces** more grass for grazing
- Grows** healthier livestock
- Improves** your property values
- Makes** your place more attractive
- Keeps** your neighbors happier
- Satisfies** your responsibility to care for the land

The four pastures in this "After" drawing allow better management of livestock grazing and increased forage production. A stockwater tank located in the corral is accessible from all pastures and reduces streambank trampling. Shrub and tree plantings along the streambank prevent erosion, replace weeds and bare areas, and provide wildlife habitat.



After You Plan!

► What Are Your Property Goals?

What do you want?
What can your land support?

- | | | |
|---------------------|-----------|-----------------|
| Livestock grazing? | How many? | Healthy forest? |
| Wildlife habitat? | | Native plants? |
| Good water quality? | | A 4-H project? |
| Fish? | | Something else? |

You may find that you have to modify some of your goals because they are not realistic for your property.

MAKE

A Plan For Your Land

Once you've looked at your property and identified your goals, you need to develop a management plan for reaching your goals. Remember, even if you like things just the way they are, you will need to **do something** to keep weeds from coming in or to keep the water clean! This booklet provides useful information on developing the many different parts of your management plan.

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Weed Management and Soils	2
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Grazing Management and Fencing Options	5
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Forest Management	8
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QUIZ

Give Your Land A Health Exam

How much of these do you have on your property?

	1	2	3
Healthy ground cover (forest, shrubs, grass, or cropland)	A lot	Some	A little
Weeds or plants that hold the soil poorly (dandelion, knapweed, cheatgrass)	A little	Some	A lot
Bare ground	A little	Some	A lot

If all of your answers are in the first column, your land earns an "A" for health. If most of your answers are in the second column, it is in average condition. If you have any responses in the third column, your land needs immediate help! Read on to learn about conservation practices that will improve your land's health.

Weed Control Weeds spread fast so regularly look for new weed patches on your property and act immediately to treat them by using one or more of the weed control practices listed below. Team up with neighbors to improve effectiveness. Remember, weed control by itself is not enough. It is also necessary to modify the practices that caused weeds to become established in the first place!

Prevention. Good land management will help keep desirable vegetation healthy and weeds under control. Buy only weed-seed-free hay, plant only certified seed, wash your vehicle after being in a weed-infested area, monitor your property, and respond quickly to any new weed infestations.

Biological. Biological control attempts to find something in nature that can weaken or eventually kill a weed plant. Successful bioagents include certain fungi and insects that weaken weeds by attacking seed heads and other plant parts.

Mechanical. Mow weeds annually before they go to seed. Pull small weed patches and weeds near streams by hand.

Livestock Grazing. Graze weeds before they go to seed using sheep, goats, or cattle. Because livestock and wildlife can easily carry and spread weed seed on their coats or in their feces, avoid moving livestock from a weedy area to a weed-free area. Some weed species, if eaten, will make livestock sick.

Chemical Herbicides. Herbicides may be expensive, but are effective when applied in the proper amounts and at the proper time of year. Read the label instructions carefully and follow directions. Use chemicals away from water to prevent adverse health effects to you and your animals and to prevent pollution of streams and groundwater. Only licensed users can use restricted herbicides. Call a local farm supply store to find out about hiring custom chemical applicators to spray your weeds. Be sure herbicide will not reach and kill desirable trees and shrubs. Properly dispose of leftover chemicals.

Is Your Soil Covered?
 ...not by insurance, but by vegetation! Vegetation protects the soil from erosion by rain, runoff, and wind. Vegetation increases water uptake by soils and holds soils in place on slopes and along streams.

How Fertile Is Your Soil?
 You'll need a soil test to find out. Contact your local Soil Conservation Service or county extension office to find out how to take a soil sample and where to send it for testing.

Know Your Weeds Before They

- Choke out desirable forage for livestock and wildlife
- Reduce the productivity of your pasture and land
- Cause water pollution and soil erosion because they're less effective at holding the soil
- Spread RAPIDLY!



Knapweed (Spotted, Russian, and Diffuse)



Leafy Spurge



Whitetop



Dalmation Toadflax



Canada Thistle



Purple Loosestrife



Sulfur Cinquefoil

To distinguish from other native cinquefoils, note that sulfur cinquefoil has many stem leaves, few basal leaves, and long, right-angled hairs along stems.

SOIL

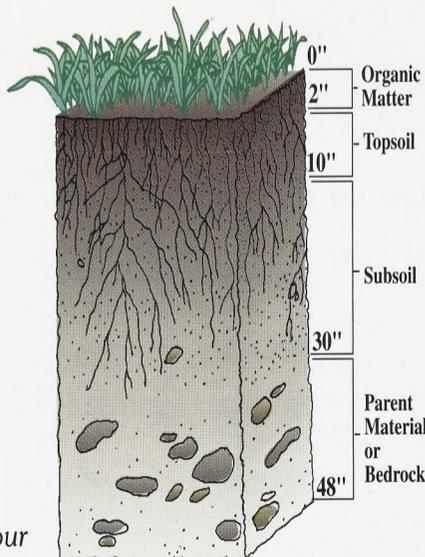
TYPES - Know Your Soil

Soils vary widely, even across your backyard. The type of soil you have will influence:

- What type and how much grass or crops your land can produce
- How quickly water moves through the soil
- If the soil will filter human and animal wastes before they reach groundwater
- How often you need to irrigate
- How much fertilizer is needed
- Possible problems with building foundations
- If the area is a wetland

For information about your soil type, refer to your county's soil survey available from the Soil Conservation Service (SCS) office (listed in your phone book under United States Government, Dept. of Agriculture).

A Soil Profile:



For Help Contact your county weed control district or county extension office to obtain a list of noxious weeds in your local area and recommendations on how best to control them.

WHAT

Is Your Annual Pasture and Hay Production?

	FERTILE SOILS		POOR SOILS	
	FEED (HAY) TONS/ACRE	FORAGE AUMS/ACRE	FEED (HAY) TONS/ACRE	FORAGE AUMS/ACRE

Irrigated	2-4	3-4	less than 2	1-2
Nonirrigated	1-2	1-2	.5 or less	.5
Rangeland/woodland	1	.5	.5 or less	.25

These figures are averages and may vary up or down, depending on management.

TIPS

To Increase Your Pasture Production

A pasture is a grazing area for animals enclosed by a fence. Pastures are often planted to nonnative plant species to increase their production. These pastures may need fertilizing, irrigating, and periodic replanting.

- Develop irrigation (if you have a water right, see page 9). Practice irrigation water management. Under-irrigating will shorten the life of your pasture; over-irrigating wastes energy, water, and your time.
- Fertilize according to SCS and soil test recommendations. Believe the soil test! Overfertilizing is not better and can damage water quality.
- Mow pastures to a uniform 3-inch height after grazing to stimulate equal growth of all plants.
- Drag or harrow to spread nutrient-rich manure.
- Control weeds.
- Reseed. Contact your local SCS office to determine the most productive seed mixture for your purpose and location.

Consider Custom Farming As A Way To Improve Your Pasture

Many landowners find it too expensive to own their own farm equipment for preparing the soil, seeding, harvesting, or baling. Ask your neighbors if they know of any custom farmers or ranchers in the area who will follow your instructions for improving your pasture.

Q: When do I need to irrigate?

A: Irrigate when the soil moisture drops to about 50 percent of its water-holding capacity in the top 3 feet of soil. Check your soil moisture by squeezing several handfuls of soil taken at 6", 12", and 18" depths in your field. Irrigate before the soil at the 18" depth begins to crumble in your hand, since most of the plants' roots are above 18".



If there is staining on your fingers from squeezing the soil, wait a couple days and test the soil again. If the soil feels only slightly moist, forms a slightly crumbly ball when squeezed in your hand, and there is no staining, then it is time to irrigate (see picture).

► **For Help** The USDA Soil Conservation Service, an irrigation company, or a consultant can provide assistance in designing an appropriate irrigation system for your property.

► Irrigation Systems

Advantages and Disadvantages

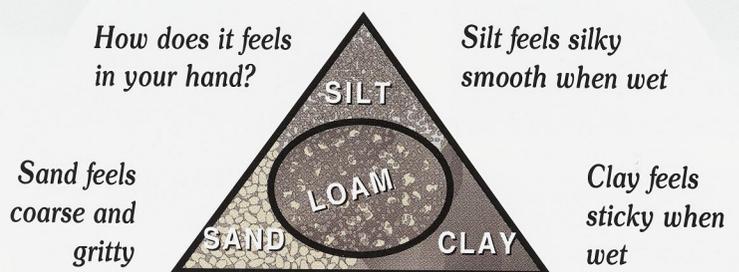
Sprinkler irrigation (includes moveable handlines, moveable wheel line, and center pivot) uses the least amount of water, requires labor to move the irrigation pipe, requires some maintenance, and requires an initial investment. Some operational costs are possible.

Flood irrigation requires lots of water, doesn't spread water evenly across the pasture, requires labor to turn water on or off a pasture, is low maintenance, and is the least expensive (assuming irrigation ditches are already in place).

"Big gun" sprinkler irrigation requires high power costs, applies excess water, and doesn't work well on clay-type soils. Water distribution is only fair and cost is moderate. Minimum labor and some maintenance are required.

► Irrigation Management

Depends on Soil Texture



Loam is a combination of all of these.

► Irrigation How Much and How Often?

SOIL TEXTURE	MOISTURE TO BE REPLACED IN THE 3-FOOT ROOTING ZONE WHEN SOIL IS AT 50% OF ITS WATER-HOLDING CAPACITY*	AVERAGE PEAK SEASON (JULY/AUGUST) IRRIGATION FREQUENCY
Loamy sand	1.4"	6 days
Sandy loam	2.3"	9 days
Loam	3.1"	12 days
Clay loam	3.2"	13 days
Clay	3.1"	12 days

* These moisture replacement estimates are for an alfalfa/grass hay crop. Amounts may vary for other crops. Irrigation is most important for alfalfa during the seedling stage and immediately after cutting. If your soil depth is less than 3', you'll need to irrigate more often and apply less water.

Q: How long should I irrigate?

A. In general, irrigate sandy soils for short periods (2-3 hours) and clay soils for longer periods (9-12 hours). Ask your farm supply store or local SCS office to recommend the correct size spray nozzle for your soil type and your irrigation system. When it rains, see if the rain has gone deeper than the soil surface before considering it a source of water for your crop.

To determine exactly how long to run your system, first place several pans at various locations under your sprinkler system. Run the system for one hour. Average the depth of the water in the pans. This is your hourly application rate. Next, divide the inches of water to replace by the hourly application rate.

EXAMPLE: Loam needs 3.1" of water replaced in the top 3 feet when it is at 50 percent of its water-holding capacity (see irrigation table). If your irrigation system's application rate is 0.3"/hour, you will need to run your irrigation system for ten and a half hours to deliver 3.1" to the soil, since $3.1 \div 0.3/\text{hour} = 10.5$ hours.

Quiz Are Your Grazing Animals Properly Managed?

- Do you have so little grass in your pastures that your animals consume dirt while trying to graze?
- Are your animals browsing on trees, shrubs, fences, or barns?
- Are your animals losing weight, or are they overweight?
- Do your animals have scruffy coats?
- Are your animals prone to colic or respiratory problems?

Y	N
<input type="checkbox"/>	<input type="checkbox"/>

If you answered "yes" to any of these questions, you need a new grazing program that will provide more grass and healthier animals... and save you money in lower feed costs and lower veterinarian expenses!



Grazing Management Produces More Grass

Continuous grazing allows weeds to grow where grass roots have been weakened. A less dense leaf canopy allows sunlight to reach invading weeds.

Pasture rotation and good grazing management produces more grass, fewer weeds, and no bare ground.

TIPS For a Successful Grazing Program

- Eliminate continuous season-long grazing.
- Subdivide large pastures into smaller pastures (see sample grazing designs on next page) and develop a pasture-rotation grazing system.
- Corral livestock and feed them hay until your pasture grasses are 6" to 8" high. Move livestock when 50% of the grass plant has been eaten (3" to 4" height remains). Do not regraze until grasses are at least 6" high (will take 1 to 3 months).
- During winter months, continue your rotation to distribute manure and feed wastes evenly across your pastures or hold animals in a corral.
- Allow long rest periods or use a high-intensity, short-duration grazing system to rejuvenate poor condition pasture.
- Provide a water source for each pasture (see next page).
- Irrigate each pasture (if you have irrigation) immediately after grazing to get plants growing again. Do not graze on wet soils.
- Horses do not need 24-hour access to feed or forage. Their nutrition needs can be met with only a few hours of grazing on good pasture each day. Corral animals for the remainder of the day to prevent overgrazing of plants and extend the forage available in your pastures.
- On a limited acreage, you may have only enough pasture to exercise your animals and will need to feed year-round.

Poor Condition Pastures Cause

- colic and respiratory problems from eating dirt
- weight loss
- parasites
- poor coat

Do You Have Enough Feed and Forage For Your Livestock?

In Montana, livestock are usually grazed May through October during the plants' growing season (if you have enough pasture) and fed hay from November through April.

Forage is what your animals consume by grazing. Forage production is measured in animal unit months (AUMs). One AUM is equivalent to the amount of forage consumed by a 1000-pound animal in one month.

Feed is the hay that you provide an animal when forage is not available. Hay production is measured in tons per acre.

Q. How much feed and forage do your animals need each year?

A. Average requirements are listed below, but may vary with season, level of use, and the age and size of the animal.

	FEED (HAY) TONS/MONTH	FORAGE AUMs OF GRAZING/MONTH
1 cow	.4	1.2
1 horse	.5	1.25
1 sheep	.1	.2
1 llama	.15	.3
1 goat	.1	.2

Q. How much feed and forage can your land produce?

A. See Pasture and Hay Production table on page 3.

Q. Do your feed and forage requirements balance with your land?

A. To find out, do your own calculations following these examples:

FEED REQUIREMENT: 3 horses x $\frac{5 \text{ tons}}{\text{month}}$ x 6 months = 9 tons hay

FEED PRODUCTION: 10 acres (fertile nonirrigated soil) x $\frac{1 \text{ ton}}{\text{acre}}$ = 10 tons hay

FORAGE REQUIREMENT: 3 horses x $\frac{1.25 \text{ AUMs}}{\text{month}}$ x 6 months = 22.5 AUMs

FORAGE PRODUCTION: 10 acres (fertile nonirrigated soil) x $\frac{1 \text{ AUM}}{\text{acre}}$ = 10 AUMs

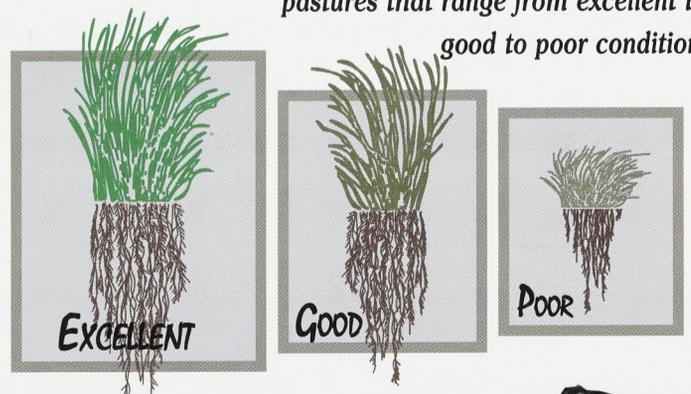
In this example, your land will produce enough hay to feed your animals for 6 months. However, you do not have enough forage (grazing) to meet your animals' needs. To avoid overgrazing your pastures each year:

- Buy additional feed or rent pasture
- Increase your pasture production (see "tips," previous page)
- Improve your grazing management
- Reduce your number of animals
- Seek assistance

How Grazing Affects Root Growth

	PERCENT GRASS PLANT REMOVED	PERCENT ROOT GROWTH STOPPED
Overgrazing occurs when more than 50 percent of the grass plant is removed all at once.	10%	0%
	20%	0%
	30%	0%
Overgrazing stops root growth and reduces grass production.	40%	0%
	50%	2-4%
Look what happens when you try to sneak in another 10 percent "harvest"---50 percent of the roots stop growing!	60%	50%
	70%	78%
	80%	100%
	90%	100%

Notice how the root mass of these grasses decreases in pastures that range from excellent to good to poor condition.



SAMPLE Grazing Schedule

For A One Herd Multiple-Pasture System

In Montana, livestock are normally grazed May through October during the plants' growing season. Begin grazing when plants are 6" to 8" in height. Move livestock after 50 percent has been eaten (3" - 4" remains). A minimum of 30 days is needed between grazing periods on irrigated pasture and up to 3 months for nonirrigated pasture. You may need to corral livestock and feed them hay until the pasture regrows.

Pasture	M O N T H S											
	M	J	J	A	S	O	N	D	J	F	M	A
1	G		G		G							
2		G		G		G						
3			G		G		G					
4			G		G							

G Graze
 Rest
 Provide feed/hay

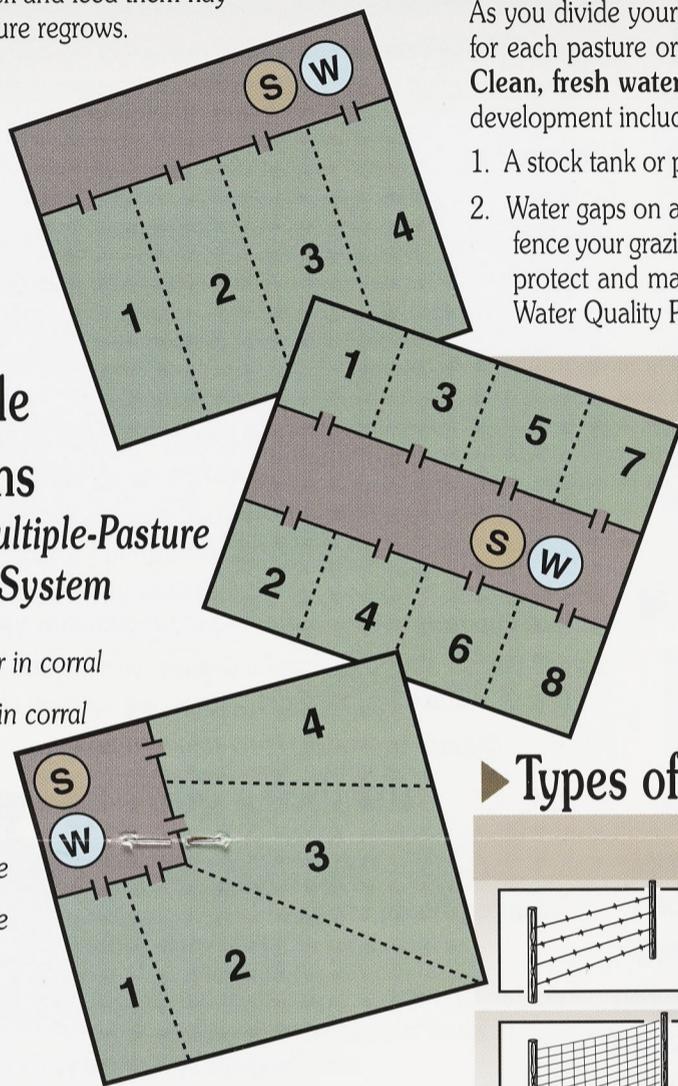
Stockwater Development

An Essential Part of Your Grazing and Animal Health Programs

As you divide your acreage into several pastures, establish separate water sources for each pasture or a single water source that is accessible from several pastures. **Clean, fresh water is essential for good animal health.** Options for stockwater development include:

1. A stock tank or pond (consider how you will keep water from freezing in winter).
2. Water gaps on a stream. For small acreages, it is highly recommended that you fence your grazing livestock away from streams to keep manure out of the stream, protect and maintain streamside grasses and shrubs, and control erosion (see Water Quality Protection on page 9).

Sample Designs For A Multiple-Pasture Grazing System



- S Shelter in corral
- W Water in corral
- ▬ Gate
- Corral
- Pasture
- Pasture fence

For Help

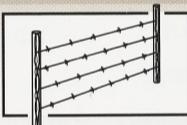
Obtain publications from county extension offices on livestock production, farming, gardening, and 4-H programs. Assistance is available from the USDA Soil Conservation Service, conservation districts, and private consultants to:

- Design a grazing system
- Increase hay and pasture production
- Design a livestock waste disposal program
- Design stockwater developments
- Help you meet water quality standards

Types of Fencing

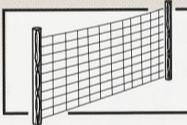
ADVANTAGES

DISADVANTAGES



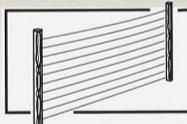
4-STRAND BARBED WIRE
Good control of cattle. Skill and design for construction readily available.

Barbed wire may be injurious to horses and llamas. Labor and material costs high. Periodic maintenance required. May be damaged by big game.



WOVEN WIRE
Skill and design for construction readily available. Good control of sheep. Add 2 upper strands of barbed wire for cattle.

Labor and material costs high. Some maintenance necessary.



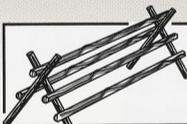
4- to 10-STRAND SMOOTH WIRE
4- to 5-strand good for horses. 8- to 10-strand will contain large, exotic animals or keep big game out. Durable.

Labor and material costs high. Periodic maintenance required.



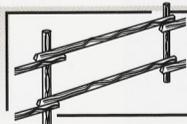
ELECTRIC
Good for establishing pasture rotation program on small acreages. Lightweight, portable, easy to set up or dismantle before and after irrigation. Less expensive.

Weathers poorly. Don't use in lengths over 1,000 ft. Requires regular maintenance. Needs solar or electric power source.



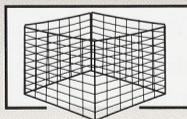
JACKLEG
Aesthetically appealing. Very durable. Withstands heavy snow. Good in areas where it is hard to dig or drive posts. Can be adapted for marshy, wet areas. Low maintenance.

High labor and material costs during construction.



POST AND POLE (RAIL FENCE)
Durable. Withstands heavy snowfall. Low maintenance.

High labor and material costs.



HOG PANELS
Can be formed into a small, portable pen. Wheels may be attached to make moving easier. Good for establishing rotation grazing for a couple animals on small acreage.

Inexpensive and easy to construct. Appropriate for only a few sheep or other small animals. Should be moved once or twice each day.

FENCING A Grazing Management Tool

Choosing The Right Fence

There are many types of fences. Each has advantages and disadvantages. No single factor determines the best type of fence to use. When selecting a fence, consider:

- Purpose (type of animal you're keeping in or out)
- Type of soil material (rocky or deep loam)
- Terrain
- Material and labor costs for construction
- Availability of power
- Maintenance requirements
- Weather
- Visual impact

QUIZ

How Safe is Your Drinking Water?

Do you have a drainfield or livestock corral less than 100 feet from your drinking well or stream?

No	Yes
<input type="checkbox"/>	<input type="checkbox"/>

Are your streambanks bare of vegetation, eroding, or falling into the stream?

<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------

Do your well tests show fecal or nitrate contamination?

<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------

If you answered "yes" to any of these questions, you will want to take immediate action to correct the problem. Get help!

Uncertain About the Safety of Your Drinking Water?

The **Farm *A* Syst** program allows you to assess the potential effects of various farmstead practices on your drinking water supplies. In addition to twelve do-it-yourself worksheets, the program provides suggestions for how you can modify your practices and where to go for help. The quality of your drinking water can affect farm values, as lenders consider the cost of corrective actions or cleanup in sale prices. Contact your county extension agent for more information.

TIPS To Prevent Water Pollution

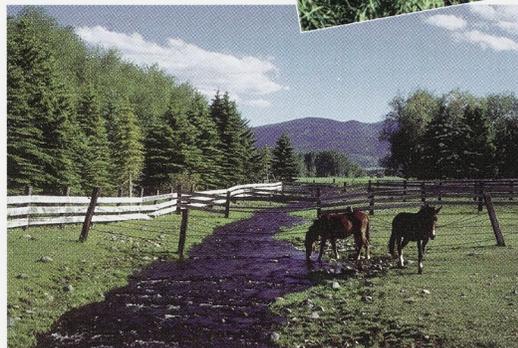
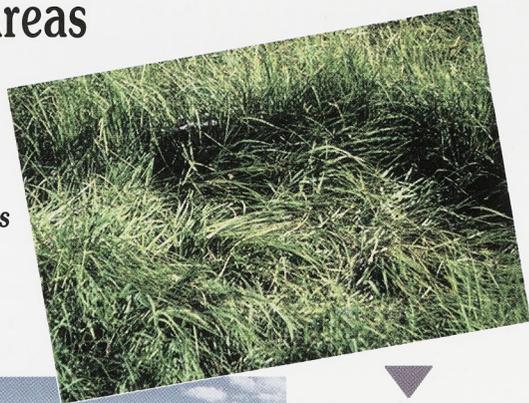
- Establish and maintain shrubs and grasses along streams and around animal confinement areas to trap and absorb pollution-laden runoff before it reaches streams or groundwater.
- Locate corrals and other livestock confinement areas away from streams. Use water gaps or off-stream stockwater tanks to minimize livestock trampling of streambanks.
- Avoid over-irrigation that can cause valuable topsoil, fertilizer, and pesticide runoff.
- Properly dispose of manure, feed, and bedding wastes by spreading on your cropland. Be sure soil is not too wet or frozen to absorb wastes. This will reduce your need for expensive commercial fertilizers.
- Locate corral and septic system downslope of your drinking water well.
- Use farming practices that reduce soil erosion and increase water infiltration, such as: minimum tillage, contour farming, filter strips, and grassed waterways.
- Do not mix, apply, or dispose of weed control chemicals, used motor oil, or other toxic substances near streams or where they can leak into groundwater. Contact your county health department for the best method of disposal in your area.

Does Your Property Have A Wetland?

Wetlands are protected from land management activities that would destroy them or change their function. Wetlands are determined by specific soil, vegetation, and hydrologic characteristics. Contact the Soil Conservation Service to determine if your wet area is a wetland.

Riparian Areas

are found along streams, lakes, and wetlands. They are comprised of water-loving plants such as alder, willow, cottonwood, and sedges.



Continuous season-long grazing often removes important riparian vegetation and may cause streambank erosion and water quality degradation.

These areas make up less than 5 percent of the landscape, yet contain 75 percent of our plant and animal diversity: turtles, beaver, muskrat, wood duck, songbirds, frogs, insects, aquatic organisms, orchids, lilies, and more. Just about everything you like about these areas depends on leaving them in their natural state.

A Healthy Riparian Area

is the key to a healthy stream system. Lush riparian and wetland vegetation along the water's edge will:

- **Slow** flood flows and reduce erosion and property loss
- **Secure** food and cover for fish, birds, and other wildlife
- **Keep** water cooler in the summer and prevent ice damage in winter
- **Reduce** water pollution by filtering out sediment, chemicals, and nutrients from runoff
- **Provide** important breeding habitat for birds
- **Shelter** animals during calving, lambing, or fawning
- **Hold** more water in the soil, slowly releasing it for longer season streamflows and groundwater recharge

For Help

- The U. S. Fish and Wildlife Service's Private Lands Program funds projects that create, enhance, or restore wetlands (761-5450).
- The Montana Department of Fish, Wildlife and Parks' River Restoration Program funds stream corridor improvements, including fencing and bank stabilization (444-2449).
- County extension offices have lots of water publications, including information on how to test your drinking water quality.
- Request the *Guide to Stream Permitting in Montana* from your conservation district. It lists the laws that must be complied with before initiating any activity in or near a stream, lake, or wetland.
- The Montana Department of Health and Environmental Sciences in Helena will answer questions about state and federal water quality laws (444-2406).

Quiz

Is Your Property Attractive to Wildlife?

Are there a variety of vegetation types, such as small grains, tall grasses, shrubs, and trees for food? For cover?

Y N

<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

Is there a pond, stream, or stockwater tank available to wildlife?

Can wildlife avoid predation from domestic animals, such as cats and dogs?

The more "yes" responses you had, the more likely you will enjoy the company of birds, small mammals, and maybe even deer and elk.

Wildlife Habitat =

Food+ Water+Cover

Wildlife habitat is being lost as more land is subdivided, bringing houses, people, livestock, dogs, cats, and other intrusions. Landowners can help offset this loss of wildlife habitat by growing a diversity of vegetation that provides food and cover for wildlife.

FOOD requirements will naturally vary by wildlife species, from the seeds and berries required by birds, to the grasses, forbs, and shrubs preferred by deer and elk.

WATER on or near your property in the form of a pond, stream, or developed stockwater will increase the variety of wildlife you can attract.

COVER is needed for hiding from predators, travel corridors, nesting, and shelter.

► Upland Game Birds

Provide food. Areas of tall grass, thickets of shrubs, and plots of wheat, barley, and other small grains provide food and habitat diversity for pheasants and other upland birds. When harvesting crops, begin cutting from the center of the field outward to flush birds away. Don't worry about water. These birds get moisture from dew and the food they eat.

Provide nesting areas and cover. Plant tall grass along roadsides and ditchbanks and shrubs along fencelines or as part of a windbreak to provide nesting and cover. Since these birds nest on the ground in the spring, avoid mowing, burning, or using weed control chemicals on your tall grass until birds are out of the nest in mid-June. (Some weeds should be sprayed prior to June 15 to control their spread effectively, so weigh your priorities.)

► Song Birds

Provide food and water. Trees and shrubs can provide seeds, fruits, and berries that birds like. Streams, ponds, or stocktanks can provide water. Place a floating board in stocktanks to prevent birds from drowning while watering.

Provide nesting areas and cover. Song birds require a diversity of vegetation heights (tall grass, shrubs, trees) and a variety of foliage densities (evergreen and deciduous trees) for nesting and safety from predators. Perches of different heights, such as old snags, fences, and telephone poles, are used by many birds (from bluebirds to hawks) for resting and searching for food.

► Waterfowl

Provide food. Waterfowl like aquatic plants, small insects, snails, and crustaceans. They also feed on grains and forage.

Provide water. Ponds are a natural for attracting ducks, geese, and other waterfowl. Ponds should have shallow and deep areas and well-vegetated banks. Vegetated islands are the safest and preferred for nesting.

Provide nesting areas and cover. Large 40- to 50-acre areas of tall, dense, undisturbed vegetation near open water are needed for successful nesting. A tangle of dead plants from last year's growth will hide nesting hens from predators. This dense, dead vegetation also creates better temperature and moisture conditions for egg hatching.

TIPS

for Creating Wildlife Habitat

- Plant a diversity of vegetation types and heights.
- Plant shelterbelts and fence rows with evergreens and fruit-bearing shrubs.
- Leave snags and down, woody material for perching, hiding, and nesting.
- Plant small grains or large-seeded grasses for wildlife food.
- Develop ponds or other watering facilities.

If you have too much wildlife or the wrong kind, contact the Montana Department of Fish, Wildlife and Parks, County Extension, or the U. S. Fish and Wildlife Service for help.

► Trout and Other Fish

Provide food and cover. In small streams, the majority of "fish food" comes from the insects and leaves that fall into the stream from overhanging vegetation. Overhanging shrubs, sedges, and grasses also help to keep water temperatures cool in summer and reduce icing in winter.

Provide habitat. Fish need riffles and deep pools to meet all of their food and cover needs at different stages in their lives. The rocks found in riffle areas churn up the water, which adds oxygen and carries insects to the fish hiding behind rocks or under overhanging banks. Deep pools provide the coldest, most-oxygenated water in summer and are least likely to freeze in winter, killing fish.

► Deer and Elk

Remember, attracting large wildlife may also mean damage to gardens and ornamental plants. More deer and elk around your home may also attract predators, like mountain lions.

Provide food. Deer and elk are primarily grazers, but also browse on trees and shrubs. Creating openings in the forest will increase grass and shrub growth for big game. In winter, deer and elk look for windblown areas where grasses are exposed—that may be **your** pasture! After feeding, elk and deer look for thickets of shrubs or stands of trees to rest and stay warm.

Provide cover. When deer and elk feed in the open, they like being no more than 600 feet from trees and brush for hiding. Consider maintaining large areas of dense shrub or trees on your property for hiding and shelter, especially near pastures. Areas of dense timber are cooler in the summer and warmer in winter than open areas. If you want to accommodate deer and elk and need a fence, build a low one with a smooth top wire. This is easier for them to cross.

► For Help

To develop a plan for improving wildlife habitat on your property, contact your local USDA Soil Conservation Service office, conservation district office, or visit your library or local bookstores.

- Order trees and shrubs that wildlife prefer from the Montana State Nursery (if you own more than ten acres) or ask your local nursery to suggest some native shrub and tree species adapted for your area.
- Information on pond development is available from the Montana Department of Fish, Wildlife and Parks and the USDA Soil Conservation Service.
- The Montana Department of Fish, Wildlife and Parks has an Upland Game Bird Program that provides limited funding to property owners who want to improve habitat for pheasants and other upland game birds. Program participants must allow some public access for hunting on their property.

QUIZ

Is Your Forest Healthy?

Are your trees free of problem insects, diseases, or animal damage?

Y	N
<input type="checkbox"/>	<input type="checkbox"/>

Are your trees spaced far enough apart to allow some sunlight to reach the plants growing on the ground?

Is there more than one age or size of tree present (e.g., seedling, pole, mature)?

Is there more than one tree species present?

Do you have scattered, rather than piles of, down woody material?

If you had all "yes" answers, your woodlot is looking good. If not, read on...

Protect Your Home from Wildfire

Maintain 30' of green lawn or fire-resistant plants around your home.

Prune the lower branches of trees below 12' to remove "ladder fuels" that can cause a ground fire to become a more destructive and harder-to-control crown fire.

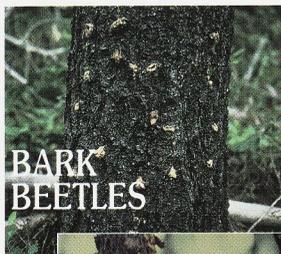
Have water and fire-fighting tools available.

Avoid using wood shakes for roofing or storing firewood next to your house.

Contact a USDA Forest Service or Montana Department of State Lands office for publications and videos on protecting homes from wildfire.

Forest Insects and Disease

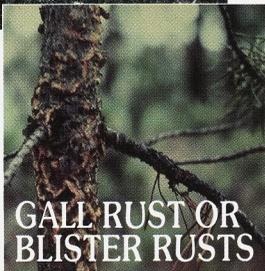
PROBLEM VULNERABLE TREES



BARK BEETLES

▲ Grand fir, subalpine fir, species of pine > 6" diameter; spruce or Douglas-fir > 14" diameter

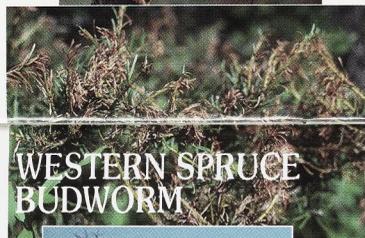
■ Pitch tubes or mass of sap on bark surface or mounds of red-orange boring dust on bark



GALL RUST OR BLISTER RUSTS

▲ Lodgepole, ponderosa pine, and white pine

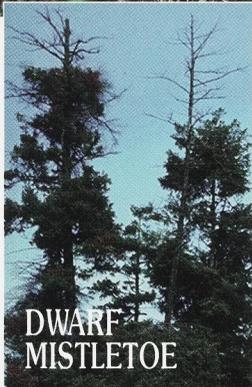
■ Gall rust forms large swellings on branches and trunks. Blister rust cracks bark open in spring, exposing yellow or orange powdery spores.



WESTERN SPRUCE BUDWORM

▲ Grand fir, subalpine fir, and Douglas-fir

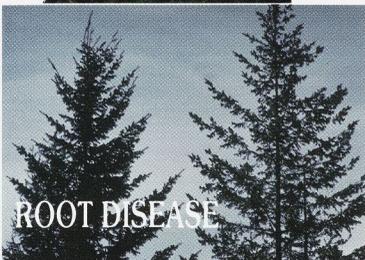
■ Initially, silky webbing in needles; followed by chewed needles turning brown at tips of branches



DWARF MISTLETOE

▲ Mostly Douglas-fir, lodgepole pine, and larch

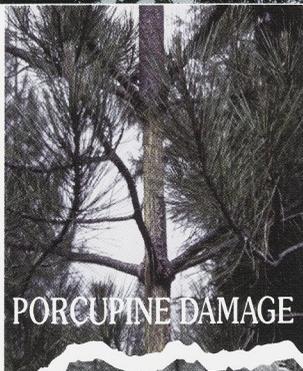
■ Witches-brooms form on infected branches



ROOT DISEASE

▲ All sizes and ages of Douglas-fir, grand fir and subalpine fir are most susceptible

■ Individual trees are dying in the stand, tree crowns thinning; rare east of Continental Divide



PORCUPINE DAMAGE

▲ All sizes, ages, and species of trees

■ Outer bark removed, exposing inner layers grooved with parallel teeth marks

TIPS for a Healthy Forest

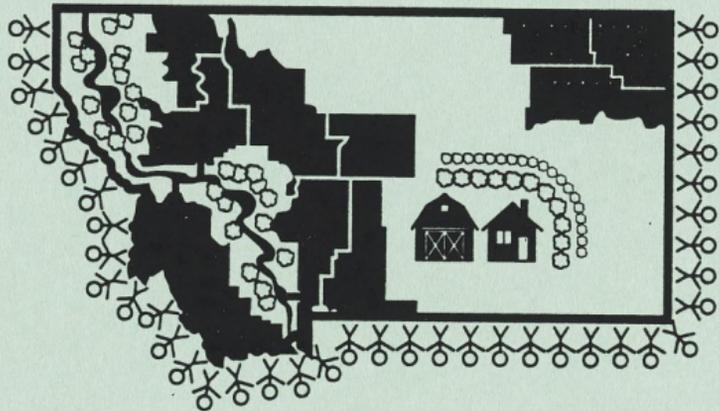
- Maintain diverse species and ages of trees.
- Reduce losses of trees to problem insects and diseases by removing infected trees and slash as soon as possible.
- Thin trees to improve growth, health, and vigor. Thinning will also increase forage. Leave the largest and healthiest trees.
- Avoid season-long livestock grazing that can compact soils and damage trees from browsing or rubbing.
- Locate access roads away from streams; construct adequate drainage. Seed cut slopes promptly to reduce erosion and water pollution.
- Dispose of heavy accumulations of down woody material to reduce fire hazard. Leave snags (standing dead) and larger downed logs for wildlife and forest nutrient cycling.
- When controlling weeds with chemicals, take special precautions not to kill trees.
- When planting trees, select species adapted to your soil, climate, and particular site. Care for new trees by watering regularly and removing competing vegetation in a 1-foot diameter around trunk. Prevent browsing by livestock and wildlife.
- Seek help when planning a timber sale to get top dollar, handle the various permits needed, and see that the remaining stand is in good shape when the harvest is over.



For Help

- The Forest Stewardship Workshop Program will teach you how to do an inventory of your property and develop your own management plan. For workshop details, call Extension Forestry (243-2773).
- The Montana Department of State Lands' Private Forestry Assistance Program gives assistance to western Montana landowners setting up timber harvests and provides information about forestry Best Management Practices (BMP's). Request the *Forest Stewardship and Water Quality Guidelines* booklet.
- The USDA Soil Conservation Service and local conservation districts can provide assistance in developing a forest land grazing plan.
- Private forestry consultants can conduct forest inventories, set up timber sales, and help you achieve your forest management goals. (A directory of consultants is available from the Montana Department of State Lands.)

Small Acreage Resource Management Program



Place
Stamp
Here

GALLATIN CONSERVATION DISTRICT
3710 W FALLON ST BOX B
BOZEMAN MT 59715-6433

For more information on land & water management, please fill out & return this card.

- Name _____ How many acres do you own? _____
- Address _____ Is your property on a stream? _____
_____ How long have you owned your property? _____
- Phone _____

• Would you be interested in attending a land and water management workshop? _____

If yes, which would you prefer? Please circle all that apply.

All day Saturday session One evening session Series of evening sessions

If yes, on what subject/s? Please circle all that apply.

Weeds Grazing Water Quality Irrigation Management
Forestry Soils Wildlife Animal Health & Nutrition
Crops Livestock--what kind _____ Other _____

• What did you like about this booklet, "Tips on Land & Water Management for Small Farms & Ranches in Montana"?

QUIZ

About to Build?

Is the site in a floodplain or close to a stream?
 Could your access road cause slumping, scar the hillside, or cause sediment to enter a stream?

Y N

<input type="checkbox"/>	<input type="checkbox"/>

Will your prospective homesite disturb wildlife habitat?

Does your neighborhood lack covenants that will protect the land, water resources, and future aesthetics of the area?

If you answered "yes" to all of the questions, WHOA—you have some planning to do.

What Is a "Conservation Easement"?

Montana is a great place to live! As more and more people are visiting, buying land, and moving here, the wide open spaces that make Montana so special are shrinking. You can help keep Montana the 'last best place' by considering a conservation easement on your property.

A conservation easement is a legal document between you and the easement holder that specifies what future uses will and will not be allowed on your property. The easement is attached to the deed for your property and remains with the property forever. The easement holder is responsible for ensuring that the terms of the easement are met in the future. Because some future development options are excluded, property taxes may be less.

If you want to take steps to sustain your land's rural agricultural qualities and to maintain wildlife habitat, contact the Montana Land Reliance, Nature Conservancy, or other local land trust organizations.



cover, and nesting:
 (a) plant small corner wood-lots,
 (b) establish shelterbelts edged with shrubs along property boundaries,
 (c) connect with meadows of native grasses or pasture land,
 (d) locate house and lawn in a corner of your property to minimize wildlife disturbance.

Tips For Planning A Homesite

- Plan for minimum impact before building.
- Site homes and roads away from streams, on stable soils, and avoid steep slopes.
- Avoid disturbing wildlife corridors, wetlands, and riparian areas.
- Control your pets so they don't disturb or attract wildlife.
- Maintain or plant native vegetation.
- As a neighborhood working together, you can provide the vegetation diversity that birds, butterflies, and small and large mammals need for food,

WHAT You Need To Know As A Montana Landowner

WHO To Contact

WATER RIGHTS - You must have a water use permit before diverting, withdrawing, impounding or distributing any surface water (or groundwater at rates of 35 gallons per minute or more).

PROTECTION OF STREAMBED AND BANKS - You must have a permit before doing any activity that modifies the stream channel or streambanks.

FLOODPLAIN PROTECTION - You must have a permit before doing any construction work in an area that would be inundated in a 100-year flood. Find out if you are in a floodplain.

CONTROL OF NOXIOUS WEEDS - All counties have laws requiring you to control noxious weeds. Find out which weeds are noxious in your county and how best to control them.

SEPTIC SYSTEM INSTALLATION - Counties regulate septic system installation, including the minimum acceptable distance between your septic system and drinking wells, streams, and groundwater. Counties also approve the septic system design, capacity, and type of soil used to treat your wastes.

CITY/COUNTY ZONING - Before building, contact your city (if you are within city limits) or your county planning office to obtain a zoning compliance permit.

WATER QUALITY PROTECTION - You are responsible for preventing livestock manure, pesticides, sediment and other pollutants from reaching waterways.

WETLANDS PROTECTION - You must have a permit to fill, drain, or dredge any waters of the U.S., including wetlands.

STOCKING FISH IN YOUR POND - You will need a permit to stock any species of fish in a private pond.

FOREST PRACTICES - In streamside areas, seven forest practices (clearcutting, burning, road construction, etc.) are prohibited on timber sales within a zone of 50 to 100 feet on each side of a stream, lake, or other body of water. A hazard reduction agreement is required before harvesting any timber.

OTHER LAND AND WATER PROTECTION MEASURES - Find out if your city or county has special ordinances, such as a Sediment and Erosion Control Ordinance that limits erosion resulting from construction, timber harvest, farming, etc., or an Aquifer Protection Ordinance that protects drinking water wells from contamination, or any type of ordinance that may affect your proposed activity.

AIR QUALITY PROTECTION - Counties determine the best time of year for open burning to minimize deterioration of local air quality and may restrict the use of woodstoves & fireplaces.

OPEN RANGE - Montana is an open range state. Adjacent landowners are equally responsible to maintain the fences between them. As a general rule, fence your property to keep range livestock out and your animals in. It is unlawful for dogs and other predators to harass, kill, or wound cattle, horses, sheep and other livestock.

• Water Rights Bureau of the Department of Natural Resources and Conservation, Helena 444-6610

• County Conservation District
 • U.S. Army Corps of Engineers, Helena 444-6670

• County Floodplain Coordinator or the Floodplain Mgmt. Section, Dept. of Natural Resources and Conservation 444-6654

• County weed control district
 • County extension office

• County health department or planning office

• City or county planning office

• Water Quality Bureau of the Department of Health and Environmental Sciences (DHES), Helena 444-2406

• U.S. Army Corps of Engineers, Helena 444-6670
 • Water Quality Bureau/DHES, Helena 444-2406
 • USDA Soil Conservation Service Field Offices (to identify wetlands)

• Dept. of Fish, Wildlife and Parks, Helena 444-2449

• Dept. of State Lands, Missoula 542-4300

• City/county planning office
 • Water quality district
 • Conservation district

• County health department or local fire department

• Department of Livestock, Helena 444-2023

Inquire about other laws that may apply to your property or proposed activities



HELP

Maintain WHAT'S BEST about MONTANA

- Productive agricultural land
- Wildlife
- Clear streams
- Native plants
- Healthy forests

About This Publication

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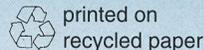
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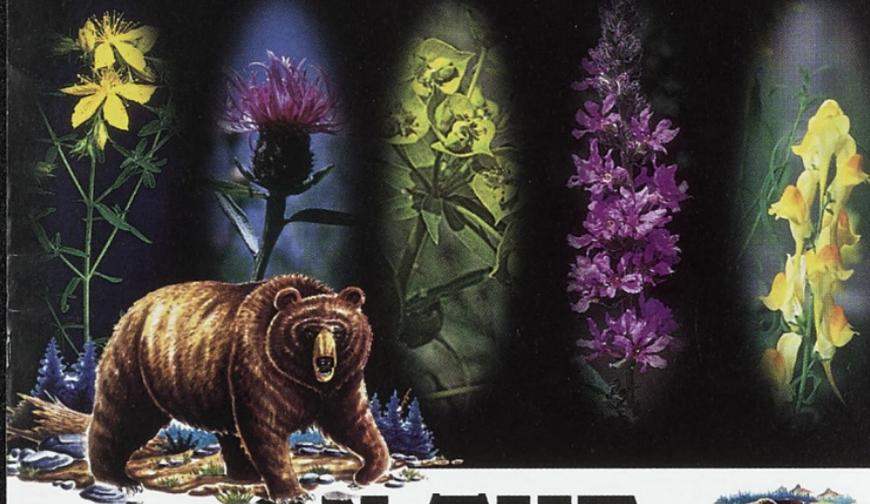
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WHAT IS SO DANGEROUS ABOUT THE IMPACTS OF NOXIOUS WEEDS



ON THE ECOLOGY AND ECONOMY OF MONTANA?



Roger L. Sheley
Bret E. Olson
Carla Hoopes



EB#152
Printed May 1998

IMPACTS OF NOXIOUS WEEDS ON THE ECOLOGY AND ECONOMY OF MONTANA

Roger L. Sheley, Bret E. Olson, Carla Hoopes

INTRODUCTION

Weeds are plants that interfere with the management objectives of a given area of land. Noxious weeds are those weeds that society has declared as our legal responsibility to manage because of their negative impacts. In most cases, noxious weeds evolved in other countries where the pressures from the environment cause them to develop aggressive and invasive characteristics. Noxious weeds are spreading like a biological wildfire and are out of control in many areas of the western United States. Negative impacts associated with noxious weeds may be ecological or economic. Noxious weeds displace native plants, reduce biodiversity, eliminate threatened and endangered plant species, alter normal ecological processes (e.g. nutrient cycling, water cycling), decrease wildlife habitat, reduce recreational value, and increase soil erosion and stream sedimentation. These negative ecological impacts result in major economic losses. The purpose of this bulletin is to describe the major impacts associated with noxious weed invasions.

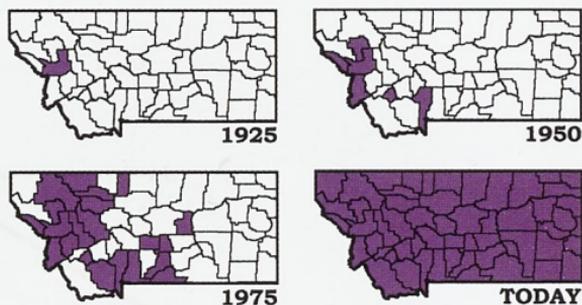


Figure 1. *Spotted knapweed* appeared near Missoula before 1925 and is now in every county in Montana.

NOXIOUS WEEDS HAVE BEEN SPREADING RAPIDLY OVER THE PAST 100 YEARS

Over the past 100 years, noxious weeds have been spreading at an alarming rate. For example, spotted knapweed arrived on the west coast in 1893 on the San Juan Islands in Washington. By 1920, this weed had established in over 24 counties in three northwestern states, with several large infestations near Missoula, Montana. Now, spotted knapweed is established in every county in the western United States and has invaded about five million acres in Montana alone (Figure 1).

Large infestations continue to expand, especially along waterways and major transportation routes. Many other knapweeds, such as yellow starthistle, diffuse knapweed, Russian knapweed, and squarrose knapweed have similar invasion rates throughout the western United States.

Leafy spurge and many other noxious weeds are invading from the east, rather than the west (Figure 2).

In our opinion, if these weeds continue to spread at their current rate for the next 100 years, they will dominate most western rangelands.

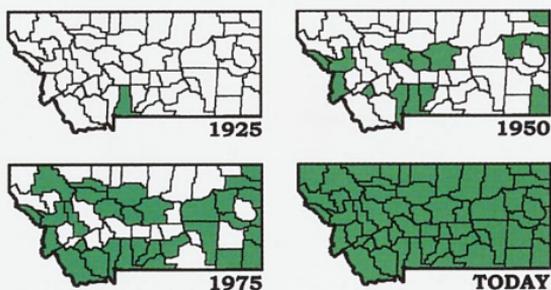


Figure 2. *Leafy spurge* was sighted in Park County as early as 1925 and is now in every county in Montana.



Figure 3. Elk populations are common to Montana's native landscapes. Noxious weeds destroy wildlife habitat.

NOXIOUS WEEDS CAUSE THE LOSS OF WILDLIFE HABITAT

Montanans enjoy large and diverse wildlife populations (Figure 3). Dense infestations of noxious weeds reduce wildlife forage, alter thermal and escape cover, change water flow and availability to wildlife, and may reduce territorial space necessary for wildlife survival. Areas dominated by leafy spurge receive much less use by deer (3 times less use) and bison (4 times less use) compared with similar uninfested areas. On native bunchgrass sites in Montana, dense spotted knapweed populations reduce available winter forage for elk by 50% to 90%. Elk use increased about 4 times after controlling the dense spotted knapweed infestation on these sites. On wetlands, invasions of purple loosestrife and saltcedar degrade habitat for furbearing animals and waterfowl. In the intermountain west, medusahead and cheatgrass invasions have increased the frequency of fires and reduced native shrub communities important for wildlife winter habitat.

NOXIOUS WEEDS DISPLACE THREATENED AND ENDANGERED SPECIES

Figure 4. Montana's Colorado butterfly is struggling for survival due to noxious weeds.



Rare, threatened, and endangered species, such as bulrush, dwarf spikerush, bog turtle, Sacramento thistle, sapphire rockcress, and Colorado butterfly are being displaced by noxious weeds (Figure 4).



Figure 5. *Healthy riparian areas provide habitat for endangered species, wildlife, and fish.*

NOXIOUS WEEDS ALTER THE FUNCTIONING OF RIPARIAN AREAS

Riparian areas are the green zones along banks of rivers and streams, and around springs, bogs, wet meadows, lakes and ponds (Figure 5). They are some of the most productive ecosystems in the West, with a great diversity of plant and wildlife species. Healthy riparian systems purify water by removing sediment as it moves through vegetation. Riparian vegetation absorbs and dissipates the energy of flood waters which cause streambank erosion. They also provide critical habitat for wildlife and fish.

Invasive weed species, such as purple loosestrife, can be extremely competitive in a riparian setting. Invasive weeds crowd out valuable native species by forming solid stands. Noxious weeds can alter the hydrologic cycles along riparian areas. For example, saltcedar, which has invaded wetlands and areas along riparian streams throughout the United States, uses large quantities of water and traps more sediment than native species. This weed lowers water tables and, in some areas, has eliminated surface water and native vegetation needed by wildlife. In addition, it has altered the shape, habitat, carrying capacity, and flooding cycle along waterways.



NOXIOUS WEEDS REDUCE FORAGE PRODUCTION FOR LIVESTOCK AND CROP PRODUCTION

Agriculture is the largest industry in Montana. Livestock production, especially beef cattle, is a major contributor to our agricultural economy. Leafy spurge and spotted knapweed can render many range sites useless for cattle production by displacing valuable forage. Grazing capacities for livestock can be reduced 65% to 90% from the original productivity. Knapweeds alone cost Montanans \$14 million dollars, annually (Table 1). If spotted knapweed is allowed to continue to spread to the fullest extent of its range, it will cost Montana's agricultural industry \$155 million dollars each year. Currently, weeds cost farmers over \$100 million each year in expenses and crop production losses in Montana.

Business Sector	Grazing	Wildlife associated Benefits	Soil & Water Conservation Benefits	Totals
	-----losses in dollars-----			
Ag. livestock	916,000	0	0	916,000
Ag. crops	3,922,000	0	556,000	4,478,000
Transportation	260,000	0	0	260,000
Communication, public utilities	175,000	0	0	175,000
Retail trade	1,738,000	883,000	0	2,621,000
Finance, insurance, real estate	434,000	0	0	434,000
Business, personal service	163,000	294,000	0	457,000
Households	3,417,000	0	0	3,417,000
Government	0	0	1,341,000	1,341,000
Electrical generation	0	0	19,000	19,000
Totals	11,025,000	1,177,000	1,916,000	14,118,000

Table 1. Annual direct economic impacts of knapweeds in Montana, 1994.



Dalmatian Toadflax



Leafy Spurge



Spotted Knapweed

NOXIOUS WEEDS DISPLACE NATIVE PLANT SPECIES

Noxious weeds outcompete most native plants for soil nutrients and water (Figure 6). In Glacier National Park, spotted knapweed reduced the frequency of six native species and totally eliminated seven other rare and uncommon native species in a three year period. On native, intact Idaho fescue/bluebunch wheatgrass rangelands, each additional spotted knapweed plant reduced the number of Idaho fescue stems by five. On a mixed-grass prairie, most native species were absent where leafy spurge was most abundant. Eleven native species were found adjacent to a dense leafy spurge infestation, but only three native species remained inside the infestation. The invasion of our rangeland by noxious weeds poses a serious threat to the conservation of native plant communities.



Figure 6. Noxious weed monocultures fill all niches for soil nutrients and water and choke out most native plants.

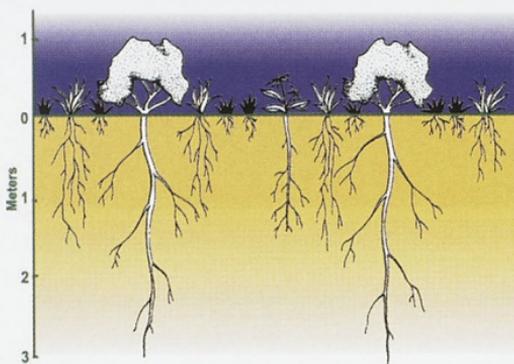


Figure 7. *Healthy plant communities include diverse species with root systems occupying all niches for soil nutrients and water.*

NOXIOUS WEEDS LOWER PLANT DIVERSITY

Plant diversity is needed to maintain healthy plant communities that resist weed invasion. Many noxious weeds, such as Russian knapweed, leafy spurge, and spotted knapweed, reduce plant diversity of native rangeland. For example, as spotted knapweed increases, biodiversity decreases. Plant diversity (Figure 7) is needed to maintain the ecological integrity of the habitat, provide resistance to weed invasion, and preserve genetic material necessary to adapt to long-term changing environmental factors, such as elevated CO₂ levels, or changes in temperature or moisture patterns.

NOXIOUS WEEDS CHANGE THE WAY A PLANT COMMUNITY WORKS

Each plant community has evolved certain ways to cycle nutrients, cycle water, capture energy from sunlight, and store energy in a form useable by animals. Noxious weeds alter the way these processes work. By increasing surface erosion, noxious weeds cause a loss of organic matter and nutrients that are normally concentrated in the surface soil layers. These nutrients necessary for growth are gone forever from the ecosystem. The removal of organic matter also reduces infiltration capacity, thereby making water less available for plants. Because many noxious weeds have relatively sparse plant canopies, more water evaporates from the soil surface, which makes even less moisture available for plant growth.



NOXIOUS WEEDS INCREASE SOIL EROSION AND SOIL SEDIMENTATION

Protecting and conserving the surface soil are critical to the long-term sustainability of healthy, functioning ecosystems (Figure 8). Soil provides nutrients and moisture necessary for plant growth and is fundamental to all life. When spotted knapweed invades rangeland dominated by native bunchgrass, protection of soil and water resources is compromised. In one study, runoff was 1.5- times higher and sediment yield was 3-times higher on spotted knapweed-dominated plots than on plots dominated by the native bluebunch wheatgrass. Loss of soil because of noxious weeds may have very serious consequences in the future.

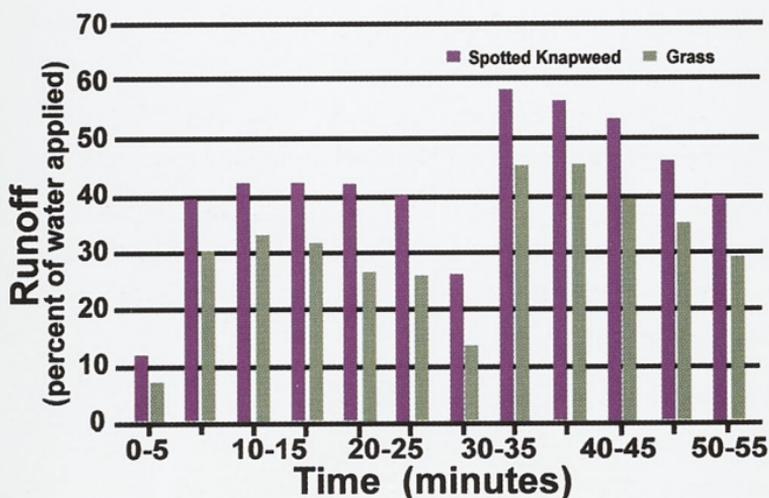


Figure 8. Soil Erosion and Soil Sedimentation increase after invasion of noxious weeds.

LACEY ET AL., (1989) ; INFLUENCE OF SPOTTED KNAPWEED ON RUNOFF AND SEDIMENT YIELD. Surface runoff from 12 grass-dominated and 12 spotted knapweed-dominated plots at various time intervals during two consecutive 30-min simulated rainfall periods in November, 1987. The initial 30-min period was on the unaltered site to measure the effect of vegetation cover plus soil surface characteristics. Vegetative cover was removed before the second 30-min period to measure the effects of surface characteristics alone.

A circular inset image showing three foxes standing in a field of tall grass. The foxes are looking towards the camera.

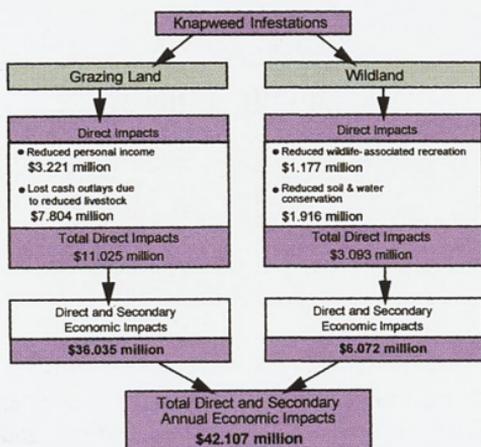
NOXIOUS WEEDS AFFECT RECREATIONAL VALUE AND USES

Montana's environment provides a wide range of recreational opportunities (Figure 9). Fishing, hunting, hiking, backpacking, camping, horseback riding, and off-road vehicle recreation are all important to the lifestyle of Montanans. For most recreationists, the enjoyment of being outdoors is diminished in areas dominated by noxious weeds. For example, hikers in the Beartrap Recreational Area along the Madison River often express the need to control spotted knapweed along the river. Riding horseback through houndstongue promotes husbandry problems for horses when seeds attach to the hide. The invasion of spiny weeds, such as Canada thistle and musk thistle, limits river access and the sharp spines make walking difficult.

Noxious weeds that displace non-game wildlife lower the quality of the outdoor experience for many recreationists. Loss of habitat for game animals and fish decreases success of hunters and anglers. This reduces the value to and the use of noxious weed infested areas by recreationists.



Figure 9. *Recreational enjoyment, a cherished form of Montana lifestyle, is diminished by noxious weed invasion.*

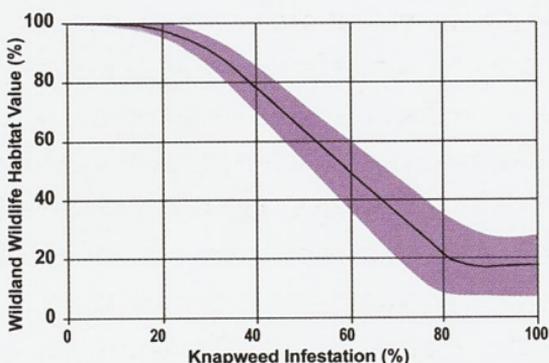


NOXIOUS WEEDS COST MONTANANS MILLIONS OF DOLLARS EVERY YEAR

Noxious weeds have a substantial impact on the economy and may cause potential job losses.

Unfortunately, the economic impact of noxious weeds is poorly understood. It has been estimated that the economic impact of leafy spurge in Montana, North Dakota, South Dakota, and Wyoming totals \$129.5 million each year and may result in the loss of 1,433 jobs. In Montana alone, spotted knapweed is estimated to cost \$42 million each year. This could support about 500 jobs. If this weed is allowed to expand to its fullest range, it could cost Montanans over \$155 million each year.

Currently, all weeds cost farmers over \$100 million each year in expenses and crop production losses in Montana alone. Degraded wildlife habitat also reduces wildlife-associated recreational expenditures in most states. Their secondary impact on the economy is unknown, but likely range between \$200 and \$300 million each year.



Wildlife habitat value decreases as noxious weed infestations increase.



NOXIOUS WEEDS CAN REDUCE THE VALUE OF LAND

Knapweed infestations have reduced the appraised value of land in Oregon. On one \$2 million recreational land transaction, the purchase price was reduced by \$200,000 because of the level of sulfur cinquefoil infestation. Noxious weeds may not have a major effect on land values in western Montana because buyers may be “paying for the view”. Realtors are seeing more potential buyers scrutinize weed infestation and management practices before closing. On production-oriented land, noxious weeds are usually considered in land appraisals. In one analysis, the presence of a noxious weed that reduces carrying capacity by 60% lowered the value of the land from the original \$220 to \$100 per acre.



St. Johnswort



Purple Loosestrife



Dalmatian Toadflax



SUMMARY

Noxious weeds are invasive plants that require immediate attention because of their impacts on the ecology and economy of Montana. These weeds are spreading rapidly. Many people believe that if the spread continues at its current rate, noxious weeds will dominate much of our rangelands and forests in a few decades. Noxious weeds outcompete and displace most native plants. This lowers plant and animal diversity essential to a healthy native ecosystem. Their invasion changes the way the ecosystem works and degrades habitat for native wildlife and fish. Noxious weeds also displace threatened and endangered species. Some weeds increase soil erosion and stream sedimentation that threatens long-term sustainability of land. Noxious weeds cost the agricultural industry millions of dollars each year in forage and crop losses. It will take all Montanans working together to protect our state from the invasion and spread of noxious weeds.

WHAT IS SO DANGEROUS ABOUT THE IMPACTS OF NOXIOUS WEEDS



ON THE ECOLOGY AND ECONOMY OF MONTANA?



About the authors: Roger L. Sheley and Carla Hoopes are assistant professor and program coordinator, respectively, Department of Land Resources and Environmental Sciences. Bret E. Olson is associate professor, Department of Animal and Range Sciences, Montana State University, Bozeman, MT 59717.

The programs of the Montana State University Extension Service are available to all people regardless of race, creed, color, sex, handicap, or national origin. Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Charles Rust, Interim Dean and Director, Extension Service, Montana State University, Bozeman, Montana 59717.



Photo by Fay Valois

Phacelia

Waterleaf's phacelia is pretty in purple

This beautiful member of the Waterleaf family (Hydrophyllaceae) is a perennial that begins blooming in May, bearing delicate purple blossoms.

The Greek word hudor means "water" and phullon means "leaf." There are several explanations why these plants were given the genus name Hydrophyllum. One is because the leaves hold water when it rains. Others are because some species have watery leaves, because some prefer moist sites, and, finally, because some leaves display a water-stained appearance. The leaves of some species can cause skin irritation.

The genus name Phacelia (fa-kel-ee-a) is derived from the Greek word phakelos, which means "fascicle" or "a small bundle." This is reference to the clustered flowers. Some of these plants also are known by the common name scorpionweed. It is said the branches of the flower cluster coil like that of a scorpion.

Some plants of this genus were often cooked as greens and eaten by the early settlers and Native Americans. Today, they make attractive additions to rock gardens. Phacelias are best grown from seed, which are available from suppliers. Elk and other large mammals also will eat phacelias.

The main area for diversity in this genus is the western United States. There are 270 species in this family worldwide, with at least 150 in North America.

The five united petals, five united sepals, and five stamens are all attached at the base of the ovary. The stamens are often protruding from the corolla, giving the plant a fringed appearance. The leaves

usually are in basal rosettes, simple or pinnately compound (divided into leaflets), opposite or alternate.

The pale lavender to deep purple phacelias can be found blooming throughout the spring and summer from the plains to the alpine zone on dry open sites, some preferring disturbed areas.

Valois is a member of the Montana Native Plant Society and president of the Upper Missouri Breaks Audubon Chapter. She can be reached at (406) 264-5465, 1-(800) 268-7102, or by writing to her at 113 Dracut Hill Road, Vaughn, MT 59847.

The Wildflower Trail

Fay Valois




Students get close to wildlife

vere in Reno I
 o it with a larger
 t was a very obvi-
 very touching to
 said. "They do it
 at the Safari Club

Safari Club Interna-
 rs in every coun-

ably the number
 world that is re-
 being as many
 as we have to-
 international pro-
 and they also do

a lot of work," Rogers said. "They have shipped literally plane loads of books to Africa to be distributed among the indigenous people there. They also take medicine and medical people in to different places in Africa."

Marlen said, "Safari Club is not only hunters, they are very avid in their message to save endangered species. And in Africa, they are doing a big job for example when animals raid crops. Safari Club will arrange to have a hunter come in and hunt the animal."

"The amount of money people are willing to pay is almost unbelievable

and that money is largely redistributed to tribe that is suffering the damage," Marlen said. "In some countries, the poor people want to go out and poach because they are hungry."

"But hunters from the United States and Europe will participate in government programs where the money will go back to the local economy."

Editor's note: There is no Great Falls chapter of Safari Club International, but headquarters of SCI are in Tucson, Ariz. For more information call (888) 724-4868.

This book will help

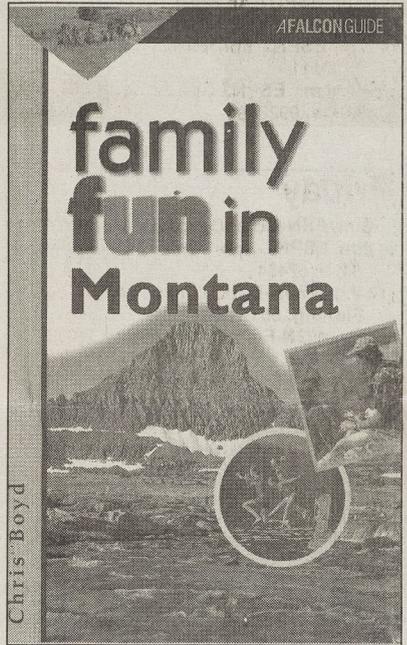
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 e tourism bureau creat-
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 Gold West Country,
 ell Country, Yellow-
 e Country, Missouri
 Country and Custer
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 ator maps found with-
 h section and a short
 scription of each site fol-
 h description includes
 ou can expect to find
 site, interesting histo-
 ut the site and infor-
 of particular interest

to kids, what the attraction might cost and phone numbers where you can obtain more information.

"Time spent with my kids in family activities has been precious, and I have always viewed it as essential," Boyd writes in her introduction. "These experiences create the kind of family bonding that holds families together through trying times."

They provide lifelong memories and give children a model of parenting that will become part of a template for their own parenting when their turn comes."

— by Michael Babcock
 Tribune Outdoor Editor



campgrounds are open

- ground — \$6 fee.
- ppground — - \$6 per unit per night. One group site available.
- ground — \$6
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- nd — \$5 per up site avail-
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- Grasshopper Creek Campground - \$6 per unit per night. One group site available.
- In the Highwood Mountains:
 Thain Creek Campground — \$5 per unit per night. One group site available.
- In the Big Snowy Mountains:
 Crystal Lake Campground — \$8 per unit per night. One group site available.

Some campsites are available for groups or organizations and may be reserved if arrangements are made two weeks in advance. Reservations may be made for group sites only. Call or stop by local Forest Service offices for more information on a

particular site.
 Campers are advised to get a Forest Travel Plan Map prior to trips into the forest.
 The map can be invaluable to forest users since it lists effective dates and types of restrictions in effect on forest travelways. There are two Lewis and Clark Forest Visitors maps that sell for \$4 each and can be purchased from any Forest Service office. For more information, call local Forest Service offices: Great Falls, 791-7700; Choteau, (406) 466-5341; Augusta, (406) 562-3247; White Sulphur Springs, (406) 547-3361; Neihart, (406) 236-5511; Harlowton, (406) 632-4391; Stanford, (406) 566-2292.

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risks are thrust upon consumers
even though there are no consumer

man body may be
there is debate about the complete

Trip to Story Hills produced disappointing results

A while ago you wrote a lead editorial praising the owner of the Story Hills for keeping his land open to the public. We thought that was fine, and yesterday we went for a hike there to see what the hills were like and to look for the bitterroot. What we found was bitter, more bitter than anything we had anticipated, but no bitterroot.

The whole area had been blanketed with herbicide and all the flowers and trees were contorted and suffering from the poison. The lupines, the arrowleaf balsamroot, the wild gera-

nium, the nodding onion, the wild rose, and the sagebrush. We suppose the owners were trying to control the leafy spurge and the spotted knapweed, but in the process they were killing everything else except the grass. And in most places, the spurge and the knapweed were thriving. Indiscriminate, ignorant slaughter of the innocents, without any appreciable affect on the target species.

The choke cherries were etiolated and suffering, the limber pine was weeping and the Douglas Fir was writhing. Rocky Mountain

Juniper was devastated and the aspens were poisoned even up to 15 feet tall. It looked like a battle zone and smelled like a chemical factory.

If the goal of the Barnard Land and Cattle Co. is to create a sterile pasture with nothing but grass and cows, then we believe they may as well lock the gates and put up no trespassing signs because nobody will want to go there to see such desecration.

*Al, Vicki and Will Scharen
4765 Aspen Lane
Bozeman*

Pick up the pace on professional rodeo coverage



playing footbag with a friend on the campus of Montana State University Wednesday afternoon. The pair
their lunch break.

ANNE SHERWOOD/CHRONICLE

mits discussions lan meetings

elves unable to
nge to document

he remains cautious about notions
of establishing a consensus, espe-
cially in light of the relatively small
turnout.

"I don't know n

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F

Headwaters of the Missouri

Named by

for trout
THREE FORKS DRINALE.

~~NAME Given By~~
Lewis & Clark

~~NAME~~ Present
~~Now~~ Name

CALKATIN RIVER (SEVERAL SPELLINGS IN JOURNALS)	SAME
MADISON RIVER ✓	✓
JEFFERSON RIVER - - -	✓
FRAZER'S RIVER	SOUTH BOULDER
ROBEN FIELDS VALLEY CREEK	NORTH BOULDER
PHILOSOPHY RIVER	WILLOW CREEK
HOWARD'S CREEK	SIXTEEN MILE
WISDOM RIVER	BIG HOLE (1)
PHILANTHROPY RIVER	RUBY (STINKING WATER)
EAST FORK JEFFERSON RIVER	RED ROCK RIVER
WEST FORK JEFFERSON RIVER	HORSE PRAIRIE CREEK
PART OF JEFFERSON RIVER	BEAVERHEAD RIVER (2)
TOPE CREEK (DEAR BOURNES)	INDIAN CREEK (BOT OF TOWNSEND)
DEARBORN (PART OF SECT. OF WAR)	DEARBORN
ORDWAY'S CREEK	LITTLE PRICKLE PEAR CR.
PATT'S CREEK	BIG ✓ ✓ ✓
CASS'S CREEK	CROW CREEK
WHITE HOUSE CREEK	DUCK CREEK (EAST SIDE OF CONYER FERRY)
WHITE EARTH CREEK	BEAVER CREEK (WEST SIDE OF ✓)

(1) JEFFERSON NOW STARTS AT MOUTH OF BIG HOLE RIVER

(2) ~~BEAVERHEAD~~ FROM CLARK CANYON DAM TO MOUTH OF BIG HOLE RIVER.

MISSOURI RIVER.

MULLET (REFERRED TO BY LEWIS & CLARK AS A FISH) IS THE COMMON "SOCKER"

WHILE @ THE HEADWATERS LEWIS SAID IN HIS JOURNAL

"WE SEE A GREAT ABUNDANCE OF FISH IN THE STREAM
SOME OF WHICH WE TAKE TO BE TROUT BUT THEY
WILL NOT BIT ANY BAIT WE CAN OFFER THEM"

(THEY WERE CAMPED BETWEEN THE JEFFERSON & MADISON)

JULY 29, 1805

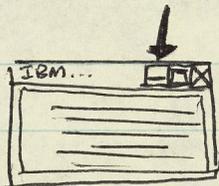
612-472-4492

Kevin Begler

hermosa5681@yahoo.com

To Email:

1. double click on  IBM Global Network icon
2. push connect button
3. minimize both internet pages by clicking  button in upper right hand corner



4. Open "Esther's Eudora" icon by double clicking
5. push "New Message" button in top row of control buttons 
6. click next to "To:" to type in ~~hermosa5681@yahoo.com~~ "hermosa5681@yahoo.com"
7. click next to "Subject:" and type here if desired
8. click ~~attach~~ inside the dialogue box below "Attached:" to begin letter
9. push send in upper right of form to send my letter.)
10. close all windows by clicking the  button in upper right of window
11. click "yes" to disconnect from network.

Trout fishing along the Lewis
and Clark Trail 1805-1806
Philadelphia 1803 4 Groce fish hooks
Mid-June - July 1805 Great Falls
area - Medicine R (Sun)
Dearborn - Smith R.

July 25 - Three Forks
Aug 5 Jefferson - Madison - Gallatin
ascending Jefferson - Wisdom
(Big Hole R) Philosophy R (Willow
Creek) Panther Creek (Pipestone
Creek) Reuben Fields Valley Creek
(No Boulder R) Philanthropy R
(Ruby R)
Aug 15 - Camp Fortunate near
confluence of Horse Prairie
and Red Rock R.

End of Aug using horses travelled
~~to~~ Bitterroot Valley to confluence
of ^{By Blackfoot} ~~Clark's Fork~~ near Sula
Wide and clear water of Clark's
Fork and description of Lolo
Hot Springs (River runs through
it)

More local news

■ Police reports/page 6

BIG SKY

3

Friday, July 9, 1999

Bozeman Daily Chronicle

City desk: 587-4491 or e-mail citydesk@gomontana.com

Insects help battle spread of weeds

Symposium:

Scientists from around the world gather at MSU to discuss ways to blunt the growth of noxious weeds

By SCOTT McMILLION
Chronicle Staff Writer

Scientists are making progress in their efforts to find bugs that will destroy leafy spurge, a noxious weed that infests an estimated 500,000 acres of Montana rangeland.

However, progress on biological control of spotted knapweed, which infests 5 million acres of Montana, still lies in the future, according to Bob Nowierski, an associate professor of entomology at Montana State University.

"It's too early in the game to say anything definitive about knapweed," said Nowierski, who is co-chair of an international symposium at MSU this week about biological control of weeds.

The symposium has attracted 285 scientists from as far away as Europe, New Zealand and Africa, Nowierski said. They are updating each other on their research and seeking common

ways to make biological control more effective and eliminate risks.

A type of flea beetle has been released on stands of leafy spurge in Montana and has shown that it can kill most plants in sunny areas with sandy soils, Nowierski said. The adult bugs shred spurge leaves and their larvae eat the roots so "you end up with just a few scattered plants left."

However, scientists still don't have an insect that will work in damp, shady areas, where spurge is most common.

Spurge, which has roots 20 feet to 30 feet deep, can take over pasture and eliminate native plants important both to livestock and wildlife. While it favors damp areas, it can live in a variety of habitats.

That adaptability is what makes it so difficult to find insects that can kill the plant. Not all bugs work well in both dry areas and damp places. Plus, spurge has 113 relatives that are

native to North America and regulators must be certain the insects won't eat native plants or crops before they can be released.

Leafy spurge is a European plant with no natural enemies on this continent, which is why it spreads so quickly. Bugs captured in eastern Europe are released here only after years of study, Nowierski said.

Progress in biological control of knapweed, even though it has only three relatives in this country, has been slow in coming.

Scientists are working with a moth called agapeta that girdles the plant's root as well as a "big fat weevil" that eats it, Nowierski said.

Noxious weeds have become an increasing problem all over the world as modern transportation has sent non-native plants and seeds to distant corners of the globe, where they can eliminate important native species and disrupt entire food chains.

If allowed to spread, they can render land nearly useless for both livestock and wildlife, increase runoff and siltation into streams, compete with endangered species and cause terrific expenses for landowners and public agencies.

Nowierski said the best tactic is to strike early when noxious weeds appear and to realize that no single treatment method — chemical herbicides, biological control or manual methods like burning or pulling — can do the job alone.

"None of them is a panacea," he said. "We have to use every tool available."

The conference, jointly sponsored by MSU and the U.S. Department of Agriculture, ends Saturday.

Nowierski urged landowners with weed problems to contact their county weed control office for information on how to battle the weeds.

OPINION

Bozeman Daily Chronicle

Friday, July 9, 1999

OUR OPINION

Set hearing times for the people who pay the bills

County commissioners are showing some refreshing flexibility by shifting the time for their weekly public hearings in order to make them more "user friendly."

The problem is, though, they're going in the wrong direction.



COMMENTARY

Mysteries fill the voids in an otherwise boring summer

Not that I'm complaining. If life weren't full of mysteries, it could be pretty boring. Mysteries give us something to ponder while we're mowing the lawn, something to discuss during coffee breaks at the office, something to muse about as we're falling asleep.

For instance, how can four city commissioners, divided fairly regularly in past votes into two even factions, select a fifth member to replace our just-resigned mayor? Shouldn't we have a system? Pick the unsuccessful candidate who got the most votes during the last election? Or during the election at which the resigning commissioner was elected?

- Recurvirostra americana* Gmelin, det. Coues (I 357; V 206) avocet
Missouri plover or pleaver,
parti-colored plover
- Rhachianectes glaucus* (Cope), det. Coues (III 224) California gray whale
whale
- Rhynchophanes mccowni* (Lawrence), det. Coues (II 120) McCown's longspur
small bird resembling lark,
lark
- Richmondia cardinalis cardinalis* (Linnaeus) det. Coues (I 38; V 111) (Coues: *Cardinalis virginianus*) eastern cardinal
Virginia nightingale
- Roccus chrysops* (Rafinesque) (I 111) (Bennitt thinks this likely) white or rock bass
rock
- Salmo gairdneri* Richardson, det. Thwaites (IV 167) steelhead trout
dark salmon trout
- Salmo lewisi* (Girard), det. Myers (II 150) (Coues: *Salmo purpuratus*; Dr. George S. Myers, Smithsonian Institution, identifies as the Yellowstone cut-throat trout) Yellowstone cut-throat trout
trout resembling our moun-
tain trout
- Salvelinus fontinalis* (Mitchill) (II 150) brook trout, speckled trout
our mountain trout, speckled
trout
- Samia cecropia* Linnaeus, det. Coues (V 87) (Coues says this or *Telea polyphemus*) cecropia moth
silkworm
- Scalopus aquaticus* (Linnaeus) (IV 113) mole (eastern)
mole
- Scapanus townsendi* (Bachman), det. Coues (IV 113) Columbian mole
mole
- Scaphirhynchus platyrhynchus* (Rafinesque), det. Coues (O 36) shovel-nosed sturgeon
sturgeon
- (*Sceloporus graciosus* Baird & Girard, lizard mentioned by Coues in connection with L. & C.'s common lizard (IV 323))
- (*Sceloporus occidentalis* Baird & Girard, lizard of the west not noted by L. & C., according to Coues)
- Sciurus douglasi* Bachman, det. Coues (V 103) (Coues, early names: *S. belcheri*, *suckleyi*, *townsendi*) pine or redwood squirrel
small brown squirrel
- Sciurus fremonti* Audubon & Bachman, det. Coues (IV 104) (either this, says Coues, or *S. hudsonicus richardsoni*) Fremont's squirrel
small gray squirrel
- Sciurus griseus* Ord, det. Coues (IV 104) (Coues: *S. fossor*, *S. hermonii*) large western gray squirrel
large gray squirrel

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FenceLines

The Farm & Ranch Journal for Southwest Montana

Hunting on ag land

three local viewpoints – should it be free or cost money?



October 1999



PLUS LOTS MORE ON LOCAL AG:

Paradise Valley is home to Montana's champion high-school cowgirl

How the local growing season is shaking out

A Montana State University analysis of why cattle prices are on the rebound

And annual celebrations of farmers and ranchers

Our local monthly roundup

This year's harvest and market time is a mixed bag



One field in the Gallatin Valley is rolled up and ready for collection. Photo by Ray Ring

by Ray Ring

As the main growing season winds down into autumn, there are a few bright spots and some continuing black holes for local ag producers.

That's the word from farmers, ranchers and others in the ag community in our region, as this issue of FenceLines goes to press.

To sum it up, in terms of production and prices this season: potatoes, beef calves and milk are looking pretty good, relatively speaking, but wheat and barley less good.

Potatoes, a major crop in the Gallatin Valley, haven't grown quite as fast as they might this season, but overall, "the quality looks pretty good," says Martin Kimm, a potato farmer near Manhattan. "I think the yield is going to be decent. The overall size is not real big — not as big as some guys like to see, but it'll make a real good seed crop."

About 80 percent of the valley's potato crop is sold as seed, Kimm says. The rest of the potato crop is sold as commercial — ending up on consumers' plates. Commercial growers prefer large potatoes because that's what most of their customers want. Seed-potato growers aim to produce smaller potatoes.

"This year looks real good for seed growers," Kimm says. "But there's a lot of guys who run little packing sheds (doing all or part of their crops as commercial) and they like a little more size."

Aphids spreading leaf roll on potato plants threatened to flare up early in the season, but "most everybody did a really good job of getting it cleaned up and getting the fields sprayed for aphids," Kimm says. "I think we got things under control in

the valley."

Potato prices also "look pretty decent this year," Kimm says. "All of North America seems to have run into a bit of a shortage in processed potatoes and fresh-packed potatoes, and that always takes a bit of the pressure off seed potatoes, because the prices go up and then there are guys who are borderline seed growers in Idaho or wherever, and they just say, 'hey, I'm just going to sell all my crop as commercial.' So then our seed prices can go up too."

For cattle producers, calf prices are a good \$10 per hundredweight higher than last fall. "People seem to be pretty satisfied with cattle prices this year," says Lisa Schmidt, extension agent for Madison County. "A lot of right around \$85 for 600-weight calves, sometimes \$86 — pretty nice. Last year it was in the high \$70s or right around \$80."

Jim Bowles, owner of Bozeman Livestock Sales Co., Inc. — the only stockyard in our region — agrees, "we're seeing stronger markets in the feeder cattle. Comparing last year to this year, we're probably \$10 a hundredweight higher across the board. It's a very needed deal, it makes everybody feel a little better about what's going on, they go home with a little money in their pockets instead of just enough to get by."

The number of cattle being sold through the stockyard has also increased. "Off the cuff, we're probably 15 to 20 percent ahead of a year ago. We just have a better market to work with," Bowles says.

As for dairy, prices are not too bad either, says Keith Nye, CEO of Darigold, the co-op that includes all 42 dairy farms in the Gallatin Valley and

continued on page 4

What FenceLines is all about

They say seven is a lucky number. Anyway, this is issue #7 of FenceLines, the monthly newspaper covering farming, ranching and the country life in Southwest Montana.

Likely most of you living on the land around here have come across us by now — FenceLines distributes nearly 10,000 copies each month. Of that total, about 8,000 copies are inserted as a special section in the Bozeman Daily Chronicle and distributed outside Bozeman and Belgrade city limits (our focus is truly the countryside). The rest are inserted in the Penny Pincher or placed as standalones in key locations — implement dealers, feed stores and other businesses that serve you farmers, ranchers and people simply living the country life.

One trait that helps distinguish FenceLines, we're local, rooted on the ground in our region. You can see that in our local news and analysis, and our local reference sections such as Country Switchboard and our list of local ag products. We're part of a major new commitment by our parent newspaper, the Chronicle, to serve readers and advertisers throughout the countryside.

FenceLines

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A hunter stalks on local ag land, by Deirdre Eitel, Bozeman Daily Chronicle; and elk find habitat on ag land, courtesy of Montana Dept. of Fish, Wildlife and Parks.

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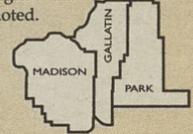
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Stockgrowers chew the fat in Livingston

by Ray Ring

How has the chicken industry gained market share on cattle and beef? No, not because consumers are suddenly seeing chicken as a healthy alternative.

Rather, what's to blame is the invention of the fast-food, deep-fried chicken nugget, which is about as healthy as a potato chip dipped in mayo.

That was some of the food for thought at a regional Montana Stockgrowers Association meeting, held the last Monday in August in downtown Livingston.

About 30 local ranchers, ag agents, sales and association reps attended, squeezing into the Beartooth Cafe to eat a meatloaf lunch and hear the talk.

The chicken-nugget phenomenon was brought up by Gary Brester, associate professor of ag economics at Montana State University-Bozeman. Consumers are eating more chicken because more chicken is deep-fried, regardless of calories and fat, and the fast-food nuggets satisfy a modern demand for convenience, Brester said.

The taste of the meat itself hardly matters — "you can deep-fry a napkin and it tastes pretty good," Brester said.

The beef industry could learn from that, not necessarily by coming up with deep-fried beef nuggets but by exploring ways to make beef more convenient, such as microwaveable beef roasts that are now being sold in some grocery stores, Brester said.

"We're not going to be reactionary anymore — we're not going to sit around and complain, we're going to be proactive," said Jenny Stickle, membership and special services coordinator for the association.

Stickle and other association reps announced a shift in political tactics — from now on, the association will get more into new programs in support of ranchers, rather than fighting rearguard actions that only react to threats such as free-trade agreements, environmentalists and wolves.

One example that was cited, the association is working up a proposal for how ranchers can get compensated for preserving sites that have historical value, such as the shores of the Missouri River where Lewis and Clark passed through.

The "historic site preservation contracts" would be something like conservation easements, said Steve Pilcher, the association's natural resources coordinator. Funding for ranchers to help preserve historic sites might come from the new Ag Heritages Program, which was launched with \$1 million by the last session of the Legislature, with some nudging by the association.

Stickle presented a case that paying dues to the association is a good idea: a hypothetical rancher with 400 head of cattle would have paid \$225 dues last year while receiving thousands of dollars worth of services, such as political lobbying, participation in the Montana Beef Network ear-tag and cattle-tracking program, and meetings and seminars such as the one in Livingston.

Among the other speakers, a sales rep talked about medicines for worms and lice in cattle — the parasites reduce the cow's appetite, which means less beef per acre, so buy now.

It was Brester who generated the most sparks. He's a lively speaker,

showing slides and applying plenty of hand gestures to emphasize his points; and he speaks from real experience, partly because he also owns a ranch near Laurel.

Most of Brester's talk had to do with cattle and beef markets, high interest to cattle ranchers.

Adjusting cattle prices for inflation, Brester said there's been a "pretty continual decline in real cattle prices" since 1972. "The only reason people have survived is technological change," which can make operations more efficient.

During the same period, there's been only a slight increase in total beef production, while pork production has increased steadily and poultry production has soared. Chicken and pork have come on strong because those industries have changed their cost structure, creating huge, integrated companies.

Pork is setting up to make a move now, Brester said. "I'm really worried that pork is going to do what chicken did to the beef industry a few years ago" — a general lowering of pork costs, so pork can sell for a lower price while increasing pork production even more and persuading the public that pork is a better product than beef.

Cattle growers should respond by emphasizing quality and turning to niche marketing to improve profits, Brester said. "The real goal is, can I have a better quality animal that I can get paid better for?"

Pricewise, Brester said he expects to see \$84 calves this fall, possibly higher (for more of Brester's take on cattle prices, see his column on markets, on page MVLR?). Brester also whisked away some myths about the import-export beef-and-cattle market. He said the perceived increase in imports from Canada in recent years has largely been just a shift in which foreign countries the cattle are imported from — before, cattle were imported from distant countries like New Zealand, and now, they're imported from neighboring Canada, so the imports are more obvious in Montana as the cattle trucks pass through.

On the other hand, during the same recent years, total U.S. exports have increased at a more rapid pace than imports — "very much a success story for the beef industry," Brester said.

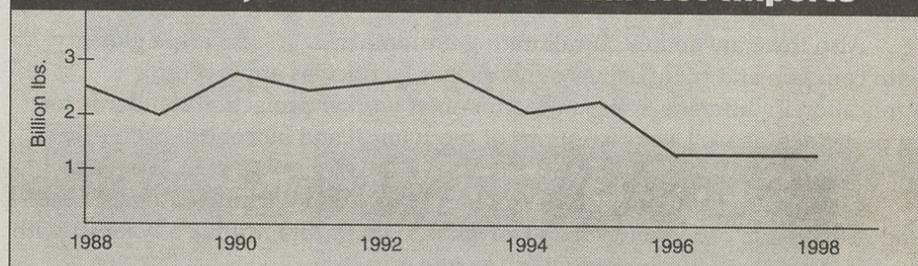
Balancing it out, the U.S. still imports more cattle and beef than it exports, but the gap is closing. Most economists think imports and exports will be equal by the year 2003 or thereabouts, Brester said.

For U.S. beef production, since the early 1970s, carcass weight (pounds per beef cow) has gone from 500 pounds to 750 pounds, meaning, fewer cattle but bigger cattle.



Gary Brester (standing), associate professor of ag economics at Montana State University, concentrates on questions fired at him by the stockgrowers in the Beartooth Cafe. Photo by Ray Ring

U.S. Beef, Veal and Live Animal Net Imports



Contrary to many people's opinion, net imports of cattle and beef to the U.S. have actually declined over the past decade. This graph is based on one presented to the stockgrowers by Brester.

Local roundup *continued from page 2*

more than half the dairy farms statewide. The September price for food milk is running \$16.14 per hundredweight. In recent years, the price for all milk,

'The quality wheat is still bringing money. The junk is not worth hauling to town.'

which includes food milk, has dipped as low as the \$12 range. Fair to say, though, milk prices are totally up in the air right now — political moves in Helena and Washington, D.C., are aiming to adjust milk prices, "so who knows where we'll come out," Nye says.

Grain is a different story. The general perception is that wheat is hurting now. But it's not that simple, says Dean Folkvord, owner of Wheat Montana, the growing and baking company based in Three Forks. "It looks like pretty tough sledding for a lot of us, on the production side. The market price is not favorable. But the quality wheat is still bringing money. The junk is not worth hauling to town. So it sends a message to farmers that you have to gear up for quality production. That message has always been in the marketplace, but never more seriously than it is right now."

Quality in wheat comes from seed "and your production practices, when you actually get in the field, how you prepare your land, how you get it seeded and your timeliness as far as the harvesting, whether your storage facilities are set up for it," Folkvord says. "We see the lower quality spring wheat worth less than \$3 a bushel, but the higher quality spring wheat is still bringing \$3.50 or more."

Government subsidies, mainly the LDP deficiency payment, will make up 30 or 35 cents on a bushel of grain to compensate for low market price, "but the key there is you've got to grow the grain first," Folkvord says. "They only pay on what you harvest, so if you have a poor crop, you're not going to get as much on the LDP as the farmer next door who

had a good crop."

Low moisture combined with low prices have wheat growers "struggling to decide whether to plant winter wheat or not," says Ron Carlstrom, extension agent for Gallatin County. Low moisture means that weeds such as cheatgrass haven't had a chance to take

hold in the fields yet. Normally, the weeds have popped up by now and can be bombed with herbicides economically, before the winter wheat is seeded.

"Some producers are going to seed winter wheat anyway, even though they know they're going to have a cheatgrass problem," Carlstrom says. "You're kind of locked into seeding some, because if you don't seed some in the fall, you've got way too much work in the spring" to seed all your land at once in spring wheat. People who seed before the weeds pop up will have higher costs applying herbicides to the crop as it grows.

Barley, which looks so nice this time of year in the fields, is the real black hole. "There's some barley being grown, but it's a money loser — it's a buck, a buck and a quarter or a buck and a half a bushel right now, horrible," Folkvord says. "If you can get beer quality, then you're going to be in the driver's seat, but that's a crap shoot. You send your samples in, and if they want to buy it, they will, and if they don't want to buy it, they won't."

The ups and downs of the producers ripple through the ag economy. In Livingston, Amy Schilling at the Agrineeds feed store sees that "the people who are drilling their winter wheat right now, they're not putting as much fertilizer down because they just don't want to spend that money if they're not

going to get any money for their crop."

On the other hand, selling to many of the potato growers and cattle ranchers, Ron Hoekema, co-owner of Churchill Equipment Co. in Amsterdam, says, "the season is going surprisingly well, I would say. At least as far as what we see coming our way (people shopping for implements), we've sold a number of fairly high-priced units. There's a certain element out there, people who have done their business wisely and have enough salted away, so that when they're ready to do something, they do it anyway" even in leaner times.

The potato harvest typically begins about Sept. 20 and runs several weeks. In the process, "there are about 20 potato farms in the Gallatin Valley and they each employ about 20 people — 400 to 500 seasonal

'I would say we sell more dog food than cattle feed anymore.'

workers, so that brings in quite a bit to the local economy too," Kimm says.

Schilling sees other trends that are a combination of amusing and scary, indicating fundamental change in the type or people who are buying ranches in our region. "I would say we sell more dog food than we do cattle feed anymore. And fish food for the fish ponds — we see a lot of new fish ponds every year. I would say that everybody who has money out here has a fish pond in their front yard. People buy fish food for their fishes — we sell the fish food in 50-pound sacks."

New weed management handbook is available

Montana State University News Service

A weed-control handbook long used by area producers is now available in an updated edition.

The Weed Management Handbook, nearly 300 pages, covering rangeland and cropland weeds, is produced biennially through Montana State University, Utah State, and the University of Wyoming.

Weed experts from the three states, including extension service and ag experiment station staffers, cover every major weed found on the region's ag land.

Also there are details on calibrating multiple nozzle sprayers, a glossary with common and trade names of herbicides, herbicides approved for application in different crops, a description of worker protection standards for ag pesticides, as well as descriptions of mechanical and biocontrol procedures for weeds.

Contributing authors include William Dyer, Dave Wichman, Roger Sheley and A. J. Bussan of Montana State University, and Barbra Mullin, a botanist with the Montana Dept. of Agriculture in Helena.

The handbook can be ordered for \$10 through either your local MSU county extension office or MSU Extension Publications, PO Box 172040, Bozeman, MT 59717; credit card orders phone (406) 994-3273.

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MARKETS

Why cattle markets are on the rebound

This year's cattle market promises to be much improved over a year ago. One can expect \$84-\$86 per hundredweight in November for 600-650 lb. feeder steers. Last year, those calves sold as much as \$10-\$12 per hundredweight less than this year's projections.

Cattle prices are higher this year because of a combination of supply-and-demand market fundamentals, which always drive the market over the long term.

Supply factors include:

- The market is probably at the bottom of the liquidation phase of the current cattle cycle. Very low fed-cattle prices during the latter 1990s have reduced livestock inventories. Consequently, the U.S. has experienced four consecutive lower calf crops, and feedlots have had to scramble to find adequate supplies, which puts upward pressure on prices.

- Low feed costs have allowed feedlots to pencil in profits for the first time in several years, which has allowed for higher bid prices for feeder cattle. However, low feed costs could have a negative impact on prices next year if, in response, dressed carcass

weights increase significantly.

Demand factors contributing to higher cattle prices include:

- The demand for beef slaughtering by-products appears stronger this year. Most by-products are exported to the Pacific Rim. Hence, the recovery of many Asian economies has positively influenced cattle prices. By-product values are very important determinants of fed-cattle prices (which determine feeder-cattle prices). For example, reductions in demand for by-products last year probably reduced fed-cattle prices by \$2-\$3 per hundredweight.



Gary W. Brester

- Both U.S. and foreign consumer demand for beef appears to be stronger this year.

- In 1998, regulatory reforms under the Northwest Pilot Project reduced the costs of exporting Montana feeder cattle to Canada. Anecdotal evidence indicates that the presence of Canadian buyers in

Montana markets last year added \$2-\$3 per hundredweight to Montana feeder cattle prices.

Here is a case where trade with Canada is absolutely good for Montana cattle producers.

Canadian feedlots demand Montana feeder cattle because our calves are acclimated to cold climates. Thus, our genetics provides us with a competitive advantage over Southern U.S. feeder cattle.

In addition, because the U.S. imports fed cattle

from Canada, Montana feeder-cattle producers can often benefit from relatively low transportation costs by obtaining backhauls on Canadian trucks returning to Canada. Thus, good trade relations with Canada have become important for Montana cattle producers.

Looking ahead, we will probably see decent

Here is a case where trade with Canada is absolutely good for Montana cattle producers.

cattle prices next year, and possibly over the next two years. As our cattle herds are rebuilt, fewer heifers will be placed on feed. That will continue to put upward pressure on prices.

However, beyond that two-year period, those retained heifers will start to produce additional feeder calves, which will eventually place downward pressure on prices.

That downward pressure might not be as severe as that of the late 1990s, if the U.S. is able to secure additional market access to Pacific Rim countries and, perhaps, the European Union during upcoming trade negotiations. Coupled with the projected development of new, convenient beef products, it is possible that demand may increase enough to offset future production increases.

Gary W. Brester is an associate professor of agricultural economics at Montana State University in Bozeman.



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Mark your calendar: two big parties will honor local ag

Outstanding ag people will be named at Gallatin banquet

The nominations are in, and the judges are figuring out what the heck to make of it. On Saturday, Oct. 2, the announcements will be made and somebody — or several somebodies — may have to make a speech.

The occasion is the annual agriculture banquet sponsored by the Gallatin Valley Agriculture Committee of the Bozeman and Belgrade chambers of commerce.

The banquet is a milestone, held at the end of every summer for 21 years now, to honor everyone in the local ag community — and especially some outstanding people in several categories:

- outstanding farmer/rancher of the year, which is based on lifetime commitment and leadership in local ag;
- outstanding young farmer/rancher of the year;
- the service to agriculture award, which, for example, might go to a community businessperson or university researcher;
- and the special ag operations award, which might go to someone who introduces a new crop or a volunteer who often works in support of local ag.

The awards banquet is the first Saturday in October, at the Holiday Inn in Bozeman. Socializing begins at 6 p.m. and the dinner at 7 p.m. For more info, call the Bozeman Chamber of Commerce, 586-5421, or the Belgrade Chamber of Commerce, 388-1616.

Other sponsors include the local implement dealers and the Gallatin Farmers Co-op. It should be an exciting evening.

Meanwhile at the university's annual ag weekend... you can dance formal, tour a brand new ag building or kiss a pig

The public is invited as students, faculty and friends of the Montana State University-Bozeman college of agriculture plan to celebrate agriculture in a big way Nov. 4, 5 and 6.

The college's new dean, Sharron Quisenberry, wants to make this year's Ag Appreciation Weekend "bigger than it has ever been, bigger even than homecoming," she says.

The weekend will get under way Thursday evening with Ag Days, featuring competitive events in agriculture for students in grades 7 through 12. The competitions — in soils, machinery, livestock, public speaking and other areas — will continue through Saturday.

Another highlight will be the Friday dedication of the new Ag Bioscience Facility. The dedication will begin at the Brick Breeden Fieldhouse at 1:15 p.m. and include comments from Lt. Gov. Judy Martz, U.S. Rep. Rick Hill and other campus and elected officials.

Tours of the Bioscience facility will follow a ribbon-cutting ceremony, starting at 3 p.m.

Ag will also play a role in the weekend's football game — on Saturday, MSU will play Eastern Washington beginning at noon. Prior to kickoff, the college of ag's tailgate party

will be held under the big tent in the booster parking lot. Halftime entertainment will include a Kiss a Pig contest, in which the top-vote-getting dignitary from the Bozeman area will receive the "honor" of kissing the critter.

The weekend's finale will be a Boots & Bow Ties candlelight dinner and dance Saturday evening, in which four leaders in Montana agriculture will be honored by the college. Music will be by Montana Rose.

The weekend events will also include a raffle featuring such items as a trip for two to Las Vegas for the National Finals Rodeo in December, and a silent auction featuring a pack trip, guided fishing trip, art, horse equipment

and other items.

All proceeds from the Kiss a Pig contest, the auction and the raffle will benefit the student activities fund at the college.

The college is also seeking art that depicts agriculture or natural resources for a juried art show. Judging will be on Thursday. Winning art and artists will be recognized at the Boots & Bow Ties dinner, and all entries will be on display within the college.

Upon completion of the show, the artist may want to donate the art to the college or the silent auction, or have it returned. Deadline for entries is October 22.

For more info about the events, contact Lynn Schledorn at 406-994-5744.

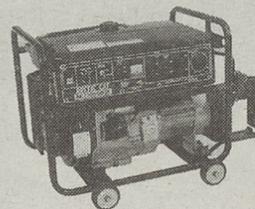
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FenceLines snapshots

Meet Milee Malone.

At 16 years old, she's Montana's high-school rodeo "Best All-Around Cowgirl," a title she won in June competing against girls from around the state.

She's got it in her blood, as she's part of a solid ag family — daughter of Gayleen and Marty Malone (the Park County Extension Agent).

She lives on the family ranch where she grew up, several hundred acres in the Paradise Valley, at the foot of the mountains near Pray.

She does well in school too — a junior in Park High in Livingston, where she's on the honor roll, in the National Honor Society, and doing FFA and 4-H.

She answers some of the questions on the FenceLines form and talks about how she got to be so good in the saddle:

"I started riding horses by myself on the ranch when I was about three years old. I would rope the dummy for practice. Then I started going to little kids' rodeos — the High Winds Rodeo Club, for kids in Sweetgrass, Park and Gallatin counties, five years old up through high school. I would compete in that, kind of my starting process. Then I did the NRA rodeos — the Northern Rodeo Association (competing around Montana) when I was 12 to 15 years old. Then I started doing the high-school rodeos. So I pretty much have rodeoed all my life.

"My whole family is into it. My Mom barrel races and my Dad and my older brother (Ryan) rope. My sophomore year, I took second in

breakaway roping in the state and won the all-around in Miles City.

People from all over Montana were there — probably 75 people competing in each event.

"I ride pretty much every day. I have three horses. They're all pretty good. We've already started the new season (for high-school rodeo) — we have rodeos from August until the first of November, then we start up again in March and go through June. I travel around the state for the rodeos. Park High doesn't have a team, and there aren't any barns over here to practice in, so I come over the pass to practice with the Gallatin Valley club. There are probably about 10 or 15 kids who do



all the events.

"I compete in barrel-racing, pole-bending, goat-tying, breakaway roping and team roping. Breakaway is probably my best event. My time is usually in the three-second range. A few weeks ago, I roped a 2.5 in Cardwell. I went to the nationals in Wyoming this summer and it went pretty good. It's kind of a drawing game, because not all the cattle are even, some of them are fast and some are slow, some run to the left or the right. I roped both my calves in breakaway, but I ended up 27th in the nation. I think there were 75 people

competing there too."

Any dislikes about the rodeo life? "Once in a while you get a down streak — you don't do good on a weekend or you miss your calf or your goat gets up or you tip a barrel over. You just have to forget about it and go on."

Likes? "I think most kids like horses, especially kids who live out in the country. If kids are scared of horses, it's probably because they've never been around them that much. It's fun, a good hobby. I hope to go to college on a rodeo scholarship, in Bozeman or Dillon. Then probably I'll continue down the road in either the amateur or pro circuits."

How to appear in snapshots

To help us get to know each other, please . . .

send us a snapshot or two and a bit of background about yourself and what's on your mind these days. The list of questions gives you something to go by, but there are no rules — write us what you'd like to write us. We'd like snapshots that show you with some aspect of your country life, say, your horse or rabbit or pitchfork or garden.

Mail to:

Ray Ring/FenceLines Snapshots
Bozeman Daily Chronicle
PO Box 1188
Bozeman MT 59771

or drop off at the Chronicle office:
2820 W. College Avenue

- 1) Your name and what you do — are you associated with an ag business or are you simply choosing the country life? And so on.
- 2) Your whereabouts, work and home, and phone number, so FenceLines can call to verify your info.
- 3) Any advice you have for other people who are living or working in the country (or for people who are thinking of trying it)?
- 4) What do you like and dislike about life in the open country?
- 5) What trends do you see in local farming and ranching and country life?
- 6) If you have land, what's it like?
- 7) A bit of your personal background: age, school and work experience, whatever you'd like to say.
- 8) Your roots: How long have you or your family lived on your land, or in the country around here? If you have an ag business, how long has it been going? How long have you been working it?
- 9) How does your family figure in?
- (10) If you have an ag business, what does it consist of? Or if you're more the lifestyle country person, some indication of what the lifestyle is for you — a few horses, a garden, whatever fits.
- 11) Recent accomplishment or milestone?
- 12) Your work load — average hours and days per week you put into your ag operation or country life, traveling you do to sustain it etc.
- 13) Any humorous anecdotes? Funniest question a customer or competitor or city dude asked you recently? Funniest situation you found yourself in?

HUNTING ON AG LAND

Some ranches let hunters
on for free, some make
hunters pay, and some
just say no

*main story by Alan Charles
interview stories by Ray Ring*



Autumn's chapter in the Book of Country Living has many different pages. For some, favorite scenes are combines sweeping like onrushing waves through oceans of amber grain.

For others, it's gathering cows and summer-fat calves off high mountain pastures, or wrangling horses on a frosty cloud-rushing day.

Add the hustle and bustle of county fair time, the all-too-punctual appearance of yellow school buses, and smoky clouds of gathering blackbirds, and you've painted some of the familiar scenes that make up this book of autumn memories.

Yet another autumn scene is the dust trails behind unfamiliar vehicles winding their way down Montana farm and ranch lanes. Hunting season has once again begun, bringing with it both the blessings and burdens that accompany this long-standing tradition.

Montana's landowners have a long history of sharing their lands with hunters. Working side by side, landowners and hunters toiled hard during the early part of this century to restore Montana's wildlife, which had been impacted greatly by overharvesting and loss of habitat during early settlement of Big Sky country.

In these current years of abundance, landowners recognize that hunters can help keep big game populations at tolerable and enjoyable levels.

Many landowners look forward to hunting season as a time to renew acquaintance with guests from past years. This is the time of year that farmyard porchways swell with boxes of apples, cheeses, sausages, and Flathead Valley cherries. A flurry of cleaning shapes up long-vacant

bunkhouses, and the swather gets an extra run mowing a traditional camping area.

This year, in particular, Montana landowners may find more than the usual number of hunters knocking on the door or calling for permission, because the law has changed regarding hunter permission on private property.

Since 1965, only big-game hunters have been required to obtain landowner permission before hunting on private property.

Effective July 1, 1999, ALL hunters (including those hunting upland gamebirds, gophers, coyotes, or any other type of wildlife) must have obtained landowner permission before hunting on private property.

For most hunters, this won't really change anything, because they have always asked for permission anyhow. But for some, certainly those who have hunted upland gamebirds in areas where landownership is not easily identified, this will require more effort.

And for "absentee" landowners who own land in areas distant from their homesites, this will also require more effort to answer a greater number of inquiries from hunters seeking permission.

Most hunters want to ask permission, yet they often can't identify who owns the land. In an effort to assist with this, Montana Dept. of Fish, Wildlife and Parks has published a Directory of Montana Maps, which explains how land-ownership maps are available from the

mapping agencies, such as counties or the Soil Conservation Service.

The new law did not change the way in which landowners can grant permission. They can do so orally, over the phone, in person, in writing, or simply by signing an area granting permission under particular rules.

continued on page 11



This hunter walks lightly, for no charge

Bob Moore, a retired Montana State University professor of biology who lives in Bozeman, has hunted on a ranch in eastern Montana for many autumns. He'd rather not name the place, to keep the traffic down, but he talks of the relationship he has with land and the ranchers:

"In 1963, I was given the name of a rancher out in Carter County, near Ekalaka. A Fish, Wildlife and Parks guy told me they were decent people. So my partner and I drove out there during hunting season and introduced ourselves and asked if we could hunt, and he (the rancher) said, 'Yeah, you can drive out in this pasture and hunt out there.' On the way out to the pasture, we shot two antelope, and we came back and thanked him. Since that time, I've gone out every year except for two years when they had bad winters and a lot of antelope were killed and I just voluntarily didn't go out.



Bob Moore and a deer he shot on ranchland in eastern Montana. Photo courtesy of Bob Moore

"Now I go with my wife, Robin, and my son, Will, who's nine. We always camp in what they call pasture. It's rangeland — fairly open sagebrush grassland, with some relief, several drainages go through the area with seasonal creeks. Beautiful country. In the evening and morning, it's just gorgeous. The antelope will feed on the grasses and forbs and go down to the lower end, where the rancher raises alfalfa.

"They (the ranch family) don't charge money. They're kind of old-fashioned. It's my opinion, they feel like that even though they feed the wild animals and the animals are on their land, the animals are public property. They perceive themselves as good

land managers, they see themselves as wildlife managers too, and I think they are. Other people are starting to charge out there. So I don't know what the progression will be. I know the low livestock prices have hit them pretty hard.

"We go there to hunt antelope and deer, and we camp and try to leave it the way we found it. The first few years, I built fires, but I haven't in probably 30 years. First place, I don't want to leave a fire pit there. Secondly, there have been times when it's been



A family outing: Bob and his son, Will, and the family dog on a hunt. Photo courtesy of Bob Moore

really dry and I don't want to run the risk of getting a range fire started.

"When we set up camp, the pickup stays there and we don't drive farther into the pasture. We walk, and when I get an antelope, I'll either drag it or now I've learned to bone it out and just pack it back. If we get an antelope on our first stalk, it's probably a two-mile round-trip. But there have been times, I've worked all day, so I've probably hiked six or seven miles to get an antelope. I think I've missed (not been successful with the hunt) one year.

"It's really a family outing for us. Will is beginning to crawl behind me, when I am crawling up to get a final place to shoot. And we'll go in and visit with two of the ranch families (the current generations). That's always part of the trip."

This rancher has imposed fees

One local rancher, who runs cattle on several parcels in our region, asked not to be identified publicly as he talks about how this autumn, he's starting a private waterfowl hunting club on one of his parcels. The private club will generate income for the ranch — he's going to charge a limited number of hunters for the right to hunt geese and ducks on the ranch's water. He still believes in giving the public some access — he's keeping another parcel in the mountains open for elk hunters at no charge:

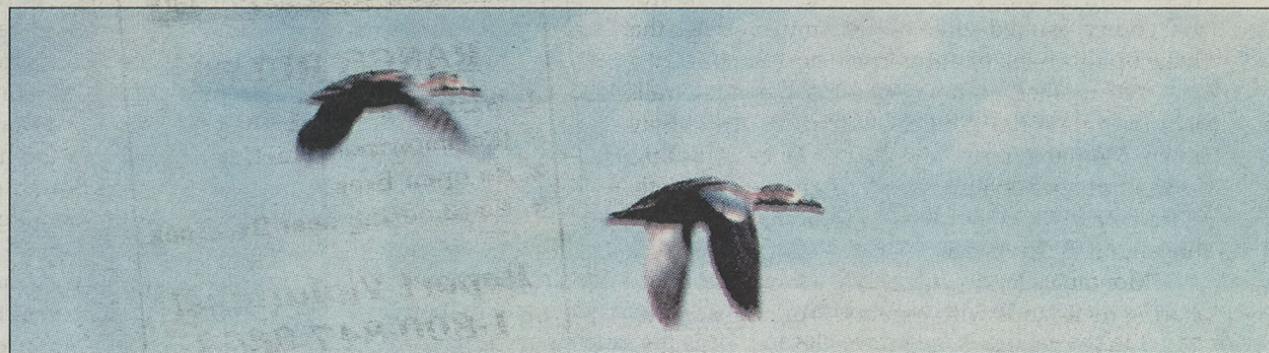
"With the waterfowl club, we're going to charge each hunter an annual fee of several hundred dollars. The annual fee will cover the immediate family, including kids who are in school up through college. On top of that, there's going to be a daily fee — maybe \$25 a day, maybe more, depending on whether you're a member or a member's guest or a guide with a client.

"For that, they'll get to waterfowl hunt, either goose or duck. The days we're going to hunt will be Tuesdays, Thursdays and Saturdays — all in the mornings — and Sunday afternoons. The schedule is subject to change, depending on availability of waterfowl. If you hunt ducks every day, the ducks don't stay in your area.

"We anticipate having 10 to 12 members in the club. The people who are interested, we've got all the way from retirees to guides, veterinarians, a writer,

and a couple out-of-staters who are big-money people. So it's a pretty wide range.

"This is the first year we're charging fees for waterfowl hunting. The trend locally is that with the influx of people, landowners look at alternatives other than being open to hunting. People move in and close off land that was available before. And there is more pressure from just sheer numbers. So you get the double whammy — less water, because some outsider



Ducks on the wing at the private club. Photo by Ray Ring

bought it up and closed it up, and more people.

"When we were open for duck hunting (for free), we had a form people would fill out and a few simple rules — that's all they had to do. We got so well known, we would average 20 hunters a day. Nobody was doing any good (the success rate was low) and we were just getting shafted by all the people being everywhere interfering with the ranch operation. We had so much trouble with trespassers. We just had some ugly situations. A few bad apples spoil the whole barrel.

"Now, with the club, the good hunters are going to have to figure out a way to police the bad hunters. I think those people will help me police it for the trespassers, because if they're paying money they aren't going to let somebody just walk on without saying something to them.

"We also have elk hunting on some land we have up in the mountains. That isn't a fee deal and it's worked pretty well. The first week is reserved for our

family, then we open it up to a limited number of hunters on a schedule. People who want to hunt elk there, they send me a self-addressed stamped envelope, saying whether they want to be early or late, and I sort them out and get a calendar out and figure out where they fit.

I do it to harvest the elk, strictly a control mechanism to try to reduce the numbers, because of the competition for the grass (elk versus cattle). Just like we manage grass, we manage hunters and manage the elk."

This hunter has an economic philosophy about it

Terry Anderson taught economics for 27 years at Montana State University. Today he's executive director of a Bozeman think tank called PERC, which believes that natural resources are managed best by the private-sector marketplace. When he can be persuaded to leave Montana for a few weeks or months at a time, he carries the message to Stanford University in California, where he's a senior fellow at the Hoover Institution. He's also an avid hunter who hunts according to his economic philosophy — he pays fees to hunt on private ranchland:

"I've had leases to hunt on ranchland here in the Gallatin Valley and over near Townsend, for going on 15 years now. They were leases I did with other people (as a group). My philosophy is that with access fees, you get limited access and I'm willing to pay not to have to race to the top of the hill to beat the other hunter. That's the main thing I've enjoyed with all of my leases.

"The place in the Gallatin Valley, I hunted elk there for years and years, and it worked until a person from out of state came in and bought the property thinking he was going to build a house and he didn't want to lease the land for hunting anymore.

"So then I joined a private hunting club near Townsend. We had approximately 30,000 acres involved in that club, which combined about 10 or 12 ranches. All of them were working ranches. Most of it was cattle grazing, pastures. The total acreage was large enough that you really had a lot of variety of terrain to hunt. The few hay fields there were quite attractive to the elk — they'd be down there grazing in the mornings.

"The Flynn brothers put the club together — Ted is a rancher and John is the Broadwater County Attorney. They incorporated as Greyson Creek Meadows Recreation. There were usually around 35 to 40 members of the club, paying annual fees to the corporation. In the end, we were paying \$450 each (or \$500 for a family) for access to the lands year-round, for hunting during its season, and fishing during its season.

"One of the things that I liked about it, as a group we formed rules, such as you could not drive on the properties at any time except to retrieve game in the middle of the day or to get to the cabins. It meant we closed down former ranch tracks to driving and really gave the elk more habitat. It also meant that there was a limited number of hunters, and most of them you probably knew, which I always appreciated. Once a year we'd have a dinner and get the members' input as to what was working and what wasn't, what rules needed to be approved or changed and so on.

"Elk was the main species for most of the members. There were deer too, but we sort of discouraged shooting any deer that were anything less than four-points. We said,

if you're going to shoot a little deer, go somewhere else and do it, we're going to try to build up the deer herd here. There was decent bird hunting as well.

"But this year, the club isn't working out. The Flynns have decided to try a year of guided hunting. They have guides' licenses and they're going to see whether they can get better compensation out of a higher-end hunting operation. They were always trying to do some guiding, and if you were bringing out-of-state guided hunters in, and they were always confronted with these club members, they would say, 'now why am I paying this much to hunt if there are other people here?' Not that it was crowded by any means. . . .

"The problem with the club was, quite frankly, we weren't paying enough to hunt — \$500 for a family membership meant my family and I could go over there and some of us could hunt and some of us could go horseback riding and we could stay in one of the cabins during the summer — \$500 for that range of benefits is not a lot.

"Our family couldn't ski for a season for that price. So I always said, we ought to double the fee for the hunting club, but there were some people who felt that any fee was higher than it should be and \$500 was kind of pushing the limit. So now we don't have it.

"Now I'm kind of scrambling for a place. I tried to negotiate a new lease on another piece of land around here, over near Jackson Creek in the Bridgers. But there's enough uncertainty about the hunting there, the rancher finally said, 'I'll let you hunt there for a year and then we'll determine the price.' That's another problem, you don't quite know what the price should be.

"You go out to a piece of land you want to hunt, and the question is, are the game always there? How many game are there? Are the game going to be there when you're there, or is the rancher or farmer going to be cutting his hay and causing the game to be staying away? Lots of questions of that sort have to be worked out."

Photo: Terry Anderson and a 6-point bull elk he shot on ranchland near Townsend, for a fee. This photo, and the photo on page 8, which shows another hunter on ranchland, courtesy of Terry Anderson and PERC



All New!

FARMERS' BREAKFAST SPECIALS

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State hunting/ag programs *continued from page 9*

For those landowners who allow hunting but who don't really want to be bothered by phone calls or visits from hunters, the wildlife department can provide signs tailored to meet the landowner's needs.

One sign is pictured on page 8. Other signs with various messages are available. Landowners interested in receiving such signs can contact a local game warden or biologist, or Mike Ross in the regional department office in Bozeman, 994-4042.

Also in order to assist hunters and landowners in communicating access information, the department has also printed 40,000 books of Hunter/Landowner "Access Courtesy Cards." These pocket-sized books contain a stock of two-part cards that enable a hunter to provide a landowner with one portion containing the hunter's name, address, vehicle license number, and signature, while the hunter retains a portion bearing the landowner's name, address, dates permission was granted, and signature. Landowners wishing to obtain some of these cards should contact the regional department office.

Most hunters sincerely appreciate the role played by Montana landowners in providing habitat for the public wildlife

resource. And they recognize that being invited onto private property is a privilege, one they very much cherish. No hunting season goes by without something happening to tarnish the sportsman's image, yet again and again, I hear from landowners that "Most hunters are good folks. It's just a few who abuse the privilege."

So I hope, this year, as the pages get turned and memories get printed, hunting season is a good time, one that brings new friends and new memories. I hope that country folks share time with city folks, and find that they all have much in common — most of all, a love of the land and its wild creatures. And I hope that we can all work together — landowners, hunters, and Fish, Wildlife and Parks staff — to preserve the colorful canvas that depicts Montana's hunting heritage.

Alan Charles is statewide coordinator of landowner/sportsman relations for the Montana Department of Fish, Wildlife and Parks. Previously, he worked at the Fort Keogh Livestock and Range Research Station at Miles City. He lives now on the Sieben Ranch north of Helena and travels throughout Montana as he looks for common ground on the issues.

How the state pays ranchers to provide hunting access

The state program that pays ranchers to open their lands to hunting has gotten so popular, there are more ranchers wanting to sign up than there is funding to handle all the signups.

For the 1999 hunting season, about 930 landowners enrolled nearly 7.3 million acres in the program, which is called the Block Management Hunting Access Program.

The idea is, the state agency, Montana Dept. of Fish, Wildlife and Parks, provides incentives to landowners to encourage public hunting and offset the impacts associated with public use.

Landowners can receive financial compensation, as well as complimentary Sportsman's Licenses, statutory liability protection, and hunter management tools such as signs, maps, and permission slips. In some cases, the agency provides additional patrolling and staff assistance for managing the hunting.

In 1998, landowners enrolled in the program received more than \$2.5 million in impact compensation.

While demand to enroll in the program currently exceeds program funding, FWP is assessing how to improve and expand the program. For more information, contact your local FWP warden or biologist, or call Mike Ross at the regional headquarters in Bozeman, 994-4042.

Montana farmers pitch in to harvest a dead man's crop

LOMA (AP) — Scores of north-central Montana farmers brought 25 combines and 25 grain trucks to the Gullickson farm to harvest a dead man's grain.

"It's a community. When there's a tragedy you just jump in to help — no debate," said Marvin Works, one of the neighboring farmers.

"When everyone got here this morning, I sunk to my knees because I couldn't believe it," said Gary Gullickson, 39, who is picking up where his father left off.

Cliff Gullickson died in August when the grain truck he was driving to Big Sandy rolled. The harvest started on a recent Thursday. "In a town this small, something like this has a big effect on people," said Dave Berg, 64, who grew up with Cliff Gullickson, playing football and drinking beer together.

The harvest took four hours, with everyone gathering in the final 170 acres to finish the job together.

Looking toward the puffs of dust billowing behind the combines and trucks circling the Gullicksons' golden fields, Berg shook his head

and smiled: "This is just awesome."

Don Jenkins lives on a border of the Gullicksons' farm. He said he started calling other farmers about helping with the harvest but soon other people were calling him and offering to help.

"Every combine you see here was working their own fields this morning. They put their work on hold to help out," he said.

Some of the combines were from 50 miles away.

Cliff's children — Lynette Ereaux of Malta, Nancy Erickson of Havre, Gary of Big Sandy and Greg Gullickson of Missoula — made 60 red and turquoise hats for the volunteers sporting the words "Cliff's Harvesting Crew, August 18, 1999."

The hats quickly replaced the farmers' worn caps and the Gullicksons had requests for more.

"This is what you do when there's a tragedy," Jenkins explained, lifting his cap off his forehead to cool down at harvest's end. "This is their bread and butter. This is their livelihood sitting out in this field."

Back in '42 we wanted folks to know we were in the dairy business.



Building located at Grand and Mendenhall presently the site of Sacks Thrift Store.

Photo: Gallatin County Historical Society

For a little local creamery that started back in 1932 we've come a long way.

September 1942 the Gallatin Valley dairy producers decided it was time to buy their own building. At that time grocery stores didn't have the refrigeration or capacity to handle dairy products so delivery was house to house. Most homes in Montana had an ice box and depended on daily milk deliveries. Retail sales were in the front of the building, the back housed the bottling equipment and storage. The plant operated 7 days a week.

The dairy, started only ten years before by a handful of local dairy farmers, was

beginning to grow. Despite rationing of commodities during the war years, the demand for fresh dairy products allowed us to expand into outlying areas. Soon it would be time to relocate and build a new and larger plant several miles from town on north seventh avenue in Bozeman.

To all our customers we say thank you.

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FROM MSU
More news and events from our ag university
Get certified for the weed war

Montana State University is offering a professional certification program in noxious weed management, Nov. 16-18 at the Comfort Inn in Bozeman.

This is the second part of a two-part program that leads to "Level 1 certification" in noxious weed management. It provides participants with fundamental knowledge about weed science and the public-relations skills to develop and implement successful weed management plans.

Preregistration by Nov. 5 is required — \$100 per person. The limit is 35 people. University credits and continuing ed units are available.

Certification and professionalism can increase public trust in a noxious weed management program, says Roger Sheley, MSU extension service noxious weed specialist who is coordinating this program.

Course topics include weed identification and mapping; herbicide safety, application and interactions with the soil, plants, and ecosystem; laws and regulations; biological and mechanical control; integrated weed management; revegetation; grazing management and rangeland principles.

Several topics this year are intended to build public-relations skills, including public speaking, leadership training, conflict resolution, educational

methods and coordinated weed management.

Overall, three certification levels are available. Level I requires two years to complete. Level II and III certification each require an additional year.

Anyone interested in the program, and in particular, anyone with Level I certification who is interested in Level II, contact Sheley at (406) 994-5686.

Dairy workshops kick off partnership with Utah State

Montana dairy producers are invited to a dairy management workshop being held in Bozeman October 5 and Great Falls on October 6.

There is no charge for the workshop, and lunch is provided free to two persons per dairy operation.

The workshops are the first educational effort organized under a new agreement between MSU Extension Service and the Utah State University Cooperative Extension Service. The agreement will allow Montana dairy producers access to more technical and educational information than they have had in past years, says David Bryant, vice provost and director of the MSU Extension.

The workshop will address heifer management, cow herd nutrition, dry cow management, manure management, alfalfa production, cost of production worksheets and other dairy topics. Presenters will

include specialists from Utah State University and MSU-Bozeman. Program registration begins 10 a.m. each day and concludes at 3:45 p.m. In Bozeman, the workshop is being held at the GranTree Inn. In Great Falls, it will be held at the Heritage Inn. To make your lunch reservation or for more info, call the MSU/Gallatin County extension office, 582-3280.

MSU prof receives ag business award

Jeff Jacobsen, head of the Montana State University-Bozeman department of land resources and environmental sciences, has received the President Award from the Montana Agricultural Business Association.

The award is for outstanding service to Montana agriculture and agribusiness, and is the highest honor given by MABA, according to 1998 MABA President Barb Herda of Billings.

Jacobsen led the effort to institute a Certified Crop Adviser program in Montana, designed to improve the professionalism of crop advisers and ag professionals. He is also author of an MSU Extension publication titled, "Protecting Our Water Resources: Environmental Stewardship Strategies for Fertilizer Facilities," which provides guidance for Montana fertilizer dealers to help them be environmentally responsible.

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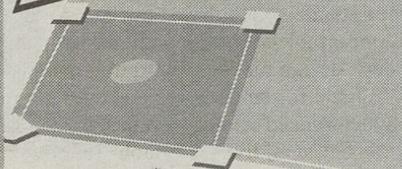
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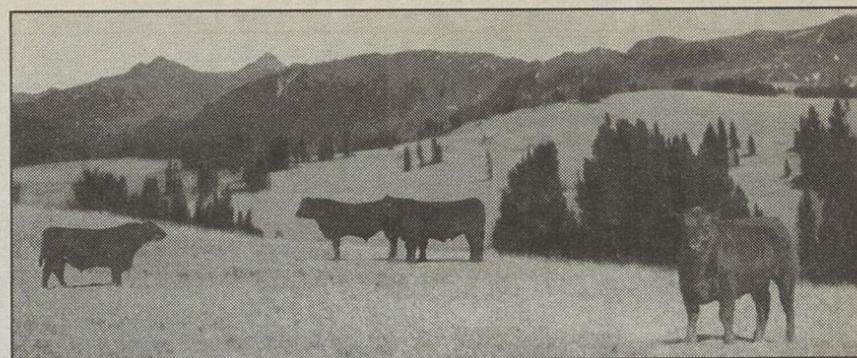


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COUNTRY SWITCHBOARD

Here's a handy phone list of support organizations, conservation and recreation groups, and so on, that can be of assistance to local agriculture and people living in the country around here.

EXTENSION SERVICE

Gallatin County Extension, ag agent Ron Carlstrom — 582-3280

Madison and Jefferson Counties Extension, ag agents Lisa Schmidt and Scott Mendenhall, in Whitehall — 287-3282

Park County Extension, ag agent Marty Malone — 222-4156

4-H

Gallatin County Extension agent for 4-H, Todd Kesner — 582-3280

Madison and Jefferson Counties Extension agent for 4-H, Lisa Schmidt — 287-3282

Park County Extension agent for 4-H, Peggy Lombard, on site Mondays and Thursdays — 222-4156 or e-mail plombard@montana.edu

WEEDS

Gallatin County Weed Control

District, supervisor Dennis Hengel — 582-3265

Jefferson County Weed District, coordinator Dave Burch — 225-4156

Madison County Weed Board, supervisor Dave Schulz — 843-5594. E-mail: madweed@3rivers.net

Park County Weed Control District, supervisor Clay Williams — 222-4156

GENERAL

Montana Farm Bureau Federation, Bozeman — 587-3153

Farm Credit Services, Bozeman — 587-4421

Farmers Union, Great Falls — 452-6406 or 1-800-234-4071

Gallatin Valley Chamber Ag Committee, c/o Bozeman Area Chamber of Commerce — 582-3270

Gallatin County Fairgrounds, manager Sue Shockley — 582-3270

Montana Agricultural Business Association, Helena — 449-7391

Montana Ag Safety Program, Les Graham in Belgrade — 284-3502

Montana Beef Council, Helena — 442-5111. Internet: www.beef.org. E-mail: beefcncl@mt.net

Montana brand inspector, in Bozeman — 994-3112

Montana CattleWomen, Helena — 442-3420

Montana Dairy Association, Helena — 442-1330

Montana Grain Growers Association, Great Falls — 761-4596. Internet: www.mgga.org

Montana Stockgrowers Association, Helena — 442-3420.

Montana Wool Growers Association, Helena — 442-1330.

MONTANA STATE UNIVERSITY

Ag Experiment Station and College of Ag, general number — 994-3681

Ag economics — 994-3703

Animal & range science — 994-3415

Entomology — 994-3861

Land resources, water/soil — 994-7060

Plant sciences — 994-4832

Potato Lab and Montana Seed Potato Certification Program — 994-3150

TechLink (NASA) — 994-7736

CONSERVATION

Gallatin Valley Land Trust, Bozeman

— 587-8404.

Sonoran Institute, Bozeman — 587-7331. Internet: www.sonoran.org. E-mail: ben@sonoran.org

Nature Conservancy of Montana, Helena — 443-0303. National Internet: www.tnc.org offers links to state programs

Montana Land Reliance, Helena — 443-7027. E-mail: mlr@desktop.org

Corporation for the Northern Rockies, Livingston — 222-0730. E-mail: northrock@ycsi.net

HORSE RIDING

Gallatin Saddle and Harness Club, Bozeman — 586-6878

Gallatin Valley Back Country Horsemen, Bozeman — 388-4047

Park County Equestrians, Livingston — 222-6099

ORGANIC

Organic Certification Association of Montana (OCAM), Missoula — 549-9346. E-mail: ocam@montana.com

Organic Food Labeling, Dept. of Public Health and Human Services, Helena — 444-5622



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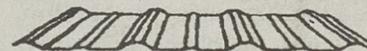
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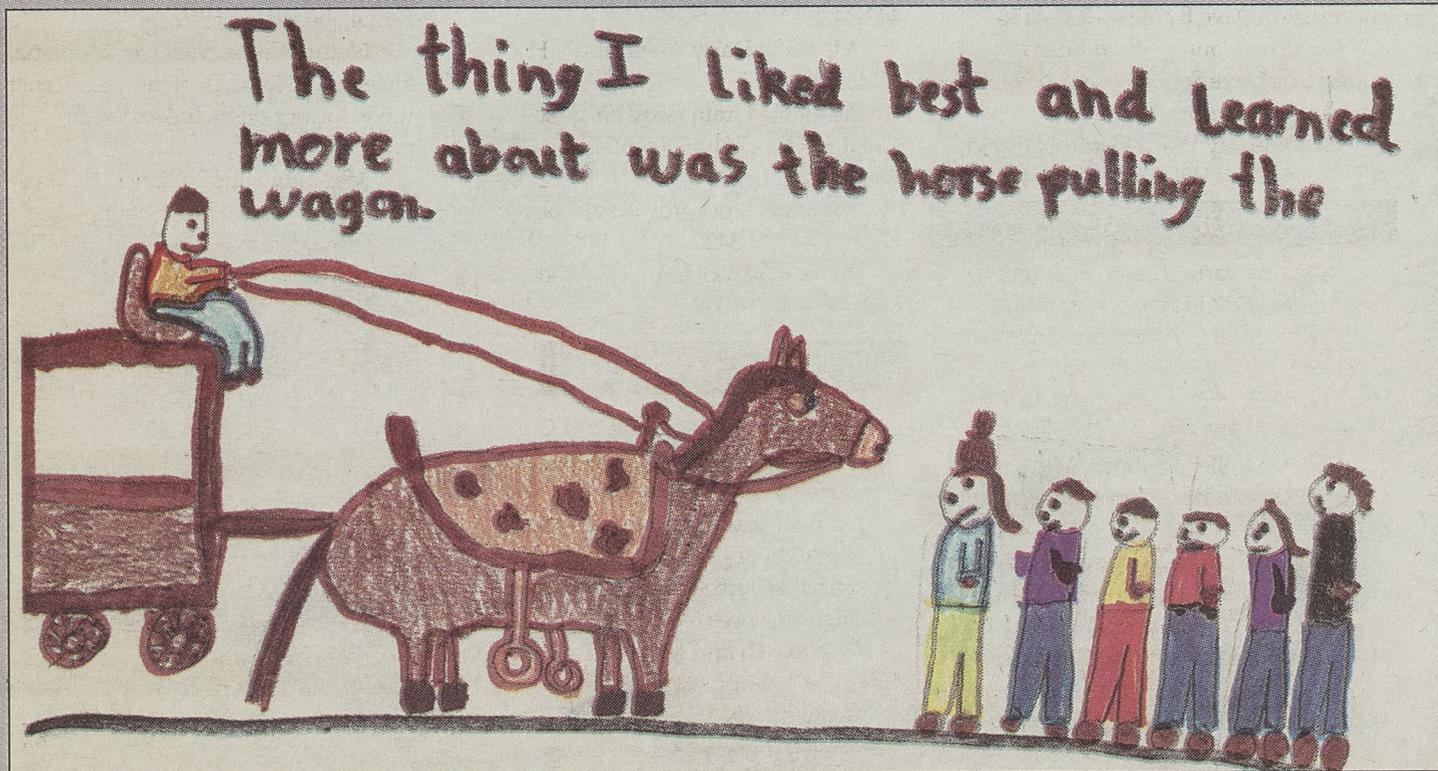
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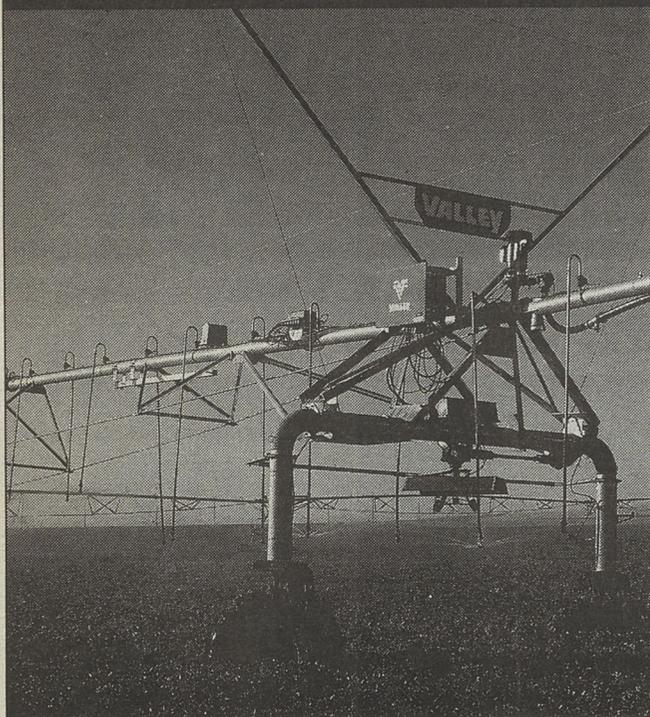
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 **FARM KIDS**



Becky Townsend, a first-grader in White Sulphur Springs Elementary last spring, explained what she'd learned from visiting local farms and ranches.

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SHOPPING LIST

Where to buy local ag products

BEEF

Barry's Montana Beef, a seasoned burger from Rice Ranches near Harrison, is available in Bozeman at Van's County Market and in some other grocery stores around our region, or from the ranch direct, call 685-3468.

Half Circle Pride Beef, prime cuts and burger from Half Circle Pride Ranch near Reese Creek, is available in Bozeman at the Community Food Co-op, or from the ranch direct, call 388-0563.

Montana Quality Highland Beef, prime cuts and burger from Ross Peak Ranch in Springhill, is available in Bozeman at the Community Food Co-op and Montana Harvest, in Livingston at Foodworks, or from the ranch direct, call 586-8884.

Various local beef shows up in Bozeman as fresh burger at Joe's Parkway Market, and occasionally in Livingston as fresh prime cuts and burger at the Livingston Meat Co.

Or you can order fresh local beef in bulk (minimum quarter carcass, about 110 pounds cut up and wrapped) through meat processors listed in the Yellow Pages.

BISON

Several brands of Montana bison — burger and steak — are available in Bozeman at the Community Food Co-op, and in Livingston at Foodworks.

BREADS AND FLOURS

Wheat Montana, a line of breads and flours made from local grain, is available at grocery stores around our region.

CHICKEN

Hutterite colonies, based near Great Falls and White Sulphur Springs, sell their chicken in Bozeman at the Community Food Co-op, Van's County Market and the Meat Shoppe, and in Livingston at Foodworks.

EGGS

Various local ranch eggs are available in Bozeman at the Community Food Co-op, in Livingston at Foodworks, in Clyde Park at Glenn's Shopping Center grocery, in Emigrant in the general store and occasionally in Ennis at both grocery stores.

Spring Hill Ranch Eggs and Yellowstone Premium brown eggs, from

Hutterite colonies near Great Falls, are available in many grocery stores around our region.

Montana's Own Country Fresh Eggs, from Springdale Poultry in White Sulphur Springs, are available in Bozeman at Montana Harvest.

HONEY

Wild Bee Honey, based in Pony, is available in Ennis at both grocery stores; in Bozeman at the Community Food Co-op, Heeb's Grocery, Van's County Market, Joe's Parkway Market and Gibson's Discount Center; in Belgrade at Albertson's; in Manhattan at the L&F grocery; in Livingston at Foodworks; and in Whitehall at the IGA grocery.

LAMB

Thirteen Mile Farm in Belgrade sells its lamb in Bozeman at the Community Food Co-op. The farm also sells direct, call 388-4945.

Various local lamb is often available in Ennis at the Economy Market IGA, and occasionally in Livingston at Foodworks.

Caroline Ranch, based in Boulder, sells its lamb in Bozeman at the Community Food Co-op.

MILK

Darigold milk, from dairies in a local co-op, is available at many grocery stores around our region.

PORK

Various local pork is available in Bozeman at the Meat Shoppe and occasionally in Ennis at the Economy Market IGA.

McAlpine Ranch, based in Valier, sells its pork in Bozeman at the Community Food Co-op.

Or you can order fresh local pork in bulk (minimum half carcass, cut up and wrapped) through meat processors listed in the Yellow Pages.

PRODUCE

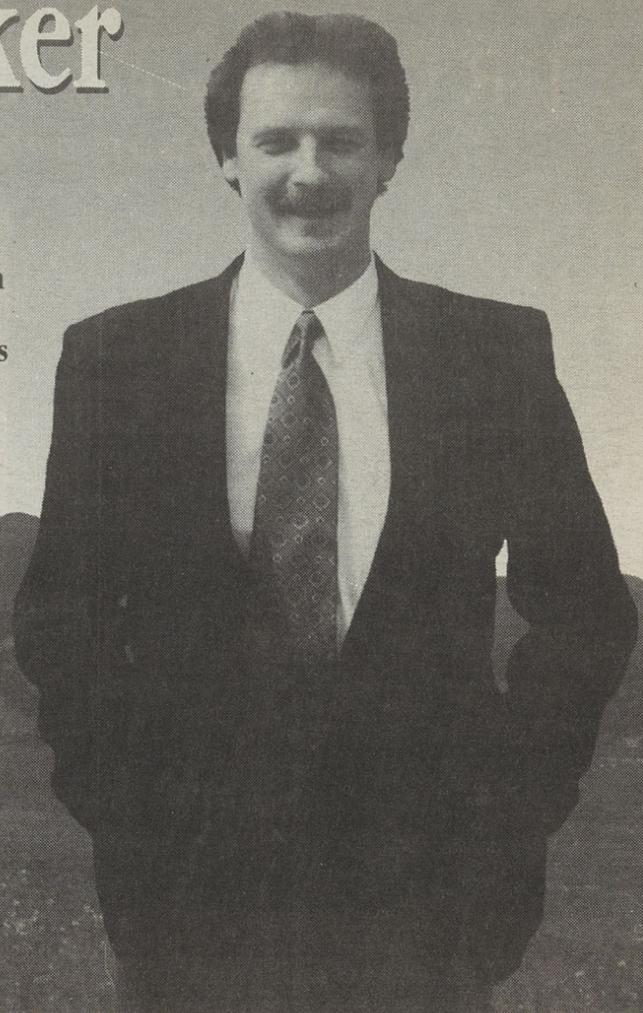
Local produce is available seasonally in Bozeman at the Community Food Co-op, in Livingston at Foodworks, and in some other grocery stores.

SPROUTS

Fresh sprouts and mixtures from P. Flats Sprouts Farm in Willow Creek are available in many grocery stores around our region.

Growers Prefer A Banker With Solid Roots...

Lyle Zimmerman's Montana roots go back a-ways. As a matter of fact, Zimmerman Trail in Billings was named after his great grandfather. Lyle is who people come to for agricultural loans in the Gallatin Valley. Not because he's a native, but because he'll remain a native and because his experience as an agricultural lender sets him apart. Give Lyle a call and see why growing with First Security Bank is something farmers and stockmen have been doing for over 80 years.



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Demand to live in Jackson drives up housing costs

JACKSON, Wyo. (AP) — Jackson Hole's lure is obvious. Mountain peaks serve as a backdrop to wild, open fields where elk graze freely.

There lies the problem: Everyone wants to live on land that is dedicated more toward preserving elk habitat than to providing housing for residents.

And that attraction may be enough to offset the extreme cost of housing in Jackson for the seasonal employees and ski enthusiasts, but working families — some earning more than \$50,000 a year — can't afford rent.

And it's only getting worse.

Although housing has always been tight in a county where the federal government owns 97 percent of the land, it was when the airport received its first commercial jet service in 1986 that the housing crunch evolved into a severe crisis, according to Bill Collins, Teton County's planner.

At the same time, Jackson saw the first of two high-end developments take place — Teton Pines and Spring Creek.

The two resorts opened the door for extravagant housing that seems to have no price limit.

In 1986, the median income was \$25,000 and the median price for a house was \$90,000, according to Collins. Today, the median income is \$56,000 with the median house price at \$360,000.

"The gap between the median income and house price is widening steadily each year," Collins noted.

Some blame stringent zoning requirements, but Collins pointed out that developers are not building homes at the highest density level possible because they make more money selling low-density projects to millionaires.

"All zoning requirements could be repealed and, as long as 40 per-

cent of the homes are built for second homeowners who have huge incomes, there will be an affordable housing problem in Jackson Hole," Collins said.

Now the word "affordable" takes on new meaning in an area where a family of four that earns \$68,000 a year is eligible for affordable housing.

Even then, it's a squeeze. Michelle Frank, 25, lives with her husband and their 2-year-old daughter Bridget in one of the first affordable housing complexes made available through the Jackson Hole Community Housing Trust.

Together they earn about \$55,000 a year, and they still struggle to pay rent.

"They pay you just enough to rack up your bills and charge enough money that you can't afford to live anywhere else in Wyoming because they can't pay you enough," Frank said. "I would love to have another child and stay home, but at this point it will probably never happen."

After researching the problem a few years ago, the county planning department determined the housing demand is driven by people who have permanent homes outside of Jackson. Forty percent of single family houses are second homes for people who live elsewhere year round, according to Collins.

He estimates the buyers of those homes earn five times the amount of permanent residents there.

"It's getting worse and worse at a faster pace," Collins said.

Many people commute up to two hours a day one way; others have roommates well beyond the stage of wanting roommates; most work two jobs or more; people skip around from apartment to apartment because complexes are constantly bought and sold for higher prices.

The gap between the median income and house price is widening steadily each year.

Bill Collins
Teton County
planner

AGRICULTURE IN BRIEF

Hormone-free milk promised for schools

BOZEMAN — Darigold Farms, responding to parents' petitions, has agreed to distribute milk free of a synthetic hormone to the school lunch program throughout Montana.

Darigold will be shipping half pints of 1 percent and 2 percent milk, minus the Recombinant Bovine Growth Hormone (rBGH), to public schools with a Darigold contract. The hormone-free milk should be available by mid-October, at no extra charge, said Keith Nye, Darigold's chief executive officer.

The move comes after Mothers and Others for Milk Safety (MOMS), the Community Food Cop and cancer survivors mounted a petition and postcard campaign to influence Darigold officials and the Bozeman School Board.

Noxious weed committee to meet in Bozeman

HELENA — Two groups that advise the Montana Department of Agriculture on noxious weeds will hold a joint meeting Oct. 5 in Bozeman.

The state Agriculture Department is bringing together the Noxious Weed Trust Fund Advisory Council and the Noxious Weed Seed Free Forage Council at the Bio-Science Center at Montana State University.

Ralph Peck, director of the state Agriculture Department, will provide an update on the status of recent legislation regarding noxious weeds.

Sharron Quisenberry, dean of agriculture at MSU, will address council members at 8 a.m., and then they will visit the Bio-Science Center and talk with researchers who work on noxious weed control.

The two councils also will meet separately. The NWTF Council will meet at 1 p.m. on Oct. 4 at the Comfort Inn, while the NWSFF Council will meet at 10 a.m. Oct. 5 in room 108 of the Bio-Science Center. Both of those meetings are open to the public.

Stockgrowers get started on 'Undaunted Stewardship'

HELENA — The Montana Stockgrowers Association has launched a program aimed at preserving historic sites and ensuring that ranching lands, especially along the Lewis and Clark Trail, remain

productive and natural-looking.

MSGA has been awarded a \$10,000 start-up grant from the Montana Agriculture Development Council to begin work on the program they are calling "Undaunted Stewardship," a play on Stephen Ambrose's best-selling book about the Lewis and Clark Expedition called "Undaunted Courage."

MSGA President Keith Bales of Otter said the "Undaunted Stewardship" program will include:

- Identifying historic sites on public and private land, especially in areas along the Lewis and Clark Trail;

- And, identification of range management techniques that will ensure the long-term productivity and natural appearance of specific ranching landscapes.

Martinsdale field day events set for Oct. 5

BOZEMAN — A field day Oct. 5 just north of Martinsdale is planned for livestock producers and natural resource managers.

Beginning at 10 a.m., Montana State University animal and range researchers will be at the Bair Ranch headquarters to show how their work can help beef producers. Researchers will describe a bit about the Bair Ranch and then get right into information such as:

- Practical estrous synchronization programs;

- Impact of calving-ease sires on calving ease, growth and carcass characteristics;

- Bair steers finishing performance and the Montana Beef Network;

- Breeding for carcass characteristics;

- Protein nutrition for first calf heifers;

- Use of Bair Ranch for undergraduate education;

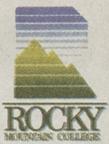
- Grazing management evaluation;

- Effect of grazing stubble height on riparian areas;

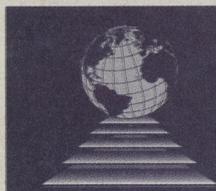
Lunch will be provided by the Bair Ranch. The program is sponsored by MSU's Animal and Range Sciences Department and the Meagher County Conservation District. Bair Ranch is about a quarter mile north of Highway 12 on Daisy Forest Service access road. The turn north is about 34 miles from White Sulphur Springs and about 25 miles if coming from Harlowton. The farm buildings are about a quarter mile from the turnoff.

— From Associated Press and Gazette News Services

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Robert Cooper

The world's number one champion on the practical application of emotional intelligence at work and excelling under pressure, whose books include *Executive EQ: Emotional Intelligence in Leadership and Organizations* and *The Performance Edge: New Strategies to Maximize Work Effectiveness and Competitive Advantage*.

Stephen Covey

The world's number one best-selling author on personal and professional development and one of the 25 most influential people in America (*TIME* magazine), whose books include *The 7 Habits of Highly Effective People* and the recently published *Living the 7 Habits*.

Tom Peters

The world's number one in awareness and credibility of business leaders and best-selling business author of all time, whose books include *In Search of Excellence*, *The Pursuit of WOW!*, *The Circle of Innovation*, and the all-new "The Work Matters!" trio, *The Brand You50*, *The Project50*, and *The Professional Service Firm50*.

Margaret Wheatley

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November 17, 1999

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MUTUAL FUNDS WEEKLY REVIEW

FUND Last Wkly 1YR 5YR Price Chg %Rt %Rt
AAL Mutual A: 11.81 -23 -12.7 NS
Bond 9.63 +0.6 -1.1 +35.7 B

Barclays Glob Inv: 20.74 -1.2 +23.8+202.5
S&P 500: 20.74 -1.2 +23.8+202.5
Asset: 51.83 -1.44 +25.1+140.0

Export: 21.61 -0.7 +26.0 NS
FidelityF: 35.36 -1.39 +24.0+185.4
Filly: 18.91 -0.93 +48.1+163.0

Hotchkis & Wiley: 25.14 -0.63 +22.7 +69.8
IAI Funds: 11.91 -0.55 +0.7 +40.1
Bond: 8.93 +0.4 +13.8 +102.8

Gib/GwthB: 13.16 -2.25 +27.0 NS
GIRB: 15.10 -1.04 +22.4 +5.5
GlyVal: 12.16 -3.34 +3.6 NS

DivrsEqly: 14.08 -6.5 +22.0 NS
EqIncl: 29.61 -3.4 +23.9+202.3
EqInclnc: 22.30 -8.6 +9.8+136.9

TxFHYH: 11.81 -0.2 -1.8 +37.1
TxFRSL: 5.26 -0.2 +1.2 +25.3
PrmTFO: 11.57 -6.7 +21.7 NS

Smith Barney & L&O: 20.37 -6.4 +5.6 NA
SoGen Funds: 25.57 -5.7 +15.0 +49.5
SoundSh: 27.54 -31.0 +64.1+129.5

AAL Mutual B: 19.28 -5.4 +4.8 +79.0
Balanced: 11.74 -2.4 +11.7 NS
EqIncl: 13.57 -5.5 +10.6 NS

Columbia Funds: 12.71 +0.7 -6 +43.4
Growth: 11.53 +2.0 +27.1+177.1
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Janus: 43.76 -4.1 +27.4 +60.1

AAL Mutual H: 19.28 -5.4 +4.8 +79.0
Balanced: 11.74 -2.4 +11.7 NS
EqIncl: 13.57 -5.5 +10.6 NS

Columbia Funds: 12.71 +0.7 -6 +43.4
Growth: 11.53 +2.0 +27.1+177.1
Growth: 44.83 -2.3 +10.1 +33.7

Janus: 43.76 -4.1 +27.4 +60.1
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Janus: 43.76 -4.1 +27.4 +60.1
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Janus: 43.76 -4.1 +27.4 +60.1

- Licorice (*Glycyrrhiza lepidota* Pursh)
- Locoweed (*Oxytropis sericea* Nutt.)
- Medicago (*Medicago lupulina* L.)
- Ninebark (*Physocarpus malvaceus*)
- Nodding Onion (*Allium cernuum* Roth)
- Prickly Lettuce (*Lactuca serriola* L.)
- Prostrate Knotweed (*Polygonum ariculare* L.)
- Serrated-leaved Groundsel (*Senecio serra*)
- Silky Lupine (*Lupinus sericeus* Pursh)
- Spotted Knapweed (*Centaurea maculosa*)
- Three-veined Fleabane (*Erigeron subtrinervis*)
- Tufted Fleabane (*Erigeron caspitosus* Nutt.)
- Verbena (*Verbena bracteata* Lag. & Rodr.)
- Weedy Cinquefoil (*Potentilla recta* L.)
- Western Snowberry (*Symphoricarpos occidentalis* Hook.)
- Wild Rose (*Rosa arkansana* Porter)
- Yellow Owlclover (*Orthocarpus luteu* Nutt.)
- Yucca (*Yucca glauca*)

LIKELY TO BE SEEN IN AUGUST

- Aster (*Aster ascendens* Lindl.)
- Big Sagebrush (*Artemisia tridentata* Nutt.)
- Birdsfoot Trefoil (*Lotus corniculatus* L.)
- Blazing Star (*Liatrus punctata* Hook.)
- Burdock (*Arctium minus* Hill.)
- Coarse Goldenrod (*Solidago rigida* L.)
- Creeping Bellflower (*Campanula rapunculoides* L.)
- Curly Cup Gumweed (*Grindelia squarrosa*)
- False Tarragon (*Artemisia campestris* L.)
- Field Bindweed (*Convolvulus arvensis* L.)
- Henbane (*Hyoscyamus niger* L.)
- Kochia (*Kochia scoparia* L.)
- Mugwort (*Artemisia ludoviciana* Nutt.)
- Redroot Pigweed (*Amaranthus retroflexus* L.)
- Rubber Rabbitbrush (*Chrysothamnus nauseosus* Pursh)
- Sagewort (*Artemisia frigida*)
- Saltbush (*Atriplex patula* L.)
- Scottish Thistle (*Onopordum acanthium* L.)
- Silver Sagebrush (*Artemisia cana* Pursh)
- Skeleton Weed (*Lygodesmia juncea* L.)
- Snakeweed (*Gutierrezia sarothrae* Pursh)
- Tansy (*Tanacetum vulgare* L.)

- Virgin's Bower or Clematis (*Clematis ligusticifolia* Nutt.)
- Water Milfoil (*Myriophyllum verticillatum* L.)
- Weedy Mallow (*Malva neglecta* Wallr.)
- Weedy Sandalwood (*Thesium linophyllum*)

GRASSES AT THEIR FINEST IN LATE SUMMER

- Bluebunch Wheatgrass (*Agropyron spicatum*)
- Canadian Wildrye (*Elymus canadensis* L.)
- Canary Reedgrass (*Phalaris arundinacea* L.)
- Cheatgrass (*Bromus tectorum* L.)
- Foxtail Barley (*Hordeum jubatum* L.)
- Garrison Creeping Foxtail (*Alopecurus arundinaceus* Poirer)
- Japanese Brome (*Bromus japonicus* Murray)
- Mannagrass (*Glyceria grandis* Wats.)
- Orchard Grass (*Agropyron repens* L.)
- Panicgrass (*Panicum capillare* L.)
- Quackgrass (*Agropyron repens* L.)
- Sloughgrass (*Beckmannia syzigachne* Steudel)
- Timothy Grass (*Phleum pratense* L.)



We gratefully acknowledge the assistance of the Montana Native Plant Society and the Montana State University Herbarium in the preparation of this plant list.

We hope you enjoy your visits in the Burke Park area. This edition of Wildflowers of Burke Park is dedicated to Chris Boyd, who was instrumental in obtaining Burke Park for the public.

If you would like to make a donation in memory of Chris Boyd, please send your contribution to:

Gallatin Valley Land Trust
P.O. Box 7021
Bozeman, MT 59771-7021
 Phone: 406.587.8404

Wildflowers of Burke Park



Shooting Star

Welcome to Burke Park!

This unique natural area contains over 220 species of plants; such a high diversity of flora in a relatively small area is quite unusual in our region. The many wildflowers you will find must be protected for all to enjoy. Therefore, please:

Tread lightly and stay on the trail.

Don't pick the wildflowers.

Take only photographs and memories when you leave.



Plants marked with • are commonly encountered

APRIL OR MAY DEPENDING ON WEATHER:

- Pasqueflower or Anemone (*Anemone patens*)
Annual Stoneseed (*Lithospermum arvense* L.)
- Avens (*Geum triflorum* Pursh)
- Balsamroot (*Balsamorhiza sagittata* Pursh)
- Bastard Toad-flax (*Commandra umbellata* L.)
- Blue Penstemon (*Penstemon nitidus* L.)
- Bluebells (*Mertensia oblongifolia* Nutt.)
- Dandelion (*Taraxacum officinale* Weber)
- False Solomon's Seal (*Smilacina stellata* L.)
- Leafy Phlox (*Phlox longifolia* Nutt.)
- Matted Phlox (*Phlox hoodii* Rich.)
- Mouse-ear Chickweed (*Cerastium arvense* L.)
- Musineon (*Musineon divaricatum* L.)
Narrow Leaved Sedge (*Carex stenophylla*)
- Nuttall's Violet (*Viola nuttalli* Pursh)
- Poison Ivy (*Toxicodendron rydbergii*)
- Shooting Star (*Dodecatheon conjugens*)
Smooth Rock Cress (*Arabis glabra* L.)
Stoneseed (*Lithospermum rederale* Lehm.)
- Wallflower (*Erysimum asperum* Nutt.)
White Biscuit Root (*Lomatium macrocarpum*)
- Wyoming Kittentails or Alpine Besseya
(*Besseya wyomingensis* A. Nels.)
Yellow Biscuit Root (*Lomatium triternatum*)
- Yellow Fritillary (*Fritillaria pudica* Pursh)

LIKELY TO BE SEEN IN JUNE:

- American Vetch (*Vicia americana* Willd.)
- Arnica (*Arnica sororia* Greene)
- Asparagus (*Asparagus officinalis* L.)
- Baneberry (*Actaea rubra* Aiton)
- Bedstraw (*Galium aparine* and *G. Boreale* L.)
- Berteroa (*Berteroa incana* L.)
Biscuitroot (*Lomatium dissectum* Nutt.)
- Blanket Flower (*Gaillardia caristata* Pursh)
- Blue-eyed Mary (*Colinsia parviflora* Lindl.)
- Canadian Violet (*Viola canadensis* L.)
- Caragana (*Caragana arborescens* Lam.)
- Catchfly (*Silene latifolia* Pior.)
- Catchweed (*Asperugo procumbens* L.)
- Clover (*Trifolium hybridum* L.)
Creeping Clover (*Trifolium repens* L.)
- Death Camas (*Zigadenus venenosus* Wats.)
- Desert Alyssum (*Alyssum desertorum* Stapf)
- Drummond's Milkvetch (*Astragalus drummondii* Hook.)
- Entire-leaved Groundsel (*Senecio ingegerriumus* Nutt.)
- False Dandelion (*Agoseris glauca* Pursh)
- False Flax (*Camelina microcarpa* DC.)
- False Solmon's Seal (*Stellaria racemosa* L.)
- Field Clover (*Trifolium pratense* L.)
- Flax (*Linum lewisii* Pursh)
- Ground Nut (*Astragalus Gilviflorus* Nutt.)
- Hairy Penstemon (*Penstemon eriantherus*)
- Honeysuckle (*Lonicera tatarica* L.)
- Hound's Tongue (*Cynoglossum officinale* L.)
- Iris (*Iris missouriensis* Nutt.)
Microsteris (*Microsteris gracilis* Hook.)
- Milkvetch (*Astragalus adsurgens* Pallas)
- Miner's Candle (*Cryptantha celosioides*)
- Narrowleaf Cottonwood (*Populus angustifolius*)
- Nuttall's Rock Cress (*Arabis nuttallii* Robbins)
- Nuttall's Sunflower (*Helianthus nuttalli*)
- Onion (*Allium textile* Nels. & Macbr.)
Orophaca (*Astragalus gilviflorus* Sheld.)
- Penny Cress (*Thlaspi arvense* L.)
- Penstemon or Beardtongue (*Oenstemonprocerus* Grah.)
- Rabbit Locoweed (*Oxytropis lagopus* Nutt.)
- Red Wild Geranium (*Geranium viscosissimum*)
Rock Cress (*Arabis holboellii* Hornem.)

- Rosy Pussy-toes (*Antennaria rosea* Greene)
- Sandwort (*Arenaria congesta* Nutt.)
- Serviceberry (*Amelanchier alnifolia* Nutt.)
Shepherd's Purse (*Capsella bursa-pastoris* L.)
- Silver Lupine (*Lupinus argenteus* L.)
- Slender Cinquefoil (*Potentilla gracilis* Hook)
- Slender Hawksbeard (*Crepis elegans*)
Speedwell (*Neronic biloda* L.)
Stinging Nettle (*Urtica dioica* L.)
- Stone Crop (*Sedum lanceolatum* Torrey)
- Sweet Cicely (*Osmorhiza longistylus* Torrey)
- Sweet Rocket (*Hesperis matronalis* L.)
- Tansy Mustard (*Descurania sophia* L.)
- Thickspike Wheatgrass (*Agropyron dasystachyum*)
- Triteleia (*Triteleia grandiflora* Lindl.)
- Tumble Mustard (*Sisymbrium altissimum* L.)
- Watson's Goosefoot (*Chenopodium watsonii*)
- Western Salsify or Goatsbeard (*Tragopogon dubius* Scop.)
- White-top (*Cardaria draba* L.)
- Wind Flower or Anemone (*Anemone multifida* Poirer)
- Woolly Groundsel (*Senecio canus* Hook.)
- Yarrow (*Achillea millefolium* L.)
- Yellow Sweet Clover (*Melilotus officinalis* L.)

LIKELY TO BE SEEN IN JULY:

- Alfalfa (*Medicago sativa* L.)
- Bessy's Locoweed (*Oxytropis besseyi* Ryd.)
- Bulrush (*Scirpus microcarpus* J. & K. Presl)
- Canada Thistle (*Crisium arvense* L.)
- Collomia (*Collomia grandiflora* Lindl.)
- Deadly Nightshade (*Solanun dulcamara* L.)
- Desert Mallow (*Sphaeralcea coccinea* Nutt.)
- Dock or Sorrel (*Rumex crispus* L.)
- Dogbane (*Apocynum androsaemifolium* L.)
- Fireweed (*Epilobium angustifolium* L.)
- Gaura (*Gaura coccinea* Pursh)
- Golden Aster (*Heterotheca villosa* Pursh)
- Goldenrod (*Solidago multiradiata* Ait.)
- Harebell (*Campanula rotundifolia* L.)
- Hawksbeard (*Crepis runcinata* James)
- Horsemint (*Monarda fistulosa* L.)
- Leafy knotweed (*Polygonum douglasii*)

Would-be assassin released

IRA prisoner: Parole raises political stakes in peace process

BELFAST, Northern Ireland (AP) — The British government freed one of the IRA's most controversial prisoners Tuesday, a man who received eight life sentences in connection with his attempt to assassinate then-Prime Minister Margaret Thatcher.

The parole of Patrick Magee after 14 years imprisonment provided more fuel for critics of Northern Ireland's peace accord, who argued that the Irish Republican Army should not keep receiving benefits under the terms of the deadlocked agreement.

Magee, 47, originally wasn't due to be

considered for parole until at least 2019.

In 1984, Magee planted a time-delayed bomb inside the English hotel in Brighton where the Conservative Party was meeting in hopes of killing Thatcher and members of her Cabinet. The blast missed Thatcher's room by a floor, but killed five people and maimed many others.

At the time, Gerry Adams, leader of the IRA-linked Sinn Fein party, called the attack "a blow for democracy." The IRA sent Thatcher its own personal warning: "Today we were unlucky. But remember, we only have to be lucky once — you will have to be lucky always."

Magee, who was whisked away by friends at the gates of the Maze prison, didn't say where he was headed. He has many relatives in Belfast, and in 1997 married a Connecticut woman he befriended by mail.

Thatcher declined to comment Tuesday. But one of her chief lieutenants, former Home Secretary Michael Howard, condemned Magee's release as "an outrage."

Ulster Unionist Party leader David Trimble said Magee's parole illustrated what he called "the ongoing disparities and inequalities" in the peace process.

Northern Ireland's rival paramilitary

groups are refusing to disarm as last year's peace accord envisioned, yet the government has allowed 277 prisoners — about half IRA, half pro-British militants — to walk free.

Trimble, the Protestant politician elected to lead Northern Ireland's Protestant-Catholic government, has refused to form an administration that includes Sinn Fein unless the IRA starts to disarm.

The IRA insists it will never disarm, even though the accord stipulated that disarmament should be complete by mid-2000, around the same time as the last paramilitary prisoners are freed.

Bomb blast kills 10, injures 80

India railway: Police blame Pakistan's intelligence agency

CALCUTTA, India (AP) — A bomb exploded Tuesday at a railway station in northeastern India, killing 10 people and injuring 80 in an attack that police blamed on Pakistan.

The blast just after noon at New Jalpaiguri, 270 miles north of Calcutta, was heard a half mile away and ripped off the railroad station's iron roof, said Ramkrishna Roy, a police inspector.

There was no claim of responsibility for the bombing. But Roy said Pakistan's intelligence agency was believed to have been involved in the attack.

Chief Minister Jyoti Basu, the West Bengal state's top elected official, met with other officials Tuesday to review security.

Police Inspector Prasun Mukherjee confirmed that two of the 10 dead were army privates, among a group on their way to fight at the Kashmir front where India is battling Muslim intruders who seized Himalayan mountain peak strongholds in May.

The bomb exploded between



two platforms just as a regional train pulled into the station, police said.

At least 42 of the injured were hospitalized in critical condition, Press Trust of India quoted railway physician Dr. A.K. Das as saying.

United News of India said 16 soldiers were seriously injured.

The explosion damaged two cars of a train that was to have headed southeast to Cooch Behar in West Bengal, said Roy.

Aside from Pakistan, other enemies of the Indian government include tribal and ethnic groups in eastern India fighting guerrilla campaigns for greater autonomy or independence.

World briefs

U.N. delays referendum on future of East Timor

UNITED NATIONS — The United Nations has decided to delay a referendum on the future of East Timor scheduled for Aug. 8 until later in August, Secretary-General Kofi Annan said Tuesday.

The vote will decide whether the 800,000 people in East Timor remain part of Indonesia, with wide-ranging autonomy, or seek independence.

"We have to ensure that the security situation was conducive and appropriate, that the logistical problems were solved, that we could deploy everybody on time," Annan told reporters upon arriving in Moscow on Tuesday.

"And so, having taken all these factors into consideration, we felt a brief delay would be beneficial. So we delayed it briefly, but the ballot will go ahead in the month of August, and the East Timorese will have a free choice," he said.

Violence has escalated in East Timor since Indonesia — in a sur-

prise policy reversal — announced in January that it would put the Timorese on the road to independence if they reject autonomy. Indonesia invaded the former Portuguese colony in December 1975 and annexed it weeks later.

French health insurers sue tobacco companies

PARIS — A local branch of France's national health insurance program has filed suit against four tobacco companies for \$8.1 million, blaming them for smoking-related diseases.

The lawsuit against Philip Morris, Rothmans, Reynolds and the French giant Seita is a first in France, where smoking remains widely tolerated and socially acceptable.

Seita called the lawsuit "groundless," saying in a statement it plans to claim damages for "improper procedure."

The suit against the tobacco manufacturers was filed last week in a court in the Atlantic coastal

city of Saint-Nazaire by the regional branch of the Caisse Primaire d'Assurance Maladie.

The CPAM said it spends \$3.7 million yearly on health care for smoking-related illnesses, including lung cancer.

Al-Fayed can challenge citizenship decision

LONDON — Harrods owner Mohamed Al Fayed won permission Tuesday to challenge a government decision refusing him British citizenship.

During a brief hearing at the High Court, lawyers for the Egyptian-born millionaire criticized the decision by Home Secretary Jack Straw as "disproportionate, unfair and pre-judged."

Last month, Straw turned down Al Fayed's application, saying he was not of the necessary "good character" because of his involvement in a political scandal and his failure to act against Harrods employees who broke into a safety deposit box belonging to a business rival.

Mir fund-raising effort gets off to a slow start

MOSCOW — A fund-raising effort to save Russia's Mir space station from being abandoned early next year began slowly Tuesday, with the first donations yielding the humble equivalent of \$80.

Cosmonaut Vitaly Sevastyanov, president of the Mir Preservation Fund, said the equivalent of \$50 million is needed to keep Mir in orbit for one more year. Official estimates put the figure between \$200 million and \$250 million.

The cash-strapped government said it would only pay for Mir to operate through the summer, and space officials decided earlier this month that Mir's last crew would depart in August.

If no new money is found by February or March, ground controllers will send the 130-ton station to burn up in the atmosphere.

The fund's organizers hope their effort will persuade the government to reconsider its decision.

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TARZAN
DAILY MAT 12:30, 2:30, 4:30;
NIGHTLY 7:00, 9:00 - G

THE GENERAL'S DAUGHTER
DAILY MAT 1:05, 1:30, 4:05, 4:30;
NIGHTLY 7:05, 7:15, 9:50 - R

AUSTIN POWERS II THE SPY WHO SHAGGED ME
DAILY MAT 12:00, 12:30, 2:15, 2:45, 4:30, 5:00
NIGHTLY 7:00, 7:30, 9:15, 9:45 - PG-13

NOTTING HILL
DAILY MAT 1:15, 4:15;
NIGHTLY 7:15, 9:50 - PG-13 STEREO

ELECTION
DAILY MAY 1:00, 4:00;
NIGHTLY 7:00, 9:40 - R STEREO

OPEN YOUR EYES
DAILY MAT 1:15, 4:15;
NIGHTLY 7:15, 9:50 - R STEREO

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INSTINCT
DAILY MAT 1:00, 3:45;
NIGHTLY 6:45, 9:30 - R

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For Better or For Worse



Horoscope

By Frances Drake © 1998, King Features Syndicate, Inc.

For Wednesday, June 23, 1999

ARIES (March 21 to April 19)
If you become slightly uncomfortable, don't let every issue rub you the wrong way. Work with what you have in order to maximize the possibilities.

TAURUS (April 20 to May 20)
You could find yourself rather possessive of your popularity, which puts you in a precarious situation. Take heed of the reasons that got you to where you are in order to stay on track.

GEMINI (May 21 to June 20)
Apply the uses of your calculator to more than just the budget that you aim to keep. Make your moves with caution and your decisions with extreme care.

CANCER (June 21 to July 22)
You release a bit of the pressure that has been pushing down on you, and it lifts your spirits to the sky. Your attitude is the navigator that indicates the direction in which you soar.

LEO (July 23 to Aug. 22)
The nature vs. nurture debate

carries on, and you need to spend time on both sides. Extend the applications beyond yourself in order to supply some rewards to others.

VIRGO (Aug. 23 to Sept. 22)
You have re-entered the "why" stage and now need an explanation for everything. The best part is that you are old enough to seek out the answers yourself.

LIBRA (Sept. 23 to Oct. 22)
You find the balance between generosity and stinginess, but applying yourself to the right side becomes a bit of a struggle. It is a hard issue on which to find a middle ground.

SCORPIO (Oct. 23 to Nov. 21)
You are unfazed by even the most shocking of situations, which makes you a fun addition to any mix. You may even be the dynamic one that is setting the standard.

SAGITTARIUS (Nov. 22 to Dec. 21)
Your imagination might lead you to spend some time in contemplative solitude. You swirl through the valleys of your dreams and swim with your flow of creativity.

(Dec. 22 to Jan. 19)
Rely on the friends who watch your back, in order to move forward. They provide the push that sends you leaping into legitimacy and soaring into success.

AQUARIUS (Jan. 20 to Feb. 18)
Your ambition has you wondering about advancement in your career and in your life. Make sure that your eagerness is properly aligned with your actions.

PISCES (Feb. 19 to March 20)
You are a zealot for your wishes and the dictator of your dreams. Your quest makes for an amazing journey. Lead yourself in a whole new direction.

YOU BORN TODAY Finding the roots of your family tree brings you joy. Your ancestry gives you insight into the stories that stir your soul. While nostalgia nurtures you and memories soothe the workings of your mind, you also have the ability to decipher the difference between the facts and the fantasies.

Birthdate of: Frances McDormand, actress; Roy Davies, singer; Wilma Rudolph, track athlete.

Contract Bridge

By Steve Becker © 1998, King Features Syndicate, Inc.

A CLEAR LOOK AT THE FUTURE

South dealer.

Both sides vulnerable.

NORTH
♠ 5
♥ A 10 9 7
♦ Q J 7 2
♣ A K 4 3

WEST
♠ Q 7 3
♥ Q 5 4 3
♦ 4
♣ Q 10 8 6 2

EAST
♠ A K 10 9 8 4 2
♥ J 2
♦ 6 5
♣ 9 7

SOUTH
♠ J 6
♥ K 8 6
♦ A K 10 9 8 3
♣ J 5

The bidding:

South West North East

1♦ Pass 1♥ 2♠

Pass 3♣ 4♣ 4♣

5♥ Pass 6♦

Opening lead — three of spades.

One of the qualities that distinguishes the expert declarer from other mortals is his ability to project the position he sees at trick one — when dummy first appears — to what the position will look like, say, 10 tricks later. Only long experience and an aptitude for long-range planning enable a player to make such projections, but being able to do so can pay big dividends.

Consider this deal where South realized at trick one that virtually his only chance for the ambitious slam undertaking was to execute a squeeze. This would require the defender who held the majority of the missing clubs to also hold the majority of the missing hearts, but since there seemed to be no better prospect, South set all his sights on this one objective.

Accordingly, after East won the opening spade lead and shifted to

a trump, declarer took the return in his hand, ruffed a spade in dummy, played another trump, cashed the A-K of clubs and ruffed a club. He then led two more rounds of trumps, producing this position:

North
♥ A 10 9
♣ 4

West
♥ Q 5 4
♣ Q

East
♠ A 10
♥ J 2

South
♥ K 8 6
♦ 9

Declarer now led his last trump, and West could not discard successfully. He could not spare either a club or a heart without presenting South with his 12th trick. The long-range plan, formulated at trick one, finally came to fruition at trick 10.

Dear Abby

By Abigail Van Buren © 1998, Universal Press Syndicate

SWIFT RESPONSE TO EMERGENCY DOESN'T MEAN ALL ENDS WELL

DEAR ABBY: The letter from "Eileen in Port Angeles" about CPR and the people who judge the caregivers hit home. As a volunteer firefighter and emergency medical technician for 18 years, I have answered many calls where a person has died from cardiac arrest. It's hard when a stranger dies in your hands, and even harder when it's someone you know.

The evolution of CPR and defibrillation has made it possible to "save" a percentage of these people, but it's a very small percentage. Most cardiac arrests result in the patient remaining dead. Therefore it's important that anyone rendering care remember that once the heart stops, the person is clinically dead. Nothing they do is going to make that worse. If all of the resuscitation efforts fail, the care provider has not "killed" the person, nor contributed to his death, and it is NEVER the provider's fault that the person died.

If more people got involved and learned CPR and other basic first-aid skills, they would have a better understanding of life and death, and they wouldn't be so quick to criticize and look for blame that is

n't there. — BOB GAJEWSKI, WALES CENTER, N.Y.

DEAR BOB: I have a stack of mail from readers echoing your sentiments. Read on:

DEAR ABBY: As a 30-year veteran emergency medical services technician and current CPR instructor, I can empathize with the overwhelming feeling of guilt experienced by "Mary Helen," who performed CPR on her brother. In our society, we are conditioned to believe that anything less than "winning" is failure. But to encourage that guilt by saying someone failed or "lost" a cardiac-arrest victim is reprehensible.

Potential rescuers must have the motivation to learn CPR. Second, they must be willing to get involved and take control in an emergency. Third, they must be able to exert the physical strength and emotional stamina. These challenges must be met before the actual CPR process begins. Most individuals are not prepared to go this far. Thankfully, "Mary Helen" was. Heroes never plan to be heroic; they just unselfishly give of themselves.

"Mary Helen," please recognize that you exhibited the courage, executed the skills and performed heroically. Remember, the ultimate decision was never yours to make.

That load is not yours to bear.

We are excited by the entry of new technology and improved CPR skills that will allow us to substantially increase resuscitation rates. I am referring to the introduction of the Automated External Defibrillator (AED) and newly enhanced courses offered by national training entities for the general public. In the near future this device will be readily available in stadiums, airports, shopping centers, businesses, churches and homes. The challenge is to train as many people as possible in the operation of this user-friendly medical marvel.

I encourage your readers to contact their nearest CPR training facility and inquire about the AED and the latest courses available in its application. — BILL CARTER, CHATTANOOGA, TENN.

DEAR BILL: That's exciting news. About five years ago, I had my staff certified in a "heart-saver" course offered by the American Heart Association. Thank heavens we have never encountered an emergency, but it's better to be safe than sorry. Thank you for the reminder to call the association and ask, "What's new?"

Today's Puzzle

By Eugene Sheffer © 1998, King Features Syndicate, Inc.

HEIR JEFF LAW
OMOO AGRO IDO
SUNTANOTIL FOR
AMES LIEGE
LASTS KING
ALEE SINECURE
MTA WADIS AHA
BASSINET BRET
HUNK RIDES
GREBE BAIL
AIL SURFBOARD
ILL ARIA XRAY
LES PIER INGE

37 Make-up artist?
39 Perfume bottle, perhaps
41 He's had some bad hare days
43 Leftovers concoction
44 Cribbage score-keeper
46 It's from the heart
50 Robert McCall, in TV reruns
55 "— Town"
56 Prickly seed cases
57 Peregrinate
58 Inseparable
59 Crooked
60 Burden
61 More, to Manuel

23 Fellows
25 N.Mex. neighbor
26 Not adorned
27 Water pitcher
28 Man, e.g.
29 Coin toss option
30 Term terminator
31 Laugh-a-minute sort
35 Slandered
38 Mead
40 Jima preceдер

42 Prot. or Cath.
45 Daughter
47 Chamber
48 Salad ingredient
49 Mars' counterpart
50 Suffer recession
51 "— Sera, Sera"
52 Coffee-maker
53 Menag-erie
54 Space walk, for short

Yesterday's answer

ACROSS

1 007, e.g.
4 Train sound
8 Thick chunk
12 Court
13 Lend a hand
14 Elite alternative
15 Request
16 Bunny's battery
18 Motif
20 Tie up the phone line
21 One of "The Brady Bunch"
24 Onetime NYC mayor
28 User of the long form
32 Mimi's enemy
33 Kenny G's instrument
34 Avifauna
36 Wrath

DOWN

1 Bat a gnat
2 Luxurious
3 Oxen's joiner
4 "Ta-ta!"
5 Coop occupant
6 Bullring bravo
7 Nashville show
8 Added alcohol
9 Columnist Smith
10 Expert
11 Slot machine symbol
17 See
20-Across
19 Leo's home?
20 Pound of verse

Puzzle for Wednesday, June 23

Solution time: 22 min.

1	2	3	4	5	6	7	8	9	10	11
12			13					14		
15			16				17			
18			19			20				
			21		22	23		24		25
28	29	30					31		32	
33			34				35		36	
37			38				39		40	
41			42				43			
			44		45		46		47	48
50	51	52				53	54		55	
56						57			58	
59						60			61	

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Buy one "Extra Value" Meal. Get one extra sandwich for only \$1.00*
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Rich & Sheila Goodloe

Lewis & Clark - Preserving Naturalists
Dr. Paul Cutright -

fondness for adventure in the woods and fields surrounding his home and acquired, as Jefferson subsequently wrote, "a talent for observation which had led him to an accurate knowledge of the plants and animals of his own country."³¹ That this knowledge was substantial is borne out by the frequency and accuracy of Lewis's later comparisons of western with eastern animals and plants. For example, on discovering the cutthroat trout (*Salmo clarkii*), he said: "These trout . . . precisely resemble our mountain or speckled trout [*Salvolinus fontinalis*] in form and the position of their fins, but the specks on these are of a deep black instead of the red or gold" (II, 150-151). And, when describing another western discovery, the dusky grouse (*Dendragapus obscurus*), he reported that it had 18 tail feathers, the same number as the eastern ruffed grouse (*Bonasa umbellus umbellus*) (II, 295).³² Surely, not many of Lewis's contemporaries knew that the eastern ruffed grouse had exactly 18 feathers in its tail.

It should not be overlooked that Lewis's mother, Lucy Meriwether Lewis (Lucy Marks, after a second marriage), was an herb doctor. For many years she tended the sick of Albemarle County, prescribing and administering vegetable drugs (simples). Thus, because of maternal ties, Lewis learned local plants of medicinal value and their purported therapeutic properties. As we shall see, information of this kind often colored his treatment of wounds and disorders suffered by himself and other members of the Corps of Discovery.

When President Washington in 1794 issued a call for volunteers to put down an insurrection in Pittsburgh (the Whiskey Rebellion), Lewis, now twenty, joined the militia hastily formed for that purpose. At the close of the rebellion, he enlisted in the regular army and served under General "Mad Anthony" Wayne in the latter's Northwest campaign against the Indians and British. At some point in this campaign, Lewis (by then an ensign) found himself attached to the 4th Sub-Legion of Wayne's army commanded by Lieutenant William Clark. In days immediately ahead, Ensign Lewis and Lieutenant Clark, sharing the experiences of border warfare, fashioned the bonds of an enduring friendship.

Lewis was shortly advanced to the rank of captain (in 1800, at the age of twenty-six) and after Wayne's death, served under General

³¹ Coues, I, xviii.

³² The genus *Dendragapus* normally, at least, has 16 tail feathers. See Raymond Darwin Burrough's *The Natural History of the Lewis and Clark Expedition* (East Lansing, Mich., 1961), 216.

- ? *Mylocheilus lateralis* Agassiz & Pickering.
Amer. Jour. Sci. Arts, 231. 1855.
COLUMBIA RIVER CHUB.
See J. E. & C. *Check List*, 112.
- Thwaites, IV, 326: Taken from Columbia, April 26, 1806, below mouth of Umatilla River. Benton Co., Wash., on north, Umatilla Co., Oregon, on south.
"caught several chubbs with a bone." Coues (III, 970) identified as *Mylocheilus caurinus*. See also Burroughs, 336.
- ? *Pantosteus platyrhynchus* (Cope)
= *Minomus platyrhynchus* Cope.
Proc. Amer. Phil. Soc., 14:134. 1874.
MOUNTAIN SUCKER.
- Thwaites, V, 266: Taken from Yellowstone R., July 16, 1806, just east of present-day Livingston, Park Co., Montana.
"One of the men brought me a fish . . . a red streak passed down each side." Coues (III, 1138) identified as *P. jordani*, the accepted name in 1893. See also Burroughs, 264.
- ? *Platichthys stellatus* (Pallas)
= *Pleuronectes stellatus* Pallas.
Zoog. Rosso-Asiat., 3:416. 1811.
STARRY FLOUNDER.
- Thwaites, IV, 163: Referred to by Lewis, Mar. 13, 1806, at Fort Clatsop, Clatsop Co., Oregon.
"The flounder is also an inhabitant of salt water." Identified by Coues (III, 891) as *P. stellatus*.
- ? *Ptychocheilus oregonensis* (Richardson)
= *Cyprinus (Leuciscus) oregonensis* Richardson.
Fauna Bor.-Amer., 3:305. 1836.
NORTHERN SQUAWFISH.
- Thwaites, IV, 335: Encountered by Lewis, Apr. 29, 1806, at mouth of Walla Walla River, Walla Walla Co., Wash.
"they take their fish which at present are a mullet." Coues (III, 976) identified as "*P. oregonensis* probably."
- Salmo clarkii* Richardson
= *Salar lewisi* Girard.
Fauna Bor.-Amer., 3:225. 1836.
CUTTHROAT TROUT.
- Thwaites, II, 150: Discovered and described by Lewis, June 13, 1805, at Great Falls, Cascade Co., Montana.
"Goodrich had caught half a dozen very fine trout . . . have generally a small dash of red on each side behind the front ventral fins." Coues (II, 367): "The identical fish named *Salar lewisi* by Girard."
- Salmo gairdneri* Richardson.
Fauna Bor.-Amer., 3:221. 1836.
STEELHEAD TROUT.
- Thwaites, IV, 167: Described by Lewis, Mar. 13, 1806, at Fort Clatsop.
"met with another species [of trout] . . . of a dark colour on the back." Coues (III, 893) det. as "*S. gairdneri*, steelhead salmon trout."

[3]

On June 10, while still at the mouth of the Marias, Lewis wrote in part: "I saw a small bird today which I do not recollect ever having seen before, it is about the size of the blue thrush or catbird . . . it appeared to be very busy in catching insects which I presume is it's usual food; I found the nest of this little bird, the female which differed but little in size or plumage from the male was seting on four eggs of a pale blue colour with small black freckles or dots" (II, 140-141).

With the full text of Lewis's description before them, ornithologists have had no difficulty in identifying this bird as the white-rumped shrike (*Lanius ludovicianus excubitorides*), not technically described until 26 years later. It is the western form of the loggerhead shrike, so well known for its singular habit of impaling insects and other food on thorns and barbed wire.

While on his Marias reconnaissance, Lewis discovered two other birds: the sage grouse (*Centrocercus urophasianus urophasianus*), the largest of gallinaceous birds excepting the wild turkey, and McCown's longspur (*Rhynchophanes mccownii*), a small relative of the sparrows and finches found east of the Rockies on the plains. At first Lewis referred to this grouse as the "mountain cock" but later, on the Columbia, as the "Prairie Cock" or "Cock of the Plains." Only rarely have modern ornithologists credited Lewis and Clark with the discovery of a bird. Of interest, therefore, are the words of Arthur Cleveland Bent, Smithsonian scientist, about the sage grouse: "It was discovered by Lewis and Clark about the headwaters of the Missouri River and on the plains of the Columbia; they named it 'cock of the plains' and gave the first account of it. The technical description and the scientific name, *urophasianus*, were supplied by [Charles Lucien] Bonaparte in 1827."⁵

The trout Lewis and his men ate for supper on June 13 at Great Falls resembled, Lewis wrote, "our mountain or speckled trout in form and in the position of their fins, but the specks on these are of a deep black instead of the red or goald colour of those common to the U'. States. these are furnished long sharp teeth on the pallet and tongue and have generally a small dash of red on each side behind the front ventral fins" (II, 151).

⁵ Arthur Cleveland Bent, *Life Histories of North American Gallinaceous Birds*, Bull. 162 (Washington, D.C., 1932), 299-300.

From this description by Lewis, particularly his allusion to the red slashes behind the front ventral fins, ichthyologists conclude that this trout was the celebrated cutthroat. When the English naturalist, John Richardson, described it (in 1836) and supplied its technical name, *Salmo clarkii*, he said he had bestowed that name "as a tribute to the memory of Captain Clarke who noticed it in the narrative prepared by him of the proceedings of the Expedition to the Pacific."⁶ Some 20 years later, the Philadelphia naturalist, Charles Girard, named the cutthroat (from specimens collected at Great Falls) *Salar lewisii*.⁷ Though the former name is the accepted one today, it is pleasing to find in the synonymy of this fish both captains receiving recognition.

On the day Clark discovered the Teton River, he said that the valley of that stream contained many cottonwoods with leaves resembling those of a wild cherry (II, 126). A few days later Lewis wrote: "The narrow leafed cottonwood grows here in common with the other species of the same tree with a broad leaf." It differed from the broad-leaved, he went on to say, only "in the shape of it's leaf and greater thickness of it's bark" (II, 145). This was the first description of the narrow-leaved cottonwood, *Populus angustifolia*. Only Lewis's untimely death, wrote one well-known scientist, "robbed him of the honor of naming this tree [which he and Clark had discovered here] and many other new species."⁸

[4]

By the time Lewis had completed his portage survey to the Sun River, Clark and his durable, long-suffering boatmen had reached a point where the "dedly sound" of falling water struck their ears. The ascent from Camp Deposit (Ordway's name for the Marias encampment) had been difficult, often hazardous, entailing frequent struggles with an ever-accelerating current. Prairie rattlesnakes (*Crotalus viridis viridis*), which inhabited the rocky ledges of the banks (and still do today), added to the dangers. One of the hunters reaching for a bush grasped a rattler by its head. Not far away, Lewis awoke to discover a large one coiled near where he had been sleeping. He killed it and then

⁶ John Richardson, *Fauna Boreali-Americana; or the Zoology of the Northern Parts of British America*, 4 vols. (London, 1836), III, 225.

⁷ Charles Girard, "Notes Upon the Species of the Genus *Salmo*, of Authors, Observed Chiefly in Oregon and California," *Procs. Acad. Nat. Scis. of Philadelphia*, VIII (1856), 219-220.

⁸ Peattie, *A Natural History of Western Trees*, 330.

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